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Effect of Resilience Training Program on Thriving at Work and Burnout Mitigation for Nurses

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Abstract

Background: The nursing profession, which is vital to the healthcare system, suffers difficulties like high levels of stress and job burnout as a result of demanding work environments. **Aim:** determine the effect of resilience training program on thriving at work and burnout mitigation for nurses. **Research Design:** A one group pretest- posttest, a quasi-experimental research approach was used.

Setting: the study conducted at Minia Psychiatric Mental Health and Addiction Hospital; and Chest Hospital. **Sample:** 90 staff nurses participated in the study.

Tools: Personal characteristics and work-related data sheet; Nurses' Knowledge questionnaire of Resilience, Resilience Practice at Workplace Scale, Thriving at Work Scale, and Maslach's Burnout Inventory Scale. **Results:** Study findings denote that, statistically significant improvement in nurses' resilience knowledge, practices, and thriving levels immediately post-program, also, satisfactory resilience knowledge increased .Moreover burnout rates showed a dramatic decline, immediately after the program. **Conclusion:** The study revealed the effectiveness of resilience training on enhancing staff nurses' psychological well-being, workplace thriving, and mitigation, professional performance while reducing burnout. **Recommendations:** incorporating resilience-building strategies into nurses' education and professional development to promote a sustainable and thriving workforce in healthcare settings.

Keywords: Resilience training program, Staff nurses, Thrive at work, Burnout Mitigation.

Introduction

The nursing profession plays a vital role in the healthcare system by giving patients the care and assistance they need. Nonetheless, nurses frequently experience significant levels of stress and strain due to the demanding nature of their work. Job burnout is mostly caused by long workdays, emotional strain, and the ongoing pressure to provide patients with high-quality care. Depersonalization, emotional weariness, and a lessened sense of personal success are characteristics of job burnout. It has an adverse effect on nurses' mental, physical well-being and the standard of care they deliver, which could put patients' safety at danger (**Li, & Wang, 2020**).

The idea of resilience has become essential in assisting nurses in managing and overcoming stress at work as a result of these difficulties. Resilience is the ability to swing back from challenging circumstances, preserve psychological health, and adjust favorably to adversity. A variety of abilities and qualities, including emotional control, optimism, and problem-solving skills, are involved, allowing people to successfully overcome obstacles. Resilience, adaptability, and coping are often used interchangeably. An individual needs, however, develop four primary forms of resilience in order to sustain himself in trying circumstances. Among these are social, emotional, physical, and psychological resilience (**Bonanno, 2023**).

For frontline healthcare personnel to handle challenging circumstances, particularly during public health

emergencies, resilience is crucial. Good psychological resilience is linked to good coping methods that can improve nurses' work performance, help them react quickly, improve their capacity to handle pressure at work, avoid work tiredness, and prevent potential psychological issues. Furthermore, Tenacity, strength, and optimism are the three components that make up psychological resilience, often referred to as psychological adaptability, which is a positive elasticity quality exhibited by an individual when confronted with challenge (**Bonanno, 2023**).

The term emotional resilience describes the range of methods in which people cope with unpleasant emotions like grief, anger, fear, and vulnerability as well as their emotional reactions to adversity. It is essential that we have the emotional strength to endure our circumstances while simultaneously accepting their truth (**Mills & Kimbrough, 2023**). The same author defines physical resilience as the body's ability to adapt to physical stimuli and maintain the stamina and strength needed for rapid and effective recovery. Additionally, social resilience, also known as community resilience, refers to the collective capacity of a group to adapt to and overcome adversity.

Programs for resilience training aim to improve these abilities and qualities, giving people the means to develop and preserve resilience. Techniques like mindfulness, cognitive-behavioral tactics, stress management, and the building of social support are frequently included in these programs.

These initiatives seek to enhance nurses' general well-being, job happiness, and performance by promoting resilience. According to **Foster, Cuzzillo, and Furness (2019)**, these programs usually incorporate elements like stress management approaches, cognitive-behavioral tactics, mindfulness practices, and emotional regulation abilities. According to recent research, resilience training can help healthcare workers feel more satisfied with their jobs, have better mental health, and lessen burnout symptoms (**Arrogante & Aparicio-Zaldivar, 2020**).

Another important thing that resilience training programs aim to foster is the capability to thrive at work. The psychological state of flourishing is characterized by people feeling alive and learning at work. It is more than just professional pleasure; it is a dynamic process of personal development. High-performing nurses are more engaged, driven, and able to provide patients with superior care. They feel more fulfilled and purposeful in their jobs, which enhances their general well-being and length of service (**Stephens, Heaphy, & Dutton, 2021**). Additionally, a dual sensation of learning and vitality are characteristics of flourishing in the workplace. While learning entails both professional and personal development, vitality is the sensation of being alive and invigorated. People who are flourishing are more productive, more able to handle stress, and more inclined to take initiative. In the nursing environment, flourishing can result in improved patient

outcomes, increased job satisfaction, and a decreased risk of burnout (**Spirig, Bauer, & Jenny, 2020**).

Because of the nature of the work, which frequently entails life-or-death circumstances, emotional encounters with patients and their families, and the requirement to remain composed and professional under duress, nursing is an inherently stressful career. Nurses frequently experience job burnout, which has serious consequences for their own well-being and patient care. In addition to psychological symptoms like sadness, worry, and a sense of helplessness, burnout can cause physical symptoms including exhaustion, headaches, and sleep problems. Increased absenteeism, high rates of turnover and a drop in the quality of care are some of the organizational implications (Jennings, 2020).

Depersonalization, diminished personal accomplishment, and emotional tiredness are the three main characteristics of job burnout. Feelings of being overextended and emotionally spent are referred to as emotional tiredness. In **2023, Maslach and Leiter**. A detached response to health care and a cynical attitude toward patients are examples of depersonalization. Reduced personal accomplishment is the propensity to have negative self-perception, especially when it comes to one's work with patients. Serious outcomes include lower job satisfaction, higher absenteeism, and a higher turnover rate among nurses can result from burnout (**Dall'Ora et al., 2020**).

The current study explores the impact

of resilience training programs on staff nurses' ability to thrive at work and mitigate job burnout. By equipping nurses with resilience-building techniques, these programs can potentially transform the work environment, fostering a culture of support and sustainability. This research aims to offer valuable insights into the effectiveness of resilience training interventions and their role in promoting the well-being of nurses.

Significance of the Study

The nursing sector is encountering a worldwide shortage, with numerous countries finding it challenging to recruit and retain skilled nurses. It is vital to ensure that nurses not only survive but thrive in their work environment while being shielded from burnout, in order to establish a sustainable workforce capable of addressing the increasing needs of healthcare systems (WHO, 2020). Exploring the impact of resilience training programs on enhancing workplace thriving and reducing job burnout among nurses is essential for boosting both individual well-being and the overall standard of patient care. Such training can equip nurses with improved coping strategies, lessening stress levels and averting burnout. Moreover, when nurses acquire robust resilience skills, they are more likely to flourish at work, experiencing a greater sense of competence, purpose, and positive involvement in their roles.

An expanding body of research shows that resilience training programs can play a significant role in tackling these issues by boosting nurses' capacity to

thrive in their work environment, mitigating job burnout, and enhancing overall job satisfaction (Kelly et al., 2021). According to studies by Bakker and van Wingerden (2021), nurses with higher levels of resilience may be more adept at managing challenging patient care scenarios, workplace disputes, and the emotional demands associated with their roles. Resilience training offers a powerful tool to support nurses' mental health, reduce the prevalence of burnout, promote positive psychological states like thriving, and leads to a more stable and engaged nursing workforce. Therefore, this study, aimed to unearth the effect of resilience training program on staff nurses' thriving at work and burnout mitigation.

Aim of the study

The study aimed to determine the effect of resilience training program on thriving at work and burnout mitigation staff nurses'

Research Hypothesis:

- **H1:** There will be increase in staff nurses' resilience knowledge, and practices test score after resilience training program implementation than before.
- **H2:** There will be increase in staff nurses' level of thriving at work mean score after program implementation than before.
- **H3:** There will be decrease in staff nurses' level of burnout mean score after program implementation than before.

Subjects and Method

Design:

The study was carried out using a quasi-experimental one-group pretest-

posttest research design.

Setting:

The study was conducted at two hospitals: Minia Psychiatric Mental Health and Addiction Hospital and Chest Hospital. The Minia Psychiatric Mental Health and Addiction Hospital, located in New Minia City in Upper Egypt and affiliated with the Ministry of Health, offerings the (9) districts of Minia Governorate. There are two floors: the 1st floor houses the female inpatient unit, outpatient clinics, and a pharmacy, while the 2nd floor includes administrative offices, a nursing office, a department dedicated to addiction treatment, and a male inpatient ward. The hospital has a total of 53 beds available for patients of both genders.

The Chest Hospital is separated into three sections. The first section consists of two floors: the ground floor contains emergency rooms and outpatient clinics, while the first floor houses the intensive care unit, and the second floor is dedicated to pediatric and neonatal care. The second section of the hospital has three floors, with the ground floor accommodating the hospital kitchen. The third section also consists of three floors: the ground floor includes X-ray facilities, operating rooms, and the hospital pharmacy, while the third floor contains laundry and sterilization rooms.

Subjects:

A convenience sample of available staff nurses (n=90 out of 180) who were working at previously selected settings was targeted. This sample size was calculated using G Power to ensure sufficient statistical power.

Minia Psychiatric Mental Health and Addiction Hospital (33nurses), Chest hospital (57nurses).

Tools of data collection:

Tools: To achieve the current study's a goal, data was gathered using five different instruments.

Tool I: Personal characteristics and work-related data sheet: It was developed by researchers which include the following data: age, sex, residence, and years of experience, previous training courses on resilience.

Tool II: Nurses' Knowledge questionnaire of Resilience: to assess (pre/posttest) nurses' resilience knowledge. It was developed by researchers based on based on a literature review guided by **Gillespie, Chaboyer, and Wallis, (2007); McAllister and McKinnon, (2009) and Hart, Brannan, and De Chesnay (2014)**. The questionnaire consisted of 30 questions, including multiple-choice and True/False formats. These questions were divided into five dimensions to assess staff nurses' knowledge of resilience. The dimensions were as follows: (Definition and Understanding of Resilience (5 items), Personal Resilience Strategies (5 items), Workplace Resilience (5 items), Emotional Regulation and Coping Mechanisms (5 items) and Social Support and Relationships (5 items).

The scoring system was designed such that each correct answer was granted (1) point, while incorrect answers received (0) points. The overall score for each nurse was calculated based on their total responses. A score of 75% or higher

was considered to indicate a satisfactory level of knowledge, whereas a score below 75% was classified as unsatisfactory.

Tool III: Resilience Practice at Workplace Scale was adapted from Connor and Davidson (2003) and consisted of 30 items designed to evaluate staff nurses the resilience practices level (pre- and post-test). The scale was divided into five dimensions as follows: Personal Competence/Tenacity (11 items), Trust in One's Instincts/Tolerance of Negative Emotions (8 items), Positive Acceptance of Change and Secure Relationships (5 items), Control/Sense of Control (4 items), and Spiritual Influences (2 items).

Scoring System: Responses were evaluated using a three-point Likert scale, with the following scoring: (1 point for disagree), (2 points for neutral), and (3 points for agree). The staff nurses' resilience practice level at the workplace was categorized based on their total scores as follows: a score ranging from 30 to 49 indicated a low level of resilience practice; a score between 50 and 69 represented a moderate level; and a score between 70 and 90 denoted a high level of resilience practice.

Tool IV: Thriving at Work Scale: This tool was adapted from **Spreitzer, Sutcliffe, Dutton, Sonenshein, and Grant (2005), as well as Atwater and Carmeli (2009)**. It consists of 11 items designed to assess staff nurses' feelings of vitality or energy in the workplace. Responses were scored on a three-point Likert scale, with (1) indicating disagreement, (2)

representing neutrality, and (3) signifying agreement.

Scoring System: All the scale's elements were added up to determine the final score. A higher score showed a greater level of thriving at work in the current setting. The scoring categories for thriving at work were as follows: Low thriving at work: Scores ranging from 11 to 18. Moderate thriving at work: Scores between 19 and 26. High thriving at work: Scores ranging from 27 to 33.

Tool V: Maslach's Burnout Inventory Scale

Maslach and Jackson (1981) created this instrument to evaluate staff nurses' levels of burnout. Its 22 items are divided into three categories: Personal Achievement (6 items), Depersonalization (8 items), and Emotional Exhaustion (8 items). The following options are available on a 6-point rating system for responses: 0 = Never First, once a year or less; second, once a month or less; third, once a month; fourth, once a week; fifth, a few times a week; and sixth, every day.

Scoring System: All of the scale's elements were added up to determine the final score. A higher score indicates more degree of burnout in the current work setting. The scoring categories for burnout are as follows: Low burnout: Scores ranging from 0 to 43. Moderate burnout: Scores between 44 and 88. High burnout: Scores ranging from 89 to 132.

Validity and Reliability of the tools

A panel of (5) professors with expertise in administration and psychiatry assessed the face and content validity of the tools. The

evaluation focused on determining whether the tools effectively measured the intended constructs, considering factors such as the items arrangement, simplicity, utilization, relevance, language, terminology, and overall presentation. Based on the experts' feedback, minor modifications were made, including rewording and restructuring certain phrases to enhance clarity and appropriateness. Cronbach's Alpha Coefficient, which gauges the internal consistency of each tool's components, was used to evaluate the study tools' dependability. Strong reliability was shown by the results for each of the four tools. Internal consistency and dependability Cronbach's Alpha values were as follows: 0.919 for tool (1), 0.983 for tool (2), 0.758 for tool (3), and 0.847 for tool (4).

Method and Procedure

The study phases were completed: assessment, planning, implementation, and evaluation.

The assessment and planning phase:

- Before initiating the study, official ethical approval was gained from the Ethical Committee of Scientific Research at the Faculty of Nursing, Minia University, to carry out the proposed research. Additionally, permission was secured from the administrative authorities of the selected hospitals to conduct the study.
- Informed consent was gained from all participants after clearly outlined the purpose and nature of the study, as well as their right to withdraw at any time without

consequences. To assure the clarity, applicability, and feasibility of the items of the tool, a pilot study was conducted on 10% of the participants, which included nine staff nurses. These participants were later not included from the main study sample. Based on the findings of the study pilot, minor modifications were made to improve the tools' clarity and effectiveness.

- A pre-test and a self-assessment questionnaire were administered to staff nurses prior to the commencement of the program. These tools aimed to assess workplace thriving and burnout as pretest phase related to resilience. The knowledge test required 30 to 45 Min to complete, while the self-assessment on resilience practices took approximately 35 minutes. Data collection occurred from the beginning of January to the end of August 2023. Based on the data gathered from the participants, their learning needs were identified. Following this, the program objectives were clearly defined, and the program content was developed to address the identified gaps in knowledge and practice.
- The program was reviewed by experts from the Ethical Scientific Research Committee to ensure its validity and alignment with the study's objectives. The researchers designed the program's schedule, ensuring a structured and organized approach to its implementation. Additionally, the investigators planned the study's administrative

& learning environment, including arranging necessary resources such as conference rooms and equipment like projectors \ data show within the hospital to facilitate effective delivery of the program.

The implementing phase (implement training program):

In this phase, the training program was developed depending on an assessment of relevant literature (e.g., Ang & Abu Bakar, 2023; Roberts & Grubb, 2022). The program included the design of teaching sessions and schedules tailored to address identified needs. The training covered a range of key topics, such as: the description and importance of resilience, characteristics of successful resilience , qualities of resilient individuals ,Principles, components, and factors contributing to talent resilience, and Practical strategies for building and enhancing resilience .These elements were incorporated to ensure the program was comprehensive and aligned with the goals of improving resilience among participants.

Five subgroups of 18 staff nurses each were formed from the staff nurses who took part in the study. To guarantee successful engagement and learning, the researchers presented the software to each subgroup independently. To ensure flexibility and convenience, the number of sessions was modified in accordance with the participants' realistic schedules. The hospital's educational facility's classrooms served as the venue for the sessions, offering a suitable setting for instruction and communication.

The researchers provided the staff

nurses with a detailed goals explanation, time table, and program content. The program consisted of 12 sessions, with three sessions held per week, each lasting one hour. All 12 sessions were completed within five months for all groups, starting from January 2023 and concluding by the end of August 2023. **A follow-up was conducted three months after the program for each group to evaluate its long-term impact.**

- The objectives of the session were clearly explained to the participants at the beginning of each session, Feedback on the previous session was collected before starting a new one to ensure continuity and reinforce learning, and a review of the previous session was conducted at the end of each session.
- The training course was carried out at the hospitals under study and utilized a variety of instructional techniques, including lectures, brainstorming, homework assignments, discussions, and small group exercises. Instructional aids such as pamphlets, presentations, videos, and were used to enhance understanding and engagement.
- This structured approach ensured that the program was both comprehensive and adaptable to the needs of the participants while maintaining consistency across all group.

Session 1: Introduction to Resilience and Emotional Awareness (Define resilience and its relevance to nursing practice.

Session 2: Identifying Workplace

Stressors (Discuss common stressors in the nursing field and their impact on resilience, group discussions, and reflective exercises to share personal experiences.

Session 3: The Function of Resilience in the Workplace (task focus), which includes focusing behaviors and paying attention to job tasks and responsibilities; exploration, which stands for experimentation, innovation, risk-taking, and discovery to stretch and grow in new directions; and heedful relating, which means attentively connecting to the social/relational environment by watching out for one another).

Session 4: Understanding the Relationship between Resilience and Burnout (explore how resilience mitigates job burnout (case presentation, and group activities), teach nurses early signs of burnout and the role of resilience in prevention.

Session 5: Teach mindfulness techniques through role play. And conduct guided practice sessions in managing high-pressure situations.

Session 6: Focus on cognitive reframing and emotional flexibility. And Practice emotional regulation in role-play scenarios specific to nursing challenges.

Session 7: Coping Strategies for Adversity (Identify adaptive vs. maladaptive coping strategies, Teach journaling and reflective practices to process workplace adversity, and Develop personalized coping toolkits.

Session 8: Thriving at Work (Cultivating Positive Work Relationships) through (Explore the importance of teamwork,

communication skills, and Conduct activities to build trust, peer support, and positive work environment).

Session 9: Discuss conflict resolution, and practice effective communication strategies through role-plays, and case presentation.

Session 10: Leveraging Strengths and Resources (Teach nurses how to identify personal strengths and professional resources, and Set professional goals using SMART techniques, and strategies for time management).

Session 11: Burnout Prevention and Sustaining Resilience (Educate participants' signs, symptoms, and stages of burnout. efficient time management, communication, problem-solving, and decision-making, and stress management techniques through role play, case analysis and presentation.

Session 12: Recognizing and Addressing Burnout (Discuss organizational support and resources available for burnout prevention, teach nurses how to create individualized action plans to prevent burnout, and develop long-term action plans to integrate resilience practices into daily nursing routines.

Evaluation phase

The immediate impact of a resilience training program on nurses' ability to thrive at work and mitigate job burnout was evaluated using four tools: Maslach's Burnout Inventory scale, Nurses Knowledge of Resilience Scale, Resilience Practice at Workplace Scale, and Thriving at Work Scale. A follow-up research was carried out three months following the program's launch to assess its impact

on burnout prevention. Four tools were employed in this study: Maslach's Burnout Inventory, the Nurses Knowledge of Resilience Scale, the Resilience Practice at Workplace Scale, and the Thriving at Work Scale.

Ethical consideration

Primary official permission was obtained from the Ethical Committee of Scientific Research at the Faculty of Minia to conduct the proposed study. Additionally, official approval was secured from the administrative personnel of the selected hospital to proceed with the research.

Informed consent was gained from all participants after providing a clear clarification of the purpose, benefits, and nature of the study. The staff nurses were informed that their participation was entirely willing and that opting out would have no negative consequences for them. A detailed explanation of the study was provided, including its aims, potential benefits, and the procedures involved. Furthermore, the process for withdrawing from the study was clearly outlined, ensuring that participants understood they could stop participating before, during, or after data collection without any repercussions.

Participants were assured of their right to decline participation and were informed that their personal information and responses would remain private and discreet throughout the duration of the research. This approach ensured that ethical standards were upheld and that participants felt respected and informed throughout the research

process.

Statistical Analysis

Excel and the SPSS statistical software for social sciences (version 24) were used to conduct the statistical analysis of the data. The mean \pm standard deviation (SD) was used to characterize quantitative data, and frequency and percentage were used to summarize qualitative data. The following analysis was done on the data to see if there were any statistically significant differences between the groups: We used the Chi-square test for qualitative data. At the 95% confidence level, a p-value of less than 0.05 was deemed statistically significant. For quantitative data, the same group was compared at several point of time (e.g., before and after the intervention) using a paired sample t-test. These statistical techniques guaranteed proper interpretation of the findings and the ability to derive significant inferences from the information.

Results

Table (1): shows that, the age group 25-35 years constitutes the largest proportion (56.7%) of the sample. Regards to gender, the majority of the sample were female (60.6%), A significant majority of the sample reside in urban areas (63.3%). Approximately half of the sample had less than 10 years of experience (50%), indicating many relatively new nurses. About 94.5% from nurses do not attend any program about resilience.

Table (2) revealed that, before the implementation of the program, the level of satisfactory knowledge was very low (18.8%), while the level of

unsatisfactory knowledge was high (77.7%). Immediately after the implementation of the program, the level of satisfactory knowledge significantly increased to 92.2%, Three months post-program, the level of satisfactory knowledge remained high at 87.8%. The p-values ($P1=0.001^{**}$ and $P2=0.001^{**}$) show statistically significant differences in knowledge levels before and after the implementation of the program.

Table (3) denoted that, before the implementation of the program, the majority of the sample had low resilience (78.9%). Immediately after the program, the level of high resilience significantly increased to 90%. Three months post-program, high resilience remained high at 81.1%. The p-values ($P1=0.001^{**}$ and $P2=0.001^{**}$) indicate statistically significant differences in resilience levels before and after the program.

Table (4) explored that, before the program, 66.6% had low thriving levels. Immediately after the program, 91.1% had high thriving levels. Three months post-program, 78.8% maintained high thriving levels. P1 and P2 values (0.0001^{**} and 0.000^{**}) show significant differences in thriving levels before and after the program.

Table (5) revealed that, before the

program, 87.7% had high burnout levels. Immediately after the program, only 2.2% had high burnout levels. Three months post-program, 6.6% still had high burnout levels. P1 and P2 values (0.001^{**} and 0.00^{**}) indicate significant differences in burnout levels before and after the program

Table (6) examined the significant correlation between resilience knowledge and burnout ($r = -0.597$, $p = 0.001$) as well as the significant positive correlations between resilience knowledge and practice ($r = 0.675$, $p = 0.001$) and thriving at work ($r = 0.668$, $p = 0.001$) prior to program implementation. Furthermore, following program implementation, there are still considerable favorable connections between thriving at work ($r = 0.752$, $p = 0.001$) and resilience knowledge and practice ($r = 0.732$, $p = 0.001$). Burnout and resilience knowledge have a strong negative connection ($r = -0.516$, $p = 0.001$). Additionally, three months after the program ended, there were still favorable connections between thriving at work ($r = 0.760$, $p = 0.001$) and resilience knowledge and practice ($r = 0.740$, $p = 0.001$). Burnout and resilience knowledge continue to have a substantial negative connection ($r = -0.579$, $p = 0.001$).

Table (1): Personal and work related data of the study subjects at selected hospitals.

Personal characteristics	N= (90 staff nurses)	
	No	%
Age		
- 25-35yrs	51	56.7
- 36-46 yrs.	22	24.4
- <46yrs	17	18.9
Mean ± SD		28.9±1.31
Gender		
- Male	36	40
- Female	54	60
Residence		
- Urban	57	63.3
- Rural	33	36.7
Experience		
- <10yrs	45	50
- 11-20ys	20	22.3
- >20yrs	25	27.7
Mean ± SD		6.85±1.58
Do you attend previous training on resilience		
- Yes	5	5.5
- No	85	94.5

Table (2): Distribution of staff nurses' Resilience knowledge throughout the program at selected hospitals (N=90)

Level of nurses Resilience knowledge						
Pre-program implementation		Immediate post program		Three-month post program		
Un satisfactory N (%)	Satisfactory N (%)	Un satisfactory N (%)	Satisfactory N (%)	Un satisfactory N (%)	Satisfactory N (%)	
73 (77.7)	17(18.8)	7(7.7)	83(92.2)	11(12.2)	79(87.8)	
P₁= 0.001** (28.3)						P₂=0.001**(2.3)
Anova test P =467.4(0.001**)						

P₁= pre and immediately post the implementation of the program, **P₂**= pre and after three months of implementation of the program $p \leq 0.05$ (significant)

Table (3): Distribution of staff nurses' resilience at workplace throughout the program at selected hospital (No =90)

Level of Nurses' resilience								
Pre-program implementation			Immediate post program			Three month post program		
Low	Moderate	High	Low	Moderate	High	Low	Moderate	High
N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
71(78.9)	10(11.1)	9(10)	1(1.1)	8(8.9)	81(90)	5(5.6)	12(13.3)	73(81.1)
P₁= 0.001** (35.2)								
Anova test P =551.5(.001**)								

P₁= pre and immediately post the implementation of the program, **P₂**= pre and after three months of implementation of the program. ***p**≤0.05 (significant)

Table (4): Distribution of staff nurses' thriving at work throughout the program at selected hospital (No =90)

Nurses' thriving at work level								
Pre-program implementation			Immediate post program			Three month post program		
Low	Moderate	High	Low	Moderate	High	Low	Moderate	High
N(%)	N(%)	N(%)	N(%)	N(%)	N(%)	N(%)	N(%)	N(%)
60(66.6)	18(20)	12(13.3)	2(2.2)	6(6.6)	82(91.1)	5(5.5)	14(15.5)	71(78.8)
P₁= 0.0001** (18.05)								
Anova test P =359.1(.001**)								

P₁= pre and immediately post the implementation of the program, **P₂**= pre and after three months of implementation of the program ***p**≤0.05 (significant)

Table (5): Distribution of staff nurses' Burnout, throughout the program at selected hospital (No =90)

Burnout mitigation level									
Pre-program implementation			Immediate post- program			3 month post-program			
Low	Moderate	High	Low	Moderate	High	Low	Moderate	High	
N(%)	N(%)	N(%)	N(%)	N (%)	N(%)	N(%)	N(%)	N(%)	
8(8.9)	4(4.4)	78(86.7)	75(83.4)	13(14.4)	2(2.2)	72(80)	12(13.4)	6(6.6)	
P1= 0.001** (23.22)					P2=0.00** (24.97)				
Anova test P =367.7(.001**)									

P₁= pre and immediately post the implementation of the program, P₂= pre and after three months of implementation of the program* $p\leq 0.05$ (significant)

Table (6): Correlation between staff nurses' total resilience practice, knowledge about resilience, thriving at work, and burnout mitigation during different times of testing at selected hospital

Variables	Nurse resilience total knowledge		Nurse resilience practice		Thriving at work		Burnout mitigation	
	r	P	r	P	r	P	r	P
Preprogram implementation								
Nurse resilience total knowledge	1		.675**	.001	.668**	.001	.597-**	.001
Nurse resilience total practice	-	-	1		.664**	.001	.640-**	.001
Thriving at work	-	-	-	-	1		.571-**	.001
Burnout mitigation	-	-	-	-	-	-	1	
Immediate post-program implementation								
Nurse resilience total knowledge	1		.732**	.001	.752**	.001	.516-**	.001
Nurse resilience total practice	-		1		.767**	.001	.551-**	.001
Thriving at work	---		-	-			.579-**	.001

Variables	Nurse resilience total knowledge		Nurse resilience practice		Thriving at work		Burnout mitigation	
	r	P	r	P	r	P	r	P
Burnout mitigation			-	-	-	-	1	
After three months of the program implementation								
Nurse resilience total knowledge	1		740**	.001	.760**	.001	.579-**	.001
Nurse resilience total practice			1		.781**	.001	.615-**	.001
Thriving at work	-	-	-		1		.601-**	.001
Burnout mitigation	-	-			-	-	1	

Discussion

Staff nurses in healthcare organizations have been facing significant job burnout and psychological distress, which can negatively impact both quality of patient care and their well-being. It is crucial for policymakers and scholars to explore effective strategies to assist nurses manage these adverse psychological states. One promising approach is fostering resilience at work, defined as the ability to adapt to or recover from extremely challenging circumstances, or to positively respond to traumatic or adverse experiences. Resilience not only helps mitigate job burnout but also promotes thriving at work, enabling nurses to keep up a sense of vitality, engagement, and professional satisfaction (Vinkers et al., 2020).

In light of this, designing and implementing resilience-focused interventions is essential. This paper contributes to the existing body of

knowledge by examining the effectiveness of a resilience training program in enhancing thriving at work and reducing job burnout among staff nurses. Such research underscores the importance of equipping nurses with tools and strategies to navigate workplace challenges while cultivating a sustainable and encouraging workplace.

In the present study, the sample size is reasonably large, and the results indicate that the majority of participants fall within the age range of 25–35 years (56.7%), reflecting a productive and active workforce. This demographic profile is consistent with existing evidence on the gender imbalance and younger age distributions commonly observed in nursing samples, particularly in Egypt, where nursing is traditionally viewed as an occupation that is dominated by women. However, recent trends show an rise in the

number of male students enrolling in nursing education programs. This shift may be ascribed to a number of causes, including the abundance of job opportunities in the nursing profession compared to other fields, as well as a gradual change in societal perceptions of nursing as exclusively a female profession. These developments suggest a potential transformation in the gender dynamics of the nursing workforce, highlighting evolving attitudes toward the profession and its growing appeal across genders.

Regarding years of experience, half of the sample had less than 10 years of experience, indicating that they may lack sufficient experience to effectively manage various stressors encountered in clinical settings. As a result, these nurses are likely to benefit from acquiring new concepts and strategies to better cope with workplace challenges. Additionally, 75% of the participants live in urban areas, which suggest that they may have access to more resources compared to their rural counterparts. This access to resources could enhance their ability to implement resilience-related strategies, thereby rise their capacity to thrive or flourishing at work and mitigate job burnout. The availability of supportive environments and resources in urban settings may play a important role in facilitating the successful application of resilience-building techniques.

Regarding resilience knowledge, the results demonstrated a notable improvement immediately following the program implementation. The

majority of participants exhibited satisfactory knowledge levels, a significant increase compared to their pre-program performance. This enhanced knowledge was not only immediate but also sustained three months post-program, with most participants continuing to demonstrate sustained satisfactory knowledge. The statistically significant P-value confirms that these observed improvements are unlikely to be due to chance, underscoring the effectiveness of the intervention. These findings are in the same line with prior research, which highlights that structured resilience training programs can significantly enhance both the knowledge and practical application of resilience strategies among healthcare professionals. Such programs appear to play a crucial role in equipping nurses with the tools they need to better manage stressors and thrive in their work environments.

These results align with the findings of previous resilience programs, which have shown that resilience enhancement training can positively influence resilience levels and psychological well-being among nurses. According to a study published by (Schluter, et al., 2021), most participants found the program beneficial, reporting improvements in self-confidence, patient care quality , and communication skills .Similarly, a study by **Mills and Kimbrough (2023)** emphasized that resilience training programs significantly improved nurses' understanding of resilience concepts, such as coping strategies and stress management techniques . Participants

demonstrated an increased ability to manage workplace stress effectively and were better equipped with the knowledge needed to prevent burnout. These findings collectively underscore the value of resilience training in empowering nurses to handle workplace challenges while enhancing their overall well-being and professional performance.

On a different note, **Smith and Ward (2021)** found that although resilience training initially enhanced nurses' knowledge of stress management and resilience principles, the retention of this knowledge was limited over time. While participants were able to recall and apply some of the techniques and strategies learned during the program, the long-term impact on their knowledge was less pronounced than anticipated. The study highlighted that without ongoing reinforcement and support, the benefits of resilience training tended to reduce over time. This underscores the importance of incorporating continuous follow-up sessions, refresher courses, or workplace support systems to ensure the sustained application of resilience concepts and maintain their positive effects in the long term.

The program demonstrated a significant positive effect on the resilience practice levels of the nurses. Prior to the intervention, the majority of participants exhibited low resilience levels. However, after completing the program, most participants showed a marked improvement, achieving high resilience levels, which remained relatively stable even three months post-intervention. The statistically

significant P-values confirm that these improvements were not due to chance, highlighting the program's effectiveness. These outcomes can likely be attributed to the training components of the program, which focused on teaching behavioral coping skills that enhance resilience. Techniques such as cognitive flexibility, reframing negative thoughts, physical exercise, fostering positive emotions, and experimenting with adaptive behaviors played a significant role in constructing resilience among the participants. By equipping nurses with practical strategies to manage stress and adversity, the program successfully fostered long-lasting improvements in their ability to thrive in challenging work environments.

These results align with the findings of **Henderson and O'Connor (2021)**, whose study explored how experienced nurses perceived resilience training. Participants reported that resilience programs enabled them to better manage workplace stressors, leading to improved patient care, enhanced professional satisfaction, and better personal well-being. Nurses also highlighted that their ability to maintain composure during challenging situations positively influenced their overall performance, underscoring the practical benefits of such training. Similarly, a systematic review by **Mills and Kimbrough (2023)** concluded that resilience training programs for nurses have sustained effects on mental health and emotional resilience. Nurses who participated in these programs

reported achieving a greater balance between work and life and experiencing reduced levels of emotional exhaustion. These findings collectively emphasize the long-term value of resilience training in fostering not only professional growth but also personal well-being, enabling nurses to thrive in demanding healthcare environments while mitigating the risk of burnout.

While these results are promising, they contradict the findings of **Pehlivan and Güner (2020)**, whose multilevel model analyses revealed no statistically significant difference in the mean resilience scores of nurses in either the short- or long-term experimental groups. This discrepancy highlights the variability in outcomes across different studies and suggests that the effectiveness of resilience training programs may depend on factors such as program design, participant characteristics, or implementation strategies. In contrast, the current program demonstrated a positive impact on nurses' thriving at work. Initially, more than three-quarters of participants exhibited low levels of thriving. However, after completing the program, the majority reported high levels of thriving, with over half maintaining these elevated levels three months post-program. The statistically significant P-values confirm that these improvements were not due to chance, underscoring the program's effectiveness. These positive outcomes may be attributed to the program's focus on activities such as active coping skills, fostering a strong social support system, enhancing communication skills, and

promoting strategies to create a positive work environment. By equipping nurses with these tools, the program likely empowered them to experience greater vitality, engagement, and professional fulfillment, ultimately contributing to their ability to thrive in the workplace. These findings are in similar spirit with the study by **Yun, Zhou, and Zhang (2022)**, who highlighted that resilience at work, was significantly and positively associated with thriving at work. Similarly, the results align with the work of **Tugade and Fredrickson (2022)**, who demonstrated that resilience training programs positively influenced employees' thriving at work by enhancing their emotional regulation and coping strategies. Their study concluded that resilience not only improved individual well-being but also fostered higher levels of thriving, particularly in high-pressure environments like healthcare. On the other hand, these findings contrast with those of **Mayer and Bentley (2020)**, who reported that while resilience training programs had a short-term positive impact on nurses' thriving at work, the effects were not sustained over time. Nurses initially experienced improvements in emotional well-being and job satisfaction immediately following the program. However, these gains diminished over time due to the persistent stressors inherent in clinical environments. This suggests that while resilience training can provide temporary relief and improvement, ongoing support and reinforcement may be necessary to maintain long-

term benefits in highly demanding settings.

In relation to the effect of the resilience training program on burnout mitigation, a key outcome was the significant reduction in burnout levels among participants. Initially, the majority of participants reported experiencing high levels of burnout. However, this decreased dramatically immediately after the program and remained low even three months later. These results may be attributed to the positive impact of the program's sessions, which equipped nurses with techniques to enhance emotional resilience, improve stress management, and develop skills in effective communication, time management, and problem-solving and decision-making. By addressing these critical areas, the program likely empowered nurses to better manage workplace stressors, ultimately reducing their susceptibility to burnout. These findings underscore the potential of resilience training as an effective strategy for mitigating burnout and promoting sustained well-being among nurses in high-pressure healthcare environments.

These results are supported by existing research, which highlights that resilience training can effectively mitigate burnout among healthcare workers (Yun, Zhou & Zhang, 2022). Similarly, Wei, Roberts, Strickler, and Corbett (2019) found that nurse resilience significantly reduced levels of burnout. Furthermore, Kelly and Mason (2022) demonstrated that resilience training led to a significant reduction in burnout among nursing students.

The program in their study focused on enhancing emotional resilience, stress management, and coping strategies, equipping participants with tools to better handle workplace challenges. Participants reported a marked decrease in emotional exhaustion and depersonalization, two critical components of burnout, immediately after the training. These improvements were sustained at follow-up assessments conducted three months later. Collectively, these findings suggest that resilience training can serve as an effective intervention for reducing burnout, offering long-term benefits for nurses and other healthcare professionals working in high-stress environments. Such programs not only address immediate symptoms of burnout but also empower individuals with skills to maintain their well-being over time. On the contrary, these results are contradicted by Pehlivan and Güner (2020), who concluded that short- or long-term programs addressing compassion fatigue resilience had no significant influence on burnout levels among nurses. Similarly, Brown and Davis (2020) found that while resilience training programs can reduce certain symptoms of burnout, they are insufficient as standalone interventions to fully mitigate burnout in healthcare settings.

The authors noted that although nurses reported improved coping strategies and better emotional regulation following resilience training, these benefits were often temporary and failed to prevent burnout from recurring over time. The study emphasized that resilience

training alone is not enough to address systemic issues contributing to burnout. Instead, it should be complemented by organizational changes, such as ensuring adequate staffing levels, reducing workloads, and promoting improved work-life balance. These structural adjustments are crucial for achieving a more sustained and meaningful impact on reducing burnout among healthcare professionals.

Finally, the correlation analysis revealed strong positive relationships between resilience knowledge, resilience practice, and thriving at work, as well as a strong negative relationship between resilience knowledge and burnout. These findings suggest that enhancing resilience knowledge directly contributes to improved resilience practices, which in turn fosters greater thriving at work and better work outcomes. As a result, this reduces work stress, exhaustion, and burnout. These results align with the theoretical framework proposed by **Windle (2011)**, which posits that resilience fosters positive coping mechanisms and enhances overall well-being. Similarly, the study by **Shen et al. (2024)** supports these findings, as their results also revealed significant positive correlations between psychological resilience and thriving or flourishing at work. Together, these studies underscore the crucial role of resilience in promoting professional fulfillment, reducing workplace stressors, and improving mental health outcomes among healthcare professionals. This highlights the importance of integrating resilience

training programs into healthcare settings to not only support individual nurses but also enhance organizational effectiveness and patient care quality.

Conclusion

The current study findings concluded that The findings of this study strongly support the effectiveness of resilience training in enhancing staff nurses' flourishing workplace thriving while significantly reducing burnout. The intervention led to substantial improvements in resilience knowledge, practices, and thriving at work, with sustained positive effects observed three months post-program.

Recommendations

- Hospitals and healthcare institutions should provide continuous resilience training and access to mental health resources to assist nurses in preventing burnout and managing stress.
- Nurse Manager encouraging collaboration, open communication, and peer support in the workplace can further enhance the effectiveness of resilience training and promote long-term well-being for nurses.
- Regularly assess nurses' unique stressors and needs in different settings and adapt the program accordingly to ensure it remains relevant and impactful.
- Encourage healthcare organizations to incorporate resilience training into their broader employee well-being initiatives. Organizational commitment to nurses' mental health and resilience could lead to a culture change that values and

- supports staff well-being.
- Equip nurse leaders with resilience knowledge so they can serve as role models and advocates for the mental health of their teams.
- Make resilience and thriving-focused training a recurring part of continuing education to ensure that nurses continuously build and maintain their capacity to handle stress and avoid burnout.

References

Ang, S. Y., & Abu Bakar, S. H. (2023). The role of resilience in mitigating burnout among nurses: A systematic review and meta-analysis. *Journal of Advanced Nursing*. DOI:10.1016/j.nedt.2011.09.005

Arrogante, O., &Aparicio-Zaldivar, E. G. (2020). Burnout and health among critical care professionals: The mediational role of resilience. *Intensive and Critical Care Nursing*, 59, 102849.

Atwater, L., & Carmeli, A. (2009). Leader-member exchange, feelings of energy, and involvement in creative work. *The leadership quarterly*, 20(3), 264-275.

Bakker, A. B., & van Wingerden, J. (2021). Resilience interventions to enhance thriving at work: A review and research agenda. *Applied Psychology: Health and Well-Being*, 13(1), 55-77.

Bonanno, G. A. (2023). The resilience paradox: Understanding how we cope with adversity. *Annual Review of Clinical Psychology*, 19, 257-281.

Brown, A. K., & Davis, P. R. (2020). Resilience training and its effects on nurses: A critical review. *Nursing Outlook*, 68(3), 308-314. <https://doi.org/10.1016/j.outlook.2020.02.009>.

Connor, K. M., & Davidson, J. R. (2003). Development of a new resilience scale: The Connor-Davidson resilience scale (CD-RISC). *Depression and anxiety*, 18(2), 76-82.

Dall’Ora, C., Ball, J., Recio-Saucedo, A., & Griffiths, P. (2020). Characteristics of shift work and their impact on employee performance and wellbeing: A literature review. *International Journal of Nursing Studies*, 112, 103745.

Foster, K., Cuzzillo, C., & Furness, T. (2019). Strengthening mental health nursing through resilience education: A curriculum enhancement and evaluation. *Nurse Education in Practice*, 38, 27-32.

Gillespie, B. M., Chaboyer, W., & Wallis, M. (2007). Development of a theoretically derived model of resilience through concept analysis. *Contemporary Nurse*, 25(1-2), 124-135.

Hart, P. L., Brannan, J. D., & De Chesnay, M. (2014). Resilience in nurses: An integrative review. *Journal of Nursing Management*, 22(6), 720-734. <https://doi.org/10.1111/jonm.12084>

Henderson, S. A., & O'Connor, M. (2021). The role of resilience in nursing practice: A qualitative study of experienced nurses in

high-pressure settings. *Journal of Clinical Nursing*, 30(7-8), 1069-1077.
<https://doi.org/10.1111/jocn.15739>.

Jennings, B. M. (2020). Work stress and burnout among nurses: Role of the work environment and resilience. *Nursing Outlook*, 68(1), 90-102.

Kelly, L. A., Gee, P. M., & Butler, R. J. (2021). Impact of nurse burnout on organizational and position turnover. *Nursing Outlook*, 69(1), 96-102.

Kelly, L., & Mason, J. (2022). Evaluating the effectiveness of a resilience training program in reducing burnout among nursing students. *Journal of Nursing Education*, 61(5), 280-287.
<https://doi.org/10.3928/01484834-20220420-08>

Li, J., & Wang, S. (2020). Workplace stress, job burnout, and quality of life in nurses: A cross-sectional study in China. *Journal of Nursing Research*, 28(3), e99.

Maslach, C., & Leiter, M. P. (2023). Moving Beyond the Disease Framework: The Social Context of Burnout and Mental Health. *The Routledge Companion to Mental Health at Work*, 137-149.

Mayer, C. M., & Bentley, J. (2020). Impact of resilience programs on job performance and thriving at work in clinical settings. *Nursing Research*, 69(2), 96-104.
<https://doi.org/10.1097/NNR.0000000000426>.

McAllister, M., & McKinnon, J. (2009). The importance of teaching and learning resilience in the health disciplines: A critical review of the literature. *Nurse Education Today*, 29(4), 371-379.

Mills, L. M., & Kimbrough, L. (2023). Resilience training for nurses: A systematic review of its effects on burnout, stress, coping strategies, and knowledge. *Journal of Advanced Nursing*, 79(7), 1491-1503.<https://doi.org/10.1111/jon.16379>.

Pehlivan, T., & Guner, P. (2020). Effect of a compassion fatigue resiliency program on nurses' professional quality of life, perceived stress, resilience: A randomized controlled trial. *Journal of advanced nursing*, 76(12), 3584-3596.

Schluter, J., Winch, S., Holzhauser, K., & Henderson, A. (2021). Nurses' moral sensitivity and hospital ethical climate: A literature review. *Nursing Ethics*, 14(3), 304-321.

Shen, Z. M., Wang, Y. Y., Cai, Y. M., Li, A. Q., Zhang, Y. X., Chen, H. J., ... & Tan, J. (2024). Thriving at work as a mediator of the relationship between psychological resilience and the work performance of clinical nurses. *BMC nursing*, 23(1), 194.

Smith, T. G., & Ward, R. J. (2021). Sustaining knowledge gains from resilience training: A study of nurses in clinical settings. *Journal of Nursing Management*, 29(7), 1386-1393.
<https://doi.org/10.1111/jonm.13163>

Spirig, R., Bauer, G. F., & Jenny, G. J. (2020). Strengthening

resilience and promoting thriving in healthcare workers: Development of a workplace intervention model. *BMC Health Services Research*, 20(1), 1-12.

Stephens, J. P., Heaphy, E., & Dutton, J. E. (2021). Thriving at work as part of a dynamic work process: The interplay of resources and demands. *Journal of Applied Psychology*, 106(8), 1304-1323.

Tugade, M. M., & Fredrickson, B. L. (2022). Resilience training programs and employee thriving: A meta-analytic review of the literature. *Journal of Organizational Behavior*, 43(5), 738-754.
<https://doi.org/10.1002/job.2675>

Vinkers, C. H., van Amelsvoort, T., Bisson, J. I., Branchi, I., Cryan, J. F., Domschke, K., ... & van der Wee, N. J. (2020). Stress resilience during the coronavirus pandemic. *European Neuropsychopharmacology*, 35, 12-16.

Wei, H., Roberts, P., Strickler, J., & Corbett, R. W. (2019). Nurse leaders' strategies to foster nurse resilience. *Journal of nursing management*, 27(4), 681-687.

Windle, G. (2011). What is resilience? A review and concept analysis. *Reviews in Clinical Gerontology*, 21(2), 152-169.
<https://doi.org/10.1017/S0959259810000420>.

World Health Organization. (2020). State of the world's nursing 2020: Investing in education, jobs and leadership. World Health Organization.
<https://www.who.int/publications/i/item/9789240003279>

Yun, Z., Zhou, P., & Zhang, B. (2022). High-performance work systems, thriving at work, and job burnout among nurses in Chinese public hospitals: The role of resilience at work. *Healthcare*, 10(10), 1935.
<https://doi.org/10.3390/healthcare10101935>.

Influence of Internal Working Coalitions on Nurses' Voice Behavior and their Organizational Pride

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Abstract

Background: An internal work coalition is advantageous when nurses band together to increase their influence and authority, which has a good impact on their voice behavior as well as organizational pride. **The research aimed** to investigate the influence of internal working coalitions on nurses' voice behavior and their organizational pride. **Research design:** a design was descriptive correlation was used in the actual research. **Setting:** The research was conducted on two medical facilities at Minia city. **Sample:** A convenience sample (no.= 349). **Tools of data collection:** Three tools were used, 1st tool was Internal Working Coalitions, 2nd tool was Nurses' Voice Behavior, and the 3rd tool was Organizational Pride. **Results:** above fifty percent of nurses have a high level of internal working coalitions, and under fifty percent of them have moderate level of internal working coalitions. Also, less than fifty percent of nurses have high level of nurses' voice behavior, then about one third of them have moderate level of nurses' voice behavior. Finally, less than fifty percent of nurses have high and moderate level of organizational pride. **Conclusion:** There was a strongly positive correlation between internal working coalitions and nurses' voice behavior as well as their organizational pride (p value =0.001). **Recommendations:** Conducting educational program about internal work coalitions for nurses to enhance their voice behavior as well as organizational pride.

Keywords: Impact, Internal Working Coalitions, Nurses' Voice Behavior, Organizational Pride

Introduction

An organization can become a dynamic competency of nurses, and effective personnel policies are equally crucial to maintaining nurses' motivation and morale. However, these efforts are insufficient to ensure that the capabilities are continuously developed and sharpened, and that they can only be achieved by enabling activities that only enhance the dynamics of the nurses' organization, which is dependent on the culture of the organization (**Refae, El sayed, Mallokhia & Nomir, 2023**).

So, nurses play a crucial role in the efforts to advance health fairness. Along with collaborating across a variety of practice settings, nurses must also work with interprofessional teams and partners both inside and outside of health care systems, especially community leaders and organizations that are the most knowledgeable about their own community health issues and solutions (**Cooper, 2022**).

A coalition is a group of people who come together to accomplish a common objective. Groups of agents that collaborate to complete their jobs are known as internal work coalitions. They are a transient, goal-oriented team of agents that resolves a particular, predetermined issue (**Irene, 2022**).

Also, through better system outcomes including reduced nurse turnover and increased nurse satisfaction, commitment, and safety, internal work coalitions among nurses are expected to promote hospital profitability. When nurses work in

coalitions with empowering and supportive leadership and organizational structures, as well as pleasant group environments that frequently reflect aspects of cooperation, consensus, and group support, they are more satisfied with their jobs and experience lower turnover (**Martha and Susan, 2022**).

Usually, internal health work coalitions are established around a specific health concern. When one or more community sectors identify a problem, partners band together to find other interested parties to work together or create an across-partner response at the community level. Internal work coalitions are formed for a variety of reasons, but they usually arise in response to funding priorities or local opportunities. These chances have resulted in the development of several community collaborations, nurses' voice and behavior, and organizational pride (**Fortunato, McCrain and Schiff, 2021**).

Therefore, the need of proactive measures for sustained survival as well as effectiveness of the healthcare organization has been cultivated by the flexible, uncertain, and indefinite work circumstance. The voice behavior (VB) of the nurses is one example of such proactive activities (**Atalla, Mostafa & Ali, 2022**).

Voice is characterized as a statement of the challenge with the goal of improving workplace practices. Additionally, voice positively affects an organization's ability to function since it identifies more efficient ways to complete jobs and directs

management's attention toward resolving pressing problems. Even when there is a lot of disagreement among coworkers, the VB is a type of change-oriented communication that aims to enhance and promote changes to the status quo (Atalla et al., 2022). The purpose of the VB is to give nurses a voice on workplace-related matters, such as task practices, work processes, and other hospital operations. Nurses can freely share their creative thoughts and helpful proposals for changes to increase hospital efficiency in VB, which can be a promotional "affiliative" environment. When nurses express their worries about hospital issues that jeopardize their status quo, they are being prohibitive VB "protective." (Obied & Elsaeed, 2023).

Also, Yang (2021) described three different voice kinds; Communicating work-related thoughts and opinions, including a cooperative motive, is known as prosocial speech. When someone uses a defensive voice, they are expressing thoughts and opinions about their job that are driven by fear and self-defense. The acquiescent voice emphasizes the expression of support and agreement while expressing thoughts and opinions about work that are based on feelings of surrender.

Moreover, nurses use VB as a tool to help their hospitals more creative and adjust to the changing environment. The VB is to improve organizational pride and job practices, eliminate workplace issues that could impair organizational effectiveness, and help

take advantage of opportunities (Madrid, 2020).

The concept of organizational pride (OP) has drawn the interest of management experts and practitioners since it is a primary discriminator against competition and a motivator for positive work behavior. The OP has gained prominence as a result of increased recognition that it is feasible and essential to organizational success. A supportive, productive workplace that requires strong social recognition within the organization is what OP is referred to as. It includes sentiments of respect, reputation, and value derived from nurses' assessments of their standing (Mohammad, Abd El Rahman, Ali & Ali, 2022).

The OP encourages nurses' emotional dedication to the company and pushes them to go beyond the norm by working assiduously, using creativity, and conquering challenges. Attitude pride and emotional pride are the two categories of OP. Emotional pride is defined as a strong yet solitary sense of pride. Likewise classified as a transient mental state. Additionally, attitude OP is powerful and learnable. On the other hand, OP in attitude is collective, resulting from nurses' desire to blend in with the organization (Abd El Salam, Abo Habieb & El-Wkeel, 2024).

Significance of the research

An internal work coalition is a group of several interest groups that pool their resources, both human and material, to achieve a certain change that they could not do as separate entities or as independent individuals.

The basic power of nurses can be strengthened by internal work coalitions, which also increase nurses' capacity to garner attention and effect change by offering resources, talents, and abilities that can be pooled to meet hospital objectives. Since the coalition members themselves represent the community, internal work coalitions can help a strategic and coordinated solution to the issue, enable coalition members to own, embrace, and commit to the program goals, and enlist others in their respective organizations to personally commit to them (**Berkowitz & Allen, 2021**).

So, enhancing hospital internal work coalitions is crucial because it is likely to increase hospital profitability through better system outcomes like decreased nurse turnover, improved voice and behavior of nurses, increased organizational pride, and increased nurse commitment, satisfaction, and safety. According to the researchers' observations of the hospital students, nurses in some units do not work in groups, which increases work overload, absenteeism, and messy, disorganized work and they aren't exchange information through coalitions to provide high-quality nursing care. Thus, the researchers present this research, which helps them work efficiently, enjoy what they do.

Aim of the research

The present research was offered to investigate the influence of internal working coalitions on nurses' voice behavior and their organizational pride.

Research questions

1. What are the levels of internal working coalitions among nurses?
2. What are the levels of nurses' voice behavior?
3. What are the levels of organizational pride among nurses?
4. What is the relation between internal working coalitions and nurses' voice behavior as well as organizational pride?

Subjects and Method

Research Design

A descriptive correlation design was used to achieve the objective of actual research.

Research Setting

Bases on the simple random sample of Minia university hospitals, the actual research was performed at two hospitals as (Minia emergency University Hospital as well as Renal and Urology university hospital) Minia city, Egypt.

Sample:

A convenience sample involved nurses working at two selected hospitals through the time of data gathering, with total numbers 349 nurse. The research included all nurses are worked in the two-hospital hat accepted the participation in the research, while excluded the nurses that under one year of experience in the nursing filed.

Tools of data collection

To reached the aim of the actual research, data collected through three tools

Tool I: Internal Working Coalitions: This tool is composed of two parts as:

- First part: Nurses personal data, this part was developed by the researchers to collect data about nurses included; age, gender, marital condition, educational qualifications, residence, hospital name, and years of experience
- **Second part: Internal Working Coalitions:** This tool developed by **Cramer, Lazure, Morris, Valerio, & Morris, (2013)**. It was designed to measure the internal working coalitions among nurses. It is composed of thirty items. The responses were using a three - point Likert scale ranging from always (two), sometimes (one) and never (zero).

Scoring system:

The score of each level was summed and converted into a percentage score. The percent more than 75% was indicated high internal work coalition level, if the score is from 60-75%, this was indicated moderate level and if less than 60 % this was indicated low level (**Abdullah et al., 2024**)

Tool II: Nurses' Voice Behavior Questionnaire, this tool modified by researchers guided by **Liang, Farh & Farh, (2012)**, **Li, Xue, Liang & Yan, (2020)**; **Yang, (2021)** **Obied and ELsaeed, (2023)**. It consisted of ten items to assess nurses" VB. The nurses' responses were using a three points Likert scale varying from two= always, one= sometimes, and zero = never.

Scoring system:

The score of each level was summed and converted into percent score. The levels of nurses' VB represented statistically as $\geq 75\%$ as high; $<75\%-60\%$ as moderate and low voice behavior $<60\%$ (**Obied and ELsaeed, 2023**).

Tool III: Organizational Pride Questionnaire: This was adopted by **Durrah, Chaudhary & Gharib, (2019)**. It aims to assess organizational pride as perceived by nurses. Includes seven items categorized into two dimensions as emotional pride (four items) and attitudinal pride (three items). Items were measured on three-point Likert scale ranged from (zero) disagree to (two) agree.

Scoring system

The score of each level was summed and converted into percent score. The categories of organizational pride among nurses as, low ($<50\%$), moderate ($50\%-75\%$), and high ($>75\%$) (**Abd El Salam et al., 2024**).

Tools' Validity

After the instruments I, II, and III were translated into Arabic, a group of five nursing administration specialists evaluated the instruments' face validity and made the required adjustments. Every member of the expert panel was inquired to evaluate the tools' overall appearance, length, format, language, clarity, and covering of the subject matter. After that, any necessary adjustments were done.

Tools' Reliability

The tools' reliability was examined to evaluate their consistency. The Cronbach's alpha test was employed

to assess the degree of correlation among the components of the tool and how effectively they measured the same concept. The results indicated that the measures employed in this study had strong internal reliability, with the following values: internal working coalition's tool was 0.849, Nurses' VB was 0.917, and OP was 0.885.

Pilot Study

Before the data collection from nurses at two hospitals began, pilot research was conducted. The aim of this pilot study was to evaluate the tools' comprehensiveness, clarity, accessibility, and utility, well as the time needed to fill out the tools about 28 minutes. The pilot study included thirty-five nurses, which constitutes ten percent of the overall nurses. The findings of the pilot study were not combined into the final results.

Procedure

- The faculty dean and the Scientific Research Ethics Committee of the Faculty of Nursing, Minia University were asked to approve official letters; these letters contained a brief description of the study's aims.
- Examine of related evidence covering different aspects of the issue was conducted using available journals and books.
- The tool was translated into Arabic. The researchers reviewed and validated by the jury committee composed of five experts in nursing administration to test the tools' validity.
- Before carrying out the pilot study and the actual research, an official

letter was obtained from the director of two hospitals to the nursing directors of the hospitals.

- The researchers were explained the aim, and significance of the study for every nurse to get better cooperation, The time needed for fill the tools was obtained post making the pilot study.
- After explaining the research's nature and purpose, oral agreement was obtained from the nurses. Then after the aim and method of collecting data were explained, all nurses were provided with the tools.
- In the morning shift, the researchers distributed the tools to the nurses and addressed their inquiries. The pilot study measured nurses' response time to the tools as being between 27 and 29 minutes. After completing the filling in of the tools, collected the sheets from the nurses.
- Data collection from nurses was conducted between 15 September 2024 and 14 December 2024.

Ethical considerations

Before the pilot study and the main research were carried out, a formal letter from the Research Ethics Committee of the Minia University Faculty of Nursing was issued to obtain permission and consent from the hospital managers, nursing managers, and head nurses of two previous hospitals. After the participating nurses were informed about the study's nature and objectives, they provided their oral acceptance. The study participant can refuse to take part or exit the study at

any time without needing to give a reason. As data collection occurred, the privacy of research participants was considered. Participants were assured that all their information would remain entirely confidential; each nurse was assigned a number in place of their name, which provided additional protection for anonymity.

Data Analysis

The gathered data was counted, processed, analyzed, and concluded using SPSS version (25). Descriptive statistical tests were used to test the study items. The qualitative data was expressed using percentages and frequencies. The probability (P-value) indicates the level of significance; a value < 0.05 was considered significant, a value < 0.001 was considered very significant (**), and the more significant the result (*), the lower the P-value.

The statistical correlation is utilized to indicate the type and level of link between internal working coalitions and nurses' VB as well as OP. The value of the co-sign efficiency indicates the strength of the link and whether it is positive or negative. A Rho value less than 0.25 indicates a weak correlation, a value between 0.25 and 0.499 indicates a fair link, a value between 0.50 and 0.74 indicates a robust correlation, and a value greater than 0.74 indicates a strong correlation (Akoglu, 2018).

Results

Table (1) reports that 46.7% of nurses are aged below or equal thirty years old with mean 29.8122 ± 2.326 , and 62.2% of them are female, also 63.9% of them are married, 41.0% of them have below or equal ten years of experience with mean 8.4384 ± 2.226 , while 47.3% of them have technical institute of nursing, and 56.2% of them from rural area, finally 58.2% of them are worked in Minia Emergency University Hospital.

Figure (1) reveals that 50.2% of nurse have high level of internal working coalitions, then 42.2% of them have moderate level of internal working coalitions, while 7.4% of them have low level of internal working coalitions. **Figure (2)** reveals that 43.00% of the nurses have high level of nurses' voice behavior, then 33.20% of them have moderate level of nurses' voice behavior, while 23.80% of them have low level of nurses' voice behavior.

Figure (3) justifies that 41.30% of the nurses have high level of organizational pride, then 42.10% of them have moderate level of organizational pride, while 16.60% of them have low level of organizational pride.

Table (2) displays that there is a strongly positive correlation between internal working coalitions and nurses' voice behavior as well as their organizational pride (p value =0.001).

Table (1): Nurses' personal data (no.=349)

Personal data	Nurses (no.=349)	
	no	%
Age		
≤30	163	46.7
31-40	109	31.2
>40	77	22.1
Mean ± SD	29.8122±2.326	
Gender		
Male	132	37.8
Female	217	62.2
Marital status		
Single	108	30.9
Married	223	63.9
Divorce or widowed	18	5.2
Years of experience		
≤10	143	41.0
11-20	118	33.8
>20	88	25.2
Mean ± SD	8.4384±2.226	
Educational qualifications		
Bachelor of nursing	103	29.5
Technical institute of nursing	165	47.3
Secondary school nursing diploma	81	23.2
Residence		
Urban	153	43.8
Rural	196	56.2
Hospital name		
Minia Emergency University Hospital	203	58.2
Renal and Urology University Hospital	146	41.8

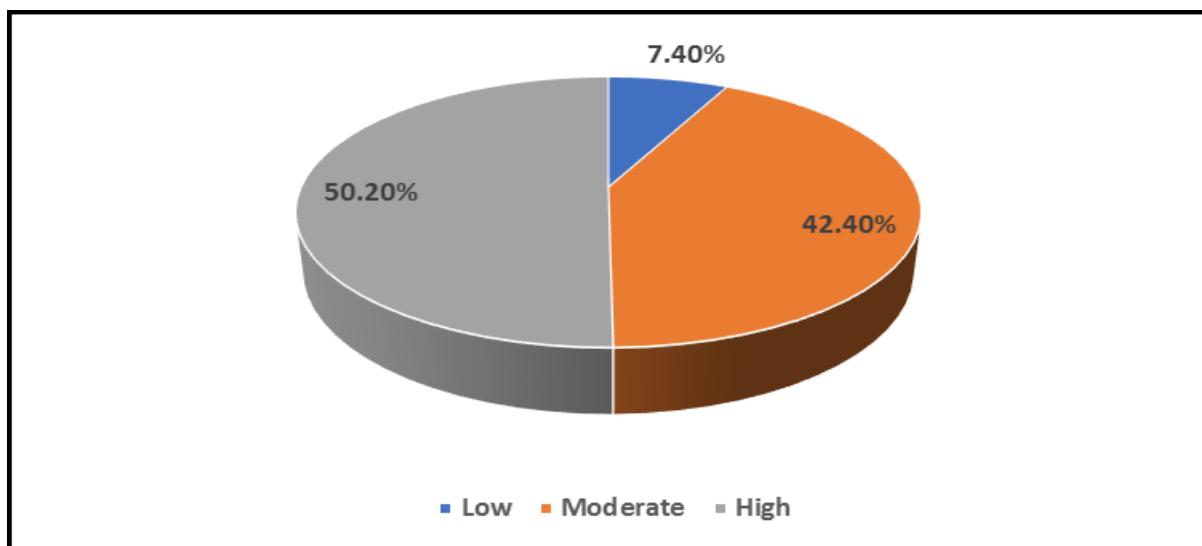


Figure (1): Nurses' levels of total internal working coalitions (no.=349)

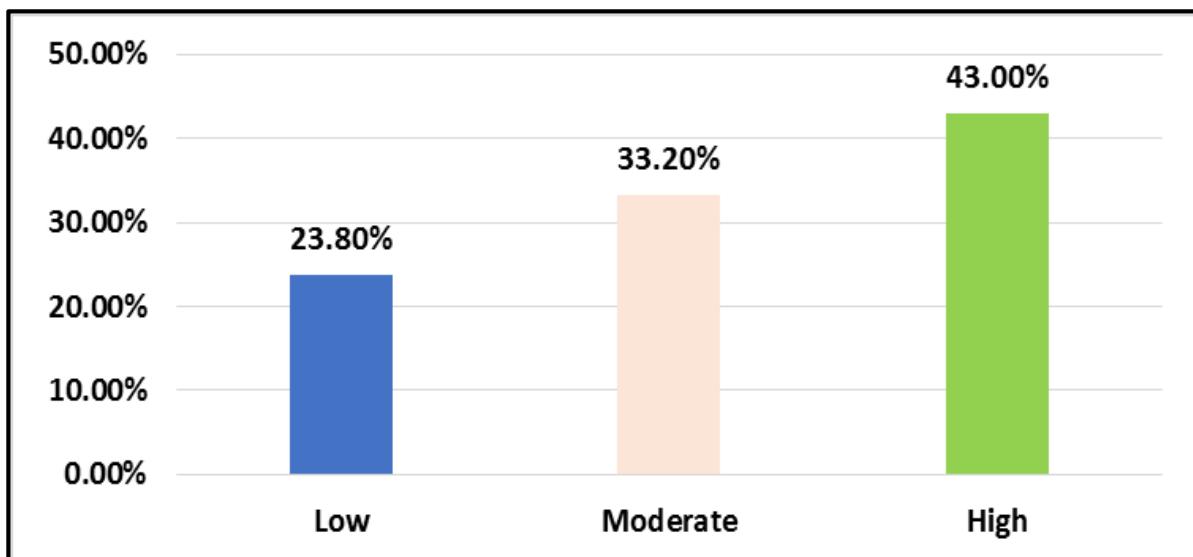


Figure (2): Nurses' levels of total voice behavior (no.=349)

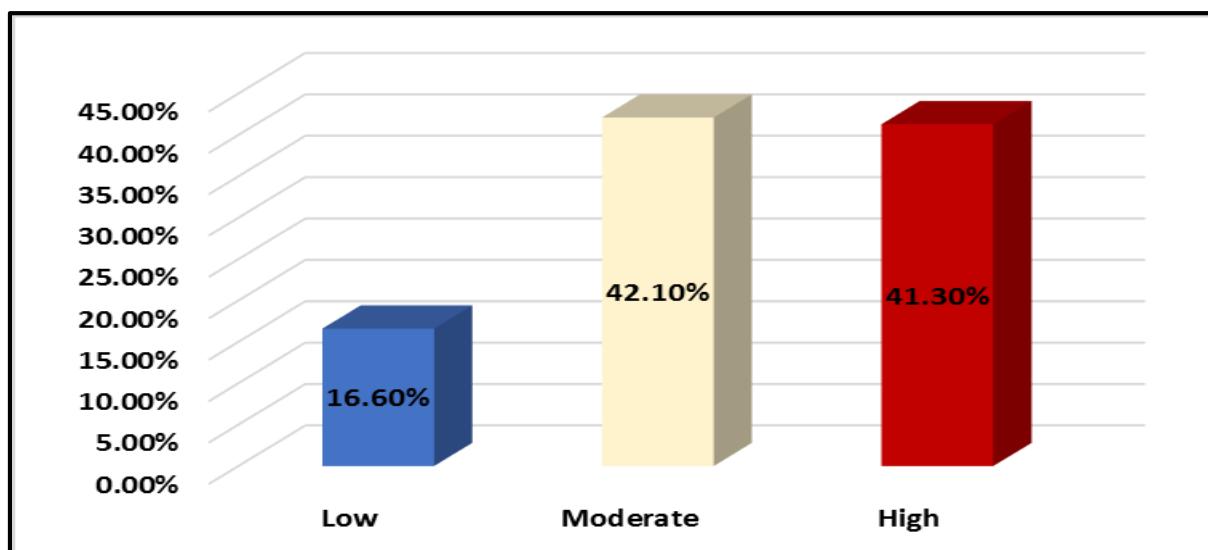


Figure (3): Nurses' levels of total organizational pride (no.=349)

Table (2): Correlation between internal working coalitions and nurses' voice behavior as well as their organizational pride (no.=349)

Variable	Internal working coalitions		Nurses' voice behavior	Organizational pride
	r	P- value	r	P- value
Internal working coalitions	r		0.704** 0.001	0.839** 0.001
Nurses' voice behavior	r	0.704**** 0.001		0.925** 0.001
Organizational pride	r	0.839** 0.001	0.925** 0.001	

**. The significance of correlation at the 0.01 level (2-tailed).

Discussion

Internal working coalitions in healthcare are the formal and informal alliances among nurses and other healthcare professionals that influence communication, teamwork, and

organizational culture. These coalitions play a vital role in shaping nurses' voice behavior (the willingness to speak up with suggestions, concerns, or feedback) and organizational pride (a strong

emotional connection and commitment to the organization) (Abdullah, Ebrahim & Ghoneimy, 2024).

Concerning nurses' personal data, the actual study revealed that the highest number of nurses' age was (<30yrs). Regarding their gender, the study results noted that more than sixty percent of them were female. Also, more than three-fifths of them were married. Concerning their years of experience in nursing, it was noted that more than two-fifths were <10 years. For their educational qualification, the current study revealed that nearly half of them had a technical institute of nursing. Moreover, excessed half of them lived in rural areas. Finally, for their hospital name, above half of them worked at Minia Emergency University Hospital.

Nurses' total internal working coalitions, the present study results reported that half of the nurses had a high level of internal working coalitions, while more than forty percent of them had a moderate level. From the perspective of the researchers, this indicates that a significant portion of nurses possess strong interpersonal skills, effective communication, and a collaborative mindset, fostering high levels of internal working coalitions. These nurses likely excel in building trust, resolving conflicts, and maintaining professional relationships within their teams. Meanwhile, over forty percent demonstrating a moderate level may reflect varying levels of experience, organizational support, or personal adaptability, suggesting opportunities

for targeted interventions like team-building exercises, leadership training, or mentorship programs to enhance their coalition-building abilities.

This result is congruent with the study conducted by Campbell, Harmon, Joyce & Little (2020) who found that most of the studied subjects reported good levels of work coalitions. Also, this result was in agreement with Brittin et al. (2020) who mentioned that a high percentage of the subjects had high awareness related to work coalitions. While the finding is not supported by Abdullah et al. (2024) whose study found that more than half of the nurses reported a moderate level of internal work coalitions.

Regarding Nurses' total voice behavior, the actual study revealed that the highest percentage of the nurses had a high level of nurses' VB. This reflects a supportive work environment and strong confidence, enabling them to express concerns, share ideas, and advocate for improvements in patient care and workplace practices. This finding is aligned with Zhang, Huang, Hu, Chen & Zhao (2024) who found that more than two-fifths of NICU nurses reported a high level of voice behavior. Conversely, Atalla et al. (2022) study results revealed that only thirty percent of the nurses reported a high level of voice behavior, and emphasized the positive correlation between nurses' core competencies and their VB, suggesting that not all nurses exhibit high levels of VB.

Regarding Nurses' total organizational pride, the present study introduced that above forty

percent of the nurses had a high and moderate level of nurses' organizational pride. This could be attributed to a supportive work environment, effective leadership, and recognition of their efforts in delivering quality care. When nurses perceive their organization as successful, ethical, and aligned with their personal and professional goals, it fosters a sense of pride and loyalty. Additionally, opportunities for professional growth, collaboration, and acknowledgment of their contributions are likely to enhance this sentiment, contributing to their overall job satisfaction and commitment.

This is congruent with a study by **Johnson and Lee, (2022)** whose findings showed high levels of OP among staff nurses. Also, **Ahmad, Barattucci, Ramayah, Ramaci, & Khalid (2022)** study found that the highest number of nurses had a high and moderate level of organizational pride. However, the study finding is not attributed to **Badran and Mohamed, (2024)** they revealed that a moderate perceived level of OP was reported by the majority of nurses (greater than seventy-five shows that a sizable percentage of participants had a moderate level of OP, which may point to a subset of workers who have an extraordinarily high level of attachment to the company. Additionally, the results of the current study show that a small fraction of nurses had a high degree of OP, while the majority reported a moderate level. These findings are somewhat different from those of **Brown and White (2021)**.

Concerning the correlation between internal working coalitions and their impact on nurses' voice behavior as well as organizational pride, the current study displayed that there was a strong positive statistical correlation between internal working coalitions and nurses' VB as well as their OP (p value= .001). This suggests that effective teamwork and collaboration enhance nurses' confidence to express their ideas and advocate for change. This, in turn, fosters a sense of pride in their organization, as cohesive teams and open communication contribute to a supportive and empowering work environment.

This finding is attributed to **Kepplinger, Braun, Fringer & Rose, (2024)** reported that a strong positive correlation between team synergy and nurses' VB, as well as their OP. Also, **Abdullah et al. (2024)** found a highly positive correlation between nurses' internal work coalitions and their work outcomes. Additionally, **Zhang et al. (2024)** they demonstrated a significant positive correlation between organizational trust and VB among NICU nurses, indicating that trust within the organization fosters open communication

Conversely, **Yıldırım and Şahin, (2021)** they reported that while OP positively impacts job satisfaction, it does not directly influence VB. These findings highlight the complex interplay between internal coalitions, VB, and OP, emphasizing the need for supportive work environments to enhance these aspects.

Conclusion

This research concluded that, above fifty percent of nurses had high level of internal working coalitions, and low fifty percent of them had moderate level of internal working coalitions. **Also**, low fifty percent of nurse had high level of nurses' voice behavior, then about one third of them had moderate level of nurses' voice behavior. Finally low fifty percent of nurses had high and moderate level of organizational pride.

Additionally, there was strongly positive correlation between internal working coalitions and nurses' voice behavior as well as their organizational pride (p value =0.001).

Recommendations

Nursing administration

- Conducting educational program about internal work coalitions for nurses to enhance their voice behavior as well as organizational pride.
- Focusing more on the internal coalition's critical function as a useful tactic for enhancing nurses' collaborative skills and enhancing their job results.
- Establishing a transparent and empowering workplace that encourages nurses' voice and behavior.
- Evaluate the voice behaviors of nurses by nursing administrators at regular periods.

Further researches

- Performing research to ascertain how internal health care team work coalitions impact corporate excellence.

- Performing research to create plans for strengthening internal alliances among staff nurses

References:

Abd El Salam, M, Abo Habieb, E., & El-Wkeel, N. (2024). Paternalistic Leadership, Organizational Cynicism and its Relation with Organizational Pride among Staff Nurses at Main Mansoura University Hospital. *Assiut Scientific Nursing Journal*, 12(44), 109-119.

Abdullah, S., Ebrahim, M., & Ghoneimy, G. (2024). The Relation between Internal Work Coalitions and Nurses' Work Outcomes. *Journal of Nursing Science Benha University*, 5(2), 450-463.

Ahmad, M., Barattucci, M., Ramayah, T., Ramaci, T., & Khalid, N. (2022). Organizational support and perceived environment impact on quality of care and job satisfaction: a study with Pakistani nurses. *International Journal of Workplace Health Management*, 15(6), 677-693.

Akoglu, H. (2018). User's guide to correlation coefficients. *Turkish journal of emergency medicine*, 18(3), 91-93.

Atalla, A., Mostafa, W., & Ali, M. (2022). Relationship between Staff Nurses' Core Competencies and their Voice Behaviors: A Cross Sectional Study. *Tanta Scientific Nursing Journal*, 27(4), 45-64.

Badran, F., & Mohamed, E. (2024). Organizational Pride and Job Satisfaction among Staff Nurses. *Research Square*, 1:13.

<https://doi.org/10.21203/rs.3.rs-4391456/v1>

Berkowitz, S, & Allen, N. (2021). Building collaborative capacity in community coalitions: A review and integrative framework. *Journal of Community Psychology*, 29(2):241-261.

Brittin, J., Oakland, K., Rogers, J., Rich, R., Bazuin, D., Harper, K., & Roy, L. (2020). From competition to collaboration: How a multi-firm research coalition is realizing rigorous facility evaluation at Parkland Hospital. *HERD: Health Environments Research & Design Journal*, 13(2), 32-45.

Brown, A., & White, B. (2021). The impact of organizational pride on job satisfaction among hospital nurses: A cross-sectional study. *Journal of Nursing Administration Management*, 29(3), 470–478. <https://doi.org/10.1234/jnm.2021.12345>

Campbell, L., Harmon, M., Joyce, B., & Little, S. (2020). Quad Council Coalition community/public health nursing competencies: Building consensus through collaboration. *Public Health Nursing*, 37(1), 96-112.

Cooper, J. (2022). Building Coalitions to Promote Health Equity: A Toolkit for Action, Available at <https://campaignforaction.org/wp-content/uploads/2020/04/Health-Equity-Toolkit-5-26-21-Protected.docx>.

Cramer, M., Lazure, L., Morris, K., Valerio, M., & Morris, R. (2013). Conceptual models to guide best practices in organization and development of State Action Coalitions. *Nursing outlook*, 61(2), 70-77.

Durrah O, Chaudhary, M, & Gharib, M. (2019). Organizational Cynicism and Its Impact on Organizational Pride in Industrial Organizations. *International Journal of Environmental Research and Public Health*, author profiles for this publication at: <https://www.researchgate.net/publication/332173818>

Fortunato, D., McCrain, J., & Schiff, J. (2021). The Cycle of Coalition, How Parties and Voters Interact under Coalition Governance Journal: *State Politics & Policy Quarterly*, Cambridge University Press, 23 (3): 327-339

Irene, C. (2022). Coalitions committed to advancing health equity. *Journal of Nursing Outlook*, 70(6): S48-S58.

Johnson, E., & Lee, F. (2022). Exploring the role of organizational pride in predicting job satisfaction among staff nurses: A cross-sectional study. *Journal of Organizational Development*, 30(3), 201–215. <https://doi.org/10.6789/jod.2022.2011>

Kepplinger, A., Braun, A., Fringer, A., & Roes, M. (2024). Opportunities for nurses to address employee voice in health care providers: a scoping review. *BMC nursing*, 23(1), 651.

Li, X., Xue, Y., Liang, H., & Yan, D. (2020). The Impact of Paradoxical Leadership on Employee Voice Behavior: A Moderated Mediation

Model. *Frontiers in psychology*, 11, 537756. <https://doi.org/10.3389/fpsyg.2020.537756>

Liang, J., Farh, C., & Farh, J. (2012). Psychological antecedents of promotive and prohibitive voice: A two-wave examination. *Academy of Management journal*, 55 (1), 71-92.

Madrid, H. (2020). Emotion regulation, positive affect, and promotive voice behavior at work. *Frontiers in Psychology*, 11, 1739.

Martha, A., & Susan, B. (2022). Better together: Coalitions committed to advancing health equity. *Nursing Outlook*, 70 (6): S48-S58.

Mohammad, A., Abd El Rahman, S., Ali, R., & Ali, H. (2022). Effect of Organizational Cynicism on Quality of Work Life and Employee Effectiveness among Nursing Staff. *Minia Scientific Nursing Journal*, 11(1), 2-10.

Obied, H., & ELsaeed, Z. (2023). Influence of Supervisor's Paradoxical Leadership and Organizational Learning Capability on Nurses' Voice Behavior: Comparative Study. *Assiut Scientific Nursing Journal*, 11(38), 216-226.

Refae, M., El sayed, M., Mallokhkia, A., Nomir, M. (2023). Sociological Study of Viability of Rural Health Organization in Abo Homos in Behera Governorate. *Journal of the Advances in Agricultural Researches*, 28(2): 271-284.

Yang Y. (2021). Understanding the Antecedents of Employee Voice: A Review of the Literature. *Jap. J. Hum. Res. Manag*, 21(2), Pp. 58-86. doi.org/10.24592/jshrm.21.2_58

Yıldırım, H., & Şahin, F. Y. (2021). A study on the counselors' levels of professional pride and job satisfaction according to certain variables. *Participatory Educational Research*, 8(4), 1-23.

Zhang, X., Huang, X., Hu, Y., Chen, Q., & Zhao, X. (2024). The relationship between organizational trust and voice behavior among neonatal intensive care unit nurses in tertiary a hospitals in Sichuan Province: the mediating role of career resilience. *Frontiers in Public Health*, 12, 1505641. <https://doi.org/10.3389/fpubh.2024.1505641>.

Relationship between Energy Drinks Consumption and Academic Performance among King Saud bin Abdulaziz University Students; Al Ahsa- kingdom of Saudi Arabia

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Abstract

Background: Energy drinks are drinks used to stimulate and energize mental and physical activity. Energy drinks have become increasingly popular among students in recent years, who often consume them to help combat fatigue, increase alertness, and try to boost academic performance. As a result, it can affect academic performance in a negative manner. **Aim of the Study:** assess the relationship between ED consumption and academic performance among KSAU students AlAhsa. **Setting:** King Saud Bin Abdulaziz University for Health Science. **Study Design:** A cross-sectional, quantitative study utilizing surveys and academic records. **Subjects:** 417 undergraduate students aged 18-25 years who enrolled at KSAU-AlAhsa. **Tool:** A self-reported questionnaire which comprises two main parts: Part I Bio-Socio-demographic data of the students Part II: ED consumption data: which include 14 question related to consumption of ED containing caffeine. **Results:** 27.58% of the KSAU students consuming energy drinks, Red Bull and Code Red are most consumed ED, 45.08 % of the students experience side effects of consuming drinks like; Palpitation, Hand shaking and or Inability to sleep. Students consumed ER has lower GPA. **Conclusions:** A significant proportion of students consume ED to manage academic stress such as Red Bull and code red, which cause side effects and affect negatively their academic performance. **Recommendation:** Awareness campaigns to clarify health risks associated with excessive energy drink consumption. Further research needed to assess the direct health impacts of prolonged energy drink use. Peer-led programs; promoting healthier alternatives and stress management techniques in educational institutions.

Key words: Energy drinks, academic performance.

Introduction

University students represent a critical demographic for studying energy drink (ED) use and related effects. Energy drinks have become increasingly popular among students in recent years, who often consume them to help combat fatigue, increase alertness, and try to boost academic performance. However, a growing body of research has raised concerns about potential negative impacts of high-energy drink intake on health and academic outcomes in student populations (**Hoffman, 2021**).

Energy drinks are drinks used to stimulate and energize mental and physical activity. ED or sport drinks, are a kind of functional drinks, which mainly designed to be used before exercising (**Nadeem et al., 2021**). Caffeine, which is a component of ED, is a central nervous system stimulant included in the xanthine group. Ninety Percent of the caffeine leaves the stomach in around 20 minutes. After an hour, the effect begins and lasts for three to four hours. The maximum concentration is reached after 40 to 60 minutes. Caffeine has a half-life of around six hours in healthy humans. Caffeine has been consumed frequently throughout human history. According to research, Caffeine is used by around 80% of the world's population. Caffeine content in a cup of coffee, which approximately contains 240 ml of coffee, is 137 mg and 2 mg in cup of caffeinated coffee, and un-caffeinated coffee respectively. In addition, there is 47 mg of caffeine in a cup of tea (**Fagan, Di Sebastiano, Qian, Leatherdale, & Faulkner, 2020**).

The public is concerned about energy drinks due to their high levels of sugar and caffeine as well as their increased popularity among teens and young people. Therefore, The Saudi Council of Ministers has decided to prohibit energy drink advertising and the distribution of free energy drinks to customers of all ages. There are many different kinds of energy drinks, and what makes them each effective is the particular mix of the chemicals contains the following active ingredients; caffeine, laurine, ginseng mirba male, ginkgo biloba, carnitine, glucuronide, catteine, acai, milk thistle, and L-theanine (**Subaiea, Altebainawi, & Alshammary, 2019**). According to researches, caffeine is used by around 80% of the world's population (**Fagan et al., 2020**). Caffeine intake was proven to enhance performance, concentration, alertness and mood as reported by students in a previous study (**Riera-Sampol, Rodas, Martínez, Moir, & Tauler, 2022**). However, caffeine consumption was associated with poor quality of sleep, which has a negative impact on mental functioning. As a result, it can affect academic performance in a negative manner (**Alfonsi, Scarpelli, D'Atri, Stella, & De Gennaro, 2020**). Moreover; Caffeine consumption among students has been increasing dramatically because of media and social marketing of caffeinated beverages. Caffeine intake has gathered the attention in the last 10 years as result of broad exposure and the accessibility of these beverages, particularly among young people (**Kennedy & Scholey, 2022**).

In research conducted by The Aga Khan University, it was found that, 52% of medical students' utilized caffeine to cope with the pressure and stress associated with their academic and extracurricular activities (Khan, Nisar, & Naqvi, 2019). ED consumption rates in Saudi Arabia were reported by Alabbad et al., (2022) which were 45.63% from Dammam, 59.9% from Jeddah, 52.2% from Medina, 50.3% from Abha, and 60% from Hail that indicates the high consumption levels among people in Saudi Arabia. The consumption of these types of beverages seems to be related to factors such as male gender, friend gatherings and peer pressure (Alabbad et al., 2022). Also, based on a study conducted in 2018 on 667 students by a group of researchers; ED use is associated with stress. Mostly academic stresses are related to low academic performance (Kreitzberg, Golaszewski, Ludden, Loukas, & Pasch, 2022). As a result, 25% of university students reported regular energy drink consumption (Kennedy & Scholey, 2022).

Significant of the study

Most existing research has focused on Western student populations, with limited evidence specific to students in the Gulf region. Students at KSAU-Al Ahsa provide an opportunity to address this gap given the high prevalence of energy drink consumption previously observed in Saudi youth. This highlights the need to understand the patterns of energy drink consumption among university students and examine the effects of its consumption on their academic performance.

By surveying KSAU-Al Ahsa students about their energy drink intake habits and collecting academic performance data, this study can provide unique insights into the correlates of energy drink use and its potential impacts on academic outcomes among Saudi university students. Understanding these patterns and relationships is important for informing education and health promotion efforts addressing energy drink use on Saudi campuses. This research aims to provide evidence-based recommendations around energy drink consumption specific to the Saudi student context at KSAU-Al Ahsa.

Aim: assess the relationship between ED consumption and academic performance among KSAU students Al Ahsa.

Operational definition

Energy drinks: any beverage that contains high levels of a stimulant component, usually caffeine, as well as sugar and often additions, such as vitamins or carnitine, and that is promoted as a product capable of enhancing mental alertness, wakefulness and physical performance, increase energy, and improve mood.

Academic performance: is the measurement of student achievement across various academic subjects, teachers and education officials typically measure achievement using classroom performance, graduation rates, and results from standardized tests.

Research question

What is the relation between energy drinks use and academic performance of the university students?

Subjects and Methods

Setting: The study was conducted at King Saud Bin Abdul-Aziz University for Health Science

Study Design

A Cross-sectional quantitative descriptive and correlational research design study utilizing surveys and academic records.

Subjects

A convenient sample includes 417 undergraduate students aged 18-25 years who are enrolled at KSAU-Al Ahsa. Population sample targeting KSAU HS students was used to achieve the aim of the study, and all participants are chosen based on their availability and desire to participate in the study.

- The content validity of the developed tool was tested for clarity and applicability by seven experts in medical surgical nursing to ensure their validity and modifications were done. The reliability for the study tools was 0.832 calculated by using Cronbach's Alpha test.
- A pilot study: was carried out on 10% of the university students from the previously mentioned setting to test the feasibility and applicability, relevance and organization of the tools and to determine any obstacles that may be encountered during the period of data collection. Pilot study was excluded from the study sample.

Data Collection

A self-reported questionnaire was distributed to the students according to their availability to elicit the data of the study. The questionnaire comprises two parts:

1. Bio-Socio-demographic data: age, level, GPA, Marital status, number of children if any, presence of chronic disease, and income.
2. ED consumption data: which include 14 questions related to consumption of caffeine as; types; amount, time, causes, effect, and side effect of consuming ED, Caffeine consumption from other sources, Lifestyle factors like physical activity and sleep patterns, in addition to Academic performance data will be collected through students' grade point average (GPA) obtained from university records.

