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Volume 38 Number 3

August

2025

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Effect of Educational Program about Quality Improvement Strategy for Administrative Structure on Nurses' Knowledge and Practices

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Abstract

Background: Quality improvement in healthcare is essential to enhance patient outcomes and promote practices. Nurses play a central role in implementing quality improvement strategies within healthcare organizations; yet they often lack the necessary training and awareness to apply these strategies effectively. **Aim:** To determine the effect of educational program about quality improvement strategy for administrative structure on nurses' knowledge and practices **setting:** The study was conducted in four departments of Tanta New Surgical Hospital. **Research design:** A quasi-experimental study design was used. **Subjects** This study included all (n = 68) nurses. **Tools**: Two tools; Nurses' Knowledge Structured Questionnaire about Quality Improvement Strategy for Administrative Structure, and Monitoring Checklist for Nurses' Opinions of Quality Improvement Strategy for Administrative Structure. **Results:** The study revealed that preprogram, 45.6% of nurses had a low level of knowledge that improved to be 10.3% and13.2%had low level immediately and after three months post- program, respectively. Moreover, regarding the total levels of monitoring checklist toward quality improvement strategies for administrative structure, 75%of nurses had unsatisfactory levels at preprogram that improved to 83.8% after three months post-program **Conclusion:** The implementation of an educational program resulted in a significant enhancement in nurses' knowledge and practices. The improvement was sustained three months post- program, indicating the effectiveness of structured educational approaches in promoting hospital quality standards. **Recommendations**: Hospital administration should integrate continuous in-service quality improvement training for nurses, reinforce policy adherence and tailor training according to staff characteristics.

Keywords: Administrative structure, educational program, nurses, quality Improvement.

Introduction:

Nurses have a large, important, and unique role in the health care delivery system. Nurses play a critical role in restoring patients' health and instilling confidence **(Pipe, et al., 2025)**. A hospital's reputation is greatly impacted by the quality of nursing care provided and the efficient administration of the nursing staff, which includes middle and upper management levels and is crucial to the advancement of the nursing profession. This nursing study fosters progress, offers crucial direction and inspiration, and demonstrates outstanding educational leadership **(Tamata & Mohammadnezhad, 2024).**

The administrative nursing department is crucial as it is responsible for developing and maintaining the administrative infrastructure that supports high-quality nursing services. This includes formulating and monitoring the implementation of nursing policies and strategies, ensuring the optimal allocation and utilization of nursing resources, and providing essential support for the efficient and smooth operation of all organizational functions within the nursing department **(The Joint Commission., (2025).**

The process of developing administrative components and managing their movement to and from other people within an organization is known as an administrative structure. The organization's purpose, vision, philosophy, objectives, policies, safety precautions, and work activities are all parts of the administrative structure. An organization's mission statement outlines the reason for its existence. For many kinds of businesses, vision and mission statements are seen as essential components of the strategic management process. Philosophy serves as a framework or direction for behavior. It outlines what are thought to be the discipline's fundamental phenomena. In terms of planning as well as more general planning, goals and objectives are an essential part of management structure for organizing, leading, and managing **(American Organization for Nursing Leadership, 2025).**

The policy is a planned set of principles to guide actions and attain sensible results. Additionally, assist nurses in understanding their roles and duties within the organization and provide the groundwork for providing high-quality, safe care at a reasonable cost. **(Falade et al., 2024).**

Providing patients with high-quality treatment that maximizes their results while staying within the

constraints of available resources is a significant issue in the healthcare industry. In order to accomplish organizational goals and improve patient satisfaction, high-quality treatment has a significant impact on patients, the company, and healthcare professionals **(Blue Care Network of Michigan, 2025).**

A methodical strategy to make adjustments that increase hospital efficacy via performance improvement is known as quality improvement. Care that emphasizes finding and promoting best practices, as well as enhancing patient happiness, performance, and safety. In order to achieve greater and long-lasting changes, it leverages the coordinated and ongoing efforts of all stakeholders, including medical professionals, patients and their families, researchers, planners, and educators. Hospitals must thus set up their structural elements to satisfy the standards of the certifying body to get accreditation **(U.S. Centers for Medicare & Medicaid Services .,2025)**.

Quality improvement places a strong emphasis on teams of organizational members who have been taught fundamental methods and problem-solving tools and who are given decision-making authority to continuously examine and improve work processes. The six aspects of quality improvement center on organizational mechanisms that avoid mistakes, coordinate treatment across locations and health team members, and guarantee that pertinent, correct information is accessible when required. These systems are essential to delivering high-quality care. Structure of organizations, management of personnel, method for recording and reporting, standards for nursing care, safety precautions, and supplies and equipment **(Donabedian, 2025).** Ensuring the availability and proper management of supplies and equipment is critical for the effective operation of any healthcare facility. These dimensions include; quality, Availability, Functionality, Safety, Cost-effectiveness, Compatibility, User training, Maintenance and Support (**Ștefan, Rusu, Ovreiu, & Ciuc, 2024)**

Significance of study

As a recently established hospital at Tanta University, the surgical hospital may have particular difficulties with the administrative framework, including personnel management, resource allocation, and policy and procedure development. The hospital can guarantee that nurses comprehend the policies, processes, and systems that direct the day-to-day operations

of the hospital by providing them with education about the administrative structure. In addition to lowering the possibility of adverse events, medical mistakes, and other patient safety hazards, this may assist the quality of care given to patients.

Additionally, teaching nurses about the hospital's administrative structure helps support a continual quality improvement culture. This covers the use of evidence-based procedures, ongoing quality enhancement, and the tracking and assessment of the standard of patient care. Also help to improve communication and collaboration among healthcare professionals within the hospital **(Abraham, Kannampallil, Patel, Almoosa, 2020).** Thus, this study aims to determine the effect of educational program about quality improvement strategy for administrative structure on nurses' knowledge and practice.