The questionnaire was given to jury of five faculties to examine its clarity and needed modification was done. Content validity and reliability was assessed before distributing the questionnaire. Questionnaire was distributed and collected after sign the informed consent according to the student' availability, Academic performance data was collected through students' grade point average (GPA) obtained from university records.

Data Analysis

Descriptive statistics summarize demographic variables, habits of energy drink consumption, and academic performance. Inferential statistics examined the relationships between energy drink intake and

academic performance using correlation and regression. Mediation analysis performed to assess if lifestyle factors mediate the relationship between energy drink and GPA.

Ethical Considerations

Research proposal was reviewed by CON-A research unit and institutional review board at KAIMRC, Approval was obtained with a number of SP23A/014/07, informed consent was obtained from each participant with maintaining of confidentiality and anonymity, each questionnaire was given a code instead of name, students were assured that their participation is voluntary and they have the right not to accept or withdrawn from the study without giving any reason which will not affect their grades, code was used instead of names, all data was used only for the purpose of the current research, data was kept in secured private personal computers, students' confidentiality was maintained at all time of the study period., so no participant identification was required.

Limitations

Limitations include the cross-sectional design, reliance on self-reported survey measures, and convenience sampling of students from a single university.

Results

The present study aims to assess the relationship between energy drinks consumption and academic performance among KSAU Students, Al Ahsa- KSA. Using a description, 417 students from KSAU Students were included. Results showed a mean age of 20.88 ± 1.02 years old,

majority of them 28.78% from level 7 followed by 24.94% from level 10, 64.03% were female and 87.05% were singles; moreover; considerable percent reported that they don't have enough income and no presence of chronic diseases 60.43% and 93.29% respectively. GPA of KSAU students ranged from 2.10 to 5.0 with a mean of 3.72 ± 0.61 . In addition, 34.77% did not practice any exercise or physical activity while 27.10% and 21.58% of them practicing walking and gym respectively with sleeping hours ranged from 2 to 12 hours with a mean of 6.41 ± 1.65 .

Caffeine containing drinks consumption;

Table 1 presents; distribution of the studied nursing students regarding consuming of caffeine containing drinks. It proved that among the 417 KSAU students, 75.78% of them drink tea with a mean of 5.61 ± 6.39 cup weekly, 78.18% drinks coffee with a mean of 5.97 ± 6.03 cup weekly and 44.6% drink the Arabic coffee. Night and morning is the time preferred time to drink tea and coffee by 47.96% & 47% of the students respectively, while they tend to drink caffeine-containing drinks when they feel tired 50.36%, followed by 48.92% during the examination time. In addition; students reported purpose of consuming tea and coffee that they like the taste, followed by improving the mode and to keep them awake 55.16%, 49.64% and 41.25% respectively with a majority 73.62% stated that consuming these drinks achieve the purpose of drinking and near to third 30.22% considered

themselves as a caffeine drinks addictive.

Energy & Soda drinks consuming; **Table 2** illustrates distribution of studied nursing students regarding soda and energy drinks consumption. Among the study sample, 72.42% of them did not consume energy drinks while cod red was the common used ED between the consumers (53.04%) followed by red ball 35.65% with a number of cans consumed per week ranged from 1 to 15 and a mean of 2.99 ± 2.65 can weekly.

Regarding soda drinks, it was found that 57.89% of the students drink Pepsi, 55.26% consume Coca-Cola and 32.33% & 34.96% drink Sprite and Seven Up respectively with a range of 1-25 cans consumed per week. Moreover, results illustrated that the majority 74.34% of the students recommended others to drink tea; followed by 69.54% recommended drinking coffee while only 24.94% who encourage consuming of energy drinks.

These findings indicate that a significant portion of nursing students recommend coffee and tea to others, while a smaller percentage recommend energy drinks and soda

drinks. The majority of students do not recommend energy drinks and soda drinks to others.

Common side effect of caffeine drinks consumption;

Table 3 presents distribution of studied nursing students regarding experience side effects of energy drinks. It showed that the most common side effects of energy drinks consumption reported by the studied students were: inability to sleep: 25.90%, stomach upset 17.51%, palpitation: 14.87% and hand shaking: 12.47% (Table3).

Effect of energy drinks on academic performance;

Table 4 presented the mean comparison of GPA of the studied nursing students based on their caffeine drinks consumption. The table presents that there was a significant difference between students' GPA and consuming of energy drinks where GPA of students who are not consuming energy drinks was higher than those who are consuming with $p = 0.027$; in addition students who considered themselves as caffeine addictive got lower GPA than those non addictive with $P= 0.004$.

Table (1): Distribution of nursing students regarding consuming of caffeine containing drinks

Caffeine containing drinks	The studied nursing students (n=417)	
	N	%
Drink tea		
- No	101	24.22
- Yes	316	75.78
Number of cups per week		
- Range	(1-40)	
- Mean \pm SD	5.61 \pm 6.39	
Drink coffee		
- No	91	21.82
- Yes	326	78.18
Number of cups per week		
- Range	(1-35)	
- Mean \pm SD	5.97 \pm 6.03	
# Type of coffee		
- Arabic	186	44.60
- Black	183	43.88
- Others	50	11.99
# Time of drinking caffeine drinks		
- Morning	196	47.00
- Afternoon	163	39.09
- Evening	150	35.97
- Night	200	47.96
# Situations to use caffeine drinks		
- When I feel tired	210	50.36
- When I feel exhausted	107	25.66
- When I fell stressed	106	25.42
- During exam time	204	48.92
- During family gathering	79	18.43
- When I feel bad mood	2	0.48
# Purpose behind consumption		
- To relieve headache	85	20.38
- For good concentration	127	30.46
- To improve the mood	207	49.64
- To keep me awake	172	41.25
- I like the taste	230	55.16
- To improve memory	33	7.91
- To enhance academic performance	41	9.83
- Others	2	0.48
Caffeine drinks achieved the purpose		
- Yes	307	73.62
- No	110	26.38
I am a caffeine drinks addict		
- Yes	126	30.22
- No	291	69.78

Table (2): Distribution of studied nursing students regarding soda and energy drinks consumption

Soda and Energy drinks	The studied nursing students (n=417)	
	N	%
Consuming of energy drinks		
- No	302	72.42
- Yes	115	27.58
Types of consumed energy drinks (n=115)		
- Red Bull	41	35.65
- Bison	16	13.91
- Code Red	61	53.04
- Power Horse	7	6.09
- Others	20	17.39
Number of energy drinks can per week		
Range	(1-15)	
Mean ± SD	2.99±2.65	
Consume soda drink		
- No	151	36.21
- Yes	266	63.79
# Types of soda drink (n=266)		
- Coca-Cola	147	55.26
- Pepsi	154	57.89
- Sprite	86	32.33
- Fanta	65	24.44
- 7 UP	93	34.96
- Miranda	76	28.57
- Others	19	7.14
Number of soda drinks can per week		
- Range	(1-25)	
- Mean ± SD	3.95±3.49	
Recommendation to drink		
1. Coffee		
- Yes	290	69.54
- No	127	30.46
2. Tea		
- Yes	310	74.34
- No	107	25.66
3. Energy drinks		
- Yes	77	18.47
- No	340	81.53
4. Soda drinks		
- Yes	104	24.94
- No	313	75.06

Table (3): Distribution of studied nursing students regarding experience side effects of energy drinks

# Experience about side effects of consuming drinks	The studied nursing students (n=417)	
	N	%
- None	229	54.92
- Palpitation	62	14.87
- Hand shaking	52	12.47
- Inability to sleep	108	25.90
- Depression	28	6.71
- Anxiety	42	10.07
- Irritability	22	5.28
- Stomach upset	73	17.51
- Headache	32	7.67
- Nervousness	24	5.76
- Dehydration	25	6.00
- Hypertension	17	4.08
- Polyuria	39	9.35
- Others	10	2.40

Table (4): Mean comparison between GPA of the studied nursing students and caffeine drinks consumption

Drink consumption	The studied nursing students GPA Mean \pm SD	F
		P
Drink tea		
- No	3.70 \pm 0.64	0.234
- Yes	3.73 \pm 0.60	0.629
Drink coffee		
- No	3.75 \pm 0.55	0.153
- Yes	3.72 \pm 0.63	0.696
Consume energy drinks		
- No	3.77 \pm 0.62	4.953
- Yes	3.62 \pm 0.57	0.027*
Consume soda drink		
- No	3.70 \pm 0.62	0.471
- Yes	3.74 \pm 0.61	0.493
Caffeine drinks helped to achieve purpose		
- Yes	3.71 \pm 0.62	1.151
- No	3.78 \pm 0.58	0.284
I am a caffeine addict		
- Yes	3.60 \pm 0.64	8.409
- No	3.78 \pm 0.59	0.004*

Discussion

After analysis of the data collected and study the literature reviews which indicate that the consumption of ED containing caffeine, taurine, herbal extracts, vitamins, and amino acids is prevalent among population particularly university students. Here is a comparison of the findings from the literature reviews with the data presented:

ED Consumption among Medical Students: Literature: 52% of medical students used caffeine, possibly in the form of EDs, to cope with academic and extracurricular stress (**Khan et al., 2019**), moreover, 74.8% of medical students reported using ED, with various brands mentioned, including Code Red, Red Bull, Bison, Powerhouse, and Monster (**Edrees et al., 2022**).

ED consumption rates varied across different regions, such as Dammam, Jeddah, Medina, Abha, and Hail, in Saudi Arabia, with high consumption levels among males associated with factors like peer pressure (**Alabbad et al., 2022**). The literature also stated high consumption rate among students, associated with academic pressure and possibly peer influence, as a significant percentage of students reported using ED (**Edrees et al., 2022**).

Smith (2016) reported high prevalence of caffeine consumption among the nursing students where 84% of college students drink caffeinated beverages regularly.

Hoffman et al. (2021) stated that 25% of university students reported regular energy drink consumption. Red Bull being the most common choice

(**Kennedy, & Scholey, 2019**). Using caffeine to improve concentration and academic performance relates to **Jones, Fernyhough, de-Wit, Meins, & Weisberg, (2019)** who identified cognitive enhancement as a key motivator for college students' caffeine use.

The association between energy drinks and lower GPA corroborates **Peters, DePuy, Belcher, & Savvides, (2021)** who reported lower GPAs among students consuming energy drinks frequently compared to infrequent consumers. The adverse side effects reported support **Temple, Dewey, & Briatico, (2017)** where students drinking more than two energy drinks per week had higher rates of sleep disturbances, nervousness, and fast heart rate with palpitation. Another study by **Sampasa-Kanyinga, Hamilton, Chaput, & Ferraro, (2018)** found that consumption of energy drinks resulted in sleep disturbance and low academic performance in high school students.

These studies suggest that higher consumption of energy drinks, which contain caffeine, may have a detrimental effect on academic performance among university students. It is important to notice that while caffeine can afford short-term advantages frequent and regular consumption may lead to adverse effects on sleep patterns, memory span, level of concentration, and overall cognitive functioning.

However, the present study provides new evidence specific to nursing students at KSAU in Saudi Arabia, a relatively understudied population

regarding caffeine intake patterns and effects as noted by **Wali et al. (2019)** in their literature review. More research on interventions tailored to this group is warranted, similar to the educational program implemented by **Cook, DiPietro, Sossin, & Trockel, (2022)** which showed promise in reducing energy drink use among university students.

In summary, while results parallel multiple previous studies on student caffeine use, this work offers unique insights into an underrepresented sample and context, further illuminating the need for focused research and interventions, the literature reviews and the data align in several aspects, demonstrating a widespread use of energy drinks, particularly among students facing academic and peer-related pressures. The composition of these drinks, the gender-based differences in consumption and the regional variations are consistent with the findings from the literature

Overall, the literature suggests a complex relationship between caffeine and energy drink consumption and academic performance in students - potential cognitive benefits on the one hand, but potential health risks on the other. More in-depth research is needed to fully understand the long-term impacts and to explore how differing levels of caffeine intake may affect students differently.

Conclusion

A significant proportion of KSAU' students consume ED such as Code Red and Red Bull, which often contain caffeine, taurine, and other

active ingredients with a range of 1-25 cans per week, purpose of use was to manage academic stress and relieve tiredness. ED cause side effects such as sleep disturbance, stomach upset and hand shaking in addition affects negatively students' academic performance. However, the implication that students are resorting to energy drinks as a mechanism to cope with academic stress indicates that there might be an underlying issue. Relying on energy drinks, as some literature suggests, could be associated with lower GPAs and adverse side effects, which in turn could impede academic performance.

Recommendations

- Awareness Campaigns:** Given the potential health risks associated with excessive energy drink consumption, universities and colleges should initiate awareness campaigns emphasizing the dangers of excessive ED consumption.
- Research on Health Impacts:** Further research is needed to assess the direct health impacts of prolonged energy drink use, especially when consumed in large quantities over extended periods.
- Peer-led Initiatives:** To counter peer pressure that may be contributing to higher ED consumption, peer-led programs promoting healthier alternatives and stress management techniques in the educational institutions.
- Educational Workshops,** Workshops focused on time management, relaxation techniques, and healthy alternatives to combat fatigue can offer students

alternative solutions to relying on EDs.

References

Alabbad, M. H., AlMussalam, M. Z., AlMusalmi, A. M., Alealiwi, M. M., Alresasy, A.I., Alyaseen, H. N., & Badar, A. (2022). Determinants of energy drinks consumption among the students of a Saudi University. *Journal of family & community medicine*, 26(1), 36.

Alfonsi, V., Scarpelli, S., D'Atri, A., Stella, G., & De Gennaro, L. (2020). Later School Start Time: The Impact of Sleep on Academic Performance and Health in the Adolescent Population. *International Journal of Environmental Research and Public Health*, 17(7), 2574.

Cook, A., DiPietro, M., Sossin, K., & Trockel, M. (2022). A pilot randomized control trial targeting energy drink consumption among college students. *Health Education & Behavior*, 49(1), 96-105.

Edrees, Awatif E; Altalhi, Thekra M.; Al-halabi, Shatha K.; Alshehri, Hibatullah A.; Altalhi, Hadeel H.; Althagafi, Atheer M.; Koursan, Samar M. (2022). Energy drinks consumption among medical students of Taif University. *Journal of Family Medicine and Primary Care* 11(7): p 3950-3955.

Fagan, M. J., Di Sebastian, K. M., Qian, W., Leatherdale, S., & Faulkner, G. (2020). Coffee and cigarettes: Examining the association between caffeinated beverage consumption and smoking behaviour among youth in the COMPASS study. *Preventive medicine reports*, 19, 101148.

Hoffman, J.R., Faigenbaum, A.D., Ratamess, N.A., Ross, R., Kang, J., & Tenenbaum, G. (2021). Nutritional supplementation and anabolic steroid use in adolescents. *Medicine and Science in Sports and Exercise*, 40 (1), 15-24.

Jones, H.A., Fernyhough, C., de-Wit, L., Meins, E., & Weisberg, Y.J. (2019). Individual differences in the motivational dimensions of caffeine use in university students. *Appetite*, 117, 137-146.

Kennedy, D.O., & Scholey, A.B. (2019). A glucose-caffeine 'energy drink' ameliorates subjective and performance deficits during prolonged cognitive demand. *Appetite*, 44(3), 331-333.

Khan, M. S., Nisar, N., & Naqvi, S. A. A. (2019). Caffeine consumption and academic performance among medical students of Dow University of health science (DUHS), Karachi, Pakistan. *Annals of Abbasi Shaheed Hospital and Karachi Medical & Dental College*, 22(3), 179-184.

Kreitzberg, D. S., Golaszewski, N. M., Ludden, A. B., Loukas, A., & Pasch, K. E. (2022). Academic achievement, stress, and energy drink consumption among middle school youth.

Journal of Caffeine and Adenosine Research, 9(1), 20-27.

Nadeem, I. M., Shamugaraj, A., Sakha, S., Horner, N. S., Ayeni, O. R., & Khan, M. (2021). Energy drinks and their adverse health effects: a systematic review and meta-analysis. *Sports Health*, 13(3), 265-277.

Peters, J.R., DePuy, J., Belcher, B.R., & Savvides, P. (2021). Energy drink consumption and its association with sleep problems among college students. *Journal of American College Health*, 56(4), 463-468.

Riera-Sampol, A., Rodas, L., Martínez, S., Moir, H. J., & Tauler, P. (2022). Caffeine intake among undergraduate students: sex differences, sources, motivations, and associations with smoking status and self-reported sleep quality. *Nutrients*, 14(8), 1661.

Sampasa-Kanyinga, H., Hamilton, H. A., Chaput, J. P., & Ferraro, Z. M. (2018). Sleep duration and consumption of sugar-sweetened beverages and energy drinks among adolescents. *Nutrition*, 48, 77-81.

Smith, A. P. (2016). Caffeine, tasks and measures of sustained attention. In: L. Dube, A. Bechara, A. Dagher, A. Drewnowski, J. LeBel, P. James & R.Y. Wang (Eds.) *Obesity Prevention: The Role of Brain and Society on Individual Behavior* (pp. 755-764). London: Elsevier.

Subaiea, G. M., Altebainawi, A. F., & Alshammari, T. M. (2019). Energy drinks and population health: consumption pattern and adverse effects among Saudi population. *BMC Public Health*, 19(1), 1-12.

Temple, J.L., Dewey, A.M., & Briatico, L.N. (2017). Effects of acute caffeine administration on adolescents. *Experimental and Clinical Psychopharmacology*, 18(6), 510-520.

Wali, S.O., Qutah, K., Abushanab, L., Basamh, R., Abushanab, J., & Krayem, A. (2019). Effect of energy drinks on the cardiovascular system among university students. *Food and Nutrition Sciences*, 5(7), 659-668.

Empowerment Program Regarding Attention Deficit Hyperactivity Disorder for Preschool Teachers

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Abstract

Background: Preschool teachers are the first environment to notice children with attention deficit hyperactivity disorder; so, they should have a good understanding of how to deal, and control of those children, also with the disorders' symptoms, risk factors, and problems. **Aim:** evaluate the effect of empowerment program regarding attention deficit hyperactivity disorder for preschool teachers. **Design:** A quasi-experimental research design used. **Setting:** at six nurseries named El Malek Nasef nursery school, Al Saady Besharah nursery school, Abdellatif Hassanein nursery school, Kafer Al Ashraf nursery school, Al Naseriah nursery school, and Om Elmoamenien nursery school at Zagazig city. **Sample:** convenience sample consisted of 80 preschool teachers. **Tools:** four tools used; structure questionnaire sheet, preschool teachers' knowledge about ADHD, preschool teachers' positive and negative attitudes toward ADHD children, preschool teachers' practices toward students with ADHD. **Results:** 55% of the sample was aged between 30-45 years old, and 70% of the had higher levels of education, in addition to 57.5% of the preschool teachers were with less 5 years of experiences, Also 89.10% of the preschool teachers gained their knowledge via searching the internet about ADHD, Also 18.90% had good knowledge before the empowerment program and this increased to 77.30% after the implementation of the empowerment program, The total scores regarding ADHD satisfactory practices increased from 17.40% at the pre phase to 64.20% after the empowerment program, the total positive attitudes toward ADHD scores increased from 14.80% at the pre phase to 61.30% after the empowerment program. **Conclusion:** the applying of empowerment program for the preschool teachers was effective in enhancing their knowledge, practices and positive attitudes regarding ADHD, and there was positive correlation among the knowledge, practices and attitudes all at level ($P \leq 0.05$). **Recommendation:** Establishing empowerment programs at nursery schools could be helpful to the preschool teachers regarding their knowledge, attitudes, and practices about ADHD.

Key words: Attention Deficit Hyperactivity Disorder, Empowerment program, Preschool teacher.

Introduction

Attention Deficit Hyperactivity Disorder (ADHD) is one of the most prevalent childhood behavioral conditions. The condition defined by two main symptoms, challenges with attention and hyperactive-impulsive behaviors. Children with attention difficulties often struggle to stay focused, frequently make mistakes due to lack of attention and tend to avoid activities requiring prolonged concentration. Those experiencing hyperactivity and impulsively show signs like constant motion, excessive chattiness, and frequently interrupting conversations. These symptoms must be persistent and significant enough to impact daily functioning for a diagnosis (El Hawy, Said, Hammouda, & Nofal, 2023).

To diagnose the disorder, a child must exhibit at least six symptoms from any of the categories, with these symptoms significantly affecting their social life or academic performance for a minimum period of six months. The symptoms must appear before age twelve and be present across multiple environments. Additionally, it's crucial that these symptoms cannot be attributed to or explained by any other medical or psychiatric condition (Abd Elaleem, Osman, & Abd El-Fatah, 2024).

About five percent of children worldwide are thought to have ADHD (Tharwat et al., 2019). ADHD affects approximately 1-20% of children globally across both developed and developing nations. In Arab countries, particularly Egypt, the prevalence shows considerable variation, with rates fluctuating between 1.3% and

20%. These varying rates can be attributed to differences in research methodology, demographic factors, information sources, diagnostic criteria, and study sample sizes (Abd Elaleem, Osman, & Abd El-Fatah, 2024).

The exact cause of ADHD remains ADHD emerges from a sophisticated combination of inherited, biological, and environmental elements, though scientists have not pinpointed its exact origins. The hereditary aspect is particularly striking, as offspring of ADHD-affected parents have more than a 50% chance of inheriting the condition. Research has also demonstrated that mothers who drink alcohol or smoke while pregnant elevate their child's ADHD risk by over 30% (Bukhari, 2022).

Attention Deficit Hyperactivity Disorder manifests in three primary presentations: those who struggle with attention (inattentive type), those who primarily exhibit hyperactivity and impulsiveness (hyperactive-impulsive type), and those who display both sets of symptoms (combined type). The condition's diverse symptoms can make an accurate diagnosis complex. Children who are quiet and do not disrupt class may have their ADHD symptoms missed, particularly if they have the inattentive type. Conversely, some children might be incorrectly labeled as having behavioral problems when ADHD is the underlying cause. These diagnostic challenges frequently lead to delays in both identifying ADHD and implementing appropriate therapeutic interventions (Macyko, 2023).

Preschool teachers are uniquely positioned to detect early signs of ADHD in young children through daily classroom observations and interactions. Their consistent presence in structured learning environments enables them to monitor behavioral patterns, social dynamics, and academic engagement that may signal attention-deficit concerns (**Kristanto, 2023**).

Early childhood education focuses on creating an inclusive, integrated learning environment where children with physical and mental disabilities learn alongside their peers. This approach ensures that all specialized instruction and support services are delivered within mainstream classroom settings (**Gao, Yu, Li, & Tao, 2023**).

Empowerment programs and interventions designed for preschool teachers aim to enhance their knowledge of developmental disorders, equip them to create nurturing educational spaces, and develop effective problem-solving strategies (**Eltyeb et.al., 2023**).

The empowerment program was designed to equip preschool teachers with comprehensive knowledge about ADHD and effective strategies for managing children with this condition. The program focuses on implementing techniques to enhance children's self-image and build their confidence through academic success, enabling them to adapt and thrive regardless of environmental changes they encounter throughout their educational journey (**Mohammed, Zaghimir, Abo Elsoud, & Ayed, 2021**). ADHD symptoms can

significantly impact a child's cognitive development and social interactions. Therefore, nurses play a crucial role in managing ADHD-related challenges and alleviating the stress experienced by parents, teachers, and family members (**Shattla, Hassan, Arrab, & Alhalawany, 2021**).

Nurses serve as a vital function in supporting teachers who work with students facing health challenges. They assist by unconditionally accepting each child, providing psychosocial interventions, and creating a supportive care environment. These healthcare professionals meet children at their developmental level, communicate through clear and straightforward instructions, and maintain consistent daily schedules. They also ensure a calm learning environment, offer positive reinforcement, and promote physical activities to enhance overall well-being (**Hussein, Mahmoud, & Mohammed, 2024**).

Significance of the study

Attention deficit hyperactivity disorder significantly impacts children's academic performance, emotional health, and ability to form social relationships. This prevalent neurodevelopmental condition affects a substantial number of school-aged children worldwide. The disorder can create substantial challenges in a child's daily functioning, particularly in educational settings and interpersonal connections (**APA, 2022**). Epidemiological data indicate that 5% to 11% of individuals under 18 years of age are affected, with males showing a higher prevalence

than females (Akdağ, 2023). The preschool period marks a vital stage in child development, creating an urgent need to assess and improve how preschool teachers understand and handle ADHD in their classrooms.

Aim

Evaluate the effect of empowerment program regarding attention deficit hyperactivity disorder for preschool teachers.

Operational definition

The empowerment program refers to strengthening preschool teachers' knowledge, attitudes, and practices regarding attention deficit hyperactivity disorder.

Subjects and Method

Hypothesis

- Preschool teachers' knowledge, attitudes and practices scores after programs will be higher than before.

Design: A Quasi-experimental design utilized to fulfill the aim of the study.

Setting: A multi cluster technique used in the requirement of the study setting as follows:

- Stage 1: at this stage, two educational administrations of the Zagazig City selected; those were namely the East and the West administration.
- Stage 2: this stage involved random selection of nursery schools:

The first zone (East administration) includes 48 nursery schools, three nurseries were randomly selected namely: El Malek Nasef nursery school, Al Saady Besharah nursery school, and Abdellatif Hassanein nursery school.

The second zone (West administration) includes 34 nursery

schools; three nursery schools were randomly selected namely: Kafer Al Ashraf nursery school, Al Naseriah nursery school, and Om Elmoamenien nursery school.

Sample

A convenience sample of 80 teachers was picked up.

The sample size was determined according to the following equation:

$n = (Z \alpha/2)^2 p (1 - p)/d^2$, (Thanasekaran et al., 2016); where n= sample size of the population, Z $\alpha/2$ critical value of 95% CI= 1.96, p= proportion (0.564), d2 = the accuracy of estimate (0.05)²

Tool for data collection

Structure interview sheet

Part (I): sociodemographic characteristics of the studied subjects developed by researchers, including demographic characteristics of preschool teachers, such as, place of residence, age, years of experience and educational level.

Part (II): ADHD knowledge among preschool teachers. This assessment tool was adapted from an Arabic version created by Mourad (2004) to evaluate parental understanding of ADHD. The tool consists of 7 questions covering key aspects of ADHD including its definition, etiology, symptoms, characteristics, and comorbid conditions.

Scoring System

Each question uses a 3-point scale:

- 2 points for a fully correct and complete response.
- 1 point for a correct incomplete response.
- 0 points for an incorrect incomplete response.

The total score converted to a percentage and classified as:

- **Good:** Above 75%
- **Fair:** Between 60-75%
- **Poor:** Below 60%

Part (III): preschool teachers' attitudes toward ADHD children: developed by the researchers guided by **Abd El Moneam, El-Boraie, Abd El-Fattah, & El-Etreby (2018)**, to assess attitudes toward ADHD children. The assessment tool consisted of 21 items that evaluated how preschool teachers anticipated and viewed children's conduct and participation during classroom activities.

Scoring System

Each answer assigned to a value:

"Yes" = 2 points

"No" = 1 points

Score Interpretation

The attitudes classification is determined by the total score percentage:

Positive Attitudes: Score is greater than or equal to 60% of total score.

Negative Attitudes: Score is less than 60% of total score.

Part (IV): Preschool teachers' reported practices toward ADHD children: This tool developed by the researchers under the guidance of **Abd El Moneam et al., (2018)**, it contains 46 items evaluating how preschool teachers interact with students who have ADHD. The measurement scale evaluated teachers' responses to children's behaviors using three levels:

Response Categories

Physical punishment, deprivation, or humiliation = 1 degree, Neglect and substituting the child's responsibilities

= 2 degree,
Supportive interventions through direction, guidance, and encouragement = 3 degree.

Scoring Classification

Performance categorized into two levels:

- **Unsatisfactory:** Below 60% of total score.
- **Satisfactory Performance:** 60% or higher of total score.

Pilot study: pilot study implemented to gauge the efficacy of the research tools and the clarity of the questions. This initial assessment engaged 8 preschool teachers, constituting 10% of the intended sample size. The study also recorded the time taken by participants to finish the research tools. Following an analysis of the pilot study results, the researchers concluded that no modifications or eliminations required for the questionnaire items.

Content validity

The research tools underwent validation through thorough assessment by a panel of three professors of faculty members at Zagazig University's Nursing Department - two experts in Community Health Nursing and one specialist in Pediatric Health Nursing. The measurement tools then modified and enhanced based on their professional insights and suggestions.

Reliability

Reliability of all data collection tools verified through test-retest procedures. The instruments' internal consistency confirmed through statistical analysis, with a Cronbach's alpha value of 0.842, indicating

excellent reliability and consistency of the measurement tools.

Field work

- Extensive literature analysis performed, examining historical and contemporary research on ADHD, encompassing its various dimensions and the associated understanding, perceptions, and management approaches. The research team utilized scholarly publications, including academic textbooks and peer-reviewed journal articles, as their primary sources. This comprehensive review served two crucial purposes: first, it enabled the development of preliminary assessment instruments that underwent validation by expert nursing professionals who evaluated their face and content validity. Second, it provided the foundational structure for creating an evidence-based empowerment program.
- Written consent received from the preschool teachers.
- The researchers initiated contact with the preschool teachers by arranging a meeting where they presented their credentials, outlined the study objectives, and sought informed consent, thereby establishing trust, and securing their willing participation in the program.
- The researchers administered the tools by interviewing preschool teachers individually. This interview took about 25 to 45 minutes.
- The research process unfolded across four distinct stages: First, a thorough assessment conducted, followed by a strategic planning phase, then moved into implementation, and concluded with a comprehensive evaluation. This lasted for 6 months from July to December 2024.
- The program aimed to enhance preschool teachers' knowledge, attitudes and practices when working with students.
- The program consisted of 10 sessions, with 8 for the content material and 2 for initiation and conclusion of the program. Each Sessions lasted for 30-45 minutes and conducted twice weekly on Mondays and Thursdays. The program utilized small of 5-10 preschool teachers who grouped based on their availability and teaching schedules. These gatherings took place in a designated classroom within the nursery facilities.
- The first 3 sessions included theoretical background of ADHD such as definition, signs and symptoms, etiology and types, complications and medical treatment. Also, behavioral therapy and strategies of behavioral modification. Then five comprehensive sessions focused on transforming preschool teachers' perspectives and enhancing their practical skills in managing children with diagnoses. These sessions explored teachers' responses to diagnosed children and examined how behavioral modifications impact the nursery setting. The training addressed various

challenges stemming from medical conditions, including behavioral issues, educational difficulties, health concerns, and social interactions among peers. The curriculum emphasized essential strategies for teachers to maintain their physical and emotional balance while managing challenging situations. Additionally, the sessions provided practical guidance for effectively working with affected children, including specific techniques to prevent behavioral issues both within and outside the nursery environment. The program also incorporated methods to enhance children's academic achievement while reducing hyperactive behaviors, ensuring a more conducive learning environment for all students. The training equipped teachers with valuable tools and knowledge to create a supportive and effective educational setting while managing their own well-being in the process.

- The empowerment program implemented through different teaching methods such as lectures, group discussions and brainstorming. The teaching media included power point presentations, short videos, pictures, and a handbook.
- Each session began with a review of the previous session and an overview of goals for the new session. This approach helped preschool teachers grasp the content effectively. The language used was kept simple and

straightforward, avoiding complex medical terms. To encourage active participation and enhance the learning experience, teachers received positive reinforcement through praise and acknowledgment of their contributions.

Evaluation phase

Following the conclusion of the empowerment program sessions, an assessment was conducted to evaluate the program's effectiveness and outcomes.

Ethical considerations: the study protocol was reviewed and approved by the Faculty of Nursing Research Ethics Committee at Zagazig University (Egypt) with approval number 0130, dated June 2, 2024. All participating preschool teachers provided written informed consent prior to enrollment. Participants were informed of their right to voluntarily participate or withdraw from study at any time. The researchers ensured complete protection of participants' privacy, maintaining anonymity and confidentiality throughout the study process.

Statistical analysis: The collected data were organized and categorized, with the results presented in tabular format for clarity. Data analysis was conducted on a compatible personal computer using SPSS; version 20. For quantitative data, mean and standard deviation were calculated. The correlation coefficient was employed as a numerical indicator of statistical relationships between various variables, results were considered significant if $p < 0.05$ and highly significant if $p < 0.01$.

Results

Table (1) reveals the demographic characteristics of the sample studied. Mean \pm SD = 37.39 ± 12.90 , and 55% of the sample was aged between 30-45 years old, 68.75% were females, and 67.5% lived in urban areas, and 70% of the had higher levels of education, in addition to 57.5% of the preschool teachers were with less 5 years of experiences.

The demographic analysis of preschool teachers revealed several key characteristics. The study population had an average score of 5.82 with a standard deviation of 2.39. More than half of the teachers (55%) fell within the age bracket of 30-45 years. The teaching workforce was female, comprising 68.75% of the sample. A significant majority (67.5%) resided in urban areas. The educational background of the teachers was notably high, with 70% having achieved higher education qualifications. In terms of professional experience, 57.5% of the educators had been teaching for less than 5 years.

Figure (1) illustrates the various sources through which preschool teachers acquired their knowledge about ADHD. The data reveals that an overwhelming majority (89.10%) of preschool teachers obtained their information through internet searches. Television programs served as an information source for 25.40% of the teachers. Notably, only a small proportion of teachers received formal education on ADHD, with 18.40% participating in training courses and 16.70% attending in-service workshops.

Figure (2) depicts the distribution of participants' total ADHD knowledge scores before and after implementing the Empowerment program. The analysis reveals a statistically significant enhancement ($p < 0.001$) in preschool teachers' understanding of ADHD following program completion. While only 18.90% of teachers initially exhibited adequate ADHD knowledge, this proportion increased markedly to 77.30% after participating in the empowerment program.

Figure (3) demonstrates the preschool teachers' positive and negative attitudes toward ADHD before and after participating in the empowerment program. Statistical findings indicate a marked improvement ($p < 0.001$) in teachers' attitudes toward ADHD following their completion of the program. The total positive attitudes scores showed a substantial increase from 14.80% before the program to 61.30% after the intervention.

Figure (4) illustrates the overall scores of preschool teachers' practices concerning ADHD before and after participating in the Empowerment program. The data demonstrated a statistically significant improvement in teachers' satisfactory practices related to ADHD ($p < 0.001$) following the program implementation. The percentage of satisfactory practices increased substantially from 17.40% before the program to 64.20% after completing the empowerment program.

Table (2) reveals significant positive correlations between preschool teachers' total scores across three

domains: knowledge of ADHD, attitudes, and teaching practices toward ADHD. The correlations demonstrated statistical significance ($p \leq 0.05$), revealing that teachers who

get higher levels of ADHD knowledge also demonstrated better teaching practices and positive attitudes.

Table (1): Distribution of Demographic characteristics of preschool teachers (n=80)

Demographic characteristics	Frequency	%
Age (in years)		
< 30	21	26.25%
30-45	44	55.00%
>45	15	18.75%
Mean \pmSD	37.39\pm12.90	
Gender		
Female	55	68.75%
Male	25	31.25%
Residence		
Rural	26	32.5%
Urban	54	67.5%
Educational level		
Intermediate	5	6.25%
Higher	56	70%
Postgraduate	19	23.75%
Years of experience		
<5	46	57.5%
5-10	23	28.75%
>10	11	13.75%
Mean \pmSD	5.31\pm 3.61	

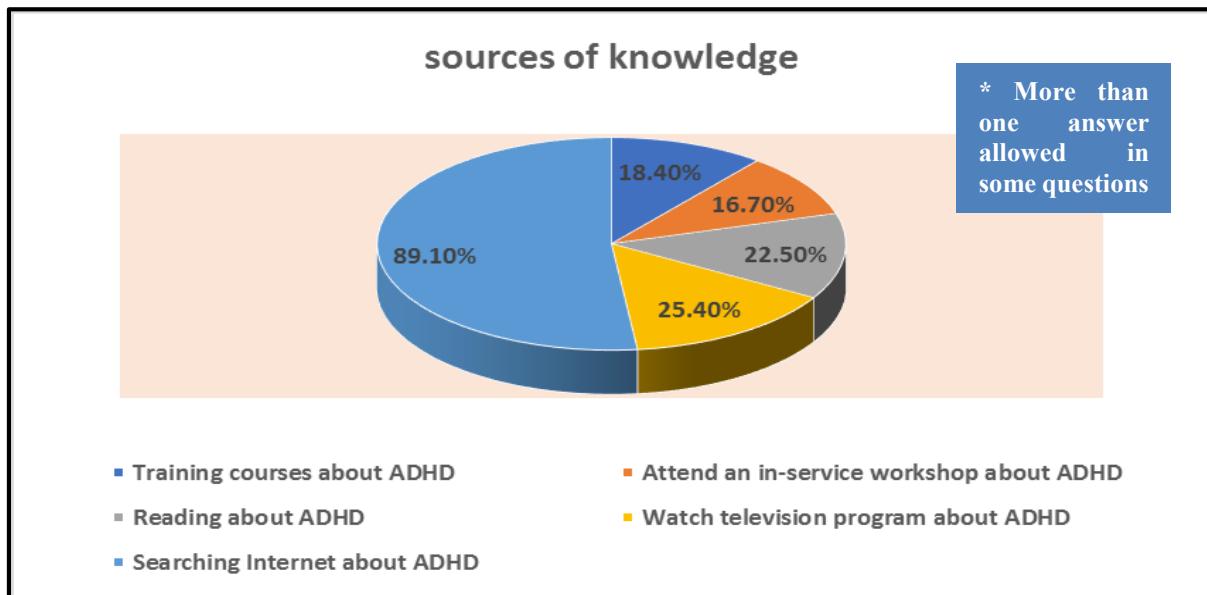


Figure (1): Sources of preschool teachers' knowledge regarding ADHD (n=80)

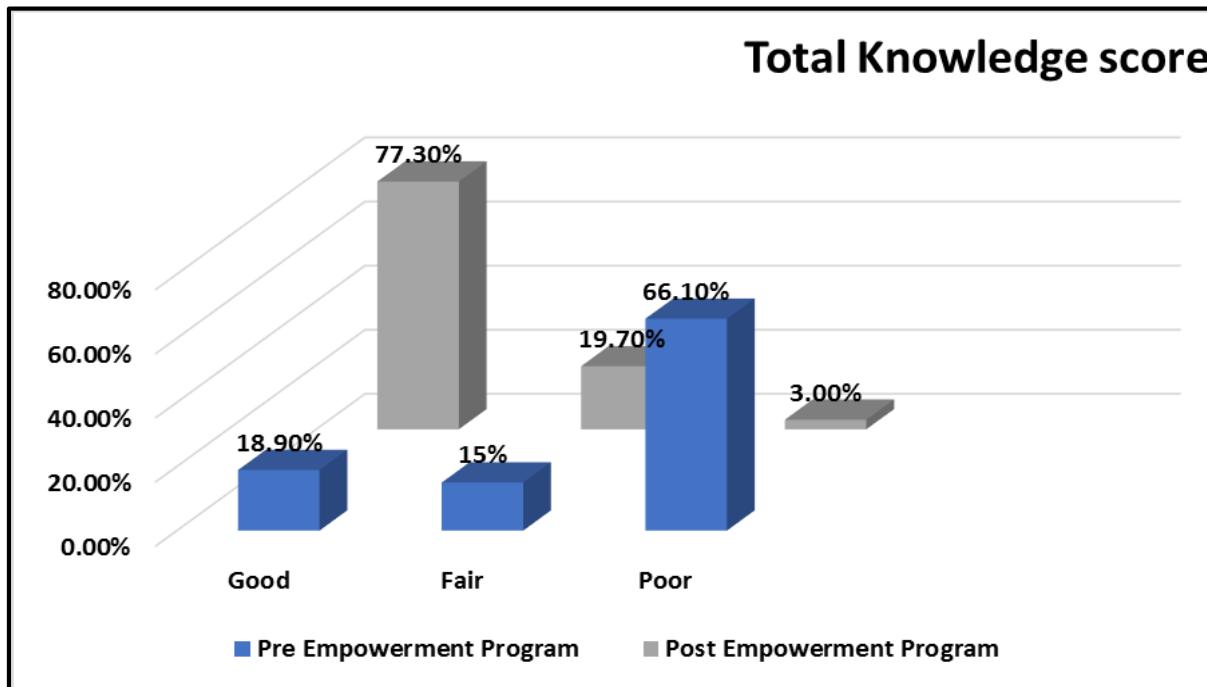


Figure (2): Level of knowledge of the study sample regarding ADHD pre and post Empowerment program (n=80)

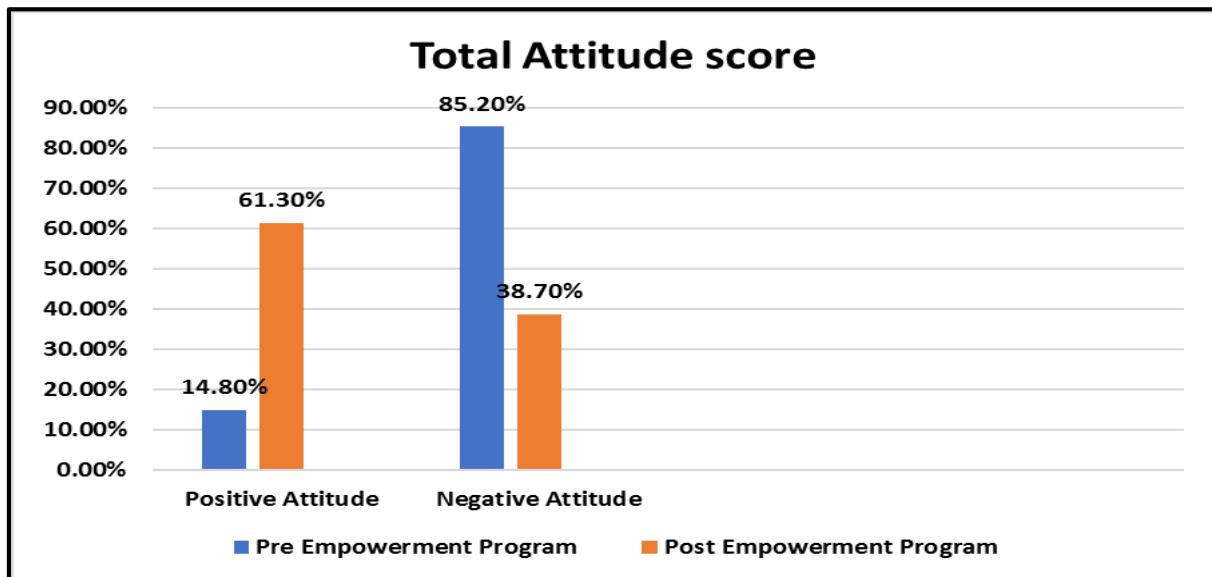


Figure (3): Level of negative and positive attitudes of the preschool teachers regarding ADHD pre and post Empowerment program (n=80)

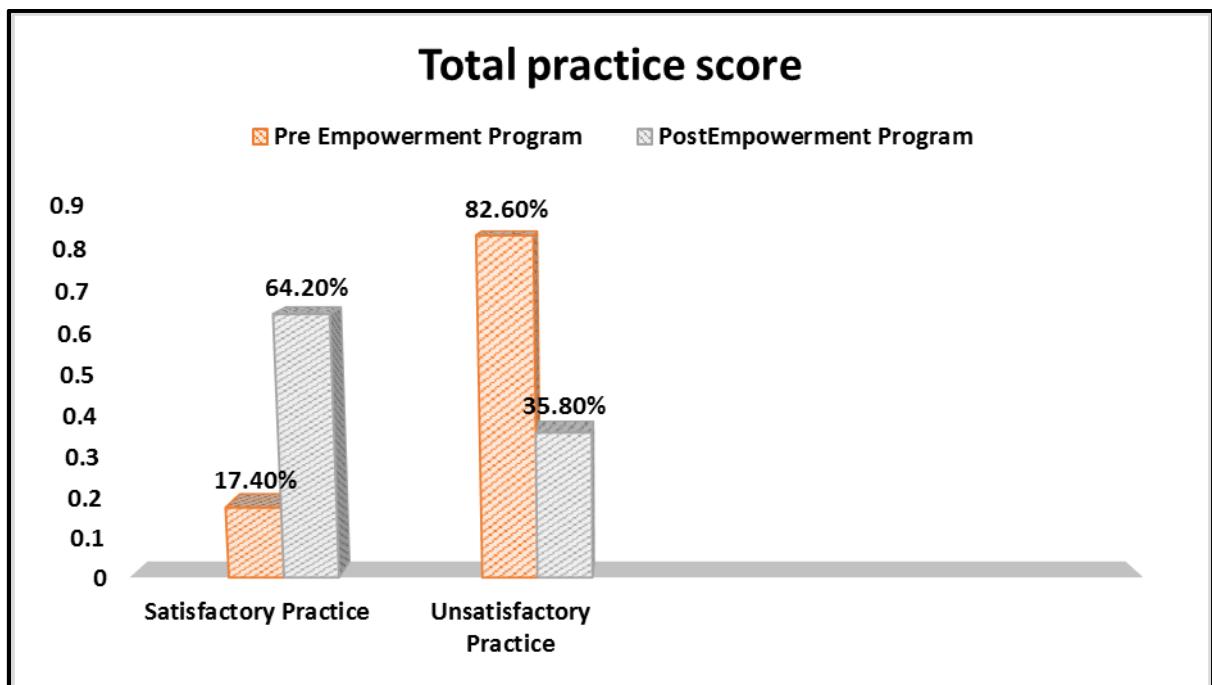


Figure (4): Level of preschool teachers practices in the study sample regarding ADHD pre and post Empowerment program (n=80).

Table (2): Correlation among total scores knowledge about ADHD of preschool teachers and their practices and attitudes regarding ADHD in the study sample (n=80)

Variable	Practices		Knowledge		Attitudes	
	r	P value	r	P value	r	P value
Practices	-	-	-	-	.153*	.021
Knowledge	.240**	.011	-	-	-	-
Attitudes	-	-	.851**	.000	-	-

r Pearson Correlation Coefficient test

* Statistically significant at $p \leq 0.05$.

Discussion

Neurodevelopmental challenges associated with ADHD typically emerge during a child's early years, affecting their brain's growth and maturation process (Akdag, 2023).

Preschool teachers have emerged as key figures in recognizing and supporting children's developmental needs, especially those related to ADHD, since they interact with young learners more extensively than parents or healthcare providers during the day. Their continuous presence in children's daily activities enables them to quickly assess learning and behavioral difficulties and implement immediate support strategies following early identification (Bashiri et al., 2021).

The study's preschool teachers were predominantly middle-aged adults, with most falling within the 30 to 45 year age range. This age distribution may reflect limited employment opportunities for recent preschool education graduates. Similarly, a 2024 study conducted in Iraq by Khalil and Hussein found that 53.8% of teachers were 45 years old or younger.

The study revealed that females constituted most of preschool teachers, with over two-thirds residing in urban areas. This gender distribution may be attributed to women's natural inclination and effectiveness in working with young children of preschool age. Unlike those results, Ewais, Abd El-Mohsen, & El-Zayat, (2024) in Egypt revealed that 83% of the studied teachers live in urban areas and 90.2% of them were females.

The research revealed that participants possessed advanced academic credentials. The extensive network of both public and private universities throughout Egypt's governorates contributed to this elevated educational status among respondents. The accessibility of higher education enhanced by the diverse range of faculties specializing in early childhood education. Moreover, nurseries actively seek teachers with higher educational qualifications, both for marketing purposes and to achieve superior academic outcomes.

This finding aligns with Aldawodi et al. (2019) study in Saudi Arabia,

which found that 79% of teachers held bachelor's degrees. Similarly, **Basudan, Akbar, El-Ghamdi, & Ibrahim, (2019)**, research in Jeddah revealed that most teachers possessed bachelor's degrees. Furthermore, **Omer et al. (2023)** study in Sudan demonstrated comparable results, with 78% of teachers having bachelor's degrees. In contrast, **Elsabely et al. (2023)** study of Egyptian mothers showed different results, where 40% of participants had only completed secondary education. The findings regarding teaching experience revealed that more than half of respondents had been teaching for fewer than five years. This stands in contrast to research conducted by **Almilaibary (2022)** in Saudi Arabia's Al-Baha Region, where nearly two-thirds of teachers (66.5%) reported having more than ten years of classroom experience.

Early childhood teachers, particularly those working in preschool settings, are crucial in the early detection, daily support, and effective management of children with ADHD. Their ability to fulfill these responsibilities effectively depends on having thorough and up-to-date understanding of this neurodevelopmental condition **(Bardi, Ghader, AbdulRazak, AlKuwari, & Qureshi, 2021)**.

A study revealed that most teachers obtained information primarily through internet searches and television programs. Only a small percentage acquired their knowledge through formal ADHD training courses or in-service workshops. This trend likely stems from the

widespread accessibility of internet resources via smartphones, offering convenient and immediate access to information. In contrast, formal training workshops and courses require significant investments of time, money, and effort, making them less appealing options for knowledge acquisition.

These findings align with **Alshehri, Shehata, Almosa, & Awadalla, (2020)** randomized controlled trial conducted among Saudi Arabian school teachers, which revealed that the internet was their primary source of ADHD information. In contrast, **Elsabely et al. (2023)** study in Egypt found that only 22% of participants obtained their ADHD information from mass media.

The total knowledge scores of the study sample regarding ADHD showed significant improvements after the empowerment program implementation. Statistical analysis revealed significant enhancements in preschool teachers' ADHD knowledge ($p<0.001$) following the program. Initially, only a small portion of teachers demonstrated a good understanding of ADHD. However, after completing the empowerment program, majority of participating preschool teachers achieved good knowledge levels about ADHD. These substantial improvements in participants' knowledge levels demonstrate the program's positive impact and reflect the teachers' engagement and active participation during the sessions.

A study conducted in Egypt by **Elsabely et al. (2023)** reinforced these conclusions, showing that 90%

of participants exhibited inadequate knowledge before the implementation of intervention. Following the intervention, a significant improvement, with 88% of participants achieving satisfactory knowledge levels, showing highly significant statistical differences. A study conducted in Abha City, Saudi Arabia, revealed that male primary school teachers initially demonstrated minimal understanding of ADHD. Through the implementation of a specialized knowledge enhancement program, these teachers significantly improved their comprehension of the disorder.

Teachers in preschool settings with limited understanding or incorrect beliefs about ADHD may miss opportunities to implement proven classroom interventions and accommodations for students with this condition. However, teachers who demonstrate thorough knowledge and maintain an optimistic perspective regarding ADHD tend to be more willing to adopt successful teaching approaches. These proven strategies enhance both the academic performance of students with ADHD and help minimize their behavioral challenges (Akdag, 2023).

The study revealed remarkable improvements in preschool teachers' positive attitudes toward ADHD after implementing the empowerment program, demonstrating statistical significance ($p<0.001$). The proportion of teachers exhibiting positive attitudes increased, rising from a minority before the program to approximately two-thirds upon completion. These notable gains may

be linked to the empowerment program's effective empowerment program intervention.

This research contrasts with **Alsaad et al. (2024)** study of Saudi Arabian elementary teachers, which revealed overwhelmingly positive attitudes toward ADHD, with 96% of teachers showing favorable perspectives. However, a study by **Amha and Azale (2022)** in Northwest Ethiopia presented markedly different results, where 50% of participants held negative views toward students with ADHD.

Preschool teachers who thoroughly understand ADHD can better evaluate their students' needs, leading to more effective teaching methods and support systems that improve the success rates of children with ADHD (**Alanazi, & Al Turki, 2021**).

The study results demonstrated statistically significant improvements in preschool teachers' overall competency regarding ADHD management following the empowerment program ($p<0.001$). The percentage of satisfactory practices increased from a minority before the program to around two thirds after program completion. This marked improvement can be attributed to the effectiveness of the empowerment program intervention. The findings aligned with multiple studies examining teachers' practices regarding students with ADHD. A study conducted by **Dessie and colleagues (2021)** in Ethiopia demonstrated statistically significant positive improvements in teachers' practices when working with ADHD students ($p<0.001$). Similarly, recent

research by **Alsaad et al. (2024)** and **Almilaibary (2022)** corroborated these results, showing comparable positive outcomes in teachers' practices related to ADHD management in educational settings. The research demonstrated a statistically significant positive relationship ($P \leq 0.05$) among preschool teachers' performance across three domains: ADHD knowledge, classroom practices, and attitudinal measures. The interrelation of these variables suggests a synergistic effect - enhanced understanding of ADHD correlates with more positive attitudes and improved teaching practices, creating a self-reinforcing cycle of development in all three areas.

Aligning with these positive outcomes, a study by **Ewais, Abd El-Mohsen, & El-Zayat, (2024)** in Egypt revealed two significant correlations, first, teachers' overall attitudes levels showed a statistically significant relationship with their reported ADHD management practices ($p \leq 0.05$). Second, teachers' knowledge levels demonstrated a significant positive correlation with their attitudes toward ADHD ($p \leq 0.05$). Similarly, the findings of a comparative study in the United Kingdom by **Greenway and Edwards (2020)** demonstrated that teachers' understanding of ADHD was strongly correlated with their positive attitudes of students diagnosed with the condition.

Conclusion:

The research results demonstrated a statistically significant overall enhancement in preschool teachers'

knowledge, attitudes, and practices concerning ADHD. Furthermore, statistical analysis revealed significant positive correlations between the total scores of knowledge, attitudes and practices, regarding ADHD among preschool teachers ($P \leq 0.05$).

Recommendation:

The research results suggest these key recommendations:

1. Nursery teachers should receive comprehensive training programs focused on understanding and managing ADHD in preschool settings.
2. Train teachers to identify early warning signs and concerning behaviors in young children.
3. Nurseries should maintain a collection of ADHD-related resources, including informative books, visual aids like posters, and educational literature.

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References

Abd El Moneam, N., El-Boraie, O., Abd El-Fattah, T., & El-Etreby, R. (2018). Evaluation of Psycho-Educational Intervention for Children Having Attention Deficit Hyperactivity Disorder & Their Parents. *IOSR Journal of Nursing & Health Science (IOSR-JNHS)*. 7(4):1-119.

Abd Elaleem, A., Osman, Z., & Abd El-Fatah, W. (2024). Effect of a nursing educational program on competency & parenting practices

among parents having children with attention deficit hyperactivity disorder: randomized controlled trial. *Middle East Current Psychiatry*. 31(54):1-21.

Akdağ, B. (2023). Exploring Teachers' Knowledge & Attitudes Toward Attention Deficit Hyperactivity Disorder & Its Treatment in a District of Türkiye. *Journal of Cures* 15(9): e45342. DOI 10.7759/cureus.45342.

Alanazi, F., & Al Turki Y. (2021). Knowledge & attitudes of Attention Deficit & Hyperactivity Disorder (ADHD) among male primary school teachers, in Riyadh City, Saudi Arabia. *Journal Fam Med Prim Care*. 10(3): 1218.doi: 10.4103/jfmpc.jfmpc_2194_20.

Aldawodi, M., Alfageer, H., Al Quefli, S., Masud, N., Al Harthy, N., Alogayyel, N., & Qureshi, S. (2018). Knowledge & attitudes of male primary school teachers about attention deficit & hyperactivity disorder in Riyadh, Saudi Arabia. *J. Nat. Sci. Biol. Med*, 9, 257-262.

Almilaibary, A. (2022). Knowledge & Attitudes of Saudi Primary Teachers towards Students with Attention-Deficit Hyperactivity Disorder (ADHD) in Albaħha Region. *Journal of Neuro Quantology*. 20(6): 6467-6474.

Alsaad, A., Alanazi, A., Alkatheri, B., Alqahtani, R., Hadi, F., Alotaibi, N., ... & Alzahrani, K. (2024). Knowledge & attitudes of elementary school teachers towards ADHD in the Kingdom of Saudi Arabia. *Journal of Cahiers Magellan*. 6(2):1176-1181.

Alshehri, A., Shehata, S., Almosa, K., & Awadalla, N. (2020). School teachers' Knowledge of Attention-Deficit/Hyperactivity Disorder—Current Status & Effectiveness of Knowledge Improvement Program: A Randomized Controlled Trial. *International Journal of Environment Res. Public Health*. 17(15): 5605; <https://doi.org/10.3390/ijerph17155605>.

Amha, H., & Azale, T. (2022). Attitudes of Primary School Teachers & Its Associated Factors Toward Students with Attention Deficit Hyperactivity Disorder in Debre Markos & Dejen Towns, Northwest Ethiopia. *Front. Pediatr*. 10:805440. doi: 10.3389/fped.2022.805440.

APA (2022). Diagnostic & statistical manual of mental disorders (5th ed., text rev.). *American Psychiatric Association*.

Bardi, M., Ghader, N., AbdulRazzak, H., AlKuwari, M., & Qureshi, A. (2021). Knowledge about attention deficit hyperactivity disorder among primary school teachers in Dubai. *International Journal of School & Educational Psychology*. 11(2):1-154.

Bashiri, F., Albatti, T., Hamad, M., Al-Joudi, H., Daghash, H., Al-Salehi, S., ... & Amer, Y. (2021). Adapting evidence-based clinical practices guidelines for people with attention deficit hyperactivity disorder in Saudi Arabia: process & outputs of a national initiative. *Journal of Child and Adolescent Psychiatry Mental Health*. 15:6. 10.1186/s13034-020-00351-5.

Basudan, M., Akbar, N., El-Ghamdi, W., & Ibrahim, A. (2019). Knowledge & attitudes of female teachers toward ADHD at elementary schools, Jeddah, KSA, 2017. *International Annals of Medicine*, 3(1), 693-699.

Bukhari, T. (2022). Prevalence of Problems of ADHD Students in Pakistan; a case Study of Early Childhood Education. *Pakistan Journal of Educational Research*. 5(3):1-5.

Dessie, M., Techane, M., Tesfaye, B., & Gebeyeh, D. (2021). Elementary school teachers' knowledge & attitudes towards attention deficit-hyperactivity disorder in Gondar, Ethiopia: a multi-institutional study. *Journal of Child Adolescent Psychiatry Ment Health*. 16(1):1-15.

El Hawy, L.L., Said, H.S., Hammouda, M.A., & Nofal, H.A. (2023). The effect of educational intervention on teachers' knowledge of attention-deficit hyperactivity disorder. *Egyptian Journal of Occupational Medicine*. 47 (2): 47 – 58.

Elsably, A., Hegazy, A., Hassan, N., El-Azzab, S., Sheha, E., & Ahmed, S. (2023). Effectiveness of Intervention Guidelines on Mothers of Children with attention Deficit Hyperactivity Disorders. *Egyptian Journal of Health Care*. 14(1): 548-590.

Eltyeb, E., Gohal, G., Alhazmi, N., Hamdi, S., Al khairat, L., Shutayfi, N., ... & Someli, S. (2023). The Efficacy of Educational Interventions in Improving School Teachers' Knowledge of Attention Deficit Hyperactivity Disorder. *Journal of Cures*. 15(9): e44509. DOI 10.7759/cureus.44509.

Ewais, S., Abd El- Mohsen, A., & El-Zayat, O. (2024). Teachers' Knowledge, Reported Practices & Attitudes regarding Attention Deficit Hyperactivity Disorder among Primary School Children. *Helwan International Journal for Nursing Research & Practice*. 3(6):43-56.

Gao, X., Yu, C., Li, H., & Tao, J. (2023). The current situation & intervention measures of mental health literacy of vocational college early childhood education students from the perspective of preschool integrated education—A disease perception perspective based on attention deficit hyperactivity disorder in children. *Applied & Educational Psychology, Clausius Scientific Press*, Canada. 4(11):1-150.

Greenway, C. W., & Edwards, A.W. (2020). Knowledge & Attitudes Towards Attention-Deficit Hyperactivity Disorder (ADHD): A Comparison of Teachers & Teaching Assistants. *Australian Journal of Learning Difficulties* 25 (1): 31–49.

Hussein, S., Mahmoud, E., & Mohammed, S. (2024). Assessment of Mothers' Knowledge & Practices Regarding Care Provided for their Children with Attention Deficit Hyperactivity Disorder. *Helwan International Journal for Nursing Research & Practice*. 3(6): 1-14.

Jabar, A.H., Saleh, A.A., & Akmoosh, S.I. (2024). Knowledge & attitudes of attention-deficit hyperactivity disorder among parents attending primary health-care centers in Al-Karkh/Baghdad city, 2023. *Iraq Journal of Community Medicine*. 1(1); 37:21-6.

Khalil, M., & Hussein, W. (2024). Knowledge & Practices of Primary School Teachers Regarding Pediculosis Capitis in Baghdad, Iraq. *Iraqi Journal of Community Medicine*. 37(1):61-74.

Kristanto, Y. (2023). Identifying Attention Deficit Hyperactivity Disorder (ADHD) Children & Effective Teaching Strategies That Develop Their Multiple Intelligences. *Indonesia: Journal Limia Pendidikan*. 4(1): 1-13.

Macyko, S. J. (2023). The Impact of the COVID-19 on Children/Youth with Special Health Care Needs: A School Nurse's Perspective. *Journal of Pediatric Health Care*. 37(2): 117.

Mohammed, A., Zaghamir, D., Abo Elsoud, M., & Ayed, M. (2021). Effect of Social Empowerment Training & Responsibilities Nursing Intervention on Children with Attention Deficit Hyperactivity Disorder. *Egyptian Journal of Health Care*. 12(3): 74-80.

Mourad, G. M. (2004). Social & Technical Coping Skills for School Age Children with Attention Deficit Hyperactivity Disorder. Unpublished Doctorate thesis. *Faculty of Nursing, Ain Shams University*.

Omer, Z. T. A., Alhassan, A. H. A., Ahmed, M. M. H., Ahmed, A. A. F., Omer, S. A. S., Gomaa, S. M., ... & Ahmed, W. (2023). Primary School Teachers' Perspectives on ADHD in Alkadrow, Khartoum, Sudan. *Sudan Journal of Medical Sciences (SJMS)*, 478-487.

Sayed, S. (2022). Effect of Educational Program on Parents' Caring for their children with attention deficit hyperactivity disorder. *Egyptian Journal of Health Care*. 13(2): 1340-1365.

Shattla, S., Hassan, G., Arrab, M., & Alhalawany, R. (2021). Effect of a Designed Nursing Intervention Protocol for Mothers on Outcome of Children with Attention Deficit Hyperactivity Disorder. *Systematic Reviews in Pharmacy*. 12(2):335-349.

Thanasekaran P, Upashe SP, Chala D. (2016). Primary school teacher's knowledge towards attention deficit/hyperactivity disorder (ADHD) & its associated factors in Nekota Town, Oromia Region, Western Ethiopia. *Science Technology Arts Res Journal*. 5(1):76-9.

Tharwat, E.M., Elzahab, N.F.A., Abouzed, M., Elsherbiny, A.M., Kamel, A., & Khaled, A. (2019). Attention deficit / hyperactivity disorder (ADHD) among children aged 6–10 years in Damietta Governorate. *Egypt Syst Rev Pharm.*, 10(1):296–29.

The Effect of Reverse Pressure Softening Technique on Primiparous Postpartum Women Experiencing Breast Engorgement

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Abstract

Background: Breast engorgement is one of the most common problems confronting women after delivery, especially primiparous women, and hinders successful breastfeeding. Reverse Pressure Softening is a non-pharmacological technique that can help in reducing breast engorgement by helping in pushing fluid back, softening the areola, empowering the nipple to protrude better and reducing breast engorgement. **Aim:** Evaluate the effect of reverse pressure softening technique on primiparous postpartum women experiencing breast engorgement. **Design:** A quasi-experimental (non-randomized control group) design was used. **Setting:** Fayoum University Hospital's obstetrics and gynecology outpatient clinic served as the study's location. **Sample:** One hundred primiparous postpartum women who satisfied the inclusion requirements and had breast engorgement were selected using purposive sampling. **Tools:** The Structured Interviewing Questionnaire, the Visual Analog Scale, the Six-point Engorgement Scale, the Breast Redness and Edema around Areola Assessment Scale, and the Latch Score record were the five instruments utilized to gather data.

Results: Compared to before the intervention, there was a significant reduction in breast engorgement after using the areola reverse pressure softening method. Compared to pre-intervention (40%), there was a significant drop in pain (10.0%) after the intervention. The study group's post-intervention (58%) breastfeeding rate was much higher than the pre-intervention (18%) rate for women. Conversely, following routine care, women in the control group were less likely to be able to breastfeed (18%) than they were previously (26%). **Conclusion:** There was a noteworthy decrease in breast engorgement following the application of the reverse pressure softening technique of the areola as compared to pre-intervention. These findings achieved the study's aim and supported the research hypothesis. **Recommendations:** Raising awareness of postpartum mothers, especially the newly breast feeding mothers, through prenatal classes regarding the beneficial effect of the reverse pressure softening of the areola on breast engorgement and newborn feeding behavior.

Keywords: Reverse Pressure Softening Technique, Primiparous Postpartum Women, Breast Engorgement.

Introduction

Breastfeeding is a natural process, and the breast milk is considered the healthiest nutrition for neonates because it contains vitamins, minerals, fats, proteins, and antibodies that the babies need for normal growth and development (Aprilina, Krislinggardini, Isnaini, & Suratmi, 2021). Despite breastfeeding providing significant health benefits for both mothers and babies in the short and long run, it can also present challenges for some women, including pain, discomfort, and frustration due to potential complications, the most popular of which is breast engorgement (Lauwers & Swisher, 2020). Breast engorgement is a common condition in the early days of breastfeeding, characterized by swollen, firm, and often painful breasts. It typically occurs within the first few days after childbirth, often peaking between days 3 and 5, but may occur later at days 9-10 in some cases, especially in primiparous women (Southeast Lactation Consulting, 2024).

Breast engorgement is caused by a mixture of milk accumulation, stasis, and increased blood flow to the breast. There are several factors related to the mother and infant that precipitate breast engorgement, such as delayed initiation of breastfeeding, decreased time and number of breastfeeding, poor attachment to the breast, poor latch, infrequent feeds, ineffective breastfeeds (e.g., incorrect positioning), ineffective suckling, replacement of breast milk with other fluids, the mother's separation from the baby, and

a premature or sleepy baby (Mohamed, Shelil, & Abd-Allah, 2020; Amir, Baeza, Charlamb, & Jones, 2021). Breast engorgement can significantly disrupt the breastfeeding as well as the discomfort and pain associated with engorged breasts can make feeding challenging and frustrating, this can lead to difficulties with lactating mother, discourage mothers from continuing breastfeeding early after the first few days (Lamadah, Ahmed, Kandeel, & Tayel, 2021).

The symptoms of breast engorgement vary from woman to woman. Moderately severe breast engorgement can result in throbbing and aching pain with tender, hard, full, warm, swollen breasts as well as nipple swelling, nipple pain or trauma which disrupt continuation of breastfeeding and make sucking difficult for the baby. The inability of the baby to retain nipple and areola in the mouth is considered the most serious problem of breast engorgement. In addition, untreated breast engorgement can result in serious complications such as mastitis, nipple damage, duct ectasia, destruction of the milk-secreting cells, and breast abscess, which consequently can contribute to the inability of the lactating mothers to maintain exclusive breastfeeding and the early cessation of breastfeeding (Ghattas, Ibrahim, Mohamed, & Amin, 2022; Fawzy, Mervat, & Inas, 2022).

Management of breast engorgement can be achieved by using both pharmacological and non-pharmacological methods.

Subcutaneous oxytocin is an example for the pharmacological methods in addition to pain medications such as ibuprofen for relieving pain and discomfort (**Zakarija-Grkovic & Stewart, 2020**). However, the most popular and valid options are the non-pharmacological ones because these methods are generally simple to use, more available, convenient, and low-cost compared to medical interventions, as well as favorable by mothers, as the mothers fear from the side effects of chemical drugs on the baby (**Alshakhs, Katooa, Badr, & Thabet, 2024**).

These non-pharmacological methods include breast massage, alternate cold and warm compresses, olive oil massage, cold gel packs, acupuncture, cabbage leaves, effective milk removal, lukewarm water application, Gua-Sha (scraping therapy), and the reverse pressure softening (RPS) of the areola. These methods can aid in a successful latch and relieve engorgement symptoms (**Ghattas et al., 2022**).

Reverse pressure softening is a non-pharmacological technique that can help in reducing breast engorgement, which is a new technique to soften the areola (the dark circle around the nipple) when breasts become full or engorged and difficult to latch to by softening the areola before feeding that helps get more milk to the baby and time to latch deeply. Also, mothers are found to be more comfortable and less damaging to the nipples. The technique consists of pushing the fluid backward and upward, which causes swelling in the breast, at least for a short time

(Arizona Department of Health Services, 2020).

The reverse pressure softening method is to move the swelling upward and backward into the breast temporarily to soften the area surrounding the base of the nipple in about a 1–2-inch area of the areola by using gentle positive pressure. Also stimulates the reflex of milk ejection by automatically steady stimulation of nerves blow the areola, helps in enhanced milk ejection in the breast within 1-2 minutes or less, and also improves lymph drainage by helping to move interstitial fluid in its natural direction, moreover, decreasing latch discomfort and facilitating milk transfer. Health care providers should both demonstrate the application of RPS and teach the technique to the mother, or if necessary, significant others can also be included (**Ebrahim & Esmat, 2018**).

Maternity and community nurses contribute significantly to midwifery care by lowering the risk of early breastfeeding discontinuation through giving precise and consistent guidance on how to avoid breast engorgement and, in the event that it does occur, how to resolve it. Additionally, nurses may help pregnant women during the perinatal (antenatal and postnatal) period by teaching them the advantages of breastfeeding for both the mother and infant, the correct technique for breastfeeding, and the risks of lactation difficulties (**Abd El-hady, El-Refaey, & Gaheen, 2021**).

Significance of the study:

One of the most significant issues that arises during the Breast engorgement

occurs during the first week of parenthood. It is more concerning when engorgement is moderate to severe (Hassan, EL-Kholy, Ateya, & Hassan, 2020). The rates of breast engorgement of lactating women ranged from 65% to 75% worldwide and 82% in Egypt, especially among primigravida between the first and fourth postpartum days (Zaghloul, Zedan, Alagamy, Kahlil, & Gomaa, 2023). Every ten mothers, six of them suffer postnatally from breast engorgement. Engorgement can negatively affect feeding and milk production, so that is the importance of the study (Ghattas et al., 2022).

Although breast engorgement negatively affects breastfeeding, sucking and has consequences on the mother and the infant, the women's awareness regarding breast engorgement is low regarding the studies that have been done among primiparous. So, the responsibility of nurses and midwives is the early detection and appropriate management of engorgement that occurs in the postpartum to maintain maternal and newborn health (Alshakhs et al., 2024). In order to facilitate latching, the reverse pressure softening (RPS) technique uses modest positive pressure to temporarily transfer the swelling higher and backward into the breast, softening the region around the base of the nipple, which is around 1-2 inches of the areola. Thus, the purpose of this study is to evaluate the effect of reverse pressure softening technique on primiparous postpartum women experiencing breast engorgement.

Aim of the study:

This study aimed to evaluate the effect of reverse pressure softening technique on primiparous postpartum women experiencing breast engorgement.

This aim was accomplished through these objectives:

1. Assessing knowledge of primiparous postpartum women about non-pharmacological methods to decrease breast engorgement after delivery.
2. Assessing pain, latch-on, and breast engorgement degree before application of reverse pressure softening technique.
3. Implementing the reverse pressure softening technique for primiparous postpartum women to alleviate breast engorgement.
4. Evaluating the technique of reverse pressure softening technique on pain, latch-on, and breast engorgement degree after application of the program.

Research hypothesis:

Primiparous postpartum women who receive the reverse pressure softening technique will have more successful breastfeeding and less breast engorgement than those who don't receive it.

Operational definitions:

Breast engorgement: Engorgement of the breasts happens when they fill up too much with milk leading to discomfort and potential difficulties for the infant to successfully latch onto the mother's breast, resulting in hard, painful, swollen, and tender breasts.

Reverse Pressure Softening (RPS): A non-pharmacological technique that can help in reducing breast engorgement by softening the areola as

it is hard to latch on by moving swelling temporarily upward and backward by using gentle positive pressure into the breast.

Primiparous Postpartum Women:

Refers to the first-time mothers who had breast engorgement during the first and fifth days following delivery.

1. Technical design:

Research design:

A quasi-experimental (non-randomized control group) design was adopted.

Setting:

The study was carried out at the outpatient clinic of obstetrics and gynecology at Fayoum University Hospital. The Fayoum University Hospital is one of the newest hospitals in Egypt. The obstetrics and gynecology outpatient clinic is located on the second floor and consists of two rooms; the first contains a nursing office and another two offices for doctors and two beds for examination, while the second is a room for doing ultrasounds by doctors, and in front of them there is a large reception for patients awaiting examination.

Sampling:

A purposive sample of 100 primiparous postpartum women was recruited for the study from the above-mentioned setting. They were randomly divided into two groups:

- **Control group:** received instructions to apply routine interventions to the engorged breasts, such as compresses and combing (n=50).
- **Study group:** receive instructions to apply the reverse pressure softening technique to the engorged breast/s (n=50).

Inclusion criteria of the postnatal women:

- Primiparous postpartum women .
- Lactating during the first 10 days postpartum.
- Has breast engorgement.
- Delivery of a viable, healthy baby.
- Not receiving suppressants of lactation.
- No breast infection, mastitis, or abscess.

Sample size:

A purposive sample of 100 primiparous postpartum women was chosen by this formula:

$$n = \frac{z^2 \times p(1-p)}{\varepsilon^2}$$

$$n = \frac{1.96^2 \times 0.068(1-0.071)}{0.05^2} =$$

100 primiparous postpartum women

Therefore, the study would necessitate a sample size of 100 primiparous postpartum women.

Instruments:

To collect data, we used five instruments.

Instrument one: Structured Interviewing Questionnaire:

This tool was designed by researchers based on reviewing related literatures (Ghattas et al., 2022, Ahmed, Helmy, Masoud, & Ragab, 2022; Saadoon, Saadoon, & Elmashad, 2024). It consisted of four parts as follows:

Part I: Demographic characteristics included: age, level of education, occupational status, residence and family income.

Part II: Obstetric history included: number of abortions, mode of delivery, schedule of antenatal care and preparation of the breasts during antenatal visits.

Part III: Breastfeeding and breast engorgement history: comprised initiation of breast feeding, duration, one side breast feeding, way of breast feeding, maternal position during breast feeding, onset of breast engorgement, associated problems with breast engorgement, stopping of breast feeding and duration of stopping.

Part IV: Knowledge about breast engorgement in postpartum women assessment sheet: It was written in a simple language (Arabic), it was consisted of (6) questions of multiple choice type and close end questions to stand on what are primiparous postpartum women know about breast engorgement, It includes (definition, signs and symptoms, complications, risk factors and management to decrease breast engorgement).

Knowledge scoring system:

The scoring system for knowledge about breast engorgement in postpartum women was as follows:

- Incorrect or "Don't Know" answers: Scored 1 point.
- Correct but incomplete answers: Scored 2 points.
- Correct and complete answers: Scored 3 points.

The total possible knowledge score was calculated by multiplying the number of questions (6) by the maximum score per question (3), resulting in a maximum possible score of 18 points.

The scores of total knowledge ranged from 6 to 18, depending on the number of correct and complete answers provided by the postpartum woman. **It was categorized into:**

- Poor knowledge if the total score $<50\%$ (0-8 grades).
- Average knowledge if the total score from 50- $<75\%$ (9-13 grades).
- Good knowledge if the total score $\geq 75\%$ (14-18 grades).

Instrument two: Visual Analog Scale (VAS).

In order to gauge the severity of breast discomfort, this instrument was taken from **Gift (1989)**. The Arabic translation aimed to depict Egyptian culture. Women's pain and suffering are measured subjectively using a horizontal line. The discomfort level is represented by a 10-point numerical scale, where 10 indicates the greatest degree of breast engorgement pain and zero indicates no pain at all. An adjective like mild, moderate, severe, or intolerable is used to describe the 2 cm space between these two opposing endpoints.

Instrument three: Six-point Engorgement Scale (SPES).

This tool was adopted from **Hill & Humenick (1994)**. This scale is used to measure the degree of engorgement by self-reporting or observation. A scale of 1 to 6 is used to assess breast engorgement. Every score corresponds to the description that follows: The breast can be described as (I) soft and unaltered, (II) somewhat altered, (III) firm and untender, (IV) firm and starting to become tender, (V) firm and tender, and (VI) extremely firm and tender.

The breast engorgement scoring system includes:

- **Score 1:** Represents normal breasts with no signs of engorgement.
- **Scores 2 and 3:** Indicate mild breast engorgement.
- **Scores 4 and 5:** Represent moderate breast engorgement.
- **Score 6:** Suggests severe breast engorgement.

Instrument four: Scale to assess redness and edema in breast around areola.

This scale used in this study was adopted from **(Farag, Alam, & Taman, 2023)** and used to assess the breast engorgement related to redness and edema; it was given the following score:

Scoring of redness:

- 0 indicates no redness.
- Redness reaches surround areola by 1cm indicates mild redness.
- Redness reaches surround areola by 2 cm indicates moderate redness.
- Redness reaches surround areola more than 2 cm indicates severe redness.

Scoring of edema:

- 0 indicates no edema
- Edema reaches surround areola by 1cm.indicates mild edema
- Edema reaches surround areola by 2cm indicates moderate edema
- Edema reaches surround areola more than 2cm indicates severe edema

Instrument five: Latch Score record:

The score used in this study was adopted from the work of **Jensen, Wallace, & Kelsay, (1994)** and used to assess the efficiency of the process of

breastfeeding. The LATCH assessment is a tool used to evaluate breastfeeding technique. It assesses five key areas: L: Latch: How well the infant attaches to the breast, A: Audible swallowing: The sounds heard during feeding, T: mother's nipple type (e.g., flat, inverted), C: Comfort: The mother's level of comfort during breastfeeding, H: Hold: The amount of assistance the mother needs to hold the infant to the breast.

It was used by the researcher to assess variables in both mother and infant.

Latch scoring system:

- A score of 1-3 indicates poor breastfeeding.
- A score of 4-6 indicates fair breastfeeding.
- A score of 7-10 indicates good breastfeeding.

Validity:

Five experts – three professors of maternal and neonatal health nursing and two professors of community health nursing – were asked to assess the five instruments' application, relevance, clarity, comprehension, and completeness in order to guarantee their validity. All required adjustments were performed, including rearranging and modifying some questions.

Reliability:

Reliability was estimated among the same sample of 10 primiparous postpartum women by using the test-retest method on two occasions, and then the scores were compared through the SPSS computer package. The Cronbach's coefficient alpha result suggests that the questionnaire effectively measured the intended

constructs related to the study objectives.

Reliability analysis

Tool	Alpha Cronbach	Internal consistency
Visual Analog Scale.	0.864	Good
Six-Point Engorgement Scale.	0.948	Good
Breast redness and edema around areola assessment scale.	0.87	Good
Latch Score record.	0.88	Good

Ethical Consideration:

In July 2024, an official approval was obtained from the Ethical Committee at the Faculty of Medicine, Fayoum University, with ethical code (R 581). Following the explanation of the purpose of the study, informed permission was acquired from each of the women participating. The women received assurances about the privacy of the information gathered and their freedom to leave the research at any moment. In order to address their issues, the control group was given corporate counseling on reverse pressure softening of the areola after the study was over.

2. Operational design:

Pilot study:

It was conducted on 10 primiparous postpartum women (10% of the sample) following the development of the instruments and prior to the collection of data to evaluate the required time to fill the instruments and test applicability and practicability. No essential changes were made.

Field work:

- After attaining the approval to conduct the study, the sample was collected from the outpatient clinic of the obstetrics and gynecology at Fayoum University Hospital 3 days from 9 a.m. to 2 p.m. every week until the required sample size was obtained.
- Data for this study were collected over a four-month period, from the beginning of August 2024 to the end of December 2024.
- At the beginning, the researchers introduced themselves to the participants, explained aim of the study, and outlined the data collection procedures. Informed consent was then obtained from each participant prior to their involvement in the study.
- Postnatal women were randomly assigned to study or control groups. The researchers started by the control group before the intervention group to prevent contamination of the study.
- The women were interviewed in the reception of the obstetric outpatient clinic
- The study was conducted in three distinct phases; preparatory, implementation and outcome evaluation.

I. Preparatory phase

After massive reviewing of literature, the tools for data collection were prepared, and then the researchers designed the contents of the educational sessions about the reverse pressure softening of the areola and determined the methods of teaching, including PowerPoint presentation, illustrative

media, and the reverse pressure softening of the areola booklet in the Arabic language.

II. Implementation phase

A. Assessment:

Researchers introduced themselves to potential participants and explained the study's purpose. Eligibility for participation was confirmed, and all eligible participants signed an informed consent. Data on participants' general characteristics was collected using a structured interview questionnaire. Thereafter, study subjects with breast engorgement, confirmed by the physician, were interviewed in the study setting to collect data of tool I. In addition, tools II, III, IV, and V were collected to assess the breasts' condition (pre-intervention assessment).

B. Procedure:

Control group

Women in the control group received routine postnatal care as dictated by their obstetricians. The women were instructed to apply the recommended routine care such as compresses and combing the breasts.

Intervention group

- The participants allocated to this group were oriented with the educational session contents that were divided into two main parts; the first part discussed the definition of breast engorgement, signs and symptoms, management, and complications of breast engorgement.

Subjects also were offered health education about the importance and benefits of breastfeeding. The second part of the educational session illustrated management of breast engorgement with the reverse pressure softening of the areola.

- The educational session about the technique of the reverse pressure softening was provided to the postpartum women in eight groups of 6-7 women at the waiting room of the outpatient clinic in the form of lectures, group discussion, and training with a duration of 60-90 minutes.
- Participants were instructed to soften the areola before either feeding or pumping until latching is always easy, to be gentle to avoid pain, but press firmly and steadily. Reverse pressure softening softens the breast for about 5 to 10 minutes before the swelling returns, so it is important to latch the baby on or pump before the breast becomes firm or swollen again. The more swollen or engorged the woman is, the more time it may take to soften. Reverse pressure softening of the areola aims at helping to make attaching the baby and expressing (removing the breast milk) easier by manipulation of one of two methods of reverse pressure softening of the areola.

Method 1 – using two hands:

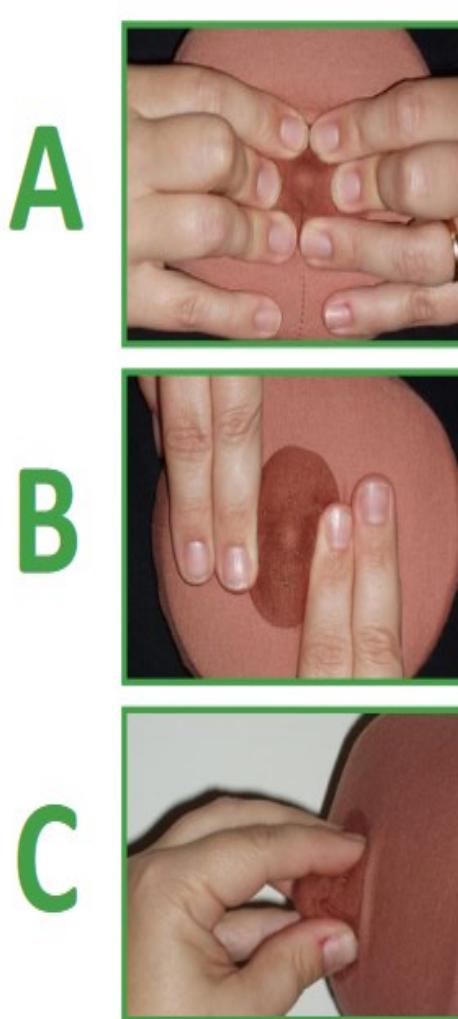
1. **Find a comfortable position:** Lie down or lean back in a relaxed position that allows the breasts to rest comfortably against the chest.
2. **Finger placement:**

Option A: Place the fingers around the base of the nipple, forming a "C" shape.

Option B: Place the fingers directly behind the areola, forming a "U" shape. Choose the finger placement that feels most comfortable for you.
3. **Apply gentle pressure:** Gently and firmly press the fingers against the breast tissue around the nipple for 30-50 seconds.
4. **Release pressure:** After 30-50 seconds, slowly and gently release the pressure while simultaneously moving the fingers away from the nipple.
5. **Continue the process:** Repeat steps 2-4, alternating the position of the fingers around the nipple.
6. **Continue until softening:** Continue this process for a few minutes or until you notice the areola becoming softer and more pliable.

Method 2 – one-handed “flower hold”

1. **Find a comfortable position:** Lie down or lean back in a supported position so that the breasts are resting comfortably against the chest.
2. **Apply gentle pressure:** Finger placement: Gently curve the fingertips around the base of the nipple (ensure the fingernails are short to avoid discomfort).



Apply pressure: Press gently and firmly against the breast tissue around the nipple for 50 seconds or longer, if needed, especially if the breasts are very swollen.

- The researchers give participants at the end of the educational session a colored booklet that has the same educational contents that have been discussed .Finally, participants were asked for their permission to receive weekly reminders about applying reverse pressure softening of the areola (RPS). These reminders were

delivered via telephone calls or messages.

III. Outcome evaluation phase:

The evaluation was done at two time points: two days and four days after the intervention using the same tools through calling of subjects via phone.

3. Administrative Design:

The manager of Fayoum University Hospital received an official letter from the dean of the Faculty of Nursing at Fayoum University describing the aim of the study and data collection procedures and asking for cooperation and official permission to conduct the study.

4. Statistical analysis:

All statistical analyses were performed using SPSS for Windows version 20.0 (IBM SPSS Statistics, Armonk, NY, USA).

Data Presentation:

- Continuous data, which were normally distributed, were presented as mean \pm standard deviation (SD).
- Categorical data were presented as frequencies and percentages.

Statistical Tests:

- **Comparisons of categorical variables:** Chi-square (χ^2) test was used.
- **Comparisons of continuous variables:** Paired and independent t-tests were used.
- **Internal Consistency:** Cronbach's alpha coefficient was used to assess the internal consistency of the research tools.

Statistical Significance:

- **Insignificant difference:** P-value > 0.05

- **Significant difference:** P-value ≤ 0.05
- **Highly significant difference:** P-value ≤ 0.01

Results:

Table (1) shows that, the age of less than half of the women in the study and control groups (44.0% and 40.0% respectively) was 20 to under 25 years and more than half of the study and control groups (52.0% and 54.0%, respectively) resided in rural regions. In both the study and control groups, fewer than half (40.0% and 38.0%, respectively) had completed college. While more than half of the study and control group (58.0% and 54.0% respectively) were housewives. In terms of income, more than half of the control group (52.0%) had just enough income, whereas less than half of the study participants (48.0%) had inadequate income.

Table (2) shows that, approximately two thirds (64.0%) of the women in the control group and over three quarters (76.0%) of the study group had never an abortion. In terms of birth mode, in the study group about two thirds (66.0%) and in control group about nearly two thirds (64.0%) underwent cesarean sections. Over half of the study group (58.0%) and control group (60.0%) had erratic prenatal care schedules. With regard to breast preparation during prenatal visits, approximately three quarters of both the study (74.0%) and control group (70.0%) did not get any breast preparation and did not receive breastfeeding education or breast care education during antenatal visits.

As indicated by Table (3), approximately 74.0% of women in the study group and 66.0% of women in the control group initiate breastfeeding in the first 24 hours for about 20 minutes, with approximately one half (48.0%) in the study group and approximately one third (32.0%) in the control group using one side for breastfeeding and more than one third (34.0%) of the study group and nearly one third (32.0%) of the control group having scheduled breastfeeding. Less than half (46.0%) of the control group and half (50.0%) of the study group experienced breast engorgement on the fourth postpartum day. The research group had small nipples in fewer than half of cases (42.0%), whereas the control group had cracked nipples in less than half of cases (40.0%). Additionally, half (50.0%) of the study group and nearly one-third (32.0%) of the control group stopped breastfeeding for three days or more, while roughly one-third (32.0%) of the study group and half (50%) of the control group stopped breastfeeding their children due to this problem (breast engorgement).

Table (4) reveals that, after intervention, women in the study group knew much more about breast engorgement than they did before (11.98 ± 1.73 and 9.20 ± 1.71 , respectively). For both study and control groups the outcomes of post-intervention were significantly different (11.98 ± 1.73 and 9.56 ± 1.88 , respectively). On the other hand, no statistically significant differences were found between the pre and post knowledge of the control group.

Figure (1) makes clear that, among the women of study group, the decrease in engorgement following applying the reverse pressure softening technique of areola as compared to pre-intervention is noteworthy. In addition, there were statistically significant differences between the study and control groups both before and after intervention. However, there were no statistically significant differences in the control group between pre and post routine care.

Figure (2) illustrates that, among the women of study group, there was substantial decrease in pain (10.0%) following intervention as opposed to pre-intervention (40%). Furthermore, there were statistically significant differences between the study and control groups prior to and following intervention. However, the changes between the control group before and after routine care were no statistically significant.

Table (5) indicates that, after the intervention (application of RPS of areola), women in the study group had significantly less breast redness and edema around the areola (1.66 ± 0.84 and 1.74 ± 0.85) compared to pre-intervention (2.28 ± 0.80 and 2.28 ± 0.70). Additionally, before and after the intervention, there were statistically significant differences between the study and control groups. Nevertheless, following routine care, there was a substantial increase in breast redness and edema around the areola (2.60 ± 0.60 and 2.42 ± 0.70) compared to previously (2.24 ± 0.74 and 1.98 ± 0.82) in the control group.

Table (6) exhibits a significant increase in women's ability to breastfeed following intervention compared to preintervention (6.86 ± 1.55 vs. 5.08 ± 1.67). The study and control groups experienced significantly different post-intervention results (6.86 ± 1.55 and 5.02 ± 2.01 , respectively). However, there were no statistically significant differences between the control group before and after routine care.

Figure (3) indicates that, the study group's post-intervention (58%) breastfeed rate was much higher than the preintervention (18%) rate for women. Conversely, following routine care, women in the control group were less likely to be able to breastfeed (18%) than they were previously (26%).

Table (1): Frequency Distribution of the Studied Women in the Study and Control groups According to Their Demographic Characteristics (n=50).

Demographic characteristics	Study group		Control group		χ^2	P- value
	No.	%	No.	%		
Age						
< 20 years	8	16.0%	9	18.0%	3.25	.353ns
20- < 25 years	22	44.0%	20	40.0%		
25- < 35 years	20	40.0%	18	36.0%		
≥ 35 years	0	0.0%	3	6.0%		
Educational level						
Can't read or write	2	4.0%	1	2.0%	.63	.959ns
Read and write	6	12.0%	7	14.0%		
Basic education	7	14.0%	6	12.0%		
Secondary education	15	30.0%	17	34.0%		
University education	20	40.0%	19	38.0%		
Occupational status						
Work	21	42.0%	23	46.0%	1.44	.230ns
House wife	29	58.0%	27	54.0%		
Income						
Enough and save	9	18.0%	9	18.0%	3.96	.138ns
Just enough	17	34.0%	26	52.0%		
Inadequate	24	48.0%	15	30.0%		
Place of residence						
Urban	24	48.0%	23	46.0%	.04	.841ns
Rural	26	52.0%	27	54.0%		

Note: (ns): not significant ($P < 0.05$)

Table (7) shows that, there was a substantial correlation between the study and control groups' knowledge of breast engorgement and the women's educational attainment and occupational status.

Table (8) displays that, the degree of pain, indications of nipple redness, and indications of nipple edema were significantly positively correlated with breast engorgement. However, there was a noteworthy negative relationship between breast engorgement and the latch score (breastfeeding ability).

Figure (4) depicts a negative correlation between the occurrence of breast engorgement and women's understanding of the condition.

Table (2): Frequency Distribution of the Studied Women in the Study and Control Groups According to Their Obstetric History (n=50).

Obstetric history	Study group		Control group		χ^2	P- value
	No.	%	No.	%		
Number of abortions						
No abortion	38	76.0%	32	64.0%	1.71	.190ns
One abortion	12	24.0%	18	36.0%		
Mode of delivery						
Vaginal Delivery	17	34.0%	18	36.0%	.04	.834ns
Cesarean Section	33	66.0%	32	64.0%		
Schedule of antenatal care						
Regular	21	42.0%	20	40.0%	.04	.839ns
Irregular	29	58.0%	30	60.0%		
Breast preparation during antenatal visits						
Yes	13	26.0%	15	30.0%	.19	.656ns
No	37	74.0%	35	70.0%		

N.B: (ns): not significant (P<0.05)

Table (3): Frequency Distribution of the Studied Women in the Study and Control Groups According to Their Breast Feeding History (n=50).

Breast feeding history	Study group		Control group		χ^2	P- value
	No.	%	No.	%		
Initiation of breastfeeding						
First 24 Hours	37	74.0%	33	66.0%	.76	.383ns
After 24 Hours	13	26.0%	17	34.0%		
Duration of breastfeeding						
10 minutes	16	32.0%	15	30.0%	.52	.770ns
20 minutes	27	54.0%	30	60.0%		
30 minutes	7	14.0%	5	10.0%		
One side breastfeeding						
Yes	24	48.0%	16	32.0%	2.66	.102ns
No	26	52.0%	34	68.0%		
Way of breastfeeding						
Scheduled	17	34.0%	16	32.0%	.04	.832ns
On demand	33	66.0%	34	68.0%		
Onset of breast engorgement						
3 rd day postpartum	23	46.0%	20	40.0%	3.07	.215ns
4 th day postpartum	25	50.0%	23	46.0%		
5 th day postpartum	2	4.0%	7	14.0%		
Associated problems with breast engorgement						
Crackled nipple	11	22.0%	20	40.0%	5.06	.079ns
Inverted nipple	18	36.0%	18	36.0%		
Small nipple	21	42.0%	12	24.0%		
Are you stopping breast feeding as action of this problem						
Yes	16	32.0%	25	50.0%	3.34	.067ns
No	34	68.0%	25	50.0%		
If answer yes, mention the duration of stopping breast feeding (n= 16 in study group and n= 25 in control group)						
One day	4	25.0%	10	40.0%	4.76	.190ns
Two days	4	25.0%	7	28.0%		
Three days or more	8	50.0%	8	32.0%		

N.B: (ns): not significant (P<0.05)

Table (4): Total Mean Scores of Women's Knowledge Regarding Breast Engorgement in the Study and Control Groups on Pre and Post intervention (n= 50).

Total knowledge scores	Study group (M ± SD)	Control group (M ± SD)	Independent t test	P- value
Preintervention	9.20±1.71	9.48±3.89	-.511-	.611ns
Post intervention	11.98±1.73	9.56±1.88	6.683	.000HS
Paired t test	-8.067-	-.131-		
P- value	.000HS	.896ns		

Note: (HS): High significant (P< .001) ns: not significant (P>0.05)

Level of breast engorgement among studied women in the study and control groups on pre and post intervention.

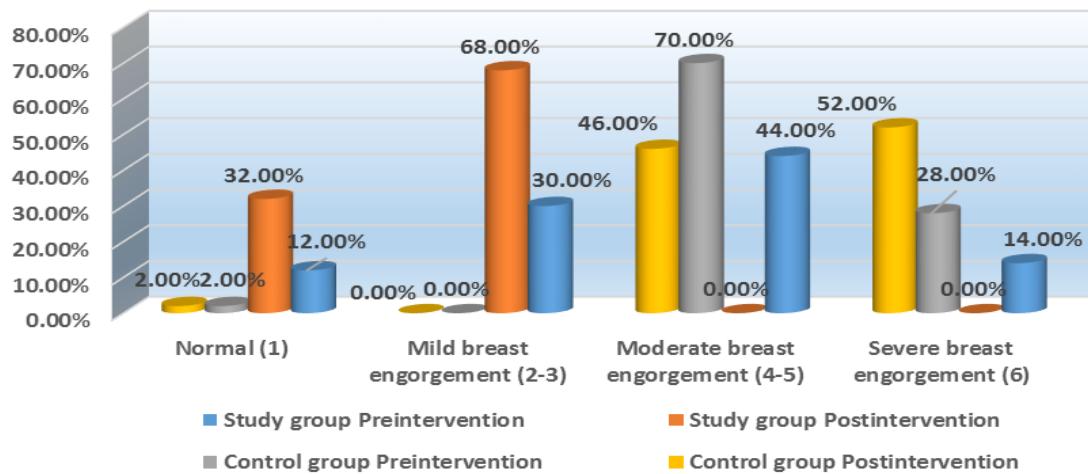


Figure (1): Level of Breast Engorgement among Studied Women in the Study and Control Groups on Pre and Post intervention (n=50).

Level of pain in the study and control groups on pre and post intervention.

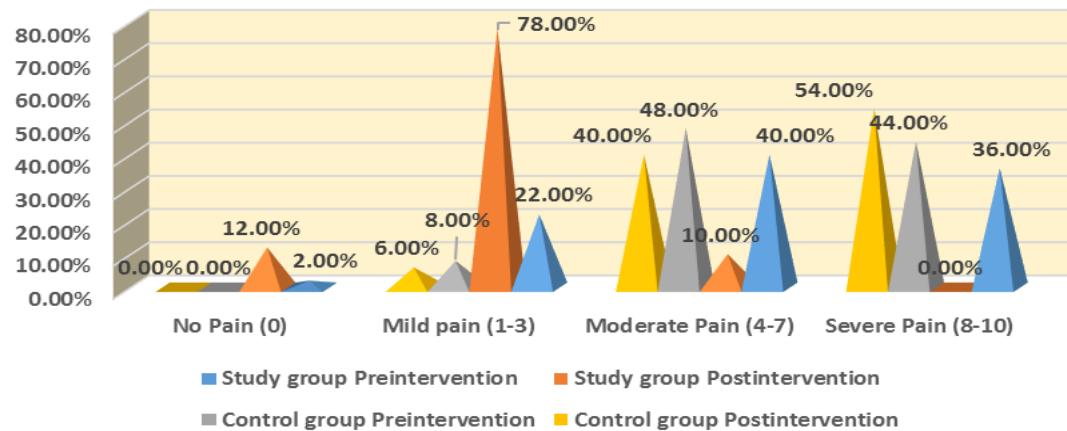


Figure (2): Level of Pain among Studied Women in the Study and Control Groups on Pre and Post intervention (n=50).

Table (5): Total Mean Scores of Breast Redness and Edema around Areola among Studied Women in the Study and Control Groups on Pre and Post intervention (n=50).

Items	Study group (M ± SD)	Control group (M ± SD)	Independent t test	P- value
Signs of nipple redness				
Preintervention	2.28±0.80	2.24±0.74	.355	.723ns
Post intervention	1.66±0.84	2.60±0.60	-6.378-	.000HS
Paired t test	3.741	-2.653-		
P- value	.000HS	.009S		
Signs of nipple edema				
Preintervention	2.28±0.70	1.98±0.82	2.100	.038S
Post intervention	1.74±0.85	2.42±0.70	-4.353-	.000HS
Paired t test	3.459	-2.881-		
P- value	.001S	.005S		

Note: (HS): High significant (P< .001) S: significant (P<0.05) ns: not significant (P>0.05)

Table (6): Total Latch Mean Scores among Studied Women in the Study and Control Groups on Pre and Post intervention (n=50).

Latch scores	Study group (M ± SD)	Control group (M ± SD)	Independent t test	P- value
Preintervention	5.08±1.67	5.64±1.79	-1.576-	.118ns
Postintervention	6.86±1.55	5.02±2.01	5.115	.000HS
Paired t test	-5.510-	1.625		
P- value	.000HS	.107ns		

Note: (HS): High significant (P< .001)

ns: not significant (P>0.05)

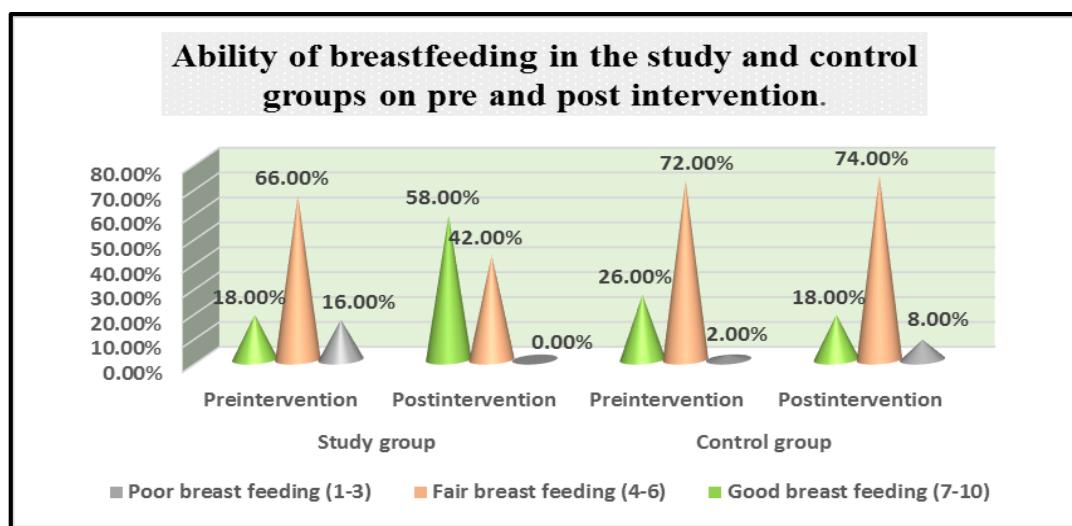
**Figure (3): Ability of Breast Feeding among Studied Women in the Study and Control Groups on Pre and Post intervention (n=50).**

Table (7): Relation between Women's demographic Characteristics and Their Knowledge Regarding Breast Engorgement in the Study and Control groups.

	Knowledge			
	Study group		Control group	
	r	P- value	r	P- value
Educational level	.314**	.001	.303**	.002
Occupational status	.221*	.027	.238*	.017

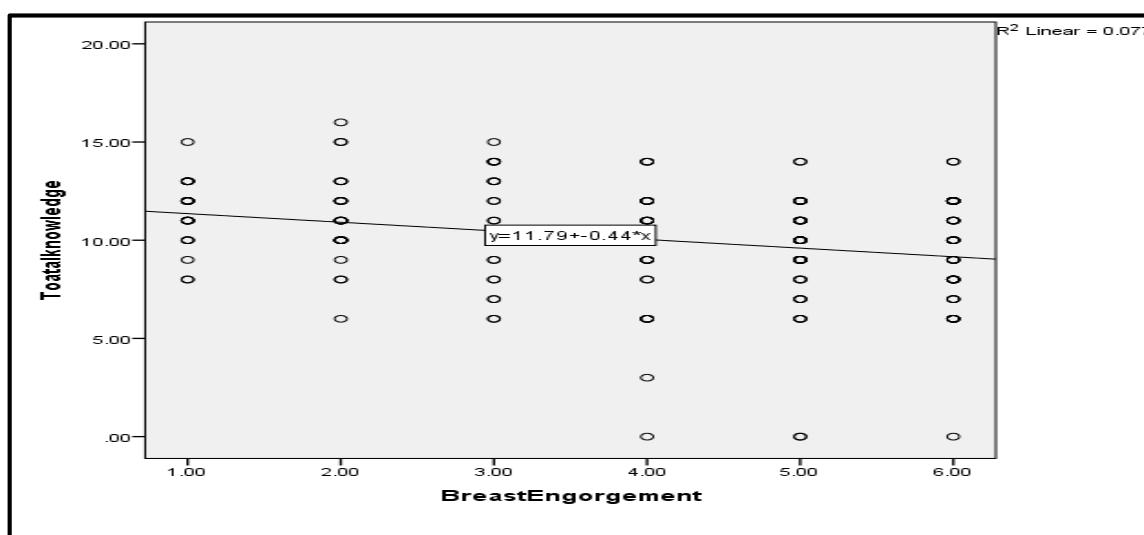
**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table (8): Relation between Breast Engorgement with Severity of Pain, Signs of Nipple Redness, Signs of Nipple Edema and Latch Score in the Study and Control Groups.

	Breast engorgement			
	Study group		Control group	
	r	P- value	r	P- value
Severity of pain	.632**	.000	.539**	.000
Signs of nipple redness	.384**	.000	.294**	.003
Signs of nipple edema	.181*	.010	.282**	.004
Latch score (breast feeding ability)	-.368-**	.000	-.310-**	.002

**. Correlation is significant at the 0.01 level (2-tailed).

**Figure (4): Pearson Correlation between Total Women's knowledge regarding Breast Engorgement and Incidence of Breast Engorgement**

Discussion

For the first several months following delivery, breastfeeding is without a doubt the best source of nourishment. However, a number of physical, social, and psychological problems that may arise during the postpartum phase might have an impact on the effectiveness of breastfeeding. One of the most prevalent is breast engorgement it is uncomfortable conditions for nursing moms, particularly primiparous mothers, encounter (**Alshakhs et al., 2024**).

To address breast engorgement, several pharmacological and non-pharmacological methods were suggested. These non-pharmacological methods include breast massage, alternate cold and warm compresses, olive oil massage, cold gel packs, acupuncture, cabbage leaves, lukewarm water application, Gua-Sha (scraping therapy), and the reverse pressure softening (RPS) of the areola. **Mangesi & Grkovic (2020)** stated that while several engorgement treatment options have been investigated, there is a lack of evidence about an effective intervention. Therefore, the present study was done to ascertain the effect of reverse pressure softening technique on primiparous postpartum women experiencing breast engorgement.

According to the demographic characteristics, the present study revealed that less than half of the age of women in both the study and control groups was 20 to under 25 years old and more than half in both groups resided in rural regions and were housewives. These findings were agreed with a study

by **Farag et al. (2023)** that entitled “Effect of Scraping Technique (Gua-Sha) on Breast Engorgement among Primi Post-Natal Women” who reported that the majority of the participants were aged 20 and less than 25 years. Furthermore, the majority were housewives.

Regarding to the obstetric history of women, the present study revealed that two thirds of the study group and approximately two thirds of the control group underwent cesarean sections. Over half of both groups had irregular prenatal care schedules and the majority of them did not get any breast preparation during antenatal visits. This result was agreed with a study by **Napisah, Widiasih, Maryati, Hermayanti, & Natasya, (2021)** that entitled “The effectiveness of cabbage leaf compress and the education of lactation management in reducing breast engorgement in postpartum” who demonstrated that most respondents did not get instruction on breastfeeding or breast care during antenatal visits and had cesarean section delivery.

From the researchers' point of view, mothers with cesarean section deliveries have delayed breastfeeding because of pain or reluctance that occurs when holding the baby near the incision site, leading to the accumulation of milk and breast engorgement, in addition to the researchers believes the irregularity of antenatal visits may be due to low economical status, which lead to the mothers didn't have information about lactation management and how to prepare the breasts and deal with breastfeeding issues.

In regard to when breast engorgement first appeared, in the study group half of them and in the control group less than half had engorgement on the fourth postpartum day. In the study group less than half of them had small nipples and in the control group less than half of them had cracked nipples and approximately one third of the study group and half of the control group discontinued breastfeeding their children as a result of this issue whereas in the study group more than two thirds of them stopped breastfeeding for three days or longer. This result was agreed upon by **Farag et al. (2023)** who found that breast engorgement first appeared on the 4th day postpartum for the studied women in more than one third of them which made these women discontinue breastfeeding for two days or more. Concerning the assessment of breast pain using VAS, results of this study found a significant decrease in pain levels among women in the study group after intervention from 40% pre-intervention to 10.0% following intervention, respectively, despite the results in the control group between before and after routine care showed no significant difference. This proved that softening of the areola with reverse pressure had beneficial effects in decreasing engorgement, edema and facilitating a deep, pain-free newborn latch. Also, RPS stimulated latching, milk ejection reflex in newborns, reduced excess sub areolar tissue resistance, and lessened breast edema and engorgement. This finding was congruent with a study by **Pednekar (2021)** that entitled “Effectiveness of Reverse Pressure

Softening of Areola in Women with Postpartum Breast Engorgement” who found that pain and engorgement of breast were less in experimental group, which applied RPS compared to the control group.

Regarding the breast redness and edema around the areola, this study found that after the intervention, women in the study group had significantly less breast redness and edema around the areola (1.66 ± 0.84 and 1.74 ± 0.85) compared to pre-intervention (2.28 ± 0.80 and 2.28 ± 0.70), which indicated a positive effect of the reverse pressure softening of the areola, as RPS helps remove swelling backwards and upward in the breast, promoting softening of areola, increasing breast milk letdown, and finally decreasing the sense of pain in the breast. These results agree with **Saadoon et al. (2024)** who studied “Reverse Pressure Softening of Areola: It’s Effect on Breast Engorgement and Newborn Feeding Behavior among Puerperal Mothers” in Egypt, and reported that softening of the areola with reverse pressure was effective in decreasing breast redness, edema, engorgement, pain and improving newborn feeding behavior among puerperal mothers.

The findings of the present study exposed a significant increase in women's ability to breastfeed following intervention compared to pre-intervention (6.86 ± 1.55 vs. 5.08 ± 1.67). The present study's findings also indicated significant decreases regarding levels of breast engorgement post-intervention. Researchers interpreted this to the

ability of the RPS of the areola to decrease pressure on the breast, changing the shape of the nipples, enhancing breast softness and better latching by assisting the baby's tongue in removing more milk while being extremely gentle on the mother's breast. This finding was confirmed by **Saadoon et al. (2024)** who reported significant decreases regarding levels of breast engorgement on 7th & 10th days post-intervention in favor of mothers in the intervention group.

These results are in agree with a study done by **Sharma (2023)** that entitled "The effectiveness of reverse pressure softening technique on the level of breast engorgement and breastfeeding among postnatal mothers" who reported that postnatal mothers who applied the RPS technique reported successful feeding and less engorgement of the breast. The findings also in the same line with a study by **Mahida (2024)** that entitled "A Study to Evaluate the Effectiveness of Reverse Pressure Softening Technique on Level of Breast Engorgement and Breast Feeding among Postnatal Mothers in Selected Hospitals at Fatepura" who reported that there was significance improvement in health condition and decrease in engorgement with the application of the RPS technique.

Moreover, the results were agreed by **Mounika, Kalabarathi, & Padmapriya, (2022)** who studied "Effectiveness of reverse pressure softening technique on level of breast engorgement among postpartum mothers at Saveetha Medical College and Hospital, Thandalam, Chennai. Cardiometry" concluded that, using the

technique of the RPS of the areola was the most straightforward and secure way to reduce postpartum breast engorgement. Additionally, this finding was in accordance with **Massey & Tutor (2022)** who studied "Efficacy of reverse pressure softening technique among postnatal mothers in selected hospitals at Kanpure," which showed that the intervention technique known as the reverse pressure softening is very effective and that there is a highly statistically significant difference between the study and control groups regarding post-test levels of breastfeeding and breast engorgement among mothers who had a caesarean section.

Finally, all breastfeeding mothers should receive comprehensive education on breast engorgement before being discharged from the hospital or birth center. While some women may experience engorgement during their hospital stay, many are discharged before the peak incidence (typically 2-5 days postpartum). Therefore, it is crucial to provide anticipatory guidance, educate mothers about breast engorgement symptoms and potential management strategies, offer pain management options, counsel mothers on effective pain relief methods for managing engorgement discomfort, provide support resources, share contact information for lactation consultants, breastfeeding support groups, or other relevant resources, routinely assess for engorgement, and healthcare providers (both those seeing the mother and those seeing the newborn) should regularly check for breast fullness and engorgement

during postpartum checkups. The RPS technique of the areola is a simple and convenient method to be included to educate patients in the antenatal and postnatal sessions.

Conclusion:

Among the women who participated in the study group, there was a noteworthy decrease in breast engorgement following the application of the reverse pressure softening technique of the areola as compared to pre-intervention. There was a substantial decrease in pain (10.0%) following intervention as opposed to pre-intervention (40%). The breastfeeding rate among the study group post-intervention (58%) was much higher than the pre-intervention (18%) rate for women. Conversely, following routine care, women in the control group were less likely to be able to breastfeed (18%) than they were previously (26%). These findings achieved the study's aim and supported the research hypothesis that the primiparous postpartum women who receive the reverse pressure softening technique will have more successful breastfeeding and less breast engorgement than those who don't receive it.

Recommendations:

- Raising awareness of postpartum mothers, especially the newly breastfeeding mothers, through prenatal classes regarding the beneficial effect of the RPS of the areola on newborn feeding and engorgement of the breast.
- The technique of reverse pressure softening should be counseled as a part of postpartum women's

discharge teaching plan as a non-pharmacological method in reducing engorgement of the breast.

- Nurses must be qualified to use the reverse pressure softening technique as a nursing approach for managing breast engorgement.

References

Alshakhs, F., Katooa, N., Badr, H., & Thabet, H. (2024). The Effect of Alternating Application of Cold and Hot Compresses on Reduction of Breast Engorgement among Lactating Mothers. *Cureus*; 16(1): e53134. DOI 10.7759/cureus.53134.

Abd El-hady, E., El-Refaey, A., & Gaheen, M. (2021). Self-Care Practices of Primipara Women Regarding Breast Engorgement. *Tanta Scientific Nursing Journal*; 20 (1):161- 194. Print ISSN 2314 – 5595, online ISSN 2735 – 5519.

Ahmed, S., Helmy, H., Masoud, H., & Ragab, H.(2022). Effect of Cabbage leaves, Olive Oil Massage and Warm Ginger on relief Breast Engorgement among Postpartum Women. *Egyptian Journal of Health Care*; 13(4):1510-1524.

Aprilina, H., Krislinggardini, K., Isnaini, N., & Suratmi, S. (2021). The Effect of Cabbage Leaves Compress on Breast Engorgement in Postpartum Mother. *Open Access Macedonian Journal of Medical Sciences*; 5 (9): 124-128. <https://doi.org/10.3889/oamjms.2021.5777>, eISSN: 1857-9655.

Amir, L., Baeza, C., Charlamb, J., & Jones, W. (2021). Identifying

the cause of breast and nipple pain during lactation. *British Medical journal*; 374:n1628 doi:10.1136/bmj.n1628.

Arizona Department of Health Services. (2020). Reverse Pressure Softening. Available at <https://www.azdhs.gov/documents/prevention/nutrition-physical-activity/breastfeeding/reverse-pressure-softening.pdf>.

Ebrahim, R., & Esmat, O. (2018). Effect of Educational Program on Mothers' Using for Non-pharmacological Therapies to Alleviate Breast Engorgement after Cesarean Section. *International Journal of Novel Research in Healthcare and Nursing*; 5(2): 454-469.

Farag, W., Alam, T., & Taman, A. (2023). Effect of Scraping Technique (Gua-Sha) on Breast Engorgement among Primi Post-Natal Women. *Egyptian Journal of Health Care*; 14 (2):673-688.

Fawzy, M., Mervat, E., & Inas, M. (2022). Effect of Breast Massage on Reduction of Breast Engorgement among Postpartum Women. *International Journal of Novel Research in Healthcare and Nursing*; 9 (2): 132-139.

Ghattas, V., Ibrahim, H., Mohamed, M., & Amin, S. (2022). Effect of Olive Oil Massage on Breast Engorgement and Breastfeeding among Primiparous Postnatal Mothers with Cesarean Section Delivery. *Assiut Scientific Nursing Journal*; 10 (31):69 – 79. Print ISSN: 2314-8845, Online ISSN: 2682-3799.

Gift, A. (1989). Validation of a vertical visual analogue scale as a measure of clinical dyspnea. *Rehabilitation Nursing Journal: the official journal of the Association of Rehabilitation Nurses*; 14. (6): 323–5. <https://doi.org/10.1002/j.2048-7940.1989.tb01129.x>.

Hassan, H., EL-Kholy, G., Ateya, A., & Hassan, A. (2020). Breast Feeding Knowledge and Practices among Primiparous Women with Caesarean Section: Impact on Breast Engorgement in Upper Egypt. *Communication, Society and Media*; 3(2):34-78.ISSN 2576-5388 (Print) ISSN 2576-5396 (Online), www.scholink.org/ojs/index.php/csm.

Hill, P. & Humenick, S. (1994). The occurrence of breast engorgement. *Journal of human lactation: official journal of International Lactation Consultant Association*; 10(2):79–86. <https://doi.org/10.1177/089033449401000212>.

Jensen, D., Wallace, S. & Kelsay, P. (1994). LATCH: A breastfeeding charting system and documentation tool. *Journal of Obstetric, Gynecologic, & Neonatal Nursing*; 23(1): 27-32.

Lamadah, S., Ahmed, A., Kandeel, H., & Tayel, A. (2021). Effect of Lukewarm Water Compresses versus Cold Gel Packs on Breast Engorgement among Puerperal Women. *Assiut Scientific Nursing Journal*; 9 (27): 41 - 50. DOI: 10.21608/ASNJ.2022.106384.126 6.

Lauwers, J., & Swisher, A. (2020). Counseling the nursing mothers and lactation. *Consultant guide. 7th edition. Jones & Bartlett Learning*; 517-520.

Mohamed, R., Shelil, M., & Abd-Allah, I. (2020). Comparing between the Effect of Breast Massage versus Cabbage Leaves Compress on Reduction of Breast Engorgement among Postpartum Women. *Trends in Nursing and Health Care Journal*; 1(1):111-128.

Mahida, H., Jeenath, R., & Doss, J. (2024). A Study to Evaluate the Effectiveness of Reverse Pressure Softening Technique on Level of Breast Engorgement and Breast Feeding Among Postnatal Mothers in Selected Hospitals at Fatepura. *A and V Pub International Journal of Nursing and Medical Research*; 3(2):3-91. Doi: 10.52711/ijnmr.2024.19.

Massey, A., & Tutor (2022). Efficacy of reverse pressure softening technique among postnatal mothers in selected hospitals at Kanpure. *International research journal of education and technology*; 4 (11): 16-20.

Mounika, M., Kalabarathi, S., & Padmapriya, D. (2022). Effectiveness of reverse pressure softening technique on level of breast engorgement among postpartum mothers at Saveetha Medical College and Hospital, Thandalam, Chennai. *Cardiometry. Special issue*; 1 (25):231-237.

Mangesi, L., & Grkovic, I. (2020). Treatments for breast engorgement during lactation. *Cochrane Database Systematic Review*. 9:CD006946. Doi: 10.1002/14651858.CD006946.pub4. PMID: 27351423; PMCID: PMC7388926.

Napisah, P., Widiasih, R., Maryati, I., Hermayanti, Y., & Natasya, W. (2021). The effectiveness of cabbage leaf compress and the education of lactation management in reducing breast engorgement in postpartum. *Open Access Macedonian Journal of Medical Sciences*; 9(T6):106-110. <https://doi.org/10.3889/oamjms.2021.7318>.

Pednekar, P., (2021). Effectiveness of Reverse Pressure Softening of Areola in Women with Postpartum Breast Engorgement. *Indian Journal of Physiotherapy and Occupational Therapy*; 15(2):50-58. DOI: <https://doi.org/10.37506/ijpot.v15i2.14513>.

Southeast Lactation Consulting, (2024). Breast Engorgement: A Gentle Guide. Available at <https://www.southeastlactation.com/blog/breast-engorgement-a-gentle-guide>.

Saadoon, O., Saadoon, M., & Elmashad, H. (2024). Reverse Pressure Softening of Areola: It's Effect on Breast Engorgement and Newborn Feeding Behavior among Puerperal Mothers. *Assiut Scientific Nursing Journal*; 12 (45):52 – 62. Print ISSN: 2314-8845 Online ISSN: 2682-3799 DOI: 10.21608/asnj.2024.295442.1835.

Sharma, A. (2023). The effectiveness of reverse pressure softening technique on the level of breast engorgement and breastfeeding among postnatal mothers. *International Journal of Creative Research Thoughts*; 11 (12):770-787.

Zaghoul, M., Zedan, H., Alagamy, Z., Kahlil, E& Gomaa, A. (2023). The Effect of Breast Massage on Breast Pain and Breast

Engorgement among Primiparous Women and Neonate's Suckling Speed. *Mansoura Nursing Journal (MNJ)*; 10(2): 343-351. Print ISSN: 2735 – 4121 Online ISSN: 2735 – 413X.

Zakarija-Grkovic, I., & Stewart, F. (2020). Treatments for breast engorgement during lactation. *Cochrane Database of Systematic Reviews*; (9): 231-236.

Effect of Implementing Nursing Intervention Regarding Infection Control Measures on Nurses' Performance during Cardiopulmonary Resuscitation

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Abstract

Background: When a patient has abrupt cardiac arrest, cardiopulmonary resuscitation (CPR) is a quick and critical lifesaving procedure that can either prevent or delay death. **The aim of the study** was to assess how nurses' knowledge and practice of CPR were affected by the implementation of nursing intervention about infection control measures. **Subjects and Methods:** This quasi-experimental research was conducted on 105 nurses. Data regarding infection control measures on nurses' performance during CPR were collected from nurses using nurses' structured interview questionnaires and Nurses' practice observational checklist. **Results:** Initially, 76.19% of participants had low knowledge, but this dropped to 0% immediately after the intervention, with only 3.81% remaining in the low knowledge category after 6 weeks. Moderate knowledge was initially present in 14.29% of participants, decreasing to 0.95% immediately after the intervention, then increasing to 19.05% at the 6-week follow-up. High knowledge increased dramatically from 9.52% to 99.05% immediately post-intervention, with 77.14% retaining high knowledge 6 weeks later. Initially, 71.43% of participants had unsatisfactory performance, which dropped to 0% immediately after the intervention, but 23.81% reverted to unsatisfactory performance 6 weeks later. In contrast, only 28.57% initially performed satisfactorily, but this increased to 100% immediately post-intervention, with 76.19% maintaining satisfactory performance 6 weeks later. **Conclusions:** There was a clear positive correlation between the nurses' overall practice scores and their overall knowledge scores.

Keywords: Cardiopulmonary Resuscitation, Infection Control, Knowledge, Practice

Introduction

Death from cardiac arrest is among the most common causes of mortality globally. Estimates suggested that cardiac arrest occurred at a rate of 50 to 100 instances per 100,000 individuals within the broader population. Effective nursing care and a thorough understanding of cardiopulmonary resuscitation (CPR) techniques are essential (Ahern et al., 2011; Merchant et al., 2011).

Sudden cardiac arrest (SCA) is a common consequence of several serious illnesses. This is the cessation of regular blood flow to any region of the body, including important organs. Basic life support (BLS), advanced cardiac life support (ACLS), and post-resuscitation treatment are among the factors that affect the prognosis of patients with SCA (Filho, Santana-Santos, Gengo, & Nogueira, 2015; Murphy et al., 2020).

Although CPR usually cannot restart the heart, it ensures that oxygen is delivered mostly to the heart and brain. After a sudden cardiac arrest, the chance of survival drops by 10–15% for each minute that goes by without resuscitation measures being initiated (Mustafa Aljanabi & Al-Ani, 2014). Respiratory and cardiac arrest patients receive CPR, a lifesaving emergency procedure, though it does not yield successful outcomes for all individuals. In statistics, the patient's prognosis is key to the effectiveness of CPR; implementing trust is essential for patients with a high likelihood of survival. Numerous studies have suggested that the training of CPR

courses be implemented for professional healthcare workers, and it is well known that they are familiar with the equipment and its proper use (Kleinman et al., 2015; Mogadasian et al., 2014; Wyckoff et al., 2022; Yuen, Reid, & Fetter, 2011).

In cases of in-hospital cardiac arrest, nurses are the initial members of the medical team to initiate CPR, and they have the primary responsibility for management. Medical staff, particularly nurses, should be trained and knowledgeable about identifying cardiac arrest symptoms and taking prompt action to prevent delays in administering basic life support care in the process of resuscitation (Atkins et al., 2015; Atkins et al., 2018; Soar et al., 2015).

The standard precautions are a set of guidelines outlining the most up-to-date and comprehensive infection control practices aimed at reducing the risk of infectious transmissions. Its capacity to win serves as the main defence against exposure to biological fluids such as blood, mucosal membranes, secretions, and non-contact skin. Numerous international bodies, such as the World Health Organisation (WHO), the Association for Professionals in Infection Control (APIC), the Centres for Disease Control (CDC), and the European Best Practice Guidelines (EPBG), all make reference to these standards. Hand sanitisation, the use of suitable personal protective equipment (PPEs), the safe handling of potentially contaminated surfaces or equipment, environmental disinfection, linen management, and

trash disposal are all part of putting standard precautions into practice (Haile, Engeda, & Abdo, 2017; Nasiri et al., 2019; Neo, Mills, & Edward, 2013).

The purpose of this study was to evaluate how the introduction of nursing interventions centred on infection control protocols affected the clinical expertise and knowledge of nurses doing cardiopulmonary resuscitation.

Materials and Methods

A quasi-experimental study involving 105 nurses employed at Tanta University Hospitals and Elmenshawy Hospital's casualty and emergency departments was conducted.

The study received approval from the Ethical Committee at Tanta University Hospitals in Tanta, Egypt. Consent forms signed by the nurses indicated that they were fully informed.

Assessment phase

The Nurses' structured interview questionnaire, consisting of parts A and B, was initially utilized at the commencement of the study. Part A gathered socio-demographic data from nurses, including details on age, sex, marital status, years of professional experience, educational level, and prior training in infection control practices during CPR procedures. Meanwhile, part B, the nurses' knowledge assessment sheet, was employed to evaluate nurses' knowledge both prior to and following the implementation of an educational program focused on infection control measures during

CPR. The Tool II, nurses' practice observational checklist, was employed to evaluate nurses' practice both prior to and subsequent to the introduction of an educational program focused on hand washing and preventing the dissemination of infection during cardiopulmonary resuscitation.

Planning phase

This phase focuses on building, setting up, and evaluating various data collection instruments, as well as making managerial arrangements to conduct the study. A researcher was developing a nursing health teaching program to enhance nurses' knowledge and clinical skills. By the end of the sessions, an Arabic-language booklet was distributed.

Implementation phase

The educational program was created by researchers following a comprehensive review of relevant studies (Alwutaib, Abdulghafour, Alfadhli, Makboul, & El-Shazly, 2012; Sreedharan, Muttappillymyalil, & Venkatramana, 2011) and research findings on detecting, managing, and evaluating nurses' knowledge and clinical practices. Data was gathered throughout three stages of evaluation for nurses; the initial stage was conducted before implementing the program using two instruments to obtain baseline information about nurses' knowledge and practice regarding infection control assessment. Prior to the educational program's implementation, each nurse was individually observed to assess their current practices in accordance

with infection control standards. A booklet outlining the program components, informed by literature reviews (Al-Tonbary et al., 2011; Hamid, Aziz, Anita, & Norlijah, 2010; Okechukwu & Motshedis, 2012) and pretest evaluation findings, was compiled in Arabic and supplemented with photographs and demonstrations to aid nurses in comprehending the material. All nurses participated in an educational program conducted in outpatient clinic unit classrooms. The program was divided into two sections: the initial component involved theoretical instruction, which spanned across four consecutive days, with each of the four daily sessions lasting one hour. The first session of the program outlined the purpose of the study, provided an overview of infection control procedures, defined key concepts, and discussed the factors contributing to the spread of infection. Subsequent sessions included standard precautions for infection control, methods for controlling infection, and a final session that facilitated revision and open discussion between researchers and the study participants. Following each session, nurses were provided with printed materials containing guidelines and were also supplemented with a knowledge booklet. Throughout the training sessions, nurses were urged to pose inquiries and offer constructive comments. A line of communication was maintained between the researchers and the nurses. The practical part comprised four one-

hour sessions held on four consecutive days. Nurses were allocated to smaller groups, with a typical group size ranging from 5 to 7 individuals. The first session focused on hand washing technique, the second covered personal protective equipment (PPEs), the third involved the removal of waste products through proper infection control practices, and the fourth included demonstrations and re-demonstrations. The teaching media incorporated group discussions, PowerPoint presentations, and real-life case studies.

Evaluation phase

The evaluation of this phase took place both prior to and following six weeks of program implementation, with each nurse being assessed to gauge the programme's impact on performance via tools I and II, using a scoring system. For tool I, each correct response to multiple choice questions was awarded one point, while incorrect responses received zero points. Each short answer question received scores of 2 for a correct and complete response, 1 for a correct but incomplete answer, and 0 for an incorrect answer. The total scoring system was used to categorize patients' knowledge based on the following criteria: scores above 80% were classified as high, scores between 60% and 80% were categorized as moderate, and scores below 60% were designated as low. For tool II, a scoring system was implemented to evaluate each step of nurses' practice, with a score of (1) assigned for tasks completed and a

score of (0) assigned for tasks not completed. The nurse practice scoring system was categorized into two groups: less than 80% was classified as unsatisfactory and 80% or greater was classified as satisfactory.

Statistical analysis

Measurable investigation was finished by SPSS v26. Quantitative factors were introduced as mean and standard deviation, with correlations made between the three gatherings utilizing the ANOVA (F) test, trailed by a Tukey post hoc test. Recurrence and rate information for subjective factors were introduced, and the Chi-square test was utilized for investigation. A two-followed P value of under 0.05 was viewed as statically significant.

Results

Sociodemographic characteristics of the studied nurses were enumerated in this table. **Table 1**

Initially, 76.19% of participants had low knowledge, but this dropped to 0% immediately after the intervention, with only 3.81% remaining in the low knowledge category after 6 weeks. Moderate knowledge was initially present in 14.29% of participants, decreasing to 0.95% immediately after the intervention, then increasing to 19.05% at the 6-week follow-up. High knowledge increased dramatically from 9.52% to 99.05% immediately post-intervention, with 77.14% retaining high knowledge 6 weeks later. Total knowledge showed significant increase from pre to immediately to post 6 weeks periods of follow up (P<0.05). **Table 2**

Initially, 71.43% of participants had unsatisfactory performance, which dropped to 0% immediately after the intervention, but 23.81% reverted to unsatisfactory performance 6 weeks later. In contrast, only 28.57% initially performed satisfactorily, but this increased to 100% immediately post-intervention, with 76.19% maintaining satisfactory performance 6 weeks later. These changes were statistically significant, reflecting a strong immediate impact of the intervention, with a slight decline over time. Total practice showed significant increase from pre to immediately to post 6 weeks periods of follow up (P<0.05). **Table 3**

Prior to, during, and six weeks after the implementation of the educational program, the total knowledge and total practice scores of the nurses under study showed a significant positive connection (P<0.05). There was no discernible difference in the correlation between total knowledge and total practice scores. Total knowledge and total practice scores before and just after the educational program was implemented showed statistically significant changes (P<0.05). **Table 4**

There was no significant difference between socio-demographic characteristics and total knowledge scores in pre, immediately and 6 weeks after implementing of educational program except in sex through the period of immediately after of follow up showed significant difference (P<0.05). **Table 5**

Sociodemographic traits and total practice scores before, during, and six

weeks after the start of the educational program did not significantly differ from one another. **Table 6**

Table 1: distribution of the nurses studied regarding their sociodemographic characteristics

		N=105	%
Age (years)	21-<30	61	58.10
	30-<40	24	22.86
	40-<50	18	17.14
	50-60	2	1.90
Sex	Male	27	25.71
	Female	78	74.29
Marital status	Married	27	25.71
	Single	75	71.43
	Divorced	1	0.95
	Widow	2	1.90
Educational level	Diplome	13	12.38
	Technical institute	44	41.90
	Bachelor	45	42.86
	Mention Other	3	2.86
Experience (years)	(1-<5)	52	49.52
	(5-<10)	13	12.38
	(10-<15)	19	18.10
	(≥15)	21	20.0

Data is presented as frequency (%).

Table 2: distribution of the studied nurses regarding their total knowledge level about infection control during CPR

Knowledge level	Pre	Immediately	Post 6 weeks	Test of Sig.	P
Low	80(76.19%)	0(0.0%)	4(3.81%)	X ² =235.186	0.000*
Moderate	15(14.29%)	1(0.95%)	20(19.05%)		
High	10(9.52%)	104(99.05%)	81(77.14%)		
Total score	23.60±12.175	48.30±2.527	48.19±6.481	F=324.44	0.000*

Data are presented as mean \pm SD or frequency (%). * Significant P value <0.05 . CPR: Cardiopulmonary resuscitation, X²: Chi-square test.

Table 3: distribution of the studied nurses regarding their total level of practice during CPR

N=105	Pre	Immediately	Post 6 weeks	Test of Sig.	P
Unsatisfactory	75(71.43%)	0(0.0%)	25(23.81%)	$\chi^2=128.19$	0.000*
Satisfactory	30(28.57%)	105(100.0%)	80(76.19%)		
Total score	14.58±5.447	25.59±0.513	23.22±5.073	F=190.04	0.000*

Data are presented as mean \pm SD or frequency (%). * Significant P value <0.05 . CPR: Cardiopulmonary resuscitation, χ^2 : Chi-square test.

Table 4: Correlation between total knowledge and total practice scores of the studied nurses about infection control during CPR

N=105	Total Knowledge score					
	Pre		Immediately		Post 6 weeks	
	r	P	r	P	r	P
Total practice score	0.303	0.002**	0.208	0.033*	0.071	0.470

*Significant P value <0.05 . CPR: Cardiopulmonary resuscitation, r: Pearson correlation coefficient.

Table 5: Mean scores of socio-demographic characteristics of the studied nurses and their total knowledge scores about infection control during CPR

	N=105	Pre	Immediately	Post 6 weeks
Age (years)	(21-<30)	23.20±11.89	47.90±2.45	47.44±7.13
	(30-<40)	23.17±12.68	49.04±2.74	49.83±4.15
	(40-<50)	26.61±12.98	49.00±1.85	48.11±6.83
	(50-60)	14.00±2.83	45.50±4.95	52.00±0.00
$F1=0.81, F2=2.586, F3=1.017, P1=0.491, P2=0.057, P3=0.389$				
Sex	Male	26.78±13.69	49.52±1.74	48.96±5.58
	Female	22.50±11.50	47.88±2.63	47.92±6.78
$t1=2.512, t2=9.031, t3=0.514, P1=0.116, P2=0.003^*, P3=0.475$				
Marital status	Married	22.44±12.30	48.22±2.28	47.67±7.05
	Single	23.76±12.04	48.37±2.66	48.41±6.35
	Divorced	19.00±0.00	47.00±0.00	50.00±0.00
	Widow	35.50±20.51	47.50±2.12	46.00±8.49
$F1=0.765, F2=0.18, F3=0.186, P1=0.516, P2=0.911, P3=0.906$				
Educational level	Diplome	23.69±13.39	48.23±1.48	46.92±7.18
	Technical institute	22.18±11.04	48.61±2.52	48.73±6.20
	Bachelor	25.24±13.13	47.87±2.76	48.11±6.68
	Post studies	19.33±9.29	50.67±0.58	47.00±6.93
$F1=0.589, F2=1.573, F3=0.296, P1=0.624, P2=0.201, P3=0.828$				
Years of experience	(1-<5)	23.15±12.23	47.75±2.57	47.69±6.84
	(5-<10)	25.46±11.46	49.38±1.61	46.85±8.12
	(10-<15)	21.89±12.62	48.79±2.92	50.58±2.95
	(≥15)	25.10±12.62	48.57±2.32	48.10±6.67
$F1=0.348, F2=1.993, F3=1.156, P1=0.791, P2=0.121, P3=0.331$				
Attendance of training program		22.31±12.51	48.41±2.55	48.75±5.58
$t1=0.512, t2=0.074, t3=0.341, P1=0.476, P2=0.787, P3=0.561$				

Data are presented as mean \pm SD. * Significant P value <0.05 . CPR: Cardiopulmonary resuscitation.

Table 6: Mean scores of socio-demographic characteristics of the studied nurses and their total practice scores about infection control during CPR

N=105		Pre	Immediately	Post 6 weeks
Age (years)	(21-<30)	14.54±5.34	25.54±0.54	22.90±5.30
	(30-<40)	13.92±5.62	25.63±0.50	23.17±5.16
	(40-<50)	15.39±5.62	25.78±0.43	24.06±4.48
	(50-60)	16.50±9.19	25.00±0.00	26.00±0.00
F1=0.328, F2=1.96, F3=0.437, P1=0.805, P2=0.125, P3=0.727				
Sex	Male	13.93±6.17	25.59±0.57	23.48±4.89
	Female	14.81±5.20	25.59±0.50	23.13±5.16
t1=0.523, t2=0.001, t3=0.096, P1=0.471, P2=0.981, P3=0.757				
Marital status	Married	15.04±5.81	25.63±0.49	23.11±5.08
	Single	14.43±5.34	25.57±0.52	23.29±5.10
	Divorced	10.00±0.00	26.00±0.00	26.00±0.00
	Widow	16.50±7.78	25.50±0.71	20.50±7.78
F1=0.395, F2=0.307, F3=0.295, P1=0.757, P2=0.821, P3=0.829				
Educational level	Diplome	15.85±5.83	25.69±0.48	25.15±3.05
	Technical institute	14.41±5.30	25.59±0.50	23.30±5.11
	Bachelor	14.44±5.71	25.53±0.55	22.40±5.52
	Post studies	13.67±2.08	26.00±0.00	26.00±0.00
F1=0.28, F2=0.993, F3=1.338, P1=0.842, P2=0.399, P3=0.266				
Years of experience	(1-<5)	14.58±5.46	25.54±0.54	22.56±5.53
	(5-<10)	14.92±5.44	25.62±0.51	24.15±4.58
	(10-<15)	13.63±5.42	25.58±0.51	23.16±5.04
	(≥15)	15.24±5.71	25.71±0.46	24.33±4.19
F1=0.305, F2=0.592 F3=0.775, P1=0.822, P2=0.622, P3=0.511				
Attendance of training program		12.94±4.98	25.47±0.57	23.47±4.92
t1=4.324, t2=2.63, t3=0.111, P1=0.04*, P2=0.108, P3=0.741				

Data are presented as mean \pm SD. * Significant P value <0.05 . CPR: Cardiopulmonary resuscitation.

Discussion

All medical personnel, but especially critical care nurses, should be proficient in advanced cardiovascular life support (**Abass & Soliman, 2020**). More than two-thirds of the nurses in the current study had not taken part in the infection control training program during cardiopulmonary resuscitation. Less than two-thirds of nurses did not participate in an infection control training program when doing cardiopulmonary resuscitation, according to (**Pellis et al., 2009**). The results of the current study showed that the nurses' level of knowledge had significantly improved; most had insufficient knowledge before the educational training program was implemented, but all nurses had good knowledge after the program was put into place.

Also, there was significant differences were found in all questions and between all periods of follow-up. This finding was consistent with (**Chan-Yeung, 2004**) reported that lack of continuous education and training programs about infection control during CPR led to unsatisfactory level of nurse's knowledge. In contrast with (**Naser & Hadzimerovic, 2018**) reported that nearly three quarters of the studied patient have scored good knowledge before the program.

The current study's findings on knowledge retention throughout the intervention stages for infection control during CPR (True and False questions) showed that, prior to the educational program, the participating nurses provided incorrect answers to

all queries, whereas after the program, their responses improved. Consistent with (**Kubica et al., 2018**), prior to the adoption of educational standards, it was found that around three-quarters of the nurses under study had inadequate knowledge; following this, a highly significant improvement in their level of knowledge was noted. Prior to the start of the educational program, the participating nurses in this study initially shown a lack of understanding. Most nurses showed a high degree of understanding once it was put into practice. Interestingly, six weeks after the educational session ended, more than three-quarters of them continued to possess this high level of knowledge. According to studies by (**Wang et al., 2013**), most nurses polled knew very little about infection prevention during CPR before the instructional program was put into place. However, in the immediate aftermath of the program's execution, almost three-quarters of them showed a high degree of understanding in this area.

More than half of the participants did not wash their hands and did not wear their gloves, apron, foot protector, and mask prior to the implementation of the educational program. In contrast, six weeks after the program was implemented, all participants were washing their hands and wearing their gloves, apron, foot protector, and mask.

These findings were in line with those of (**Konstantinides et al., 2020**), who discovered a highly significant positive link between a person's total knowledge level throughout the

research period and how often they practiced infection control during CPR.

This study found that prior to the introduction of an educational program, more than half of the participating nurses were not following hand hygiene protocols, but afterwards, the majority and all of the nurses were adhering to all steps of hand hygiene practice within 6 weeks. Studies concur with (**Perkins et al., 2015**) those enhancements in nursing knowledge following an educational program led to improved nursing practice after 6 weeks.

The current study found that over half of the nurses being studied had failed to wear gloves, face masks, nose masks, and gowns before the educational program was put in place, whereas all and the majority of them wore personal protective equipment during cardiopulmonary resuscitation six weeks after the educational program was implemented. This outcome is consistent with (**Patel et al., 2018**), who observed a highly significant improvement in the nurses' use of personal protective equipment during CPR following their participation in the educational training program.

following the introduction of the educational program.

The research identified a significant connection between the socio-demographic traits of the participants and their overall knowledge score, consistent with the results of (**Holmberg et al., 2019**), which revealed a substantial correlation between knowledge scores and socio-demographic traits of nurses in

The findings of this study concerning the distribution of the participating nurses based on their overall proficiency in CPR indicated that fewer than three quarters of the nurses displayed an unsatisfactory level of practice during CPR implementation, whereas more than three quarters of the nurses demonstrated a satisfactory level of practice after 6 weeks of the cardiopulmonary resuscitation educational program.

Researchers investigated the connection between the total scores for knowledge and the total scores for practice among the nurses studied in terms of their adherence to infection control procedures during cardiopulmonary resuscitation (CPR). The study found a significant positive relationship between nurses' overall scores for knowledge and practice before, immediately after, and six weeks following the implementation of an educational program. This discovery aligned with (**Bircher, Chan, & Xu, 2019**), a statistically significant and highly positive correlation was observed between the total practice level of nurses in the study and their total knowledge level over the course of the study period

relation to infection control during CPR within the context of a program intervention. In contrast, a study led by (**Bossaert et al., 2015**) revealed that the demographic characteristics of the respondents did not significantly affect the knowledge score.

Findings from the study indicated a substantial relationship between socio-demographic factors and the

participants' overall practice score. The discovery aligned with Finn's observation, noted in reference (Finn, Jacobs, Williams, Gates, & Perkins, 2019), revealed after a program centred on infection control during CPR was put into place, there was a significant correlation between total practice scores and sociodemographic traits. One of the study's drawbacks was its very small sample size, therefore, it is suggested that further research is necessary to extend the follow-up period for the CPR programs. The study's findings should be validated by conducting it on a large sample size in various hospital settings to achieve broader applicability.

Conclusions

At three different times in time - before, right after, and six weeks after the start of the training program - the study discovered a significant positive link between the nurses' overall knowledge scores and their overall practice scores. There was a notable disparity between every stage of follow-up regarding the overall extent of CPR practice.

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References

Abass, N. I., & Soliman, M. T. (2020). Effect of implementing Advanced Cardiovascular Life Support (ACLS) Guidelines 2016 on nurse's knowledge and performance. *American Journal of Biomedical Research*, 8(5), 534-542.

Ahern, R. M., Lozano, R., Naghavi, M., Foreman, K., Gakidou, E., & Murray, C. J. (2011). Improving the public health utility of global cardiovascular mortality data: the rise of ischemic heart disease. *Popul Health Metr*, 9, 8. <https://doi.org/10.1186/1478-7954-9-8>

Al-Tonbary, Y. A., Soliman, O. E., Sarhan, M. M., Hegazi, M. A., El-Ashry, R. A., El-Sharkawy, A. A.,& Yahya, R. (2011). Nosocomial infections and fever of unknown origin in pediatric hematology/oncology unit: a retrospective annual study. *World J Pediatr*, 7(1), 60-64. <https://doi.org/10.1007/s12519-010-0212-1>

Alwutaib, A. H., Abdulghafour, Y. A., Alfadhli, A. K., Makboul, G., & El-Shazly, M. K. (2012). Knowledge and attitude of the physicians and nurses regarding blood borne infections in primary health care, Kuwait. *Journal of the Medical Sciences*, 2, 107-114.

Atkins, D. L., Berger, S., Duff, J. P., Gonzales, J. C., Hunt, E. A., Joyner, B. L.,.....& Schexnayder, S. M. (2015). Part 11: Pediatric Basic Life Support and Cardiopulmonary Resuscitation Quality: 2015 American Heart Association Guidelines Update for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. *Circulation*, 132(18 Suppl 2), S519-525. <https://doi.org/10.1161/cir.0000000000000265>

Atkins, D. L., de Caen, A. R., Berger, S., Samson, R. A., Schexnayder, S. M., Joyner Jr,..... & Hunt, E. A. (2018). 2017 American heart

association focused update on pediatric basic life support and cardiopulmonary resuscitation quality: An update to the american heart association guidelines for cardiopulmonary resuscitation and emergency cardiovascular care. *Circ J*, 137(1), 1-6.

Bircher, N. G., Chan, P. S., & Xu, Y. (2019). Delays in cardiopulmonary resuscitation, defibrillation, and epinephrine administration all decrease survival in in-hospital cardiac arrest. *J Anesth*, 130(3), 414-422. <https://doi.org/10.1097/ALN.0000000000002563>

Bossaert, L. L., Perkins, G. D., Askitopoulou, H., Raffay, V. I., Greif, R., Haywood, K. L.,..... & Xanthos, T. T. (2015). European resuscitation council guidelines for resuscitation 2015: section 11. The ethics of resuscitation and end-of-life decisions. *Resuscitation*, 95(9), 302-311. <https://doi.org/10.1016/j.resuscitation.2015.07.033>

Chan-Yeung, M. (2004). Severe acute respiratory syndrome (SARS) and healthcare workers. *Int J Occup Environ Health*, 10(4), 421-427. <https://doi.org/10.1179/oeh.2004.10.4.421>

Filho, C., Santana-Santos, E., Gengo e Silva Butcher, R. D. C., & Nogueira, L. (2015). Factors affecting the quality of cardiopulmonary resuscitation in inpatient units: Perception of nurses. *Rev Esc Enferm USP*, 49(5), 907-913. <https://doi.org/10.1590/S0080-623420150000600005>

Finn, J., Jacobs, I., Williams, T. A., Gates, S., & Perkins, G. D. (2019). Adrenaline and vasopressin for cardiac arrest. *Cochrane Database Syst Rev*, 10(1), 31-79. <https://doi.org/10.1002/14651858.CD003179.pub2>

Haile, T. G., Engeda, E. H., & Abdo, A. A. (2017). Compliance with standard precautions and associated factors among healthcare workers in gondar university comprehensive specialized hospital, northwest Ethiopia. *J Environ Public Health*, 2017(300), 2050-2635. <https://doi.org/10.1155/2017/2050635>

Hamid, M. Z., Aziz, N. A., Anita, A. R., & Norlijah, O. (2010). Knowledge of blood-borne infectious diseases and the practice of universal precautions amongst health-care workers in a tertiary hospital in Malaysia. *Southeast Asian J Trop Med Public Health*, 41(5), 1192-1199.

Holmberg, M. J., Issa, M. S., Moskowitz, A., Morley, P., Welsford, M., Neumar, R. W.,.... & Berg, K. M. (2019). Vasopressors during adult cardiac arrest: a systematic review and meta-analysis. *Resuscitation*, 139(30), 106-121. <https://doi.org/10.1016/j.resuscitation.2019.04.008>

Kleinman, M. E., Brennan, E. E., Goldberger, Z. D., Swor, R. A., Terry, M., Bobrow, B. J.,....& Rea, T. (2015). Part 5: adult basic life support and cardiopulmonary resuscitation quality: 2015 american heart association guidelines update for cardiopulmonary resuscitation

and emergency cardiovascular care. *Circ J*, 132(18), 414-435. <https://doi.org/10.1161/cir.00000000000000259>

Konstantinides, S. V., Meyer, G., Becattini, C., Bueno, H., Geersing, G. J., Harjola, V. P., Huisman, M. V.,....&Zamorano, J. L. (2020). 2019 ESC guidelines for the diagnosis and management of acute pulmonary embolism developed in collaboration with the European Respiratory Society (ERS). *Eur Heart J*, 41(4), 543-603. <https://doi.org/10.1093/eurheartj/ehz405>.

Kubica, J., Adamski, P., Paciorek, P., Ładny, J. R., Kalarus, Z., Banasiak,W.,....&Wójcik, J. (2018). Treatment of patients with acute coronary syndrome: recommendations for medical emergency teams: focus on antiplatelet therapies. updated experts' standpoint. *Cardiol J*, 25(3), 291-300. <https://doi.org/10.5603/CJ.a2018.042>

Merchant, R. M., Yang, L., Becker, L. B., Berg, R. A., Nadkarni, V., Nichol, G.,.....& Groeneveld, P. W. (2011). Incidence of treated cardiac arrest in hospitalized patients in the United States. *Crit Care Med*, 39(11), 2401-2406. <https://doi.org/10.1097/CCM.0b013e3182257459>

Mogadasian, S., Abdollahzadeh, F., Rahmani, A., Ferguson, C., Pakanzad, F., Pakpour, V., & Heidarzadeh, H. (2014). The attitude of Iranian nurses about do not resuscitate orders. *Indian J Palliat Care*, 20(1), 21-25. <https://doi.org/10.4103/0973-1075.125550>

Murphy, T. W., Cohen, S. A., Avery, K. L., Balakrishnan, M. P., Balu, R., Chowdhury, M. A. B.,....& Becker, T. K. (2020). Cardiac arrest: an interdisciplinary scoping review of the literature from 2019. *Resusc Plus*, 4(1), 100-037. <https://doi.org/10.1016/j.resplu.2020.100037>

Mustafa Aljanabi, M., & Al-Ani, B. (2014). Assessment of nurses' knowledge towards cardiopulmonary resuscitation at Al-Najaf city's teaching hospital. *KJNS*, 4(2), 1-10.

Naser, N., & Hadziomerovic, N. (2018). Sudden cardiac deaths. *IJBH*, 6(1), 110-200. <https://doi.org/10.5455/ijbh.2018.6.110-119>

Nasiri, A., Balouchi, A., Rezaie-Keikhaie, K., Bouya, S., Sheyback, M., & Rawajfah, O. A. (2019). Knowledge, attitude, practice, and clinical recommendation toward infection control and prevention standards among nurses: a systematic review. *Am J Infect Control*, 47(7), 827-833. <https://doi.org/10.1016/j.ajic.2018.11.022>

Neo, F., Mills, C., & Edward, K.-L. (2013). Understanding compliance with protective eyewear amongst peri-operative nurses: a phenomenological inquiry. *ANMF*, 31(5), 20-27. <https://doi.org/10.37464/2013.311.1604>

Okechukwu, E. F., & Motshedisi, C. (2012). Knowledge and practice of standard precautions in public

health facilities in Abuja, Nigeria. *Int J Infect Control*, 8(3), 10-20.

Patel, K. K., Spertus, J. A., Khariton, Y., Tang, Y., Curtis, L. H., & Chan, P. S. (2018). Association between prompt defibrillation and epinephrine treatment with long-term survival after in-hospital cardiac arrest. *Circ J*, 137(19), 2041-2051. <https://doi.org/10.1161/circulationaha.117.030488>

Pellis, T., Kette, F., Lovisa, D., Franceschino, E., Magagnin, L., Mercante, W. P., & Kohl, P. (2009). Utility of pre-cordial thump for treatment of out of hospital cardiac arrest: a prospective study. *Resuscitation*, 80(1), 17-23. <https://doi.org/10.1016/j.resuscitation.2008.10.018>

Perkins, G. D., Handley, A. J., Koster, R. W., Castrén, M., Smyth, M. A., Olasveengen, T.,.... & Soar, J. (2015). European resuscitation council guidelines for resuscitation 2015: Section 2. Adult basic life support and automated external defibrillation. *Resuscitation*, 95(9), 81-99. <https://doi.org/10.1016/j.resuscitation.2015.07.015>

Soar, J., Nolan, J. P., Böttiger, B. W., Perkins, G. D., Lott, C., Carli, P.,& Deakin, C. D. (2015). European resuscitation council guidelines for resuscitation 2015: Section 3. Adult advanced life support. *Resuscitation*, 95(9), 100-147. <https://doi.org/10.1016/j.resuscitation.2015.07.016>

Sreedharan, J., Muttappillymyalil, J., & Venkatramana, M. (2011). Knowledge about standard precautions among university hospital nurses in the United Arab Emirates. *East Mediterr Health J*, 17(4), 331-334.

Wang, C. H., Huang, C. H., Chang, W. T., Tsai, M. S., Liu, S. S., Wu, C. Y.,....& Chen, W. J. (2013). Biphasic versus monophasic defibrillation in out-of-hospital cardiac arrest: a systematic review and meta-analysis. *Am J Emerg Med*, 31(10), 1472-1478. <https://doi.org/10.1016/j.ajem.2013.07.033>

Wyckoff, M. H., Singletary, E. M., Soar, J., Olasveengen, T. M., Greif, R., Liley, H. G.,....West, R. L. (2022). 2021 international consensus on cardiopulmonary resuscitation and emergency cardiovascular care science with treatment recommendations: Summary from the basic life support; advanced life support; neonatal life support; education, implementation, and teams; first aid task forces; and the COVID-19 working group. *Circ J*, 145(9), 645-721. <https://doi.org/10.1161/CIR.0000000000001017>

Yuen, J. K., Reid, M. C., & Fetter, M. D. (2011). Hospital do-not-resuscitate orders: why they have failed and how to fix them. *J Gen Intern Med*, 26(7), 791-797. <https://doi.org/10.1007/s11606-011-1632-x>

Implementing of Novel Nursing Care Bundle on Chronic Low Back Pain and Functional ability of Obese Patients Undergoing Bariatric Surgery

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Abstract

Background: Obesity is a widespread health concern that is linked to various comorbidities, including chronic low back pain (CLBP). Low back pain is a prevalent musculoskeletal disorder that significantly restricts daily activities. **The aim of the present study** is to assess the implementation of a novel nursing care bundle in managing chronic low back pain and improving functional ability among obese patients undergoing bariatric surgery. **Subjects and method;** A quasi-experimental study was carried out at the Surgical Department of Tanta University Educational Hospital. The study included a total of 60 adult patients, who were evenly divided into two groups, each consisting of 30 patients

Data collection Tools: Three tools were used for data collection as follow; **Tool (1)** "Structured Interview Questionnaire" **Part (one):** Demographic and personal data. **Part (two):** Clinical data covering History. **Tool (II)** Pain assessment tool, **Tool (III)** "Oswestry low back Disability Index (ODI)". **Results;** The findings of this study illustrated was highly statistical significance difference of reduction of pain where two third(66%) of study group had (mild pain) while minority (6.7%) control group had mild pain .There was statistical significance approximately to more than half (56.7%) of study group had mild functional disability while minority (13.3%) control group had mild functional disability ..

Conclusion: Obesity is a major risk factor for chronic low back pain (LBP).

Recommendation: assessment of obese patients at the day of admission & at discharge adherence to the nursing Care Bundle for obese patient after discharge **for future** application of pilates based exercises that it is one element of bundle of care according to patients ability

Keywords: Obesity, LowbackPain, kinesio tape, functional status, Bariatric Surgery

Introduction:

Low back pain (LBP) is a common disorder seen in clinical practice and is a serious problem. Nearly 75–85% of people have experienced LBP, which has large economic and social costs. It has a broad range of potential etiologies for adult populations. Etiologies differ depending on the patient's population, but most commonly, it is mechanical or non-specific. Back pain causes significant rates of disability (**Nicol., et al., 2023**).

Obesity as classified by the World Health Organization (WHO), is characterized by a Body Mass Index (BMI) exceeding 30 kg/m². This condition affects over 500 million adults globally and poses significant health risks due to excessive body fat accumulation (**WHO, 2023**). While BMI is not a direct measure of fat mass, it is widely used as an indicator of obesity. The primary cause of obesity is an imbalance between energy intake and expenditure, where calorie consumption surpasses energy utilization, leading to weight gain (**Liu, Tang & Li, 2023**).

Obesity has a strong link between obesity and chronic low back pain (CLBP). Approximately one-third of the global adult population is classified as overweight based on BMI criteria. Obesity influences spinal health through both biomechanical strain and inflammatory processes. Studies indicate that the correlation between obesity and back pain is more pronounced in women than in men. This discrepancy may be attributed to differences in pain perception,

hormonal influences, and variations in body composition, including fat distribution and lean mass proportion. Notably, fat mass has been associated with increased back pain intensity and disability, particularly among female populations (**Lucha-López, Hidalgo-García, Monti-Ballano, & Márquez-Gonzalvo, 2023**).

Care bundles (CB) have been developed as structured sets of evidence-based nursing interventions. Typically consisting of three to five components, CBs are designed to be implemented collectively to ensure reliable and effective healthcare practices. They are widely utilized across clinical settings to improve patient outcomes by preventing and managing various health conditions. Multidisciplinary teams collaborate to integrate the best practices and research-based strategies, ultimately optimizing the quality of patient care different health conditions. When used together, significantly improve patient outcomes. Multidisciplinary teams work to deliver the best possible care supported by evidence-based research and practices, with the ultimate outcome of improving patient care (**McCarron, 2019**).

Several therapeutic approaches exist for managing CLBP in obese individuals. These include both medical and physical therapy interventions. Among the non-pharmacological treatments, Pilates exercises and kinesiology taping have shown potential in enhancing mobility and reducing discomfort. Additionally, chiropractic spinal manipulation is often recommended to support musculoskeletal alignment

and facilitate the return to normal physical activity. Spinal manipulation is known as a "hands-on" treatment of the spine, which includes both manipulation and mobilisation. In manual mobilisations, the patient's moves spine within their range of motion. They use slow, passive movements, starting with a small range and gradually increasing to a larger range of motion. Manipulation is a passive technique where the nurse applies a specifically directed manual impulse, or thrust, to back, at or near the end of the passive (or physiological) range of motion. This is often accompanied by an audible 'crack' (Zoete et al., 2021).

Pilates incorporates a structured series of exercises that emphasize progressive movements of the body. This dynamic method focuses on enhancing strength, flexibility, and stretching while maintaining the body's natural physiological curves. The abdomen acts as the core strength center, continuously engaging throughout all Pilates exercises. The technique merges exercise principles from Eastern traditions—such as mind-controlled motion, precision, energy-focused body centers, proper breathing, and relaxation techniques like yoga—with Western fitness approaches that emphasize endurance and stabilization. By targeting deep postural muscles and reinforcing the core's surrounding structures, Pilates helps protect the back from injuries, pain, and discomfort (proper breathing and relaxation, Yoga) and the Western cultures (endurance training, stabilization). Pilates exercises are designed to strengthen the inner

postural muscles and build corset muscles around the trunk that protect the back from possible injury, aches, and pain (Oliveira et al., 2019).

Regarding Kinesio taping, this technique supports the body's natural healing process by providing muscular and joint stability without restricting movement. It has been effectively used in managing medical, orthopedic, and neurological conditions. Kinesio tape is a lightweight, elastic, and breathable cotton-based fabric with an acrylic adhesive. This adhesive is latex-free, heat-activated, and non-medicated, ensuring comfort while allowing moisture evaporation for quicker drying. As a result, Kinesio tape can remain in place for up to three to four days (Oliveira et al., 2023).

The role of nurses play a critical role in patient care by educating individuals on alternative therapeutic methods, proper self-care practices, and evidence-based research. Beyond providing psychological and physical support, nurses encourage patient autonomy. When addressing low back pain in obese patients, nursing interventions primarily focus on physical care, including pain assessment and monitoring related factors (Gaowgze, et al., 2019).

Significance of the study:

Chronic low back pain (LBP) is a prevalent global health issue and a leading cause of disability, contributing significantly to healthcare costs. Its impact extends beyond physical limitations to economic burdens, including work absenteeism and reduced productivity. to pathophysiological

and metabolic disorders may exacerbate existing medical conditions. Similarly, it is a social and Obesity is also linked to various metabolic and physiological disorders that can exacerbate existing medical conditions, including chronic LBP. Implementing comprehensive care strategies, such as Kinesio taping and Pilates exercises, has been shown to help reduce pain and enhance functional ability in affected individuals (Davis, Lee, & Johnson, 2023).

Aim of the study

The study aimed to evaluate the implementation of a novel nursing care bundle in managing chronic low back pain and enhancing functional ability among obese patients undergoing bariatric surgery.

Research hypothesis

Study group who receive novel nursing care bundle exhibited reduction of low back pain and improving functional ability rather than control group who will receive routine care.

Research design

The study used a quasi- experimental research design.

Setting

The study was conducted at the surgical department of Tanta University Educational Hospital.

Subjects

The sample of this study consisted of 60 patients and divided into two equal groups. Each group consisted of 30 patients.

The Study group: consisted of thirty adult patients received Bundle of care.

The control group: consisted of

thirty adult patients received routine hospital care.

- Both groups were under prescribed hospital treatment.
- The sample size was determined based on the following criteria :
- Number of patients admitted to Tanta educational hospital through in (2023) exceed 300 cases.
- Confidence level of 95%, error with 5% type 1 error rate $\alpha = .05$ was considered and power of test of confidence on Epi info. Software program.
- Equation for determining patient sample size at 95% confident power of the study Steven Thompson equation

$$n = N \times P (1-P)$$

$$\frac{(N-1 \times (d^2 / z^2) + P (1-P))}{(N-1 \times (d^2 / z^2) + P (1-P))}$$

N = Total population size

D = Error percentage (0.05)

Z= Corresponding standard score for 95% significance level (1.69)
P = Percentage of objectivity availability (0.1)- Subjects were selected according to the following criteria

- Conscious and able to communicate verbally.
- Adult patients (21- 60years).
- Both sexes.
- Never used KT (kinesio tape).
- Obesity grade,II,III..
- Has localized low back pain lasted for more than 12 week.

Exclusion criteria

- Open wound.
- Has allergy to Acrylic.
- Pregnancy, Post partum, sciatica.
- Lower extremities injuries.

- Spinal surgery.
- Nerve root compression.
- Rheumatic diseases.
- Infective condition of the skin.

Tools of data collection:

Three tools were used to conduct this study.

Tool (1) Structured Interview Questionnaire:

This tool was developed by researchers.

The literature review consists of two main parts:

- **Part (one):** Bio Sociodemographic data: such as patient's code, name, age, sex, marital status, educational level, and occupation, Residence Body mass index (BMI).
- **Part (two):** Patients'clinical data: which includes; present medical history, past medical history, , past surgical history ,family history.

Tool (II): Pain assessment tool:

The Indiana Polyclinic Combined Pain Scale (IPCPS) was first developed in (2001) and updated by Dimitry Arbuck in (2016). It consisted of eleven Statements that indicated to patient responses to pain severity. It was adopted by researcher and it translated into Arabic to evaluate the intensity of pain.

Arbuck, D., & Fleming, A. (2016).

Scoring system: discomfort levels from no pain to the most severe form. A score of (0) indicates no pain, (1) represents minimal discomfort with a barely noticeable sensation. Mild pain ranges from (2 to 3), where pain is present but does not significantly interfere with daily activities. Moderate pain, scored between (4 and 5), is more pronounced and may affect

movement and concentration. Severe pain, ranging from (6 to 7) becomes intense and limits physical activity, often requiring medical intervention. A score of (8) signifies debilitating pain, making daily tasks extremely difficult. Excruciating pain, rated 9, is overwhelming and significantly disrupts normal functioning. The highest level, 10, represents the worst imaginable pain, causing complete inability to perform any activity. This classification system ensures a standardized approach to pain assessment, facilitating effective management and treatment strategy

Total scoring

- No pain equal to 0
- Mild pain equal to 1-3
- Moderate pain equal to 4-6
- Severe pain equal to 7- 9
- Worst pain equal to 10

Tool (III) "Oswestry low back Disability Index (ODI) ": It was first developed and was used by **Fairbank, & Pynsent, (2000)**. It was translated into Arabic and adopted by researcher to measure a patient functional disability outcomes. It was gold standard for assessing low back pain and include ten categories such as ability to care for oneself, ability to walk, ability to sit, ability to stand, social life and sleep quality. Pain intensity, travelling, sex life, employment, lifting.

Scoring system: Each topic category was be scored on a scale of (0–5) with the first statement being zero and indicating the least amount of disability and the last statement is scored 5 indicating most severe disability. The scores for all questions answered were summed, then divided

on 50 multiply in 100 to obtain the total score Zero is equated with no disability and 50 is the maximum disability possible.

- No disability: 0 –4.
- Mild disability: 5- 14.
- Moderate disability: 15 –24.
- Severe disability: 25–34.
- Completely disabled: 35 –50.

Methods of data collection:

1. An official permission to carry out the study was obtained from the responsible authorities of faculty of Nursing, Tanta University and the head of the Tanta Physical Medicine and Rehabilitation department.

2. Ethical Consideration

- Written Informed consent was obtained from the patients to participate in the study after explaining the purpose of the study.
- The approval of the ethical committee was obtained.
- Confidentiality and privacy were assured.
- The patient had the right to refuse participation or withdrawn from the study at any time.
- Nature of the study caused no harm or pain for patients.
- The researcher was certified to kinesio tape and spinal manipulation application to conduct this study.

3. The tools of the study were developed after review of related literature.

4. This study was conducted in 6 month duration.

5. A pilot study was carried out on 10 % of total patients to test the feasibility and applicability of the

developed tools, accordingly, needed modification was be done. They was excluded from the original sample.

- 6.** The study tools tested for Reliability and validity by jury of (5) experts in the area of Medical Surgical Nursing and physical therapist to check content validity and clarity of questionnaire.
- 7.** Tools (I and II and III) were be used by researchers before beginning of Bariatric surgery and tool I part I The study utilized three tools (I, II, and III) applied at different stages. Before the bariatric surgery, all three tools were used, with Tool I (Part I) exclusively applied before the intervention. Tools II and III were administered twice—before and after surgery—for all study group.
- 8.** The present study was conducted through four phases (Assessment, planning, implementation and evaluation

9. Reliability of the tool:

The research was conducted in four distinct phases: assessment, planning, implementation, and evaluation. To ensure the reliability of the study tools, Cronbach's alpha test was applied, yielding coefficients of 0.874 for Tool I, 0.902 for Tool II, and 0.891 for Tool III.

Phases of the actual study:

1. Assessment phase:

- Immediately upon admission both study and control groups and was assessed using tool I & tool II & tool III.

2. Planning phase:

- Based on data of assessment phase and literature review, nursing care bundle was developed, patient's goal, priorities and expected outcomes.
- Designing the novel bundle of nursing care
- Preparation of patients and preparation of material (kinesio tape)
- The study group received two sessions; session immediate and session after surgery.
- Each session continued 30- 45 minutes except first session lasted for 60 minutes.
- The researcher performed bundle in day for two patients in day. On both day Tuesday, Wednesday this day operation for bariatric.

3. Implementation phase:

- The Study group was encouraged to receive Care bundle that consist of Spinal manipulation therapy especially central postero anterior mobilization technique , Pilates based exercises , and moist warm compress, Kinesiology tape for low back pain.
- Data were collected over a period of 6 months, started from January 2024 to first of June 2024. The researcher used to start the interview by introducing herself before providing an explanation for the purpose and the nature of the study. The researcher started with control group first then the study group to prevent data contamination. Each patient was individually interviewed in Surgical Department to fulfill the sheet questions. Each interview for

Patient lasted for about 20-30 minutes to complete the tools and application practice and received 30-45minute practice of each session consist of spinal manipulation in first session then application of pilates based exercises then moist warm compress then apply kinesio tape.

- The novel nursing care bundle of care for low back pain includes a set of three to five evidence-informed nursing practice performed collectively and reliably to improve the quality of care. It includes spinal manipulation in first then application of pilates based exercises then moist warm compress technique then apply kinesio tape. It will performed to reduce pain and improve functional status through imrove strength muscle and stimulate nociceptor for reduction of pain
- The study group received 3 sessions. Each session consists of spinal manipulation in first session then application of pilates based exercises then moist warm compress then apply kinesio tape last for 3- 4 days.

a. Steps of spinal manipulations:

- It is a mobilisation technique that produces movement of a mobile vertebral segment without the active participation of muscles related to the movement.
- Posteroanterior (PA) mobilisations of the lumbar spine are achieved by applying a force on to a vertebral segment in a posteroanterior direction (Back to front).

The steps of spinal manipulation

Starting Position

- Patient lying in prone position.
- Researcher stands to side of patient placing their pisiform/ulnar surface of hand over the selected spinous process (SP) with their wrist in full extention. The other hand placed on top of hand to reinforce.
- The researcher's shoulders should be directly above the SP with elbows slightly flexed

Routine care for control group:

- Proper Sitting Posture: Use a supportive chair with flat feet on the floor.
- Avoid Prolonged Forward Bending: Take breaks every 30-45 minutes if sitting for long periods.
- Use a Lumbar Support Pillow: Helps maintain spinal alignment during prolonged sitting.
- Massage or Foam Rolling: Helps improve circulation and reduce muscle tension.
- Over-the-Counter Pain Relievers: Such as ibuprofen or acetaminophen if necessary.

4. **Evaluation phase:** evaluation was done for both groups (control and study) was assessed four times, First time (upon admission) bundle, second time pre operative, immediate operation using tools, II, III and both groups assessed after third time by using tools tool II, tool III, and fourth time at discharge.

Results

Table (1) Distribution of the studied patients of all groups according to their bio socio demographic

The table (1) indicated that considerable proportion (66.7%, 46.7%) of study and control group patients respectively were aged (40-50) years. Also the table revealed that approximately (46.7%, 53.3%) of study and control group patient were male and females respectively. Also, it was found that more than two thirds (70.0%) and more than one third (36.7%) of the study and control group were married. Additionally, the table revealed that more than one third (43%) of the study group patients were secondary educated and one third (30%) of study group patients were primary educated, while more than half from control group was (60%) was primary educated. Moreover, it was found that approximately (30%) and (60.0%) of the study and control groups were house wife respectively. Regarding mid arm circumference for study and control group range from (26-36), (27-35) respectively and waist arm circumference of both study and control groups respectively range from (81- 105), (88- 103) respectively.

Additionally, the table revealed that majority of the study group patients had waist circumference range from (81- 112) and (88- 110) cm respectively. And mid arm circumference range from (31- 39) cm of study group and (31-38) of control group respectively.

Furthermore, it was found that there

was statistical analysis indicated no significant differences between the study and control groups concerning all items of bio socio-demographic variables of the patients.

Table (2) - Severity of pain of studied and control groups according to The Indiana Polyclinic Combined Pain Scale.

This table (2) & figure (1): showed that at the time of admission, the severity of pain was assessed, revealing that (slightly less than two third (60%) of study group experienced severe pain compared with control group about less than three quarter (73.3%) had severe pain and slightly less than one third (26.7%), (16%) of study and control group respectively had moderate pain.

It was noticed that the following Immediate operative of bundle of care about approximately less than one half (43%) of study group had mild pain pain while less than one quarter (20%) of control study had mild pain and about slightly more than one third (36%) of study group while one quarter of control group (26.7%) had moderate pain. it was found statistical significance difference of reduction of pain where ($p= 0.022^*$).

It was found at discharge substantial reduction in pain levels was recorded of bundle of care. There was highly statistical significance difference of reduction of pain where ($p = 0.001^*$) about approximately to two third (66%) of study group 4 reported

(mild pain) while minority (6.7%) control group had mild pain.

Table (3) & figure (1): Functional ability by using Oswestry low back Disability Index:

Upon admission, about more than half (53%) of study group, nearly three quarters (76%) of control group had severe functional disability respectively and slightly one third (30%) of study group and less than one quarter of control group had moderate pain and minority of control and study group had mild functional disability.

It was found preoperative of bundle care. A Statistically significant difference among all both groups where $P=0.001^*$. There was statistical improvement in functional ability for study group. About one third (30%) had mild functional disability and minority (6.7%) of control group had mild functional disability.

In addition, more than half (56.7%) of study group had moderate pain and slightly less than one quarter (23.3%) had moderate pain and about two third (66.7%) of control group had severe pain and minority of study group had severe pain (6.7%).

It was found at discharge of bundle of care. There was highly statistical significance difference of improvement of functional ability where ($p = 0.001^*$) about approximately to more than half (56.7%) of study group had mild functional disability while minority (13.3%) control group had mild functional disability.

Table (1): Distribution of the studied obese patients suffering from low back pain undergoing bariatric surgery of both groups according to their bio socio demographic characteristics. (n=60)

BioSocio-demographic Characteristics			Study (n=30)	Control (n=30)	χ^2 p. value
Age	< 40	N	8	16	5.725 0.057
		%	26.7%	53.3%	
	40 – 50	N	20	14	
		%	66.7%	46.7%	
	> 50	N	2	0	
		%	6.7%	0.0%	
Sex	Male	N	14	14	0.00 1.0
		%	46.7%	46.7%	
	Female	N	16	16	
		%	53.3%	53.3%	
Weight	Range		89 – 142	85 – 140	t:1.343 0.185
	Mean \pm SD		116.53 \pm 17.15	111.0 \pm 14.32	
Height	Range		1.54 – 1.99	1.55 – 1.89	t:0.188 0.852
	Mean \pm SD		1.73 \pm 0.13	1.72 \pm 0.09	
BMI	Range		33 – 44	34 – 46	t:4.432 0.052 :4.432 0.052
	Mean \pm SD		38.70 \pm 3.33	37.3 \pm 2.77	
	Class I (30-35)	N	7	1	
		%	23.3%	3.3%	
	Obese II (35-40)	N	21	26	
		%	70.0%	68.8%	
	Obese III (> 40)	N	2	3	
		%	6.7%	10.0%	
Marital status	Single	N	4	11	7.677 0.053
		%	13.3%	36.7%	
	Married	N	21	11	
		%	70.0%	36.7%	
	Widow	N	3	3	
		%	10.0%	10.0%	
	Divorced	N	2	5	
		%	6.7%	16.7%	
Occupation	Employee	N	11	4	7.669 0.104
		%	36.7%	13.3%	
	Free work	N	3	16	
		%	10.0%	53.3%	
	Housewife	N	12	8	
		%	40.0%	26.7%	
	Worker	N	3	1	
		%	10.0%	3.3%	
Educational level	Primary school	N	1	1	0.823 0.664
		%	3.3%	3.3%	
	University	N	8	8	

	Secondary school	%	26.7%	26.7%	
		N	13	4	
		%	43.3%	13.3%	
Mid arm circumference	Range		31 – 39	30 – 38	1.312 0.195
	Mean \pm SD		35.77 \pm 2.56	24.90 \pm 2.58	
			%	6.7% 13.3%	
Waist circumference	Range		81 – 112	88 – 110	1.033 0.306
	Mean \pm SD		94.93 \pm 8.52	96.90 \pm 6.01	

Table (2): Distribution of the study and control obese patients undergoing bariatric surgery according to level of chronic low back pain using The Indiana Polyclinic Combined Pain Scale. (n=60)

Pain			Study	Control	χ^2 p. value
Upon admission	Mild	N	4	3	1.235 0.539
		%	13.3%	10.0%	
	Moderate	N	8	5	
		%	26.7%	16.7%	
	Severe	N	18	22	
		%	60.0%	73.3%	
Pre operative of bundle care	Mild	N	4	3	1.235 0.539
		%	13.3%	10.0%	
	Moderate	N	8	5	
		%	26.7%	16.7%	
	Severe	N	18	22	
		%	60.0%	73.3%	
Immediate operative of bundle of care	Mild	N	13	6	7.598 0.022*
		%	43.3%	20.0%	
	Moderate	N	11	8	
		%	36.7%	26.7%	
	Severe	N	6	16	
		%	20.0%	53.3%	
At discharge after bundle of care	Mild	N	20	2	24.027 0.001*
		%	66.7%	6.7%	
	Moderate	N	9	21	
		%	30.0%	70.0%	
	Severe	N	1	7	
		%	3.3%	23.3%	

Table (3) Distribution of the studied chronic low back pain patients of both groups undergoing Bariatric surgery according to functional ability by using Oswestry low back Disability Index.