Aim of the Study

The study aimed to determine the effect of educational program about quality improvement strategy for administrative structure on nurses' knowledge and practices.

Research hypothesis:

Nurses' knowledge and practices about quality improvement strategy for administrative structure are expected to be improved after implementing educational program.

Subjects and methods

Study design

Quasi experimental research design was used to achieve the aim of the present study

Setting

The present study was conducted at four departments (Intensive care unit, Operation, Orthopedic, Cardiothoracic) of Tanta New Surgical Hospital that is affiliated to Ministry of Higher Education and Scientific Research. Its total capacity is 660 beds.

Subjects

All nurses (n=68) working at the previously mentioned setting. Including at Intensive care unit (22 nurse), Operations (21 nurse), Orthopedics (13 nurse), Cardiothoracic department (12 nurse) participated in this study

Tools of data collection

To achieve the aim of the present study the data was collected using the following two tools**:**

Tool I: Nurses' Knowledge Structured Questionnaire about Quality Improvement Strategy for Administrative Structure

This tool was developed by the researcher guided by **Aly (2011), El-Sayed, & El-Sayed (2021),Gahar (2021)and Gassas, & Ahmed, (2022).** It aimed to assess nurses'

knowledge about quality improvement strategy for administrative structure. It consisted of two parts as the following.

Part 1:

Nurses' personal characteristics and work related data: It included age, gender, department, marital status, level of nursing education, position, years of experience, and Previous attended about quality improvement strategy.

Part 2:

Nurses' knowledge Questionnaire about quality improvement strategy for administrative structure: It included nurses' knowledge questionnaire about quality improvement strategy for administrative structure. It consisted of (77) questions, in the form of multiple-choice questions (57) items and true and false questions (20) items.

These questions were classified into eight categories as follows:

-Basic concepts of quality improvement included 5 questions.
-Importance and barriers of quality improvement included 2 questions.
-Components of organizational structure included 7 questions.
-Personnel management included 12 questions.
-Recording and reporting system included 17 questions.
-Nursing care standard included 16 questions.
-Safety measures included 12 questions.
-Supplies and equipment included 6 questions.

The scoring system:

Each question was taken score (1) for correct answer and (0) for incorrect answer. All the questions scores were summed up and categorized according to statistical cut-off points (60 %) into:

- High level of knowledge: >80%
- Moderate level of knowledge: 60 - 80%
- Low level of knowledge: <60

Tool II: Monitoring Checklist for Nurses'opinions to Quality Improvement Strategy for Administrative Structure:

This tool was developed by the researcher guided by **Spiegel & Hyman, (2009),** Mnaa**, El Molla, Banan, Hassan, (2021) and Mallick, (2021).**

It used to monitor nurses' opinions to quality improvement strategy for administrative structure in Tanta New Surgical Hospital. It consisted of 32 items divided into six dimensions as follows:

Organizational structure included 6 items

- **Personnel management** included 9 items.

Recording and reporting system included 10 items.

-**Nursing care standard and policies** included 3 items.

- **Safety measures standard** included 2 items

- **Supplies and equipment** included 2 items.

Scoring system:

Nurses opinion was measured as follow; Yes = (1), No = (0). Nurses' practices levels were summed up and classified according to statistical cut- off points (80%) into the following levels:

- Satisfactory level ≥ 80%

-Unsatisfactory level < 80%

Methods

-Official permission to conduct the study was obtained from the Dean of Faculty of Nursing to the Director of Tanta New Surgical Hospital.

Ethical consideration:

-An approval from Scientific Research Ethics Committee was obtained with a Code No (21/6/2023).

- The researcher introduced herself to the participants, a full explanation of the aim and method of the study was done to obtain the acceptance and cooperation as well as their informed consent.

- The participants have the right to terminate participation at any time will be respected.

- The nature of the study did not cause harm for the entire sample.

- Tools of the study were translated into Arabic language.

- 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 two assistant professors from the Nursing Administration Department and one professor from the Psychiatric Health Nursing Department, Faculty of Nursing at-Tanta University.

- A pilot study was carried out after the experts' opinions and before staring actual data collection. It was carried out on a sample of 10% of subjects (n= 7) to check and ensure the clarity of the tools, identify obstacles and problems that might be encountered during data collection.

-The study's subjects included all nurses in the previously mentioned setting. The aim of pilot study was to test the sequence of items, clarity, applicability and relevance to study variables. Necessary modifications were made includingclarification, simplifying certain questions and adding others. Pilot study also served to estimate the time required for filling questionnaire sheets. The estimated time needed to fulfill tool I was approximately (20-30)

minutes. The estimated time needed to complete tool II by the researcher was approximately (20-30) minutes.

- The reliability of tools were tested using Cronbach Alpha Coefficient test-its value for tool (I)= 0.94 and tool(II)=0.83,indicating high reliability of the study tools .
- Data will be collected within one year. The data collection started in September 2023 and lasted ten months until June.

Statistical analysis

Data was fed to the computer and analyzed using by (IBM SPSS Statistics for Windows, Version (25.0) Armonk, NY: IBM Corp.). Statistical presentation of the present study was conducted using the mean, standard deviation, unpaired student t-test was used to compare between two groups in quantitative data, chi-square test was used to compare between groups in qualitative data, ANOVA test was used for comparison among different times in the same group in quantitative data, linear correlation coefficient was used for detection of correlation between two quantitative variables in one group

Results

Table (1): Reveals distribution of nurses according to their personal characteristics and work- related data. The nurses' ages ranged between 20 –40 or more years with a mean age score of 32.74±4.6. More than three-quarters (77.9%) of them fall in the age group 20 - <30 years. More than two- thirds (66.2%) of them were female. About 32.4% and 30.9 of nurses worked in critical care units and operation department, respectively. While 19.1% and 17.6% worked in the orthopedic and cardiothoracic departments, respectively .A high percent of them (73.5%) were married. Regarding education level, nearly two- thirds (64.7%) of nurses had a Technical Institute of Nursing, while 35.3% of them had a Bachelor Degree in Nursing Sciences. Regarding years of experience, nearly half (48.5.2%) of nurses had less than five years with mean years of experiences 7.23±3.51. All (100%) of them didn't attend any previous training on quality improvement strategy.

Table (2): and figure (1): Shows total levels of nurse's knowledge about quality improvement strategy through program phases. The table showed that there was a statistically significant improvement in total levels of nurse's knowledge about quality improvement strategy and immediately and after 3months post program at ($p \leq 0.001$).

Preprogram, about (45.6%) of nurses had a low level of knowledge that improved to be that improved to be 70.6 %, 66.2 % had a high level

immediately and after 3months post-program.

Table (3): Illustrates mean and standard deviation scores of nurses' knowledge toward quality improvement strategy for administrative structure through program phases. It shows that there was a highly statistical significant improvement of all dimensions of nurse's knowledge toward quality improvement strategy for administrative structure. Mean and standard deviation of total dimensions of knowledge was (4.33±1.20) at pre- program that improved to (13.74±2.67) at immediately and (13.26±2.58) after 3months post- program

Table (4): and figure (2): Illustrate levels of monitoring check- list toward quality improvement strategy for administrative structure preprogram and post program. It was noticed that there was a highly statistically significant improvement of levels of monitoring about quality improvement strategy dimensions post program at ($p<0.001$).

Table (5): Illustrates Mean and standard deviation scores of items of quality improvement strategy for administrative structure through pre and post program. It shows that there was a highly statistical significant improvement of all items of quality improvement. Mean and standard deviation scores of items of quality improvement was (7.76±2.86) at preprogram that improved to (25.76±3.54) at post after 3^{th} months program.

Table (6): Revealed that there was a positive statistically significant correlation between Total quality improvement strategies for administrative structure and monitoring check- list for administrative structure preprogram, and after 3^{th}months post program at ($p\leq0.001$).

Table (1): Distribution of nurses according to their personal characteristics and work related data (n=68)

personal characteristics	N	%
Age		
20- <30	53	77.9
30- <40	6	8.8
40 or more	9	13.2
Mean±SD	32.74±4.6	
Gender		
Female	45	66.2
Male	23	33.8
Department		
Orthopedic	13	19.1
Cardiothoracic	12	17.6
Critical care	22	32.4
Operation	21	30.9
Marital status		
Married	50	73.5
Un-married	18	26.5
level of nursing education		
Technical Institute of Nursing	44	64.7
Bachelor of Science in Nursing	24	35.3
Position		
Nursing supervisor	7	10.3
Staff nurse	61	89.7
Years of experience		
<5	33	48.5
5- <10	20	29.4
10 or more	15	22.1
Mean±SD	7.23±3.51	
Previous attended about quality improvement strategy		
Didn’t attend	68	100

Table (2): Total levels of nurses knowledge about quality improvement strategy through program phases (n=68)

Total knowledge	Pre		Immediately		After3th months post program		P1		P2	
	N	%	N	%	N	%	x^2	P-value	x^2	P-value
High	16	23.5	48	70.6	45	66.2	33.040	<0.001*	0.384	0.825
Moderate	21	30.9	13	19.1	14	20.6				
Low	31	45.6	7	10.3	9	13.2				

P1=Preprogram and immediately post program
P2= Immediately and after 3thmonths post program

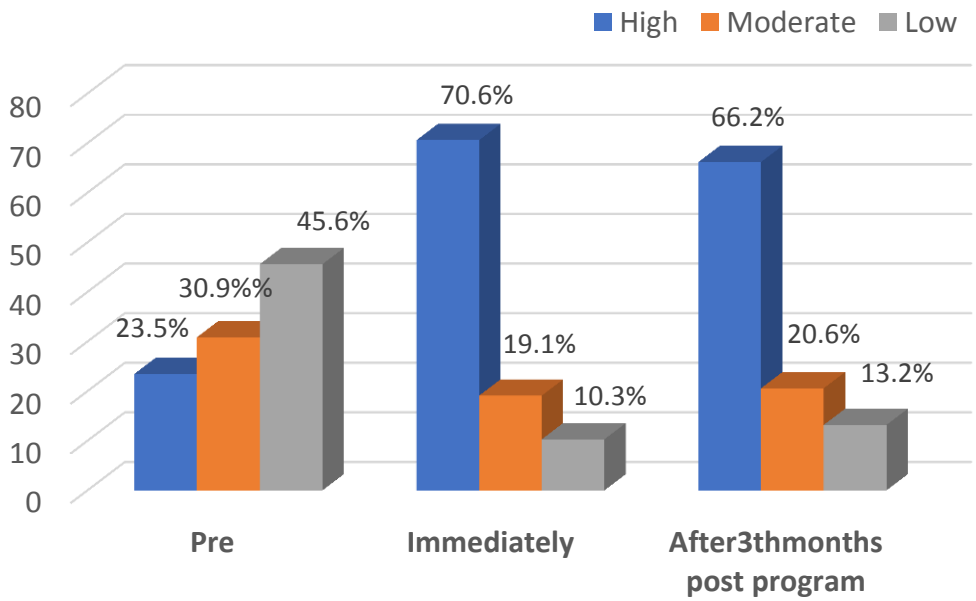

Figure (1): Total levels of nurses knowledge about quality improvement strategy through program phases (n=68).