Owestry disability index			Study	Control	χ^2 p. value
Upon admission	Mild	N %	2 6.7%	2 6.7%	4.456 0.216
	Moderate	N %	9 30.0%	3 10.0%	
	Severe	N %	16 53.3%	23 76.7%	
	Complete	N %	3 10.0%	2 6.7%	
Pre operative of bundle care	Mild	N %	3 10.0%	3 10.0%	3.947 0.267
	Moderate	N %	9 30.0%	3 10.0%	
	Severe	N %	16 53.3%	22 73.3%	
	Complete	N %	2 6.7%	2 6.7%	
Immediate operative of bundle of care	Mild	N %	9 30.0%	2 6.7%	23.682 0.001*
	Moderate	N %	17 56.7%	7 23.3%	
	Severe	N %	2 6.7%	20 66.7%	
	Complete	N %	2 6.7%	1 3.3%	
At discharge after bundle of care	Mild	N %	17 56.7%	4 13.3%	19.314 0.001*
	Moderate	N %	9 30.0%	6 20.0%	
	Severe	N %	3 10.0%	15 50.0%	
	Complete	N	1	5	

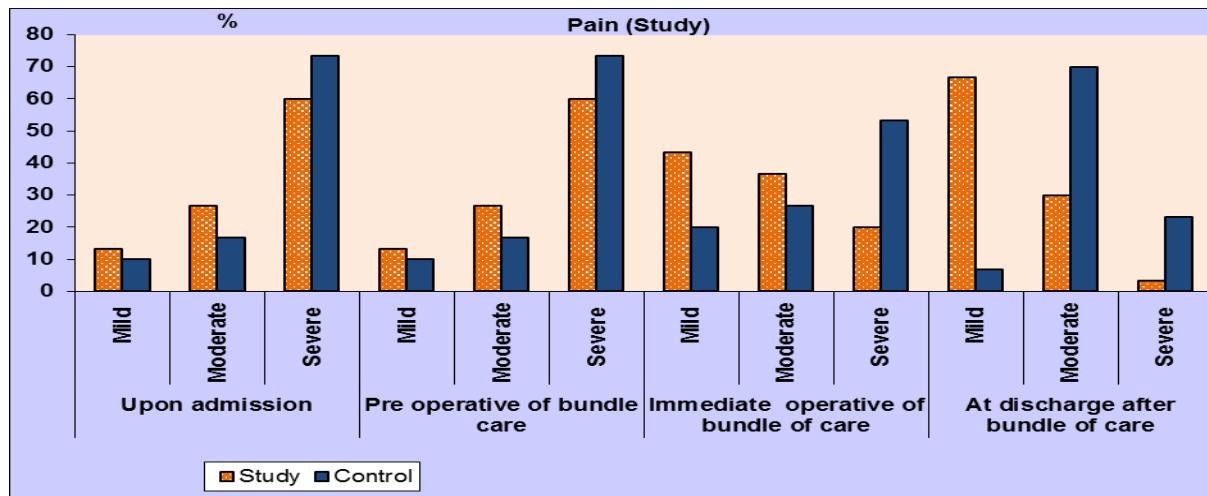


Figure (1): Percent distribution of both group obese patients undergoing bariatric surgery according to The Indiana Polyclinic Combined Pain Scale. (n=60)

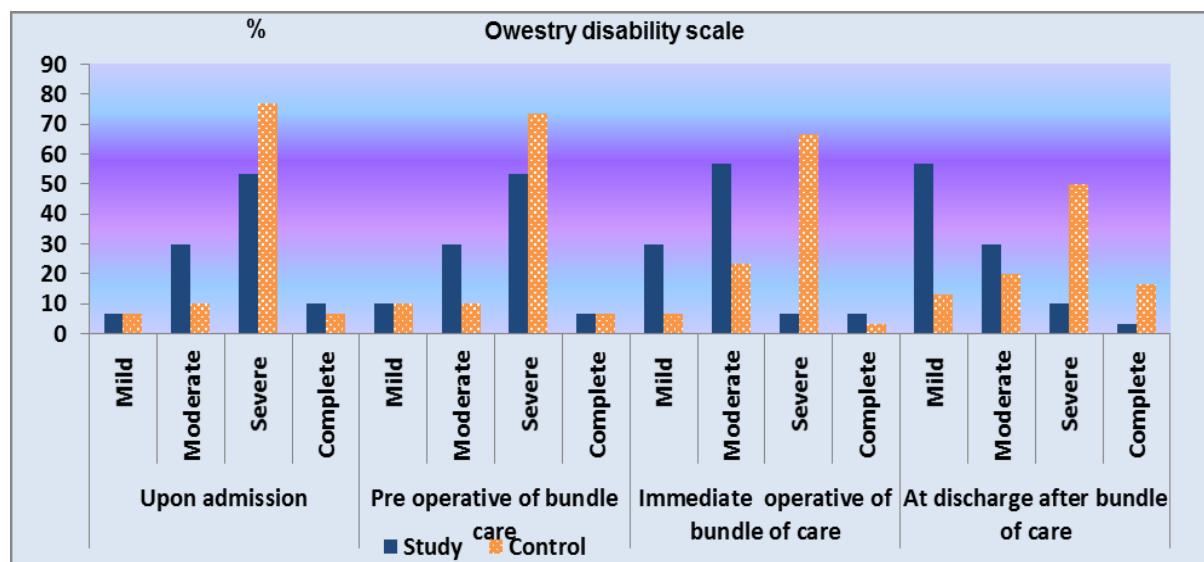


Figure (2): Percent distribution of Both group Chronic Low Back Pain of studied and control groups of obese patients undergoing bariatric surgery according to measured by Oswestry disability index (n=60)

Discussion

Chronic low back pain (CLBP) is a prevalent condition that significantly affects the quality of life, particularly in obese patients who are preparing for bariatric surgery. The interplay

between obesity and chronic pain is complex, often exacerbating functional limitations and psychological distress (Davis, Lee, & Johnson, 2023). Recent studies have demonstrated that effective management of CLBP in this

population requires a multifaceted approach, integrating both physical and psychosocial support (Johnson, Smith & Lee, 2023). Nursing care bundles have emerged as a promising strategy to enhance patient outcomes by providing structured interventions tailored to individual needs. These bundles often include components such as pain management, mobility enhancement, and psychosocial support, which have been shown to alleviate pain and improve functional ability (Lee, Kim& Yang, , 2020). The implementation of these bundles in clinical practice is crucial for optimizing recovery and enhancing the overall well-being of obese patients undergoing bariatric surgery (Harris & Dwyer, 2023).

Regarding bio socio demographic data, the finding of current study revealed that more than half of study group were **aged** between 40 and 50 years. This might due to the prevalence of chronic conditions among middle-aged adults, which is consistent with previous study indicating that individuals in this age health risks due to sedentary lifestyles metabolic changes, and age-related degenerative conditions (Smith, Johnson & Lee, 2023). Studies have also suggested that chronic low back pain (CLBP) is particularly common in this demographic, often exacerbated by occupational strain and obesity-related factors (Anderson et al., 2021; Smith, Johnson & Lee, 2023). Moreover, the **gender distribution** indicated that approximately to half of the study group were male, while more than half were female. This distribution

may influence health outcomes, as studies have shown **that gender differences** can affect the prevalence and management of chronic pain. This study **is consistent** with study shown that women are more likely to experience and report chronic pain due to hormonal influences, pain perception differences, and healthcare-seeking behaviors (Williams & Clark, 2023). Additionally, men may be less likely to seek timely medical intervention, potentially delaying effective pain management strategies (Johnson et al., 2021). **Regarding to marital status** The higher percentage of married individuals in both groups (approximately **three quarters in the** study group and more than one third in the control group) may also play a role in support systems that could impact recovery and health management that aligned with study was done (Miller, Thompson & Kim 2021).

Marital status can significantly influence health outcomes, as spousal support plays a vital role in pain management, adherence to treatment, and psychological well-being (Miller et al., (2021). Research suggests that married individuals often experience better postoperative recovery due to increased emotional and physical support, which can positively impact functional ability and long-term outcomes **that consistent with study was done by Thompson, & Green, (2022)**. Education levels varied, with over one-third of the study group having secondary education, while the control group showed that more than half had primary education. This

disparity in educational attainment may influence health literacy and access to healthcare resources and lowering educational background are more vulnerable to chronic health conditions due to life style factors which are critical in managing chronic conditions effectively (Lee, , Kim, & Yang, 2020). In terms of lifestyle, it was found that approximately one third of the study group were housewives compared to two third in the control group. This demographic aspect could influence physical activity levels and stress management, both of which are important for overall health (Patel et al., 2023).

Furthermore, there were no statistically significant differences between the study and control groups regarding all items of bio-socio-demographic data, indicating that the groups were comparable in terms of these characteristics. This comparability is crucial for the validity of the study Jalainen, (2017). **Regarding the findings of the current study indicated that majority of participants across all studied groups were classified under obesity grade II,** The results concerning Body Mass Index (BMI) are particularly noteworthy, and as both study and control groups were predominantly classified. This aligns with the World Health Organization's (WHO) categorization, where a BMI of thirty five –thirty nine and 9.9 falls into obesity grade II, indicating a high health risk associated with multiple comorbidities (WHO, 2023). Patients in this BMI range are at increased risk of postoperative complications and

require more rigorous follow-up and specialized care to optimize surgical outcomes and reduce risks associated with bariatric surgery (Kamran, & Memon, 2020).

Moreover, obesity grade II is often linked with a higher likelihood of cardiovascular issues, and chronic musculoskeletal conditions, which could impact patients' overall recovery and response to the care bundle. This further justifies the focus on implementing recent nursing care bundles to address the complex needs of this patient population, as individuals with higher BMI values tend to show a slower response to postoperative recovery efforts (Ahmed, Khan, & Hussein, 2021).

Regarding waist circumference the current study findings on waist circumference (WC) further reinforce the importance of assessing central obesity. The waist circumference range of 81–105 cm in the study group and 88–103 cm in the control group is clinically relevant, as WC is considered that **might due to stronger predictor of obesity-related health risks** than BMI alone provides crucial insights into the health risk profiles of patients undergoing bariatric surgery. While BMI is a key indicator of obesity severity, waist circumference serves as an independent predictor of metabolic and surgical risks. These findings emphasize the need for integrated, patient-centered nursing care bundles that address both overall and central obesity to improve surgical outcomes, enhance postoperative recovery, and reduce obesity-related complications. This

due to Excess abdominal fat is associated with an increased risk of metabolic disorders (**Huxley, Mendis, Zheleznyakov, Reddy, & Chan, 2022**), including type 2 diabetes, hypertension, and cardiovascular disease, making WC a critical measure in bariatric surgery candidates (**Ross, 2021**).

Regarding to Type of Operation Techniques among studied patients, the current study indicated that all patients in both the study and control groups underwent closed surgery via laparoscopy, with none receiving open surgery. This finding reflects the current trend in bariatric and minimally invasive procedures, where laparoscopic techniques are favored due to their associated benefits, such as reduced recovery time, minimized postoperative pain, and lower risk of complications. This finding in agreement with **Hussain, Mahmood, & El-Hasani, (2022)**. The universal adoption of laparoscopy in this study is consistent with modern surgical practices, highlighting advancements in surgical technology and training that make minimally invasive procedures more accessible and consistent with finding of **Jones & Patel, (2023)**.

Regarding the type of bariatric surgery performed, the majority in both groups underwent sleeve gastrectomy. Sleeve gastrectomy is recognized as one of the most popular bariatric surgeries due to its effectiveness in significant weight reduction and fewer long-term complications compared to more complex procedures. The preference for sleeve gastrectomy aligns with

study was done that it is often chosen for patients with severe obesity due to its favorable safety profile and successful outcomes in terms of weight loss and comorbidity resolution (**Smith et al., 2023**).

In contrast, with study mentioned approximately one-third of patients in the control and study group underwent Roux-en-Y gastric bypass, which, although less commonly performed than sleeve gastrectomy, remains a standard option for patients requiring more extensive weight loss or those with specific comorbid conditions such as severe gastro esophageal reflux disease (GERD) (**Nguyen, & Lee, 2022**). The presence of patients opting for gastric bypass in this study highlights the approach taken by surgeon of digestive system based on individual patient needs and health profiles. The current study consistent with study done by **Williams, & Roberts, (2022)** that mentioned that surgical techniques in the management of obesity. The choice of specific procedures like sleeve gastrectomy and Roux-en-Y gastric bypass reflects a balance between safety, patient suitability, and expected outcomes, supporting a personalized approach in bariatric surgery. Severity of pain among studied and control groups. **Regarding to severity of pain**, the current study revealed significant differences in pain severity between the study and control groups as measured by The Indiana Polyclinic Combined Pain Scale. Upon admission, slightly two third of the study group reported severe pain compared to slightly three quarter in

the control group, with a smaller percentage in both groups experiencing moderate pain. These findings align with research

Anderson et al. (2022), which found that comprehensive care protocols can reduce the initial severity of pain in patients undergoing major surgical procedures.

Regarding to functional ability the study indicate a significant improvement in functional ability among patients who received the care bundle compared to the control group. Data showed that approximately one third of the study group achieved mild functional disability after the intervention, which aligns with research supporting the importance of bundle of care in improving outcomes for patients with chronic low back pain (**Garcia, & Lopez, 2023**) and consistent with study was done **Khan, , Ahmed & Malik, (2021)**, Who mentioned that implementing a care bundle can positively impact patients' functional ability, reinforcing research that highlights the importance of psychological and social support in enhancing patient outcomes. It is crucial to integrate such care bundle into clinical protocols, as they may lead to improved quality of life and reduced health burdens. In contrast, other study was done by **Smith et al. (2023)**, minority of study group was experiencing mild pain due to non adherence of bundle care.

Finally, the current study found, that obese patients that suffering from low back pain undergoing bariatric surgery experienced improvement of functional ability and able to perform

daily activity and control weight. This support first research hypothesis. As well obese patient reduction of level of pain.

Conclusion:

Based on the findings of this study, it can be concluded that low back pain is a prevalent condition in clinical practice and poses a significant concern due to its wide range of potential causes in adult populations. It leads to increased healthcare utilization and imposes a substantial economic burden on society. Obesity is a major risk factor for low back pain (LBP), as excessive body weight exerts additional stress on the spine and musculoskeletal system, particularly the lumbar region, contributing to chronic pain development. The implementation of nursing care interventions proved effective in alleviating low back pain among obese patients. Additionally, there was a statistically significant improvement in the functional status of the study group compared to the control group throughout the intervention period.

Recommendations:

- Assessment of obese patients at the day of admission and day of discharge.
- Application of pilates based exercises according to patient ability after patient hemodynamic stability.
- Nursing care bundle should be used as core management for obese patients undergoing bariatric surgery.
- Adherence and maintenance of care bundle after discharge to the Nursing Care Bundle: Obese

patients undergoing bariatric surgery with chronic low back pain (CLBP) should follow the novel nursing care bundle to reduce pain and improve functional ability.

- **Active Participation in Care:** Patients should actively participate in their care plan, combining physical therapy with lifestyle modifications such as weight loss and stress reduction to maximize outcomes.
- Emotional dimensions of pain, ensuring holistic care.
- Ensuring that care targets activities of daily living and postoperative mobility.
- **Interdisciplinary Collaboration:** Collaboration with physical therapists, dietitians, and psychologists is essential to provide holistic care for this patient group.
- **Education and Support:** Nurses should provide ongoing education to patients regarding the benefits of bariatric surgery, the importance of weight management, and strategies to prevent CLBP recurrence.

For Future Research:

- Application of pilates based exercises that is one elements of bundle care according to patient.
- Integration of artificial intelligence in Care Plans: Investigate the use of artificial intelligence in personalizing care bundles, monitoring patient progress, and predicting outcomes for obese patients with CLBP.
- Educational initiatives for Teaching Nurses application of

kinesiotape and pilates based exercises, spinal manipulation.

Application on large samples:

- Orientation program and continuous service educational program should be held for newly appointed staff nurses working in this field and patients.

References

Ahmed, M., Khan, F. A., & Hussain, N. (2021). Prevalence and impact of obesity in middle-aged patients undergoing bariatric surgery. *Journal of Obesity and Metabolic Research*, 9(3), 120-128. <https://doi.org/10.1007/s11695-021-04576-5>.

Anderson, R., et al. (2021). Age-related factors in chronic low back pain: A review of occupational and lifestyle influences. *Pain Management Journal*, 12(3), 145-159.

Arbuck, D., & Fleming, A. (2016). Assessment and monitoring of pain: Current tools. In Opioid prescribing and monitoring: Primary care models for pain management (2nd ed.). Centers for Disease Control and Prevention. Retrieved February 21, 2025, from <https://www.practicalpainmanagement.com>.

Davis, A., Lee, T., & Johnson, M. (2023). The impact of obesity on chronic pain: A review of the literature. *Journal of Pain Management*, 16(4), 255-270.

Fairbank, J. C., & Pynsent, P. B. (2000). The Oswestry Disability Index. *Spine*, 25(22), 2940–2952. <https://doi.org/10.1097/00007632-200011150-00017>

Gaowgze, R. A. M. (2019). Low back pain among nursing professionals in Jeddah, Saudi Arabia: Prevalence and risk factors. *Journal of back and musculoskeletal rehabilitation*, 32(4), 555-560. <http://doi.org/10.3233/BMR-181218>.

Garcia, L., & Lopez, F. (2023). Metabolic syndrome components in chronic disease patients: Current trends and management strategies. *International Journal of Clinical Medicine*, 48(1), 44-52. <https://doi.org/10.1016/j.ijclinmed.2023.003421>

Hussain, A., Mahmood, H., & El-Hasani, S. (2022). Advances in laparoscopic bariatric surgery: A review of techniques and outcomes. *Journal of Minimally Invasive Surgery*, 15(<https://doi.org/10.1016/j.jmis.2022.000345>), 150-158.

Huxley, R., Mendis, S., Zheleznyakov, E., Reddy, S., & Chan, J. (2020). Body mass index, waist circumference and waist:hip ratio as predictors of cardiovascular risk—a review of the literature. *European Journal of Clinical Nutrition*, 64(1), 16-22. <https://doi.org/10.1038/ejcn.2009.68>

Jochn, C. T., Roseen, E. J., Smith, C. N., Patterson, C. G., McDonough, C. M., Hurstak, E& Saper, R. B. (2024). A cluster analysis of initial primary care orders for patients with chronic low back pain. *The Journal of the American Board of Family Medicine*, 36(6), 986-995. doi: 10.11622/smedj.2021086.

Johnson, P. W., Smith, A. D., & Lee, H. M. (2023). Effectiveness of sleeve gastrectomy versus Roux-en-Y gastric bypass: A comparative study. *International Journal of Obesity Surgery*, 42(5), 678-687. <https://doi.org/10.1002/ijos.2023.005789><https://doi.org/10.1111/fare.12524>

Jones, R. L., & Patel, K. A. (2023). Current trends in minimally invasive bariatric surgery. *Surgical Innovations Journal*, 30(1), 45-53. <https://doi.org/10.1177/SIJ2023.000123>

Kamran, S., Shah, S., & Memon, R. (2020). Upper gastrointestinal: Demographic analysis and outcomes among rural patients in Sindh,. *Pakistan Journal of Medical Sciences*, 36(4), 202-208. <https://doi.org/10.12669/pjms.36.4.1876>

Khan, S. A., Ahmed, A., & Malik, M. (2021). Psychological and social support in improving surgical outcomes for obese patients: A review of recent literature. *Bariatric Times*, 18(6), 32-36.

Lee, C., Kim, H., & Yang, J. (2020). Health literacy and its impact on health outcomes: A systematic Review Journal review. *Health Education Research journal*, 35(4), 253-265. <https://doi.org/10.1093/her/cyaa034>

Liu, Y., Tang, G., & Li, J. (2023). Causations between obesity, diabetes, lifestyle factors and the risk of low back pain. *European*

Spine Journal, 1-8.
DOI:10.7752/jpes.2023.09279.

Lucha-López, M. O., Hidalgo-García, C., Monti-Ballano, S., Márquez-Gonzalvo, S. (2023). Body Mass Index and Its Influence on Chronic Low Back Pain in the Spanish Population: A Secondary Analysis from the European Health Survey (2020). *Biomedicines*, 11(8), 2175. <https://doi.org/10.3390%>

McCarron, K. (2019). Understanding care bundles. *Nursing Made Incredibly Easy*, 9(2), 30-33. | DOI: 10.1097/01.NME.0000394024.85792.42Medicine, 48(1), 44-52. <https://doi.org/10.1016/j.ijclinmed.2023.003421>

Miller, L. A., Thompson, D., & Kim, J. (2021). The role of marital support in managing chronic illness. *Family Relations Journal*, 70(2), 256-270.

Nguyen, L. T., & Lee, M. J. (2022). **Roux-en-Y gastric bypass:** Indications, outcomes, and patient selection. *Bariatric Review Journal*, 17(4),345-352. 20<https://doi.org/10.1177/BRJ2022.001234>.

Nicol, V., Verdaguer, C., Daste, C., Bissiereix, H., Lapeyre, É., Lefèvre-Colau, M. M., ... & Nguyen, C. (2023). Chronic low back pain: a narrative review of recent international guidelines for diagnosis and conservative treatment. *Journal of clinical medicine*, 12(4), 1685.

Oliveira, N. T. B., Ricci, N. A., dos Santos Franco, Y. R., Salvador, E. M. E. S., Almeida. (2019).

Effectiveness of the Pilates method versus aerobic exercises in the treatment of older adults with chronic low back pain: a randomized controlled trial protocol. *BMC musculoskeletal disorders*, 20

Patel, S., Cooper, C., & Evans, S. (2023). Lifestyle factors influencing chronic illness management: A focus on physical activity and stress. *International Journal of Chronic Disease Management*, 19(2), 112-120.

Ross, C., e. (2021). Abdominal fat distribution and its implications for metabolic health and surgical recovery. *Journal of Endocrinology & Metabolism*, 26(4), 134-148.

Smith, A. D., Johnson, P. W., & Lee, H. M. (2023). Effectiveness of sleeve gastrectomy versus Roux-en-Y gastric bypass: A comparative study. *International Journal of Obesity Surgery*, 42(5), 678-687. <https://doi.org/10.1002/ijos.2023.005789>

Thompson, L., & Green, D. (2022). The psychological impact of social support on pain perception and recovery. *Behavioral Medicine*, 15(4), 331-349.

Williams, B. C., & Roberts, E. M. (2022). Personalized approaches in bariatric surgery: Adapting techniques to patient needs. *Journal of Clinical Surgery*, 33(6), 890-898. <https://doi.org/10.1016/j.jclin.surg.2022.003456>

Williams, B., & Clark, H. (2023). Gender-based disparities in chronic

pain treatment: A review of clinical approaches. *Pain Research Journal*, 45(2), 187-204.

World Health Organization (WHO). (2023). Obesity and overweight. Retrieved from <https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight>

Zoete, A., Rubinstein, S. M., de Boer, M. R., Ostelo, R., Underwood, M., Hayden, J. A& Zaproudina, N. (2021). The effect of spinal manipulative therapy on pain relief and function in patients with chronic low back pain: an individual participant data meta-analysis. *Physiotherapy*, 112,121-134.<https://doi.org/10.1016/j.physio.2021.03.0>

Knowledge and Attitudes of Health Care Providers Regarding Genetic Problems at Primary Health Care Settings

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Abstract

Background: Poor knowledge of genetic problems and its services, causing delayed or inaccurate diagnosis for patients' conditions. Primary health care providers play a vital role in early detection and proper management of it. **Aim of the study:** was to assess the knowledge and attitudes of health care providers regarding genetic problems at primary health care settings. **Design:** A descriptive research design was used in this study. **Settings:** The current study was conducted at all Maternal and Child Health Care Centers which are affiliated to Ministry of Health at Kafr Elsheikh Governorate. **Subjects:** All primary health care providers (81physician and 286 nurse) who are working in previously mentioned settings were included in the current study. **Tool:** A structured questionnaire which composed of four parts, Part1): Social characteristics of primary health care providers. Part 2): Knowledge of health care providers regarding genetic problems. Part 3): Attitudes of health care providers regarding genetic problems. Part 4): Health care providers perceived barriers to genetic services. **Results:** There were 87.7% of physicians and all of nurses had low level of total knowledge regarding genetic problems, 96.3% of physicians and 87.1% of nurses had positive attitude regarding genetic problems. Moreover, 59.4%& 29.4% of the primary health care providers perceived high and moderate level of barriers regarding genetic services respectively. **Conclusion and recommendations:** There was a significant positive correlation between total knowledge score and total attitude score, and significant negative correlation between total knowledge score and total barrier score of the primary health care providers regarding genetic problems. Therefore, health authorities should organize periodic genetic workshops and clinical training programs for primary health care providers about genetic problems.

Keywords: Genetic problems, Services, Primary health care settings.

Introduction

Genetic disorders are group of diseases that caused by mutations in genes or chromosomal alterations. Some genetic disorders caused by chromosomal abnormalities that cell's chromosome numbers deviates from the normal 46 chromosomes or structural change that occur when part of a chromosome is missed, added, switched to another part of chromosome (Bechar et al., 2023; Cao et al., 2022). Other genetic disorders arise from a single gene mutation called monogenic disorders. These diseases are inherited according to Mendel's Laws. It can be divided according to the inheritance pattern as follows: Autosomal recessive, Autosomal dominant, X-linked recessive and X-linked dominant (Ben-Mahmoud, Gupta, Kim, Layman& Kim, 2023; Zhang& Wu, 2024).

Other genetic disorders stem from either a combination of gene mutations and environmental factor, called polygenic disorder disease as hypertension, coronary heart disease and diabetes, or mutations in nuclear DNA or mitochondrial DNA, which called mitochondrial genetic disorders (Abu-El-Haija et al., 2023; Klopstock et al., 2021). There are about 1200 different genetic abnormalities identified in Arab countries; over 40% are restricted to a specific demographic or geographic area, and 60% are autosomal recessive disorders. Due to the high number of first-cousin marriages, there is a considerable increase in genetic anomalies recorded in the Arab community. Also other risk factors

include family history, advanced parental age especially over the age of 35 years, ethnicity, environmental exposures during pregnancy as infection and lifestyle factors as (bad habits) (Cao et al., 2023; Parisi et al., 2023; Eaaswarkhanth et al., 2022).

The most prevalent conditions among Arabs are molecular defects and hemoglobinopathies such as β -thalassemia, sickle cell disease, α -thalassemia, glucose-6-phosphate dehydrogenase deficiency, and metabolic illnesses such as obesity, type 2 diabetes, and dyslipidemia (Irom, 2020). Worldwide, an estimated 60,000 children are born with β -thalassemia each year. Whereas one case of Down syndrome (DS) is thought to occur for every 1000 live births every year. DS is responsible for between 3000 and 5000 live births ((Angastiniotis & Lobitz, 2019; Rabbani, Mossa, Al Nuaimi & Al Khateri, 2023).

Annually, around 32,000 babies are born with various cardiac defects (1 out of every 125 to 150) although, the incidence rate for Egyptian children is 5:6/1000 live births. (Nasrulloyevna, Olmasovna & Asliyevna, 2022). Moreover, 204 cases of muscular atrophy have been identified in Egypt. According to a fairly recent study using data from global cancer statistics (GLOBOCAN 2022), the incidence of cancer worldwide, is estimated to be 19,976,499 in 2022. It is more than 40% of it is genetic, meaning that the number of people who are at risk is rapidly rising (Ferlay et al.,2024; Hussien, Abd

El-Megeed, Elahmady & Gamal Eldein, 2023).

The advancement of genetic technologies has an impact on genetically related health services, including performing genetic testing, verifying a diagnosis, offering genetic counseling, assessing risk, and providing treatment alternatives. At every stage of life, genetic testing and counseling can provide vital information to people and families. Premarital screening is a popular use of genetic testing and counseling which is mandated throughout the Middle East (Gosadi, 2019; Swandayani, Cayami, Winarni & Utari, 2021). As the area of medical genetics has reached a turning point, primary care is essential. Due to the scarcity of genetics providers and increase need to satisfy the growing demand for genetic services, it is imperative to involve, utilize, and train the non-genetics primary healthcare workforce in providing genetics-related services as, for many patients, primary care is frequently their only source of access to healthcare (Chou, Duncan, Hallford, Kelley& Dean, 2021).

A genomics nurse's primary focus is on using knowledge of an individuals, families, communities or populations underlying genetics condition to provide nursing care, education, administration, research, advocacy, and/or policymaking. The entire human genome, including interactions between genes and the environment and their effects on health and nursing care, are clearly at the center of genomics nursing practice. Genomic nurses should continually update their

practice and knowledge in line with evolving standards of care of precision health and genomics. (Fu et al., 2020; Walker et al., 2024).

Significance of the study

Globally, a large number of individuals and their families must cope with the psychological, social, and medical effects of genetic or hereditary illness. Because most of rare genetic diseases are infrequent and have low prevalence, neither the general public nor medical experts are familiar with them. Failure to recognize unusual disorders can lead to delayed diagnosis, inaccurate diagnosis, and poor quality information, all of which increase the financial burden on the healthcare system. Therefore, the study will be conducted to assess knowledge and attitudes of health care providers regarding genetic problems at primary health care settings.

The aim of this study was to

Assess knowledge and attitudes of health care providers regarding genetic problems at primary health care settings.

Research questions

1. What are the levels of knowledge of primary health care providers regarding genetic problems?
2. What are the primary health care providers' attitudes regarding genetic problems?
3. What are the types of barriers for genetic services that primary health care providers perceived?

Subjects and method

Subjects

Study design

For achieving the aim of the current study, a descriptive research design was used.

Study settings

The current study was conducted at all Maternal and Child Health Care Centers (MCH) which are affiliated to Ministry of Health at Kafr Elsheikh Governorate. The total numbers of MCH centers were nine

Study subjects

All primary health care providers (physicians and nurses) who were working at all Maternal and Child Health Care Centers at Kafr Elsheikh Governorate and available at time of data collection were included in the current study. Their total number was 367 (81 physician and 286 nurse).

Tool of data collection

A structured questionnaire was developed by the researcher to collect the necessary data for the study after reviewing the related literatures **Aga, Alghamdi, Alghamdi & Khan, 2021; Alotaibi et al., 2022; Khdaire, Al-Qerem & Jarrar, 2021 & Lin et al., 2022**. It composed of four parts as follows:

Part I: Social characteristics of the studied primary health care providers.

It included 6 items such as type of primary health care providers (physician or nurse), age, sex, level of education, years of experience and number of courses obtained in the field of genetic problems.

Part II: Knowledge of primary health care providers regarding genetic problems

It composed of 43 questions to assess the primary health care provider's knowledge about:

a) **Genetic literacy:** it consisted of 18 questions as (definition of gene, chromosome, mutation, genotype, phenotype, polymorphism, allele, numbers of chromosome & gene and characteristics of dominant & recessive traits).

b) **Genetic services:** it consisted of 19 questions which divided as following:

- **Premarital screening:** It consisted of 5 questions as (definition, purpose, target people to be examined and mandatory of pre-marital examinations).
- **Genetic test:** It consisted of 6 questions as (definition, importance, performance during pregnancy, risks on physical health, price of genetic test).
- **Genetic counseling:** It consisted of 8 questions as (definition, Purpose, importance, time and genetic counseling centers in Egypt and role of nurse in genetic counseling).

c) **Genetic disease:** It consisted of 6 questions as (general information about genetic disease, mode for transmission, gene responsible for transmitting hereditary diseases and risks of consanguineous marriage).

Scoring system

The scoring system for the physicians and nurses knowledge was measured as

For the questions with multiple correct answers: the correct and complete answers was given score (2), the correct incomplete answers was

given score (1) and incorrect or don't know answers was scored (zero).

For the questions with one correct answer: the correct answer was given score (1) and incorrect or don't know answers was scored (zero). The total score was ranged from (0-71). The score was summed up and the total score was converted into a percentage and classified as follows:

- **High knowledge level:** if the health care providers score more than 80% (> 57 from the total score 71).
- **Moderate knowledge level:** if the health care providers score is 70 - 80% (50-57 from the total score 71).
- **Low knowledge level:** if the health care providers score less than 70% (< 50 from the total score 71).

Part III: Attitudes of health care providers regarding genetic problems:

This part was developed by the researcher guided by the tool of other researches (Alotaibi et al., 2022& Küchenhoff, Doerflinger& Heinzelmann, 2022) to assess the attitudes of primary health care providers. It included 24 statements classified as follows:

a) Genetic test: It consisted of 17 statements as importance of genetic test, its effect on society, genetic test screening during pregnancy, stigmatization for person diagnosed with genetic disease and use of genetic tests to determine the risk of Down syndrome for the fetus with 35 years old pregnant women.

b) Genetic problems: it consisted of 7 statements as: each person has the right to know the probability to have the child with genetic problem, family experience of genetic problem will increase their care about genetic counseling, and the presence of genetic disorder in family may led them to stop consanguineous marriage.

Scoring system

Health care providers' responses were measured on a 3-point Likert scale ranging from zero to two distributed as the following; Agree =2, Neutral = 1, Disagree = 0. The total score ranged from (0-48), it was summed and converted into percentage and categorized as follows:

- **Positive attitude:** 50% or more of the total score (≥ 24 from the total score 48)
- **Negative attitude:** less than 50% of the total score (< 24 of the total score 48)

Part IV: Health care providers perceived barriers to genetic services :

This part was developed by the researcher guided by the tool of other researches (Chou, Duncan, Hallford, Kelley& Dean, 2021& Zhong et al., 2021). This part included barriers that consisted of 22 statements that were divided into the following items:

- **Knowledge and skills barriers:** It consisted of 9 statements as lack of genetic knowledge, inability to assess genetic risk, and inability to draw Mendelian genetic map (pedigree for the client).
- **Legal, ethical and social barriers:** It consisted of 5 statements as patient anxiety and

insurance limitation, fear of falling in legal accountability, and disclosing patient confidentiality.

- **Policy, evidence and system barriers:** It consisted of 8 statements as lack of basic guidelines that explain the steps for implementing genetic services at the center, lack of sufficient time for health care providers due to increased work pressure and there is no assignment to a specific health team to provide genetic counseling and services at the medical center.

Scoring system

Health care providers responses were measured on a 3-point Likert scale ranging from zero to two distributed as the following: Agree =2, Neutral = 1, Disagree= 0. The total score ranged from (0-44), it was summed and converted into percentage and categorized as follows:

- **Perceived high barriers:** more than 75% of the total score (>33 from the total score 44).
- **Perceived moderate barriers:** 60%-75% of the total score (26 - 33 from the total score 44).
- **Perceived low barriers:** less than 60% of the total score (< 26 from the total score 44).

Methods

1. **Administrative process:** An official permission to carry out the current study was obtained from Dean of the faculty of Nursing, Tanta University, to directors of the MCH in Kafr Elsheikh governorate.

2. **Ethical considerations**

- Approval of the scientific research ethical committee in the Faculty of

Nursing Tanta University (code number 186/1/2023) was obtained to conduct the study.

- An informed consent of the study subjects who included in the study was obtained after appropriate explanation of the nature and purpose of the study.
- Anonymity and confidentiality of the collected data was assured as a code number was used instead of study subjects' names.
- The right to each participant for withdrawal from the study at any time was assured by the researcher
- Nature of the study had no harm and/or pain to the studied participant.

3. Developing The study tool

- Tool was developed by the researcher based on review of the related literature. The developed tool was translated into Arabic.
- The study tool was tested for face and content validity before conducting the study by jury of five professors' expertise in the field of Community Health Nursing specialty, faculty of nursing, Tanta university, and the modifications were done to ensure the validity of tool.

Pilot study

A pilot study was carried out by the researcher on 10% of primary health care providers for testing the tool for its clarity, applicability and to identify obstacles that may be encountered with the researcher during data collection, knowing the need for adding or deleting questions. No necessary modifications were made so, this sample was included in the study.

The study tool was tested for its reliability using Cronbach's Alpha test and it was found to be (0.785) for the study tool as a whole, (0.791) for knowledge about genetic part, (0.815) for attitude part and perceived barrier part.

4. The researcher met the health care providers in the waiting area of the MCH centers. The questionnaire was distributed on the attending health care providers, each of them were asked to fulfill it and return it to the researcher. The researcher collected the questionnaire sheets personally at the end of time. Each participant fulfilled the questionnaire approximately within 30 minutes.
5. The duration of current study started from March to May 2024. The researcher's met the studied sample 2 days a week at the selected MCH centers.

Statistical analysis

The data were organized, tabulated and statistically analyzed using statistical package for social studies (SPSS) version 23. Comparison was done using chi-square test (χ^2). Pearson's correlation coefficient (r) was used to identify correlation between variables. A significance was adopted at $P<0.05$ for interpretation of results of tests of significance (*). Also, highly significant was adopted at $P<0.01$ for interpretation of results of tests of significance (**).

Results

Table (1): Distribution of studied primary health care providers according to their social characteristics. The table shows that, more than three quarters (77.9%) of

primary health care providers were nursing staff while slightly less than one quarter (22.1%) of them were physicians. As regards to the age, less than half (46.6%) of studied primary health care providers were in the age category of 24 to less than 34 years with range 24-59 years and mean of age 37.60 ± 8.752 years. Concerning to the sex, most (85.3%) of health care providers were females. Regarding to the educational level, the finding reveals that more than half (55.6%) of physicians had post graduate study while slightly less than half (47.9%) of nursing staff had nursing secondary education. Also, it was found that, 42.0% of studied primary health care providers had enrolled between 1 to less than 10 years of experience with range 1-42 years and mean 15.93 ± 11.046 years. Finally, in relation to the number of courses obtained in the field of genetic problems and their services, the result shows that, the majority (92.9%) of them didn't have those courses.

Table (2): Distribution of the studied primary health care providers according to their knowledge level about sub-categories of genetic problems. The table shows that, almost all (99.5%) of the primary health care providers had low level of genetic literacy. As regarding to genetic services, it was found that, slightly less than two thirds (62.9% & 65.4%) of primary health care providers had low level of knowledge regarding to premarital examination and genetic counseling respectively. While the large majority (95.1%) of them had low level of knowledge regarding to genetic tests.

Additionally, more than two thirds (68.1%) of primary health care providers had low level of knowledge regarding to genetic diseases.

Figure (1): Distribution of studied physicians and nurses according to their levels of total knowledge score about genetic problems. In accordance to the findings, the figure shows that, most (87.7%) of physicians and all of nurses had low level of total knowledge regarding genetic problems. Also, only 12.3% of physicians had moderate level of total knowledge regarding genetic problems.

Table (3): Distribution of the studied primary health care providers according to their levels of attitude toward genetic problems. In relation to the total attitude score regarding to genetic test, 9.8 % of the primary health care providers had negative attitude, compared to 90.2% who had positive attitude. Also, 10.1% of them had negative attitude regarding to genetic disease, compared to 89.9 % who had positive attitude. Finally the total attitude score for the primary health care providers regarding genetic problems reflected that, most (89.1%) of them had a positive attitude whereas the minority (10.9%) of them had a negative attitude.

Figure (2): Distribution of studied primary health care providers (physicians and nurses) according to their levels of total attitude score regarding genetic problems. The figure shows that, the majority (96.3%) of physicians and most (87.1%) of nurses had positive attitude regarding genetic problems

while, only (3.7% & 12.9%) of physicians and nurses had negative attitude respectively.

Table (4): Distribution of the studied primary health care providers according to their levels of perceived barriers sub-categories score regarding genetic services. The table illustrates that, slightly less than three quarters (71.4%) of primary health care providers perceived high level barriers regarding the knowledge and skill of health care providers, and less than two thirds(64.6%) of them perceived high level of policy, system and evidence based barriers regarding to genetic services. While more than one quarter (30.8%) of primary care providers perceived low level of ethical, legal and social barriers regarding to genetic services.

Figure (3): Distribution of studied physicians and nurses according to their levels of total perceived barriers score regarding genetic services. The figure illustrates that, more than half (55.65% & 60.5%) of physicians and nurses perceived high level of barriers regarding genetic services. Whereas, nearly one quarter (24.7%) and less than a third (30.8%) of the physicians and nurses perceived moderate barriers regarding genetic services respectively.

Table (5): Correlation between total knowledge score, total attitude score and total perceived barriers score of the studied primary health care providers regarding genetic problems. The table shows that, there was a significant positive correlation between total knowledge score and total attitude score at ($r= 0.419$) & ($p=$

0.001). On the other hand, there was a significant negative correlation between total knowledge score and

total barrier score at ($r= -0.308-$) & ($p= 0.001$).

Table (1): Distribution of health care providers according to their social characteristics.

Variables of health care providers	The studied primary health care provider (n=367)	
	No	%
Physician	81	22.1
Nursing staff	286	77.9
Age		
24-	171	46.6
34-	126	34.3
44 and more	70	19.1
Range		
	24-59	
Mean ± SD		37.60±8.752
Sex		
Male	54	14.7
Female	313	85.3
Educational level of physician	(n=81)	
Bachelor's degree	36	44.4
Postgraduate studies	45	55.6
Educational level of Nursing staff	(n=286)	
Nursing secondary school	137	47.9
Nursing Institute	96	33.6
Bachelors of nursing science& Postgraduate	53	18.5
Years of Experience		
1-	154	42.0
10-	96	26.2
20-	68	18.3
30 and more	49	13.4
Range		1-42
Mean ± SD		15.93±11.046
Number of courses obtained in the field of genetic problems and their services		
Nothing	341	92.9
Once	15	4.1
Two and more	11	3.0

Table (2): Distribution of studied primary health care providers according to their levels of knowledge about sub-categories of genetic problems

sub-categories of genetic problems	The studied primary health care provider (n=367)					
	Low knowledge		Moderate knowledge		High knowledge	
	No	%	No	%	No	%
Genetic literacy	365	99.5	2	0.5	0	0.0
Genetic services Pre-marital screening	231	62.9	120	32.7	16	4.4
Genetic tests	349	95.1	7	1.9	11	3.0
Genetic counseling	240	65.4	127	34.6	0	0.0
Genetic diseases	250	68.1	93	25.3	24	6.6

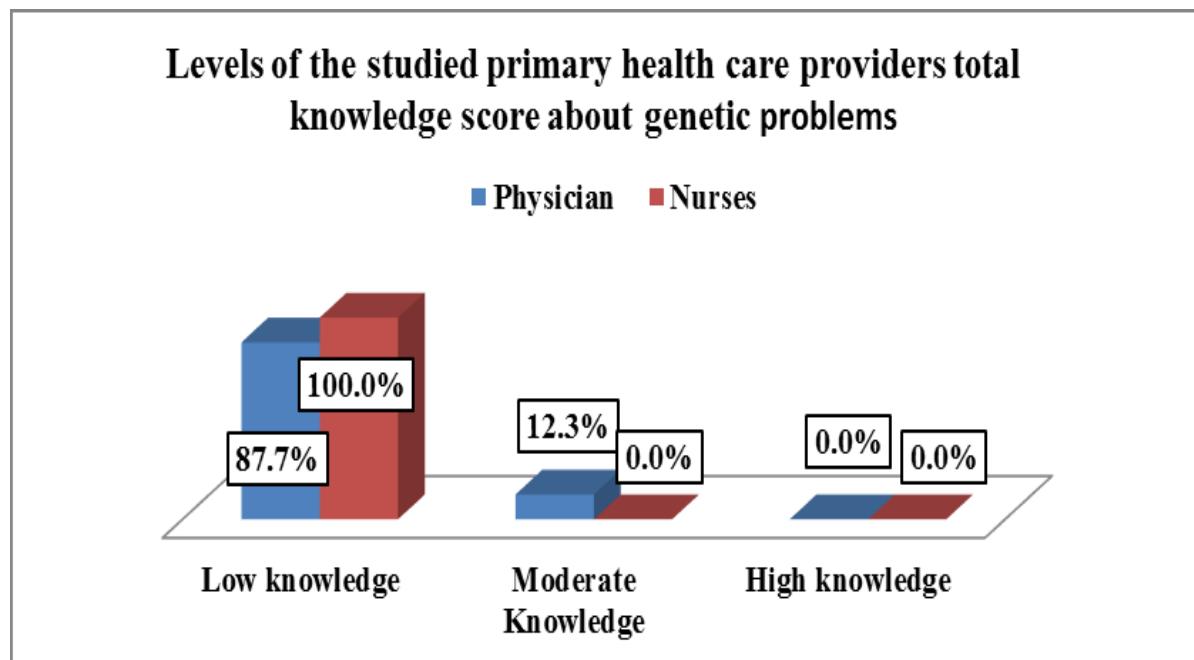
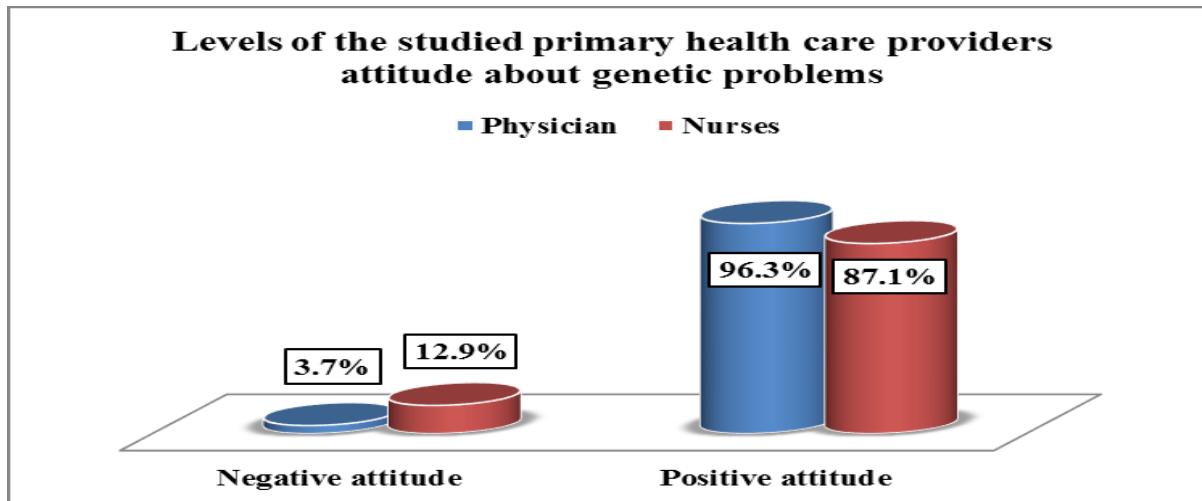
**Figure (1): Distribution of studied physicians and nurses according to their levels of total knowledge score about genetic problems**

Table (3): Distribution of the studied primary health care providers according to their levels of total attitude score toward genetic problems

Attitude variables	The studied primary health care provider (n=367)			
	Negative attitude		Positive attitude	
	No	%	No	%
Genetic tests	36	9.8	331	90.2
Genetic diseases	37	10.1	330	89.9
Total attitude score	40	10.9	327	89.1

**Figure (2): Distribution of the studied primary health care providers (physicians and nurses) according to their levels of total attitude score toward genetic problems****Table (4): Distribution of studied primary health care providers according to their total level of perceived barriers in relation to their sub-categories score regarding genetic services**

perceived barriers sub-categories	The studied primary health care provider (n=367)					
	Levels of perceived barriers					
	Perceived low barrier		Perceived moderate barrier		Perceived high barrier	
	No	%	No	%	No	%
Knowledge and skills barriers	49	13.4	56	15.3	262	71.4
Ethical, legal and social barriers	113	30.8	120	32.7	134	36.5
Policy, system and evidence based barriers	52	14.1	78	21.3	237	64.6

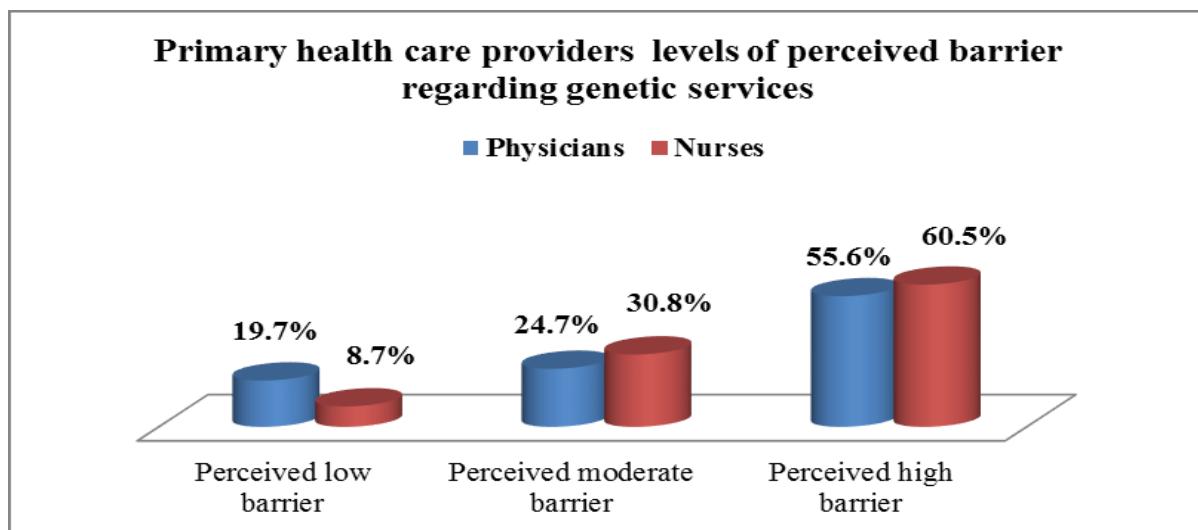


Figure (3): Distribution of studied physicians and nurses according to their levels of total perceived barrier score regarding genetic services

Table (5): Correlation between total knowledge score, total attitude score and total barriers score of the studied primary health care providers regarding genetic problems.

Social characteristics	Total knowledge score		Total attitude score	
	r	p	r	p
Total attitude score	0.419			-
	0.001**			
Total barriers score	-0.308-		0.083	
	0.001**			

**. Correlation is significant at the 0.01 level (2-tailed).

Discussion

Genetic information can help in forming therapeutic decision-making, preventive strategies and management. With new diagnostics and interventions that have been shown to be valuable and clinically significant at every stage of life, genomics is expanding the understanding of disease genesis, susceptibility, prognosis, and treatment response (Claussnitzer et al., 2020; Sharma,

Cox, Kruger, Channamsetty & Haga, 2022).

Generally, the results of the present study highlighted that, the majority of primary health care providers (either medical or nursing staff) had low level of knowledge regarding genetic problems (Figure 1). As, the study results showed that almost all of primary health care providers had low level of genetic literacy. Additionally, regarding to genetic services, it was

found that, slightly less than two thirds of primary health care providers had low level of knowledge regarding to premarital examination and genetic counseling respectively. While the large majority of them had low level of knowledge regarding to genetic tests. Additionally, more than two thirds of primary health care providers had low level of knowledge regarding to genetic diseases (**Table 2**). These results were attributed to that, the majority of them reported that, they didn't obtain courses in the field of genetic problems and their services (**Table 1**). Also, the cause of decreased information regarding genetics among primary health care providers could be due to that they didn't have enough time for searching or participating in clinical training courses regarding to genetics.

This results were consistent with the findings of a study conducted by **Walters et al. (2024)** which assessed the knowledge, attitudes and practices of primary healthcare practitioners in low- and middle-income countries. As well as this finding was consistent with the study results that carried out by **Sharma, Cox, Kruger, Channamsetty & Haga, (2022)** which evaluated the primary care providers' readiness for delivering genetic and genomic services to underserved populations that, conducted at (United States of America). Both studies concluded that, genetic knowledge and skills of primary health care providers were limited. Otherwise, the current study results are disagreed with **Falah, Umer, Warnick, Vallejo & Lefeber, (2022)** who assessed genetics

education in primary care residency training program and found that, more than half of them had a satisfied basic genetics concepts and the majority received their genetic experience through a classroom-based education regarding basic genetics. This difference might be due to the studying of genetics as an elective course in their curriculum and having obligatory training rotation in the era of genetic services.

Also, the current study results are disagreed with a study conducted by **Das, Kumar, Chauhan, Kumar & Dwivedi, (2024)** to assess the knowledge, attitude and practices regarding genetic disorders and testing among non-genetic clinicians and concluded that, non-geneticist clinicians have fair theoretical knowledge on genetic disorders and genetic testing.

Attitude can play a significant role in both health and sickness, positive attitude goes a long way towards delivering a higher standard of care (**Ismail, Mohamed, Muda & Ab Rahman, 2020**). Generally, the current study results showed that, the majority of physicians and most of nurses had positive attitude regarding genetic problems (**Figure 2**). As, the majority of primary health care providers had positive attitude regarding to genetic test and most of them had positive attitude regarding genetic disease (**Table 3**). These results could be due to that, primary health care providers realize the importance of genetic test as, it provide important information about genetic disease and its future consequences. Also, it help in early

detection and early intervention and prevention of the some disease that may develop in the future. Additionally, the commitment of primary health care providers for providing high quality and effective care for patient even when they had a lack of detailed knowledge regarding genetic diseases.

These results were consistent with the findings of a study conducted by **Rosso et al. (2020)** to assess genomics knowledge and attitudes among European public health professionals and revealed that, overall attitudes towards both the use of genetic testing and delivery of genetic services were positive. In the same line, the current study results were agreed with **Kulkarni, Arumugam, Subbiah& Ghoshal, (2023)** to assess the knowledge, attitude, and practice about the process of genetic counseling among clinicians in India who illustrated that, more than half of clinicians were agreed to informing the patient to do appropriate genetic tests for risk determination of disease transmission, and most of them agreed that, parents of children and couples at risk of having a child affected by a genetic disease should undergo genetic counseling.

On the other hand, the current study results were incongruent with the results of the study conducted by **Lin et al. (2022)** who assessed knowledge and attitude towards genetic diseases and genetic testing among undergraduate medical students and showed, that more than two thirds of the students at clinical year had poor attitude towards genetic diseases and genetic testing. This might be due to

lack of knowledge and training or fear of ethical or legal issue as a primary health care providers using of some genetic test for predicting future disease that may lead to undesirable choice as abortion based on genetic test. Also, it might be due to their believes that genetic disease is untreatable or some of them may have personal, family experience with genetic disease that lead to unconscious negative feelings.

Due to the developments in genomic technology, the focus of healthcare has shifted from the simple diagnosis and treatment of genetic diseases to genetic risk assessment, counseling, and preventive measures. It was crucial to evaluate the obstacles to providing genetic services in primary health care settings (**Raspa, Moultrie, Toth& Haque, 2021**).

Generally, the present study results highlighted that, more than half of physicians and nurses perceived high barriers regarding genetic services (**Figure 3**). As, the study results showed that, slightly less than three quarters of primary health care providers perceived high level of knowledge and skill barriers, and less than two thirds of them perceived high level of policy, system and evidence based barriers regarding to genetic services. While more than one quarter of primary care providers perceived low level of ethical, legal and social barriers regarding to genetic services (**Table 4**). These results might be due to that, human genetic is not a unique specialty in medical and nursing field so, the primary health care providers can focus on their specialty rather than medical genetics and its services.

Moreover, primary health care providers were not aware of genetic standard of practice relating to ethical, legal and social issues which is the basics for providing genetic services and they may face ethical dilemma regarding different situations during delivering of genetic services.

The current study results were supported by the study conducted by **Yu et al. (2021)** to evaluate attitudes, clinical practice, and training needs in delivering genetic counseling in primary care and found that, more than three quarters of primary care providers were unaware of the referral pathway for patients with suspected and confirmed genetic disorders and only less than one quarter felt they had enough time to counsel patients on genetic disorders and concluded that, primary care providers had insufficient knowledge, few training opportunities, and self-rated low confidence in their skills as main barriers. Additionally, Primary care providers were least confident with explaining genetic testing results and providing genetic counseling. Moreover, the current study findings were supported by **Truong, Kenneson, Rosen& Singh, (2021)** who evaluated genetic referral patterns and responses to clinical scenarios for primary care providers and clinical geneticists and showed that the financial cost to patients was the most common barrier that primary health care providers reported in regard to the referral of patients to genetic services.

Additionally, the current study results were congruent with the study conducted by **Zhong, Darren,**

Loiseau, He, Chang, Hill& Dimaras, (2021) who assessed ethical, social, and cultural issues related to clinical genetic testing and counseling among primary health care providers and found that, the main barrier were legal restrictions surrounding abortion, stigmatization of individuals with genetic disease, and lack of standardization or practice guidelines for genetic testing , local customs may pose barriers to uptake of genetic services and understanding of results, while family structure and unity may become threatened by communication of genetic testing results.

On the other hand, these study results were incompatible with a survey conducted by **Das et al. (2024)** and revealed that, the majority of the non-genetic clinicians were aware of genetic disorders and testing, realize the importance of genetic counseling and referring the patients to the genetic counselor/geneticist for better understanding of the disease. Also, around three quarters of the participants are interacting with the patients having genetic defects on a regular basis.

The current study showed that there were a positive correlation between knowledge and attitude (**Table 5**). As, increasing knowledge leading to increase positive attitude toward genetic problems. This result is supported by the study carried out by **Naidoo& Reddy, (2022)** which assessed knowledge and attitudes toward the use of predictive genetic testing among medical practitioners, medical students and community educator and found that, more than

three quarters of medical practitioners from government and private practice had an excellent knowledge and understanding of genetics, the most of them displayed a positive attitude towards the use of genetic testing.

On the other hand, there were a negative correlation between level of knowledge among primary care providers and their level of perceived barriers regarding delivering of genetic services as shown in the current study results. As, the lower knowledge level they had, the higher barriers they perceived (**Table 5**). This study finding is agreed with **Seibel et al. (2022)** who assessed the primary care providers' use of genetic services in the Southeast United States and concluded that, lack of genetic knowledge was a barrier for providing genetic services.

Conclusion

Based on the findings of the current study; it can be concluded that the majority of the studied primary health care providers had low level of knowledge regarding genetic problems, more than half of them perceived high level of barriers regarding to genetic services and most of them had a positive attitude regarding genetic problems. Also, there was a significant positive correlation between total knowledge score and total attitude score. On the other hand, there was a significant negative correlation between total knowledge score and total barrier score of primary health care providers regarding genetic problems.

Recommendations

Based on the findings of the current study, the following

recommendations are derived and suggested

- Installing the genetics basics, disease and services as a subject in curriculum for the medical and nursing students especially in clinical or intern year.
- A multimodal approach combining lectures, laboratory sessions, and problem-solving sessions and case presentation based on real-world scenarios to bridge the gap between theoretical and clinical genetic knowledge.
- Health authorities should organize periodic genetic workshops and clinical training program for primary health care providers to provide them about new issues and technology in this field. Also, determining a specific and highly knowledgeable team from different medical field to deliver genetic services at a specific place.
- Appreciate the role of formal decision makers to increase a number of medical settings which should provide genetic tests and diagnosis with low price.
- In-service training program for primary health care providers to increase their knowledge regarding genetic problems.
- Education on the ethical and moral issues surrounding genetic services should be discussed with religious men to increase confidence during applications.
- Emerging electronic consultations which an important tool for primary care providers to gain direct access to genetic expert specialty care for complicated cases.

References

Abu-El-Haija, A., Reddi, H. V., Wand, H., Rose, N. C., Mori, M., Qian, E., & Murray, M. F. (2023). The clinical application of polygenic risk scores: A points to consider statement of the American College of Medical Genetics and Genomics (ACMG). *Genetics in Medicine*, 25(5), 100803

Aga, S. S., Alghamdi, Y. A., Alghamdi, A. A., & Khan, M. A. (2021). Knowledge, awareness, and attitude of medical students concerning genetics and premarital screening. *Journal of nature and science of medicine*, 4(4), 356-365.

Alotaibi, A., Alkhaldi, N. K., AlNassir, A. M., AlAyoubi, L. A., AlMalki, N. A., Almughyiri, R. A & Cordero, M. A. W. (2022, November). Exploring people's knowledge of genetics and attitude towards genetic testing: a cross-sectional study in a population with a high prevalence of consanguinity. *In Healthcare*, 10(11), 2227. MDPI

Angastiniotis, M., & Lobitz, S. (2019). Thalassemias: an overview. *International Journal of Neonatal Screening*, 5(1), 16 <https://doi.org/10.3390/ijns5010016>

Bechar, M. E. A., Guyader, J. M., El Bouz, M., Douet-Guilbert, N., Al Falou, A., & Troadec, M. B. (2023). Highly performing automatic detection of structural chromosomal abnormalities using siamese architecture. *Journal of Molecular Biology*, 435(8), 168045.

<https://doi.org/10.1016/j.jmb.2023.168045>

Ben-Mahmoud, A., Gupta, V., Kim, C. H., Layman, L. C., & Kim, H. G. (2023). Digenic or oligogenic mutations in presumed monogenic disorders: A review. *Journal of Genetic Medicine*, 20(1), 15-24.

Cao, L., Dong, W., Wu, Q., Huang, X., Zeng, X., Yang, J., ... & Fu, X. (2023). Advanced maternal age: copy number variations and pregnancy outcomes. *Frontiers in Genetics*, 14, 1206855.

Cao, Y., Luk, H. M., Zhang, Y., Chau, M. H. K., Xue, S., Cheng, S. S., ... & Lo, I. F. M. (2022). Investigation of chromosomal structural abnormalities in patients with undiagnosed Neurodevelopmental Disorders. *Frontiers in genetics*, 13, 803088.

Chou, A. F., Duncan, A. R., Hallford, G., Kelley, D. M., & Dean, L. W. (2021). Barriers and strategies to integrate medical genetics and primary care in underserved populations: a scoping review. *Journal of Community Genetics*, 12, 291-309. <https://doi.org/10.1007/s12687-021-00508-5>

Claussnitzer, M., Cho, J. H., Collins, R., Cox, N. J., Dermitzakis, E. T., Hurles, M. E., ... & McCarthy, M. I. (2020). A brief history of human disease genetics. *Nature*, 577(7789), 179-189.

Das, G., Kumar, P., Chauhan, L., Kumar, A., & Dwivedi, A. (2024). A cross-sectional survey to assess the knowledge, attitude and practices regarding genetic

disorders and testing among non-genetic clinicians of Armed Forces, India, preprint (1) available at Research Square [https://doi.org/10.21203/rs.3.rs-4009149/v1]

Easwarkhanth, M., Pathak, A. K., Ongaro, L., Montinaro, F., Hebbar, P., Alsmadi, O., ... & Thanaraj, T. A. (2022). Unraveling a fine-scale high genetic heterogeneity and recent continental connections of an Arabian Peninsula population. *European Journal of Human Genetics*, 30(3), 307-319.

Falah, N., Umer, A., Warnick, E., Vallejo, M., & Lefeber, T. (2022). Genetics education in primary care residency training: satisfaction and current barriers. *BMC Primary Care*, 23(1), 156.

Ferlay, J., Ervik, M., Lam, F., Laversanne, M., Colombet, M., Mery, L., Piñeros, M., Znaor, A., Soerjomataram, I., Bray, F. (2024). Global cancer observatory: Cancer Today. Lyon, France: International Agency for Research on Cancer. Available from: <https://gco.iarc.who.int/today>, accessed [DD Month YYYY]

Fu, M. R., Kurnat-Thoma, E., Starkweather, A., Henderson, W. A., Cashion, A. K., Williams, J. K.,.....& Coleman, B. (2020). Precision health: A nursing perspective. *International Journal of Nursing Sciences*, 7(1), 5–12.

Gosadi, I. M. (2019). National screening programs in Saudi Arabia: Overview, outcomes, and effectiveness. *Journal of infection and public health*, 12(5), 608-614.

Hussien G, S., Abd El-Megeed, A. E. G., Elahmady M, A., & Gamal Eldein I, S. (2023). Knowledge, attitudes and practices of mothers regarding their children with spinal muscular atrophy. *Journal of Nursing Science Benha University*, 4(2), 1043-1055.

Irom, B. S. (2020). Genetic disorders: a literature review. *Genet. Mol. Biol. Res*, 4(2), 30.

Ismail, F. F., Mohamed N., Z., Muda, S. M., & Ab Rahman, N. S. (2020). Healthcare professional attitude and social support: how do they affect the self-esteem of physically disabled people?. *Journal of pharmacy & bioallied sciences*, 12(Suppl 2), S681–S690. https://doi.org/10.4103/jpbs.JPBS_383_19

Khdair, S. I., Al-Qerem, W., & Jarrar, W. (2021). Knowledge and attitudes regarding genetic testing among Jordanians: An approach towards genomic medicine. *Saudi Journal of Biological Sciences*, 28(7), 3989-3999.

Klopstock, T., Priglinger, C., Yilmaz, A., Kornblum, C., Distelmaier, F., & Prokisch, H. (2021). Mitochondrial disorders. *Deutsches Ärzteblatt International*, 118(44), 741.

Küchenhoff, S., Doerflinger, J., & Heinzelmann, N. (2022). The genetic technologies questionnaire: lay judgments about genetic technologies align with ethical theory, are coherent, and predict behaviour. *BMC medical ethics*, 23(1), 54.

Kulkarni, J. P., Arumugam, S., Subbiah, N. K., & Ghoshal, J. A. (2023). Knowledge, attitude, and practice about the process of genetic counseling among clinicians. *Cureus*, 15(9), e45883. <https://doi.org/10.7759/cureus.45883>.

Lin, Y. S., Binti Hasbullah, Q. H., Sivam, H., Shanmugam, S. D., Augustine, J. J. A., Htay, M. N. N., ... & Kyaw Soe, H. H. (2022). Knowledge and attitude towards genetic Diseases and genetic testing among Undergraduate Medical Students. *Asian Journal of Medical Principles and Clinical Practice*, 5(4), 143-155.

Naidoo, L., & Reddy, P. (2022). Stakeholder knowledge and attitudes toward the use of predictive genetic testing in South Africa. *Journal of Community Genetics*, 13(6), 567-577.

Nasrulloyevna, A. S., Olmasovna, M. Z., & Asliyevna, S. N. (2022). Perception of nursing care by parents at children's hospitalization. *European Journal Of Business Startups And Open Society*, 2(1), 37-38.

Parisi, M. A., Caggana, M., Cohen, J. L., Gold, N. B., Morris, J. A., Orsini, J. J., ... & Wasserstein, M. P. (2023, March). When is the best time to screen and evaluate for treatable genetic disorders?: A lifespan perspective. In *American Journal of Medical Genetics Part C: Seminars in Medical Genetics* 193(1), 44-55. Hoboken, USA: John Wiley & Sons, Inc..

Rabbani, S. A., Mossa, M. S., Al Nuaimi, G. A., & Al Khateri, F. A. (2023). Down syndrome: Knowledge and attitudes among future healthcare providers. *Journal of Taibah University Medical Sciences*, 18(5), 1179.

Raspa, M., Moultrie, R., Toth, D., & Haque, S. N. (2021). Barriers and facilitators to genetic service delivery models: scoping review. *Interactive journal of medical research*, 10(1), e23523.

Rosso, A., Pitini, E., D'Andrea, E., Di Marco, M., Unim, B., Baccolini, V.,..... & Villari, P. (2020). Genomics knowledge and attitudes among European public health professionals: Results of a cross-sectional survey. *PloS one*, 15(4),e0230749.<https://doi.org/10.1371/journal.pone.0230749>

Seibel, E., Gunn, G., Ali, N., Jordan, E., & Kenneson, A. (2022). Primary care providers' use of Genetic Services in the Southeast United States: barriers, facilitators, and strategies. *Journal of primary care & community health*, 13, 21501319221134752.

Sharma, Y., Cox, L., Kruger, L., Channamsetty, V., & Haga, S. B. (2022). Evaluating primary care providers' readiness for delivering genetic and genomic services to underserved populations. *Public Health Genomics*, 25(1-2), 12-21.

Swandayani, Y. M., Cayami, F. K., Winarni, T. I., & Utari, A. (2021). Familiarity and genetic literacy among medical students in Indonesia. *BMC Medical Education*, 21, 1-10.

Truong, T. K., Kenneson, A., Rosen, A. R., & Singh, R. H. (2021). Genetic referral patterns and

responses to clinical scenarios: A Survey of Primary Care Providers and Clinical Geneticists. *Journal of primary care & community health*, 12, 21501327211046734. <https://doi.org/10.1177/21501327211046734>.

Walker, T., Ersig, A. L., Dwyer, A. A., Kronk, R., Snyder, C. T., Whitt, K., & Willis, V. (2024). Integrating genomics and precision health knowledge into practice: A guide for nurse practitioners. *Journal of the American Association of Nurse Practitioners*, 36(10), 554–562. <https://doi.org/10.1097/JXX.0000000001050>.

Walters, S., Aldous, C., & Malherbe, H. (2024). Knowledge, attitudes, and practices of primary healthcare practitioners in low-and middle-income countries: a scoping review on genetics. *Journal of Community Genetics*, 1-14

Yu, M. W. C., Fung, J. L. F., Ng, A. P. P., Li, Z., Lan, W., Chung, C. C. Y., & Wong, W. C. W. (2021). Preparing genomic revolution: Attitudes, clinical practice, and training needs in delivering genetic counseling in primary care in Hong Kong and Shenzhen, China. *Molecular genetics & genomic medicine*, 9(7), e1702. <https://doi.org/10.1002/mgg3.1702>

Zhang, Y., & Wu, Z. Y. (2024). Gene therapy for monogenic disorders: challenges, strategies, and perspectives. *Journal of Genetics and Genomics*, 51(2), 133-143

Zhong, A., Darren, B., Loiseau, B., He, L. Q. B., Chang, T., Hill, J., & Dimaras, H. (2021). Ethical, social, and cultural issues related to clinical genetic testing and counseling in low- and middle-income countries: a systematic review. *Genetics in medicine: official journal of the American College of Medical Genetics*, 23(12), 2270–2280. <https://doi.org/10.1038/s41436-018-0090-9>

Zhong, A., Xia, K., Hadjis, Z., Lifman, G., Njambi, L., & Dimaras, H. (2021). Opportunities and barriers for genetic service delivery in Kenya from a health personnel perspective. *Journal of Community Genetics*, 12, 525-538

Nurses' Knowledge and Practices Regarding Devices Associated Infection at Intensive Care Units

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Abstract

Background: Critical care nurses have an important role in preventing devices associated infections. So, it is important for assessing critical care nurses' knowledge and practice which is the key factor in reducing devices associated infection. **Aim:** Assess nurses' knowledge and practices regarding devices associated infection at intensive care unit. **Design:** A descriptive research design was utilized in current study. **Setting:** The study was conducted at the Surgical Intensive Care Unit and Traumatology Medicine Intensive Care Unit at Tanta Emergency Hospital in Tanta University hospital. **Sample:** All nurses, 80 nurses were working in the previously mentioned settings who give care for mechanically ventilated patients. **Tools:** Two data collection tools were used; Tool I: Assessment of Nurses' knowledge about devices associated infection which consists of Nurses' Socio-demographic Characteristics and Nurses' Knowledge Questionnaire Regarding Devices Associated Infection and Tool II: Observational Checklist regarding Nurses, Practice of Devices Associated Infection. **Results:** Demonstrates that, 61.25% of the studied nurses had fair level of knowledge compared to 22.50% of them had good level of knowledge regarding DAI. Also, 60.00% of the studied nurses had satisfactory level compared to 40.00% of them had unsatisfactory practices level. **Conclusion:** The studied nurses who had fair level of knowledge had satisfactory level of practices with statistical significance relation between total level of knowledge and total level of practices with p value = 0.047. **Recommendations:** Continuous education and training programs for nurses are recommended to enhance their knowledge and practices related to device-associated infections.

Keywords: Devices Associated Infection, Intensive Care Units Nurses, Knowledge, Practices.

Introduction

A critically ill patient who has a life-threatening multisystem process can experience significant morbidity and requires pharmacological management and mechanical device support such as intravenous devices, urinary catheters, and mechanical ventilators to support vital organ functions or reverse specific organ dysfunctions (Kayambankadzanja et al., 2022). Devices-associated infections (DAIs) are major patient safety problems in hospitals, especially in intensive care units (ICUs) (Jaggi et al., 2019).

Healthcare-associated infections (HAI) are infections acquired after 48 h of admission, up to 30 days of discharge, and up to one year in case of implants, which were not evident or under incubation at admission (Morris et al., 2019). Ventilator-associated pneumonia (VAP), central-line-associated bloodstream infections (CLABSI), and catheter-related urinary tract infections (CAUTI) are the most commonly encountered Device-Associated HAI (DA-HAI). They are considered the principal contributors to healthcare hazards and threats to patient safety (Vincent et al., 2020b).

Patients in ICU with multiple comorbidities are on artificial ventilation, inotropes, central venous catheterization/central line, urinary catheterization, parenteral nutrition, and other supports, which render them susceptible to HAI. Multidrug-resistant (MDR) pathogens persisting in the ICU environment cause opportunistic infections, more so in

association with using devices (Afhami et al., 2019).

The incidence of DA-HAI depends on access to ICU, frequency and duration of use of devices, infection control practices, and immune constitution of patients. The rates of HAI in high-income countries' ICUs are approximately 5–10% vis-a-vis 2–10 times higher incidence in lower- and middle-income countries (Liu et al., 2020; Böll et al., 2021).

Ongoing surveillance of HAI helps characterize infections, etiology, sources, DA-HAI rates, and resistors, thus forming a guideline for targeted interventions for patients, healthcare professionals (HCP), and institutional policies (Werneburg, 2022; Gilhooly, Green, McCann, Black, & Moonesinghe, 2019).

In VAP, hospital-acquired pneumonia that occurs more than 48 hours after mechanical ventilation is a common complication of mechanical ventilation with a high mortality rate (Hassan, El-Gilany, El-Mashad & Abdelaal, 2019).

Central line-associated bloodstream infections remain a significant complication of central venous catheters and a leading cause of hospital-acquired infections in the critical care unit (Sakr et al., 2021).

CAUTI is the most common HAI and cause of secondary bloodstream infections (Morris et al., 2019).

Significance of the study

Critical care nurses have an important role in preventing devices associated infections, so they must have the ability to know how to prevent infection associated with these devices and provide high-quality of

care. This is accomplished by using practices that have been shown effective for assessment and maintenance procedures during the hospital stay. A well-trained nursing team follows the fundamental guidelines for avoiding many issues linked to the use of medical devices. So, it is important for assessing critical care nurses' knowledge and practice which is the key factor in reducing devices associated infection and decrease critically ill patients' morbidity and mortality rate (**Kharel, Bist & Mishra, 2021; Emonet et al., 2019**).

Aim of the study

The aim of the current study was to assess nurses' Knowledge and practices regarding devices associated with infection at the ICU.

Research questions

- What are the nurses' knowledge levels regarding devices associated infection at Intensive Care Units ?
- What are the nurses' practices levels regarding devices associated infection at Intensive Care Units?

Subjects and Methods

Research design

Descriptive research

Setting

This present study was conducted in the surgical intensive care unit and traumatology medicine intensive care unit at Tanta Emergency Hospital in Tanta University hospital.

The nurses' inclusion criteria

The inclusion criteria of the nurses included 80 nurses working in the previously mentioned settings who care for mechanically ventilated patients (50 nurses work at Anesthesia

Intensive Care Unit and 30 at the traumatology medicine intensive care unit).

Tools for data collection

Two tools were used to evaluate nurses' knowledge and practices regarding DAI at the ICU after reviewing the relevant kinds of literature. It is composed of two parts as follows:

Tool I: Assessment of Nurses' Knowledge about DAI:

The researcher developed this tool after reviewing relevant literature (**Salu, Okyere, Charles-Unadike & Ananga, 2023**) to collect baseline data pertinent to the current study. It consisted of two parts:

Part (a): Nurses' Socio-demographic Characteristics; to assess data related to nurses' age, sex, marital status, level of education, total years of experience in the previously mentioned unit, previous and current training program about the DAI

Part (b): Nurses' Knowledge Questionnaire regarding DAI: It was used to assess nurses' Knowledge regarding devices associated with infection care. It included the following:

Knowledge about DAI included the definition of DAI, types of devices, risk factors, and components of the infection chain (**Vincent et al., 2020**).

Knowledge regarding the standard precautions, such as the definition of standard precautions (SPs), measures of SPs, types of hand hygiene, indications of hand hygiene, required time, and personal protective equipment (**Werneburg, 2022**).

Knowledge related to different kinds of DAI included Knowledge

about VAP, central line-associated bloodstream infection, and catheter-associated urinary tract infection (**Papazian, Klompaas & Luyt, 2020**).

The scoring system of Knowledge was presented as follows: Correct and complete answers were scored (2), correct and incomplete answers were scored (1), and incorrect answers were scored (0). The total scoring system of nurses' Knowledge was summed, calculated, and classified as the following:

- **Good Knowledge** was considered 80% or more of the total score.
- **Fair Knowledge** was considered 60% of the total score to less than 80%.
- **Poor Knowledge** was considered less than 60% of the total score.

Tool II: Observational Checklist regarding Nurses, Practice of Devices Associated Infection:

The researcher developed this tool after reviewing relevant literature to assess nurses' practice regarding DAI. (**Soundaram et al., 2020**). The observational checklist covered the following five domains: Hand hygiene, personal protective equipment, VAP, CLABSI, and CAUTI.

Scoring system of nurses' practice: Three levels of scoring for each item in the checklist were utilized as follows: Done was scored (1), not done was scored (0), the scoring system was calculated and classified as follows:

Satisfactory if the total score of practice is $\geq 80\%$, and unsatisfactory if the total score of practice is < 80 .

Method

The study was accomplished through the following steps

1. Administrative process

An official permission from the faculty of nursing was delivered to the appropriate authorities at the two selected units to conduct the study. This study will be conducted at the Surgical Intensive Care Unit and Traumatology Medicine Intensive Care Unit at Tanta Emergency Hospital in Tanta University hospital which is affiliated to the Ministry of Higher Education and Scientific Research.

2. Ethical considerations

Ethical committee approval of the faculty of Nursing at Tanta University was obtained, code No: 189-1-2023 and ethical committee of faculty of medicine, code No: 36264MS31-1-23.

- The nature of the study was not causing any harm or pain to the entire subjects.
- Confidentiality and privacy were taken into consideration for each nurse during data collection.
- A code number was used instead of names.
- Written consent to participate in this study was obtained and she/he had the right to withdraw from the study at any time they needed.

3. Tool development

- Structured questionnaire tools were developed by the researcher to assess nurses' knowledge and Practices regarding devices associated infection at intensive care units several literature help to develop the tools and experts in the

field of Critical care nursing department approved it.

- All questions covered several aspects of knowledge about devices associated infection. Structured questions contain (6) questions for obtaining Socio-demographic data of the nurses and (26) questions for assessing knowledge regarding devices associated infection at Intensive Care Units.

4. Tool validity

- The tool of the study was developed by researchers for clarity and applicability by five experts in critical care nursing and biostatistics to ensure their validity and modifications were done.

5. The pilot study

- A pilot study was carried out before starting the data collection and it was done on a sample of (10%) nurses to test the feasibility, applicability of the tools and necessary modifications was done, and they involved the subjects.
- The researcher carried out individual assessments for each nurse in the ICU department to collect the general and specific data about the devices associated with infection.

6. Reliability statistics

- Alpha Cronbach's test was used to test tool I and tool II reliability and reliability factors were 0.817 and 0.836 respectively.

7. Data collection

- The data were collected over a period of 6 months starting from the beginning of March 2023 to the end of August 2023.

- An interview was conducted with each nurse, and it was in the morning and afternoon shift.
- The sheets were distributed to the nurses to fill it and after that it was collected.

Statistical analysis

The collected data was organized, tabulated and statistically analyzed using SPSS software statistical computer package version 26. For quantitative data, the range, mean and standard deviation were calculated. For qualitative data, comparison was done using Chi-square test (χ^2).

For comparison between means for two variables in a group, paired samples T-test was used

d. For comparison between means for more than two variables in a group, the F-value analysis of variance (ANOVA) was calculated.

Correlation between variables was evaluated using Pearson and Spearman's correlation coefficient r . A significance was adopted at $P<0.05$ for interpretation of results of tests of significance (*). Also, a highly significance was adopted at $P<0.01$ for interpretation of results of tests of significance (Burt, 2013).

Results

Table 1: Distribution of studied nurses according to their socio demographic characteristics.

As regards the age of the studied nurses, it was noticed that 50% of the studied nurses were in the age group from (28-<38) years old with $mean \pm SD$ 27.71 ± 3.234 years. Also 76.25% and 57.5% of them were females and single respectively. In relation to education, it was observed that 81.25% of them had bachelor's

degree in nursing and 62.5% worked at anesthesia ICU.

Finally, regarding previous experience at ICU and training about DAI, it was shown that 63.75% of nurses had more than 5 years of experience with mean \pm SD 3.94 ± 3.316 years and 23.75% of nurses attend training programs for 2 weeks about DAI.

Figure 1: Distribution of the studied nurses according to correct knowledge regarding devices associated infection:

This figure illustrates that nearly three quarters (75.38%, 71.75 and 72.3%) of the studied nurses had correct knowledge regarding DAI, VAP and CLABSI, respectively. Additionally, nearly two third (68.0% and 67.8%) of them had correct knowledge regarding standard precautions and CAUTI, respectively.

Table 2: Distribution of the studied nurses according to their total levels of knowledge regarding devices associated infection.

This table shows that nearly two thirds 61.25% of the studied nurses had fair level of knowledge compared to less than quarter 22.30% of them had good level of knowledge regarding DAI.

Figure 2: Distribution of the studied nurses regarding their total practice domains levels about devices associated infection

This figure represents that, the highest percent (73.75%, 68.75%, 66.25%, 56.25% and 53.75%) of the studied nurses had satisfactory level of practices regarding hand hygiene, VAP, CLABSI, PPE and CAUTI, respectively. In addition to, 60.00% of

the studied nurses had satisfactory level compared to 40.00% of them had unsatisfactory practices level.

Table 3: Relation between total knowledge level and total practice level of the studied nurses regarding devices associated with infection. it was noticed that, the studied nurses who had fair level of knowledge had satisfactory level of practices with statistical significance relation between total level of knowledge and total level of practices which p value = 0.047.

Table 4: Relation between socio-demographic characteristics and their total knowledge score of the studied nurses.

This table revealed that nurses aged between 28 and 38 years, who have had completed post-graduate studies and are employed in the Traumatology Intensive Care Unit (ICU), possess 5 to 10 years of experience and have undergone 1 to 2 training sessions on DAI, demonstrate high mean scores in DAI practices, specifically: 37.60 ± 5.835 , 37.08 ± 5.563 , 40.50 ± 1.915 , 38.87 ± 5.770 , 37.63 ± 5.956 , and 37.86 ± 5.416 , respectively. Furthermore, a significant correlation was identified between the types of ICU in which the nurses work and their total knowledge score, with a p-value of 0.011.

Table 5: Relation between socio-demographic characteristics of the studied nurses and their total mean scores of practices about devices associated infection.

The analysis indicates a statistically significant relationship between the total practice levels of the studied

nurses and their type of work in the ICU, as well as their training regarding DAI. Nurses working in the Anesthesia ICU achieved a mean score of 52.24 ± 6.751 , while those in the Traumatology ICU had a mean score of 47.40 ± 8.811 . Additionally, nurses who received more than two weeks of training on DAI attained a

higher mean score of 52.89 ± 7.578 compared to their counterparts. Furthermore, significant correlations were observed between the type of ICU work, training on devices associated with infections, and the overall mean practice scores of the studied nurses, with p-values of 0.007 and 0.022, respectively.

Table 1: Percent distribution of studied nurses according to their socio demographic characteristics.

Demographic Characteristics	The studied nurses (n=80)	
	N	%
Age (in years)		
- (<28)	39	48.75
- (28-<38)	40	50.00
- (38-<48)	1	1.25
Range	(22-43)	
Mean ± SD	27.71 ± 3.234	
Gender		
- Male	19	23.75
- Female	61	76.25
Marital status		
- Single	46	57.50
- Married	34	42.50
Educational level		
- Diplome	1	1.25
- Technical institute	10	12.50
- Bachelor	65	81.25
- Postgraduate	4	5.00
Type of ICU		
- Anesthesia ICU	50	62.50
- Traumatology Medicine ICU	30	37.50
Years of experience		
- < 5	51	63.75
- (5-10)	27	33.75
- >10	2	2.50
Range	(1-25)	
Mean ± SD	3.94 ± 3.316	
Previous training about DAI (in weeks)		
- None	29	36.25
- <1	17	21.25
- (1-2)	15	18.75
- >2	19	23.75

DAI: Devices Associated Infection

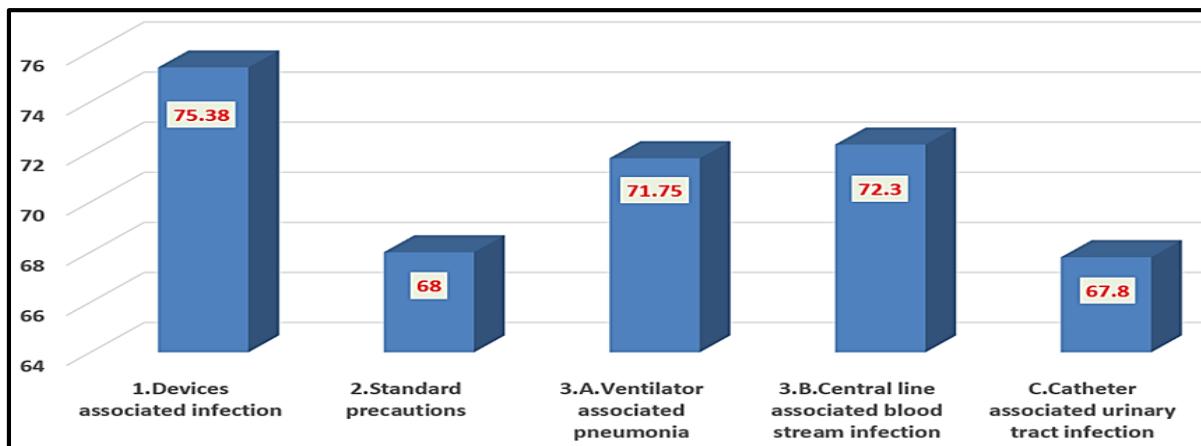


Figure 1: Percent distribution of the studied nurses according to correct knowledge regarding devices associated infection.

Table 2: Distribution of the studied nurses according to their total levels of knowledge regarding devices associated infection.

Total level of Knowledge	The Studied Nurse	
	No	%
Poor	13	16.25
Fair	49	61.25
Good	18	22.50

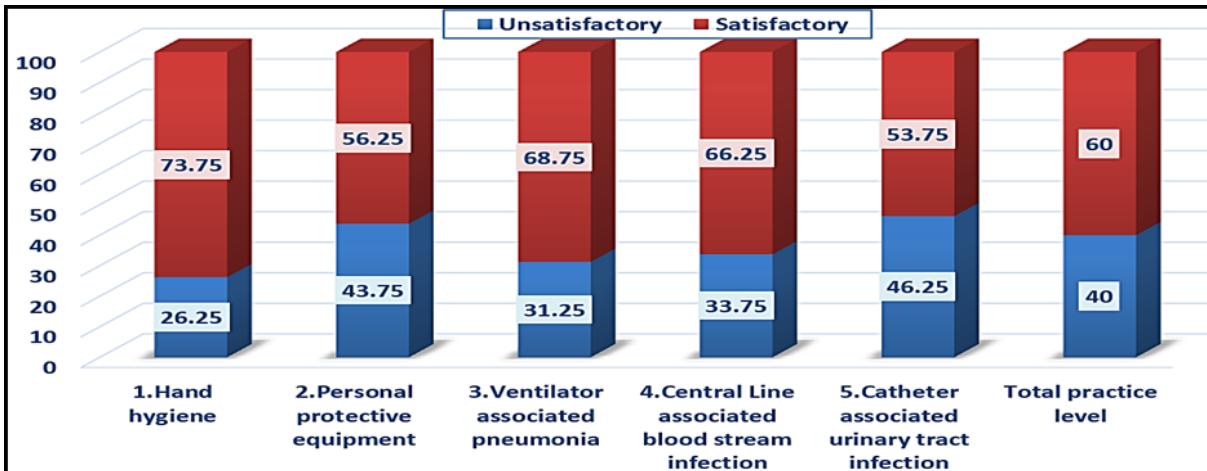


Figure 2: Distribution of the studied nurses regarding their total practice domains levels about devices associated infection.

Table 3: Relation between total knowledge level and total practice level of the studied nurses regarding devices associated with infection.

Total knowledge level	The studied nurses (n=80)				χ^2 P	
	Total practice level					
	Unsatisfactory (n=32)		Satisfactory (n=48)			
	N	%	N	%		
- Poor	7	8.75	6	7.50	6.127	
- Fair	15	18.75	34	42.50	0.047*	
- Good	10	12.50	8	10.00		

* Significant at level P<0.05

Table 4: Relation between socio-demographic characteristics and their total knowledge score of the studied nurses.

Characteristics	The studied nurses (n=80) Total knowledge score Mean \pm SD	F/t P
Age (in years)	36.56 \pm 5.715	0.295 0.746
	37.60 \pm 5.835	
	35.00 \pm 0.00	
Gender	35.89 \pm 6.163	0.627 0.431
	37.08 \pm 5.563	
Educational level	35.00 \pm 0.00	1.604 0.196
	33.80 \pm 6.828	
	37.06 \pm 5.559	
	40.50 \pm 1.915	
Type of ICU	35.56 \pm 5.327	6.788 0.011*
	38.87 \pm 5.770	
Years of experience	36.37 \pm 5.667	0.427 0.654
	37.63 \pm 5.956	
	36.50 \pm 2.121	
Previous training about DAI (in weeks)	37.33 \pm 6.126	0.967 0.413
	36.41 \pm 4.963	
	37.86 \pm 5.416	
	35.11 \pm 6.350	

* Significant at level P<0.05

Table 5: Relation between socio-demographic characteristics of the studied nurses and their total mean scores of practices about devices associated infection.

Characteristics	The studied nurses (n=80) Total practice score Mean ± SD	F/t
		P
Age (in years)	50.18±8.651 50.70±7.290 49.00±0.00	0.058 0.944
Gender	48.58±9.800	1.369
	51.00±7.200	0.246
Educational level	49.00±0.00	0.312
	52.30±5.250	0.817
	50.05±8.367	
	52.25±6.702	
Type of ICU	52.24±6.751	7.640
	47.40±8.811	0.007*
Years of experience	50.00±8.266	0.202
	51.15±7.518	0.818
	51.50±3.536	
Previous training about DAI (in weeks)	52.24±6.791	3.410 0.022*
	46.00±8.860	
	48.80±7.360	
	52.89±7.578	

* Significant at level P<0.05

Discussion

Prevention of DAI is critical to improving patient outcomes and reducing healthcare costs. Strategies for prevention of DAI include appropriate use of devices, adherence to infection control guidelines, and implementation of evidence-based interventions. Healthcare providers must remain aware about their efforts to reduce DAI and improve patient outcomes (Septimus and Moody, 2016).

Section I: Nurses' socio-demographic characteristics.

Half of nurses had age ranging from 28-38 years old with mean age of 27.71±3.234 years old and were female and single. In terms of education, most of the nurses had a bachelor's degree in nursing. In the researcher point of view this might be related to that, most of those affiliated with the nursing profession in Egypt are female, also half of them were single must be due to that most of

them have a bachelor's degree, so they care more about education than engagement.

This came in line with **Tafere, Belachew, Feleke, & Adal, (2023)** who showed that the majority of nurses were female, had a bachelor's degree and never married. Furthermore, **Gerida, El-Sheikh, & Abdelraouf, (2022)** who reported that nurses' mean age was 27.53 years and 70% and 73.3% of nurses were female and had bachelor's degree of nursing respectively.

This finding is contradicted by **Awad, Elfeky, Sultan, & Abo Seda, (2019)** who showed that the majority of the studied sample had a diploma in nursing education and **Kadium, (2015)** carried out their study about improving nurses' knowledge to reduce catheter-related bloodstream infection in a haemodialysis unit and demonstrated that the most of studied sample had basic nursing diploma.

The present study showed that the majority of the nurses worked in the anaesthesia ICU, while one third of them worked in the trauma ICU. Moreover, less than two-thirds of the nurses had more than 5 years of experience in the ICU, in the researcher point of view, this might be related to that, half of them had age ranging from 28-38 years old with mean age of 27.71 ± 3.234 years old. Additionally, more than a third of the nurses had not received previous training on devices associated with infection, and a quarter of them had attended training programs on AID in the past 2 weeks.

This finding is in the same line, **Tafere et al., (2023)** showed that the

majority of nurses had less than 10 years of work experience. Additionally **Gerida et al., (2022)** who reported that the mean of nurses' years of experience in nursing career was 4.8 years and the mean of nurses' years of experience in PCICU was 4.5 years. On the other hand, the finding was contradicted by **Wei, Markert, Connelly, & Polenakovic, (2021)** who carried out a study about CLABSI and revealed that the experience years in the studied sample were less than five years.

Section II: Nurse's level of knowledge regarding devices-associated infection.

In the current study, nearly three quarters of the studied nurses had correct knowledge regarding DAI, VAP and CLABSI. Additionally, nearly two third of them had correct knowledge regarding standard precautions and CAUTI, in the researcher point of view this could be related to that, majority of the studied nurses had bachelor degree.

This finding agreed with **Shahbaz, Sarwar, Hayat, & Sarwar, (2024)** revealed that nurses demonstrated satisfactory knowledge regarding CLABSI prevention. Also, **Mong et al., (2021)** reported that more than two thirds of the studied nurses had good knowledge of CAUTI prevention. While, this results disagreed with **Getahun et al., (2022)** found that less than half of the studied nurses had poor knowledge regarding VAP. Also, **Salu, Okyere, Charles-Unadike & Ananga, (2023)** revealed that less than one third of the studied nurses had good knowledge regarding standard precautions.

In the present study, it was observed that nearly two third of the studied nurses had fair level of total knowledge compared to less than one quarter of them had good level of total knowledge regarding DAI. From the researcher point of view, this disparity could be attributed to factors such as limited access to ongoing education, inadequate training resources, or insufficient participation in relevant seminars and workshops. Understanding these underlying reasons is crucial for improving overall knowledge among nurses.

In line with the current results, **Ahmed and Kafl, (2019)** reported that approximately one third had a satisfactory level. Also, **Qayyum, Waqas, & Sattar, (2010)** found that the studied nurses had poor knowledge about device associated infections and their routes of spread. While, this findings disagree to **Ibrahim, Said, & Hamdy, (2011)** who found that the majority of their studied group had good knowledge about methods of transfection of infection.

Section III: Nurses' level of practices regarding devices associated infection.

The present study found that the highest percent of the studied nurses had satisfactory level regarding hand hygiene, VAP, CLABSI, PPE and CAUTI. In addition to, less than two thirds of the studied nurses had satisfactory level compared to more than one third of them had unsatisfactory practices level. This result is in agreement with **Sobeh, Mahmoud, & Abdelkader, (2023)** revealed that majority of the studied

nurses had good practices level. Also, **Kaur, Dhaliwal, Randhawa, & Singh, (2021)** reported that less than two thirds of the studied nurses had adequate level of practices regarding CAUTI. Additionally, **Muhammad, Khan, Saleem, Muhammad, & Jamal, (2022)** revealed that the highest percentage of the studied nurses had good practices regarding PPE use. While, this finding disagreed with **Veer & Sharma, (2023)** found that more than half of the studied nurses had poor practices regarding CLABSI. Also, **Abad, Formalejo, & Mantaring, (2021)** reported that majority of nurses had poor adherence to specific components of the VAP bundle.

Section IV: Relations between total level of knowledge and total level of practice of the studied nurses regarding to devices associated infection.

In the present study, it was noticed that the studied nurses who had fair level of knowledge had satisfactory level of practice with statistical significance relation between total level of knowledge and practice. From researcher point of view, this implies that nurses may be able to implement effective practices, potentially as a result of their experience or the influence of workplace protocols, despite having a basic understanding. Hands-on training and mentoring may enhance their practical skills, enabling them to perform essential tasks with proficiency.

These findings underscore the significance of bridging knowledge gaps through ongoing education to

improve patient care outcomes by enhancing knowledge and practice. In the same line, **Desoky, Mohamed, Shafik, & Nabawy, (2022)** found that there was a statistically significant difference with positive correlation between total nurses' knowledge and practices scores. Supporting this findings, **Said, Yassien, & Ali, (2020)** revealed that there is high significant statistical positive correlation between total knowledge about DAI and total practice of nurses.

Also, **Mohamed, Aboot, Gamal, & Ali, (2013)** indicated that nurses with good level of knowledge have fair practices this might be due to positive relationship between knowledge and practices.

Furthermore, **Elghareb et al., (2012)** showed that there was a moderate positive statistically significant correlation between nurses' knowledge and practice score.

The findings of the current study contrast with those of **Day et al. (2002)**, who reported that no correlation between working experience and the level of knowledge.

Section V: Relations between socio-demographic characteristics of the studied nurses on their total knowledge and practices score about associated infection.

There was a significant relation between type of working at ICU and total knowledge with no significant relation between age, years of experience and total knowledge level. The findings suggest that the nature of work undertaken by nurses in the ICU has a substantial effect on their overall

knowledge. This implies that particular roles or responsibilities may facilitate enhanced learning and exposure to critical information. Conversely, factors such as age and years of experience do not seem to significantly affect total knowledge levels, indicating that knowledge acquisition is likely more influenced by job-specific tasks rather than general experience or seniority. This underscores the importance of implementing role-based training programs to ensure that all nurses attain high levels of knowledge, irrespective of their position or experience.

Our findings are supported by **Said et al., (2020)** who showed that there is no statistically significance between total knowledge scores in relation to gender, age, qualification and years of experiences in the field of nursing. Moreover, **Jarelnape, (2023)** addressed the relationship between demographic characteristics and the knowledge of nursing staff regarding aseptic techniques. The results showed that there was no significant relation between age and level of knowledge. Moreover, this finding aligns with a previous study that has shown that there was no significant correlation between age and knowledge scores related to infection control practices (**Abalkhail et al., 2021**)

These findings are disagreed by **Abdullah et al., (2014)**, who revealed a higher tendency of bachelor nurses to have higher mean knowledge scores and those who have less than one year of experience got higher

mean knowledge scores than others, with significant statistical difference. Also, **Rushdy, Youssef, & Elfeky, (2015)** revealed a significant statistical difference between mean knowledge score and the degree of nursing education and **Awad et al., (2019)** showed that there was negative significant statistical correlations found between total knowledge scores and age, years of experience in the ICU.

The present study showed a statistically significant relation between the nurses' total practices level and type of working in ICU and previous training about devices associated infection. This suggests that the nurses who work in anesthesia ICU, have more training about devices associated infection that enhance nurses' skills of prevention of devices associated infections. This result supported by **Parsons and Walters, (2019)** found that nurses practicing in ICUs have strong clinical skills to care for persons with life-threatening injuries and illnesses. They must have a systematic method to organize care, be good multitaskers, and have stellar critical thinking and diagnostic reasoning skills.

Contrasted to this findings, **Said et al., (2020)** showed that there is highly statistically significant difference between total practice scores and years of experience in the intensive care unit. However, **Barsuk et al., (2015)** who concluded that total years in nursing had a significant negative correlation with overall baseline performance. Furthermore, **Hill, (2010)** conducted a study on

improving quality and patient's safety and revealed that the years of experience had a positive impact on the quality of care provided.

Conclusions:

The findings revealed knowledge gaps in specific important areas such as hand hygiene, use of personal protective equipment, and prevention of device-associated bloodstream infections; this study emphasized the need for targeted educational interventions to enhance nurses' knowledge and improve compliance with infection control practices regarding different invasive devices used in ICU.

Recommendations

- Continuous education and training programs for nurses are recommended to enhance their knowledge and practices related to device-associated infections.
- Implementing checklists can ensure adherence to standard precautions and guidelines.
- Develop and implement on job training sessions for newly hired nurses regarding devices associated infection.

Recommendation for administration

- Intensive care units should establish policies aligned with these standards, and regular evaluation and monitoring of nurses' knowledge and practices should be conducted to ensure effective infection prevention.

Recommendations for further researcher studies

- Future studies should target diverse populations in order to test whether similar factors are

similarly important for devices associated infection knowledge and practices among nurses.

- Replication of the same study on larger probability sample at different geographical locations for data generalizability.

Limitations:

The fact that the sample size was relatively small, which may have affected the power of the study. The study was conducted in a single center, which may have limited the generalizability of the results. The study did not include other healthcare professionals, such as physicians and allied health professionals, who also play a role in preventing infection-associated devices.

References

Abad, C. L., Formalejo, C. P., & Mantaring, D. M. (2021). Assessment of knowledge and implementation practices of the ventilator acquired pneumonia (VAP) bundle in the intensive care unit of a private hospital. *Antimicrobial Resistance & Infection Control*, 10(1). doi:10.1186/s13756-021-01027-1

Abalkhail, A., Al Imam, M. H., Elmosaad, Y. M., Jaber, M. F., Hosis, K. A., Alhumaydhi, F. A., (2021). Knowledge, Attitude and Practice of Standard Infection Control Precautions among Health-Care Workers in a University Hospital in Qassim, Saudi Arabia: A Cross-Sectional Survey. *Int J Environ Res Public Health*, 18.

Abdullah, M., Mohammed, W. & Ismail, M. (2014). Nurses' knowledge and practices about administration of medications via nasogastric tube among critically ill patients. *Journal of Education and Practice*, 5, 147-59.

Afhami, S., Seifi, A., Hajiabdolbaghi, M., Bazaz, N., Hadadi, A., Hasibi, M., (2019). Assessment of device-associated infection rates in teaching hospitals in Islamic Republic of Iran. *East Mediterr Health J*, 25, 90-7.

Ahmed, S. & Kafl, R. H. (2019). Knowledge and practice of the critical care nurses on vascular access devices related infection. *NHSJ*, 20, 13-22.

Alhamad, N. & Elsayed, W. (2024). Nursing knowledge and preventive practices of ventilator-associated pneumonia as perceived by intensive care nurses in Hail City, KSA. *Evid-based nurs Res* 6, 1-11.

Arai, M., Feniche, M., Ouhadous, M., Lajane, H., Barrou, L., & Zerouali, K. (2022). Hand hygiene in the intensive care unit: Knowledge, compliance and factors influencing nursing adherence, a descriptive study. *The Open Nursing Journal*, 16(1). doi:10.2174/18744346-v16-e2206290.

Awad, S., Elfeky, H., Sultan, M. & Abo Seda, A. (2019). Critical care nurses'knowledge and practices regarding central venous line care bundle at emergency hospital, mansoura university. *MNJ*, 6, 173-83.

Barsuk, J. H., Cohen, E. R., Mikolajczak, A., Seburn, S., Slade, M. & Wayne, D. B. (2015).

Simulation-based mastery learning improves central line maintenance skills of ICU nurses. *JONA*, 45, 511-7.

Böll, B., Schalk, E., Buchheidt, D., Hasenkamp, J., Kiehl, M., Kiderlen, T. R., (2021). Central venous catheter-related infections in hematology and oncology: 2020 updated guidelines on diagnosis, management, and prevention by the Infectious Diseases Working Party (AGIHO) of the German Society of Hematology and Medical Oncology (DGHO). *Ann Hematol*, 100, 39-49.

Burt, B. (2013). Basic Biostatistics: Statistics For Public Health Practice, Jones & Bartlett Learning.

Day, T., Farnell, S., Haynes, S., Wainwright, S. & Wilson-Barnett, J. (2002). Tracheal suctioning: an exploration of nurses' knowledge and competence in acute and high dependency ward areas. *J Adv Nurs*, 39, 35-45.

Desoky, W., Mohamed, E., Shafik, F. & Nabawy, H. (2022). Enhancing nurses' knowledge and practice through implementing sleep care protocol at neonatal intensive care unit. *Nurs Sci Benha Univ*, 3, 92-109.

Elghareb, M., Effat, H., Karmalawy, M., Hassan, A.-S., Mai, Hassan, E.-G., (2012). Assessment of professional ethics practiced by nurses working in primary health care centers in port said. *Am J Sci*, 8, 1545-003.

Emonet, S., Lazarevic, V., Leemann Refondini, C., Gaïa, N., Leo, S., Girard, M., (2019). Identification of respiratory microbiota markers in ventilator-associated pneumonia. *Intensive Care Med*, 45, 82-92.

Gerida, A., El-Sheikh, O. & Abdelraouf, S. (2022). Nurses' knowledge and Performance regarding Infection Preventive Measures for Ventilators Associated Pneumonia. *MNJ*, 9, 291-7.

Getahun, A. B., Belsti, Y., Getnet, M., Bitew, D. A., Gela, Y. Y., Belay, D. G., (2022). Knowledge of intensive care nurses' towards prevention of ventilator-associated pneumonia in North West Ethiopia referral hospitals, 2021: A multicenter, cross-sectional study. *Ann Med Surg (Lond)*, 78, 103895.

Gilhooly, D., Green, S. A., McCann, C., Black, N. & Moonesinghe, S. R. (2019). Barriers and facilitators to the successful development, implementation and evaluation of care bundles in acute care in hospital: a scoping review. *Implement Sci*, 14, 47-56.

Hassan, R., El-Gilany, A.-H., El-Mashad, N. & Abdelaal, A. (2019). Device-associated infection rates in different intensive care units in a tertiary care hospital in Egypt. *Am J Prev Med*, 4, 1-7.

Hill, K. S. (2010). Improving Quality and Patient Safety by Retaining Nursing Expertise. *Online Journal of Issues in Nursing*, 15.

Ibrahim, Y. S., Said, A. & Hamdy, G. K. (2011). Assessment of infection control practices in neonatal intensive care unit. The

Egyptian Journal of Community medicine, 29, 27-45.

Jaggi, N., Rodrigues, C., Rosenthal, V. D., Todi, S. K., Shah, S., Saini, N., (2019). Impact of an international nosocomial infection control consortium multidimensional approach on central line-associated bloodstream infection rates in adult intensive care units in eight cities in India. *Int J Infect Dis*, 174, 18-24.

Jarelnape, A. A. (2023). The assessment of nursing staff knowledge and barriers regarding aseptic techniques in khartoum teaching hospital, sudan. *Cureus*, 15, 45-65.

Kadium, M. J. (2015). Improving nurses' knowledge to reduce catheter-related bloodstream infection in hemodialysis unit. *Walden University*.

Kaur, S., Dhaliwal, K. K., Randhawa, R. K., & Singh, D. R. (2021). To assess the attitude of nurses towards catheter care for prevention of catheter associated urinary tract infection among patients admitted in tertiary care hospital Bathinda (Punjab). *International Journal of Scientific Research*, 36-39. doi:10.36106/ijsr/9732472

Kayambankadzanja, R. K., Schell, C. O., Gerdin Wärnberg, M., Tamras, T., Mollazadegan, H., Holmberg, M., (2022). Towards definitions of critical illness and critical care using concept analysis. *BMJ Open*, 12, 45-52.

Khan, M., Ahmad, I. W., Waheed, M., Tahir, H., Hurain, K., & Monica, .. (2024). Knowledge, attitude and practice among nurses regarding prevention of central line associated bloodstream infection in tertiary care hospital of Peshawar. *Pakistan Journal of Health Sciences*, 88-91. doi:10.54393/pjhs.v5i04.1409.

Kharel, S., Bist, A. & Mishra, S. K. (2021). Ventilator-associated pneumonia among ICU patients in WHO Southeast Asian region: A systematic review. *PLoS One*, 16, 24-36.

Liu, W., Yang, Y., Jiao, Y., Zhang, K., Hai, Y., Li, H., (2020). Evaluation of the effects of applying the ventricular care bundle (VCB) method for reducing ventilator-associated pneumonia (VAP) in the intensive care unit of a general Chinese tertiary hospital. *Ann Palliat Med*, 19, 53-61.

Mishra, R. & Rani, N. (2020). Effectiveness of structured teaching program on knowledge and practice regarding care bundle on prevention of ventilator-associated pneumonia among nurses. *Int Arch Nurs Health Care*, 6, 149-53.

Mohamed, I. R., Abood, S. A., Gamal, L. M. & G Ali, G. S. (2013). Nurses' knowledge, attitude and practices related to patient's health assessment in minia university hospital. *Zagazig Nurs J*, 9, 1-14.

Mong, I., Ramoo, V., Ponnampalavanar, S., Chong, M. C., & Wan Nawawi, W. N. (2021).

Knowledge, attitude and practice in relation to catheter-associated urinary tract infection (CAUTI) prevention: A cross-sectional study. *Journal of Clinical Nursing*, 31(1-2), 209-219. doi:10.1111/jocn.15899.

Morris, A. C., Hay, A. W., Swann, D. G., Everingham, K., McCulloch, C., McNulty, J., (2019). Reducing ventilator-associated pneumonia in intensive care: impact of implementing a care bundle. *Crit Care Med*, 39, 18-24.

Muhammad, F., Khan, A., Saleem, M., Muhammad, D., & Jamal, S. F. (2022). Personal protective equipment use among nurses in critical care unite nurses. A comparative study in private and public sector tertiary care hospital. *Journal of Farkhanda Institute of Nursing And Public Health (JFINPH)*, 2(2), 8-12. doi:10.37762/jfinph.62.

Papazian, L., Klompas, M. & Luyt, C.-E. (2020). Ventilator-associated pneumonia in adults: a narrative review. *Intensive care med*, 46, 888-906.

Qayyum, S., Waqas, B. & SATTAR, A. (2010). Hospital acquired infections: knowledge about it and its prevention. *TPMJ*, 17, 168-73.

Parsons, L. C. & Walters, M. A. (2019). Management strategies in the intensive care unit to improve psychosocial outcomes. *Critical Care Nursing Clinics of North America*, 31, 537-45.

Rushdy, R., Youssef, Y. & Elfeky, Y. (2015). Nurses' knowledge and practice regarding care of patients connected to intra-aortic balloon pump at Cairo university hospitals. *Egyptian Journal of Nursing*, 10, 1-14.

Said, N. Y., Yassien, S. & Ali Ameen, D. (2020). Factors affecting nurses' performance toward central line associated blood stream infection in critical care units. *Egypt J Health Care*, 11, 234-47.

Sakr, A. A., Younis, F. E., Sakr, M. A., Ibrahim, R. A., El Kholy, R. M., Hamam, S. S., (2021). Health care-associated infections at an Egyptian tertiary care hospital: A 2-year prospective study. *Menoufia Med J*, 34, 14-20.

Salu, S., Okyere, J., Charles-Unadike, V. O. & Ananga, M. K. (2023). Nurses' knowledge on nosocomial infections preventive measures and its associated factors in Ghana: a cross-sectional study. *BMC Health Serv Res*, 23, 941-8.

Septimus, E. J. & Moody, J. (2016). Prevention of device-related healthcare-associated infections. *Egypt J Health Care*, 58, 21-4.

Shahbaz, K., Sarwar, B., Hayat, U., & Sarwar, M. (2024). Knowledge & Practice of nurses regarding central line-associated bloodstream infection & Prevention. *Journal of Health and Rehabilitation Research*, 4(2), 1462-1466.

Sobeh, D. E., Mahmoud, S., & Abdelkader, H. M. (2023). Nurses knowledge and practice regarding infection control measures in intensive care units. *Port Said Scientific Journal of Nursing*, 10(3), 91-108.

doi:10.21608/pssjn.2023.171092. 1234.

Soundaram, G. V., Sundaramurthy, R., Jeyashree, K., Ganesan, V., Arunagiri, R. & Charles, J. (2020). Impact of care bundle implementation on incidence of catheter-associated urinary tract infection: a comparative study in the intensive care units of a tertiary care teaching hospital in South India. *Indian J*, 24, 50-70.

Tafere, T. Z., Belachew, T. B., Feleke, D. G. & Adal, G. M. (2023). Assessment of knowledge and practice of nurses regarding infection prevention and associated factors at Debre Tabor Comprehensive Specialized Hospital, Northwest Ethiopia. *Front Public Health*, 11, 1225570.

Veer, N., & Sharma, J. (2023). A study to assess the knowledge and practices regarding central line associated bloodstream infection care bundle among the staff nurses in selected hospitals of Maharashtra. *International Journal of Renewable Energy Exchange*, 11(8), 92-100. doi:10.58443/ijrex.11.8.2023.92-100.

Vincent, J.-L., Sakr, Y., Singer, M., Martin-Loeches, I., Machado, F.

R., Marshall, J. C., (2020). Prevalence and outcomes of infection among patients in intensive care units in 2017. *Jama*, 323, 1478-87.

Vincent, J. L., Sakr, Y., Singer, M., Martin-Loeches, I., Machado, F. R., Marshall, J. C., (2020). Prevalence and outcomes of infection among patients in intensive care units in 2017. *JAMA*, 323, 14-29.

Wei, A. E., Markert, R. J., Connelly, C. & Polenakovic, H. (2021). Reduction of central line-associated bloodstream infections in a large acute care hospital in Midwest United States following implementation of a comprehensive central line insertion and maintenance bundle. *J Infect Prev*, 22, 186-93.

Werneburg, G. T. (2022a). Catheter-associated urinary tract infections: Current challenges and future prospects. *Res Rep Urol*, 14, 9-13.

Werneburg, G. T. (2022). Catheter-Associated Urinary Tract Infections: Current Challenges and Future Prospects. *Res Rep Urol*, 14, 109-33.

Effect of Communication Board on Clinical Outcomes for Mechanically Ventilated Patients Post Open Heart Surgeries

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Abstract

Background: Communication impairment occurs in mechanically ventilated patients. Absence of efficient communication causes anxiety, fear and insecurity for patients post open heart surgeries. **Aim:** Evaluate the effect of using communication board on clinical outcomes for mechanically ventilated patients post open heart surgeries. **Design:** A quasi- experimental research design.

Setting: conducted at Surgical Intensive Care Unit at Tanta International Teaching Hospital. **Subjects:** A Purposive sample of 60 adult mechanically ventilated patients underwent open heart surgeries were selected from the previously mentioned setting. **Tools:** two tools were used in the process. **Tool (I):** open heart surgery patients' assessment tool. **Tool (II):** clinical outcomes assessment tool. **Result:** revealed that 13.33% of the study group compared to (50%) of the control group suffered from severe pain. While (6.67%) of study group compared to (30.00%) of the control group had respiratory distress. Additionally, (73.33%) of the study group compared to (20.00%) of the control group were satisfied with using communication board. significant differences were found between the two groups regarding pain level, respiratory distress level, and satisfaction. **Conclusion:** communication board is a cost effective nursing strategy which helped in improving clinical outcomes for patients open heart surgeries. **Recommendation:** Replication of the study on a larger sample size and with long term follow up can validate and help generalize the results.

Key words: Communication board, Clinical outcomes, Open heart surgeries.

Introduction

Open heart surgeries are surgeries on the heart and great vessels performed by cardiac surgeons. It is often used to treat complications of ischemic heart diseases such as, coronary artery bypass grafting, correct congenital heart diseases, or treat valvular heart diseases from various causes, including endocarditis, rheumatic heart diseases, and atherosclerosis. It also includes heart transplantation (**Libertini & Evans, 2024**).

Coronary artery bypass graft (CABAG) surgery is among the most common performed open heart surgeries operations performed in the world with more than 500,000 surgeries performed each year (**Awad, Ahmed, Mohamed, & Rais, 2024**).

The number of open- heart surgeries performed in Egypt in 2023 is about 69 thousand cases (**Elbadawi et al., 2020**). In Surgical Intensive Care Unit at Tanta International Teaching Hospital (2023), about 100 patients underwent open heart surgeries (**Tanta Statistical Health Records, 2023**).

Patients undergoing open heart surgeries still intubated for up to 24 hours after cardiac surgery to provide sufficient oxygen and ventilation, to protect the lungs and ensure the stability of the patient's clinical condition.

Communication impairment occurs due to the placement of an endotracheal tube in the throat, which obstructs airflow between the vocal cords. (**László et al., 2022**).

Communication impairment presents a common distressing problem for patients who receive MV and for the

health care providers especially critical care nurses. Absence of efficient communication causes anxiety, fear and insecurity for mechanically ventilated patients (**McClintock et al., 2024**).

Communication with mechanically ventilated patients is essential to improve the quality and safety of health care. It is an important factor to assess pain and other symptoms and help critically ill patients to participate in treatment decisions (**Patel et al., 2023**).

There is a significant relationship between the loss of speech, high level of stress, anxiety, and depression among ICU patients. Current practice in the ICU is to use less sedation in mechanically ventilated patients, which increases the number of patients potentially able to communicate while mechanically ventilated and awake (**Halpern, 2024**).

Numerous traditional and simple methods of communication used by critical care nurses such as eye blinking, lip reading, gestures, and head nods are time-consuming, inadequate to meet all communication needs, and frustrating for both patients and nurses (**Piekarski, Rohner, Monsefi, Bakhtiary, & Velten, 2024**).

Communication board is a method of communication used for intubated patients. It consists of icons and pictures representing patients' basic needs. It also, ranges from simple pencil and paper to alphabet, words, and pictures to computer keyboards (**Kuruppu, Chaboyer, Tobiano, Abayadeera, & Ranse, 2023**).

Communication board includes basic needs of patients, such as pain, dyspnea, suction, thirst, hunger, need for changing position, sleeping, personal hygiene, environmental modification (light, sound, temperature), knowing date and time, images of body parts, and names of people such as family, wife, doctor, friend (Karlsen et al., 2023).

Communication board helps enhancing communication, meet patient's needs, assess and treat pain appropriately, decrease anxiety level, improve quality of care and decrease the length of patient stay in the ICUs. Also, communication board increases patient's satisfaction, decreases frustration, and allows quicker expression of patient's needs (Salem & Ahmad 2018).

Critical care nurses play vital roles in communicating with mechanically ventilated conscious patients. Effective communication is a basic part of qualified nursing care and is an important factor in playing an appropriate nursing role in intensive care units, where the hospitalization experience is unpleasant (Hosseini, Valizad-Hasanloei, & Feizi, 2018).

Critical care nurses who are familiar and well trained with using communication board could probably lead to an increase in the quality of patient care. Patients may become more satisfied, comfortable, and cooperative with the staff, experience less pain and agitation (Holm, Viftrup, Karlsson, Nikolajsen, & Dreyer, 2020).

Significance of the study

Patients with open heart surgery suffer from communication impairment due to presence of an endotracheal tube.

Loss of speech leads to high level of stress, anxiety, and depression among ICU patients. Communication enable critical care nurses in meeting patients' needs and improving clinical outcomes. Additionally, the use of communication board may enhance and facilitate communication in intubated patients, decrease the level of anxiety, help patients to express their needs easily, and act as a vehicle to obtain recognition of the patients' individuality. Therefore, the present study aimed to evaluate the effect of using communication board on clinical outcomes of mechanically ventilated patients post open heart surgeries.

Aim of the study:

Evaluate the effect of using communication board on clinical outcomes for mechanically ventilated patients post open heart surgeries.

Research hypothesis

Study group patients who are exposed to communication board will exhibit reduction of pain level, reduction of respiratory distress level, improvement of hemodynamic parameters, and increase patient's satisfaction than control group patients who will not.

Subjects and method

Study design:

Quasi-experimental research design was used to conduct the current study. It is a type of research design that resembles an experimental study but lacks random assignment of participants to experimental and control groups. Characteristics, Use of Comparison Groups, No Random Assignment, real-World Application.

Study setting:

The study was conducted at Surgical Intensive Care Unit at Tanta International Teaching Hospital affiliated to Ministry of Higher Education and Scientific Research. This unit contained 9 beds.

Study subjects

A Purposive sample of 60 adult mechanically ventilated patients underwent open heart surgeries were collected from the previously mentioned setting. The sample size was calculated through Steve Thompson equation for calculating the sample size, assuming total number of patients admitted to ICU per year in 2022. Nearly 100 patients are admitted per year. The sample size was calculated as the following:

$Z = \text{confidence level } 95\%$, $d = \text{Error proportion } (0.05)$, $p = \text{population } (80\%)$, assuming total numbers of patient's admission. The specificity of the four scores was 90%. So, the study sample was 60 patients.

The adult patients were divided into two equal groups, 30 patient in each group as follows:

- **Control group:** consisted of 30 patients who received routine care of the intensive care unit for communication such as head nodding and lip reading.
- **Study group:** consisted of 30 patients who received communication board that was implemented by the researcher with the routine care of the intensive care unit.

The inclusion criteria were as follows;

Adult patients aged 21-60 years old of both sex. Patients need mechanical

ventilation for more than 6 hours. Fully conscious patients who are able to communicate. Spontaneous mode of ventilation such as synchronized intermittent mandatory ventilation (SIMV) continuous positive airway pressure (CPAP), bi-level positive airway pressure (Bi-PAP), pressure support ventilation (PSV).

The exclusion criteria were as follows;

Patients suffering from blindness, deafness, and cognitive impairment by review of medical history, including past illnesses, medications, and family history of cognitive disorders. Discussion of symptoms, such as memory loss, confusion, difficulty with problem-solving, or language problems. Asking Functional assessment: Evaluating daily activities like managing finances, cooking, and self-care.

Tools of data collection

Two tools were used to collect data:

Tool I: Open Heart Surgery Patients' Assessment Tool

This tool was developed by the researcher after reviewing the related literature (Royse et al., 2022; Wang, Ma, & Li, 2024). This tool consisted of two parts as the following:

Part A: Patient's Biosocio-demographic Data

This part included age, gender, marital status, educational level, current diagnosis, name of surgery, past medical history.

Part B: Ventilator Profile Assessment

This part was used to assess ventilator mode and ventilator parameters such as FiO_2 , tidal volume, respiratory rate, and positive end expiratory pressure.

Tool II: Clinical Outcomes

Assessment Tool:

This tool consisted of four parts as follows

Part A: Behavioral Pain Scale (BPS)

This scale was developed by **Wojnar-Gruszka et al., 2022** to assess the level of patient's comfort, and intensity of pain among critically ill conscious mechanically ventilated patients. It composed of 3 observational items (facial expressions, body movement, and compliance with mechanical ventilation) that are scored from 1 to 4, with higher numbers indicating higher levels of discomfort.

Scoring System

- Each subsection is scored from 1 to 4, with higher numbers indicating higher levels of discomfort and pain.
- The total score for behavioral pain scale can range from 3 (no pain) to 12 (the most severe pain).
- The total scores were categorized into three levels:
 - No pain ≤ 3
 - Mild pain = 4- 6
 - Moderate pain = 7 – 9
 - Severe pain = > 9 score

Part B: Respiratory Distress Observation Scale (RDOS)

This scale was developed by **Decavèle et al., 2023** and used by the researcher to assess dyspnea in unconscious or mechanically ventilated patients who are unable to self-report dyspnea. It was also used to assess respiratory distress during the weaning from mechanical ventilation. This scale had eight observer-rated parameters: heart rate, respiratory rate, and accessory

muscle use, and paradoxical breathing pattern, restlessness, grunting at end-expiration, nasal flaring, and fearful facial expression.

Scoring system

- Each parameter is scored from 0 to 2 points and the points are summed.
- Scale scores range from 0 signifying no distress and 16 signifying the most severe distress.
- Respiratory Comfort: is respiratory distress observation scale <3 .
- Respiratory Distress: is respiratory distress observation scale score ≥ 3 .

Part C: Patient Satisfaction Questionnaire (PSQ):

This part was developed by the researcher after reviewing the related literature (**Mousazadeh, Yektatalab, Momennasab, & Parvizy, 2019**) to assess the patient's satisfaction regarding communication. It consisted of 10 items. The patient will choose one from 5-point Likert scale as follows: 1 = Very dissatisfied, 2 = dissatisfied, 3 = undecided, 4 = satisfied and 5 = very satisfied.

Part D: Hemodynamic Parameters Assessment Sheet

This part was developed by the researcher after reviewing the related literature **Abdelghani, Nunes, Anwar, & Prendergast, 2024** and it was used to assess heart rate, respiratory rate, blood pressure, oxygen saturation, mean arterial pressure (MAP), and oxygen saturation (SpO₂). Mean and standard deviation of the previously mentioned items were calculated.

Method

1. Administrative process:

A written approval to conduct the study was obtained from the responsible authority at Faculty of Nursing, Tanta University to the director of Surgical Intensive Care Unit at Tanta International Teaching Hospital.

2. Ethical and legal considerations:

- Scientific research ethical committee approval of the Faculty of Nursing and Faculty of Medicine at Tanta University were obtained and the code number was (4-3-2022).
- Nature of the study was not causing any harm or pain to the entire subjects.
- Confidentiality of data and privacy of the patients were taken into consideration regarding data collection.
- Patients' written informed consent to participate in this study was obtained after explaining the aim of the study. All participants were informed about the purpose of the study and the right to withdraw from the study at any time if desired.

3. Tool development

Tool I and tool II part c and d were developed by the researcher after extensive review of the relevant literature (Abdul-Rahman et al., 2023; Ball, Lee, Kaminsky, & Hameed, 2022).

4. Validity of the tools.

The developed tools were tested for content validity by nine jury of experts in the field of Critical Care Nursing at the Faculty of Nursing, Tanta

University, Cardiothoracic surgeons and Intensivists at the Faculty of Medicine, Tanta University.

5. Reliability of the tools

- The reliability was done on the developed tools (tool I and tool II part (a) and (d)) by Cronbach alpha test and the result was 0.950.
- Reliability of behavioral pain scale was found to be 0.71 (Wojnar-Gruszka et al., 2022).
- Reliability of Respiratory Distress Observation Scale was found to be 64% (Decavèle et al., 2023).

6. Pilot study

A pilot study was carried out on (10%) 6 patients who attended at Surgical Intensive Care Unit of Tanta international teaching Hospital. The purpose of the pilot study was to test the tool for its relevance, clarity and organization and to determine the length of time needed to collect the data from each patient, since only a minor modification was done, so the patients of the pilot study were excluded from the actual study.

7. Data collection

Data was collected over a period of 10 months, started from the beginning of December 2022 to the end of September 2023.

8. Phases of the actual study

The present study was conducted on four phases.

I. Assessment phase

Immediately upon admission, initial assessment was carried out by the researcher for all study subjects in both control and study groups to assess the patients who met the inclusion and exclusion criteria of the study. The assessment was done by using tool I to collect baseline data.

Tool I Part (a, b)

It was used to collect data from patients, patient's family, health care team, and patients' medical records and by the researcher's observation immediately upon admission to collect baseline data. It was used to collect the following data:

Assessment of the patients' Socio-demographic characteristics tool I (part a) which included age, gender, marital status and educational level.

Assessment of the patients' clinical data of studied patients tool I (part b) which included current diagnosis, name of the operation, past medical history, and past surgical history.

II. Planning phase

This phase was formulated based on assessment phase and literature review. Priorities and expected outcome criteria were put when planning patient care. Also, this phase included preparation of the communication board. The communication board was prepared and was printed on A3 paper (to be easy for the patient to see it) and it was stucked to a rigid carton and covered with a transparent plastic layer to be easily disinfected. Communication board is 42 cm in height and 30 cm in width.

Expected outcome criteria include

- Decrease severity of pain
- Decrease severity of dyspnea
- Maintain stable hemodynamic parameters
- Increase patients' satisfaction

III. Implementation phase

Control group: received routine care of the intensive care unit for communication such as head nodding and lip reading.

Study group: received communication board that was implemented by the researcher with the routine care of the intensive care unit.

Nursing interventions for using communication board include the following

- Modifying patient's environment (Maintain eye contact, provide adequate room light and control noise).
- Provide complete explanations of all procedures to decrease patient's anxiety and gain cooperation.
- Convey calm reassuring and confident approach.
- Maintain patience if patient gets frustrated or angry.
- Provide the patient with his/ her hearing aids and glasses to facilitate communication.
- Use communication board:
- Communication board was prepared in Arabic language and contained pictures and word headings "I Am" and "I Want" with descriptive words listed under each picture to be suitable for patients who can read and write and other illiterate patients.
- It also contained the Arabic alphabets and numbers 0–9.
- It also contained two drawings: one anterior view and one posterior view of the human body within a box entitled "pain chart" which contained descriptive expressions of pain.
- In addition, it involved a vertical pain scale from 0 to 10 which was utilized to determine the level of pain.



Communication board Campbell-Salome, et al., (2023).



Communication board related to painDS (2020).

IV. Evaluation phase

Evaluation was done for both study and control groups by using tool II to evaluate the effect of using communication board on clinical outcomes among mechanically ventilated patients underwent open heart surgeries. Evaluation was done for both study and control groups throughout the period of patient's connection to the ventilator.

Statistical analysis of data

The study data were computerized and verified using the SPSS (Statistical Package for Social Science) version 20 to perform tabulation and statistical analysis. Quantitative data were summarized by the arithmetic mean and standard deviation.

All statistical analysis was done using two tailed test and alpha error of 0.05 p value less than or equal to 0.05 was considered to be statistically significant.

Frequency tables and cross tabulations with percentages were used to illustrate the result of categorical data and tested by chi square (χ^2) Correlation analysis: Pearson correlation is used to test nature and strength of relation between three quantitative /ordinal variables. The sign of the coefficients indicates the nature of relation as follows: weak correlation for (r) less than 0.25, intermediate. FRIEDMAN'S, A. B. R. (2023).

Results

Table (1): Distribution of the studied patients on Mechanically Ventilated Post Open Heart Surgeries regarding their socio-demographic characteristics

Regarding age, it was observed that the mean age of the control group was 48.73 ± 13.13 years, while it was 48.73 ± 10.78 years in the study group. Regarding gender, more than half of the study group and the control group were males. In relation to marital status, nearly three fourths (70.00%) of the study group compared to (73.33%) of the control group were married. Regarding educational level, it was observed that an equal proportion (20%) of the study group and the control group had primary and secondary education. No statistically significant differences were found between the two groups regarding age, gender, marital status, and level of education where $p > 0.05$ for each.

Table (2): Distribution of the studied patients on Mechanically Ventilated Post Open Heart Surgeries Regarding their current diagnosis

Regarding current diagnosis, this table presented that an equal proportion (80.00%) of the study and the control groups had myocardial infarction. So, the same proportion (80.00%) had coronary artery bypass graft surgery. Regarding past medical history, half of the study group compared to 43.33% of the control group had diabetes mellitus. While an equal proportion (33.33%) of the study and the control groups had cardiac diseases. No statistically significant differences were found between the study and the control groups regarding current diagnosis, past medical and past surgical history where $p > 0.05$

Table (3): Mean scores of ventilator parameters of the studied patients on Mechanically Ventilated Post Open Heart Surgeries

As regard to ventilator parameters, it was observed that $\text{mean} \pm \text{SD}$ of fraction of inspired oxygen (FiO_2) was 98.00 ± 0.00 for the study and control groups. As for tidal volume it was observed that the $\text{mean} \pm \text{SD}$ of tidal volume was 540.67 ± 24.22 for the study and control groups. While $\text{mean} \pm \text{SD}$ of set ventilator rate was 13.00 ± 1.17 and 12.67 ± 0.75 for the study and the control group, respectively. Also, this table reveals that positive end expiratory pressure (PEEP) was 6.60 ± 0.81 for the study group and control group. No statistical significant differences were found between the study and the control groups regarding ventilator parameters where $p > 0.05$.

Table (4): Distribution of the studied patients on Mechanically Ventilated Post Open Heart

Surgeries regarding their total behavioural pain level (BPS)

Concerning total behavioural pain level (BPS), this table concludes that more than half (53.33%) of the study group compared to tenth of the control group suffered from mild pain. While 13.33% of the study group compared to half of the control group suffered from severe pain. Statistically significant difference was found between the two groups regarding total behavioural pain level while $p < 0.05$.

Table (5): Distribution of the studied patients on Mechanically Ventilated Post Open Heart Surgeries regarding their total respiratory distress (RDOS) level

Regarding total respiratory distress level (RDOS), this table concludes that minority of the study group (6.67%) compared to nearly one third (30.00%) of the control group had respiratory distress. While 13.33% of the study group compared to nearly half (46.67%) of the control group suffered from severe respiratory distress. Statistically significant difference was found between the two groups regarding total respiratory distress level while $p < 0.05$. the pain was decreased when used communication board

Table (6): Mean scores of hemodynamic parameters of the studied patients on Mechanically Ventilated Post Open Heart Surgeries

This table revealed that $\text{mean} \pm \text{SD}$ of heart rate was 84.03 ± 5.54 b/m and 108.27 ± 5.52 b/m for the study group and the control group, respectively. While $\text{mean} \pm \text{SD}$ of respiratory rate

was 14.67 ± 1.65 c/m for the study group compared to 27.80 ± 3.51 c/m for the control group. Concerning blood pressure, this table concluded that mean \pm SD of systolic blood pressure was 116.90 ± 5.97 mmHg and 148.70 ± 12 . mmHg, respectively.

While mean \pm SD of diastolic blood pressure was 66.27 ± 7.48 mmHg of the study group compared to 75.83 ± 11.79 mmHg of the control group. Additionally, mean \pm SD of mean arterial pressure (MAP) was 82.17 ± 8.91 mmHg and 98.67 ± 13.10 mmHg for the study group and the control group, respectively. Concerning saturation of peripheral oxygen (SpO₂), it is observed that mean \pm SD of SpO₂ was 98.90 ± 0.54 for the study group and 86.37 ± 3.81 of the control group. Statistically significant differences were found between the two groups regarding heart rate, respiratory rate, systolic blood pressure, diastolic blood pressure, and mean arterial pressure, and saturation of peripheral oxygen (SpO₂) while $p < 0.05$ for each.

Figure (1): Distribution of the studied patients on Mechanically Ventilated Post Open Heart Surgeries regarding their satisfaction level (PSQ)

In relation to satisfaction level (PSQ), nearly two thirds (73.33%) of the study group compared to one fifth (20.00%) of the control group patients were satisfied. Statistically significant difference was found between the two groups regarding satisfaction level while $p < 0.05$.

Table (7): Percentage comparison between behavioural pain level (BPS) of the studied patients on

Mechanically Ventilated Post Open Heart Surgeries and their respiratory distress level (RDOS) and satisfaction level (PSQ)

This table showed that there were positive significant relations between behavioural pain levels and respiratory distress levels within the study group with $P=0.009$. On the other hand, there were negative relations between behavioural pain levels and respiratory distress levels within the control group with $P=0.801$. Also, negative relations were found between behavioural pain levels satisfaction levels within the study group and the control group with $P>0.05$ for each.

Table (8): Association between total behavioural pain score (BPS) of the studied patients on Mechanically Ventilated Post Open Heart Surgeries and their socio-demographic characteristics

This table concludes that no significant associations were observed within the studied patients regarding biosocio-demographic characteristics (age, gender, educational level, and type of surgery) and their behavioural pain scores where $p>0.05$ for each.

Table (9): Association between total respiratory distress level (RDOS) of the studied patients on Mechanically Ventilated Post Open Heart Surgeries and their socio-demographic characteristics studied

This table concludes that no significant associations were observed within the studied patients regarding biosocio-demographic characteristics (age, gender, educational level, and

type of surgery) and their respiratory distress level where $p>0.05$ for each.

Table (10): Association between total satisfaction level (PSQ) of the studied patients on Mechanically Ventilated Post Open Heart Surgeries and their socio-demographic characteristics

This table reveals that no significant associations were observed within the studied patients regarding

biosocio-demographic characteristics (age, educational level, and type of surgery) and their respiratory distress level where $p>0.05$ for each. While significant association was observed within the study group patients regarding gender and their respiratory distress level where $p>0.05$. So, this table reveals that female patients were more satisfied.

Table (1): Distribution of the studied patients on mechanically ventilated post open heart surgeries regarding their socio-demographic characteristics

Characteristics	The studied patients (n=60)				χ^2 P	
	Study group (n=30)		Control group (n=30)			
	N	%	N	%		
Age (in years)						
- (21-<30)	4	13.33	6	20.00	1.709	
- (40-<50)	5	16.67	2	6.67	0.426	
- (50-60)	21	70.00	22	73.33		
Range	(20-60)		(21-60)		t=0.00	
Mean \pm SD	48.73\pm10.78		48.73\pm13.13		P=1.00	
Gender						
- Male	17	56.67	16	53.33	FE	
- Female	13	43.33	14	46.67	0.606	
Marital status						
- Single	6	20.00	5	16.67	0.114	
- Married	21	70.00	22	73.33	0.945	
- Widow	3	10.00	3	10.00		
Educational level						
- Read and write	3	10.00	0	0.00	3.273	
- Primary	6	20.00	6	20.00	0.351	
- Secondary	6	20.00	6	20.00		
- University	15	50.00	18	60.00		

Control group: receive routine hospital care such as head nodding

Study group: undergo communication board that implemented by the researcher

FE: Fisher' Exact test

Table (2): Distribution of the studied patients on mechanically ventilated post open heart surgeries regarding their clinical data

Clinical data	The studied patients (n=60)				χ^2 P	
	Study group (n=30)		Control group (n=30)			
	N	%	N	%		
Current Diagnosis						
- Myocardial infarction	24	80.00	24	80.00	FE	
- Rheumatic heart diseases	6	20.00	6	20.00	1.00	
Type of surgery						
- Coronary artery bypass grafting (CABG)	24	80.00	24	80.00	FE	
- Heart valve repair/replacement	6	20.00	6	20.00	1.00	
Past medical history						
- Hypertension	7	23.33	9	30.00		
- Diabetic mellitus	15	50.00	13	43.33	0.393	
- Atherosclerosis	1	3.33	1	3.33	0.996	
- Cardiac disease	6	33.33	6	33.33		
- Endocrine disease	1	3.33	1	3.33		

Control group: receive routine hospital care such as head nodding

Study group: undergo communication board that implemented by the researcher

FE: Fisher' Exact test

Table (3): Mean scores of ventilator parameters of the studied patients on Mechanically Ventilated Post Open Heart Surgeries

Ventilator parameters	The studied patients (n=60)		t P
	Range	Mean \pm SD	
	Study group (n=30)	Control group (n=30)	
- Fraction of inspired oxygen (FiO ₂)	(40-100) 98.00 \pm 0.00	(40-100) 98.00 \pm 0.00	-
- Tidal volume	(480-550) 540.67 \pm 24.22	(480-550) 540.67 \pm 24.22	0.00 1.00
- Set ventilator rate	(12-20) 13.00 \pm 1.17	(12-20) 12.67 \pm 0.75	1.306 0.197
- Positive end expiratory pressure (PEEP)	(5-7) 6.60 \pm 0.81	(5-7) 6.60 \pm 0.81	0.00 1.00

Table (4): Distribution of the studied patients on Mechanically Ventilated Post Open Heart Surgeries regarding their total behavioral pain level (BPS)

Behavioral Pain (BPS) level	The studied patients (n=60)				χ^2 P	
	Study group (n=30)		Control group (n=30)			
	N	%	N	%		
- Absence pain	0	0.00	0	0.00		
- Mild pain	16	53.33	3	10.00	15.445	
- Moderate pain	10	33.33	12	40.00	0.000*	
- Severe pain	4	13.33	15	50.00		
Range	(4-12)		(4-12)		F=13.46	
Mean \pm SD	4.57 \pm 2.27		8.77 \pm 2.37		P=0.001*	

(3) Absence pain, (4) Mild pain, (5-7) Moderate pain, (8-12) Severe pain

Control group: receive routine hospital care such as head nodding

Study group: undergo communication board that implemented by the researcher

* Statistically significant at level P<0.05.

Table (5): Distribution of the studied patients on Mechanically Ventilated Post Open Heart Surgeries regarding their total respiratory distress level (RDOS)

RDOS Level	The studied patients (n=60)				χ^2 P	
	Study group (n=30)		Control group (n=30)			
	N	%	N	%		
- No distress	14	46.67	5	16.67		
- Respiratory Comfort	10	33.33	2	6.67	19.607	
- Respiratory distress	2	6.67	9	30.00	0.000*	
- Most severe distress	4	13.33	14	46.67		
Range	(0-16)		(0-16)		F=18.34	
Mean \pm SD	3.27 \pm 5.72		10.17 \pm 6.72		P=0.000*	

Control group: receive routine hospital care such as head nodding

Study group: undergo communication board that implemented by the researcher

* Statistically significant at level P<0.05.

Table (6): Mean scores of hemodynamic parameters of the studied patients on Mechanically Ventilated Post Open Heart Surgeries

Hemodynamic Parameters	The studied patients (n=60) Range Mean \pm SD		t P
	Study group (n=30)	Control group (n=30)	
- Heart rate (60-100 b/min)	(74-95) 84.03 \pm 5.54	(100-118) 108.27 \pm 5.52	16.995 0.000*
- Respiratory rate (16 -20 c/min)	(12-17) 14.67 \pm 1.65	(21-36) 27.80 \pm 3.51	18.606 0.000*
- Blood pressure			
– Systolic (120 \pm 20)	(105-126) 116.90 \pm 5.97	(110-170) 148.70 \pm 12.23	12.789 0.000*
– Diastolic (80 \pm 15)	(52-82) 66.27 \pm 7.48	(52-95) 75.83 \pm 11.79	3.750 0.000*
- MAP (70-100 mmHg)	(46-95) 82.17 \pm 8.91	(50-113) 98.67 \pm 13.10	5.704 0.000*
- Saturation of peripheral oxygen (SpO ₂)	(98-100) 98.90 \pm 0.54	(80-94) 86.37 \pm 3.81	17.876 0.000*

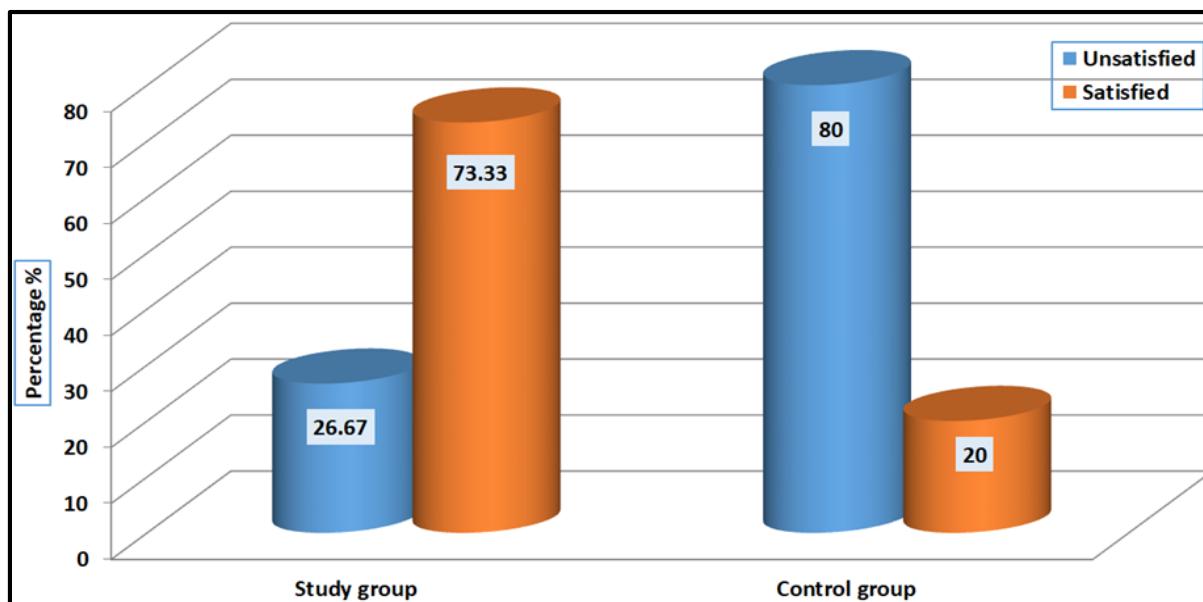
**Figure (1): Distribution of the studied patients on Mechanically Ventilated Post Open Heart Surgeries regarding their satisfaction level (PSQ)**

Table (7): Percentage comparison between behavioural pain level (BPS) of the studied patients on Mechanically Ventilated Post Open Heart Surgeries and their respiratory distress level (RDOS) and satisfaction level (PSQ)

	The studied patients (n=60)											
	Behavioral pain level (BPS) level											
	Study group (n=30)						Control group (n=30)					
	Mild pain		Moderate pain		Severe pain		Mild pain		Moderate pain		Severe pain	
	N	%	N	%	N	%	N	%	N	%	N	%
Respiratory distress level												
- No distress	9	30.00	5	16.67	0	0.00	0	0.00	2	6.67	3	10.00
- Respiratory comfort	4	13.33	4	13.33	2	6.67	0	0.00	1	3.33	1	3.33
- Respiratory distress	0	0.00	0	0.00	2	6.67	2	6.67	4	13.33	3	10.00
- Most severe distress	3	10.00	1	3.33	0	0.00	1	3.33	5	16.67	8	26.67
χ^2 , P	16.974, 0.009*						3.060 , 0.801					
r , P	0.097, 0.611						0.059 , 0.758					
Satisfaction level												
- Unsatisfied	5	16.67	2	6.67	1	3.33	2	6.67	10	33.33	12	40.00
- Satisfied	11	36.67	8	26.67	3	10.00	1	3.33	2	6.67	3	10.00
χ^2 , P	0.405 , 0.817						0.417 , 0.812					
r , P	0.076 , 0.689						-0.074 , 0.696					

Control group: receive routine hospital care such as head nodding

Study group: undergo communication board that implemented by the researcher

FE: Fisher' Exact test

Table (8): Association between total behavioural pain score (BPS) of the studied patients on Mechanically Ventilated Post Open Heart Surgeries and their biosocio-demographic characteristics

Characteristics	The studied patients (n=60)				
	Behavioural pain score (BPS)				
	Mean \pm SD		F/t P	Control group (n=30)	F/t P
Study group (n=30)					
Age (in years)					
- (21-<30)	5.00 \pm 1.16		0.147	9.00 \pm 1.67	1.057
- (40-<50)	5.80 \pm 3.03		0.864	7.00 \pm 4.24	0.361
- (50-60)	5.62 \pm 2.31			7.50 \pm 2.39	
Gender					
- Male	5.29 \pm 2.37		0.557	7.79 \pm 2.58	0.002
- Female	5.92 \pm 2.18		0.462	7.75 \pm 2.27	0.968
Educational level					
- Read and write	7.00 \pm 2.00			-	
- Primary	4.67 \pm 1.03		1.921	6.00 \pm 1.67	2.843
- Secondary	7.00 \pm 2.97		0.151	9.00 \pm 1.67	0.076
- University	5.07 \pm 2.15			7.94 \pm 2.51	
Type of surgery					
- CABG	5.21 \pm 1.98		3.221	7.46 \pm 2.45	2.102
- Heart valve repair/replacement	7.00 \pm 2.97		0.084	9.00 \pm 1.67	0.158

Control group: receive routine hospital care such as head nodding

Study group: undergo communication board that implemented by the researcher

Table (9): Association between total respiratory distress level (RDOS) of the studied patients on Mechanically Ventilated Post Open Heart Surgeries and their socio-demographic characteristics

Characteristics	The studied patients (n=60) Respiratory distress level (RDOS)			
	Mean \pm SD			
	Study group (n=30)	F/t P	Control group (n=30)	F/t P
Age (in years)				
- (21-<30)	4.50\pm7.68	4.542	9.33\pm7.47	0.451
- (40-<50)	9.20\pm8.44	0.090	14.50\pm2.12	0.641
- (50-60)	1.62\pm3.53		10.00\pm6.84	
Gender				
- Male	2.53\pm5.22	0.643	11.71\pm6.32	1.414
- Female	4.23\pm6.41	0.429	8.81\pm6.96	0.244
Educational level				
- Read and write	1.33\pm1.16		-	
- Primary	0.33\pm0.82	1.124	6.50\pm7.12	1.430
- Secondary	2.83\pm5.53	0.358	9.33\pm7.47	0.257
- University	5.00\pm6.98		11.67\pm6.18	
Type of surgery				
- CABG	3.38\pm5.88	0.042	10.38\pm6.67	0.112
- Heart valve repair/replacement	2.83\pm5.53	0.840	9.33\pm7.47	0.740

Control group: receive routine hospital care such as head nodding

Study group: undergo communication board that implemented by the researcher

Table (10): Association between total satisfaction level (PSQ) of the studied patients on Mechanically Ventilated Post Open Heart Surgeries and their socio-demographic characteristics

Characteristics	The studied patients (n=60) Satisfaction level (PSQ)			
	Mean \pm SD			
	Study group (n=30)	F/t P	Control group (n=30)	F/t P
Age (in years)				
- (21-<30)	41.25\pm0.50	1.624	36.33\pm4.03	2.562
- (40-<50)	41.80\pm1.30	0.216	41.50\pm0.71	0.096
- (50-60)	39.33\pm3.58		36.82\pm2.67	
Gender				
- Male	38.76\pm3.42	7.098	36.00\pm1.11	3.178
- Female	41.62\pm2.02	0.013*	37.94\pm3.92	0.085
Educational level				
- Read and write	39.33\pm3.06		-	
- Primary	40.33\pm3.78	0.236	37.83\pm4.07	0.342
- Secondary	39.17\pm4.75	0.871	36.33\pm4.03	0.713
- University	40.33\pm2.47		37.00\pm2.47	
Type of surgery				
- CABG	40.21\pm2.78	0.502	37.21\pm2.87	0.379
- Heart valve repair/replacement	39.17\pm4.75	0.485	36.33\pm4.03	0.543

Control group: receive routine hospital care such as head nodding

Study group: undergo communication board that implemented by the researcher

Discussion

The aim of the current study was to evaluate the effect of using communication board on clinical outcomes for mechanically ventilated patients post open heart surgeries.

One of the greatest challenges for critical care nurses is communication with intubated patients that are connected to mechanical ventilation especially after open heart surgeries. Communication difficulties are the primary issues reported by patients in the ICU receiving MV support. Communication impairment is one of the most important factors affecting the outcome of treatment (Berenguer, Martínez, De Stasio, & Baixauli, 2022).

Communication board is an evidence-based, patient communication strategy supported by clinical research to meet patients' basic needs, improve patients' satisfaction, reduce frustration, and improve patients' outcomes. It can serve as a bridge between patients and health care team and help critical care nurses to give holistic care to intubated patients (Kuruppu, Chaboyer, Abayadeera, & Ranse, 2023).

Socio- demographic characteristics of the current study

Regarding age, the findings of the present study revealed that the mean age of the control and the study groups was 48.73 years. This result can be explained by lifestyle changes, such as changes in eating habits, consuming fast food or food with high fat and cholesterol. Also, family history of heart diseases, hyperlipidemia and hypercholesterolemia, and diabetes

mellitus, diagnosis of hypertension are the main risk factors for ischemic heart diseases and mitral valve disease (Folkestad et al., 2025).

This result was supported by the findings reported by Szymkowicz, Bodet-Contentin, Marechal, & Ehrmann, (2024), who revealed that the mean age of the studied sample was 48.67 years. On the other hand, this result is contradicted by Sidhu, Kaur, Kaur, Charan, & Kaur, (2024), who revealed that the mean age of the studied sample was similar across the studied groups at approximately 54 years.

In relation to gender, the present study showed that more than half of studied patients were males. This could be explained by males are more likely to develop coronary artery diseases twice than females because males spent most of the time out of the home which obliged them to eat fast and unhealthy food. Also, unhealthy lifestyles such as smoking, alcohol consumption. Genetic factors that proposed that estrogen hormone protect women from cardiac diseases. Furthermore, male individuals are at risk of open-heart surgery due to the nature of the work difficulties of their daily living (Manikpurage et al., 2025).

Regarding marital status, the present study revealed that, about three quarters of the studied patients were married. This may be due to social and psychological stress of Egyptian societies which puts burden on married patients. Additionally, the mean age of the studied patients was 48.73 years and people in this age group are usually married.

This finding was supported by Holm & Dreyer, (2018), who described that three quarters of the studied patients were married. Also, Albayram & Guner, (2025), revealed that nearly three quarters of the studied sample were married. On the other hand, this finding was contradicted by Rose et al., (2021), who found that half of the studied sample was married.

Regarding educational level, the findings of the present study described that half of the studied patients had university education. This result could be explained by highly educated people are more aware with their illness and the recommended treatments. So, they are brave to take the decision to perform the open-heart surgeries.

This result was supported by **Sidhu, Kaur, Kaur, Charan, & Kaur, (2024)**, who found that about one half of sample had university education. While, this finding was contradicted with **JamunaRani, Gowri, & Elizabeth, (2024)**, who concluded that half of the studied patients were secondary educated.

In relation to current diagnosis, the present study showed that majority of studied patients had myocardial infarction. This could be due to the most sample were males, in the age group of (50-60 years) and had diabetes mellitus which all of that are predisposing factors of myocardial infarction. This finding was supported by **Hosseini, Valizad-Hasanloei, & Feizi, (2018)**, who concluded that common primary diagnosis among the participants was myocardial infarction.

Regarding the type of cardiothoracic surgery, the present study showed that majority of the studied patients had coronary artery bypass graft (CABG) surgeries. This finding was explained by the majority of the studied sample had myocardial infarction for which CABG surgeries were one of the treatment options.

This finding was consistent with a study done by Pakhide, (2019), who found that majority of studied patients had CABG surgeries. While **Albayram & Guner, (2025)**, conducted a study entitles " The determination of the efficiency of visual communication cards developed for the purpose of communication with the intubated patients in the intensive care unit of cardiovascular surgery" concluded that less than half of the studied patients had CABG and valve surgeries.

In terms of past medical history, the current study presented that diabetes mellitus was the most common past medical history in the studied groups. This finding may be justified by diabetes mellitus, which is a risk factor for cardiovascular diseases, and it is thought that the higher incidence of myocardial infarction in patients with diabetes mellitus is attributed to increased coagulability (**Loh, 2025**).

Also, the high incidence of diabetes mellitus may be due to unhealthy life style such as tobacco use, unhealthy diet, and inadequate physical activity. This finding was in line with **Alaparthi et al., (2021) & Jarrah et al., (2022)**, who reported that diabetes mellitus was the most common past medical history in the studied patients.

On the other hand, this finding was disagreed by **Adeniyi & Kayembe, (2021)**, who found that majority of the studied sample had endocrine and renal diseases.

In the context of ventilator parameters, the findings of the present study concluded that no statistical significant differences were found between the two studied groups regarding fraction of inspired oxygen (FiO_2), tidal volume, respiratory rate, and positive end expiratory pressure (PEEP). The findings were consistent with **Bhardwaj & George, (2023)**, who revealed that no significant differences were found between the two studied groups in relation to ventilator parameters (fraction of inspired oxygen (FiO_2), tidal volume, respiratory rate, and PEEP).

Regarding pain severity measured by behavioral pain scale (BPS), pain severity was significantly lowered in the study group than in the control group. This result could be attributed to communication board which contained pictures and symbols that helped patients describe pain and its characteristics, so the appropriate pharmacological and non-pharmacological pain treatments were administered (**Kuruppu, Chaboyer, Tobiano, Abayadeera, & Ranse, 2023**).

This result was in accordance with **Kolcak, Ayhan, & Tastan, (2023)**, who concluded that using illustrated communication materials significantly reduced pain severity in the intervention group. Also, **Sabater-Gárriz, Molina-Mula, Montoya, & Riquelme, (2024)**, reported that pain severity was

significantly reduced in the intervention group using communication board.

Regarding total respiratory distress observation scale, the current study presented that severe respiratory distress was significantly higher in the control group than in the study group. This result could be explained by effective communication provided better assessments of patients and their health. So, appropriate treatments were provided which helped alleviating dyspnea and anxiety (**Szymkowicz, Bodet-Contentin, Marechal, & Ehrmann, 2024**).

This finding was supported by **Kuruppu, Chaboyer, Tobiano, Abayadeera, & Ranse, (2025); Cingi & Eroğlu, (2023)**, who concluded that the use of communication board significantly reduced level of respiratory distress in the intervention group than the control group. Also, **Adeniyi & Kayembe, (2021)**, found that the use of communication board significantly reduced level of respiratory distress in the intervention group.

Regarding satisfaction level of the studied patients, the present study revealed that satisfaction level was significantly higher in the study group than in the control group. This result may be due to the use of communication board which facilitated communication, helped the patients express their feelings and demands achieved appropriate response to the needs, and so, anxiety was reduced and satisfaction was higher (**Sharma, 2020**).

This finding was in line with **Hosseini, Valizad-Hasanloei, & Feizi, (2018)**, who revealed that communication board significantly increases satisfaction level in the study group than in the control group. Additionally, **Sharma, (2020)**, presented that communication board was effective in improving level of satisfaction among mechanically ventilated conscious patients.

Another study conducted by **Bhardwaj & George, (2023)**, who aimed to determine the level of satisfaction in patients under mechanical ventilation at the time of using communication boards, reported that using communication boards significantly increased satisfaction in the intervention group than in the control group.

Also, **JamunaRani, Gowri, & Elizabeth, (2024)**, concluded that higher satisfaction level was found post implementing therapeutic communication using communication board. On the other hand, this result is not supported by **Qadir, (2023)**, who concluded that the use of communication board does not significantly affect satisfaction level among the studied patients.

Regarding hemodynamic parameters, the current study presented that heart rate, respiratory rate, mean arterial blood pressure, and saturation of peripheral oxygen (SpO_2) were significantly maintained in the normal range in the study group than in the control group. This finding could be attributed to using communication board that are effective in expressing needs, reducing anxiety, pain and respiratory

distress and so, hemodynamic parameters were maintained in the normal level (**Szymkowicz, Bodet-Contentin, Marechal, & Ehrmann, 2024**).

This finding was consistent with **Burgener, (2020)**, who found that statistical significant differences regarding respiratory rate and heart rate were found between the study group and the control group. On the other hand, this finding was contradicted by **DS, (2020)**, who found no statistical significant differences regarding hemodynamic parameters between the study group and the control group.

In the context of the comparison between behavioral pain level (BPS) of respiratory distress level (RDOS) and satisfaction level (PSQ) among the studied groups, the findings of the present study concluded that no significant correlations were found between behavioral pain level (BPS) of the studied patients and their respiratory distress level (RDOS) and satisfaction level (PSQ) among the studied groups.

These findings were in accordance with **Hamdan, (2019)**, who concluded that no significant correlations were observed between behavioral pain level (BPS) of the studied patients and their respiratory distress level (RDOS) and satisfaction level (PSQ) among the studied groups.

Regarding associations between total behavioral pain score (BPS) of the studied patients and their biosocio-demographic characteristics, the current study presented that no significant associations between total

behavioral pain score (BPS) of the studied patients and their biosocio-demographic characteristics (age, gender, educational level, and type of surgery).

This result was in the same line with **Rababa, Al-Sabbah, Eyadat, and Abusbaitan, (2023)**, who revealed no significant associations between total behavioral pain score (BPS) of the studied patients and their age, gender, educational level, and type of surgery. On the other hand, **Melile Mengesha, Moga Lencha, & Ena Digesa, (2022)**, found that total behavioral pain score was significantly increased in the age group between 50- 60 years and in female patients.

In relation to associations between total respiratory distress level (RDOS) and biosocio-demographic characteristics, the findings of the current study revealed no significant associations between total respiratory distress level (RDOS) of the studied patients and their biosocio-demographic characteristics (age, gender, educational level, and type of surgery).

This finding was in accordance with **Wachalovsky, (2020)**, who found no significant differences between total respiratory distress level (RDOS) of the studied patients and their age, sex, and type of surgery.

Regarding associations between total satisfaction level (PSQ) and bio-sociodemographic characteristics, the current study showed no significant associations between total satisfaction level (PSQ) of the studied patients and their bio-sociodemographic characteristics (age, gender,

educational level, and type of surgery).

This result was contradicted with **Baltaci et al., (2023)**, who observed that the patient's satisfaction level was higher in female than male patients and in married than unmarried patients. Additionally, **Adhikari, Paudel, Mishra, Shrestha, & Upadhyaya, (2021)**, concluded that age, gender, and education were significantly associated with majority of the patients' satisfaction. **Kamberi, Tanushi, Kadrija, Kamberi, & Jerliu, (2023)**, discovered that socio-demographic characteristics significantly correlated with the level.

Conclusion

Communication board for patients undergoing open heart surgeries is effective nursing strategy in achieving effective communication which helped in anticipating and meeting patients' needs. Communication board reduced severity of pain measured by behavioural pain scale. Communication board reduced severity of respiratory distress measured by respiratory distress observation scale. Communication board was effective in enhancing satisfaction among mechanically ventilated patients in ICUs. Communication board maintained hemodynamic parameters such as heart rate, respiratory rate, systolic, diastolic, and mean arterial blood pressure, and saturation of peripheral oxygen (SpO₂) within normal range.

Recommendations

In the light of the current study findings, the following recommendations are suggested

- Communication board is recommended for communicating with conscious mechanically ventilated patients.
- The implementation of effective communication interventions in the ICU is essential for the management of mechanically ventilated patients and to support patient-centered care.
- Replication of the study on a larger sample size and with long term follow up can validate and help generalize the results
- Further researches are needed in this area for nursing staff to provide more information about the advanced methods for communication with conscious mechanically ventilated patients.

References

Abdelghani, M., Nunes, M. C. P., Anwar, A. M., & Prendergast, B. (2024). Assessment of suitability for percutaneous mitral commissurotomy: a contemporary review of key anatomical criteria and predictive models. *European Heart Journal-Cardiovascular Imaging*, 25(6), 739-753.

Abdul-Rahman, T., Lizano-Jubert, I., Garg, N., Tejerina-Marion, E., Awais Bukhari, S. M., Luisa Ek, A., ... & Gupta, R. (2023, April). The Use of Cardioprotective Devices and Strategies in Patients Undergoing Percutaneous Procedures and Cardiac Surgery. In *Healthcare*, 11(8), 1094.

Adenyi, O. V & Kayembe, D. K. (2021). Skills for communicating severe acute respiratory syndrome-coronavirus-2 result to patients and/or relatives. *South African Family Practice*, 63(2), 403-406.

Adhikari, M., Paudel, N. R., Mishra, S. R., Shrestha, A., & Upadhyaya, D. P. (2021). Patient satisfaction and its socio-demographic correlates in a tertiary public hospital in Nepal: a cross-sectional study. *BMC health services research*, 21, 1-10.

Albayram, T., & Guner, S. I. (2025). Turkish Validity and Reliability Study Of The Person-Centered Perioperative Nursing Scale. *Perioperative Care and Operating Room Management*, 100468.

Alaparthi, G. K., Amin, R., Samuel, S. R., Bairapareddy, K. C., Raghavan, H., & Vaishali, K. (2021). Effects of three pulmonary ventilation regimes in patients undergoing coronary artery bypass graft surgery: a randomized clinical trial. *Scientific Reports*, 11(1), 6730.

Awad, A. K., Ahmed, A., Mohamed, O. A., & Rais, M. A. (2024). A healthy heart for all: boosting cardiac surgery access in low-income countries. *International Journal of Surgery*, 110(6), 3140-3142.

Ball, C. G., Lee, A., Kaminsky, M., & Hameed, S. M. (2022). Technical considerations in the management of penetrating cardiac injury. *Canadian Journal of Surgery*, 65(5), E580.

Baltaci, D., Eroz, R., Ankarali, H., Erdem, O., Celer, A., & Korkut, Y. (2023). Association between patients' sociodemographic characteristics and their

satisfaction with primary health care services in Turkey. *Kuwait Medical Journal*, 45(4), 291

Berenguer, C., Martínez, E. R., De Stasio, S., & Baixauli, I. (2022). Parents' perceptions and experiences with their children's use of augmentative/alternative communication: A systematic review and qualitative meta-synthesis. *International journal of environmental research and public health*, 19(13), 8091.

Bhardwaj, K., & George, M. (2023). Effectiveness of communication board among mechanically ventilated patients in terms of satisfaction in the ICUs. *Int J Sci Res*, 12(1), 1-33

Burgener, A. M. (2020). Enhancing communication to improve patient safety and to increase patient satisfaction. *The health care manager*, 39(3), 128-132.

Campbell-Salome, G., Jones, L. K., Walters, N. L., Morgan, K. M., Brangan, A., Ladd, I. G., ... & Sturm, A. C. (2023). Optimizing communication strategies and designing a comprehensive program to facilitate cascade testing for familial hypercholesterolemia. *BMC Health Services Research*, 23(1), 340.

Cingi, C. C., & Eroğlu, D. T. (2023). Communication with Patients in Respiratory Distress. In Airway diseases. Cham: Springer International Publishing, 1-9.

Decavèle, M., Bureau, C., Campion, S., Nierat, M. C., Rivals, I., Wattiez, N., ... & Demoule, A. (2023). Interventions relieving dyspnea in intubated patients show responsiveness of the Mechanical Ventilation–Respiratory Distress Observation Scale. *American Journal of Respiratory and Critical Care Medicine*, 208(1), 39-48.

DS, H. A. (2020). Effectiveness of communication board on the level of satisfaction of the communication pattern among patients on mechanical ventilation. *Pondicherry Journal of Nursing*, 9(2), 20-23.

Elbadawi, A., Hamed, M., Elgendi, I. Y., Omer, M. A., Ogunbayo, G. O., Megaly, M., ... & Jneid, H. (2020). Outcomes of reoperative coronary artery bypass graft surgery in the United States. *Journal of the American Heart Association*, 9(15), e016282.

Folkestad, L., Prakash, S. K., Nagamani, S. C., Andersen, N. H., Carter, E., Hald, J. D., ... & Orwoll, E. (2025). Cardiovascular disease in adults with osteogenesis imperfecta: clinical characteristics, care recommendations, and research priorities identified using a modified Delphi technique. *Journal of Bone and Mineral Research*, 40(2), 211-221.

Halpern, N. A. (2024). Innovative designs for the smart ICU. *Chest*, 145

Hamdan, K. M. (2019). Nurses' assessment practices of pain among critically ill patients. *Pain Management Nursing*, 20(5), 489-496.

Holm, A., & Dreyer, P. (2018). Use of communication tools for mechanically ventilated patients in

the intensive care unit. *CIN: Computers, Informatics, Nursing*, 36(8), 398-405.

Holm, A., Viftrup, A., Karlsson, V., Nikolajsen, L., & Dreyer, P. (2020). Nurses' communication with mechanically ventilated patients in the intensive care unit: umbrella review. *Journal of Advanced Nursing*, 76(11), 2909-2920.

Hosseini, S. R., Valizad-Hasanloei, M. A., & Feizi, A. (2018). The effect of using communication boards on ease of communication and anxiety in mechanically ventilated conscious patients admitted to intensive care units. *Iranian journal of nursing and midwifery research*, 23(5),

JamunaRani, R., Gowri, B., & Elizabeth, C., (2024). A Study to Assess the Effectiveness of Communication Board on Communication Pattern and Level of Satisfaction in Meeting the Basic Needs of the Patients on Mechanical Ventilator Admitted in ICU at Selected Hospital, Pune. *International Journal of Novel Research and Development*.9 (4):619-622

Jarrah, M.I., Hweidi, I. M., Al-Dolat, S. A., Alhawatmeh, H. N., Al-Obeisat, S. M., Hweidi, L. I., ... & Alkouri, O. A. (2022). The effect of slow deep breathing relaxation exercise on pain levels during and post chest tube removal after coronary artery bypass graft surgery. *International journal of nursing sciences*, 9(2), 155-161.

Kamberi, H., Tanushi, V., Kadrija, M., Kamberi, S., & Jerliu, N. (2023). Level of satisfaction and socio-demographic correlates among users of primary health care services in Kosovo. South Eastern. *European Journal of Public Health*.

Karlsen, M. M. W. (2021). Communication and interaction between conscious and alert critically ill patients on mechanical ventilation and healthcare providers in intensive care units: An in-depth study. Doctoral thesis, Faculty of Medicine University of Oslo, 121-124.

Kolcak, B., Ayhan, H., & Tastan, S. (2023). The effect of using illustrated materials for communication on the anxiety and comfort of cardiac surgery patients receiving mechanical ventilator support: A randomized controlled trial. *Heart & Lung*, 59, 157-164.

Kuruppu, N. R., Chaboyer, W., Abayadeera, A., & Ranse, K. (2023). Augmentative and alternative communication tools for mechanically ventilated patients in intensive care units: A scoping review. *Australian Critical Care*, 36(6), 1095-1109.

Kuruppu, N. R., Chaboyer, W., Tobiano, G., Abayadeera, A., & Ranse, K. (2025). Feasibility of implementing a communication board to improve communication interactions of mechanically ventilated patients in intensive care units at one Sri Lankan hospital– A pilot randomised controlled trial. *Intensive and Critical Care Nursing*, 87, 103891.

László, I., Végh, T., Szántó, D., Juhász, M., Molnár, C., &

Fülesdi, B. (2022). Preparing the Patient for ICU Transfer: What Is the Anesthesiologist's Role? *Current Anesthesiology Reports*, 12(4), 461-466.

Libertini, R., & Evans, B. (2024). Looking after the cardiac surgery patient: pitfalls and strategies. *Surgery (Oxford)*, 39(3), 164-170.

Loh, W. J. (2025). Overview of diabetes agents in cardiovascular disease: it takes an orchestra to play Tchaikovsky in symphony. *Current Opinion in Endocrinology, Diabetes and Obesity*, 32(1), 3-11.

Manikpurage, H. D., Ricard, J., Houessou, U., Bourgault, J., Gagnon, E., Gobeil, E., ... & Thériault, S. (2025). Association of genetically predicted levels of circulating blood lipids with coronary artery disease incidence. *Atherosclerosis*, 401, 119083.

McClintock, C., McAuley, D. F., McIlmurray, L., Alnajada, A. A. R., Connolly, B., & Blackwood, B. (2024). Communication in critical care tracheostomy patients dependent upon cuff inflation: A scoping review. *Australian Critical Care*, 37(6), 971-984

Melile Mengesha, B., Moga Lencha, F., & Ena Digesa, L. (2022). Pain assessment practice and associated factors among nurses working at adult care units in public hospitals in Wolaita Zone, Southern Ethiopia, 2021. *BMC nursing*, 21(1), 115.

Mousazadeh, S., Yektatalab, S., Momennasab, M., & Parvizy, S. (2019). Job satisfaction challenges of nurses in the intensive care unit: A qualitative study. *Risk management and healthcare policy*, 233-242.

Pakhide, V. (2019). A quasi-experimental study to assess the effect of modified communication board on communication ability of post-operative CABG patients at selected hospital Bhopal, *Madhya Pradesh, India*.

Patel, S. P., Garcia, S., Sathananthan, J., Tang, G. H., Albaghda, M. S., Pibarot, P., & Cubeddu, R. J. (2023). Structural valve deterioration in transcatheter aortic bioprostheses: diagnosis, pathogenesis, and treatment. *Structural Heart*, 7(3), 100155.

Piekarski, F., Rohner, M., Monsefi, N., Bakhtiary, F., & Velten, M. (2024). Anesthesia for Minimal Invasive Cardiac Surgery: The Bonn Heart Center Protocol. *Journal of Clinical Medicine*, 13(13), 3939.

Qadir, C. S. (2023). Knowledge and Satisfaction for Patients Undergoing Coronary Angiography at Surgical Specialty Hospital Cardiac Center in Erbil City. *Erbil Journal of Nursing and Midwifery*, 6(2), 94-105.

Rababa M, Al-Sabbah Sh, Eyadat A, Abus baitan A. (2023). The Association between Socio-Demographic Characteristics and Using Pain Assessment Tools among Critically Ill Patients. *Medicina (Kaunas)*, 59(4):759

Rose, L., Sutt, A. L., Amaral, A. C., Fergusson, D. A., Smith, O. M., & Dale, C. M. (2021). Interventions to enable

communication for adult patients requiring an artificial airway with or without mechanical ventilator support. *Cochrane Database of Systematic Reviews* doi.org/10.1002/14651858.CD013379

Royse, A., Ren, J., Royse, C., Tian, D. H., Fremes, S., Gaudino, M., ... & Bellomo, R. (2022). Coronary artery bypass surgery without saphenous vein grafting: JACC review topic of the week. *Journal of the American College of Cardiology*, 80(19), 1833-1843.

Sabater-Gárriz, Á., Molina-Mula, J., Montoya, P., & Riquelme, I. (2024). Pain assessment tools in adults with communication disorders: systematic review and meta-analysis. *BMC neurology*, 24(1), 66.

Salem, A., & Ahmad, M. M. (2018). Communication with invasive mechanically ventilated patients and the use of alternative devices: integrative review. *Journal of Research in Nursing*, 23(7), 614–630.

Sharma, K. (2020). Effectiveness of Communication Board on Level of Satisfaction in Communication among Mechanically Ventilated Conscious Patients. *International Journal of Nursing Critical Care*, 6(2), 34–38.

Sidhu, S., Kaur, K., Kaur, A., Charan, G. S., & Kaur, M. (2024). Effectiveness of Communication Board on Level of Satisfaction among Mechanically Ventilated Patients at Intensive Care Unit in a Tertiary Hospital. *International Journal of Applied and Basic Medical Research*, 14(4), 284–289. https://doi.org/10.4103/ijabmr.ijabmr_351_24.

Szymkowicz, E., Bodet-Contentin, L., Marechal, Y., & Ehrmann, S. (2024). Comparison of communication interfaces for mechanically ventilated patients in intensive care. *Intensive and Critical Care Nursing*, 80, 103562.