Table (3): Mean and standard deviation scores of nurses knowledge toward quality improvement strategy for administrative structure through program phases (n=68)

Dimensions of knowledge	Maximum score	Pre		Immediately		After 3thmonths post program		P1		P2	
		Mean±SD	Mean %	Mean±SD	Mean %	Mean±SD	Mean %	*T*	P-value	*t*	P-value
Basic concepts about quality improvement	3	0.75±0.34	25.0	2.58±0.64	86.0	2.48±1.21	82.7	4.374	0.011*	0.127	0.905
Personnel management	3	0.78±0.52	26.0	2.52±0.72	84.0	2.43±1.37	81.0	3.393	0.027*	0.101	0.924
Recording and reporting system	3	0.93±0.46	31.0	2.61±0.53	87.0	2.52±1.5	84.0	4.146	0.014*	0.098	0.926
Nursing care standard	3	0.81±0.62	27.0	2.55±0.47	85.0	2.49±1.52	83.0	3.874	0.018*	0.065	0.951
Infection of control policies	2	0.60±0.33	30.0	1.76±0.44	88.0	1.64±0.78	82.0	3.653	0.021*	0.232	0.827
Supplies and equipment	2	0.46±0.26	23.0	1.70±0.43	85.0	1.69±0.82	84.5	4.274	0.013*	0.019	0.986
Total	16	4.33±1.20	27.1	13.74±2.67	85.9	13.26±2.58	82.9	12.858	<0.001*	0.517	0.609

t-test& p value (1): between Preprogram and immediately post program, t-test& p value (2): between preprogram and after 3months post program

Table (4): Levels of monitoring about quality improvement strategy for administrative structure pre and post program (n=68)

Items of quality improvement	Pre				Post				Chi-square	
	Satisfactory		Unsatisfactory		Satisfactory		Unsatisfactory			
	N	%	N	%	N	%	N	%	x^2	P-value
Organizational structure	14	20.6	54	79.4	55	80.9	13	19.1	49.452	<0.001*
Personnel management	15	22.1	53	77.9	57	83.8	11	16.2	52.063	<0.001*
Recording and reporting system	19	27.9	49	72.1	58	85.3	10	14.7	45.533	<0.001*
Implementation of nursing care	21	30.9	47	69.1	54	79.4	14	20.6	32.372	<0.001*
Infection control and Safety measures	15	22.1	53	77.9	56	82.4	12	17.6	49.538	<0.001*
Supplies and equipment	18	26.5	50	73.5	59	86.8	9	13.2	50.323	<0.001*

at ($p \leq 0.001$)

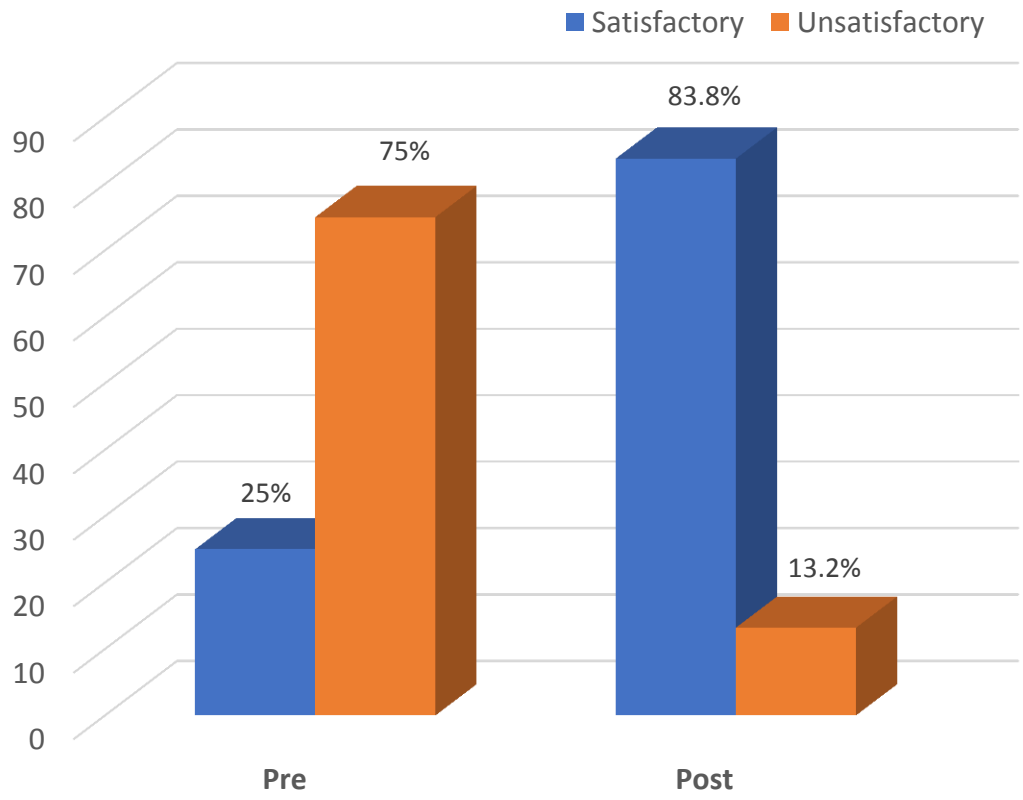

Figure (2): Levels of monitoring about quality improvement strategy for administrative structure pre and post program (N=68)

Table (5): Mean and standard deviation scores of items of quality improvement strategy for administrative structure through pre and post program (n=68)

Items of quality improvement	Maximum score	Pre		Post (after 3th months		Paired t-test	
		Mean±SD	Mean%	Mean±SD	Mean %	T	P-value
Organizational structure	5	1.03±0.42	20.6	4.05±0.88	81.0	6.925	<0.001*
Personnel management	9	1.99±0.74	22.1	7.54±1.47	83.8	10.117	<0.001*
Recording and reporting system	10	2.79±1.08	27.9	8.53±2.23	85.3	7.326	<0.001*
Implementation of nursing care	3	0.93±0.52	31.0	2.38±0.53	79.3	3.382	0.028*
Infection control and Safety measures	2	0.44±0.23	22.0	1.65±0.64	82.5	3.082	0.037*
Supplies and equipment	2	0.53±0.19	26.5	1.74±0.78	87.0	4.060	0.015*
Total	31	7.76±2.86	25.0	25.76±3.54	83.1	22.022	<0.001*

Table (6): Correlation between Total Knowledge and Total quality improvement strategy for administrative structure

Total quality improvement strategy	Total Knowledge	
	R	P-value
Pre	0.332	<0.001*
Post	0.427	<0.001*

Discussion

Regarding nurses' knowledge levels about quality improvement strategy for administrative structure

The results of this study indicated a statistically significant improvement in total levels of nurses' knowledge about quality improvement strategies immediately and after three months post program. The successful implementation of quality improvement strategies program increases their awareness about the importance of organizational structure, personnel management, recording and reporting systems, nursing care standards, infection control, safety measures, and supplies and equipment.

This outcome from the researcher point of view may be assigned those nurses before program implementation don't know the meaning of the aspect concept of quality improvement strategy. Moreover, after an educational program was implemented, nurses refreshed their knowledge about quality improvement strategy. Also, the program provides reinforcement and relevant information for nurses. It also improved their understanding of quality improvement strategies that affect their practices and knowledge.

This finding is on the same line with **Smith, White, Black, (2021)** who conducted a study on the impact of educational program on nurses' knowledge and found that structured training programs significantly improved nurses' understanding of quality improvement strategies. In disagreement with this, a study conducted by **Brown, Green, Blue, (2019)** found that while short-term knowledge improvement was evident immediately after training, the retention of knowledge declined significantly after three months. The present study findings revealed statistically significant and sustained improvements in nurses' knowledge levels about total quality improvement strategies both immediately after the program and a slight decline in three months post-program. The preprogram levels of knowledge were relatively low., However, these levels significantly increased immediately post-program and remained high three months later with a slight decline.

This is may be due to the successful implementation of the quality improvement strategies program and increased awareness about its importance and increased interest of studied nurses to attend the training program about quality improvement strategies, as of the studied nurses had attended any courses about

quality improvement strategies before. In addition, the level of nurses' knowledge increased due to Tanta New Surgical Hospital being prepared for GAHAR accreditation during the data collection period and the Education Unit and the quality unit in the hospital presenting training programs to the nurses especially, about quality improvement strategies.

In agreement with these findings, **Johnson, and Lee, (2020)** reported similar findings in their study, where they found that continuous education and training programs led to a sustained improvement in nurses' knowledge and application of quality improvement strategies over time. This supports the observation in the present study that knowledge levels remained improved even three months after the program.

Regarding to levels of monitoring for nurses' opinions to quality improvement strategy for administrative structure

The results of this study indicated a statistically significant improvement in nurses monitoring levels about quality improvement strategies across all dimensions throughout pre- and post- program phases. In dimensions of recording and reporting systems and supplies and equipment, most of the studied nurses had a satisfactory level about quality improvement strategies in those two dimensions.

This may be due to the studied nurses highly understood the contents of the training program. These are the areas of practices. They mostly deal with their daily work in recording and reporting systems and the simple and scientific language the program used. In-addition, all nursing procedures need supplies and equipment during performing them so, the repetitive them by nurses allowed for excellence of practices. Also, the preparation for GAHAR accreditation of the hospital allowed for professional practices for all hospital departments.

In alignment with these findings **Hastings, Sloane ,Goldberg, Oddone, & Olsen, (2024)** assessed the impact of an interdisciplinary program and reported a notable increase in resolved patient care demands and a decrease in return visits, especially after applying recording and reporting systems and highlighted enhanced nursing capacity in managing patient needs with the use of proper equipment and supplies.

However, in disagreement with this, a study conducted by **Wachter, Pronovost,&,Shekelle, (2023)** found that not all quality improvement educational programs

yield uniformly positive outcomes. Some programs inadvertently lead to unintended consequences, such as increased resource utilization or shifts in healthcare providers' behavior that decreased improvement of patient care which were negative consequences of organizational outcomes.

Regarding the studied nurses' total monitoring levels about quality improvement strategies, this present study showed that there were statistically significant improvements in total monitoring levels about quality improvement strategies throughout the post-program phase in comparison with the pre-program phase. The majority of studied nurses had a satisfactory level regarding total practices of quality improvement strategies.

These statistically significant improvements were attributed to the process of implementing the training program, which was based on adult learning educational approaches allowing for more interactive and participative learning. The program raised awareness and facilitated the practical application of quality improvement strategies during the practical sessions of the program leading to improvements in the practices of the quality improvement strategies.

Educational programs centered on quality improvement strategies are instrumental in enhancing nurses' competencies, leading to better patient outcomes and more efficient healthcare delivery. However, the success of these programs depends on their design, implementation, and alignment with the specific needs of the healthcare environment.

Regarding correlation between total quality improvement strategies knowledge and total quality improvement practices among studied nurses pre and post program:

The current study findings revealed a statistically significant positive correlation between total quality improvement strategies knowledge and total quality improvement practices among studied nurses pre- and post- program. The observed positive and statistically significant correlation between the total knowledge of quality improvement strategies for the administrative structure and monitoring checklist scores both pre-program and three months post-program suggests that enhancing quality improvement strategies within hospital administration can lead to measurable improvements in

monitoring outcomes of quality improvement strategies practices.

These findings collectively suggest that while the implementation of quality improvement strategies can positively influence administrative structures and monitoring outcomes, the success of such program is contingent upon factors such as staff knowledge, attitudes, and the specific organizational context. Therefore, for quality improvement programs to be effective, they must be thoughtfully designed and adapted to the unique needs and challenges of the healthcare setting in which they are implemented.

This is supported by a study by **Chadborn, et al. (2020)** highlighted that quality improvement studies in nursing homes have shown variability in effectiveness, suggesting that while quality improvement programs lead to improvements, their success is highly dependent on the context and implementation strategies. This underscores the importance of tailoring quality improvement programs to specific organizational settings to achieve desired outcomes.