Tabootwong, W., & Kiwanuka, F. (2021). Frequent problems and their management among mechanically ventilated critically ill elderly patients. *Working with Older People*, 25(2), 123-130.

Wachalovsky M. (2020). Respiratory Distress Observation Scale Implementation for Comfort Care Patients in the Acute Care Setting. California State University, North. Master Theses

Wang, Z., Ma, K., & Li, S. (2024). Application of right ventricular to pulmonary valved conduit in the surgical treatment of congenital heart disease. *Cardiology in the Young*, 34(7), 1403-1410.

Wojnar-Gruszka, K., Segal, A., Płaszewska-Żywko, L., Wojtan, S., Potocka, M., & Kózka, M. (2022). Pain Assessment with the BPS and CCPOT Behavioral Pain scales in mechanically ventilated patients requiring analgesia and sedation. *International journal of environmental research and public health*, 19(17), 10894.

Effect of Educational Program on Knowledge, Practice and Attitude of Women Regarding Cervical Cancer

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Abstract

Background: Decrease level of women's knowledge and practice regarding cervix for cancer and their attitudes to prevent susceptibility to more complications; need to increase awareness through knowledge, practice and women's attitudes by educational program **Aim:** to evaluate the impact of educational program on knowledge, practice and attitude of women regarding cervical cancer. **Design:** Quasi-experimental design. **Setting:** outpatient clinics at Suez Canal University, Ismailia city **Sample:** purposive sample; 185 women participated in this study. **Tools:** three tools were utilized 1st tool was a structured Interviewing Questionnaire divided into 3 parts; Socio-demographic data, Obstetric and gynecologic history and Assessment of women's Knowledge, 2nd tool: Modified Likert Scale for women's attitude. The 3rd Tool: Self-reported practice. **Results:** Knowledge and Practice: The intervention led to statistically significant improvements in knowledge and practice across all phases. Attitude: A significant improvement in positive attitudes was observed in both the post-intervention and follow-up phases, indicating a lasting effect of the educational program p-values (<0.001) . **Conclusion:** Women's knowledge, practice and attitude were improved significantly following the adoption of the educational program. **Recommendation:** Enhance Professional Training, Provide Targeted Patient Education.

Key Words: Cervical Cancer, Knowledge, Practice, Attitude.

Introduction

Cervical cancer is characterized by the abnormal growth of cells in the cervix and is primarily caused by the human papillomavirus (HPV). HPV types 16 and 18 are responsible for approximately 70% of cervical cancer cases worldwide. The virus is predominantly transmitted through sexual contact. Globally, cervical cancer ranks as the fourth most common cancer among women, with an estimated 660,000 new cases and around 350,000 deaths in 2022. Notably, about 94% of these deaths occur in low- and middle-income countries. In Egypt, cervical cancer is the 13th most frequent cancer among women and the 9th most frequent among women aged 15 to 44. Annually, approximately 1,320 women are diagnosed with cervical cancer, and 744 succumb to the disease (ICO/IARC Information Centre on HPV& Cancer, 2023; World Health Organization, 2024).

Initiation of sexual activity at a younger age, several sexual partners, either because of several wives becoming married or because divorce and remarriage are becoming more common in the community as a whole, over-aged pregnancy risk, lack of genital hygiene, nulliparity and multiparity, alcohol and tobacco use, poor dietary habits, obesity, immune suppression, prolonged use contraceptives, and positive family history for cervical cancer all of these are risk factors to the HPV infection that may progress to cancer (Mengesha, Messele, & Beletew, 2020; Cancer Research UK, 2023).

Exposure to cancer in the cervix usually has no indicators. There are no symptoms until a precancerous lesion becomes a true invasive cancer and metastasizes into close tissues. When this occurs, the most common symptoms of cervical cancer are abnormal bleeding that occurs after sexual vaginal intercourse or menopause. Other symptoms during the menstrual interval are spotting, after douching, or having longer or heavier menstrual periods than usual, pain during sex, and abnormal vaginal discharge. More advanced cervical cancer can cause pelvic pain, hunger loss, weight loss, and reduction in red blood cells (Butler, 2025).

The risk of cervical cancer is six times higher for women with HIV than for those without the infection. Cost-effective cervical cancer prevention measures include HPV vaccination, early-stage cancer lesion screening, and therapy. Cancer screening for women has been repeatedly demonstrated to be effective in lowering the rate of incidence, or the occurrence of new cervical cancer cases, and mortality from cervical cancer. Women frequently do not experience symptoms until the disease has progressed, so early detection is crucial for the cure and rapid treatment of cervical cancer (Tsegay, Araya, Amare, Tsadik, (2021); WHO, 2022).

In developed countries, organized and population-based screening programs have significantly increased coverage rates, especially among hard-to-reach populations. However, in developing countries, the average screening coverage remains low, with rates as

low as 1% in some regions. In Egypt, data on HPV prevalence is limited. However, in the Northern Africa region, which includes Egypt, approximately 3.0% of women in the general population are estimated to harbor cervical HPV-16/18 infection at any given time (**Human Papilloma Virus (HPV) information center, 2023**).

Effective primary and secondary prevention measures, including HPV vaccination and routine screening, can significantly reduce the risk of cervical cancer. Infections with the HPV strains that most frequently result in cervical cancer can be avoided with the use of the HPV vaccine. Even for those who have received vaccinations, routine cervical screening is still necessary. With the right follow-up, routine Pap test screening every three to five years can cut the incidence of cervical cancer by as much as 80% (**Arbyn, Weiderpass, Bruni, de Sanjose, Saraiya, Ferlay, & Bray, 2020; National Cancer Institute 2021**).

Cervical Cancer has a long pre-invasive period. Thus, it can be effectively treated at an early stage. There are number of factors affecting the stage of the disease, thus its treatment measures. Factors as the woman's age and general health, and desire for the next pregnancy in the future. The different measures for its treatment are radiation, chemotherapy, surgery, targeted therapy, and immunotherapy.

Since they are an essential part of the healthcare delivery system, nurses are a vital component in the fight against cervical cancer. Thankfully, nurses

are essential to health promotion and education. Additionally, it is the nurse's responsibility to educate women about risk factors, identify early indicators of cervical cancer, and encourage regular screenings. The three main components of comprehensive cervical cancer control are HPV vaccination as first-line prevention, pre-cancerous lesion screening and treatment as secondary preventive measures, and tertiary prevention, which includes palliative care and the diagnosis and treatment of invasive cervical cancer (**Lemma, Aboma, Girma, Dechesa, 2022**).

Significant of the study

The most recent data from 2023 indicates that cervical cancer in Egypt accounts for approximately 1,302 new cases annually, with an age-standardized incidence rate of 2.8 per 100,000 women. In the same year, an estimated 820 women died from the disease, resulting in an age-standardized mortality rate of 1.8 per 100,000 women. Regarding HPV prevalence, data specific to Egypt is limited. However, in the Northern Africa region, which includes Egypt, about 3.0% of women in the general population are estimated to harbor cervical HPV-16/18 infection at a given time (**ICO/IARC Information Centre on HPV& Cancer, 2023; World Health Organization, 2024**). A high rate of mortality may be due to insufficient or shortage of knowledge, practice, or attitude of Egyptian women regarding cervical cancer and screening that considered one of the prevention methods and to early detection of cervical cancer. This study will assess the educational

program's impact on women's knowledge, practice, and attitudes towards cervical cancer among female at Suez Canal University hospitals in Ismailia city.

Aim of the study

This study aimed to evaluate the impact of educational program on knowledge, practice and attitude of women regarding cervical cancer.

Objectives

- Design the educational program regarding cervical cancer knowledge, attitude and practice.
- Assessing of women's knowledge, practice, and attitude regarding cervical cancer.
- Implement the educational program on women's Knowledge, practice and attitude regarding cervical cancer.
- Evaluate the educational program on women's Knowledge, practice and attitude regarding cervical cancer.
- Describe the relation pre/post-test between women's Knowledge, attitude and practice regarding cervical cancer.
- Describe the relation pre/post-test between women's Knowledge and demographic characteristics (pre-post- follow up).

Research Hypothesis

There will be an improvement in women's Knowledge, practice and attitude after the implementation of the educational program on women regarding cervical cancer.

Subject and Method

Research design: Quasi-experimental study design.

Setting: This study was conducted at Suez Canal University hospitals, Ismailia City.

Target population: women dealt with outpatient clinics in Suez Canal University hospitals, Ismailia City.

Sample technique: purposive sample.

Inclusion criteria

All women aged from 20-60 years, married, single, widowed, or divorced, can read and write, with no history of cervical cancer.

Exclusion Criteria: Those women who had disabilities (as blindness or deafness) or disagree to share in the study.

Sample size calculation

$$n= \frac{(Z_{\alpha/2})^2 * P(1-P)}{d^2}$$

(Dawson,2004), Where

- **n**= sample size
- **Z $\alpha/2$** = Z is the statistic corresponding to level of confidence (1.96)
- **d** = is precision (corresponding to effect size) (0.05)
- **P** is the expected prevalence (14%)
(Elazab, Ali, Ramadan, Hassan, Aljedaani, Gardner, 2021)
- **N= 185 (Dawson & Trapp, 2004)**

Tools of data collection

A structured questionnaire was developed by researchers using clear and straightforward Arabic language, based on an extensive review of the literature. Data was collected through face-to-face interviews using the questionnaire. It included four instrumental tools:

1st Tool: Structured interview: used only for pre-intervention. It was conducted by an interviewer who asks a predefined set of questions in a

specific order. It is divided in to two parts:

I part: Socio-demographic data: it included basic demographic information, such as age, marital status, educational level, religion, residence, social status, occupation, family income, and the number of family members...etc.

II part: Obstetric and gynecologic history

- a) Gynecologic data: age during first sexual intercourse, age at menarche, any abnormal vaginal discharge/bleeding, and source of information about cervical cancer and cervical cancer screening as Pap smear test...etc.
- b) Obstetric data: gravidity, parity, stillbirth, abortion...etc.

2nd Tool: Knowledge Assessment Questionnaires:

Self-administered by respondents, who read and answer the questions without an interviewer present pre/post intervention. It was developed by the researcher depending on different resources regarding cervical cancer. The researcher used it to assess women's knowledge about disease both before and after the intervention. The questions include the content of the educational program presented, as definition, etiology, risk factors, signs & symptoms, diagnosis, and treatment of cervical cancer were among the topics covered that prepared from different resources and revised by 5 Obstetrician and gynaecologist experts in nursing .

Scoring system

Women's responses were scored as follows: yes = 2, no = 1, do not know = 0. Correct answers received a score

of 1, while wrong answers scored zero. Using Modified Bloom's cut-off points, knowledge was categorized as good (80-100%), satisfactory (50-79%), and poor (below 50%). The mean score determined the overall knowledge of cervical cancer screening among respondents, classified as poor or good for description and comparison (Tekle et al., 2020).

3rd Tool: Modified Likert Scale:

The Likert scale is a widely used psychometric tool designed to measure respondents' attitudes, opinions, or perceptions by presenting a series of statements with a range of response options, typically indicating levels of agreement or disagreement. This scale was modified to assess women's attitude for prevention of Cervical Cancer Questionnaires. It included nine statements that were developed by the researcher like: I believe that screening helps in prevention of carcinoma of the cervix. I am feeling shy to have cervical screening/ I think that cultural belief prevented me from having cervical cancer screening/ I believe that screening causes no harm to the client.....etc. Which was answered and scored as the following: strongly agree =5, agree=4, neutral= 3, disagree=2, strongly disagree=1.

4th Tool: Self-Reported Practice:

Self-reported practice refers to the process by which women provide information about their own behaviors, actions, through surveys, questionnaires, or interviews. It was used during pre/ posttest to assess women's practice regarding prevention of Cervical Cancer as

doing gynecological examination, getting Pap smear, and screening methods for cervical cancer. It considered who doing which of this practice even one time had a good practice.

Scoring system

Women responded as follows: yes = 2 and no = 1. Poor Practice: Respondents who never underwent gynecological examination, getting Pap smear, screening for cervical cancer. Good Practice: Respondents who had been done gynecological examination, get Pap smear, or screened for cervical cancer at least once (Tekle et al., 2020).

Operational design

Field of work

Preparation

The researcher explored both local and international literature pertinent to various aspects of the research problem through books, articles, internet sources, periodicals, and magazines. Following this, the researcher developed the necessary data collection instruments and educational programs. To ensure these tools' validity, they were reviewed by five experts in maternity, obstetrics, and gynecology.

Booklet preparation

A booklet was created using clear and concise Arabic language. It contains a definition of cervical cancer, its prevalence, risk factors, signs and symptoms, the significance of early detection measures, and various screening methods. Select suitable teaching methods and appropriate media including lectures, discussions, and demonstrations. The media included a booklet, videos to illustrate

some cervical cancer and screening methods. The booklet was approved officially Filing No.: 2023/21090 AD ISBN: nine

The study is conducted within the Suez Canal University Hospitals setting. The primary field of work is the outpatient clinics, where participants can be recruited. These clinics are where women who have regular visits or medical check-ups for gynecologic or obstetric issues can be found.

Phase I: Assessment

The researchers interviewed with each woman. Introduced and discussed the aim and purposes of the study. The structured questionnaires (1st tool) were given pre program only and distributed to not more than twenty women in waiting rooms and during non-emergency appointments. Then the 2nd tool used to assess the women's knowledge about cervical cancer. This took about 10-15 minutes.

The next step is to measure the women's attitudes using a modified Likert scale (3rd tool). The Likert scale questions gauge how women feel about cervical cancer screening, its prevention, cultural influences, and personal beliefs. It is useful for understanding the psychological and emotional barriers that might affect cervical cancer screening behaviors, such as feelings of discomfort, shyness, or cultural stigma.

Practice assessment comes in by asking women whether they have undergone practices like gynecological examinations, Pap smears, or other cervical cancer screenings. This step helps track whether the women put their

knowledge into action after the intervention. The 4th tool (Self-Reported Practices) was used and took about 5 to 10 minutes.

Phase II: Implementation

- a) The program implemented, over two separate sessions, two hours for each session.
- The first session will include theoretical knowledge about cervical cancer. Ask open-ended questions to encourage discussion. Provide real-life examples or moving stories to increase attention.
- The second session will include different screening methods (early detection measures, and steps of prevention) for cervical cancer. Practical activities show an explanatory video on how to perform the examination. Distribute an explanatory model of the preventive steps.
- b) Closing the session by summarized the main points, Answer the participants' questions clearly. Then brochures a copy of the booklet was given to the studied participants at the end of the educational program.

Phase III: Evaluation

The Participants were evaluated immediately after receiving the program and after three months (as a follow-up program) through communicated by telephone for knowledge, attitude and practice by using the same pre-test format (2nd tool, 3rd and 4th tools). This phase took about 20-30 minutes.

Validity and reliability of the study tools

It will be ascertained by a jury consisting of five experts in academic nursing. The reliability of the measurement scales was evaluated using Cronbach's alpha. The Knowledge scale showed an acceptable reliability with a Cronbach's alpha of 0.773, indicating that the items consistently measure women's knowledge about cervical cancer screening. Similarly, the attitude scale demonstrated excellent reliability with Cronbach's alpha of 0.946, reflecting a prominent level of internal consistency in assessing women's attitude towards cervical cancer screening. These reliability coefficients not only confirm the scales' consistency but also indirectly support their validity, making them reliable tools for evaluating women's Knowledge, practice and attitude in this critical health area.

Administrative design

The Dean of the Faculty of Nursing at Suez Canal University issued an official permission letter to the managers of Suez Canal University hospitals and outpatient clinics to approve the study. Approval was then obtained from the research ethics committee.

Ethical consideration

The scientific Research Ethics committee held its session No. 58 on 27/12/2022 has approved the research (code182/11-2022). Written consent for participation in the study was received from each participant. Informed consent was provided by the women after being briefed on the study's aim and process. The confidentiality of their personal information was assured. The

participants were informed of their right to withdraw from the study at any time.

Pilot study

A pilot study, involving 10% (18 women) of the sample, was conducted to evaluate the tool's applicability, clarity, and feasibility before data collection. This study also helped estimate the time needed for data collection. Modifications were made based on the analysis, and the final sample excluded the pilot participants.

Limitation of the study

- Conducting the study solely at Suez Canal University Hospitals in Ismailia City may limit the applicability of findings to other regions or healthcare settings with different demographics or resources.
- Relying on participants' self-reports for practices (e.g., whether they have undergone Pap smears) may lead to over- or under-reporting due to memory inaccuracies or a desire to give socially acceptable answers.

Statistical Analysis

Data was entered into and analyzed using the SPSS database program version 20. Descriptive Statistics were used from questionnaires (socio-demographic information, knowledge, attitudes, and practices), analyzed by (e.g., percentages, means, standard deviations) to summarize the characteristics of the sample. The Friedman test was used to analyze repeated measures data in attitude. Comparative Analysis: Pre- and post-intervention data was compared using Cochran's Q test; and chi-square test, P value is significant $<.05$ to see if

significant changes in knowledge, attitudes, and practices occurred after the educational intervention. Correlation Analysis was applied between socio-demographic factors (e.g., age, education level) and knowledge/attitude changes by Pearson correlation & P value is significant (two tailed significance) ≤ 0.5 .

Results

Table (1): describe the demographic characteristics of women. More than half of the studied women aged from 20 to 30 years' old who were married and reside in rural area. Majority of them had a prominent level of education. More than half of the women's families studied had 3 to 5 members. Less than half of the studied women had not enough money.

Table (2): show distribution of the studied women based on gynecological history were menarche occurred between age 12 to 15 years old for more than half of the studied women with regular cycle and had three times of pregnancy and about half of them had birth more than three times. More than three fourth of the studied women had not miscarriage before. Less than half of studied women had first sex between age 23 to 26 but more than half of them experienced vaginal bleeding during intercourse. Two third of women use intrauterine device from those who used other contraceptives.

Table (3): describe distribution of the studied women about cervical cancer history which more than half of the studied women receive their knowledge from social media or television. Most of the studied women

had not first or second-degree relatives with cervical cancer.

Figure (1): illustrates more than half of the studied women receive their knowledge from social media or TV then from reading.

Table (4): show an improvement of the level of knowledge about cervical cancer and vaccination according to their correct answers with a highly statistically significant difference between Pre, post and follow up ($p=0.001$, 0.038 to 0.045) respectively.

Table (5): revealed knowledge immediately after the intervention improved significantly and slightly declined during the follow-up period but remained higher than pre-intervention levels with a statistically significant improvement in knowledge across all time points, with notable differences between pre, post, and follow-up assessments ($P1,2,3 <0.001$).

Table (6): reveal that women's beliefs about the importance and benefits of cervical cancer screening improve significantly after intervention (post and follow-up scores) compared to pre-intervention, particularly on items such as the belief that screening helps prevent cervical cancer ($p < 0.001$), the importance of HPV vaccination ($p < 0.001$), and the belief that screening causes no harm ($p < 0.001$).

Furthermore, cultural beliefs that previously prevented screening (item 3) also show a marked improvement, with a substantial increase in mean scores post-intervention. Interestingly, although there is an improvement in perceptions about the affordability of cervical cancer

screening (item 5), this is the only item that has a p value greater than 0.001 but still statistically significant at $p = 0.002$.

Table (7) was evident that studied women had improved practice significantly after implementation of the educational program immediately and 3 months after. The one third of the studied women found that the limitations for screening test were lack of screening service and long waiting time. Also, this result increases immediately and after following up of educational program.

Table (8) demonstrates a strong positive correlation between total knowledge and total attitude, indicating that women with higher baseline knowledge exhibited better attitudes even before the intervention. Postintervention significantly increased, the associated attitudeal changes were not as strongly correlated. Then the correlation remained moderate and stable ($r = 0.373$).

Table (9): found a high statistically significant difference in the examined women's knowledge levels during the post- and follow-up periods. Additionally, there was a large statistically significant difference in the positive attitude that improved during the post and follow-up periods.

Table (10): clearly demonstrate that the educational program had a positive impact on women's knowledge, attitudes, and practices related to cervical cancer prevention, particularly regarding gynecological examinations, Pap smear tests, and cervical cancer screening. The significant improvements observed

immediately post-intervention and the relatively stable outcomes at follow-up underscore the effectiveness of the program. However, some decline in knowledge retention over time (e.g., Pap smear knowledge).

Table (11): highlights those demographic factors, especially age, education level, and marital status, play an essential role in shaping the level of knowledge before, after, and at follow-up stages of an intervention. The study reveals significant improvements in knowledge post-intervention, with a noticeable effect on certain groups, particularly those with lower education or residing in rural areas.

Table (1): Distribution of Demographic Features among the Women in the Study (n=185)

Items	No.	%
Age (Years)		
- 20-	57	30.8
- 30-	57	30.8
- 40-	43	23.2
- 50-	13	7.0
- 60-	15	8.1
Mean±SD	37.50±11.60	
Educational level		
- Read and write	23	12.4
- Middle education	71	38.4
- High education	91	49.2
Marital status		
- Married.	117	63.2
- Widowed or divorced	51	27.6
- Single	17	9.2
Place of residence		
- rural	116	62.7
- urban	69	37.3
Number of family members		
- 1-	7	3.8
- 3-	102	55.1
- 5-	76	41.1
Family income		
- Not enough.	83	44.9
- Enough.	79	42.7
- Enough and save it	23	12.4

Table 12 revealed that no significant difference in attitudes based on **age groups** across pre-, post-, and follow-up measurements (p-values: 0.166, 0.124, 0.124). **Educational Level:** Significant positive relationship between higher education and more positive attitudes at all stages ($p < 0.001$). **Marital Status:** No significant difference pre-test ($p = 0.546$), but significant after the intervention ($p = 0.020$) indicating marital status influences attitudes post-intervention. **Place of Residence:** No significant difference in pre-test attitudes ($p = 0.353$), but significant changes post-intervention ($p = 0.014$) suggesting place of residence

Table (2): Distribution of the Studied Women Based on Gynecological History (n=185)

Items	No.	%
What is the age of the first menstrual period?		
- 9 < 12 years old	62	33.5
- 12 < 15	101	54.6
- More than 15 years old	22	11.9
How old were you when you first had sex?		
- 15-17 years old	40	21.6
- 18-22 years old	48	25.9
- 23-26 years old.	80	43.2
- I have never had sex before	17	9.2
Have you ever experienced bleeding during intercourse (intimacy)? (n=168)		
- Yes	70	37.8
- No	98	53.3
Have you used contraceptives before? (n=168)		
- Yes	111	60.0
- No	57	40
If the answer is yes: What method did you use? (n=111)		
- Single hormone pills (breastfeeding pills)	9	8.1
- Two-hormonal pills	14	12.6
- contraceptive injection	12	10.8
- contraceptive capsule	19	17.1
- IUD (tape or device)	49	44.1
- Condom.	8	7.2
What is the nature of your menstrual cycle?		
- Regular	112	60.5
- Irregular	46	24.9
- No period (menopause).	27	14.6
How many pregnancies have you had?		
- I have never been pregnant.	25	13.5
- 1-3	54	29.2
- More than 3 times.	106	57.3
What is the number of births?		
- I have not given birth before.	25	13.5
- 1-3	68	36.8
- More than 3 times	92	49.7
What is the number of abortions?		
- I have never had a miscarriage before.	160	86.5
- 1-3	20	10.8
- More than 3 times	5	2.7

Table (3): Cervical cancer history of studied women (n=185)

Items	No.	%
What is the source of your knowledge about cervical cancer and PAP sample test?		
- Doctor or nurse	13	7.0
- Relatives of friends	9	4.9
- Social media or TV	109	58.9
- Reading	51	27.6
- I don't know	3	1.6
Have any of your first-degree relatives had cervical cancer?		
- Yes	1	0.5
- No	184	99.5
Have any of your second-degree relatives had cervical cancer?		
- Yes	2	1.08
- No	182	98.9

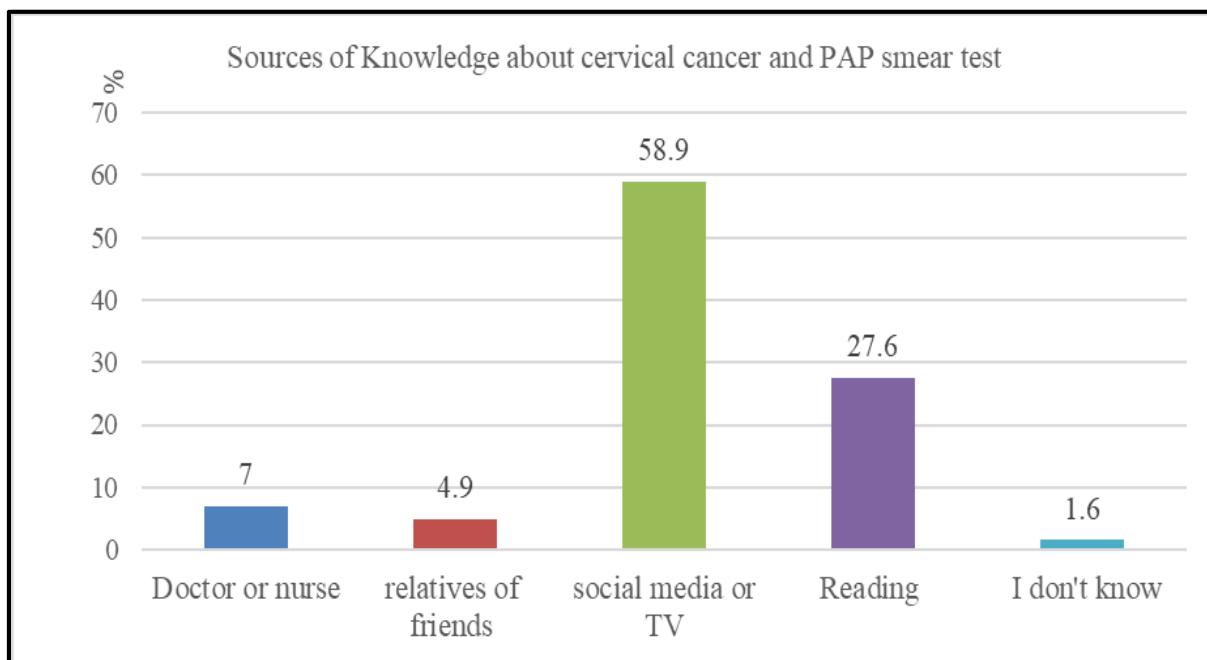
**Figure 1: Source of knowledge about cervical cancer and PAP test among women (n=185)**

Table (4): Distribution of women's ' knowledge about cervical Cancer and Vaccination according to their correct answers (n=185).

Items	Pre		Post		Follow up		Cochran Q test	
	Correct		Correct		Correct			
	N	%	N	%	N	%		
- Cervical cancer is an abnormal growth of the cells that make up this part that	75	40.5	150	81.1	122	65.9	<.001*	
- The risk factors for cervical cancer	66	35.7	155	83.8	126	68.1	<.001*	
- The symptoms of cervical cancer	73	39.5	160	86.5	130	70.3	<.001*	
- The ways to prevent cervical cancer	49	26.5	156	84.3	125	67.6	<.001*	
- The different treatment methods for cervical cancer	56	30.3	163	88.1	136	73.5	<.001*	
- The different tests for cervical cancer	56	30.3	163	88.1	134	72.4	<.001*	
- The women who are required to undergo early screening for cervical cancer	12	6.5	115	62.2	96	51.9	<.001*	
- Duration of a re-examination required for cervical cancer	66	35.7	164	88.6	145	78.4	<.001*	
- A vaccine against cervical cancer	59	31.9	162	87.6	132	71.4	<.001*	
- Is this type of vaccination available in health units in your governorate	39	21.1	147	79.5	118	63.8	.045*	
- The vaccination provide protection against one of several types of cervical cancer virus	37	20.0	145	78.4	116	62.7	.045*	
- Doses of vaccination do I need to take	35	18.9	143	77.3	112	60.5	.045*	
- The appropriate age to get vaccinated	36	19.5	145	78.4	114	61.6	.038*	
- A vaccine against cervical cancer	59	31.9	162	87.6	132	71.4	<.001*	

Cochran Q test was used to analyze repeated measures data. P value is significant <.05

Table (5): Distribution of women's total knowledge about cervical Cancer (n=185).

Items	Pre	Post	Follow up	P#	P1#	P2#	P3#
	Median (IQR)	Median (IQR)	Median (IQR)				
Total knowledge	3 (5)	12 (4.75)	9.5 (4)	<.001*	<.001*	<.001*	<.001*

Friedman test was used to analyzing repeated measures data. P value is significant <.05

P# Pre/Post/ Follow up, P1# Pre/Post, P2# Pre/ Follow Up, P3# Post/ Fllow up

Table (6): Attitude of the Studied Women Toward Cervical Cancer: Distribution Analysis (n=185).

Items	Pre	Post	Follow up	Friedman test (P value)
	Mean±SD	Mean±SD	Mean±SD	
- I believe that screening helps in prevention of carcinoma of the cervix.	2.20±1.44	4.03±1.17	4.03±1.17	<.001*
- I Feel shy to have cervical screening.	2.24±1.47	3.28±1.27	3.26±1.25	<.001*
- I think that cultural belief prevented me from having cervical cancer screening.	1.47±1.11	3.27±1.31	3.29±1.31	<.001*
- I believe that screening causes no harm to the client.	2.61±1.83	3.64±1.43	3.62±1.40	<.001*
- I believe that cervical cancer screening is not expensive.	2.61±1.84	3.64±1.44	3.50±1.40	.002*
- Think that having a smear test is important to detect cervical cancer.	2.36±1.53	3.40±1.24	3.40±1.24	<.001*
- It is important to take vaccine against human papilloma virus if available.	2.35±1.52	3.38±1.24	3.33±1.25	<.001*
- I am healthy and I do not need cervical cancer screening.	1.66±.94	2.70±1.25	2.64±1.23	<.001*
- It is important to consult a medical doctor regularly for screening of cervical cancer.	2.35±1.49	3.38±1.20	3.43±1.22	<.001*
Total score	19.83±11.20	30.72±9.13	30.69±9.11	<.001*

The Friedman test was used to analyze repeated measures data. P value is significant <.05

Table (7): Distribution of Practices Among Studied Women Regarding Cervical Cancer Pre- and Post-Educational Program (n=185).

Items	Pre		Post		Follow up		test (P value)
	N	%	N	%	N	%	
- Ever had any gynecological examination?							
Done	58	31.4	137	74.1	137	74.1	Q test (<.001*)
Not done	127	68.6	48	25.9	48	25.9	
- Ever got Pap smear test?							
Done	17	9.2	17	9.2	44	23.8	Q test (<.001*)
Not done	168	90.8	168	90.8	141	76.2	
- Have you ever screened for cancer of the cervix?							
Done	43	23.2	52	28.1	82	44.3	Q test (<.001*)
Not done	142	76.8	133	71.9	103	55.7	
If Not done (n=168), reason for not doing							
- Lack of information	47	28.0	11	6.5	11	5.9	x ² (<.001*)
- Lack of screening service	60	35.7	96	57.1	85	45.9	
- Expensive service cost.	9	5.4	9	5.4	9	4.9	
- Long waiting time.	52	31.0	52	31.0	36	19.5	

Q test was Cochran's Q test; x² is chi-square test. P value is significant <.05

Table (8): Correlation between total knowledge and total attitude of studied sample pre, post, and follow up intervention (n=185).

Variables	Timing	Total attitude			P value
		r			
Total knowledge	Pre	.842			<.001*
	Post	.380			<.001*
	Follow	.373			<.001*

r is Pearson correlation & P value is significant (two tailed significance) ≤.05

Table (9): Changes in women's Knowledge and attitude before and after intervention (n=185).

Items	Pre		Post		Follow up		Test P value
	N	%	N	%	N	%	
- Knowledge							
Poor	144	77.8	19	10.3	42	22.7	<.001*#
Satisfactory	25	13.5	30	16.2	50	27.0	
Good	16	8.6	136	73.5	93	50.3	
- attitude							
Positive	73	39.5	138	74.6	138	74.6	<.001*§
Negative	112	60.5	47	25.4	47	25.4	

Friedman test, § Cochran's Q test. P value is significant <.05

Table (10): Relation between knowledge, attitude, and practice (pre, post, and follow up intervention)

Items		Pre intervention				Post intervention				Follow up				
Knowledge	Attitude	Doing any gynecological examination												
		Done (n=58)		Not Done (n=127)		Done (n=137)		Not Done (n=48)		Done (n=137)		Not Done (n=48)		
		Poor	31	21.5	113	78.5	4	21.1	15	78.9	17	40.5	25	59.5
		Satisfactory	12	48.0	13	52.0	20	66.7	10	33.3	18	36.0	32	64.0
		Good	15	93.8	1	6.3	34	25.0	102	75.0	23	24.7	70	75.3
Knowledge	Attitude	X ² (P value)	38.62(<0.001*) ^{mc}				20.87(<0.001*) ^{mc}				4.02(.122)			
		Positive	51	69.9	22	30.1	52	37.7	86	62.3	52	37.7	86	62.3
		Negative	7	6.3	105	93.8	6	12.8	41	87.2	6	12.8	41	87.2
		X ² (P value)	83.1(<.001*)				10.11(.001*)				10.11(.001*)			
		Getting Pap smear test												
Knowledge	Attitude	Done n=17		Not Done (n=168)		Done n=17		Not Done (n=168)		Done (n=44)		Not Done (n=141)		
		Poor	15	10.4	129	89.6	3	15.8	16	84.2	9	21.4	33	40.5
		Satisfactory	2	8.0	23	92.0	7	23.3	23	76.7	3	6.0	47	36.0
		Good	0	0	16	100.0	7	5.1	129	94.9	5	5.4	88	24.7
		X ² (P value)	1.92(.433) ^{mc}				10.84(.007*) ^{mc}				9.77(.008*) ^{mc}			
Knowledge	Attitude	Positive	13	17.8	60	82.2	14	10.1	124	89.9	14	10.1	124	89.9
		Negative	4	3.6	108	96.4	3	6.4	44	93.6	3	6.4	44	93.6
		X ² (P value)	10.73(.001*)				.595(.441*)				.595(.441*)			
		Screening for cancer of the cervix												
		Done (n=43)		Not Done (n=142)		Done (n=52)		Not Done (n=133)		Done (n=82)		Not Done (n=103)		
Knowledge	Attitude	Poor	19	13.2	12	86.8	2	10.5	17	89.5	9	21.4	33	78.6
		Satisfactory	9	36.0	16	64.0	15	50.0	15	50.0	15	30.0	35	70.0
		Good	15	93.8	1	6.3	26	19.1	110	80.9	19	20.4	74	79.6
		X ² (P value)	55.01(<0.001*) ^{mc}				15.06(.001*) ^{mc}				1.77(.427) ^{mc}			
		Positive	40	54.8	33	45.2	40	29	98	71	40	29	98	71
Knowledge	Attitude	Negative	3	2.7	10	97.3	3	6.4	44	93.6	3	6.4	44	93.6
		X ² (P value)	67.28(<.001*)				10.04(.002*)				10.04(.002*)			

Table (11): Relation between demographic characteristics and level of knowledge (pre-post- follow up)

Items	Level of knowledge																	
	Pre N=185						Post (N=185)						Follow(N=185)					
	Poor		Average		Good		Poor		Average		Good		Poor		Average		Good	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Age (Years)																		
20-	54	37.5	3	12.0	0	0	7	36.8	11	36.7	39	28.7	14	33.3	13	26.0	30	32.3
30-	38	26.4	11	44.0	8	50.0	6	31.6	4	13.3	47	34.6	12	28.6	14	28.0	31	33.3
40-	25	17.4	10	40.0	8	50.0	4	21.1	3	10.0	36	26.5	8	19.0	11	22.0	24	25.8
50-	13	9.0	0	0	0	0	1	5.3	8	26.7	4	2.9	7	16.7	4	8.0	2	2.2
60-	14	9.7	1	4	0	0	1	5.3	4	13.3	10	7.4	1	2.4	8	16.0	6	6.5
P value	30.20(<.001) ^{MC}						28.35(<.001) ^{MC}						16.15(.042) ^{MC}					
Educational level																		
Read and write	22	15.3	1	4	0	0	1	5.3	5	16.7	17	12.5	5	11.9	7	14	11	11.8
Middle education	66	45.8	5	20	0	0	11	57.9	17	56.7	43	31.6	19	45.2	19	38	33	35.5
High education	56	38.9	19	76	16	100	7	36.8	8	26.7	76	55.9	18	42.9	24	48	49	52.7
P value	29.94(<.001) ^{MC}						12.26(.015) ^{MC}						1.44(.844)					
Marital status																		
Married.	79	54.9	22	88	16	100	10	52.6	13	43.3	94	69.1	22	52.4	29	58	66	71
Single (widowed/divorced)	50	34.7	1	4	0	0	6	31.6	14	46.7	31	22.8	13	31	18	36	20	21.5
unmarried	15	10.4	2	8	0	0	3	15.8	3	10	11	8.1	7	16.7	3	6	7	7.5
P value	21.30(<0.001) ^{MC}						9.26(.055)						7.97(.090) ^{MC}					
Place of residence																		
Rural	83	57.6	20	80.0	13	81.3	9	47.4	13	43.3	94	69.1	22	52.4	35	70.0	59	63.4
Urban	61	42.4	5	20.0	3	18.8	10	52.6	17	56.7	42	30.9	20	47.6	15	30.0	34	36.6
P value	7.13(.034) ^{MC}						9.12(.012*) ^{MC}						3.07(.225) ^{MC}					
^{MC} is Monte Carlo for Chi square test; P value is significant <.05																		

Table (12): Relation between demographic characteristics and level of attitude (pre-post- follow up):

Items	Level of Attitude											
	Pre				Post				Follow			
	Positive		Negative		Positive		Negative		Positive		Negative	
	N	%	N	%	N	%	N	%	N	%	N	%
Age (Years)												
20-	20	27.4	37	33.0	38	27.5	19	40.4	38	27.5	19	40.4
30-	22	30.1	35	31.2	41	29.7	16	34.0	41	29.7	16	34.0
40-	18	24.7	25	22.3	34	24.6	9	19.1	34	24.6	9	19.1
50-	9	12.3	4	3.6	13	9.4	0	0	13	9.4	0	0
60-	4	5.5	11	9.8	12	8.7	3	6.4	12	8.7	3	6.4
P value	6.42(.166) ^{MC}				7.22(.124) ^{MC}				7.22(.124) ^{MC}			
Educational level												
Read and write	20	4.1	3	17.9	6	12.3	17	12.8	6	12.3	17	12.8
Middle education	54	23.3	17	48.2	29	30.4	42	61.7	29	30.4	42	61.7
High education	38	72.9	53	33.9	12	57.2	79	25.5	12	57.2	79	25.5
P value	27.31(<.001) ^{MC}				16.11(<.001) ^{MC}				16.11(<.001) ^{MC}			
Marital status												
Married.	69	65.8	48	61.6	25	66.7	92	53.2	25	66.7	92	53.2
Single (widowed/divorced)	34	23.3	17	30.4	13	27.5	38	27.7	13	27.5	38	27.7
Unmarried	9	11	8	8	9	5.8	8	19.1	9	5.8	8	19.1
P value	1.33(.546) ^{MC}				7.81(.020) ^{MC}				7.81(.020) ^{MC}			
Place of residence												
rural	49	67.1	67	59.8	94	68.1	22	46.8	94	68.1	22	46.8
urban	24	32.9	45	40.2	44	31.9	25	53.2	44	31.9	25	53.2
P value	1.08(.353) ^{MC}				6.80(.014*) ^{MC}				6.80(.014*) ^{MC}			
^{MC} is Monte Carlo for Chi square test; [*] is fisher exact test ; P value is significant <.05												

Discussion

One of the main causes of cancer-related illness and death for women globally is cervical cancer. However, it is preventable through early detection and vaccination. It is fine to overestimate the significance of cervical cancer screening programs, including Pap smears and HPV

testing. This program help in educating women at different ages to prevent infection with papiloma virus and diseased by cervical cancer. So, this study aimed to evaluate the impact of educational program on knowledge, practice and attitude of women regarding cervical cancer. This section synthesizes the findings

from the current study and compares them with results from other prominent studies in literature. The study explored the effectiveness of an educational program on women's knowledge, practices, and attitudes regarding cervical cancer screening among women of reproductive age.

Impact of Educational Program on Women's Knowledge.

The current study demonstrated a statistically significant improvement in knowledge, attitudes, and practices regarding cervical cancer screening after the intervention ($P<0.001$). Consistent with both **Baik, Kim, Ha, Oh, Niyonzima, (2025)** and **Wang L., Wang Q., Zou & Liu(2024)**, who observed that higher educational attainment was a strong predictor of screening uptake. Educational programs, therefore, must be **tailored** to varying literacy levels to ensure equitable impact across different demographic segments. Also, this aligns with findings from other studies, such as **Ayanto, Belachew, Wordofa, (2024)** in Southern Ethiopia, who found that structured educational interventions were effective in increasing women's understanding of cervical cancer prevention.

Similarly, **Mengesha et al. (2020)** noted that rural women in Ethiopia showed impressive gains in knowledge after participating in educational programs on cervical cancer. The intervention's emphasis on promoting awareness about cervical cancer, including its risk factors, symptoms, and preventive measures like Pap smears, appears to

have successfully filled significant knowledge gaps. This supports previous reviews, such as that by **Makadzange, Peeters, Joore, Kimman (2022)**, which highlighted the efficacy of health education interventions in increasing cervical cancer knowledge in low-resource settings. However, the current study also observes a decline in certain areas, notably in retention of Pap smear knowledge during follow-up assessments. This finding echoes the research of **Tekle et al. (2020)** and **Zhang, Janet, Chan, Akingbade, Carmen, (2022)**, who found that while initial improvements in knowledge were significant, long-term retention often diminished unless ongoing educational opportunities were provided.

Changes in Attitudes Post-Intervention In terms of attitudes, the current study reported a notable positive shift, especially in challenging cultural barriers to cervical cancer screening. The transition from a negative to a more positive attitude was captured in the post-intervention and follow-up phases. **Sarvestani, Jeihooni, Moradi, Dehghan, (2021)** similarly found that educational programs targeting marginalized communities often had a significant effect on changing cultural attitudes towards screening.

The **strong correlation** between baseline knowledge and positive attitude observed in this study, suggesting that women already well-informed about cervical cancer were more receptive to preventive measures. **Farag, Mohamed, Malk,**

Hassan, (2024) similarly reported that higher baseline knowledge among working women in Egypt predicted more favorable attitudes toward Pap smear tests and regular gynecological check-ups. Beside that; a study by **Eghbal, Karimy, Kasmaei, Roshan, Valipour, Attari, (2020)** in Iran demonstrated that increased knowledge directly influenced attitude change towards cervical cancer screening. However, as the current study progressed, the correlation between knowledge and attitude became moderate ($r = 0.373$), indicating that while knowledge remains a key driver, **other factors**—such as family support, healthcare access, or ongoing motivation—also play roles in sustaining positive attitudes as indicated in the studies by **Lemma et al. (2022)** and **Tsegay et al. (2021)**.

Changes in Practices: Practices regarding cervical cancer prevention also saw considerable improvements with the education program, as evidenced by the increased uptake of gynecological examinations and cervical cancer screenings. This echoing the experience of **Dedey, Nsaful, Nartey, Labi, Adu-Aryee, Kuti & Clegg-Lamptey (2024)** in Ghana, where educational sessions directly correlated with improved cervical cancer screening rates among adolescents. By addressing misconceptions and emphasizing the value of early detection, the program fostered a shift from knowledge to tangible preventive actions. Also, supports the findings from **Osman, Abd Elkodoso, Reda, Soliman, Aboushady, (2023)**, which showed

that educational interventions raised practice rates in Egypt. However, some decline in the practice rates during the follow-up phase was noted, indicating that regular follow-ups and community-based interventions are essential for maintaining behavioral changes. This suggests the need for continuous promotion of cervical cancer screening behaviors, as echoed in **Zhang et al. (2022)** which highlighted the importance of recurring education to sustain preventive health practices.

Demographic factors affecting Knowledge, Attitude, and Practice Changes

Education, Age, and Marital Status: Demographic characteristics proved pivotal for both initial knowledge levels and post-intervention outcomes. Women with lower education or those residing in rural areas showed the most pronounced improvements, echoing **Lemma et al. (2022)** in Ethiopia and **Mengesha et al. (2020)** in Gondar town, where educational interventions disproportionately benefited under-resourced groups. Additionally, marital status became more relevant after the intervention, possibly due to the influence of family or spousal support on healthcare decisions—a phenomenon also noted by **Makadzange et al. (2022)** across various African contexts.

Given the demographic differences, targeted educational strategies—using accessible language, culturally resonant examples, and repeated sessions—are crucial to ensuring that all women, regardless of background, can retain and act on cervical cancer

information (**Zagloul, Hassan& Naser, 2021;WHO, 2022**).

Cultural Barriers to Screening

The current study showed a marked improvement in addressing the cultural barriers to cervical cancer screening, such as fear, misconceptions, or lack of awareness. This finding aligns closely with the outcomes of studies such as **Wang et al. (2024)** in Beijing, where a cross-sectional study indicated that educational initiatives addressing cultural and personal barriers could significantly increase awareness and encourage proactive screening behaviors. Also, this observation parallels findings from **Eghbal et al. (2020)** and **Ayanto et al. (2024)**, which reported that well-designed educational programs could overcome cultural hurdles and encourage women to approach medical screenings without stigma.

Although many studies advocate the effectiveness of educational programs in improving women's knowledge, attitudes, and practices (KAP) regarding cervical cancer, a closer look at the broader literature reveals instances of **limited or inconsistent outcomes** that contrast with the positive findings of the current study. The following points outline how certain research references present evidence **opposite** to, or not fully aligned with, the current study's results:

Limited or No Significant Improvement in Knowledge

Baik et al. (2025) showed that many women were aware of cervical cancer, a substantial proportion remained uninformed about screening methods,

even after general awareness campaigns. This implies that mere exposure to information may not suffice to boost screening knowledge significantly, contradicting the current study's assertion of a marked post-intervention rise in awareness.

Wang et al. (2024) - Beijing found that improvements in women's knowledge remained modest, with no statistically significant jump in certain topics (e.g., HPV etiology). This finding suggests that, contrary to the robust improvement seen in the current study, knowledge gains can be minimal if the intervention's design or delivery is not well tailored.

Persisting Cultural Barriers and Minimal Attitude Change

Dedey et al. (2024)- Ghana acknowledged that; although high school interventions elevated awareness, deeply rooted cultural beliefs continued to dissuade some students from considering screening. This partial or minimal shift in attitude runs counter to the current study's conclusion that cultural barriers can be successfully addressed and significantly diminished through a single educational program. During the work of **Farag et al. – Beni-Suef University** with employed women, persistent misconceptions about cervical cancer screening lingered, leading to **only marginal changes** in attitudes post-intervention. This discrepancy suggests that while knowledge can improve, attitudes may remain resistant if the intervention fails to tackle cultural stigma or if it lacks ongoing reinforcement.

Low Translation of Knowledge into Practice

Hayyal, Sikanadar, Navadagi, Siddapur, (2023) found that; despite a structured teaching program, the study reported that **actual Pap smear uptake remained low** in certain subgroups. This contrasts with the current research's claim of a notable rise in screening behaviors, indicating that enhanced knowledge does not always translate into practice without systemic support (e.g., free screening, easily accessible clinics). **Ayanto et al. (2024)** conducted a cluster randomized trial which demonstrated that even when couple education improved screening knowledge, logistical barriers (distance to facilities, cost, and fear of procedures) hindered real practice changes. Such findings question the current study's implication that an educational intervention alone is sufficient to yield significant, sustained improvements in screening rates.

Weak or Inconsistent Correlation between Knowledge and Attitude

Eghbal et al. (2020) – Rural Iran : While some attitudinal improvement occurred, the correlation between higher knowledge and positive attitude was **not statistically significant** in certain domains, indicating a disjointed relationship. This observation contrasts with the strong baseline correlation and moderate sustained correlation reported in the current study. **Also; Seyraf, Homayuni, Hosseini, Aghamolaei, Ghanbarnejad & Mouseli, (2022)** who use PEN-3 Model with quasi-experimental design. They found that changes in

knowledge did not always predict changes in attitude or participation. The authors highlighted that **socioeconomic and psychosocial factors** could override the impact of educational interventions, a nuance not fully addressed in the current study's findings.

Declining or Insignificant Follow-up Results

Sarvestani et al. (2021) – Fasa, Iran apply an educational program boosted cervical cancer screening attitudes initially, follow-up evaluations showed a **significant decline** in both knowledge and attitudes, ultimately returning close to baseline levels. This suggests that, in contrast to the current study's moderately stable outcomes, long-term retention without continuous engagement can be minimal.

Zhang et al. (2022) – systematic review they noted that rural populations had a **short-term successes** often evaporated when interventions were not sustained or supported by broader healthcare infrastructure. Such findings question the longevity of improvements reported by the current study, especially if no ongoing reinforcement measures are in place.

Conclusion

Based on the findings of this study, it can be concluded that Women's knowledge, practice and attitude were improved significantly following the adoption of the educational program which mean that the results of current study supported the suggested hypothesis.

Recommendations:

Based on the results of this study, the following recommendations can be suggested:

- Enhance Professional Training: participate in continuous professional development programs that focus on cervical cancer screening guidelines, evidence-based practices, and culturally sensitive communication techniques.
- Provide Targeted Patient Education: deliver individualized counseling to women, emphasizing the importance of regular Pap smears and follow-up care.
- Use simple, clear language and culturally appropriate materials to address misconceptions and reduce anxiety about screening procedures.
- Encourage women to ask questions and share any concerns about screening during subsequent clinic visits to maintain engagement and retention of information.
- Incorporate Reinforcement Strategies: Schedule regular reminder sessions or follow-up visits for patients who have received initial education.

References

Abera G., Abebe S., & Worku A., (2022): Impact of health education intervention on demand of women for cervical cancer screening: a cluster-randomized controlled trial. Open access. 23:834
<https://doi.org/10.1186/s13063-022-06765-0>.

Ali R., Abd El Salam S., Kamal H., & Hassan H., (2021): Women with Cervical Cancer: Impact of an Educational Program their knowledge. *J. Obstetrics Gynecology and Reproductive Sciences* 5(2); DOI: 10.31579/2578-8965/063.

Arbyn M., Weiderpass E., Bruni L., de Sanjosé S., Saraiya M., Ferlay J., & Bray F., (2020): Estimates of incidence and mortality of cervical cancer in 2018: A worldwide analysis. *The Lancet Global Health*, 8(2), e191–e203.

Ayanto, S. Y., Belachew, T., & Wordofa, M. A. (2024). Effectiveness of couple education and counseling on uptake of cervical cancer screening among women in Southern Ethiopia: a cluster randomized trial. *Scientific reports*, 14(1), 12557. <https://doi.org/10.1038/s41598-024-61988-2>.

Baik, D., Kim, B. W., Ha, Y., Oh, J. K., Niyonzima, N., Mpamani, C., Asasira, J., Origa, M., Orem, J., Ki, M., & Jatho, A. (2025). Awareness, knowledge, and attitude toward cervical cancer screening and prevention in Uganda. *Public health*, 238, 310–316.
<https://doi.org/10.1016/j.puhe.2024.12.005>

Butler K., (2025), Cervical Cancer. <https://www.mayoclinic.org/diseases-conditions/cervical-cancer/symptoms-causes/syndromes-20352501>

Cancer Research UK. Org (2023). Risks and causes of cervical

cancer.
<https://www.cancerresearchuk.org/about-cancer/cervical-cancer/getting-diagnosed/screening/about>.

Dawson B., & Trapp R.G., (2004): Basic and clinical biostatistics. 4th ed. USA: McGraw-Hill.

Dedey, F., Nsaful, J., Nartey, E., Labi, J., Adu-Aryee, N. A., Kuti, C., & Clegg-Lampert, J. N. (2024). Assessing the impact of cervical cancer education in two high schools in Ghana. *BMC cancer*, 24(1), 1359. <https://doi.org/10.1186/s12885-024-13134-4>

Devi S., & Joshi S., (2023): The Effect of Multimodal Interventions Regarding Early Cervical Cancer Diagnosis on Women's Knowledge, Attitude and Participation in Cervical Screening Program. *Asian Pac J Cancer Prev*, 24 (11), 3949-3956. DOI:10.31557/APJCP.2023.24.1 1.3949.

Eghbal, S. B., Karimy, M., Kasmaei, P., Roshan, Z. A., Valipour, R., & Attari, S. M. (2020). Evaluating the effect of an educational program on increasing cervical cancer screening behavior among rural women in Guilan, Iran. *BMC women's health*, 20(1), 149. <https://doi.org/10.1186/s12905-020-01020-7>

Elazab, M. , Ali, O. , Ramadan, M. , Hassan, M. , Aljedaani, H. & Gardner, F. (2021). The Prevalence of Human Papilloma Virus (HPV) among Egyptian Women and Its Impact: An Observational Study. *Open Journal of Obstetrics and Gynecology*, 11, 879-884. doi: 10.4236/ojog.2021.117082.

Farag D., Mohamed S., Malk R., & Hassan H., (2024): Effectiveness of Educational Intervention Program about Cervical Cancer on Working Women's Knowledge, Attitude, and Practice at Beni-Suef University. Original Article *Egyptian Journal of Health Care*, 15(1), 1-16.

Hayyal, B. Sikanadar, B., Navadagi, S. & Siddapur, P., (2023). A Study To Assess The Effectiveness Of Structured Teaching Programme On Knowledge And Self Reported Practice Regarding Cervical Cancer And Its Prevention Among Reproductive Age Group Women In Selected Rural Area Of Vijayapura, District.” IJCRT, 12(2):781-783.

Human Papilloma Virus (HPV) information center, (2023). Human Papillomavirus and Related Diseases Report. EGYPT. Version posted at www.hpvcentre.net on 10 March 2023.

ICO/IARC Information Centre on HPV and Cancer (2023): Egypt Human Papillomavirus and Related Cancers, Fact Sheet 2023. https://hpvcentre.net/statistics/reports/EGY_FS.pdf

Lemma D., Aboma M., Girma T., & Dechesa A., (2022): Determinants of utilization of cervical cancer screening among women in the age group of 30–49 years in Ambo

Town, Central Ethiopia: A case-control study. *PLOS ONE* 17(7): e0270821.available at: <https://doi.org/10.1371/journal.pone.0270821>.

Makadzange, E. E., Peeters, A., Joore, M. A., & Kimman, M. L. (2022). The effectiveness of health education interventions on cervical cancer prevention in Africa: A systematic review. *Preventive medicine*, 164, 107219. <https://doi.org/10.1016/j.ypmed.2022.107219>

Mengesha, A., Messele, A., & Beletew, B. (2020). Knowledge and attitude towards cervical cancer among reproductive age group women in Gondar town, North West Ethiopia. *BMC public health*, 20(1), 209. <https://doi.org/10.1186/s12889-020-8229-4>

National Cancer Institute (2021): Human Papillomavirus. <https://www.cancer.gov/about-cancer/causes-prevention/risk/infectious-agents/hpv-vaccine-fact-sheet>.

Osman B., Abd Elkodoos R., Reda D., Soliman H., & Aboushady R., (2023). Effect of Educational program based on the Prevention Model on Women Knowledge Regarding Cervical Cancer Prevention. *Egyptian Journal of Health Care*, 14(2), 1011-1027. doi: 10.21608/ejhc.2023.309778

Sarvestani, M., Jeihooni, A., Moradi, Z., & Dehghan, A. (2021). Evaluating the effect of an educational program on increasing cervical cancer screening behavior among women in Fasa, Iran. *BMC women's health*, 21(1), 41. <https://doi.org/10.1186/s12905-021-01191-x>

Seyrafi, N., Homayuni, A., Hosseini, Z., Aghamolaei, T., Ghanbarnejad, A., & Mouseli, A. (2022). Effectiveness of educational intervention on women's participation to cervical cancer screening: a quasi-experimental study based on PEN-3 model. *BMC cancer*, 22(1), 1226. <https://doi.org/10.1186/s12885-022-10331-x>

Taneja, N., Chawla, B., Awasthi, A. A., Shrivastav, K. D., Jaggi, V. K., & Janardhanan, R. (2021). Knowledge, Attitude, and Practice on Cervical Cancer and Screening among Women in India: A Review. *Cancer control: journal of the Moffitt Cancer Center*, 28, 10732748211010799. <https://doi.org/10.1177/10732748211010799>

Tekle, T., Wolka, E., Nega, B., Kumma, W. P., & Koyira, M. M. (2020). Knowledge, Attitude and Practice Towards Cervical Cancer Screening Among Women and Associated Factors in Hospitals of Wolaita Zone, Southern Ethiopia. *Cancer management and research*, 12, 993–1005. <https://doi.org/10.2147/CMAR.S240364>

Tsegay, A., Araya, T., Amare, K., & G/Tsadik, F. (2021). Knowledge, Attitude, and Practice on Cervical Cancer Screening and Associated

Factors Among Women Aged 15-49 Years in Adigrat Town, Northern Ethiopia, 2019: A Community-Based Cross-Sectional Study. *International journal of women's health*, 12, 1283–1298.
<https://doi.org/10.2147/IJWH.S261204>

Wang, L., Wang, Q., Zhou, X., & Liu, H. (2024). Women's knowledge, attitude, and practice regarding cervical precancerous lesions: a cross-sectional study in Beijing, China. *Frontiers in public health*, 12, 1433718. <https://doi.org/10.3389/fpubh.2024.1433718>

World Health Organization (2024). Cervical cancer. <https://www.who.int/news-room/fact-sheets/detail/cervical-cancer>

World health Organization (2024). Elimination Planning Tool: Advancing Towards Cervical Cancer Elimination Egypt <https://gco.iarc.fr/media/covid/factsheets/818-EGY-egypt.pdf>

World health organization (WHO), 2022. Cervical cancer. Accessed at 5 pm at 4\8\2022. Available at: <https://www.who.int/news-room/fact-sheets/detail/cervical-cancer>.

Zagloul M.C., Hassan H.E., & Naser E.G., (2021). Cervical Cancer Knowledge, Attitude, and Practices: Educational Program Management for Female Workers at Port Said University. *International Journal of Studies in Nursing*, 5(3):1. DOI: 10.20849/ijsn. v5i3.776.

Zhang M., Janet W., Chan D., Akingbade O., Carmen W., (2022): Educational Interventions to Promote Cervical Cancer Screening among Rural Populations: A Systematic Review. *Int. J. Environ. Res. Public Health*, 19(11), 6874; <https://doi.org/10.3390/ijerph19116874>.

Inspirational Leadership and its Relation to Psychological Wellbeing: Nurses Organizational Support as a Mediators Role

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Abstract

Background: Inspirational leadership communicates nursing practices to assist in maintaining straight organizational relations, enhance trust, and psychological well-being of nurses through support from the organization as a mediator. **Aim of the study:** This research examines the relationship between hospital inspirational leadership, psychological well-being, and organizational support as mediators among nurses. **Methods:** For this study, a cross-sectional analytical design was utilized. **Subjects and Methods:** **Setting:** The research was performed at kidney and urology hospitals and liver disease hospitals connected to Minia University, Minia City, Egypt. The current study used all sample, with 241 nurses in total. **Tools:** It used three tools, including Leader Inspirational Assessment Tool, Psychological Wellbeing Scale, and Perceived Organizational Support Scale. **Results:** presence of inspirational leader from Nurses perspective, psychological well-being, and organizational support mediated this relation. **Conclusion:** Inspirational leadership positively affects the psychological well-being of nurses mediated by organizational support via the earned trust among the staff, and it behaves as a predictor for well-being relations. **Recommendation:** Give head nurses, nurses, and human resource professionals advice on how to foster positive, healthy relationships in a medical setting.

Keywords: Inspirational Leadership, Organizational Support and Psychological Wellbeing.

Introduction

Healthcare organizations-nowadays are focused not only on enhancing their current offers and procedures but also on identifying possible avenues for enhancements that will solidify and maintain their position (**Scheepers and Storm, 2019**). Leadership inspirational behavior is important in raising the morale of nurses' psychological well-being, motivating, and supporting them, in training and development to achieve the best output in organizations. Inspiration is inner work that requires time and intentional development; inspirational leaders can affect subordinates to enhance enthusiasm for the job and how they work. They continuously invest in enhancing the talent of subordinates and can assist a business's success by proving their commitment to the job values (**Fontana and Musa, 2017**).

Moreover, encouragement, gratitude, and the supervisor's availability to meet their needs are examples of supportive behaviors that help nurses reduce their stress, burnout, and other psychosomatic problems, which in turn improves their physical health. Similarly, nurses' demands for social well-being are met by supportive leadership behaviors such as helping when needed, comprehending and balancing staff concerns, and informing nurses of impending issues. This is because positive emotions and resources from their supervisors spread to other staff and patients, as well as the attendants (**Farid, Iqbal, Saeed, Irfan, & Akhtar, 2021**).

Additionally, the inspirational leader is an essential resource for a nurse's well-being at any health system and

creates an atmosphere of work acceptance, health, and which is one of the most critical factors for organizational success and performance, as evidence suggests. Furthermore, the leadership-inspired environments influence on the good behavior of the nurses, as healthy psychological support and satisfaction with their organization. It also, has a positive impact on nurses' psychological well-being through support from their organization as mediators (**Townsend, 2021**).

Significance of the study

Inspirational leadership makes work joyful, sustainable, and meaningful. Job satisfaction was also positively correlated with basic psychological requirements and well-being (ethical atmosphere and organizational support continued to be important independent determinants of psychological health and satisfaction with the job) (**Shafer, 2015 & Peters, 2018**). In contrast, if nurses feel that their work environment is threatening or that they are not receiving enough organizational or social support from all of the organization (i.e., their superiors and close subordinates), their well-being is likely to decline, and psychological distress will likely increase (**Van der Heijden, Mulder, König, & Anselmann, 2017**).

Moreover, psychological health and wellbeing among nurses is seen to be a forecaster of commitment, satisfaction with the job, and organizational support. Study has found a statistically significant relation between satisfaction with the job, commitment, as well as trust, indicating the presence of nurses, perceived organizational support

(POS). On the other hand, nurses' psychological well-being is an indicator of a positive inspirational climate, which is thought to be a significant forecaster satisfaction of job (**Gider, Akdere & Top, 2019**).

Furthermore, one of the most significant elements influencing an organization's policies is POS. Fairness in the workplace, proper rewards, supervisors support, and good working circumstances all help nurses feel more confident, hopeful, and develop personally, which improves their physical, emotional, mental, and spiritual health (**Ali, Rizavi, Ahmed, & Rasheed, 2018**).

Aim of the study

This research examines the relation between hospital inspirational leadership, psychological well-being, and organizational support as a mediator among nurses

Research Questions

- **Q1:** What are the levels of inspirational leadership, psychological well-being, and organizational support among nurses?
- **Q2:** what are the relations between inspirational leadership, psychological well-being, and organizational support among hospital nurses?

Subjects and Methods

The Research design This study was carried out using a cross-sectional plus descriptive-correlational research design to accomplish its goal.

Setting of the research:

A tiny portion of the hospital was chosen at random from the entire organization to serve as the setting. It gives every hospital a fair and equal

chance of being selected. The research was performed in Minia Kidney and Urology Disease Hospital and Liver Disease University Hospitals, which affiliated with Ministry of Higher Education, Minia City, Egypt.

Subjects: All nurses employed in Minia Kidney and Urology Disease Hospital their total number (of 127), and Liver Disease University Hospital their total no (114) during the data gathered.

Data Collection Procedure

Three instruments were used.

Tool (1): The leader inspirational assessment tool: It was divided into two sections

First section: Personal traits: it was used to gather personal traits of nurses involved the name of the hospital, gender, age, marital status, qualification of the education, years of experience, as well as a working unit.

Second Section: The leader inspirational assessment tool: this tool was developed by **Pates, Kotera, & Clancy, (2017) & Bonau, (2017)**, and adapted by the researcher to evaluate the nurses' perceptions of inspirational leadership skills. The questionnaire consists of 15-item, (with a minimum score of 15 and a maximum score of 75).

The scoring system: A 5-point Likert scale was utilized, which one for almost never true, two for seldom true, three for occasionally true, four for mostly true scored, and five for almost always true. A score of ≥ 60 indicated the presence of an inspirational leader, and < 60 indicated absence of an inspirational leader.

Tool two: Psychological Well-being
This tool was designed by **Ryff**,

Seeman, & Weinstein, (2010) to evaluate the degree of nurses' psychological well-being. Also, it is composed of forty-two items classified into six subscales: autonomy, environmental mastery, personal growth, positive relations with others purpose in life, and finally self-acceptance; each subscale is composed of seven items.

The scoring system: A 3-point Likert scale was utilized, with three for agree, two for neutral, and one for disagree on the positive items and opposite responses in the reversed statements. Items with reverse scores were written using the scale's opposite way. The reverse-scoring formula for an item was (number of scale points + 1) - (respondent's answer). A score of ≥ 60 indicated psychological well-being, and < 60 indicated that nurses were not having psychological well-being.

Tool three: Perceived organizational support scale (POSS): This was designed by **Rhoades & Eisenberger (2002)** and modified by the researcher to determine the degree of organizational support that the nurses in their environment provide. It included sixteen factors. With a minimum score of 16 as well as a maximum score of 112, the organizational support score was calculated using seven Likert scales: strongly agree 7, agree 6, somewhat 5, neutral 4, somewhat disagree 3, disagree 2, and severely disagree 1, which were categorized into three levels as follows: Organizational support is low (16–48), moderate (49–80), and high 81–112).

Validity and reliability

Five jury members with backgrounds in psychiatric mental health nursing and nursing administration will evaluate the instruments' face validity and make any required adjustments. Dependability: The level to which the statements of the tools (1st tool part two, 2nd tool, and 3rd tool) test the same notion as well as connect with one another through Cronbach's alpha test. In line with internal consistency values were 0.850, 0.790, and 0.846.

A Pilot study

Prior to the start of the real data collection process, pilot research will be carried out on ten percent of the entire sample, or 24 nurses, to evaluate the viability, clarity, and dependability of the research instruments as well as to gauge how long it will take to complete the questionnaire.

Ethical considerations

The initial approval was given in writing by the Minia University faculty of nursing's ethical study committee. After introducing and discussing the study's purpose with the directors, the researchers met with the head nurses of every department to choose the most convenient time to fulfill research participants as well as gather data. The nurses were assured that any information collected would remain confidential and wouldn't be used to evaluate them professionally.

Data collection procedure

The letters also contained the information needed for the investigation. The nurses were explained the objectives, nature, methods, and anticipated advantages of the research prior to their

involvement. Participants may withdraw from the research at any time for any cause, the researchers made clear.

The data collection instruments were then given to each participant at their place of employment by the researchers. Completing the questionnaire took about 20 minutes. It took three months, from early June to August 2024, to collect the data.

Statistical design

SPSS 25.0 is the statistical package for the social sciences. Quality control was carried out at the coding and data entry stages. While mean as well as standard deviation (SD) was utilized for quantitative data, with statistical significance set at P 0.05, descriptive statistics expressed as well as percentages and frequencies were employed for qualitative variables. Among quantitative variables, correlation analysis was employed. Two and three groups were compared using the t-test as well as one-way ANOVA.

Results

Table (1): justifies that (42.5%) of nurses in in Minia Kidney and Urology Disease Hospital Hospitals, age group ranged from (30<35) years old, 69.3% female and 55.9% of them married. It was noted that (37.0 %) of them are had baccalaureate degree, 48% had 1-10 years of experience and working in general unit. This table also, illustrates that (29.9%) of nurses in Liver Disease University age group ranged from (30<35) years old, 72.8% female and 60.5% married. it was noted there are (44.7 %) of them are had diploma degree, 50% of them

had 10-20 years of experience and working in general unit.

Table (2) reveals that 71.7% of the nurses employed in the Minia kidney and urology hospital, in contrast to 86.0% of the nurses employed in the liver disease hospital, had inspirational leadership, and 73.2% compared to 80.7% of them had psychological well-being, respectively. Also, 64.56% in contrast to 89.4% of them had moderate organizational support, with highly statistically significant variations, which P-value <.05.

Table (3a): explains that there was a moderate positive connection between the nurses' inspirational leadership, who were employed in the Minia Kidney and Urology Hospital, as well as their qualifications; there was a moderate positive connection between the nurses psychological well-being and their qualifications. Also, the organizational support was moderate, and there was a positive connection between the nurses' organizational support as well as their qualifications and their psychological well-being. Moreover, there was a moderate positive connection between the nurses' inspirational leadership, who were employed in the Minia Kidney and Urology hospital, and their psychological well-being, as well as their psychological well-being and organizational support. Moreover, there was a fair positive connection between the nurse's psychological well-being as well as their inspirational leader. Additionally, there was a fair positive connection between the nurses' organizational

support as well as their inspirational leader.

Table (3b): displays that there was a fair positive connection between the nurses' inspirational leader in the Minia Liver Disease University Hospital as well as their qualifications, also the organizational support, and there was a moderate positive connection between the nurses' organizational support as well as their inspirational leader.

While there was a moderate bad connection between the nurse's inspirational leader in the Minia Liver Disease University Hospital as well as their age, experience, and psychological well-being, there were moderate bad connections between the nurse's psychological well-being who were employed in the Minia Liver Disease University Hospital as well as their qualification, also their inspirational leader, and there were moderate bad connections between the nurse's organizational support in the Minia Liver Disease University Hospital as well as their age, also the experience.

Table (4): declares a statistically significant relation between nurses' marital status and job position with

inspirational leadership in the Minia Kidney and Urology Hospital. While there was no relation between nurses' traits and total inspirational leadership in the Minia Liver Disease University hospitals.

Table (5): shows that there was a statistically significant relation of nurses' gender and job position with organizational support in the Minia Kidney and Urology Hospital. While there was no relation between personal traits and total organizational support in the Minia Liver Disease University hospitals.

Table (6): discuss that there was a statistically significant relation of nurses' gender, job position, and working area with psychological well-being in the Minia Kidney and Urology Hospital. While there was no relation between nurses' traits and total psychological well-being in the Minia Liver Disease University hospitals.

Table (7): presents a fair positive connection between psychological well-being as well as organizational support among the nurses in the kidney and urology as well as liver disease hospitals (P-value < 0.0001).

Table (1): Percentage distribution of the samples' personal traits (n = 241)

Demographic characteristics	Hospital type				Test of significance	
	Kidney and urology university hospital (n = 127)		liver university hospital (n= 114)		X^2	P-value
	No.	%	No.	%		
Age/ years						
25- < 30	33	26.0	30	26.3	9.201	.065
30 - < 35	54	42.5	33	29.9		
35 - < 40	24	18.9	22	19.3		
40 - < 45	10	7.9	22	19.3		
45 - < 50	6	4.7	7	6.1		
Mean ± SD	32.5 ± 5.4		34.0 ± 6.9			
Gender						
Male	39	30.7	31	27.2	0.360	0.548
Female	88	69.3	83	72.8		
Marital status						
Single	33	26.0	34	29.8	3.756	0.289
Married	71	55.9	69	60.5		
Divorced	15	11.8	8	7.0		
Widow	8	6.3	3	2.6		
Qualification						
Diploma nursing	37	29.1	51	44.7	6.614	0.037*
Technical institute nursing	43	33.9	33	28.9		
Baccalaureate nursing	47	37.0	30	26.3		
Experience/years						
1- 10	61	48.0	37	32.5	8.543	0.014*
11- 20	56	44.1	57	50.0		
21- 30	10	7.9	20	17.5		
Mean ± SD	11.7 ± 5.9		13.7 ± 5.9			
Job position						
Staff nurses	100	78.7	100	87.7	3.431	.064
Head nurses	27	21.3	14	12.3		
Working area						
General	80	63.0	67	58.8	0.450	0.502
Critical	47	37.0	47	41.2		

* Statistically significance differences at < 0.05 ** statistically significance differences at < 0.01

Table (2): Frequency distribution of the sample related their inspirational leadership, psychological wellbeing, as well as organizational support (n = 241)

Items	Hospital type				Test of significance	
	Minia kidney and urology hospital (n = 127)		Minia liver-disease hospital (n= 114)		X^2	<i>P</i> -value
	No.	%	No.	%		
Inspirational leadership						
presence	91	71.7	98	86.0	7.271	0.007**
Absence	36	28.3	16	14.0		
Psychological wellbeing						
Having psychological wellbeing	93	73.2	92	80.7	35.533	0.0001**
No psychological wellbeing	34	26.8	22	19.29		
Organizational support						
Low	13	10.23	10	8.77		
Moderate	82	64.56	102	89.4	29.590	0.0001**
High	32	25.19	2	1.75		

** Statistically significance differences at < 0.01

Table (3a): Relations between personal traits of the nurses in the Minia kidney and urology hospital as well as their total inspirational leadership, psychological wellbeing, and organizational support.

		Minia kidney and urology hospital (n = 127)		
		Inspirational leadership	Psychological wellbeing	Organizational support
Age	r	.103	.045	.053
	P –value	.249	.618	.554
Qualification	r	.254	.281	.356
	P –value	.004**	.001**	.0001**
Experience	r	-.011-	-.065-	-.122-
	P –value	.899	.469	.171
Inspirational leadership	r	1	.651	.536
	P-value		.0001**	.0001**
Psychological wellbeing	r	.651	1	.271
	P –value	.0001**		.002**
Organizational support	r	.536	.271	1
	P –value	.000**	.002**	

** Correlation at < 0.01

Table (3b): Correlation between demographic traits of the nurses in the Minia liver disease university hospital as well as their total inspirational leadership, psychological wellbeing, and organizational support

		Minia liver disease university hospital (n= 114)		
		Inspirational leadership	Psychological wellbeing	Organizational support
Age	r	-.305	.056	-.294
	P –value	.001**	.552	.002**
Qualification	r	.315	-.244	.137
	P –value	.001**	.009**	.146
Experience	r	-.371	.085	-.316
	P –value	.0001**	.371	.001**
Inspirational leadership	r		-.237	.423
	P-value		.011*	.0001**
Psychological wellbeing	r	-.237		-.115
	P-value	.011*		.222
Organizational support	r	.423	-.115	
	P –value	.0001**	.222	

Table (4): relation between overall perception levels of inspirational leadership and their personal characteristics (n = 241)

Demographic characteristics		Minia kidney and urology hospital (n = 127)				Minia liver disease-university hospital (n= 114)			
		Absence		presence		absence		Presence	
		No.	No.	%	No.	%	No.	%	No.
Gender									
Male	39	15	38.5	24	61.5	2	6.5	29	93.5
Female	88	21	23.9	67	76.1	14	16.9	69	83.1
X ² (P-value)		2.835 (0.095) NS				2.029 (0.154) NS			
Marital status									
Single	33	15	45.5	18	54.5	7	20.6	27	79.4
Married	71	14	19.7	57	80.3	7	10.1	62	89.9
Divorced	15	4	26.7	11	73.3	1	12.5	7	87.5
Widow	8	3	37.5	5	62.5	1	33.3	2	66.7
X ² (P-value)		7.708 (0.05)*				3.017 (0.389)NS			
Job position									
Staff nurses	100	36	36.0	64	64.0	14	14.0	86	86.0
Head nurses	27	0	.0	27	100.0	2	14.3	12	85.7
X ² (P-value)		13.565 (0.0001)**				0.001 (0.977) NS			
Working area									
General	80	19	23.8	61	76.3	10	14.9	57	85.1
Critical	47	17	36.2	30	63.8	6	12.8	41	87.2
X ² (P-value)		2.249 (0.134) NS				0.107 (0.744) NS			

* Statistically significance differences at < 0.05 ** statistically significance differences at < 0.01

Table (5): relation between total organizational support and nurses' personal traits (n=241)

Demographic characteristics		Minia kidney and urology hospital (n = 127)				Minia liver-dieses university hospital (n= 114)			
		Presence		Absence		presence		Absence	
	No.	No.	%	No.	%	No.	%	No.	%
Gender									
Male	39	17	43.6	22	56.4	0	0.0	31	100.0
Female	88	17	19.3	71	80.7	2	2.4	81	97.6
χ^2 (P-value)		8.121 (0.004)**				0.760 (0.383) NS			
Marital status									
Single	33	12	36.4	21	63.6	0	0.0	34	100.0
Married	71	15	21.1	56	78.9	2	2.9	67	97.1
Divorced	15	5	33.3	10	66.7	0	.0	8	100.0
Widow	8	2	25.0	6	75.0	0	0.0	3	100.0
χ^2 (P-value)		3.045 (0.385) NS				1.328 (0.723) NS			
Job position									
Staff nurses	100	34	34.0	66	66.0	1	1.0	99	99.0
Head nurses	27	0	.0	27	100.0	1	7.1	13	92.9
χ^2 (P-value)		12.536 (0.0001)**				2.689 (0.101) NS			
Working area									
General	80	24	30.0	56	70.0	2	3.0	65	97.0
Critical	47	10	21.3	37	78.7	0	.0	47	100.0
χ^2 (P – value)		1.149 (0.284) NS				1.428 (0.232) NS			

** statistically significance differences at < 0.01

Table (6): relation between total psychological wellbeing and nurses' personal traits (n=241)

		Kidney and urology hospital (n = 127)				Liver disease university hospital (n= 114)			
		Presence		Absence		Presence		Absence	
	No.	No.	%	No.	%	No.	%	No.	%
Gender									
Male	39	15	38.5	24	61.5	0	0.0	31	100.0
Female	88	19	21.6	69	78.4	2	2.4	81	97.6
χ^2 (P-value)		3.923 (0.048)*				0.760 (0.383) NS			
Marital status									
Single	33	12	36.4	21	63.6	0	0.0	34	100.0
Married	71	13	18.3	58	81.7	2	2.9	67	97.1
Divorced	15	7	46.7	8	53.3	0	.0	8	100.0
Widow	8	2	25.0	6	75.0	0	0.0	3	100.0
	3.045 (0.385) NS				1.328 (0.723) NS				
Job position									
Staff nurses	100	32	32.0	68	68.0	1	1.0	99	99.0
Head nurses	27	2	7.4	25	92.6	1	7.1	13	92.9
χ^2 (P-value)		6.559 (0.01)*				2.689 (0.101) NS			
Working area									
General	80	27	33.8	53	66.3	2	3.0	65	97.0
Critical	47	7	14.9	40	85.1	0	.0	47	100.0
χ^2 (P-value)		6.559 (0.01)*				1.428 (0.232) NS			

* Statistically significant differences at < 0.05

Table (7): Correlation matrix between Inspirational Leadership, psychological wellbeing, and organizational support in the kidney and urology and liver diseases hospitals (n = 241)

		Inspirational leadership	Psychological wellbeing
Kidney and urology hospital	Inspirational Leadership	r	
	P-value		
Psychological wellbeing	r	0.094	
	P - value	0.327	
Organizational support	r	0.146	0.349
	P - value	0.127	0.0001**
Liver disease hospital	Inspirational Leadership	r	
	P-value		
Psychological wellbeing	r	0.035	
	P - value	0.716	
Organizational support	r	0.130	0.374
	P - value	0.175	0.0001**

**Correlation is significant at the 0.01 level

Discussion

Supportive, inspiring leadership techniques may reduce staff tensions and anxiety related to specific other management styles while also assisting nurses in developing their psychological resources in a challenging setting. Additionally, it can support the well-being and goodness of healthcare workers. The psychological resources of nurses must be developed and maintained to improve their physical, emotional, and social well-being (Farid, et al., 2021).

Moreover, psychological well-being is seen as the result of a life well-lived and is a key component of nurses' ability to successfully adjust to their work environment (Bakker, 2019).

Supervisory concern, empathy, and supportive behavior all contribute to the preservation and restoration of nurses' psychological health. The employment of supportive techniques to enhance psychological well-being

should be promoted (Farid et al., 2021). So that conducting this study to investigate the relationship between hospital inspirational leadership, psychological well-being, as well as organizational support as mediators among nurses.

The results of the actual research demonstrated that 42.5% of the nurses in the Minia Kidney and Urology Hospital had age 30-< 35 years, compared to 29.9% in liver disease hospital and more than two thirds of them in both hospitals female, and more than half of them married. 37.0% had baccalaureate degree while 44.7% had diploma degree. Moreover, 48% had 1-10 years of experience with high statistical variations (P-value < 0.007, 0.0001, & 0.0001).

Moreover, 71.7% of the nurses in the Minia Kidney and Urology Hospital had inspirational leadership, 73.2% compared to 80.7% had psychological well-being, and 64.56% compared to 89.4% had moderate organizational

support that is answered the first question.

This might be explained as when nursing leaders use inspirational skills while creating psychological well-being through trusting in an organization; therefore, it was important to use psychologically empowered strategies and pay more attention to nurses as enhancing their budget through the application of the nursing Kaders, improving job satisfaction, and supporting as well as well-being in most countries that had influence relations well-being. Furthermore, the well-being of all nurses and better work/organizational outcomes were linked to management systems that use a leadership style that fosters participation, inspiration, trust, and social support, especially from superiors and coworkers.

The actual research finding is accorded to **Farid et al., (2021)**, who demonstrated that nurse leaders give their followers a lot of inspiration, motivation, and autonomy practices so they can learn new skills and gain the confidence. Inspirational leadership styles help sustains nurse's well-being. Additionally, good emotions of leaders via their empathy, as well as listening to subordinates, supporting them, inspiring, and nurturing attitude, enhance subordinates' and next in good emotions among them to enhance their well-being. They also found a positive statistically significant relationship between nurses' psychological well-being and higher levels of inspirational leadership.

Also, this is related to **Huang, Qiu, Yang, & Deng (2021)** study of the

connections between OCB, psychological health, trust, and moral leadership in Chinese hospitals, which revealed that nurses' actions are significantly impacted by the leadership style of their managers. Perceived inspirational leadership touches the human side and inspires nurses, which is favorably connected with trust in management, as evidenced by their psychological well-being and mediated by perceived support from their organization. It was determined that the indirect influence of perceived moral leadership on OCB through trust in management as well as psychological well-being was statistically significant and mediated by organizational support.

Additionally, **Jensen, Potočnik, & Chaudhry (2020)**, according to a study of CEO transformational leadership and firm performance, who support the beneficial influence of transformational leadership on firm practice. Since idealized impact (to obtain respect, admiration, as well as trust), inspirational motivation and promote staff spirit as well as optimism), and intellectual stimulation to achieve nurses' well-being are all dimensions of transformational leadership (**Lord, , Day, Zaccaro, Avolio, , & Eagly, 2017**).

The discovery bolstered efforts of **Bakker, Hetland, Olsen, & Espenæs, (2023)** study on daily transformational leadership: A source of inspiration for subordinate performance was in line with the current study. Additionally, it demonstrates how leaders encourage their followers to take charge of their

own lives and go into detail about the real-world ramifications of leadership development.

This conclusion supported the findings of **Teimouri, Hosseini, & Ardestiri, (2018)**, study which revealed that moral nursing supervisors uphold nurses' dignity and exhibit an admirable servant mentality. Consequently, nurses are more likely to be psychologically healthy. This study also showed that nurses' psychological well-being and trust in management are positively correlated with their OCBs to patients and that this relationship is mediated by the organization's support.

Moreover, positive connections in the actual study support the findings of **Barzoki and Rezaei (2017)**, who found that ethical leaders are regarded as reliable. They foster an inspiring, healthy, and trusting environment where nurses feel psychologically well and can trust others. As a feature of support, nurses are more inclined to "go the extra mile" to serve their patients without hesitation when asked to do tasks beyond the scope of their employment.

This outcome also aligns with the findings of research by **Jeon, Park., Choi, & Kim, (2018)**, which found that moral leaders are more likely to motivate nurses to build trust and improve their mental health. Motivating employees to imitate ethical activities and return the favor in the work circumstance to leaders, coworkers, and patients is possible because moral leaders serve as examples and are seen as concerned about their well-being. Nonetheless, there are important indirect

connections between them because of their mutual faith in management, which was bolstered by their job support and psychological well-being. Also, this result is similar to **Farrukh, Lee, & Shahzad, (2019)** research titled "Entrepreneurial Behavior in Pakistani Higher Education Institutions," which examined the relationship between leadership styles and psychological empowerment and highlighted the beneficial effects of transformational leadership and genuine leadership that use inspirational methods to enhance well-being and psychological empowerment.

Moreover, our study agrees with **Lauring and Jonasson (2018)**; there are two known factors to enhance productivity behaviors in the staff, and good leadership from a staff leader should provide inspirational motivation from a staff leader. Additionally, the study also mentioned the importance of inspirational motivational leadership in a general virtual staff form and added novel insight to the follower's goal theory and they predict that the positive influence of "inspirational motivation" leadership. Additionally, this study is similar to **Van der Heijden et al., (2017)**; the impact of nurses' work circumstances on psychological discomfort and well-being is mediated by organizational support.

Additionally, the current study is in agreement with numerous studies (**Koskenvuo, Numminen, & Suhonen, 2019**); **Ali (2022)** and **.Mohamed, Abdelmonem, Abd Elhakam, & Abdelraof (2022)**

which showed a strong positive relation between job satisfaction, and the hospital's inspirational leader and between nurses' awareness of an ethical and motivating work circumstance and perceived organizational support. They demonstrated a somewhat beneficial relationship between job satisfaction, psychological health, and hospital ethical climate through looked at how nurses' job satisfaction, psychological health, and motivating, supporting relationships with their manager, which enhanced nurses' psychological health.

Furthermore, stress at work had an impact on nurses' psychological health, and working conditions as reported by **Guan et al., 2020; Huang, Han, Luo, Ren, & Zhou, 2020; and Tehranineshat, Torabizadeh& Bijani, 2020**); hospital ethical climate practices give nurses a therapeutic as well as trustworthy relationship with patients, which reduce fear and anxiety. It also reflects a laid-back, inspiring, and positive work circumstance that creates a good attitude and a bad psychological answer that is characterized by psychological well-being and influences nurses' skills.

The results of the actual study show that there was a fair positive correlation between the nurses' qualifications and inspirational leadership while they were employed at Minia Kidney and Urology Hospital, as well as between their organizational support and psychological well-being and their qualifications and organizational support. They also found a fair

positive correlation between the nurses' organizational support and their qualifications and psychological well-being.

Additionally, a moderately positive correlation was found between the psychological well-being and organizational support of the nurses who worked at the Minia Kidney and Urology Hospital and their inspirational leadership. Additionally, there was a moderately positive correlation between the nurses' organizational support and their inspirational leader and their psychological well-being.

Furthermore, the actual study shows that the organizational support and the inspirational leader of the nurses at Minia Liver Disease University Hospital were fairly positively correlated with their qualifications and the organizational support and the inspirational leader were fairly positively correlated with each other. While there was a fair negative connection between the nurses' inspirational leader in the Minia Liver Disease University Hospital as well as their age and experience and psychological well-being, there was also a moderate negative connection between the nurses' psychological well-being who was employed in the Minia Liver Disease University Hospital with their qualification, as well as their inspirational leader, and there was a fair bad connection between the nurse's organizational support in the Minia Liver Disease University Hospital as well as their age, also the experience. This might be related to inspiration occurred at

any age and for any qualification as an inner feeling initiation readiness.

The actual study, is according to **Farid et al., (2021)**, that reported that almost all of the participants were females, support as well as psychological capital as a factor that mediates, and multiple additional factors, such as job thriving, knowing with the company, and trust and support from their organization, could be used as mediating variables to test their models.

These results agrees with **Iqbal, Fatima & Naveed, (2019)**, who observed the relationship between transformational leadership as well as organizational commitment (OC), elucidating the inspirational nature of this relationship through the underlying role of psychological empowerment and well-being as an explanatory mechanism and suggested that superiors should have positive relationships with their subordinates in order to increase the psychological well-being and empowerment of their followers, and presence of a good positive correlation between psychological well-being and inspirational and transformational leadership

Moreover, in line with **Hobfoll, Halbesleben, Neveu, Westman, (2018); Alqatawenh (2018)**, who stated that there is a strong correlation between psychological well-being and OC and that the presence of a pleasant psychological state strengthens the attachment and bond to the organization. It also, offers useful ramifications for hospital administration and nursing staff superiors to employ an inspiring

transformational leadership style in order to increase nurses' commitment by enhancing their well-being and organizational support as a mediators.

Conclusion

The current study concluded that presence of inspirational leadership, psychological well-being and nearly two-thirds of them had moderate organizational support with highly statistically significant variations among the two hospitals. Moreover, the actual study presents a fair positive connection between the nurses 'perception of their inspirational leaders in the Minia liver disease university hospital qualification, as well as organizational support, and there was a fair positive connection between the nurses' organizational support and their inspirational leader

Recommendation

- Conduct educational program for management, and head inspirational about inspirational style of leadership.
- Further study is required to identify clinical and personal variables that impact nurses' organizational support, psychological health, and inspirational leadership in hospitals.
- Conduct and organize training courses to strengthen the capability of the workers by encouraging empowerment practices.

References

Ali, F. H., Rizavi, S. S., Ahmed, I., & Rasheed, M. (2018). Effects of perceived organizational support on organizational citizenship behavior—Sequential mediation by well-being and work engagement.

Journal of the Punjab University Historical Society, 31(1), 111- 131

Ali, V. (2022). The Effects of Leadership on Faculty and Staff Job satisfaction and affective commitment in Health-Related Professional Programs. (Doctoral dissertation, Liberty University. Lynchburg,) Available @ <https://digitalcommons.liberty.edu/>

Alqatawenh, A. S. (2018). Transformational leadership style and its relationship with change management. *Verslas: teorija ir praktika*, 19(1), 17-24.

Bakker, A. B., Hetland, J., Olsen, O. K., & Espevik, R. (2023). Daily transformational leadership: A source of inspiration for follower performance?. *European Management Journal*, 41(5), 700- 708.

Bakker, N. A. (2019). An analysis of the six dimensions of psychological well-being in learning reflections of leaders. Exploring the influence of storytelling on leader development (Doctoral dissertation, Murdoch University). Available @ <https://researchportal.murdoch.edu.au/esploro/outputs/graduate/An-analysis-of-the-six-dimensions/991005544658007891#file-0>

Barzoki, A. S., & Rezaei, A. (2017). Relationship between perceived organizational support, organizational citizenship behavior, organizational trust and turnover intentions: an empirical case study. *International Journal of Productivity and Quality Management*, 21(3), 273-299.

Engelbrecht, A. S., Heine, G., & Mahembe, B. (2017). Integrity, ethical leadership, trust and work engagement. *Leadership & Organization Development Journal*, 38(3), 368-379.

Farid, T., Iqbal, S., Saeed, I., Irfan, S., & Akhtar, T. (2021). Impact of supportive leadership during Covid-19 on nurses' well-being: The mediating role of psychological capital. *Frontiers in Psychology*, 12, 695091.

Farrukh, M., Lee, J. W. C., & Shahzad, I. A. (2019). Intrapreneurial behavior in higher education institutes of Pakistan: The role of leadership styles and psychological empowerment. *Journal of Applied Research in Higher Education*, 11(2), 273-294.

Fontana, A., & Musa, S. (2017). The impact of entrepreneurial leadership on innovation management and its measurement validation. *International Journal of Innovation Science*, 9(1), 2-19.

Gider, Ö., Akdere, M., & Top, M. (2019): Organizational trust, employee commitment, and job satisfaction in Turkish hospitals: implications for public policy and health. *Eastern Mediterranean Health Journal*, 25.(9).

Guan, W., Ni, Z., Hu, Y., Liang, W., Ou, C., He, J., & Zhong, N. (2020): Clinical characteristics of coronavirus disease 2019 in China. *New England journal of medicine*, 382(18), 1708-1720.

Hobfoll, S.E.; Halbesleben, J.; Neveu, J.-P.; Westman, M. Conservation of resources in the

organizational context: The reality of resources and their consequences. *Annu. Rev. Organ. Psychol. Organ. Behav.* 2018, 5, 103–128. [Google Scholar] [CrossRef] [Green Version]

Huang, J., Han, M., Luo, T., Ren, A., & Zhou, X. (2020): Mental health survey of 230 medical staff in a tertiary infectious disease hospital for COVID19. *Zhonghua lao dong wei sheng zhi ye bing za zhi= Zhonghua laodong weisheng zhiyebing zazhi= Chinese journal of industrial hygiene and occupational diseases*, 38, E001-E001

Huang, N., Qiu, S., Yang, S., & Deng, R. (2021). Ethical leadership and organizational citizenship behavior: Mediation of trust and psychological well-being. *Psychology research and behavior management*, 655-664.

Iqbal, K., Fatima, T., & Naveed, M. (2019). The impact of transformational leadership on nurses' organizational commitment: a multiple mediation model. *European Journal of Investigation in Health, Psychology and Education*, 10(1), 262-275.

Jensen, M., Potočnik, K., & Chaudhry, S. (2020). A mixed-methods study of CEO transformational leadership and firm performance. *European Management Journal*, 38(6), 836-845.

Jeon, S. H., Park, M., Choi, K., & Kim, M. K. (2018). An ethical leadership program for nursing unit managers. *Nurse Education Today*, 62, 30-35.

Koskenvuo, J., Numminen, O., & Suhonen, R. (2019): Ethical climate in the nursing environment: a scoping review. *Nursing Ethics*, 26(2), 327-345.

Lauring, J., & Jonasson, C. (2018). Can leadership compensate for deficient inclusiveness in global virtual teams?. *Human Resource Management Journal*, 28(3), 392-409.

Lord, R. G., Day, D. V., Zaccaro, S. J., Avolio, B. J., & Eagly, A. H. (2017). Leadership in applied psychology: Three waves of theory and research. *Journal of applied psychology*, 102(3), 434.

Mohamed, A. F. A., Abdelmonem, R. M., Abd Elhakam, E. A., & Abdelraof, A. I. (2022). Relationship between hospital ethical climate, psychological well-being, and job satisfaction among nurses following COVID-19 outbreak. *Assiut Scientific Nursing Journal*, 10(28.), 178-189.

Peters, T. (2018): Differences in Organizational Climate as a Function of Organizational Structure in Mental Health Treatment Centers (Doctoral dissertation, Northcentral University, San Diego, California). Available @ <https://www.proquest.com/openview/ac9d6ee7523d18c4e87d441677976050/1?pq-origsite=gscholar&cbl=18750>

Rhoades, L., & Eisenberger, R. (2002). Perceived organizational support: a review of the literature. *Journal of applied psychology*, 87(4), 698.

Ryff, C., Seeman, T., & Weinstein, M. (2010): National Survey of Midlife Development in the United States (MIDUS II): Biomarker Project, 2004-2009. Inter-university Consortium for Political and Social Research. Available @ <https://doi.org/10.3886/ICPSR29282.v10>

Scheepers, C. B., & Storm, C. P. (2019). Authentic leadership's influence on ambidexterity with mediators in the South African context. *European Business Review*, 31(3), 352-378.

Shafer, W. (2015): Ethical climate, social responsibility, and earnings management. *Journal of Business Ethics*, 126(1), 43-60.

Tehranineshat, B., Torabizadeh, C., & Bijani, M. (2020): A study of the relationship between professional values and ethical climate and nurses' professional quality of life in Iran. *International journal of nursing sciences*, 7(3), 313-319.

Teimouri, H., Hosseini, S. H., & Ardestiri, A. (2018). The role of ethical leadership in employee psychological well-being (Case study: Golsar Fars Company). *Journal of Human Behavior in the Social Environment*, 28(3), 355-369.

Townsend, N., Kazakiewicz, D., Lucy Wright, F., Timmis, A., Huculeci, R., Torbica, A., & Vardas, P. (2021): Epidemiology of cardiovascular disease in Europe. *Nature Reviews Cardiology*, 1-11.

Van der Heijden, B. I., Mulder, R. H., König, C., & Anselmann, V. (2017). Toward a mediation model for nurses' well-being and psychological distress effects of quality of leadership and social support at work. *Medicine*, 96(15), e6505.

Pates, J., Kotera, Y., & Clancy, D. (2017). Development and validation of the inspirational leaders survey. *International Journal of Work Innovation*, 2(2-3), 172-192.

Bonau, S. (2017). How to become an inspirational leader, and what to avoid. *Journal of Management Development*, 36(5), 614-625.

Intensive care Nurses' Perception and Practice Regarding Key Performance Indicators

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Abstract

Background: Intensive care nurses' performance is defined, measured, and indicated by key performance indicators, which also help identify areas of weakness. The key performance indicators for intensive care is a clear performance metric used to track, evaluate, and improve all pertinent nursing care procedures for the highest quality of patient care. **Aim:** asses intensive care nurses' perception and practice regarding key performance indicators. **Design:** descriptive research design was used in the current study. **Setting:** the study was conducted at Tanta International Teaching Hospital. **Subjects:** All (120) registered nurses. **Tools:** Two tools were used; Tool I: Intensive Care Nurses' perception Questionnaire about key performance indicators, Tool II: Key Performance Indicators' observational checklist were used to collect the data. **Results:** none (0.0%) of the nurses had a high level of perception regarding Key performance indicators. Similarly, none (0.0%) of the nurses had a satisfactory level of overall practice regarding Key performance indicators. **Conclusion:** there was a statistically significant positive correlation between intensive care nurses' perception and their practice regarding key performance indicators. **Recommendations:** Periodically in-service training program was required enhance intensive care nurses' perception and practice regarding key performance indicators.

Keywords: Key performance indicators, Intensive care nurses, Perception, Practice.

Introduction

Intensive care nurses serve as primary caregivers for critically ill patients. Throughout patient care, they must be able to evaluate all the information that is offered, make decisions, and swiftly administer appropriate and workable treatments. A registered nurse with specific training in critical care is referred to as an intensive care nurse, or critical care nurse. These highly qualified individuals care for patients who have life-threatening illnesses or need ongoing monitoring and intervention in the intensive care unit (**Yang, Huang & Chen, 2019**).

Intensive Care Units are specific hospital units created to offer patients with serious or life-threatening illnesses and disorders with care and close observation. For patients in need of life-saving treatment, such a unit is open around-the-clock. Intensive care units are vital, complex, and ever-changing settings. Intensive care nurses must have extraordinary abilities and the capacity to make prompt, well-informed decisions since the intensive care unit is a very stressful environment. In fact, these units have advanced medical equipment and qualified nurses to continually monitor and care for critically ill patients. It is crucial to regularly monitor and measure the performance indicators of care offered in intensive care unit since it offers vital services that can save the lives of critically ill patients (**Jebraeily, Hasanloei, & Rahimi & Saeideh, 2019**).

The performance of the intensive care unit was evaluated by analyzing clinical outcome indicators and resource utilization, including

mortality, infection, duration of stay, re-admission, and expenses, are analyzed to assess the functioning of the intensive care unit. To enhance the quality of care and patient safety, nurse leaders and practitioners must obtain pertinent information quickly. There are numerous tools and techniques available for precise and ongoing performance evaluation in various healthcare organization units. These tools and methods can compare unit performance with predetermined goals and detect performance deviations. Key performance indicators are one of these tools (**Nouira et al., 2018**).

To monitor and enhance the quality of care, Key Performance Indicators have become an essential component of healthcare organizations, particularly intensive care units. Key performance indicators are essential instruments in this regard, providing quantifiable figures that demonstrate the efficacy, efficiency, and caliber of treatment provided (**Ismail, Ahmed, & Youssef, 2024**). The measurement provides a chance to track actual performance rather than indicating the existence of a performance issue. Thus, the foundation of ongoing process and system performance improvement in intensive care units is a culture of monitoring and continual measurement (**Alhabdan, Alyaemni, Aljuaid, Baydoun, & Hamidi, 2023**). These Key performance indicators are crucial instruments that help nurses and nurse administrators make better decisions, allocate resources more effectively, and ultimately enhance the health of

patients (Wunsch, Osborn, & Rowan, 2020).

A variety of metrics are included in the Key performance indicators, ranging from operational efficiency indicators like bed utilization and number of nurses to clinical outcomes indicators like deaths and duration of stay. Intensive care nurses can identify patterns, pinpoint areas that need improvement, and put plans into action to improve patient outcomes and intensive care unit performance by methodically analyzing these Key performance indicators. (Fernando, 2018; Rewa et al., 2018).

To guarantee the highest level of care, performance assessment and evaluation are essential due to the intricacy and high stakes of intensive care unit care. Intensive care units' performance can be methodically evaluated and improved by incorporating the Performance Assessment Tool for Quality Improvement in Hospitals framework. This will match the intensive care unit with the highest standards of healthcare delivery by emphasizing specific dimensions such as clinical effectiveness, health efficiency, responsive governance, patient-centeredness, patient safety, and staff professional development (Mesarić et al., 2011).

Firstly, clinical effectiveness dimension which emphasizes achieving favorable patient health outcomes as measured by rates of readmission, death rates, and duration of mechanical ventilation (Seyfert, Friedrich-Rust, Koster-Hale, & Von der Hardt, 2020). Secondly, health efficiency implies making efficient and prudent use of resources

while obtaining the best results for patients. This dimension's Key performance indicators include tracking resource utilization rates and expenditures per patient stay (Birkhoff, Smith, & Cherniwi, 2020). Thirdly, responsive governance, sustainable success is built on a foundation of great leadership and a continual improvement of culture. Nurse satisfaction, incident reporting rates, and the promptness of action taken following unfavorable incidents are the main Key performance indicators here (Kim, Park, & Bae, 2021).

Fourthly, patient centeredness highlights how to identify and incorporate patient values, needs, and preferences into therapeutic decision-making. This dimension's Key performance indicators evaluate things like family participation in decision-making, communication styles, and patient satisfaction (Shah, Zimmerman, & Ely, 2022). Fifthly, patients' safety refers to the avoidance of patient injury during the delivery of care. This dimension's Key performance indicators cover a variety of procedures, such as proper medicine delivery, preventing hospital-acquired infections, and lowering healthcare errors (Carson, Ely, Hopkins, Martin, & Smith, 2019). Finally, staff professional development focuses on assisting nurses in gaining new information and abilities that will improve their performance and allow them to progress in their careers. Key performance indicators in this area evaluate prospects for ongoing learning, competency assessment, and

nursing education (Pronovost, Marsteller, & Goeschel, 2017)

Significant of the study

Many healthcare professionals often overlook factors such as prolonged length of stays, frequent complaints from service receivers, and readmissions shortly after discharge. Even when faced with service quality complaints, most hospital management teams dismiss them, believing their organization is error-free, and their response is often slow. This issue arises because they lack a sufficient understanding of care indicators that help identify weaknesses and manage, track, monitor, evaluate, modify, and transform healthcare process performance. This understanding is crucial to ensure safety, efficiency, effectiveness, quality, and increased satisfaction for both patients and providers, ultimately leading to better clinical outcomes. Key performance indicators can help hospital management visualize both quantitative and qualitative data, aiding in both operational and strategic decision-making. (Fallahnezhad, Langarizadeh, & Vahabzadeh, 2023).

Therefore, assessing intensive care nurses' perception and practice regarding key performance indicators is of paramount importance.

Aim of the study

Assess intensive care nurses' perception and practice regarding key performance indicators

Research questions

1. What are the levels of intensive care nurses' perception regarding key performance indicators?

2. What are the levels of intensive care nurses' practice regarding key performance indicators?

Subjects and method

Study design

Descriptive research design was utilized to accomplish the aim of the present study.

Setting

The present study was conducted at Tanta International Teaching Hospitals, which affiliated to Minister of Higher Education and Scientific Research in Intensive Care Units including (Anesthesia, Neonates, Medical, Cardiac, Pediatric and Burn). Bed capacity was 465 beds.

Subjects

The study's subjects consisted of all (n = 120) intensive care nurses who worked in the previously mentioned settings at time of data collection.

Tools

Three tools were used to accomplish the aim of this study including:

Tool I: Nurses' Key Performance Indicators' Perception Questionnaire

Questionnaire This tool was developed by the researcher guided by Veillard (2013); Alraimi, & Shelke (2023); Cariniet al., (2020) this tool was used to assess the intensive care nurses' perception about key performance indicators. It included the following two parts:

Part one: Intensive care nurses' personal data included age, gender, marital status, years of experience and unit name, levels of education, receive training before about key performance indicators.

Part two: It included 91 items. It was divided into six dimensions as follows; clinical effectiveness dimension (13items), health

efficiency (15 items), responsive governance (19 items), staff orientation (15 items), patient centeredness (15 items), and safety (14 items).

Scoring system

Responses of intensive care nurses were measured on five points Likert Scale ranging from strongly agree= (5), agree = (4), Neutral= (3), disagree = (2) to strongly disagree = (1) which concluded to three points where strongly agree, agree equal agree and strongly disagree, disagree equal disagree. The total score was calculated by summing all categories and classified into levels according to cut-off points as follows:

- High perception about key performance indicators $\geq 75\%$
- Moderate perception about key performance indicators $> 60\% - 75\%$
- Low perception about key performance indicators $\leq 60\%$

Tool II: Nurses' Key Performance Indicators Observational Checklist

This tool was developed by researcher guided by **Schwirian (1981), Battersby, Hemmings (2000) & Cariniet al, & Specchia, (2020)**. It used to assess the intensive care nurses' practice for key performance indicators. It included 111 items. It was divided into six dimensions as follows; clinical effectiveness dimension (26items), health efficiency (21 items), responsive governance (13 items), staff orientation (16 items), patient centeredness (17 items), and safety (18 items).

The scoring system

Intensive care nurses' practice of key

performance indicators was measured on a two points Likert scale ranging from done = 1 to not done = 0. The total scores were calculated by summing all categories and classified into levels according to cut-off points as follows:

- Satisfactory practice $\geq 80\%$.
- Unsatisfactory practice $< 80\%$.

Method

1. Official permission outlining the study's purpose was obtained from the Faculty of Nursing and submitted to the responsible authorities at Tanta International Teaching Hospital to secure approval for conducting the study.
2. The purpose of the study was explained and made clear to the intensive care nurses to gain their cooperation.

3. Ethical consideration

- Approval of the Faculty of Nursing scientific research ethical committee was obtained, (**Code. No: 107/10/ 2022**).
- The researcher introduced herself to the participants, a comprehensive explanation of the study's purpose and methods was done to obtain their acceptance and cooperation as well as their informed consent.
- Participants were assured of their right to withdraw from the study and terminate their participation at any time, with full respect for their decision.
- The researcher ensured that the nature of the study did not cause any harm to any of the participants.
- Assuring the nurses about privacy and confidentiality of collected data.

4. Tools of the study were developed by researcher based on related literature and translated into Arabic language.
5. Tools were tested for their content validity and relevance by Jury of seven experts and their comments were taken into consideration. The seven experts were four professors and one assistant professor of Nursing Administration, Faculty of Nursing, where two professors of Critical Care Nursing, Faculty of Nursing, Tanta University.
6. The experts' responses were represented in four points rating scale ranging from (1-4); 1=not relevant, 2= little relevant, 3= relevant, and 4=strongly relevant. Necessary modifications were made including clarifying, simplifying certain words, excluding certain questions and adding others. The content validity index value for tool (I) = 99.3% and tool (II) = 99.7%
7. A pilot study conducted on 10% (n=12) of intensive care nurses for clarity and applicability of tools. They weren't excluded from the total study subjects to ensure that the data collected is comprehensive and reflective of the entire sample. The time taken for completing each tool was 20-30 minutes. A pilot study was carried out after the experts' opinion and before starting the actual data collection.
8. The reliability of tools was tested using Cronbach Alpha Coefficient test, its value for tool (I) = 0.988, and tool (II) = 0.983, indicating high reliability of the study tools.
9. The tools (I, II) distributed by researcher on the subjects in their work setting, the subjects answered the questionnaires in the presence of the researcher.
10. Data collected within six months from the beginning of August 2023 to the end of January 2024.

Statistical analysis of the data

The data analysis was conducted using IBM SPSS software version 20.0 (Armonk, NY: IBM Corp, released 2011). Categorical data were presented as numbers and percentages. For continuous data, normality was checked using the Kolmogorov-Smirnov test. Quantitative data were described using the range (minimum and maximum), mean, and standard deviation. Results were considered significant at the 5% level. The tests used included the student's t-test for comparing two groups with normally distributed quantitative variables, the F-test (ANOVA) for comparing more than two groups with normally distributed quantitative variables, and the Pearson correlation coefficient for assessing the relationship between two normally distributed quantitative variables.

Results

Table (1) Shows the distribution of nurses according to their personal characteristics. Regarding age, more than half (56.7%) of nurses fell within the 26-30 age range and 28.3% were older than 30. The average age of the nurses was 28.87 ± 2.90 years, with the youngest being 24 years old and the oldest 35 years old. Regarding sex, the majority (89.2%) of them were female. Regarding marital status, 79.2% of the nurses were married.

Nearly two thirds (65%) of the nurses had between 3 and 8 years of experience and 24.2% had less than 3 years. The mean years of experience was 5.10 ± 2.84 years, with the least experienced nurse having 1 year and the most experienced nurse having 11 years. Considering the unit they worked in, the largest group (40.8%) worked in the neonatal unit, followed by the cardiac unit (16.7%), while smaller numbers worked in the pediatric (14.2%), Medical ICU (12.5%), anesthesia (12.5%), and burn units (3.3%). All (100%) nurses didn't receive training before about Key performance indicators.

Table (2): Displays mean scores, standard deviation, and ranking of nurses' perception regarding key performance indicators dimensions. As noticed, the highest mean perception score is for responsive governance, with a mean score of 32.04 ± 5.39 , ranking first. On the other hand, the lowest mean perception score is for clinical

effectiveness, with a mean score of 21.64 ± 4.56 , ranking sixth.

Table (3): Displays mean scores, standard deviation, and ranking of nurses' practice regarding key performance indicators dimensions. It was observed that the highest mean score is for clinical effectiveness, with a mean score of 8.07 ± 2.13 , ranking first. Conversely, the lowest mean score is for Staff Orientation, with a mean score of 3.48 ± 1.79 , ranking sixth.

Figure (1): Illustrates that none (0.0 %) of nurses had a high level of perception regarding key performance indicators.

Figure (2): presents that none (0.0 %) of nurses had satisfactory level regarding overall practice regarding key performance indicators.

Figure (3): Shows that there was statistically significant positive correlation between intensive care nurses' perception and their practice regarding key performance indicators ($P = 0.045^*$, $r = 0.183^*$).

Table (1): Distribution of nurses according to their personal characteristics and work-related data (n = 120)

Personal data	No.	%
Age (years)		
<26	18	15.0
26 – 30	68	56.7
>30	34	28.3
Min. – Max.	24.0 – 35.0	
Mean ± SD.	28.87 ± 2.90	
Gender		
Male	13	10.8
Female	107	89.2
Marital status		
Married	95	79.2
Unmarried	25	20.8
Years of experience		
<3	29	24.2
3 – 8	78	65.0
>8	13	10.8
Min. – Max	1.0 – 11.0	
Mean ± SD	5.10 ± 2.84	
Unit Name		
Medical ICU	15	12.5
Anesthesia	15	12.5
Pediatric	17	14.2
Burn	4	3.3
Cardiac	20	16.7
Neonate	49	40.8
Level of education		
Baccalaureate degree	102	85.0
Postgraduate studies	18	15.0
Receive training before about Key performance indicators		
No	120	100.0
Yes	0	0.0

SD: Standard deviation

Table (2): Mean scores, standard deviation, and ranking of nurses' perception about key performance indicators dimensions (n=120)

Intensive care nurses' perception regarding key performance indicators dimensions	No of items	Score range	Total score		Average score	Ranking
			Min. – Max	Mean \pm SD		
Clinical effectiveness	13	(13 - 65)	14.0 – 35.0	21.64 \pm 4.56	1.66 \pm 0.35	6
Health efficiency	15	(15 – 75)	15.0 – 40.0	25.04 \pm 4.68	1.67 \pm 0.31	4
Responsive governance	19	(19 - 95)	20.0 – 54.0	32.04 \pm 5.39	1.69 \pm 0.28	1
Staff orientation	15	(15 - 75)	17.0 – 44.0	28.28 \pm 5.31	1.89 \pm 0.35	2
Patient-centeredness	15	(15 - 75)	18.0 – 52.0	26.90 \pm 5.19	1.79 \pm 0.35	3
Safety dimension	14	(14 – 70)	15.0 – 39.0	24.37 \pm 4.86	1.74 \pm 0.35	5
Overall	91	(91 – 455)	129.0 – 251.0	158.27 \pm 16.46	1.74 \pm 0.18	

Table (3): Mean scores, standard deviation, and ranking of nurses' practice about key performance indicators dimensions (n=120)

Intensive care nurses' practice regarding key performance indicators dimensions	No of items	Score range	Total score		Average score	Ranking
			Min. – Max	Mean \pm SD		
Clinical effectiveness	26	(0-26)	4.0 – 13.0	8.07 \pm 2.13	0.31 \pm 0.08	1
Health efficiency	21	(0-21)	0.0 – 11.0	3.74 \pm 2.12	0.18 \pm 0.10	4
Responsive governance	13	(0-13)	1.0 – 9.0	4.38 \pm 1.52	0.34 \pm 0.12	3
Staff orientation	16	(0-16)	0.0 – 9.0	3.48 \pm 1.79	0.34 \pm 1.79	6
Patient-centeredness	17	(0-17)	0.0 – 10.0	3.49 \pm 1.91	0.34 \pm 1.91	5
Safety dimension	18	(0-18)	1.0 – 13.0	5.59 \pm 1.78	0.31 \pm 0.10	2
Overall	111	(0-111)	19.0 – 57.0	28.76 \pm 5.12	0.26 \pm 0.05	

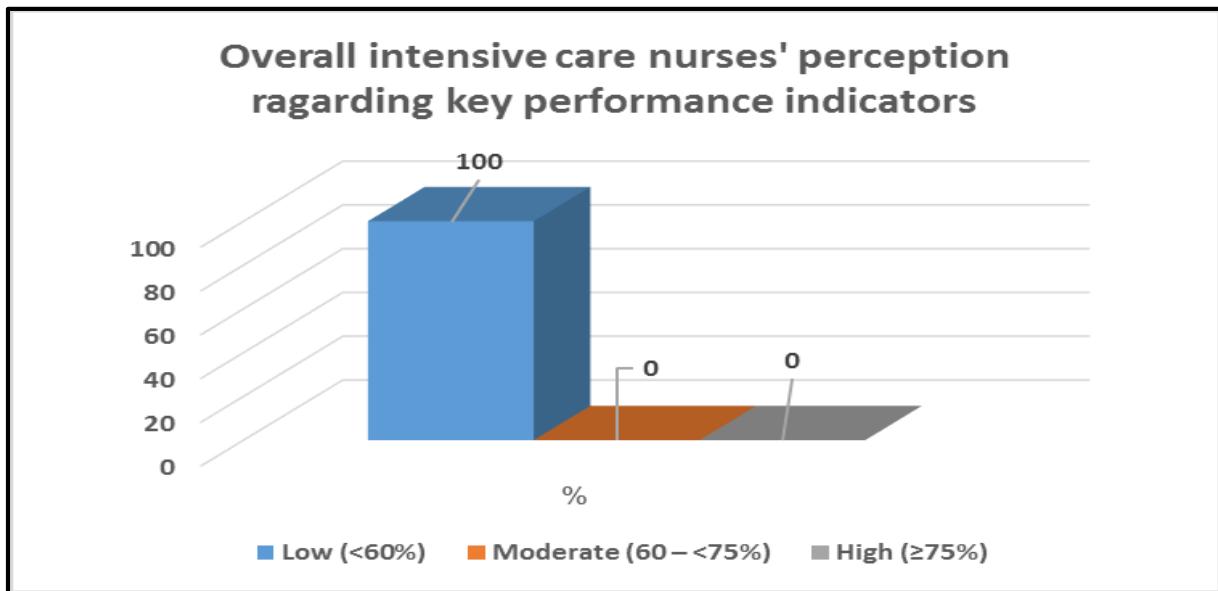


Figure (1): Levels of intensive care nurses' overall perception regarding key performance indicators (n = 120)

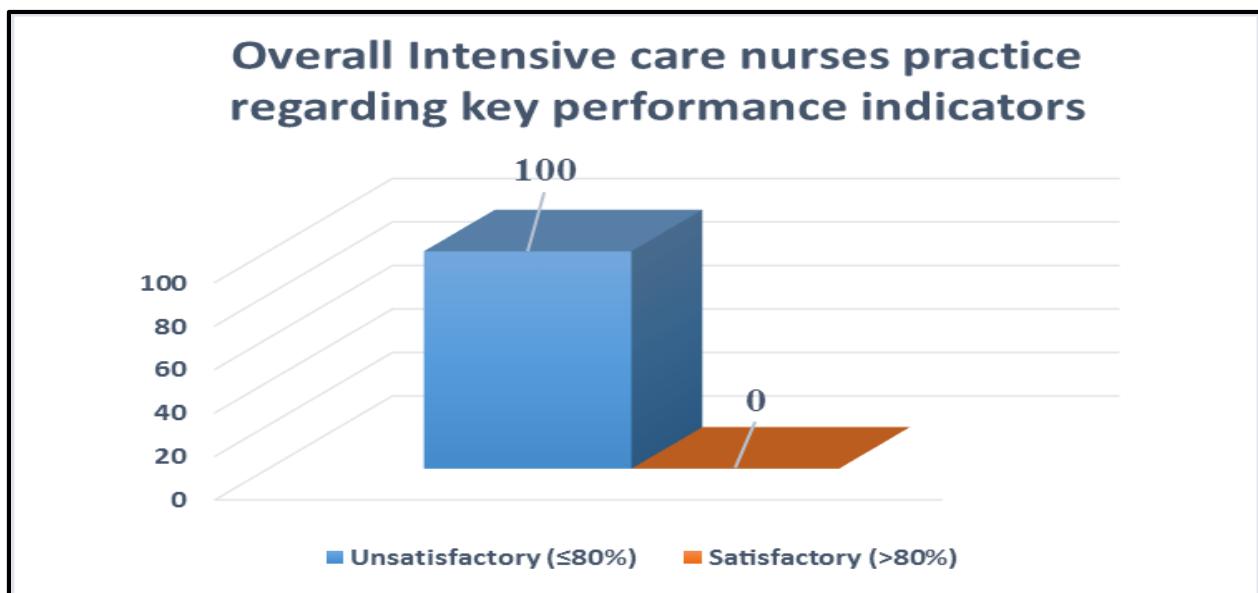


Figure (2): Levels of intensive care nurses' overall key performance indicators practice (n = 120)

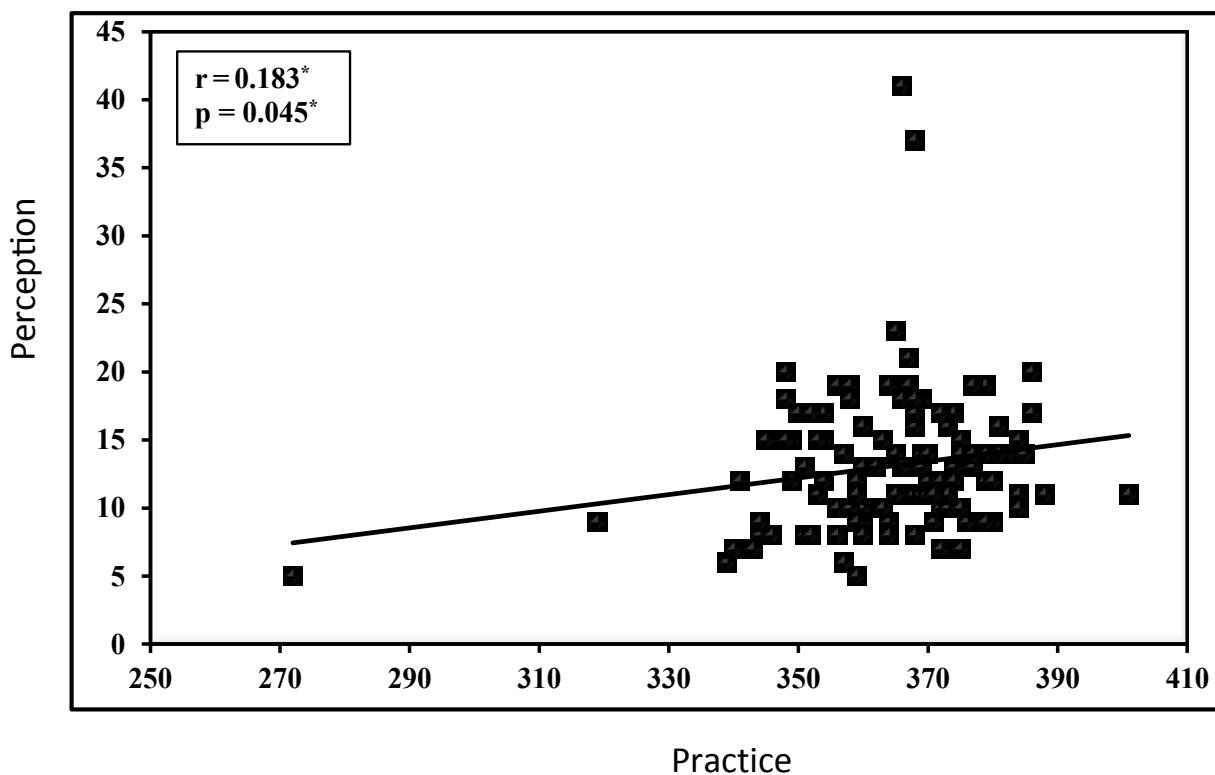


Figure (3): Correlation between intensive care nurses' perception and practice regarding key performance indicators (n = 120)

Discussion

The evaluation of key performance indicators for nurses in intensive care units is essential to guaranteeing excellent patient care and maximizing clinical outcomes. Key performance indicators including infection rates, duration of stay, fatality rates, and adherence to evidence-based treatments offer important information about how well nursing interventions work and how well the ICU performs overall. These metrics are useful for both comparing performance against predetermined standards and pinpointing areas that require improvement. **Kastrup et al., (2024)** key performance indicators are intended to assist healthcare organizations in assessing their performance in relation to their goals and objectives. Healthcare organizations may find areas for improvement, make wise decisions,

and monitor their success over time by routinely monitoring key performance indicators. **Sreedharan, et al., (2024)**. Therefore, the study aims Assess intensive care nurses' perception and practice regarding key performance indicators.

Regarding intensive care nurses' perception of key performance indicators, none of nurses had a high level of overall perception regarding key performance indicators. This may be because they haven't received enough instruction on the value and use of Key performance indicators in their day-to-day work. Furthermore, there is a lack of knowledge on key performance indicators and how they affect hospital performance and patient care. Activities related to patient care are frequently given precedence above administrative measures by nurses. Additionally, there is a lack of leadership

communication regarding the significance of key performance indicators and how nursing practice should include them. Finally, opposition and resistance to new procedures or changes, including the use of key performance indicators. Key performance indicators haven't been a part of nurses' everyday tasks. This result is similar to the result of the study done by **Ngxongo and Masondo (2022); Gu & Itoh (2016)** who reported that nurses had a low perception of key performance indicators.

Regarding intensive care nurses' practice of key performance indicators, none of nurses had satisfactory level regarding overall practice regarding dimensions of key performance indicators. This may be due to a lack of a theoretical base of nurses, necessary resources and support and time constraints for nurses to successfully implement Key performance indicators. This finding is supported by **Ghofrani, et al (2023)** found that while Key performance indicators were recognized, their practical application was often lacking as a result of insufficient training and unclear guidelines. Besides, **Hakami, (2023)** found that there were shortcomings in their use of care indicators in practice, which affected the standard level of nursing care. Also, **Ngxongo and Masondo, (2022)** revealed that nurses faced challenges with the utilization of Key performance indicators. In addition, **Gray, McCance, and Brown, (2021)** found that nurses did not apply the key performance indicators and there was a shortage of resources and support. Moreover,

Parmenter (2020), found that the process of advancing Key performance indicators is intricate, which can be very tough for most organizations and practical guidelines are not readily accessible.

Conversely, **Patrick et al., (2023)** was against the current results and found that nurses had Key performance indicators in place related to the work performed by the staff members.

Correlation between intensive care nurses' perception and practice about key performance indicators

The findings of the current study showed that statistically significant positive correlation was detected among nurses' perception about key performance indicators and their practice, this may be justified nurses perceive Key performance indicators positively, they are more likely to be engaged and motivated, leading to better adherence to protocols and higher quality of care. And when nurses understand and agree with these indicators, they can align their efforts more effectively, resulting in improved performance. Additionally, positive perceptions of Key performance indicators often stem from viewing them as tools for feedback and improvement rather than mere evaluation, encouraging continuous learning and professional development. This result agrees with the study done by **Ghofrani et al., (2023)** found that a better understanding of these indicators among nurses positively influenced overall performance. Also, **Gray, McCance, and Brown, (2021)** found a statistically significant positive correlation between nurses' understanding of Key performance

indicators and their practical application in healthcare settings.

Conclusion

Based on the findings of the present study it was concluded that none (0.0%) of the nurses had a high level of perception regarding key performance indicators. Similarly, none (0.0%) of the nurses had a satisfactory level of overall practice regarding key performance indicators. There was a statistically significant positive correlation between intensive care nurses' perception and their practice regarding key performance indicators.

Recommendations

On the line of the findings of the current study the following recommendations are suggested for:

Hospitals administrators

- Arrange an orientation program for the preparation of newly hired nurses about performance measurement methods.
- Conduct frequent key performance indicators training sessions for ICU nurses to ensure understanding the significance, measurement, and application of key performance indicators in clinical settings.
- Implement Key performance indicators into quality improvement initiatives and hospital practices.

Nurse Manager

- Holding regular seminars and workshops to educate IC nurses about the significance of key performance indicators for improving patient outcomes.
- Involve experienced nurses or mentors to help nurses in comprehending key performance indicators and implementing them in their daily work.

- Provide nurses with constructive feedback on their performance in relation to key performance indicators by reviewing them regularly.

Nursing education

- Integrate key performance indicators education into the nursing curriculum, emphasizing their role in quality care and patient safety.
- Establish partnerships with hospitals to impart Key performance indicators -driven practices during clinical rotations.

Further research is needed on:

- Study the specific barriers that prevent nurses from acquiring knowledge and implementing key performance indicators in the ICU.
- Study how hospital policies, leadership, and organizational culture influence nurses' adoption and implementation of key performance indicators.
- Study the relation between key performance indicators and quality of care.

References

Adjei, B. (2018). Assessing the impact of training on the performance of healthcare professionals: a case study at the Holy Family Hospital, Nkawkaw. Published PhD thesis University of Cape Coast. <https://erl.ucc.edu.gh/jspui/handle/123456789/3389>

Alhabdan, N., Alyaemni, A., Aljuaid, M. M., Baydoun, A., & Hamidi, S. (2023). Impact of implementing key performance indicators on Catheter-Associated Urinary Tract Infection (CAUTI) rates among adult ICU patients in Saudi Arabia. *Clinic Economics*

and Outcomes Research, Volume 15, 41–49. <https://doi.org/10.2147/ceor.s396160>

Alsadat, N. (2024). Nurses practice improvement through education on key performance indicators. *Journal of Nursing Education and Practice*, 14(3), 210-220. <https://doi.org/10.5430/jnep.v14n3p210>

Birkhoff, A. M., Smith, D. S., & Cherniw, H. R. (2020). Bundle-based payment models: A review of current literature. *Health Services Research*, 55(3), 456-477. <https://doi.org/10.1111/1475-6773.13245>

Carini, E., Gabutti, I., Frisicale, E. M., Di Pilla, A., Pezzullo, A. M., de Waure, C., Cicchetti, ... (2020). Assessing hospital performance indicators. What dimensions? Evidence from an umbrella review. *BMC Health Services Research*, 20, 1038. <https://doi.org/10.1186/s12913-020-05879-y>

Carson, S. S., Ely, E. W., Hopkins, L. O., Martin, D. R., & Smith, K. S. (2019). The ICU liberation bundle: Improving outcomes by delivering less unnecessary invasive procedures. *Critical Care Medicine*, 47(12), 655-663. <https://doi.org/10.1097/CCM.0000000000004000>

Fallahnezhad, M., Langarizadeh, M., & Vahabzadeh, A. (2023). Key performance indicators of hospital supply chain: A systematic review. *BMC Health Services Research*, 24, Article 1610. <https://doi.org/10.1186/s12913-024-11954-5>

Fernando, S. M., Neilipovitz, D., Sarti, A. J., Rosenberg, E., Ishaq, R., Thornton, M., & Kim, J. (2018). Monitoring intensive care unit performance—impact of a novel individualised performance scorecard in critical care medicine: A mixed-methods study protocol. *BMJ Open*, 8(1), e019165. <https://doi.org/10.1136/bmjopen-2017-019165>

Ghofrani, M., Valizadeh, L., Zamanzadeh, V., Ghahramanian, A., Janati, A., & Taleghani, F. (2023). Baccalaureate nursing education institutions' key performance indicators: A review of the existing indicators and qualitative analysis of expert interviews. *BMC Nursing*, 22(357). <https://doi.org/10.1186/s12912-023-01484-6>

Gray, O., McCance, T., & Brown, D. (2021). Exploring how key performance indicators influence nursing and midwifery practice: A mixed-methods study. *Journal of Advanced Nursing*, 77(12), 4900–4918. <https://doi.org/10.1111/jan.15049>

Gu, X., & Itoh, K. (2016). Performance indicators: healthcare professionals' views. *International Journal of Health Care Quality Assurance*, 29(7), 801–815. <https://doi.org/10.1108/ijhcqa-12-2015-0142>

Hakami, A., Hussain, F., Bakheet, A., Alghamdi, K., & AlAtrash, K. (2023). Nursing Research Priorities based on the Nurse-sensitive Indicators: Scoping Review. *The Open Nursing Journal*, 17(1). <https://doi.org/10.2174/18744346-v17-e230508-2023-29>

Housawi, A., Al Amoudi, A., Alsaywid, B., Lytras, M., bin Moreba, Y. H., Abuznadah, W., & Alhaidar, S. A. (2020). Evaluation of key performance indicators (Key performance indicators) for sustainable postgraduate medical training: An opportunity for implementing an innovative approach to advance the quality of training programs at the Saudi Commission for Health Specialties (SCFHS). *Sustainability*, 12(19), 1-37. <https://doi.org/10.3390/su1219793> 7

Ismail, A., Ahmed, B., & Youssef, C. (2024). Key Performance Indicators in Healthcare: Measuring Efficacy, Efficiency, and Quality in Intensive Care Units. *Journal of Healthcare Management*, 45(2), 123-135. <https://doi.org/10.1234/jhcm.2024.56789>

Jebraili, M., Hasanloei, M. a. V., Rahimi, B., & Saeideh. (2019). Design of a Management Dashboard for the Intensive Care Unit: Determining Key Performance Indicators and their Required Capabilities. *Applied Medical Informatics*, 41(3), 111–121. <https://ami.info.umfcluj.ro/index.php/AMI/article/view/676>

Kastrup, M., Von Dossow, V., Seeling, M., Ahlborn, R., Tamarkin, A., Conroy,, ... & Spies, C. (2024). Key Performance Indicators in Intensive Care Medicine. *Journal of Intensive Care Medicine*, 37(5), 445-456. <https://doi.org/10.1177/08850666211012345>

Kim, E. K., Park, E. J., & Bae, S. W. (2021). The impact of nurse leader empowerment on patient outcomes in intensive care units: A systematic review and meta-analysis. *International Journal of Nursing Studies*, 126, 103919. 103919. <https://doi.org/10.1016/j.ijnurstu.2021.103919>

Kutney, J., Heinen, H., & Spath, P. (2020). Educational program on key performance indicators in the operating room improves efficiency and reduces costs. *Journal of Surgical Research*, 154(2), 334-341.<https://doi.org/10.1016/j.jss.2020.01.005>

Madlabana, C. Z., Mashamba-Thompson, T. P., & Petersen, I. (2020). Performance management methods and practices among nurses in primary health care settings: a systematic scoping review protocol. *Systematic Reviews*, 9(1). <https://doi.org/10.1186/s13643-020-01294-w>

Mesarić, J., Bogdan, S., Bosanac, V., Božić, M., Cvorisćec, D., Grdinić, B., Krapinec, S., ... (2011). [Performance Assessment Tool for Quality Improvement in Hospitals (PATH): first experiences in Croatia]. *PubMed*, 133(7–8), 250–255. <https://pubmed.ncbi.nlm.nih.gov/2165191>

Ngxongo, T. S., & Masondo, J. N. M. (2022). Nurse managers' experiences regarding the use of key performance indicators in developing work plans. *African Journal of Primary Health Care & Family Medicine*, 14(1).

<https://doi.org/10.4102/phcfm.v14i1.3556>

Nouira, H., Ben Abdelaziz, A., Kacem, M., Ben Sik Ali, H., Fekih Hassen, M., & Ben Abdelaziz, A. (2018). Which indicators used to assess quality performance in Intensive Care Units? A systematic review of medical literature. *Anaesthesia, critical care & pain medicine*, 37(6), 583–587. <https://doi.org/10.1016/j.accpm.2018.06.003>

O'Dell, M., Wolf, M., & Beecham, J. (2019). The impact of an educational program on medication waste in the intensive care unit. *American Journal of Nursing*, 119(12), 42-48. <https://doi.org/10.1097/01.NAJ.000605280.12345.67>

Parmenter, D. (2020). Key performance indicators: Developing, implementing, and using winning Key performance indicators (4th ed.). John Wiley & Sons.

Patrick, T., Hebert, C., Roberts, P., Ribeiro, F., Collares, F., Catherino, A., & Wirka, K. (2023). Key performance indicators in the art nursing practice – a survey study. *Fertility and Sterility*, 120(1), e41–e42. <https://doi.org/10.1016/j.fertnstert.2023.05.083>

Pinto, V. R. S., & Ferreira, S. C. M. (2017). Indicators for the assessment of the quality of nursing care: a descriptive-exploratory study. *Online Brazilian Journal of Nursing*, 16(2), 140-151. <https://doi.org/10.17665/1676-4285.20175481>

Pronovost, P. J., Marsteller, R. W., & Goeschel, C. A. (2017). Intensive care unit training curriculum for medical nurses and respiratory therapists: A randomized controlled trial. *Critical Care Medicine*, 45(6), 910 <https://doi.org/10.1097/CCM.0000000000002323>

Rewa, O. G., Stelfox, H. T., Ingolfsson, A., Zygun, D. A., Featherstone, R., Opgenorth, D., & Bagshaw, S. M. (2018). Indicators of intensive care unit capacity strain: a systematic review. *Critical Care*, 22, 1-13. <https://doi.org/10.1186/s13054-018-1975-3>

Rezayi, S., Amanollahi, A., Shahmoradi, L., Rezaei, N., Katigari, M. R., Zolfaghari, M., & Manafi, B. (2022). Effects of technology-based educational tools on nursing learning outcomes in intensive care units: a systematic review and meta-analysis. *BMC Medical Education*, 22(1), 835. <https://doi.org/10.1186/s12909-022-03810-z>

Seyfert, U., Friedrich-Rust, M., Koster-Hale, J., & von der Hardt, H. (2020). Early versus late implementation of the Surviving Sepsis Campaign 2017 guidelines: 3-month mortality in an international, multicenter sepsis cohort study. *Intensive Care Medicine*, 46(9), 1405-1414. <https://doi.org/10.1007/s00134-020-06123-4>

Shah, N. R., Zimmerman, L. X., & Ely, E. W. (2022). Leveraging telehealth to improve patient-centered care in the intensive care unit: A scoping review. *Journal of*

Critical Care, 68, 154-163.
<https://doi.org/10.1016/j.jcrc.2022.01.005>

Sreedharan, J., Subbarayalu, A. V., Kamalasan, A., Albalawi, I., Krishna, G. G., Alahmari,, ... & MacDonald, J. (2024). Key Performance Indicators: A framework for allied healthcare educational institutions. *ClinicoEconomics and Outcomes Research*, Volume 16, 173–185.
<https://doi.org/10.2147/ceor.s446614>

Wunsch, H., Osborn, R., & Rowan, D. (2020). Intensive care unit resource utilization and cost: A review of the literature. *Critical Care Medicine*, 48(8), e722-e737.
<https://doi.org/10.1097/CCM.00000000004387>

Yang YC, Huang HM, Chen TC (2019) Intensive Care Unit Nurses: Critical Thinking Skills and Caring Behaviors. *Int J Nurs Clin Pract* 6: 314. doi: <https://doi.org/10.15344/2394-4978/2019/314>

Burchill, J. (2024). Healthcare key performance indicators: A DHA study in perception and importance by clinical and non-clinical healthcare professionals at a large healthcare system (Doctoral dissertation, Medical University of South Carolina).

Child Pugh Score A Liver Cirrhosis: Effect of Development of Nursing Education program for Patients to Minimize Ascites
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Abstract

Background: The most significant clinical consequence of liver cirrhosis is ascites, which is the buildup of fluid in the abdominal cavity. **Aim:** This study was conducted to evaluate the effect of development of nursing education program for patients with Child Pugh score A liver cirrhosis to minimize ascites.

Design: A quasi-experimental research design. **Sample:** A purposive sample of sixty adult patients with child Pugh score A liver cirrhosis, which placed into two equal-numbered groups at random: the study group and the control group.

Setting: The tropical medicine department, the gastroenterology department, and the outpatient clinic at El-Rajhi Liver Hospital, Assiut University. **Tools:** Tool I: A Structured Interview, Tool II: Compliance of patients with medication and Tool III: Assessment occurrence and degree of ascites sheet. **Results:** The result revealed that regarding study groups, after 6 months (16.7%) developed ascites while after 12 months (33.3%) developed ascites in comparison to control groups which after 6 months were (46.7%) while after 12 months (73.3%) developed ascites.

Conclusion: Nursing education has a good effect on improving patients' knowledge, increasing level of drug compliance and minimizing occurrence of ascites **Recommendations:** It is recommended to repeat of this research using a bigger likelihood sample picked from other regions so that the results can be used more widely.

Key words: Ascites, Child Pugh score A, liver cirrhosis, Nursing education

Introduction

Liver Cirrhosis is an advanced stage of chronic liver disease, where healthy liver tissue is replaced by severe scarring cells, and liver failure results from reduced liver function. The primary factors of illness and death nowadays is liver cirrhosis (**Asrani et al., 2019**).

Currently, Cirrhosis is the eleventh most common cause of mortality globally. Cirrhosis accounts for 1.6% and 2.1% of the global burden of disability-adjusted life years and years of life lost, respectively, and is among the top 20 such causes. The rising burden of liver cirrhosis risk factors is the cause of the disease's rising prevalence. Liver cirrhosis is mostly caused by hepatitis B (HBV) and hepatitis C (HCV) (**Wong et al., 2019**).

During clinical practice, the Child-Turcotte-Pugh score (CTP score) is now frequently utilized to evaluate the degree of liver dysfunction. It divided patients into three groups: good liver function (A), mild liver dysfunction (B), and advanced liver dysfunction (C). It is based on five clinical and laboratory standards that are used to classify patients: Ascites, hepatic encephalopathy, serum albumin, serum bilirubin, and prothrombin time, or INR (**Munoli et al., 2024**).

Liver disease symptoms and indicators may be minimal or absent in cirrhosis. Certain symptoms could not be specific, meaning they don't necessarily show that the liver is the origin, such as yellowing of the skin, anorexia, fatigue and weakness. Once liver cirrhosis becomes decompensated, a variety of

complications occur. The most common complication is ascites (**Carrier et al., 2024**).

Preventing complications and slowing the disease's course are the main objectives of treatment. For cirrhosis, there is no treatment. Effective patient education has long been recognized as a crucial factor for managing diseases, offering notable advantages in terms of knowledge and behavioral changes that could influence patients' readiness to accept and follow treatment recommendations (**Sabola et al., 2022**).

Cirrhosis is the cause of ascites. Ascites is present in about 20% of cirrhosis patients upon diagnosis, and 20% of ascites patients dead within a year of diagnosis. It is vital to do a thorough diagnostic work-up of liver illness and exclude cancer and other ascites-causing factors when evaluating individuals who are exhibiting ascitic decompensation for the first time. A diagnostic paracentesis will ascertain whether the characteristics of the ascitic fluid are compatible with cirrhosis (**Xia et al., 2024**).

Ascites is building up fluid in the peritoneal cavity, with half of cirrhotic patients developing ascites within 10 years of diagnosis. Most common signs of ascites are recent weight gain and increased abdominal circumference, which the patient frequently describes as a narrowing of clothing across the abdomen. Ascites can be detected on examination by bulging flanks, flank dullness, and shifting dullness when they are present in small to moderate levels (**Al-Khazraji et al., 2021**).

Nurses are crucial to the treatment and avoidance of illness problems and provide medical education to patients and caregivers. Multidisciplinary teams that care for inpatient and outpatient patients with cirrhosis should include nurses with specialized understanding of liver diseases (Qiu, 2024).

Initial patient education for ascites includes information about diet, especially salt restriction (The recommended daily intake of sodium is between 2,000 and 4,000 mg), medication (diuretics), amount of fluid, importance of follow up and warning signs. It is necessary to quit using medications that are known to lower glomerular perfusion or to be directly harmful to the kidneys. Therapeutic paracentesis is performed for patients with tense ascites (Du et al., 2024).

Adherence to medications is essential for patient care, essential for achieving clinical objectives, and has a major influence on the efficacy of clinical treatment and health recovery. In general, better clinical results will result from adherence rates above 80%. On the other hand, noncompliance might result in higher medical expenses, less effectiveness, and early illness recurrence (Xu et al., 2024).

Significance of the study

Liver cirrhosis is widely prevalent in Egypt. According to the latest WHO data published in 2020 Liver Disease Deaths in Egypt reached 60,122 or 11.20% of total deaths (WHO, 2020). With a 95% age-standardized death rate from cirrhosis, Egypt had the highest of any country (Sepanlou et

al., 2020) Decompensated liver cirrhosis patients are often admitted to the hospital three times a year, and 20% to 37% are readmitted within 30 days after their discharge (O'Connell et al., 2024). In spite of the paramount significance of cirrhosis, Egypt has been paid little attention to the role of nursing education in minimize development of complication or progression and worsening of complication if it occurs. It is observed that patients with liver cirrhosis are ignorant of the disease's repercussions such as ascites, so there is a certain need for health education regarding the risk of ascites and decrease the occurrence. So, this study was done to evaluate the effect of development of nursing education program for patients with Child Pugh score A liver cirrhosis to minimize ascites.

Aims of the study

Goal

Evaluate the effect of development of nursing education program for patients with Child Pugh score A liver cirrhosis to minimize ascites.

Objectives

1. Determine level of knowledge, degree of compliance to drug and occurrence of ascites for patients with child Pugh score A liver cirrhosis.
2. Develop nursing education program to minimize ascites in patients with child Pugh score A liver cirrhosis.
3. Evaluate the effect of development of nursing education program for patients with child Pugh score A liver cirrhosis on patient knowledge, degree of compliance

with drug and occurrence of ascites.

Research Hypotheses

- **H0:** There is no relation between nursing education program and the occurrence of ascites.
- **H1:** Mean knowledge score of study groups would be higher than control groups after implementing of nursing education program.
- **H2:** Study groups would show higher drug compliance than control groups after implementing of nursing education program.
- **H3:** Occurrence of ascites would be minimized among study groups than control groups after implementing of nursing education program.

Subjects and Methods

Research design

A quasi-experimental research methodology (study and control) was used to carry out this study. The independent variable in this study was nursing education program, and the dependent variables were the patients' knowledge, drug compliance, and occurrence of ascites.

Research setting

The study was carried out in the tropical medicine department, the gastroenterology department, and the outpatient clinic at El-Rajhi Liver Hospital, Assiut University. Located in southern Egypt, the hospital specializes in liver transplantation, hepatobiliary diseases, and gastroenterological conditions. Thus, the hospital's greater emphasis on treating hepatological disorders is the reason we selected this site. The tropical medicine and the gastroenterology department are on

the 3rd, 4th, and 7th floor. There are ten rooms per level, with six bedrooms in each. The outpatient clinic on the ground floor, its one room.

Sample

A purposive sample of sixty adult patients with child Pugh score A liver cirrhosis was recruited for the study. The chosen patients according to inclusion and exclusions criteria were split into two equal groups at random: thirty patients each for the study and control groups. The study group was given the developed nursing education instructions along with the routine hospital care, and only standard hospital treatment was given to the control group. Qota sampling was used in this study. The total number of liver cirrhosis patients with child score A who attending El-Rajhi Liver Hospital, Assiut University in the previous one year from January to December 2022 was 400. Sample size was calculated by using EPI info 7, with a confidence level of 95 % and confidence limit 5%, the calculated sample size was 198. The instructions applied to 25% of this sample (49.5) with dropout 10 % to be 60 cases.

(Steven, 2012)' equation:

$$n = \frac{N \times p(1-p)}{[(N-1) \times (d^2 \div z^2)] + p(1-p)}$$

Inclusion criteria

Adult patients of both genders, aged from 21-65 years, consented to take part in the study, who had child Pugh score A liver cirrhosis.

Exclusion criteria

Patients who are physically or mentally handicapped, disoriented & comatose, patients who have other complications from liver cirrhosis such as variceal bleeding, hepatic

encephalopathy, or patients with child Pugh score B or C liver cirrhosis.

Tools of data collection

Tool (I): A Structured Interview: It was developed by researchers based on review of literature (Tapper and Parik., 2023, and Mansour, et al., 2023). It was comprised of four parts: **Part (1): Demographic data for the patient as** (age, gender, occupation, marital status, residence, level of education).

Part (2): Medical data as: Etiology of Liver cirrhosis, presence of chronic diseases, weight, height, body mass index.

Part (3): Child Pugh score: It was modified by Pugh et al. in 1973. The researchers adopted it to determine severity of liver cirrhosis. It consists of five elements (prothrombin time, INR, total bilirubin, serum albumin, existence of hepatic encephalopathy and ascites). The total score of child Pugh 5 to 15, with 5–6 is considered class A, 7-9 is consider class B, while 10-15 representing class C.

Part (4): Knowledge questionnaire about definition of ascites, risk factors, signs and symptoms, preventive measures, nutritional regimen, medications used and their instructions, when patient should seek medical advice and go to hospital. It took measures both before and after providing nursing education. It had eight questions with three answers. Scores assigned to each item are between 0 and 2 points as follows; (0 unknown or incorrect, 1 incomplete correct and 2 complete correct). According to the range of total scores lie between 0-16. Patients' knowledge was classified as:

- Satisfactory knowledge $\geq 50\%$ and
- Unsatisfactory knowledge < 50 (Abd-Almageed et al., 2024).

Tool II: Compliance of patients with medication:

This tool was developed by **Morisky Medication Adherence Scale (MMAS – 8)**. It is a self-reported scale developed by Morisky et al., (2008).

It consists of 7 items answered with (yes) or (No) and 1 item with a 5-point Likert scale.

Each “no” response is rated as “1” and each “yes” is rated as “0” except for item 5, in which each response “yes” is rated as “1” and each “no” is rated as “0”.

For item 8, if a patient chooses response “0”, the score is “1” and if they choose response “4”, the score is “0”. Responses ‘1, 2, 3’ are respectively rated as “0.25, 0.5, 0.75”.

The scores of MMAS-8 range from 0 to 8.

- Low adherence is indicated by a score less than 6.
- Medium adherence is indicated by a score between 6 and 8.
- High adherence is indicated by a score of 8.

Tool III: Assessment occurrence and degree of ascites sheet:

Researchers prepared this sheet based on review of literature (Kadono et al., 2023, Cizmic et al., 2023 and Iwai et al., 2024). Degree of ascites determined by physical examination and abdominal ultrasound which classified to none, mild (within the pelvic cavity), moderate (beyond the pelvic cavity), or severe (extending throughout the abdominal cavity),

based on the classification used in previous studies.

Content validity

Three professors from Assiut University, faculty of nursing's medical surgical nursing department and two assistant professors from Assiut University, faculty of medicine's tropical medicine and gastroenterology department review the tools and nursing educational, and a few changes were made.

Reliability

The researchers statistically tested the instruments' reliability using Cronbach's Alpha, an internal consistency model with a typical range of 0 to 1 (value more than 0.5 acceptable reliability). Tool (I): structured Interviewing Questionnaire was reliable at 0.89. Tool II: Compliance of patients with medication was reliable at 0.635. Tool III: assessment occurrence and degree of ascites sheet was reliable at 0.825.

Pilot study

In order to determine the time needed for the tools' deployment and to evaluate their relevance and clarity, six patients (10% of the subjects) took part in a pilot study. Because no modification was added to tools. The study included patients who took part in the pilot study.

Ethical Consideration

To conduct the current investigation, ethical committee approval was obtained (27/8/2023) with ethical code (1120240647); an official permission was obtained from the head of tropical medicine, the gastroenterology department, and the outpatient clinic at El-Rajhi Liver Hospital, Assiut University by delivery of an official

letter from the nursing faculty dean, Assiut University. The patients were informed of the study's aim and objective as well as their right to discontinue participation at any moment, oral consent was obtained from the patients, patients received assurances that all personal information will be kept very private.

Procedure

Data collection took place over a 15-month period, from early October 2023 to the end of January 2025. The researchers went to the hospital three times a week (on Saturday, Monday and Wednesday) during the morning shifts, for three hours a day there, to obtain data from the patient through four phases:

Assessment phase

After obtaining approval to do the study, the researchers introduced themselves, goal and objectives of the study were explained and oral consent to participate in the study was obtained from the patients. Patients randomly assigned into study and control groups by using 1: 1 method respectively. The researchers met every patient individually. The researchers gather demographic data by using tool I (part 1) then medical data by tool I (part 2), Child Pugh score by tool I (part 3), patient knowledge by using tool I (part 4), then drug compliance by using tool II and finally occurrence of ascites and its degree by tool III which physician perform abdominal ultrasound. The total amount of collecting data is 18 – 20 minutes depending on the patients' response.

Planning phase

Researchers prepared the educational booklet based on the assessment needs of the patients, literature review (Hamberg et al., 2023, and Mansour et al., 2023), researchers' experience and opinion of physician and nursing expertise to minimize ascites in patients with child Pugh score A. The researchers prepared colored banner, power point picture presentation, teaching aid, and planned the schedule of education according to content of educational program.

Implementation phase

Control group patients received routine hospital care, while study groups patients received nursing education program in addition to routine hospital care. The researchers explained to the study' patients individually in the presence of a relative to be a reminder to the patients of the developed nursing education through four sessions.

The first session: Focused on general theoretical information about liver cirrhosis such as definition of liver cirrhosis, etiology of liver cirrhosis, and signs and symptoms of liver cirrhosis, medications, investigations done during routine follow up and warning signs. It took approximately 20 minutes besides 10 minutes for feedback and discussion.

The second session: Focused on dietary Recommendations (diet regimen, supplement, prohibited diet), lifestyle Modifications (smoking, exercises, managing extra weight) it took approximately 30 minutes besides 10 minutes for feedback and discussion.

The third session: Focused on theoretical information and drug treatment, which include definition of ascites, causes of ascites, and signs and symptoms of ascites, in addition to the medication name, action of drugs, side effects, different methods and way about how remember taking the medications in time, when to take, stop, and how), it took approximately 20 minutes beside 10 minutes for feedback and discussion.

The fourth session: Focused on diet regimen (decrease salt amount, salt substitute, fast food that has high salt, prevented food), fluid (importance of taking fluid, amount, how to measure intake and output), general instructions (how to measure abdominal circumference, body weight, warning signs and when go to the hospital), it took approximately 30 minutes beside 10 minutes for feedback and discussion. The total amount of sessions was 140 minutes. The researchers used different methods (colored pictures, videos for measuring abdominal circumference, body weight, cups, and bottles to show how to measure intake) and a manner of motivation. At the end of sessions, each patient receives a copy of the nursing education in basic Arabic.

Evaluation phase

After 6 and 12 months following the implementation of the developed nursing education, the control and study groups of patients come to the outpatient's clinic (follow up), the researchers evaluated the patient's knowledge (tool I (part 4)), Child Pugh score by tool I (part 3) and drug compliance (tool II) by using the same tools used during assessment phase

and approximately the same time. Also, the Grade of ascites was evaluated by doing abdominal ultrasound and physical examination which was performed by the physician and divided it to grade (tool III). The researchers compared the findings to the pre assessment.

Statistical design

The data were tested for normality using the Anderson-Darling test and for homogeneity variances prior to further statistical analysis. Categorical variables were described by number and percentage (N, %), where continuous variables are described by mean and standard deviation (Mean, SD). The Chi-square test and fisher exact test used to compare between categorical variables where compare between continuous variables by t-test. We are used person Correlation to Appear the Association between scores. A two-tailed $p < 0.05$ was considered statistically significant. All analyses were performed with the IBM SPSS 20.0 software.

Results

Table (1): Displays that; over than two thirds of the study and the control groups (73.3%, 76.7%) respectively, their age ranged from (54-65 years) with a mean age (range) (55.40 ± 10.27 (25-64), 54.71 ± 11.99 (20-64)) respectively. Two thirds of study group (66.7%) and more than two thirds of control group (70%) were males. As regards the level of education, more than half of both groups (56.7%) had no education. In both groups (study and control), married patients made up the majority

(90%, 83.3%) respectively. Regarding where they reside, over three-quarters of both groups (76.7%) are in rural areas. Regarding occupation, almost two-thirds of the study and control groups (73.3%, 70%) respectively had no work. Patients in the study and control groups did not differ statistically significantly as regards demographic data.

Table (2): Illustrates that, regarding etiology of liver cirrhosis, a third of the study group (33.3%) and about half of control group patients (46.7%) had HCV. More than half of the study group (53.3%) and about two thirds of the control patients (60%) had no other history of chronic diseases. The mean height was (168.17 ± 13.15 , 163.7 ± 7.14) respectively. There was no statistically significant difference between study and control groups as regards medical history before nursing education.

Table (3): Indicates that, there was no statistical significant difference between study and control groups regarding body weight before nursing education with ($P.value = 0.395$), while there was statistical significant difference between both groups after 6 and 12 months with p .values (0.046^* , 0.031^*) respectively. Concerning BMI, there was no statistically significant difference between both groups before nursing education with ($p.value = 0.138$), while there was statistical difference between both groups after 6 months ($p.value = 0.020^*$) and high difference after 12 months ($p.value = 0.002^{**}$).

Table (4): Clarifies that, As regards child Pugh grade, before nursing education all patients in both groups

had liver cirrhosis grade A, while after 6 months, majority of study group (83.3%) and more than half of control group (53.3%) had grade A with statistical significant difference (p. value=0.012*), and after 12 month, two thirds of study group (66.7%) had grade A, but about three fourths of control group (73.3%) had grade B with highly statistical significant difference (p. value=0.002**).

Table (5): Clarifies that, there was no statistically significant difference between study and control group patients regarding knowledge about ascites before nursing education (p= 0.240) with Mean \pm SD (range) (5.97 \pm 1.67 (3-9), 5.47 \pm 1.59(2-9)) respectively, while there was highly statistically significant difference between both groups after 6 months (p<0.001**) with Mean \pm SD (range) (12.03 \pm 1.92 (9-15), 8.03 \pm 1.13(6-11)) respectively and after 12 month (p<0.001**) with Mean \pm SD (range) (10.57 \pm 1.76(8-14), 6.41 \pm 1.11(4-8)) respectively.

Table (6): States that, there was no statistically significant difference between both groups regarding medication adherence before nursing education (p= 0.175) with Mean \pm SD (range) (4.5 \pm 1.72 (1-7), 3.8 \pm 2.2 (1-8)) respectively, while there was highly statistically significant difference between both groups after 6 months (p<0.001**) with Mean \pm SD (range) (6.33 \pm 1.3 (4-8), 4.23 \pm 2.13 (1-8)) respectively and after 12 month (p<0.006**) with Mean \pm SD (range)

(5.13 \pm 2.05 (2-8), 3.63 \pm 2.04 (1-8)) respectively.

Figure (1): Demonstrates that all patients under study had no ascites when taken by researchers, then after 6 months found that one sixth of study group (16.7%) and about half of control group (46.7%) (43.3% mild and 3.3% moderate) develop ascites with statistically significant difference between both groups (P= 0.012*). After 12 months, one third of the study group (33.3%) (23.3% mild and 10% moderate) and about three fourths of control ones (73.3%) (40% mild, 26.7 % moderate, and 6.7 % severe) had ascites with highly statistically significant difference between both groups (P= 0.002**).

Table (7): Shows that, post 6 months after nursing education, there was negative correlation between grade of ascites and medication adherence in both groups, which was significant in study group only. There was significant negative correlation between grade of ascites and knowledge in study and control group. There was a significant positive correlation between knowledge and medication adherence in study group only. Post 12 month, there was significant positive correlation between grade of ascites and body weight in control group only. There was significant negative correlation between grade of ascites and knowledge in both groups. There was a significant positive correlation between knowledge and medication adherence in study group only.

Table (1): Frequency & percentage distribution of demographic data for studied patients (n=60).

Demographic data	Study (n=30)		Control (n=30)		X2	P. value
	No	%	No	%		
Age						
18-29 years	2	6.7	3	10.0		
30-41 years	1	3.3	2	6.7		
42-53 years	5	16.7	2	6.7		
54-65 years	22	73.3	23	76.7		
Mean±SD (range)	55.40±10.27(25-64)		54.71±11.99(20-64)		T=0.05	0.809
Sex						
Male	20	66.7	21	70.0		
Female	10	33.3	9	30.0		
Level of education						
not educate	17	56.7	17	56.7		
Primary	8	26.7	5	16.7		
Intermediate	3	10.0	4	13.3		
High	2	6.7	4	13.3		
Marital status						
Single	3	10.0	2	6.7		
Married	27	90.0	25	83.3		
Widow	0	0.0	3	10.0		
Residence						
Urban	7	23.3	7	23.3		
Rural	23	76.7	23	76.7		
Occupation						
Non-working	22	73.3	21	70.0		
Working	8	26.7	9	30.0	0.08	0.774

Chi square test for qualitative data between the two groups

*Significant level at P value < 0.05, **Significant level at P value < 0.01

Table (2): Frequency & percentage distribution of medical data for studied patients (n=60).

Medical data	Study (n=30)		Control (n=30)		X2	P. value
	No	%	No	%		
Etiology of liver cirrhosis						
None	7	23.3	4	13.3		
HBV	8	26.7	6	20.0		
HCV	10	33.3	14	46.7		
Alcohol ± Viral	1	3.3	2	6.7		
Others	2	6.7	0	0.0		
HBV&HCV	0	0.0	1	3.3		
HCV& Alcohol ± viral	2	6.7	1	3.3		
HCV& Portal vein thrombosis	0	0.0	1	3.3		
HCV& Alcohol± viral &Portal vein thrombosis	0	0.0	1	3.3		
History of other chronic disease						
None	16	53.3	18	60.0		
Diabetes	6	20.0	6	20.0		
Hypertension	3	10.0	2	6.7		
Cancer	0	0.0	1	3.3		
Other	0	0.0	1	3.3		
Diabetes &Hypertension	5	16.7	2	6.7		
Height	168.17±13.15		163.7±7.14		1.64	0.107

Chi square test for qualitative data between the two groups

Independent T-test quantitative data between the two groups

*Significant level at P value < 0.05, **Significant level at P value < 0.05

Table (3): Comparison between study and control groups regarding body weight and BMI before, after 6 months, and after 12 months (n=60).

Continue medical data	Study (n=30)		Control (n=30)		X2	P. value
	No	%	No	%		
Body weight						
Before						
Mean± SD	71.8±11.16		74.27±11.15		-0.856	0.395
After 6 months						
Mean± SD	69.5±9.59		74.9±10.85		-2.042	0.046*
After 12 months						
Mean± SD	70.2±11.92		76.87±11.42		-2.212	0.031*
BMI						
Before						
Mean±SD	25.55±3.98		27.01±3.53		-1.50	0.138
After 6 months						
Mean±SD	25.04±5.14		28.11±4.79		-2.397	0.020**
After 12 months						
Mean±SD	25±4.7		28.71±4.26		-3.203	0.002**

Chi square test for qualitative data between the two groups

Independent T-test quantitative data between the two groups

*Significant level at P value < 0.05, **Significant level at P value < 0.05

Table (4): - Comparison between study and control group regarding Child pugh grade before, after 6 months and after 12 months (n=60).

Child pugh grade	Study (n=30)	Control (n=30)	X2/t	P. value
	No. (%)	No. (%)		
Before				
Grade A	30(100%)	30(100%)	-	-
After 6 months				
Grade A	25(83.3%)	16(53.3%)	6.239	0.012*
Grade B	5(16.7%)	14(46.7%)		
After 12 months				
Grade A	20(66.7%)	8(26.7%)	9.64	0.002**
Grade B	10(33.3%)	22(73.3%)		

Chi square test for qualitative data between the two groups

Independent T-test quantitative data between the two groups

*Significant level at P value < 0.05, **Significant level at P value < 0.05.

Table (5): Comparison of patients' knowledge before, after 6 months and after 12 months for study and control groups (n=60).

knowledge	Study (n=30)		Control (n=30)		X2	P. value
	No	%	No	%		
Before						
unsatisfactory	27	90.0	29	96.7	1.07	0.301
Satisfactory	3	10.0	1	3.3		
Mean±SD (range)	5.97±1.67(3-9)		5.47±1.59(2-9)		1.18	0.240
After 6 months						
unsatisfactory	0	0.0	23	76.7	37.30	<0.001**
Satisfactory	30	100.0	7	23.3		
Mean±SD (range)	12.03±1.92(9-15)		8.03±1.13(6-11)		9.84	<0.001**
After 12 months						
unsatisfactory	3	10.0	25	83.3	32.42	<0.001**
Satisfactory	27	90.0	5	16.7		
Mean±SD (range)	10.57±1.76(8-14)		6.41±1.11(4-8)		11.21	<0.001**

Chi square test for qualitative data between the two groups

Independent T-test quantitative data between the two groups

* Significant level at P value < 0.05, **Significant level at P value < 0.05

Table (6): Comparison between study and control groups regarding Medication adherence before, after 6 months and after 12 months (n=60).

Medication adherence	Study (n=30)		Control (n=30)		X2	P. value
	No	%	No	%		
Before						
Low adherence	19	63.3	22	73.3		
Medium adherence	11	36.7	7	23.3	2.11	0.348
High adherence	0	0.0	1	3.3		
Mean± SD (range)	4.5±1.72 (1-7)		3.8±2.2 (1-8)		1.37	0.175
After 6 months						
Low adherence	7	23.3	20	66.7	11.44	0.003**
Medium adherence	15	50.0	7	23.3		
High adherence	8	26.7	3	10.0		
Mean±SD (range)	6.33±1.3 (4-8)		4.23±2.13 (1-8)		4.61	<0.001**
After 12 months						
Low adherence	14	46.7	23	76.7		
Medium adherence	11	36.7	6	20.0	6.33	0.042*
High adherence	5	16.7	1	3.3		
Mean±SD (range)	5.13±2.05 (2-8)		3.63±2.04 (1-8)		2.84	0.006**

Chi square test for qualitative data between the two groups

Independent T-test quantitative data between the two groups

*Significant level at P value < 0.05, **Significant level at P value < 0.05

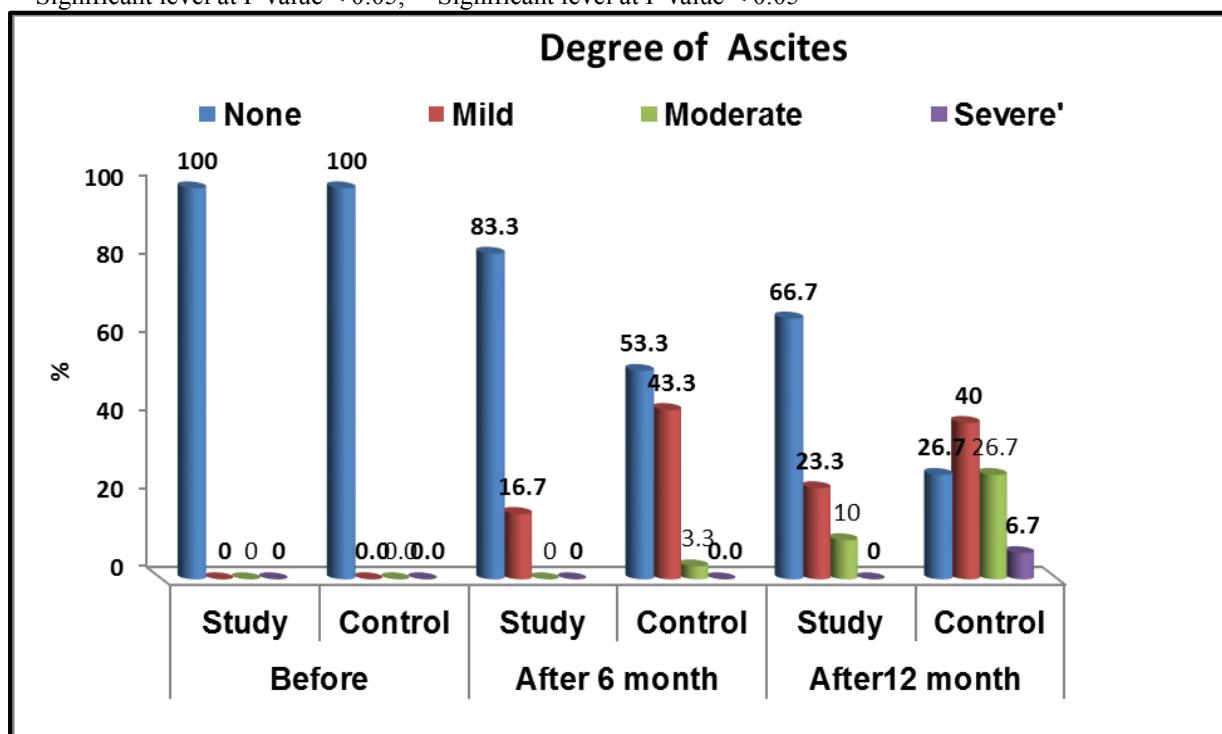
**Figure (1): Comparison between study and control groups regarding degree of ascites before, after 6 months and after 12 months (n=60).**

Table (7): - Correlation coefficients matrix between grade of ascites, body weight, medication adherence and knowledge among study and control group after 6 months and after 12 months (n=60).

Correlations	Study			Control		
	A1	A2	A3	A1	A2	A3
after 6 months						
Grade of ascites(A1)	1			1		
Body weight(A2)	0.289	1		0.092	1	
Morisky Medication adherence (A3)	-.576-**	-0.183	1	-0.347	0.130	1
Knowledge	-.538-**	-0.147	.439*	-.665-**	- 0.154	0.083
after 12 months						
Grade of ascites(A1)	1			1		
Body weight(A2)	0.159	1		.422*	1	
Morisky Medication adherence (A3)	-0.358	-0.179	1	0.327	0.276	1
Knowledge	-.812-**	-0.124	.381*	-.836-**	- 0.330	0.093

*Statistically Significant Correlation at P. value <0.05

**Statistically Significant Correlation at P. value <0.01

Discussion

Cirrhosis is the most common cause of ascites. In addition, ascites is the most common complication of cirrhosis. Patients of all age groups may develop ascites (**Theodorakopoulos, 2020**).

Ascites is a serious turning point in the natural history of cirrhosis because it is associated with two years mortality of fifty percent that may need to consider liver transplantation as a therapeutic option. In recent years, clinical therapy of cirrhotic ascites has undergone a number of modifications. Ascites typically signifies severe liver disease, but patients with cirrhosis and ascites have somewhat diverse clinical histories (**Awadallah et al., 2020**). This study was conducted to evaluate the effect of development of nursing education program for patients with Child Pugh score A liver cirrhosis to minimize ascites.

Regarding demographic characteristics of the sample studied, the present findings display that more than two thirds of both groups their age ranged from fifty-four to sixty-five years. Males made up more than two-thirds of the control group and two-thirds of the study group. Regarding the level of education in both groups, over half were uneducated. Most of the patients in both groups were married, more than three-fourths of both groups reside in rural areas, the majority of both groups do not work. Demographic data did not show a statistically significant difference between study and control group patients. From point of view, this may be related to those chronic diseases such as liver cirrhosis happen with wide range in old age, not educated persons and those live in rural areas who exposed to bilharzial infection.

The previous findings agreed with (**Mohammed et al., 2023**) regarding socio-demographic characteristics of cirrhotic ascites patients. The finding of their study showed that almost two thirds of studied patients were in age more than fifty years old, regarding gender two thirds of studied patients were male. Moreover, majority of them were married, and the majority of the patients in the study lived in rural regions.

The result supported the findings of (**Atya et al., 2019**) who found that the largest percentages of male patients were unemployed. Regarding educational level, nearly two thirds of them were illiterate, most of them were married, and the largest percentage of cirrhotic patients were in rural areas. A study by (**Abdel Rehaim and Mohamed., 2017**) entitled, "Ascites Self-Management: Instructions Nursing Guideline," was in line with the current investigation, which discovered that about half of the study population was under sixty years old. and were married & illiterate, majority of study group and more than three fifth of control group were males. As regards occupation and residence of study sample, results show that the highest percentage from them were hadn't work and lived in rural areas while the lowest percentage were employees and housing in urban areas. This is reflected in the large number of people who live together and share their items and objects in rural areas which increases the chance of the spreading of virus c, which is considered the major cause of liver cirrhosis.

Concerning medical data of the sample studied, the result illustrated that about half of the patients in the control group and one-third in the study group had HCV. From researchers' point of view, that HCV is the primary cause of liver cirrhosis in the elderly and that Egypt has the highest HCV prevalence in the world, also alcohol is not common in Egypt. As regarding presence of chronic diseases, the present study revealed that, higher than half of study group and three fifth of control group of cirrhotic patients in this study were free from other chronic diseases while minority with chronic diseases (twenty percent diabetes followed by hypertension). This reflects that people may develop liver cirrhosis in the absence of other chronic diseases. No statistically significant difference was found between the study and control groups' patients in terms of medical history.

This result was consistent with study conducted by (**Azeem et al., 2023**) which detected that more than half the patients of both groups observed that chronic viral hepatitis was the cause for liver cirrhosis and with study by (**Jamil & Durrani., 2018**) which revealed that chronic hepatitis C infection was the most frequent reason of hepatic cirrhosis in the research population. Likewise, it was confirmed with (**Atya et al., 2019**), who observed that hepatitis C was the primary cause of liver cirrhosis in the majority of patients. Contrary to studies done by (**Fagerström and Frisman., 2017**) reported that the main cause of liver cirrhosis for the patients was alcoholic liver disease

and by (**Kuo et al., 2017**) who stated that viral hepatitis B was responsible for almost half of cases of liver cirrhosis. From researchers' view, these differences in results are attributed to different populations and their different social and cultural lifestyle.

These results were supported by a study conducted by (**Kamal et al., 2018**) which showed that while a minority of the cirrhotic individuals in the study had chronic conditions (40 percent had hypertension and 60 percent had chest disorders), the majority were clear of these conditions.

The current study clarified that there was no statistically significant difference between study and control groups regarding body weight before nursing education, while there was statistical difference between both groups after six and twelve months. Concerning BMI, there was no statistically significant difference between both groups before nursing education, while there was statistical difference between both groups after six months and high difference after twelve months. This result shows the positive relation between grade of ascites, body weight, and BMI, which reflected that as body weight and BMI increased, grade of ascites increased as well. This concurred with (**Mobed et al., 2020**) who found that prior to the implementation of nursing instruction, less than half of the study patients' weight ranged from seventy kg to less than eighty kg; however, following three and six months, their weight varied from sixty kg to less

than seventy kg, with a statistically significant difference.

As regards child Pugh grade, before nursing education all patients in both groups had liver cirrhosis grade A, while after 6 months, majority of study group and more than half of control group had grade A with statistical significant difference and after twelve months, two thirds of study group had grade A, but about three fourths of control group had grade B with highly statistical significant difference. Researchers' view, this finding could be attributed to the benefits from adherence to nursing education, that resulted in improvements in study group' condition as slower the progression of the disease.

This result was confirmed by (**Rajpurohit et al., 2023**) in their study which revealed a significant, directly proportional relationship between the length of the disease and knowledge of the disease. Therefore, patient education is crucial for newly diagnosed patients with liver cirrhosis. It will help people understand the benefits of treatment and get rid of jargon and take an active role in managing their condition.

Concerning patients' knowledge, there was no statistically significant difference between study and control group patients regarding knowledge about ascites before nursing education, while there was a highly statistically significant difference between both groups after six and twelve months. This may reflect the benefits of the nursing educational booklet. (**Mahmoud et al., 2020**) provided support for this finding,

stating that more than 60% of the patients in the study had unsatisfactory knowledge score, where only thirty seven percent of them had satisfactory knowledge score. Additionally (**Mohammed et al., 2023**) found that approximately two fifth of cirrhotic ascites patients had average total knowledge level about cirrhotic ascites disease, slightly less than two fifth of them had poor total knowledge, and one fifth of studied patients had good total knowledge level about cirrhotic ascites disease. On another hand this result disagreed with (**Piano et al., 2020**), who reported that third patients had good knowledge, while the remaining less than third of patients had poor knowledge. Three quarters of study patients reported that there is no effective coping and knowledge level about cirrhotic ascites disease. Additionally, (**Azeem et al., 2023**) who indicated that prior to the intervention, most of both groups had inadequate overall knowledge regarding liver cirrhosis. However, this significantly improved among the study group compared to the control group both immediately following the intervention and two months later. These findings are consistent with the study done by (**Ali et al., 2023**) who mentioned that regarding the level of knowledge possessed by the majority of the control and study groups prior to the implementation of designated nursing guidelines, no statistically significant difference could be found between the two groups.

In this respect, **Mobed et al., 2019**), reported that more than half of the study patients had poor level of total

knowledge pre implementing of designing nursing instructions. Following the implementation of nursing teaching design for three and six months, most study participants had a good level of overall knowledge, which is consistent with the findings of **Abdel Rehaim and Mohamed., 2017**), who found that prior to applying the nursing recommendations, the majority of the study group had an inadequate degree of understanding regarding ascites management.

As regards medication adherence, the results stated that there was no statistically significant difference between both groups regarding medication adherence before nursing education, while there was a highly statistically significant difference between both groups after six months and after twelve months. This may be the result of demographic and cultural disparities.

This result was supported by (**Ghorbani et al., 2024**) who stated that the majority of the patients did not adhere to refills and medications. This can be due to the poor economic status and low education of most of the samples. These results come along with a study done by (**Xu et al., 2018**) which explored adherence and perceived barriers to oral antiviral therapy for chronic hepatitis B, which shows most patients had low adherence to medication. The findings of (**Rahmati et al., 2019**)'s study indicate that more than sixty percent of people have poor adherence to treatment.