Conversely, a study conducted by **El-Sherbiny, Abou Hashish, Fouad, (2020)** investigated the relationship between nurses' knowledge of quality improvement and their actual implementation of quality improvement practices in Egyptian hospitals. Their findings showed **no statistically significant correlation** between nurses' knowledge of quality improvement strategies and their real application of these practices. The authors suggested that **organizational barriers**, such as **lack of administrative support, work overload,** and **poor communication**, often hinder nurses from translating theoretical knowledge into practical action.

Conclusion

Based on the findings of the present study, it was concluded that:

Pre-educational program, high percent of nurses's demonstrated inadequate knowledge and unsatisfactory practices across several dimensions of quality improvement strategies; including administrative structure, personnel management, recording and reporting, nursing care standards, safety measures, and supply and equipment policies. After implementation of the educational program, there was a statistically significant improvement in both nurses' knowledge and their practices in all assessed areas, especially in hospital organizational structure and policies related to infection control. Additionally, the results revealed a statistically

significant positive correlation between total knowledge of quality improvement strategies and the total practices scores pre- and post-program. This finding confirmed the research hypotheses, which stated that, nurses' knowledge and practice about quality improvement strategy for the administrative structure were expected to be improved after implementing educational program.

Recommendations

I. For Hospital Administration:

-Support and sustain administrative structures that facilitate quality improvement, such as maintaining written and visible mission, vision, philosophy, and department-specific goals.

-Establish and enforce personnel management policies to ensure nurses are supported in scheduling, performance appraisals, development plans, and incentive systems to influence the success of quality initiatives.

-Ensure integration and monitoring of quality standards into all hospital recording and reporting systems, including patient admissions, discharges, deaths, and units reports, to support data-driven decision-making.

II. For Head Nurses:

-Deliver regular training and knowledge updates for nurses in all domains of quality improvement strategies, including administrative, personnel, clinical, safety, and documentation policies to sustain the gains that are observed post-program.

-Encourage collaborative monitoring practices and engage staff in self-assessment using monitoring checklists to promote ownership of quality practices

III. For Future Research:

- Asses the relation between quality improvement strategy and nurses performance.

- Study the effect of implementing quality improvement strategy for administrative structure in another healthcare setting.

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Effect of Educational Program about Concepts Mapping on Critical Thinking Skills for Nursing Administration Students

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Abstract

Background: Current nursing practice requires nurses to develop their critical thinking skills in order to administer safe, optimal nursing care, solve nursing practice problems creatively, and make effective decisions. Concept mapping educational program could be a useful method to help nursing administration students develop their critical thinking abilities for practical problem solving. **Objective:** Determine the effect of educational program about concepts mapping on critical thinking skills for nursing administration students. **Setting:** Faculty of Nursing, Tanta University. **Subject:** Fourth year undergraduate nursing administration students (N= 222). **Tools:** Tool I: Knowledge about Concept Mapping and Critical Thinking Questionnaire, Tool II: Concepts Mapping Assessment and Tool III: Critical Thinking Skills Assessment. **Results:** Preprogram, few (8.15%) compared to majority (90.5%) had high level of total knowledge about concept mapping and critical thinking at post and follow up program. The concept mapping assessment revealed statistically significant improvement in students' concept mapping skills post than preprogram with further improvement or maintenance at the follow-up. Highly statistically significant improvement of students solving of management problems by concept mapping found at post and follow up than preprogram. Highly statistically significant improvement of total level of student's critical thinking knowledge and skills found for problem solving. **Conclusion:** Implementation of an educational program about concept mapping give a significant improvement of student's critical thinking skills **Recommendations:** Concept mapping need to formally embed into nursing education to help students connect theoretical knowledge with real-life administrative decision-making scenarios

***Keywords*:** Concept Mapping, Critical Thinking, Nursing Administration, Educational Program, Nursing Education.

Introduction

Current nursing practice requires nurses to develop their critical thinking skills in order to administer safe, optimal nursing care, solve nursing practice problems creatively, and make effective decisions, **(Morton & Thurman, 2023)**. Nursing education systems is required to prepare student to deal with today's complex and evolving healthcare settings (**Ghorbani, Mohammadi, Rooddehghan, Bakhshi, & Nasrabadi, 2023).**

Concept mapping approach with their visual representation of relationships between key ideas serves as valuable tool for revealing and building nursing students understanding of complex subjects. It helps for the better understanding of the subject information in the form of different shapes, hierarchical graphs. It is mainly assisting in the construction of knowledge on any topic **(Yahaya et al., 2024).** Specially nursing administration students can solve practice issues and develop their critical thinking skills by using concepts mapping. As it helps them organize and assess nursing interventions. Beside strengthen their problem-solving skills and function at higher cognitive level.**(Chatzi & McNamara, 2025).**

Evaluating problem-solving skills through a structured rubric can provide educators with reliable methods to evaluate and enhance students' problem-solving abilities (**Shanta & Wells, 2022).**

Critical thinking involves several steps, most of which adults breeze though without much thought. These steps include identify the issue, think about the goal, brainstorm possible solutions, think through possible results, try one of the solutions, and finally, evaluate the outcome. Critical thinking strategies are not extensively developed or practiced during primary and secondary education. Teachers are therefore, obligated to help students develop the skills necessary to synthesize the nuances of a modern, complex society (Al-Ghadouni, 2021).

The six critical thinking skills—conceptualizing, logical reasoning, applying, analyzing, decision making, and synthesizing—are interdependent and essential for effective problem-solving and decision-making. Mastery of these skills enhances cognitive abilities, fosters intellectual autonomy, and contributes to more informed and rational choices **(Kurniawan, et al., 2025).** The Holistic Critical Thinking Scoring Rubric is a used to assess the quality of critical thinking in both written and verbal contexts. The scoring consists of four levels of evaluation, with the first level representing minimal critical thinking ability and the fourth level indicating advanced critical thinking skills

(Irianti, Faridi, Pratama, & Suwandi, 2024).

Aim of the study

The aim of study is to:

Determine the effect of educational program about concepts mapping on critical thinking skills for nursing administration students

Research hypothesis

After implementing of the educational program, the nursing administration student's concept mapping and critical thinking skills are expected to be improved

Subjects and method

Study design

Quasi-experimental research design was used to achieve the aim of the present research.

Setting

The study was conducted at Faculty of Nursing, Tanta University, Nursing administration department

Subjects

The study subjects consisted of representative sample of nursing administration students (222) from the total of (524) fourth year undergraduate nursing administration students. They were studying the first term in year 2023-2024

Tools

Three tools were used to accomplish the aim of this study including:

Tool I: Students Knowledge about Concept Mapping and Critical Thinking Questionnaire:

This tool was developed by the researcher based on recent relevant literatures **Elmeghawri & Sleem (2021); Hashim , El Sayed and Abdeen (2021)** to test nursing administration students' knowledge about concept mapping and critical thinking. This tool consisted of two parts as follows: -

Part one: Personal Data of Students

Part two: Students knowledge regarding Concept Mapping and Critical Thinking:

It includes questions on

- Concept mapping principles, and steps for designing
- Critical thinking benefits and skills

Scoring system

Each question take score (1) for correct answer and (0) for wrong answer. All the questions score was summed up and categorized according to cut-off points into:

- High knowledge level > 80%
- Moderate knowledge level 60 - 80%
- Low knowledge level < 60%

Tool II: Nursing Administration Students Concepts Mapping skills Assessment: This tool was developed by **Elmeghawri & Sleem, (2021)** and **Brondfield, et al., (2021)** and modified by the researchers. It consisted of 4 situation problems related to poor communication, conflict, human resources management and waste management. Solving the

problem was graded on 5 dimensions as follows:-

-Structure that provides a very complete picture of ideas.

-Relationships that indicate both simple and complex relationships.

-Exploratory that shows complex thinking about the meaningful relationship between ideas.

-Communication that allows for a high level of understanding.

-Organization which the map is treelike, well organized, logical format and contains main concepts.

Scoring system

Student's concept mapping grading was scored on four point likert scale as (1-4). Need improvement = (1), Developing = (2), Sufficient = (3) and above average = (4)

Tool III: **Nursing Administration Students Critical Thinking Skills Assessment**

This tool was developed by the researchers based on **Obied & Abo Gad, (2017)** :It consists of five problem situations regarding managerial skills include leadership, time management, motivation, delegation and nursing shortage.

The scoring system

Student's responses to problem situations were scored by using Holistic Critical Thinking Scoring Rubric encompassed of four levels.

Method

-Official permission to carry out the study was obtained from Faculty of Nursing, as well as from the top management.

-Ethical consideration

-Approval of Ethical Committee at Faculty of Nursing was obtained, and student's consents to participate in the study

-Participation in the study was voluntary

-The participants' rights were protected by informed oral consent

-Respondents were assured that the data was treated as strictly confidential.

-Tools (I, II, III) were resented to jury of sevenexperts in the area of specialty to check the content validity and reliability of its items. Necessary modifications were made. The content validity was 90% for tool I, 89% for tool II and 81% for tool III.

-Pilot study was carried out on 10 % of the sample (N= 22) and excluded from study sample. Necessary modification was done.

-Reliability of tools were tested using Chronbach alpha coefficient test, its 0.831 for tool (I), it was value = 0.774 for tool (II) and 0.758 for tool (III).

-Nursing students were divided into 10 groups program time was 3 hours for each group. One session every day (45mints. /day for 4 days). The

program sessions conducted in the OSCE room on ten small groups.

-After 3 months of program implementation and researcher follow up the post-test were re-conducted using tool (I) and (II) to determine the level of nursing students critical thinking using tool (I) and (III).

Results

Table (1): Shows personal data of students. 56.8% aged ≤ 22, 83.3% unmarried, 72.1% female. and 95.0% live with family. Students 39.6% had excellent grade and 73.0% their previous learning was secondary school. While 51.8% had attended an orientation program about concept mapping.

Table (2): Reveals levels of student's total knowledge for each dimension of concept mapping at pre post and follow up program. There was highly statistical significant improvement of students levels of total knowledge for each dimension of concept mapping at (p= <0.001) post than preprogram.

Preprogram 91.4%, 82.95 and 77.5 %of students showed low level of knowledge improved post and at follow up program to 54.4%, 68.5% and 32.9% while 59%, 73.4% and 39.2% showed high level

Table (3): Reveals levels of students' total knowledge for each dimension of critical thinking at pre, post and follow up program. There was highly statistical significant improvement of students levels of each dimension of critical thinking at (p= <0.001) at post and follow up than preprogram. Preprogram 63.7% of students had low level of knowledge on conceptualizing and logical reasoning skills that improved to be 78% and 75.8% had high level of knowledge at post and follow up program respectively.

Preprogram students 84.8% had low level of knowledge regarding critical thinking application and analytical thinking skill, improved to be 27.4% and 62.8% had high level of knowledge at post and follow-up program respectively .

Students 62.8% had low level of knowledge regarding critical thinking decision making and synthesizing skills pre-program, changed to be 74.9%and 62.8% had high level of knowledge at post and follow up program respectively.

Preprogram students 70.3% had low level of knowledge regarding developing themselves as a critical thinker, while 73.9% and 74.3% had high level of knowledge at post and follow up of program respectively

Table (4): Illustrates students mean of each dimension of concepts mapping skill for problem solving pre, post and follow up program There was highly statistically significant improvement of mean of each dimension of concepts mapping skill at (p=<0.001) post and follow up than preprogram.

Preprogram students mean score of structure dimension was 5.55 ± 1.80 statistically significant increased to12.54 ± 1.15 and 13.91 ± 1.25 respectively post and follow up program at p =<0.001. While, mean score of relationship dimension was 5.44 ± 1.03 statistically significant increased to 12.27 ± 1.50 and 13.77 ± 1.04post and follow up program at p =<0.001 respectively.