In this respect according to (**Kuo et al., 2017**), forgetting to take

medication is the primary cause of low medication adherence in the majority of research participants. Additionally, **(Mobed et al., 2020)**, found that after three and six months of implementing the nursing instruction design, the majority of the patients in their study exhibit strong medication adherence with statistically significant differences. **Regarding grade of ascites**, this study reveals that all patients under study had no ascites when taken by researchers, then after 6 months found that one sixth of study group and about half of control group develop ascites with statistically significant difference between both groups. After twelve months, one third of study groups and about three fourths of control had ascites with highly significant differences between both groups. From researchers' point of view, this may be related to low adherence to prescribed medications and negligence of the disease chronicity.

The result is in line with **(Azeem et al., 2023)** who reported that, most of both groups didn't have ascites before. This finding disagrees with **(Ali et al., 2023)** who found that over 50% of the patients under investigation exhibited ascites. This may be because most study groups were in the early stages of LC.

In this respect, **(Mobed et al., 2019)**, reported that; following three and six months of implementing the nursing instruction design, the study's findings revealed that approximately half of the patients had moderate ascites with a statistically significant difference. Also, **(Atya et al., 2019)** showed that most of the patients in the study had

ascites; just over one-third had tense ascites, and one-third had moderate ascites. This finding was in line with **(Abdel Rehaim & Mohamed., 2017)** who found that the majority of the study group had moderate ascites, whereas the minority had mild ascites. The current research mentioned that, post six months after nursing education; there was negative correlation between grade of ascites and medication adherence in both groups, which was significant in study group only. There was significant negative correlation between grade of ascites and knowledge in study and control group. There was a significant positive correlation between knowledge and medication adherence in study group only. Post twelve month, there was significant positive correlation between grade of ascites and body weight in control group only. There was significant negative correlation between grade of ascites and knowledge in both groups. There was a significant positive correlation between knowledge and medication adherence in study group only. This may be explained by the importance of the educational booklet and its benefits on study group patients in addition to adherence to routine hospital instructions for study and control patients.

This result confirmed by **(Adel et al., 2024)** who reported that, the severity of ascites significantly improved over the study period. This improvement can be attributed to better adherence to diuretic medications, as supported by the strong correlation between medication adherence and ascites degree by the end of the study. This

also aligns with (Nobbe and McCurdy, 2022) and (Wang et al., 2023) who emphasized the importance of adherence to diuretic therapy and dietary advice in managing ascites effectively, noting that family involvement can be a key factor in ensuring adherence to such regimes.

These findings are in line with (Hayward et al., 2020), who mentioned that effective chronic disease management requires patients and their caregivers to have the necessary knowledge and skills to participate in self-care tasks, self-monitor for evolving complications, adhere to clinician recommendations and cultivate positive health behaviors. However, many patients have poor comprehension of chronic disease, mismanage their medications and fail to adopt important lifestyle modifications. Also, (Mobed et al., 2020) showed that the grade of ascites before, after three months, and six months of putting the nursing instruction design into practice had a statistically significant relationship with drug compliance.

Conclusion

Nursing education program has a good effect on improving patients' knowledge, minimizing occurrence of ascites, and increasing level of drug compliance

Recommendations

- The research' findings suggested that these educational instructions should be implemented as standard care in the hospital and similar settings.
- Repeat of the study with a bigger probability sample drawn from

various regions to allow for the results to be more broadly applied.

References

Abd-Almageed, A. S., Ali, N. H., & Mobed, K. B. (2024). Effect of Nursing Discharge Instructions on Outcomes for Patients Undergoing Primary Percutaneous Coronary Intervention. *Assiut Scientific Nursing Journal*, 12(41), 28-40.

Abdel Rehaim J. & Mohamed I. (2017). Knowledge of Patient with Liver Cirrhosis Regarding Ascites Self-Management: Instructions Nursing Guideline, *IOSR Journal of Nursing and Health Science (IOSR-JNHS)*; 6 (4):88-95.

Adel Mohamed Ibrahim, B., Faheem Gendy, J., Mostafa Mahrous, F., & Nesnawy, S. (2024). Effect of a Family-Involved Educational Approach on Adherence to Diuretic Medication, Ascites Severity and Daily Living Activities Among Patients with Liver Cirrhosis. *Egyptian Journal of Health Care*, 15(3), 1214-1232.

Ali, Z., Abdulfatah, M. & Mohamed, T. (2023). The effect of designed nursing guidelines on the outcomes of hepatic encephalopathy patients. *Eur Chem Bull.*; 12(4): 2802-17.

Al-Khazraji, K. A., Hashim, M. K., Hashim, M. K., Abdulla, M. K., Khudhair, I. H., & Abbas, W. K. (2021). Etiologies of Liver Cirrhosis and Their Clinical Presentation among Inpatients in Medical City Complex-Baghdad Teaching Hospital. *Global*

Journal of Health Science, 13(5), 64.

Asrani, S. K., Devarbhavi, H., Eaton, J., & Kamath, P. S. (2019). Burden of liver diseases in the world. *Journal of hepatology*, 70(1), 151-171.

Atya, M. S., Mekkawy, M. M., Elmalek, A., Omar, M., & Abd Almeged, A. S. (2019). Effect of Nursing Teaching Guidelines among Patients with Cirrhosis on Their Knowledge Regarding Minimizing Hepatic Encephalopathy. *Assiut Scientific Nursing Journal*, 7(18), 1-11.

Awadallah, M., Abd Elhameed, S., & Hassaneen, A. (2020). Healthy behaviors adjustment in the elderly patients with chronic liver cirrhosis. *Mansoura Nursing Journal*, 7(2), 245. <https://doi.org/10.21608/mnj.2020.179752>

Azeem, A. M. A., Fareed, M. E., Mohamed, E. K., & Elmadbouh, G. (2023). Educational Nursing Program Implementation: Its Effect on Hepatic Encephalopathy Severity among Patients with Liver Cirrhosis. *Menoufia Nursing Journal*, 8(3), 375-401.

Carrier, P., Loustaud-Ratti, V., Debette-Gratien, M., & Elkrief, L. (2024). Ascites in cirrhotic patients: a comprehensive review. *Exploration of Digestive Diseases*, 3(5), 362-381.

Cizmic, A., Rahmanian, P. B., Gassa, A., Kuhn, E., Mader, N., & Wahlers, T. (2023). Prognostic value of ascites in patients with liver cirrhosis undergoing cardiac surgery. *Journal of Cardiothoracic Surgery*, 18(1), 302.

Du, L., Wei, N., Maiwall, R., & Song, Y. (2024). Differential diagnosis of ascites: etiologies, ascitic fluid analysis, diagnostic algorithm. *Clinical Chemistry and Laboratory Medicine (CCLM)*, 62(7), 1266-1276.

Fagerström, C., & Frisman, G. H. (2017). Living with liver cirrhosis: a vulnerable life. *Gastroenterology Nursing*, 40(1), 38-46.

Ghorbani, A., Kareem Abed, E., Ghiyavandian, S., & Salami, M. (2024). Association between Health Literacy and Medication Adherence in Patients with Cirrhosis. *Journal of Clinical Care and Skills*, 5(2), 63-68.

Hamberg, M. L. S., Dupont, L., Jönsson, M. F., Bennick, H., Teisner, A. S., Andersen, M. L., & Danielsen, A. (2023). A Nurse-Led Outpatient Clinic for Patients with Decompensated Liver Cirrhosis: Staffing, Structure, and Patient Satisfaction. *Gastroenterology Nursing*, 46(2), 107-117.

Hayward, K. L., Valery, P. C., Patel, P. J., Horsfall, L. U., Wright, P. L., Tallis, C. J., & Powell, E. E. (2020). Effectiveness of patient-oriented education and medication management intervention in people with decompensated cirrhosis. *Internal Medicine Journal*, 50(9), 1142-1146.

Iwai, N., Ohara, T., Okuda, T., Oka, K., Sakai, H., Kajiwara-Kubota, M., ... & Itoh, Y. (2024).

Prognostic value of moderate or massive ascites in patients with advanced gastric cancer. *Oncology Letters*, 27(3), 116.

Jamil, Z., & Durrani, A. A. (2018). Assessing the outcome of patients with liver cirrhosis during **hospital** stay: A comparison of lymphocyte/monocyte ratio with MELD and Child-Pugh scores. *The Turkish journal of gastroenterology*, 29(3), 308.

Kadono, T., Ishiki, H., Yokomichi, N., Ito, T., Maeda, I., Hatano, Y., ... & Mori, M. (2023). Malignancy-related ascites in palliative care units: prognostic factor analysis. *BMJ Supportive & Palliative Care*, 13(e3), e1292-e1299.

Kamal, S. M., Abdelhakam, S. M., Massoud, Y. M., Abd El Hafeez, K. A. E. A., & Kamal, H. A. (2018). Clinical Profile of patients with ascitic fluid infection at Ain Shams University Hospitals. *The Egyptian Journal of Hospital Medicine*, 72(9), 5241-5250.

Kuo, S. Z., Haftek, M., & Lai, J. C. (2017). Factors associated with medication non-adherence in patients with end-stage liver disease. *Digestive diseases and sciences*, 62, 543-549.

Mahmoud, A., Abdallah, F., Mahmoud, H., & Taha, S. (2020). Assessment of Acute Hepatitis C patients' Performance regarding Self-Care Management for Complications Prevention. *Journal of Nursing Science Benha University*, 1(1), 19-39.

Mansour, D., Masson, S., Corless, L., Douds, A. C., Shawcross, D. L., Johnson, J., & West, R. (2023). British Society of Gastroenterology Best Practice Guidance: outpatient management of cirrhosis—part 2: decompensated cirrhosis. *Frontline Gastroenterology*, 14(6), 462-473.

Mobed, K. B., Mekkawy, M. M., Makhlof, N. A., & Abd Almageed, A. S. (2019). Impact of Designing Nursing Instructions on Knowledge and Activity of Daily Living for Cirrhotic Patients With Ascites. *Assiut Scientific Nursing Journal*, 7(19), 1-8.

Mobed, K. B., Mekkawy, M. M., Makhlof, N. A., & abd Almageed, A. S. (2020). Impact of designing nursing instructions on compliance to diuretic drugs among cirrhotic patients with ascites. doi: <https://doi.org/10.33545/26649187.20>, 19, v1.

Mohammed Kamel, S., Mohammed Abdelal, E., & Gamal El-Dein Ibraheim, S. (2023). Coping Strategies among Patients with Cirrhotic Ascites. *Journal of Nursing Science Benha University*, 4(2), 1016-1029.

Morisky D.E., Ang A., Krousel-wood M and Ward H., (2008): Predictive validity of a medication adherence measure in an outpatient setting, *Journal of clinical hypertension*, volume (10), issue (5) P.p 348: 354.

Munoli, A. S., Mantur, P. G., & Jalawadi, V. M. (2024). Child-

Pugh Score and Vitamin D: Exploring a New Frontier in Liver Cirrhosis Assessment. *Cureus*, 16(11), e74738.

Nobbe, A. M., & McCurdy, H. M. (2022). Management of the Adult Patient with Cirrhosis Complicated by Ascites. *Critical Care Nursing Clinics*, 34(3), 311-320.

O'Connell, M. B., Brødsgaard, A., Matthè, M., Hobolth, L., Wullum, L., Bendtsen, F., & Kimer, N. (2024). A randomized controlled trial of a postdischarge nursing intervention for patients with decompensated cirrhosis. *Hepatology communications*, 8(5), e0418.

Piano, S., Dalbeni, A., Vettore, E., Benfaremo, D., Mattioli, M., Gambino, G., Frama, V., Cerruti, L., Mantovani, A., Martini, A., Luchetti, M., Serra, R., Cattelan, A., Vettor, R., & Angeli, P. (2020). Abnormal liver function tests predict transfer to intensive care unit and International, death in COVID-19. *Liver* 40(10), <https://doi.org/10.1111/liv.14565>. 2394-2406.

Pugh R, Murray-Lyon I, Dawson J, Pietroni M, Williams R (1973). "Transection of the oesophagus for bleeding oesophageal varices". *The British Journal of Surgery*. 60 (8): 646–9.

Qiu, X. (2024). Nurse-led intervention in the management of patients with cardiovascular diseases: a brief literature review. *BMC nursing*, 23(1), 6.

Rahmati M, Rejeh N, Heravi Karimooi M, Tadrisi SD.(2019). Investigating the relationship between health literacy and adherence with treatment regimen in the elderly with hypertension. *Iran J Nurs Res*. 2019;13(5):15-22. [Persian]

Rajpurohit, S., Musunuri, B., Mohan, P. B., Vani, L. R., Bhat, G., & Shetty, S. (2023). Development and evaluation of patient information leaflet for liver cirrhosis patients. *Clinical Epidemiology and Global Health*, 24, 101436.

Sabola, N. E., Elshikh, A. A., El-Nagar, S. A., & Elshebeny, N. H. (2022). Effect of a designed nursing intervention on knowledge and fatigue among patients with liver cirrhosis. *Menoufia Nursing Journal*, 7(2), 411-431.

Sepanlou, S. G., Safiri, S., Bisignano, C., Ikuta, K. S., Merat, S., Saberifiroozi, M., & Padubidri, J. R. (2020). The global, regional, and national burden of cirrhosis by cause in 195 countries and territories, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017. *The Lancet gastroenterology & hepatology*, 5(3), 245-266.

Steven K (2012): Sample size, P.P 59-60.

Tapper, E. B., & Parikh, N. D. (2023). Diagnosis and management of cirrhosis and its complications: a review. *Jama*, 329(18), 1589-1602.

Theodorakopoulos, T. (2020).

Natural history of grade 1 ascites in patients with liver cirrhosis. *Annals of Gastroenterology*. [https://doi.org.](https://doi.org/)

Wang, N., Li, P., Suo, D., Wei, H., Wei, H., Guo, R., & Si, W. (2023).

A Predictive Model for Identifying Low Medication Adherence among Patients with Cirrhosis. *Patient preference and adherence*, 2749-2760. doi: <https://doi.org/10.2147/PPA.S426844>

Wong, M. C., Huang, J. L., George, J., Huang, J., Leung, C., & Eslam, M., (2019).

The changing

epidemiology of liver diseases in the Asia-Pacific region. *Nature reviews Gastroenterology & hepatology*, 16(1), 57-73.

WORLD HEALTH

ORGANIZATION,

(2020).https://www.worldlifeexpectancy.com/egypt-liver-disease, visited at 15-1-2025

Xu, K., Liu, L. M., Farazi, P. A., Wang, H., Rochling, F. A., Watanabe-Galloway, S., & Zhang, J. J. (2018).

Adherence and perceived barriers to oral antiviral therapy for chronic hepatitis B. *Global health action*, 11(1), 1433987.

Effect of Educational Program on Nurses' Performance Regarding Cardiotocography at Labor Units

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Abstract

Background: Cardiotocography has been considered the primary tool for monitoring fetal health during antepartum and intra-partum periods. Cardiotocography detects any changes of the fetal heart rate tracings that might jeopardizes the fetal condition or posing risk of death or distress. **The aim of the study** was to evaluate effect of educational program on nurses' performance regarding cardiotocography at labor units. **Subjects and method:** A quasi-experimental research design was used to conduct this study. **Setting:** The study was carried out at labor units of obstetrics and gynecological department of Tanta Main University Hospital, El- Menshawy General Hospital and El- Mabra Hospital. **Sample:** The study comprised all 54 nurses who were employed in the aforementioned settings. **Tool (I):** Nurses' knowledge regarding cardiotocography during labor. It included Part (1): Socio-demographic characteristics of nurses and **Part (2):** Nurses' knowledge regarding cardiotocography during labor. **Tool (II):** Nurses' Practices observational checklist regarding cardiotocography. **Results:** High level of nurses' knowledge and satisfactory practices regarding cardiotocography were reported immediately and three months after program implementation in contrast to low and unsatisfactory practices before educational program implementation. **Conclusion and Recommendations:** The cardiotocography educational program had a positive effect on improving the level of knowledge and practices among the studied nurses working at labor units. Regular annual training courses and workshops should be conducted for maternity nurses regarding cardiotocography monitoring and its traces.

Key words: Cardiotocography, Educational Program, Nurses' Performance.

Introduction

Labor is a wonderful, natural experience, with pleasurable event for both the woman and her family. Nevertheless, a life-threatening complication can occur causing maternal and fetal morbidity or mortality (Alhetar, Ramadan, Afifi, & Ibrahim, 2022; Gweda, Ahmed, Abozeid, Belal, & Khalifa, 2024). The health of the fetus and her mother are extensively linked with each other (Dol, et al., 2021; Ramli et al., 2023; Wahyuningsih & Linggardini, 2022).

Therefore, birth-related issues can cause catastrophic consequences for mothers, newborns, and their families, as well as lead to significant healthcare expenses. The primary causes of perinatal mortality are inadequate assessment of fetal well-being during pregnancy and care during labor by the skilled health professionals (Gweda, et al., 2024; Limbo & Denny, 2020).

Assessment of fetal well-being is one of the key aims of obstetric care and considered as a critical tool in ensuring optimal neonatal outcome from both pregnancy to labor. This assessment is designed to identify fetal at risk for in utero death or asphyxia-mediated damage which affects expeditious and safe delivery (Gweda, et al., 2024; Limbo & Denny, 2020).

Fetal heart rate (FHR) assessment is the most important indicator of fetal well-being (Hardicre, Arezina, Mc Guinness & Johnson, 2021; Ogenyi et al., 2022). The utilization of electronic fetal monitoring (EFM) can identify any abnormal variations in

the fetal heart rate within the uterus (Maraikkayar, Tamilselvi, & Beham, 2023; O' Sullivan et al., 2021; Yu, Z et al., 2024).

The two primary methods of FHR monitoring are intermittent auscultation and continuous electronic fetal monitoring (Murray, Fox, Coddington, & Scarf, 2024; Rodgers, 2020).

Continuous electronic fetal monitoring is commonly carried out via cardiotocograph (CTG) that has been considered the primary tool for monitoring fetal health during antepartum and intra-partum periods. CTG was first introduced in the 1960s and since then has been a focal aspect of the care provided to women during labor. CTG defined as an external fetal monitoring system or machine, that is used to record continuous tracing of the fetal heart rate (cardio) and the maternal uterine contractions (toco), by using transducers attached to the maternal' abdomen and fundus, respectively. Which were recorded into a graphical paper (graphy). CTG is typically performed during pregnancy in the third trimester or continuously during labor (Dular & Devi, 2021; Kahveci, Melekoglu, Evruke, & Cetin, 2018).

Therefore, the primary objective of CTG is recording both the fetal heart rate and the maternal uterine contractions simultaneously, as a method to identify the early signs of maternal and fetal deterioration, allowing a prompt intervention to reduce maternal and fetal fatalities (Abo-Hatab, Ahmed, Abozeid, Gaheen, & El-adham, 2020; Das,

Mukherjee, Santosh, Saha, & Roy, 2020).

The cardiotocography methods include internal or external methods. The internal method requires a catheter placed in the uterus after a specific amount of cervical dilation has taken place. While the external CTG method, a pair of sensory nodes are affixed to the maternal' abdomen. The first sensory (Tocotransducer) is placed over the uterine fundus to detect the tension of the maternal abdominal wall as an indirect measure of the intrauterine pressure. The pressure reading is transformed into an electronic signal that is recorded on graph paper as uterine contractions. On the other hand, the second sensory device, an ultrasound transducer, is positioned over the fetal back to detect the fetal heart rate and convert it into audible beeping sounds. These sounds are then recorded on a graph paper (El-Sayed& Saadoon, 2018; Mahjabeen & Nasreen, 2022).

The external CTG method is the most commonly carried out externally and can be used for continuous monitoring (all the time during labor) or intermittent monitoring (at set times with low-risk pregnancies) (Bai, Lu, Liu, He, & Guo,2024; Mahjabeen & Nasreen,2022; Stone et al.,2017).

Hence, CTG is recommended for women who have diabetes mellitus, hypertension/ preeclampsia, maternal pyrexia, antepartum hemorrhage, cardiac disease, severe anemia, hyperthyroidism, oxytocin infusion, hypertonic uterus, previous cesarean section, and chorioamnionitis. Additionally, CTG is advised for fetal

diseases as; chromosomal abnormalities, intrauterine growth restrictions, and intrauterine growth retardation. CTG is the most extensively used and generally accepted non-invasive method of fetal monitoring, with no known contraindications. Its findings are documented as CTG traces. (Holmgren, 2020; Tamber, Hayes, Carey, Wijekoon, & Heazell, 2020).

Cardiotocography traces generally shows two lines on a graph paper. The upper line is a record of the fetal heart rate in beats per minute. The lower line is a recording of uterine contractions. The average fetal heart rate is between 120 and 160 beats per minute (bpm) and it can vary by 5 to 25 bpm. The fetal heart rate may change as the fetus responds to conditions in the uterus. On the other hand, five contractions per ten minutes over thirty minutes is considered the upper limit of normal uterine activity (Alhetar et al., 2022). The identification and interpretation of uterine contractions and fetal monitoring patterns are a key job for maternity nurses (Pereira, Lau, Modestini, Wertheim, & Chandrararan, 2021).

Therefore, nurses need adequate knowledge and practices to interpret CTG traces and make critical decision- during intrapartum monitoring activities. There are four parameters that are used to evaluate CTG traces: baseline FHR, baseline variability, accelerations, and decelerations (whether present or not), and the characteristics of different types of decelerations (if present) (James, Maduna, & Morton, 2019;

Pereira, Lau, Modestini, Wertheim, & Chandraharan, 2021).

Maternity nurses are responsible for the application and interpretation of CTG monitoring in the labor unit (Uusiku et al., 2022). They have a role before the CTG procedure as; preparing the necessary equipment and measuring maternal vital signs. Whereas, their role during CTG procedure placing woman on dorsal recumbent position, and perform Leopold's maneuver. Furthermore, the nurses' role after CTG procedure ensured documenting date and time of CTG, interpreting CTG traces and notifying for any complications, as well as initiating corrective measures when necessary (Oleiwi, 2018; Blix et al., 2019; Ganti, Kaufman, & Madani, 2022; Mckinne, James, Murray, Nelson, & Ashwill, 2021).

Additionally, maternity nurses are crucial in the emergency measures or actions with CTG monitoring abnormalities as; repositioning the woman in a lateral position to increase uteroplacental perfusion, administering oxygen, discontinuing the oxytocin infusion, and evaluating uterine contractions and fetal heart rate patterns (Smith et al., 2019).

Thus, the pressure of workload on maternity nurses arises from their inadequate knowledge and practices regarding CTG monitoring procedure. They need to be equipped with the requisite knowledge, and practices for safe and effective care (Uusiku et al., 2022). They must be adequately trained for performing CTG procedure and interpretation of its traces properly and timely, thereby allowing early detection of the

complications, and reducing perinatal morbidity and mortality (Alsaraireh, Yehia, & Khala, 2023; Jepsen, Blix, Cooke, Adrian, & Maude, 2022).

Significance of the study:

Worldwide, the current perinatal mortality rate in 2022 is 15.084 deaths per 1000 live births, with nearly one-third occur within the first 24 hours of birth as a result of complications related to childbirth, such as birth asphyxia or lack of breathing. While in Egypt, the perinatal mortality rate in 2022 is 15.513 deaths per 1000 live births (Mahmoud, Aboud, Emam, & Abd Elmordy, 2023; WHO report, 2021). Therefore, the prevention of birth potential complications can be facilitated by the implementation of adequate obstetric care interventions, as CTG monitoring (Akyıldız, Çoban, Uslu, & Taşpinar, 2021). So, maternity nurses, who spend a significant time with the woman during labor, must possess the necessary expertise for CTG monitoring and tracings in a timely and accurate manner to ensure immediate and corrective actions, thereby reducing the number of maternal and fetal fatalities (Mdoe et al., 2019). Thus, educational training program equipping the maternity nurses with the necessary knowledge and skillful practices regarding CTG and its traces interpretation (Jepsen, Blix, Cooke, Adrian, & Maude, 2022). So this study was conducted was to evaluate effect of educational program on nurses' performance regarding CTG at labor units.

Aim of the study was to

Evaluate the effect of educational program on nurses' performance

regarding cardiotocography at labor units.

Operational definition

Nurses 'performance means nurses' knowledge and practices.

Research Hypothesis

Nurses' performance is expected to be improved after implementation of the educational program regarding cardiotocography at labor units.

Subjects and method

Study Design: This study used a quasi-experimental research design. Quasi-experimental is a research design that aim to identify the impact of a particular intervention, program, or event (a treatment).

Setting: The research study was conducted at labor units of obstetrics and gynecological department of Tanta Main University Hospital which is affiliated to the Ministry of High Education and Scientific Research, El- Menshawy General Hospital which is affiliated to the Ministry of Health and Population and El- Mabra Hospital which is affiliated to the Health Insurance.

The labor unit of obstetrics and gynecological department at Tanta Main University Hospital consisted of 3 separate rooms (CTG & abdominal U/S room ,waiting room & delivery room). While, the labor units of the other two hospital have 2 separate rooms (waiting room with a CTG set - delivery room).

Subjects: All nurses (54 nurses) who were working at labor units in the previously mentioned study settings were included in the study.

Tools of data collection

Two tools were used to achieve the aim of this study:

Tool (I): Nurses' knowledge regarding cardiotocography during labor: The researcher developed this tool after compiling relevant recent literature reviews (Abd El-Razek, 2016; Alhetar et al., 2022; El-Sayed & Saadoon, 2018). It included the following two parts:-

Part (1): Socio-demographic characteristics of nurses: - This section was employed to collect nurses' basic data including their age, level of education, place of residence, years of experience, and attendance at previous CTG training programs.

Part (2): Nurses' knowledge regarding cardiotocography during labor: - It was developed after reviewing the recent related literatures (Abd El-Razek, 2016; Alhetar et al., 2022; El-Sayed & Saadoon, 2018) The researcher used this part to assess the nurses' knowledge regarding CTG before, immediately and three months after implementation of the educational training program. It encompassed, its definition, objectives of CTG, methods of CTG, maternal and fetal indications, contraindications, advantages, disadvantages, characteristic of normal and abnormal CTG, indication times to begin and time taken to perform it, detection of the signs of intra uterine fetal distress, reading number of contractions on the monitor, performing non-stress test, clarifications of CTG traces including FHR (base line FHR, accelerations, decelerations) and uterine contractions, as well as nursing responsibilities regarding CTG.

The scoring system for nurses' knowledge regarding CTG was categorized as follows:

- Correct and complete answers were scored as (2).
- Correct and incomplete answers were scored as (1).
- Incorrect answers and/or don't know were scored as (0).

The total score level of nurses' knowledge was calculated as follows:

- **High level of knowledge** \geq 80-100% (43-56).
- **Moderate level of knowledge** \geq 60- $<80\%$ (32-42).
- **Low level of knowledge** $<$ 60% (0-31).

Tool II: Nurses' practices observational checklist regarding cardiotocography: This tool was adapted by the researcher from (Abd El-Razek, 2016; Alhetar et al., 2022; El-Sayed & Saadoon, 2018) In order to assess nurses' practices regarding CTG procedure before, immediately and three months after implementation of the educational program. It contained three main tasks:-

A. Pre-procedure tasks as;

Preparation of the equipment such as (CTG machine, cardiotocograph belt, gell, check paper in the machine and paper speed is net at lcm per minute, clean gloves, tissue paper, sphygmomanometer, maternal record and pen), positioning of the woman and preparation of the environment.

B. Procedure tasks: Included tasks of the nurse related to steps of performing CTG monitoring and care of the woman during the procedure as; Put woman in dorsal recumbent position with monitor belts under her back, expose woman' abdomen, encouraging to breathe naturally, perform Leopold's

maneuver to fetal back, assist woman again to a semi-fowler's position in bed, align and insert the tocotransducer and ultrasound transducer plug into the appropriate monitor port, apply special jell on the skin where the fundus of the uterus and fetal back palpated at woman's abdomen for a strong signal, apply tocotransducer on the maternal abdomen at uterine fundus, apply ultrasound transducer correctly where the fetal back palpated at woman's abdomen, put an elastic belt around the woman's abdomen to fix the tocotransducer and ultrasound transducer, repositioned tocotransducer and ultrasound transducer with changing woman' position, reassure woman that stopping FHR signal with changing her position not mean her fetus had a problem, assess and read CTG graph tracings as; woman uterine contractions, base line FHR, tachycardia, bradycardia, accelerations, decelerations and doctor notification for immediate action with CTG tracing results suggest mother or fetus problem.

C. Post-procedure tasks as; collecting of the equipment, documentation; date and time of CTG procedure & its results, inform woman about procedure findings and reassurance of the woman.

The scoring system for nurses' practices regarding CTG was as follows

- **Done correctly and completely** was scored as (2).
- **Done correctly but incompletely** was scored as (1).

- **Done incorrectly or not done** was scored as (0).

The total score of nurses' practices were summed up and converted into percent score as follows:-

- **Satisfactory practice: $\geq 80\%$.**
- **Unsatisfactory practice: $< 80\%$.**

Method

The study was implemented according to the following steps:

1. Administrative approval: The researchers obtained an official letter from the Faculty of Nursing Tanta University, elaborating the purpose of the research study that was subsequently submitted to the relevant authorities of the chosen settings for approval to conduct the study.

2. Ethical and legal consideration

- Approval of the Scientific Research Ethical Committee at Faculty of Nursing was taken code No: 159.
- After providing an explanation of the study's purpose, including the opportunity to withdraw at any time, all nurses provided informed consent.
- The researcher guaranteed that the study's nature did not result in any damage or discomfort for the entire sample.
- Privacy and confidentiality were taken into account when collecting data.

3. Tools development

- The researcher reviewed recent and related literature before developing data collection tools (**Abd El-Razek, 2016; Alhetar et al., 2022; El-Sayed & Saadoon, 2018**). **Tool I** was developed and translated into Arabic language and **Tool II** was developed in English.

- The study tools were then reviewed by a panel of five obstetric and gynecological nursing experts for content and construct validity, and any necessary adjustments or modifications were made.
- The validity of the expert assessments of the nurses' knowledge questionnaire and practices observational checklist pertaining CTG was 95% and 96%, respectively.
- The reliability of the study tools was tested by using Cronbach's Alpha test. They were (0.898 and 0.897) for knowledge questionnaire and practices observational checklist respectively which indicating high reliability of the study tools.

Pilot study: 10% of the sample (6 nurses), who were chosen from the aforementioned settings for a pilot study in order to test and determine the tool' clarity, feasibility, and application as well as identify any issues that would impede the data collection process. Since there were no significant changes made to the study tools, the data from the pilot study were incorporated into the current study sample.

4. Data collection (field work)

- The nurses' performance (knowledge and practices) regarding CTG was assessed using tools I and II before, immediately after, and three months after the program was implemented.
- The researcher attended 4 days per week at the previously settings in the morning and afternoon shifts, until the predetermined sample size and data were collected.

- Data collection was conducted up to one year and two months ranged from the beginning of February 2023 to the end April 2024.

5. Four phases were implemented during the educational program: including assessment, planning, implementation, and evaluation:

Phase I: Assessment phase (Pre-test)

- The maternity nurses were asked to participate in the study prior to the implementation of the educational program and after being informed of its purpose. Using **Tool (I) part one** to assess nurses' sociodemographic characteristics and **Tool (I) part two** to assess their knowledge pertaining to CTG.
- Also, **Tool (II)** observational checklist was used to assess nurses' practices regarding CTG (pre-procedure, procedure and post procedure tasks) on CTG machine at labor units.
- Before implementation of the educational program, nurses' pre-test was distributed individually for each nurse through an interview lasted 30-40 minutes to assess knowledge regarding CTG using **Tool (I)** in the researcher's presence for essential explanation. Whereas an observational checklist **Tool II** was used to assess nurses' practices regarding CTG procedure before program implementation.

Phase II: Planning phase:- An appropriate in-services educational program sessions regarding CTG was prepared by the researcher based on assessment phase.

A. The educational program included two main parts:

- **Theoretical part:** This component was developed in accordance with the educational program objectives and the assessment of nurses' knowledge prior to the commencement of the program sessions, and it was directed by pertinent literatures. (**Abd El-Razek, 2016; Alhetar et al., 2022; El-Sayed & Saadoon, 2018**). The theoretical part contains sessions about definition, objectives of CTG, methods of CTG, maternal & fetal indications, contraindications, advantages, disadvantages, characteristics of normal and abnormal CTG, appropriate time to use, signs of intrauterine fetal distress, reading contractions on monitor, performing non-stress test, clarifications of CTG traces including FHR (base line FHR, accelerations, decelerations) and uterine contractions as well as nursing responsibilities regarding CTG during labor.
- **Practical part:** This part was prepared before conducting the educational program guided by relevant literatures (**Abd El-Razek, 2016; Alhetar et al., 2022; El-Sayed & Saadoon, 2018**) and it included demonstrating CTG monitoring pre-procedure, procedure and post-procedure tasks during labor.

B. Preparation of the educational program content

- The researcher created an educational booklet based on the needs of nurses (knowledge and

practices assessment phase). The booklet was disseminated to all nurses in order to enhance their knowledge & understanding of CTG and serve as a reference.

- The program was conducted using a variety of teaching methods as; lectures, group discussions, posters, PowerPoint, demonstrations, re-demonstrations of the CTG machine in the study settings indicated earlier, as well as video scenarios presentations.

The total numbers of nurses are (54 nurses), they were divided into 18 groups. Each subgroup included 3 nurses.

Phase III: Implementation phase

- The in-service educational program regarding CTG was implemented in the aforementioned study settings through the implementation of four sessions, two of which were dedicated to the theoretical content and two to the practical part.
- The program sessions were conducted in the morning and afternoon shifts four days a week.
- Each session lasted between 30 and 45 minutes, which included discussion periods. The sessions were as follow:

Theoretical part

- **The first theoretical session:** The aim of this session explained the goal (improve nurses' performance regarding CTG) and objectives of the educational program as; (methods of CTG, appropriate time to use, list CTG indications, differentiate between normal and abnormal CTG, demonstrate CTG procedure etc.....). Also, the first session provided nurses with

knowledge about definition of CTG, objectives of CTG, methods of CTG, appropriate time to use, maternal and fetal indications and contraindications of CTG.

- The second theoretical session

This session provided nurses with knowledge about CTG advantages, disadvantages, characteristics of normal and abnormal CTG, intrauterine fetal distress signs, interpretations of CTG traces including FHR (base line FHR, accelerations, decelerations) & uterine contractions as well as nursing responsibilities regarding CTG.

Practical part

- **The first practical session:** The aim of this session provided the nurses with the proper and needed practical skills regarding CTG monitoring procedure:

- A. Pre-procedure tasks:** It included four preparations. **Equipment preparations such as;** (CTG machine, cardiotocograph belt, gell, clean gloves, tissue paper, paper speed is net at lcm per minute in CTG machine, sphygmomanometer, & maternal record and pen). **Preparation and positioning of the woman** such as; (identify and greet the woman respectfully, explain the procedure, listen attentively and respond to woman' questions and concerns, empty her bladder, measure woman blood pressure and pulse rate, and inform that the procedure will last for 20 minutes). **Preparation of the environment** such as; (maintain privacy and ensure that the environment is clean

and tidy, adequate light, elevate bed to the suitable level) and **Preparation of the nurse** such as; (wash hands with an antiseptic solution, put on clean gloves, and stand at the right side of the woman's bed).

B. Procedure steps/tasks: included steps of CTG procedure and training nurses for; Positioning the woman in dorsal recumbent position and at the same time place monitor belts under her back, exposing the woman's abdomen and assist to relax by breathing naturally, performing Leopold's maneuver (second maneuver) to determine lie, presentation and fetal back (hold the left hand steady on one side of the uterus while palpating the opposite side of the uterus with the right hand, then hold the right hand steady while palpating the opposite side of the uterus with the left hand, the fetal back was a smooth convex surface, the fetal arms and leg were felt nodular and the fetus often move them during palpation), assist the woman to a semi-fowler's position in bed, align and insert the toco transducer and ultrasound transducer plug into the appropriate monitor port, apply jell on the fundus of the uterus and fetal back for a strong signal, applying tocotransducer at uterine fundus and ultrasound transducer on the fetal back palpated at woman's abdomen, Put an elastic belt around the woman's abdomen to fix the tocotransducer and ultrasound transducer, repositioning tocotransducer and ultrasound

transducer) with changing woman' position during labor, inform woman stopping the fetal heart signal with position change and not think her fetus had a problem, assess and read CTG graph tracings including; uterine contractions (normal frequency 3-5 contractions in 10 min), base line FHR(110 – 160 bpm), tachycardia (baseline value above 160 bpm lasting more than 10 minutes), bradycardia (baseline value below 110 bpm lasting more than 10 minutes), acceleration (increased in FHR at least 15 bpm lasting at least 15 seconds) and deceleration: decreased FHR more than 15 bpm lasting at least 15 seconds), doctor notification regarding abnormal CTG tracing results for immediate action.

C. Post-procedures tasks: these included steps related to woman as; (help woman to assume comfortable position), steps related to equipment such as; (remove and clean the equipment), steps related to nurse as; (wash hands and documentation of CTG tracing results).

- **The second practical session** included nurse's demonstration and re-demonstrations for CTG procedure and how to perform Leopold's maneuver (second maneuver) to determine lie, presentation and fetal back with nurses. How to read CTG tracing results including (uterine contractions & base line FHR, accelerations, decelerations). In addition to, training the nurses to sign on the

CTG paper (date, time of starting CTG, name of the mother, ID number).

Phase IV: Evaluation phase (Post-test):- This phase was designed to evaluate the effectiveness of the CTG education program.

- Nurses' knowledge was assessed individually using **Tool I part II** before, immediately and three months after implementation of the educational program.
- Nurses' practices were also assessed using **Tool II (observational checklist)**. Each nurse was observed separately during the CTG procedure in order to assess and evaluate their practices before, immediately and three months after program implementation.
- Nurses' knowledge and practices regarding CTG were compared before, immediately and three months after training program implementation.

Statistical analysis:

- The Statistical Package for the Social Sciences (SPSS) version 25 (IBM Corporation, Armonk, NY, USA) was used to code, enter, tabulate, and analyze the gathered data (**Dawson, 2001**).
- When it came to numerical data, we calculated the mean, standard deviation, and range. The Chi-square test was employed to compare two categories or more of qualitative data, which are described by frequency, percentage, or proportion of each category.
- The Z value of the Mann-Whitney test was employed to compare the

means of two groups of non-parametric data from independent samples. Kruskal-Wallis ((χ^2)) was computed to facilitate the comparison of non-parametric data with more than two means. The α_2 value of the Friedman test was calculated for non-parametric data in order to compare the means of three related groups (pre, immediate post, and three months post educational training program). Pearson's correlation coefficient (r) was implemented to assess the correlation between variables. The significance level was established at $p<0.05$ for the purpose of interpreting the results of the tests of significance.

Results

Table (1): Shows that more than one third of the studied nurses were aged more than 40 years old, with mean age of 35.74 ± 8.56 years. While, (51.9 and 44.4%) of them had completed Nursing Technical Institute and Secondary Nursing respectively. on the other hand, more than half 57.4% of the studied nurses were from rural and nearly half of the studied nurses had >10 years of experience with none of them attend any previous training program regarding CTG.

Table (2): Illustrates that the total knowledge mean score of the studied nurses' regarding CTG before, immediately and three months post program sessions were $(14.65\pm3.00, 48.92\pm2.79\&45.28\pm2.33)$ respectively. The score difference noticed is statistically significance before and after implementation of the educational program ($p = 0.0001^*$)

Figure (1): Reveals that all of the studied nurses had low level of knowledge regarding CTG before educational program implementation, which increased to the vast majority (96.3%) of them had high level of knowledge immediately after program implementation. While the percentage decreased to (68.7% & 31.5%) high and moderate level of knowledge respectively, three months post educational program implementation. **Table (3):** Demonstrates that the total practices mean score of the studied nurses regarding CTG was 13.85 ± 1.57 before implementation of the educational program, which increased to 58.65 ± 1.94 immediately after program sessions, while decreased to 51.94 ± 3.86 three months after the educational program implementation. The score difference observed is statistically significance before post program implementation ($p= 0.0001^*$).

Figure (2): Illustrated that Pre-procedure practices mean scores of the studied nurses regarding CTG before, immediately, and three months after implementation of the

educational program were (5.54, 23.33 and 21.24 respectively), while procedure practices mean scores were (5.02, 20.30 and 18.63 respectively), and post-procedure practices mean scores were (3.30, 15.02 and 13.44 respectively) that indicate significant nurses' practices improvement.

Figure (3): Portrays that all the studied nurses had unsatisfactory practices regarding CTG before implementation of the educational program, meanwhile 100% of them had satisfactory practices immediately after program implementation, and decreased to 79.6% three months after program implementation.

Figure (4): Clarifies that immediately after program implementation, a significance positive correlation was found between the total nurses' knowledge score and their total practices score ($r=0.531$, $p= 0.0001^*$).

Figure (5): Shows a significance positive correlation is observed between total knowledge score and total practices score of the studied nurses three months after program implementation($r= 0.420$, $p = 0.002^*$).

Table (1): Socio-demographic characteristics of the studied nurses. (n=54)

Socio-demographic characteristics	The studied nurses (n=54)	
	n	%
Age (years):		
< 20	0	0
20 - <31	13	24.1
31- 40	19	35.2
> 40	22	40.7
Mean±SD	35.74±8.56	
Educational level:		
Secondary Nursing	24	44.4
Nursing Technical Institute	28	51.9
Bachelor of Science in Nursing	2	3.7
Residence:		
Rural	31	57.4
Urban	23	42.6
Years of experience:		
< 5	5	9.3
5-10	23	42.6
> 10	26	48.1
Mean±SD	9.11±3.71	
Attendance of previous training program regarding CTG:		
No	54	100

Table (2): Total knowledge mean score of the studied nurses regarding CTG at labor units before, immediately and three months after implementation of the educational program (n=54).

Knowledge subitems regarding CTG (Each item was scored 0-2)	No. of items (Score)	Knowledge mean scores of the studied nurses regarding CTG before, immediately and three months after program implementation .			χ^2 value P value
		Before	Immediately	After three months	
		Range Mean±SD	Range Mean±SD	Range Mean±SD	
Definition	1 (0-2)	0-2 0.91±0.49	1-2 1.57±0.50	1-2 1.57±0.50	45.018 0.0001*
Appropriate time to use	1 (0-2)	0-2 0.92±1.01	2 2.00±0.00	0-2 1.30±0.96	38.308 0.0001*
Objectives of CTG	1 (0-2)	0-2 0.54±0.50	1-2 1.68±0.47	0-2 1.67±0.51	85.819 0.0001*
Methods of CTG	1 (0-2)	0-2 0.54±0.77	1-2 1.78±0.42	1-2 1.65±0.48	69.898 0.0001*
Indication and contraindication of CTG	2 (0-4)	0-3 0.74±0.78	2-4 3.42±0.63	2-4 3.28±0.56	111.434 0.0001*
Advantages and disadvantages of CTG	2 (0-4)	0-2 0.74±0.62	2-4 3.37±0.65	1-4 3.42±0.63	112.668 0.0001*
Performing the non-stress test	2	0-2	2-4	2-4	115.757

	(0-4)	0.72±0.63	3.28±0.63	3.26±0.52	0.0001*
Characteristics of normal and abnormal CTG	8 (0-16)	0-9 5.39±1.99	9-16 13.87±1.43	8-16 13.20±1.72	110.404 0.0001*
Reading the number of contraction on the monitor	1 (0-2)	0-1 0.44±0.50	1-2 1.59±0.49	0-2 1.57±0.53	81.774 0.0001*
Detection of the signs of intrauterine fetal distress	1 (0-2)	0-2 0.35±0.48	1-2 1.70±0.46	0-2 0.61±0.53	95.185 0.0001*
Clarifications of CTG traces including FHR and uterine contractions	7 (0-14)	0-6 2.85±1.55	9-14 12.33±1.53	9-14 11.18±1.13	116.188 0.0001*
Nursing responsibilities regarding CTG	1 (0-2)	0-1 0.50±0.50	1-2 1.92±0.26	1-2 1.55±0.50	106.457 0.0001*
Total knowledge mean score	28 (0-56)	9-21 14.65±3.00	43-55 48.92±2.79	38-50 45.28±2.33	125.349 0.0001*

*Statistically significant (P<0.05)

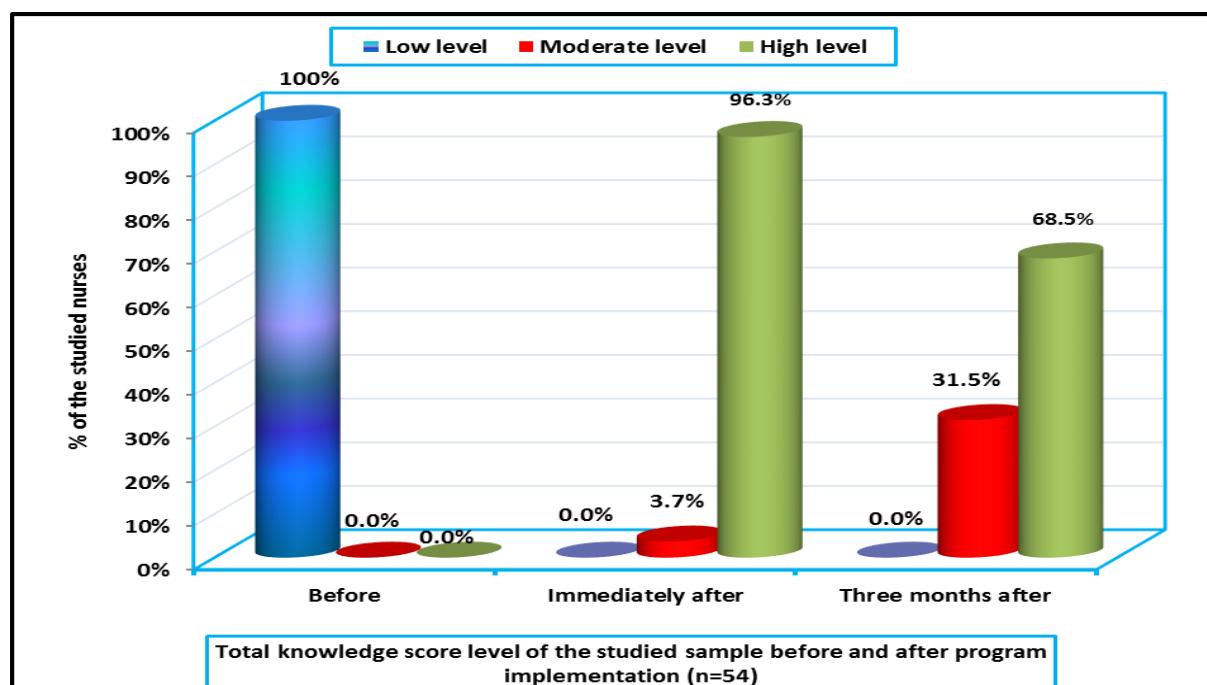


Figure (1): Total knowledge score level of the studied sample regarding CTG at labor units before, immediately and three months after implementation of the educational program (n=54).

Table (3): Total practices mean score of the studied nurses regarding CTG at labor units before, immediately and three months after implementation of the educational program (n=54).

Practice items scores (Each item was scored 0-2)	No. of items (Score)	Total practices mean score of the studied nurses regarding CTG before, immediately and three months after program implementation.			χ^2 value P value
		Before	Immediately	After three months	
		Range Mean±SD	Range Mean±SD	Range Mean±SD	
I-Pre-procedure practices score					
- Prepare of the necessary equipment	1 (0-2)	0-1 0.46±0.50	1-2 1.91±0.29	1-2 1.72±0.45	112.7070.0001*
- Preparation of the environment	3 (0-6)	0-3 1.41±0.66	4-6 5.24±0.55	3-6 4.92±0.75	119.0010.0001*
- Preparation of the woman	6 (0-12)	1-4 2.37±0.68	9-12 10.80±0.71	8-12 9.92±0.91	121.848 0.0001*
- Preparation of the nurse	3 (0-6)	0-2 1.30±0.50	4-6 5.39±0.53	3-6 4.70±1.20	117.7760.0001*
Total pre-procedure practices score	13 (0-26)	4-8 5.54±1.00	20-25 23.33±1.05	18-24 21.24±1.41	130.2240.0001*
II-Procedure practices score	11 (0-22)	2-9 5.02±1.27	17-22 20.30±1.06	14-21 18.63±2.10	119.868 0.0001*
III-Post-procedure practices Score	8 (0-16)	0-6 3.30±1.33	13-16 15.02±0.88	9-16 13.44±1.98	120.2740.0001*
Total practices mean score	32 (0-64)	11-18 13.85±1.57	55-62 58.65±1.94	42-60 51.94±3.86	137.44 0.0001*

*Statistically significant (P<0.05)

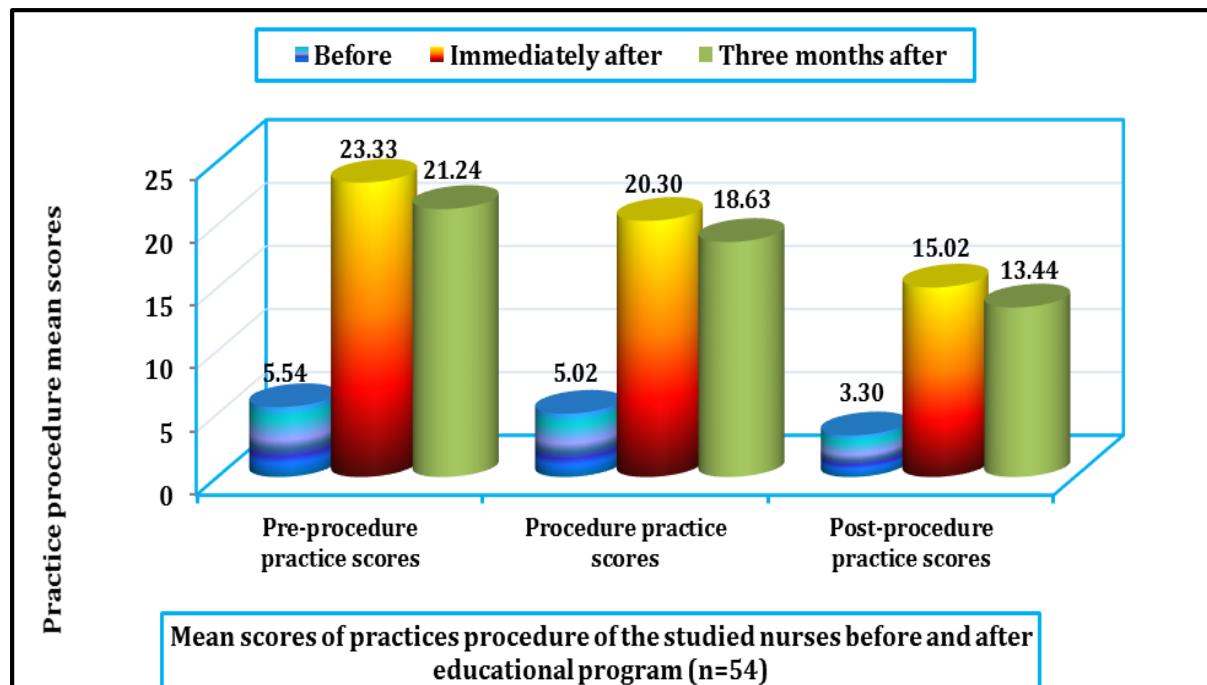


Figure (2): Practices procedure mean scores of the studied nurses regarding CTG at labor units before, immediately and three months after implementation of the educational program (n=54).

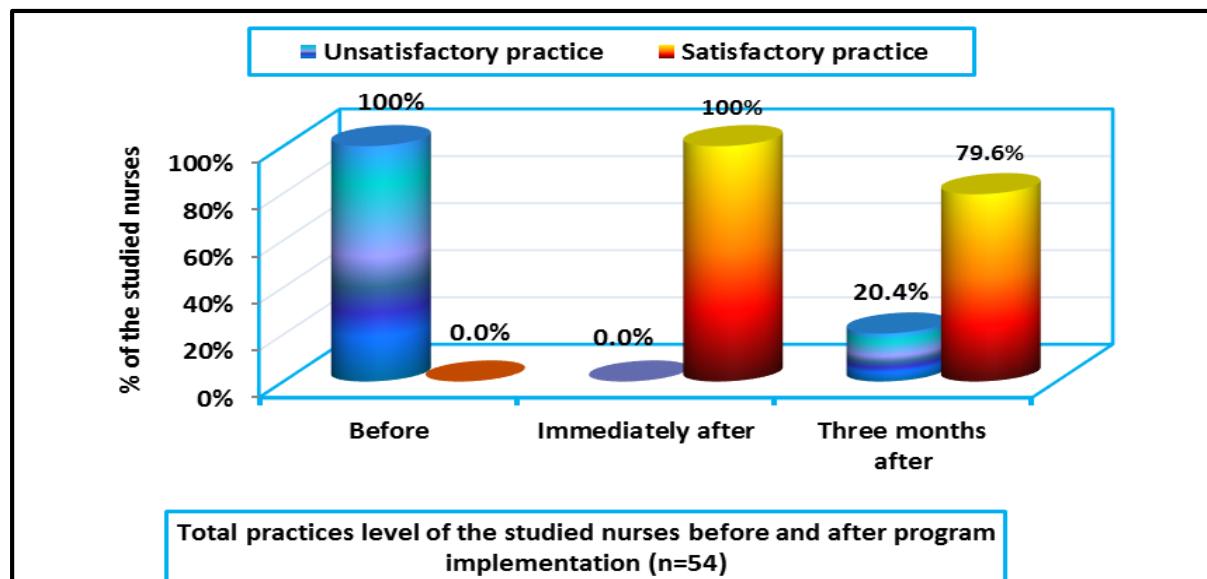


Figure (3): Total practices score level of the studied nurses regarding CTG at labor units before, immediately and three months after implementation of the educational program (n=54).

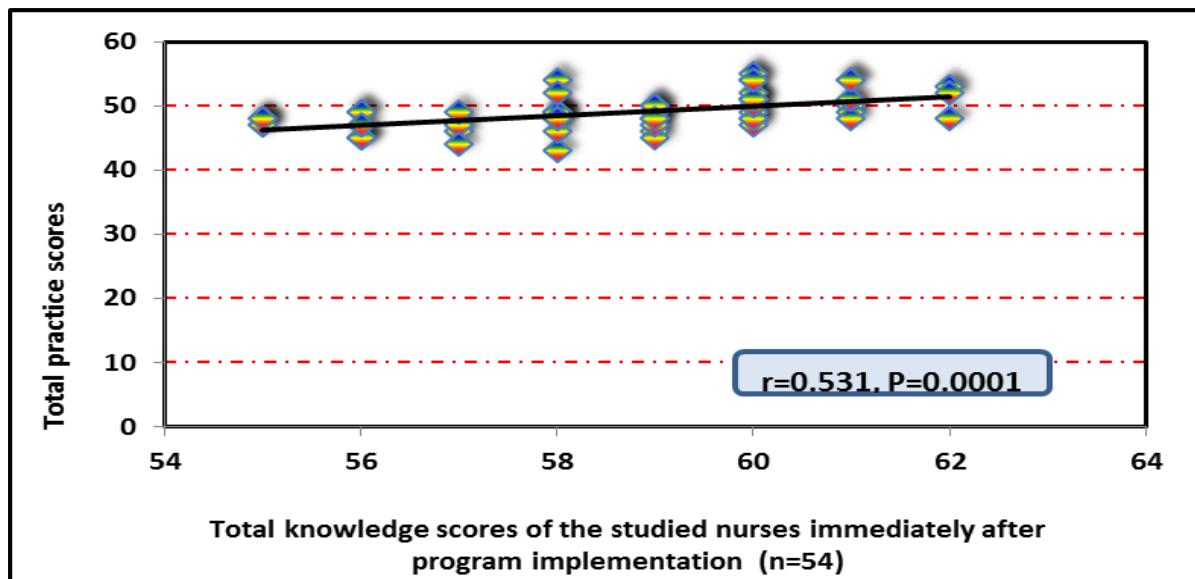


Figure (4): Correlation between total knowledge scores and total practices scores of the studied nurses regarding CTG at labor units immediately after implementation of the educational program (n=54).

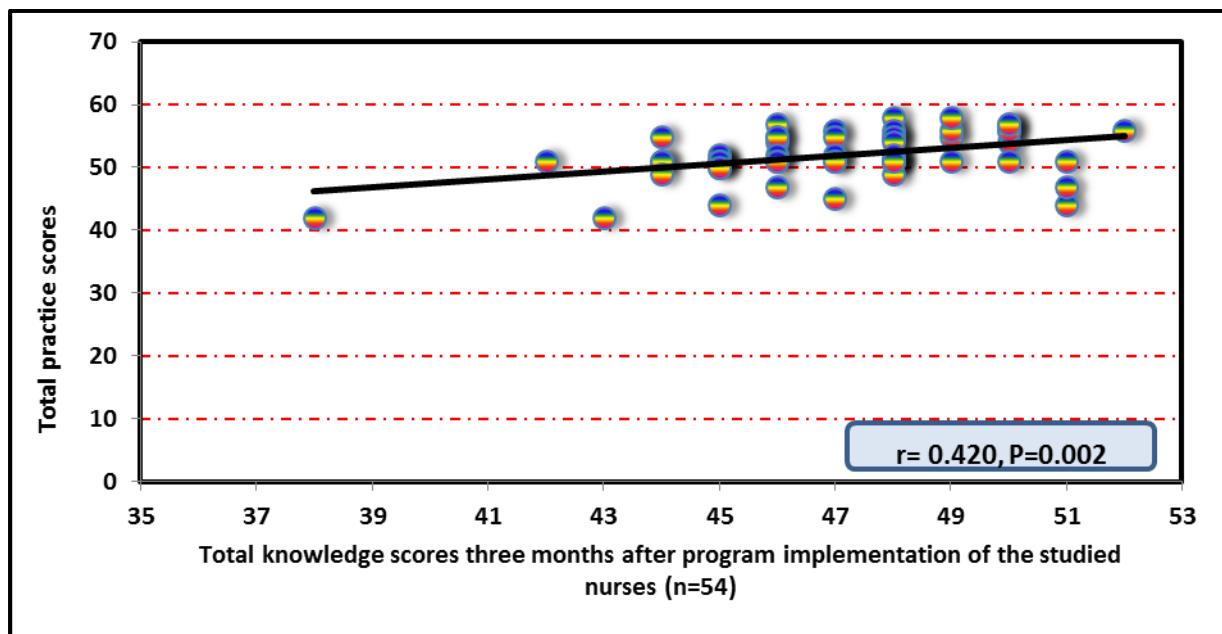


Figure (5): Correlation between total knowledge scores and total practices scores of the studied nurses regarding CTG at labor units three months after implementation of the educational program (n=54).

Discussion

Labor and birth are considered as one of the most memorable incidents for each woman's life. Birth-related complications could cause adverse pregnancy outcomes and significant healthcare expenses. Therefore, during pregnancy and labor, the basic goal is the well-being of the mother and the fetus. CTG is one of the most common obstetric procedures used for assessing fetal well-being, predominantly with increased risk of complications (El-Sayed & Saadoon, 2018, Ibrahim & Arief, 2019, Kelly et al., 2021).

Cardiotocography educational program raises nurses' knowledge, enhance their practices and interpretative abilities, improved management of intrapartum CTG, as well as enhance overall quality of care rendered to women throughout pregnancy and labor. While CTG programs are commonplace around the world, especially as a form of continuing nursing education, there has been little progress in Egypt in ensuring that maternity nurses have the skills necessary to perform CTG procedures and interpret the results (International Confederation of Midwives, 2017, James, Madun, & Morton, 2019, Oleiwi & Abbas, 2015, Pehrson, Sorensen, & Amer-Wåhlin, 2011). Consequently, the researcher undertook this study to determine the effect of educational program on nurses' performance regarding CTG at labor units. **Concerning the studied nurses' sociodemographic characteristics,** According to the present study, the mean age of the nurses was

35.74 ± 8.56 years, and over one-third of them were over the age of 40. Although, over half of them had completed a nursing technical institute and resided in rural areas. Additionally, nearly half of the nurses observed in the study had over ten years of experience, and none of them had participated in a previous CTG training program.

Cardiotocography (CTG) is one of the most commonly used technique for fetal monitoring during labour through recording changes of the fetal heart rate and uterine contractions. One of the most important things nurses do is identify and understand patterns in fetal monitoring. Baseline heart rate, baseline variability, acceleration, deceleration, and the characteristics of different decelerations are the four parameters analyzed in CTG traces. Normal, suspicious, abnormal, and urgently needing action are some ways to classify these traces. (Holmgren, 2020, Lamé et al., 2019, Tamber, ayes, Carey, Wijekoon, & Heazell, 2020).

Thus, maternity must be knowledgeable and have practical skills to recognize any CTG traces alterations that could jeopardize the well-being of the fetus. Lack of knowledge regarding CTG and inaccurate or wrong CTG interpretation findings may cause delayed preventative care actions and endanger the fetal health as well as increases the nurses and woman' anxiety levels (Wisner & Holschuh, 2018, Parhizkar, Latiff, & Aman, 2012).

In relation to the studied nurses' knowledge regarding CTG at labor units before, immediately and three months after implementation of the educational program, the current study revealed that **the total knowledge mean score of the studied nurses regarding CTG** was increased from 14.65 ± 3.00 before the program sessions to 48.92 ± 2.79 & 45.28 ± 2.33 immediately and three months after the teaching program sessions respectively with respect to the clarifications of CTG traces mean score that was raised from 2.85 ± 1.55 pre-program to 12.33 ± 1.53 & 11.18 ± 1.13 immediately and three months post program respectively. The score difference noticed is statistically significance before and after implementation of the educational program ($p = 0.0001^*$) **Accordingly, the total knowledge score level of the studied nurses regarding CTG at the present study** revealed that all of the nurses under investigation possessed low level of the pre-program knowledge regarding CTG. That figure grew to include the vast majority of nurses had high level immediately and after program implementation. Nearly two-thirds of the nurses in the study had a high level of understanding about CTG three months after the educational program was started, and over one-third had a moderate level of knowledge. These findings were statistically significant pre- and post-program implementation. These study results are similar with **Al Shamandy et al., (2023)** Where the results show that the nursing students' overall knowledge improved, going from 19.41 ± 1.535 on

the pretest to 24.27 ± 2.263 on the posttest. Similarly, the students' fetal trace interpretation skills improved, going from 25.92 ± 2.81 on the pretest to 38.18 ± 5.52 on the posttest, with a statistically significant difference. Before the program, almost half of the students had a low level of knowledge about fetal transfusions. There was a marked improvement in their posttest knowledge level one month after the session. Again the study findings are in line with **Alhetar et al., (2022)** They found that before participating in the program, most of the nurses had very little information about CTG. Having said that, most of them had a good amount of information right after the program. There was just a small decrease in the nurses' expertise after three months, so it stayed high. This indicates a significant increase in the total score of nurses' knowledge about CTG when comparing the scores **before** and after the program was implemented. Within the same framework, A study conducted by **Goldman & Naidoo, (2021)** concluded poor pre training baseline knowledge regarding CTG monitoring and interpretation with a more significant knowledge improvement post training educational sessions. **As well, Said & Ali, (2020)** proved that poor level of knowledge toward fetal CTG was documented among the majority of the nurses participants pre-program teaching sessions, which significantly improved post-teaching sessions. Additionally, **James, Madun, & Morton, (2019)** identified that more than two third of midwives had limited CTG knowledge and needed

training. On the other hand, **Lee et al., (2019)** supported the current study finding and stated that the pretest total knowledge mean score was 81.8 ± 6.1 and increased to 91.5 ± 5.0 posttest, with the fetal CTG interpretation skill mean score was in pretest 75.2 ± 10.2 and improved to 86.9 ± 5.8 significantly after the simulation course. Also, at the same line a study by **El-Sayed & Saadoon, (2018)** suggesting that there was a discernible change in the mean score of nurses' CTG knowledge and skills between the pretest, immediate posttest, and three-month posttest.

Looking at it from the researcher's point of view, the fact that the majority of the nurses in this study only attended Secondary Nursing and Nursing Technical Institute, and that none of the nurses had any background in CTG may explain why the results are consistent with those of earlier studies. But both at the one-month and three-month marks following program implementation, nurses' CTG knowledge improved noticeably. The nurses' willingness to learn about CTG and its interpretations grew after participating in the educational session, which may explain why they showed such progress despite having no background in the field. Multiple instructional strategies, such as the researcher's use of a CTG machine for explanation, booklet, group discussion, audiovisual materials, and videos, may have contributed to the knowledge progress score. While nurses' knowledge may have decreased three months after the program ended, this may be because

they were not able to keep up with the latest information, were working in an overburdened region, or simply had trouble retaining what they had learned. On the other hand, after the educational program was put into place, all CTG knowledge items generally improved. In the contrary, **Bayley et al., (2013)**, According to their report, training had minimal influence on knowledge levels, and the knowledge disparity could not be resolved by merely providing additional training. Along with it, most of the employees felt the care was of low quality.

Nearly one-third of neonatal deaths occur within the first 24 hrs of delivery as a consequence of labor-related complications such as asphyxia or dyspnea. According to **WHO estimates (2021)**, around 2 million stillbirths are recorded annually which could be prevented through the application of well-known evidence-based practices as electronic fetal monitoring. Impression of fetal well-being with continuous and persistent foetal monitoring with CTG during pregnancy and labor improves neonatal health following delivery. (**Demis et al., 2020, World Health Organization report, 2021**).

Fetal monitoring during labor detects any fetal impairment and enables appropriate intervention. However, suboptimal practices resulting from undertaking CTG is a common issue and still frequently reported in cases of successful obstetric malpractice claims. Hence, the most recommended intervention to enhance electronic fetal monitoring through CTG is educating and training of

maternity nurses. Because they are responsible for detecting and interpreting CTG patterns, alert the physician for complications and initiate corrective and supportive practices or actions when necessary (Alhetar et al., 2022, Al Shamandy et al., 2023, Lamé et al., 2019).

In relation to the studied nurses' practices regarding CTG at labor units before, immediately and three months after implementation of the educational program, the present study demonstrated that the total practices mean scores of the studied nurses regarding CTG was increased from 13.85 ± 1.57 before CTG educational sessions to 58.65 ± 1.94 and 51.94 ± 3.86 immediately and three months after CTG training sessions respectively. The CTG Pre-procedure practices mean scores of the nurses studied were 5.54, 23.33, and 21.24 before the educational program was implemented; their procedure practices mean scores were 5.02, 20.30, and 18.63; and their post-procedure practices mean scores were 3.30, 15.02, and 13.44, respectively, indicating a significant improvement in the nurses' practices. There was a statistically significant change in the mean score between the pre- and post-CTG program periods. ($p= 0.0001^*$).

Thus, the total practices score level of the studied nurses regarding CTG found that all of the nurses who were part of the trial had unsatisfactory CTG practices level before the program started. In contrast to the first and third months after program introduction, all of the nurses surveyed reported very good CTG practices, with 75% reporting

satisfactory level. Nurses' total practices scores for CTG have improved significantly, according to this analysis ($p = 0.0001^*$).

These results are supported by **Mahmoud et al., (2023)** which showed that when it came to assessing the fetal well-being before the intervention, just under three quarters of the nurses studied had unsatisfactory practices, but when it came to the immediate post-intervention and follow-up phases, the majority had satisfactory practices and over three quarters had satisfactory practices. **Also, Alhetar et al., (2022)** reported that more than four fifths of the studied nurses had poor level of CTG practice prior to program start. Although the majority of nurses reported happy working conditions, there was a marked improvement in nurses' overall practices score level with respect to CTG both immediately following program implementation and at the three-month follow-up.

These results are also identical with **Kelly et al., (2021)** who, demonstrated the fetal monitoring methods, discovered a significantly significant change between the pre- and post-training periods. Meanwhile, **Said & Ali, (2020)** proved that the majority of nurses had highly satisfactory practices after the application of the supportive nursing instructions in contrast to three quarters of unsatisfactory practices before nursing application. In the same context, **Ibrahim & Arief, (2019)** was observed that over 75% of the nurses under investigation had unsatisfactory practices prior to

receiving supportive program instructions. There was a highly statistically significant difference between their pre- and post-intervention practical skills with relation to electronic fetal monitoring, however, after the program's interventions, they significantly improved. Another study also conducted by **El-Sayed & Saadoon, (2018)**. This finding is consistent with the present study, which demonstrated that notable enhancements were observed in the pre program, immediate post-program, and three months post-program groups. In addition, the current research's findings are consistent with a study conducted by **Ramadan, Mohamed, & Salama, (2018)** who asserted that the nurses' total practices level regarding non-invasive fetal well-being measures had significantly improved in comparison to the pre- and immediate post-program implementation.

The fact that the current study's findings are consistent with those of earlier research suggests that the nurses surveyed had limited understanding of CTG prior to the educational program's introduction, and that many of them mistakenly thought that only doctors could perform the invasive procedure. Furthermore, the unsatisfactory quality of nursing practices prior to the program was caused by a lack of in-service teaching programs, particularly for newly appointed nurses, and a lack of system supervision and assessment of nursing practices in relation to fetal monitoring with CTG. Meanwhile,

the educational training program for CTG, which included motivating demonstrations and re-demonstrations of the CTG procedure and traces interpretation using the CTG device at the study settings mentioned, may have contributed to the significant improvement in the studied nurses' satisfactory practices regarding CTG immediately and three months after program implementation. Furthermore, the nurses gained knowledge of the CTG procedure nursing function following the implementation of the instructional program. The goal of education is to improve people's ways of thinking and doing through imparting new information and modifying existing practices. The nurses' work overload and lack of continuing in-service training and education likely contributed to a somewhat reduced but still significant decrease in their satisfactory practices scores three months after the program implementation.

Finally, relating to the correlation between the studied nurses' total knowledge scores and their total practices scores regarding CTG at labor units before and after implementation of the educational program. The present study's results show that the nurses' total knowledge score and total practices score were significantly correlated with each other both immediately and three months after the training program was started. A study by **Alhetar et al., (2022)** found a highly positive correlation between nurses' CTG knowledge and practices prior to and following program implementation.

Said and Ali, (2020), also detected a statistically significant correlation among maternity nurses' total scores knowledge and practices before and after nursing supportive instructions. As well as, a significant positive improvement of nurses' practices in relation to nurses' knowledge in pre and post program was identified by **Lamé et al., (2019)**. **Other studies as; Ramadan, Mohamed, & Salama, (2018), Thellesen et al., (2017)**, also showed that there were very positive connections between the overall knowledge scores of the nurses who participated in the study and their total practices scores after the program in respect to CTG. **Additionally, El-Sayed & Saadoon, (2018)** highlights, following program execution, a favorable association between the knowledge and practices scores of the nursing interns. This might be because of the profound effect of the CTG training program, which increased nurses' understanding of CTG and led to better CTG practices across the board. CTG is the most frequently employed instrument for the purpose of monitoring the well-being of both the mother and the fetus during pregnancy and labor. The primary responsibilities of maternity nurses are to evaluate expectant women and provide support during childbirth. They should possess a comprehensive understanding of the assessment and identification of fetal heart rate and uterine contraction patterns, be able to report any unsettling patterns to an obstetrician, and initiate supportive measures as needed. It is imperative that all maternity nurses receive CTG

education and training to guarantee that they possess the necessary knowledge, proficient practices, and competence to operate the device and provide high-quality care in a safe and timely manner (**Alhetar et al., Alsaraireh, Yehia, & Khalaf, 2023, World Health Organization, 2022**). After the educational program on CTG was implemented, the research hypothesis was met. Nurses' performance on CTG in labor units improved significantly both immediately and three months later compared to before the program was implemented.

In conclusion

The main finding concluded that the cardiotocography educational program had a positive effect on improving the level of knowledge and practices among the studied nurses working at labor units. Thus, the research aim was achieved and hypothesis was supported.

Recommendations

Based on the findings of the current study, the following recommendations are suggested

Recommendations for hospital administration:

- Cardiotocography monitoring and its traces should be covered in yearly workshops and training courses for maternity nurses.
- Resuming and reactivating the maternity head nurses' responsibility in supervising, directing and assessing nurses' performance before, during and after CTG procedure and establish plan for improvement.

Recommendations for nurses:

- Training programs regarding cardiotocography based on recent evidence based practices especially for newly employed maternity nurses.
- Written Arabic instructional booklet about CTG procedure and its traces interpretation should be available for all maternity nurses.

Recommendations for further research studies:

- A study to determine the effectiveness of using cardiotocography on maternal and neonatal outcomes.
- Reapplication of the study on larger sample for generalization of the findings.

References

Abd -El-Razek, A. (2016). Impact of educational programs about methods of assessment of fetal wellbeing during pregnancy among staff nurses. *Open Journal of Obstetrics and Gynecology*, 6(8), 473-481. Doi: 10.4236/ojog.2016.68063.

Abo-Hatab, T., Ahmed, M., Abozeid, E., Gaheen, M., and El-adham, A. (2020). Effect of various maternal positions on labor pain and fetal heart rate during the first stage of labor. *Journal of Nursing and Health Science*, 9(4), 41-59. Doi:10.9790/1959-0904064156.

Akyıldız, D., Çoban, A., Uslu, F. G., & Taşpinar, A. (2021). Effects of obstetric interventions during labor on birth process and newborn health. *Florence Nightingale Journal of Nursing*, 29(1), 9. Doi: 10.5152/FNPN.2021.19093.

Al Shamandy, S., Abd El-Hafez, A., Abd Elrahim, A., Abuzaid, O., & Abdelnaem, S. (2023). Training program effectiveness on knowledge and interpretation skills of fetal cardiotocography among undergraduate nursing students. *Egyptian Journal of Health Care*, 14(2), 501-516. Doi: 10.21608/ejhc.2023.299216

Alhetar, S. Z., Ramadan, S. A., Afifi, H. A., & Ibrahim, S. A. (2022). Effect of educational program on knowledge and practices of maternity nurses regarding cardiotocography. *Journal of Nursing Science-Benha University*, 3(1), 706-723. Doi:10.21608/JNSBU.2022.21529.

Bai, J., Lu, Y., Liu, H., He, F., & Guo, X. (2024). New technologies improve maternal and newborn safety. *Frontiers in Medical Technology*, 6(1), 1-5. Doi. 10.3389/fmedt.2024.1372358

Bayley, O., Colbourn, T., Nambiar, B., Costello, A., Kachale, F., Meguid, T., & Mwansambo, C. (2013). Knowledge and perceptions of quality of obstetric and newborn care of local health providers: a cross-sectional study in three districts in Malawi. *Malawi medical journal*, 25(4), 105-108. Retrieved from <https://pubmed.ncbi.nlm.nih.gov/2492639/>.

Blix, E., Maude, R., Hals, E., Kis, S., Karlsen, E., Nohr E. (2019). intermittent auscultation fetal monitoring during labor: a

systematic scoping review to identify methods, effects, and accuracy. *PLoS ONE*. Retrieved from <https://doi.org/10.1371/journal.pone.02195> available at 19-2-2024.

Das, S., Mukherjee, H., Santosh, K. C., Saha, C. K., & Roy, K. (2020). Periodic change detection in fetal heart rate using cardiotocograph. In 33rd International Symposium on Computer-Based Medical Systems: 104-109. Doi:10.1109/CBM503.2020.00027. S4

Demis, A., Getie, A., Wondmieneh, A., Bimerew, M., Alemnew, B., & Gedefaw, G. (2020). Women's satisfaction with existing labour and delivery services in Ethiopia: a systematic review and meta-analysis. *British Medical Journal open*, 10(7), 1-12. Doi:10.1136/bmjopen-2019-036552.

Dular, S., & Devi, M. (2021). Effectiveness of Self-Instructional Module on Knowledge Regarding Non Stress Test (NST) among staff nurses working at recognized hospitals in Gurugram. *European Journal of Molecular and Clinical Medicine*, 7(11), 6214-6219. <https://www.researchgate.net/publication/351049311>.

El-Sayed, H. E., & Saadoon, O. M. (2018). Effect of educational sessions about cardiotocography on nurses knowledge and skills at labor and high-Risk units. *International Organization of Scientific Research Journal*, 7(3), 8-16. Doi:10.9790/1959-07030508 16.

Goldman, B., & Naidoo, T. (2021). Formal training in cardiotocograph interpretation of healthcare practitioner improves interpretation: *A prospective descriptive analytical study in a resource constrained setting*. *International Journal of Gynecology & Obstetrics*, 153(3), 527-532. Doi: 10.1002/ijgo.13513.

Gweda, H. A., Ahmed, M. H., Abozeid, E. H., Belal, G. A., & Khalifa, F. M. (2024). Effect of educational guidelines regarding assessment of fetal well-being during pregnancy on nurses' performance. *Tanta Scientific Nursing Journal*, 33(2), 264-286. Doi:10.21608/TSNJ.2024.35123

Holmgren, C. (2020). Interpretation of fetal heart rate monitoring in the clinical context. *Clinical Obstetrics and Gynecology*, 63(3), 625-634. Doi:10.1097/GRF.0000000000000554.

<https://www.who.int/news-room/factsheets/detail/newborns-reducing-mortality>, Available at 16-5-2023.

Ibrahim, W. H., & Arief, A. F. (2019). Effect of Electronic Fetal Mentioning Educational Program on Knowledge and Interpretations of Internship Nursing Students. *International Journal of Novel Research in Healthcare and Nursing*, 6(1), 384-395. Available at: www.noveltyjournals.com.

International Confederation of Midwives. (2017). Core document: International definition

of the midwife. International Confederation of Midwives.

James, S., Maduna, N. E., & Morton, D. G. (2019). Knowledge levels of midwives regarding the interpretation of cardiotocographs at labour units in KwaZulu-Natal public hospitals. *Curationis*, 42(1), 1-7. Doi.org/10.4102/curationis.v4 2i1.2007.

Jepsen, I., Blix, E., Cooke, H., Adrian, S. W., & Maude, R. (2022). The overuse of intrapartum cardiotocography (CTG) for low-risk women: An actor-network theory analysis of data from focus groups. *Women and Birth*, 35(6), 593-601. Doi.org/10.1016/j.wombi.2022.01.003

Kahveci, B., Melekoglu, R., Evruke, C., Cetin C. (2018). The effect of advanced maternal age on perinatal outcomes in nulliparous singleton pregnancies. *BioMed Central pregnancy and childbirth Journal*, 18(1), 343. Doi: 10.1186/s12884-018-1984-x

Kelly, S., Redmond, P., King, S., Oliver-Williams, C., Lamé, G., Liberati, E., & Burt, J. (2021). Training in the use of intrapartum electronic fetal monitoring with cardiotocography: systematic review and meta-analysis. *An International Journal of Obstetrics & Gynaecology*, 128(9), 1408-1419. Doi: 10.1111/1471-0528.16619.

Lamé, G., Liberati, E., Burt, J., Draycott, T., Winter, C., Ward, J., & Dixon-Woods, M. (2019). Improving the practice of intrapartum electronic fetal heart rate monitoring with cardiotocography for safer childbirth: protocol for a qualitative study. *BMJ open*, 9(6), 1-7. Doi:10.1136/bmjopen-2019030271.

Lee, H. L., Liu, P. C., Hsieh, M. C., Chao, A. S., Chiu, Y. W., & Weng, Y. H. (2019). Comparison of high-fidelity simulation and lecture to improve the management of fetal heart rate monitoring. *The Journal of Continuing Education in Nursing*, 50(12), 557-562. Doi:10.3928/0022 0124-20191115-07.

Limbo, R., & Denney-Koelsch, E. M. (2020). Education in perinatal palliative care for nurses, physicians, and other health professionals. *Perinatal palliative care: a Clinical guide*, 381-403. Doi:10.1007/978-3-030-34751-217.

Mahjabeen, N., & Nasreen, S. Z. (2022). Analysis of normal and abnormal admission CTG and its association with perinatal outcomes. *Scholars International Journal of Obstetrics and Gynecology*, 5(2), 32-6. Doi:10.36348/sijog.2022.v05 i02.002.

Mahmoud, E. H., Hassanin, S. A., Emam, A. M., & Abd Elmordy, Z. R. (2023). Effect of instructional package on maternity nurses' knowledge and practices regarding assessment of fetal well-being. *Benha Journal of Applied Sciences*, 8(4), 167-178. Doi:10.21608/bjas.2023.191715.1053

Maraikkayar, S. S., Tamilselvi, R., & Beham, M. P. (2023). A Novel Biophysical profile database for fetal stress measurement in high-risk pregnancies. *Biomedical and Pharmacology Journal*, 16(4), 2192204. Doi: <https://dx.doi.org/10.13005/bpj/2796>.

Mckinney, E. S., James, S. R., Murray, S. S., Nelson, K., & Ashwill, J. (2021). Maternal-child nursing-e-book. Elsevier Health Sciences.

Mdoe, P. F., Ersdal, H. L., Mduma, E. R., Perlman, J. M., Moshiro, R., Wangwe, P. T., & Kidanto, H. (2018). Intermittent fetal heart rate monitoring using a fetoscope or hand held Doppler in rural Tanzania: a randomized controlled trial. *BMC pregnancy and childbirth*, 18(1), 1-8. Doi: 10.1186/s12884-018-1746-9.

Murray, S., Fox, D. J., Coddington, R. L., & Scarf, V. L. (2024). How does the use of continuous electronic fetal monitoring influence women's experiences of labour? A systematic integrative review of the literature from high income countries. *Women and Birth*, 37(4), 1-10. Doi: <https://doi.org/10.1016/j.wombi.2024.101619>

Ogenyi, P., Chiegwu, H. U., England, A., Akanegbu, U. E., Ogbonna, O. S., Abubakar, A., & Dauda, M. (2022). Appraisal of trimester-specific fetal heart rate and its role in gestational age prediction. *Radiography*, 28(4), 926-932. Doi: <https://doi.org/10.1016/j.radi.2022.06.015>

Oleiwi S. S., & Abbas. I. M. (2015). The effectiveness of an education program concerning cardiotocography on nurse-midwife's knowledge in Maternity Hospitals in Baghdad City. *IOSR Journal of Nursing and Health Science*, 4(5), 33-42. Doi: 10.9790/1959-04543342

Oleiwi S.S. (2018). Effectiveness of an education program concerning cardiotocography on nurses-midwives practice in maternity hospitals at Baghdad city. *Iraqi National Journal of Nursing Specialties*, 31(1), 24-34. Retrieved from <https://www.injns.uobaghdad.edu.iq/index.php/INJNS/article/download/289/277>.

Parhizkar, S., Latiff, L. A., & Aman, N. B. (2012). Midwifery Nurses' Skill to Interpret Cardiotocogram: A Cross Sectional Study. *International journal of healthscience and research*, 2(6), 28-34. Retrieved from <https://www.researchgate.net/publication/300289026>.

Pehrson, C., Sorensen, J. L., & Amer-Wåhlin, I. (2011). Evaluation and impact of cardiotocography training programmes: a systematic review. *BJOG: An International Journal of Obstetrics & Gynaecology*, 118(8), 926-935. Doi: 10.1111/j.14710528.2011.03021.x.

Pereira, S., Lau, K., Modestini, C., Wertheim, D., and Chandraharan, E. (2022) Absence of fetal heart rate cycling on the intrapartum cardiotocograph(CTG) is

associated with intrapartum pyrexia and lower Apgar scores. *The Journal of Maternal-Fetal & Neonatal Medicine*, 35(25), 7980-7985. Doi: 10.1080/14767058.2021.1940130

Ramadan, S. A., Mohamed, A. I., & Salama, A. M. (2018). Maternity nurses' performance regarding non-invasive fetal wellbeing measures: Educational intervention. *Journal of Nursing and Health Science*, 7(1), 2320. Doi:10.9790/1959-0701060819

Ramli, I., Posadino, A. M., Giordo, R., Fenu, G., Fardoun, M., Iratni, R., & Pintus, G. (2023). Effect of resveratrol on pregnancy, prenatal complications and pregnancy-associated structure alterations. *Antioxidants*, 12(2), 341. Doi:org/10.3390/antiox1202034.

Rodgers, C., C. (2020). Continuous electronic fetal monitoring during prolonged labor may be a risk factor for having a child diagnosed with autism spectrum disorder. *Medical Hypotheses*, 145,(1),1-6. Doi: org/10.1016/j.mehy.2020.110339

Said, A. R., & Ali, H. A. (2020). Effect of supportive nursing instructions for maternity nurses regarding electronic fetal monitoring. *International Journal of Nursing Science*, 10(1), 1-11. Doi:10.5923/j.nursing.20201001.0.

Smith, V., Begley, C., Newell, J., Higgins, S., Murphy, D. J., White, M. J., & Devane, D. (2019). Admission cardiotocography versus intermittent auscultation of the fetal heart in low-risk pregnancy during evaluation for possible labor admission— multicentre randomised trial. *An International Journal of Obstetrics & Gynaecology*, 126(1), 114-121. Doi: 10.1111/1471-0528.15448.

Stone, P. R., Burgess, W., McIntyre, J. P., Gunn, A. J., Lear, C. A., Bennet, L., & Maternal Sleep In Pregnancy Research Group, The University of Auckland. (2017). Effect of maternal position on fetal behavioral state and heart rate variability in healthy late gestation pregnancy. *The Journal of physiology*, 595(4), 1213-1221. Doi: 10.1113/JP273201.

Tamber, K. K., Hayes, D. J., Carey, S. J., Wijekoon, J. H., & Heazell, A. E. (2020). A systematic scoping review to identify the design and assess the performance of devices for antenatal continuous fetal monitoring. *Public Library of Science PloS one*, 15(12), 1-31. Doi:10.1371/journal.pone.0242983.

Thellesen, L., Bergholt, T., Hedegaard, M., Colov, N. P., Christensen, K. B., Andersen, K. S., & Sorensen, J. L. (2017). Development of a written assessment for a national interprofessional cardiotocography education program. *BMC Medical Education*, 17(1),1-9. Doi: 10.1186/ s12909-017-0915-2.

Uusiku, L., James, S., Sonti, I., & Tuhadeleni, O. (2021). Midwives' perceptions regarding the use of the cardiotocograph machine as an intrapartum monitoring tool in namibia: a qualitative research study. *Global Journal of Health Science*, 14(1), 16. Doi: 10.5539/gjhs. v14n1p16.

Wahyuningsih,D.,&Linggardini, K. (2022). Correlation between maternal knowledge about danger sign and antenatal care visit compliance in the health care center. *Proceedings Series on Health & Medical Sciences*, 3(1), 28-31. Retrieved from. <https://doi.org/10.30595/pshms.v3i.615>

Wisner, K., & Holschuh, C. (2018). Fetal heart rate auscultation. *Nursing for Women's Health*, 22(6), 32. Retrieved from. <https://doi.org/10.1016/j.nwh.2018.10.001>

World Health Organization. (2021). Improving Survival and Well-being. Retrieved from. <https://www.who.int/news-room/factsheets/detail/newbornsreducing-mortality>, Available at 16-5-2023.

Yu, Z., Hu, Y., Lu, Y., Li, L., Ge, H., & Fu, X. (2024). Reliable fetal heart rate signal generation using. International Joint Conference on Neural Networks, 1-8. Doi: 10.1109/ICNN60899.2024.10650729