Preprogram student's skill of exploratory mean score was 4.90 ± 1.46 while at post program and follow up this values was improved to be 13.21 ± 1.40 and 14.21 ± 1.07 respectively. Students concept mapping communication dimension mean score was 6.09 ± 1.49 preprogram which statistically significant increased to 13.25 ± 1.47 and 14.12 ± 1.14 respectively post program and follow up at p =<0.001.

Students organization dimension of concept map mean score was 5.30 ± 1.31preprogram which statistically significant increased to 13.55 ± 1.46 and 14.23 ± 1.30 respectively at post and follow up program at p =<0.001.

Table (5): Shows students' total level of critical thinking skills for problem solving pre, post and follow-up program. There was highly statistically significant improvement of total level of students critical thinking skills for problem solving at (p=<0.001) post and follow up program implementation than preprogram.

Pre-program (41.0 and 55.9%) of students, respectively fall at levels one and two of critical thinking skills for solving leadership problem while, post program 34.7% and 62.6% fall at levels three and four respectively. Beside students 32.4% and 63.5% fall respectively at levels one and two of critical thinking skills for solving time management problem while, post program students 35.1% and 62.2% fall in levels three and four respectively.

Pre-program (47.3% and 51.4%) of students, respectively fall between levels one and two of critical thinking skills for solving delegation problem while, post program (33.8% and 60.8%) of students respectively fall in levels three and four. Preprogram students (35.15% and 46.4 %) respectively fall between levels one and two of critical thinking skills for solving nursing shortage problem While, post program students 46.4% and 50.9% respectively fall in levels three and four.

Figure (1): Represents levels of student's total concept mapping knowledge at pre, post and follow up program. Preprogram few of students compared to majority had high level of total knowledge about concept mapping at post and follow up program**.**

Figure (2): Shows students levels of total knowledge about critical thinking at pre, post and follow up program. Preprogram majority of students had low level of knowledge, while at post and follow up of program about three quarters of students were at high level of knowledge.

Figure (3): Shows correlation between post program total critical thinking knowledge and post program total critical thinking skills of problem solving. There was a statistically significant, weak positive relationship between total critical thinking knowledge and critical thinking skills in problem-solving. The p-value ($p < 0.001$) is very small, indicating that the correlation was statistically significant.

Figure (4): Correlation between post overall critical thinking skills of problem solving with post concept map structure. There was positive correlation between post overall critical thinking skills of problem solving with post concept map structure. The correlation coefficient ($r = 0.274$) indicated weak positive correlation. The p-value ($p < 0.001$) is very small, indicating that the correlation was statistically significant.

Table (1): Personal data of nursing administration students (N = 222)

Personal Data	No.	%
Age (years)		
≤ 22 years	126	56.8
> 22 years	96	43.2
Min. – Max.	21.0 – 43.0	
Mean ± SD.	22.46 ± 2.02	
Median	22.0	
Gender		
Male	62	27.9
Female	160	72.1
Marital status		
Married	37	16.7
Unmarried	185	83.3
Living		
With Friend	11	5.0
With Family	211	95.0
Residence		
City	69	31.1
Village	153	68.9
Grades		
Good	78	35.1
Very good	56	25.2
Excellent	88	39.6
Previous learning		
Secondary school	162	73.0
Nursing school	60	27.0
Attending of orientation program about concept mapping		
Yes	115	51.8
No	107	48.2
Years of clinical training in private hospitals		
Min. – Max.	0.0 – 8.0	
Mean ± SD.	0.80 ± 1.54	

SD: Standard deviation

Table (2): Levels of students' total knowledge for each dimension of concept mapping at pre, post and follow up program (N=222)

Knowledge levels of concept mapping dimensions	Pre		Post		Follow up		p
	No.	%	No.	%	No.	%	
Definition, principles, benefits and uses							
Low (<60%)	101	45.5	2	0.9	2	0.9	
Moderate (60 - <80%)	97	43.7	36	16.2	47	21.2	<0.001*
High (≥80%)	24	10.8	184	82.9	173	77.9	
Advantage							
Low (<60%)	184	82.9	70	31.5	59	26.6	
Moderate (60 - <80%)	0	0.0	0	0.0	0	0.0	<0.001*
High (≥80%)	38	17.1	152	68.5	163	73.4	
Key guidelines							
Low (<60%)	172	77.5	26	11.7	19	8.6	
Moderate (60 - <80%)	31	14.0	123	55.4	116	52.3	<0.001*
High (≥80%)	19	8.6	73	32.9	87	39.2	
Types							
Low (<60%)	203	91.4	101	45.5	91	41.0	
Moderate (60 - <80%)	-	-	-	-	-	-	<0.001*
High (≥80%)	19	8.6	121	54.5	131	59.0	
Steps for designing problems solving							
Low (<60%)	79	35.6	9	4.1	-	-	
Moderate (60 - <80%)	90	40.5	80	36.0	-	-	<0.001*
High (≥80%)	53	23.9	133	59.9	222	100.0	

SD: **Standard deviation**

p: p value for comparing between the **different periods**

*: Statistically significant at $p \leq 0.05$

Table (3): Levels of students' total for each dimension of critical thinking at pre, post and follow up program (N=222)

Knowledge levels of critical thinking dimensions	Pre		Post		Follow up		p
	No.	%	No.	%	No.	%	
Definition, benefits, characteristics and components							
Low (<60%)	163	73.1	16	7.2	6	2.7	
Moderate (60 - <80%)	51	22.9	47	21.1	46	20.6	<0.001*
High (≥80%)	8	3.6	160	71.7	170	76.2	
Conceptualizing and logical reasoning skills							
Low (<60%)	142	63.7	15	6.7	12	5.4	
Moderate (60 - <80%)	56	25.1	33	14.8	41	18.4	<0.001*
High (≥80%)	24	10.8	174	78.0	169	75.8	
Critical thinking application and analytical thinking skill							
Low (<60%)	189	84.8	67	30.0	16	7.2	
Moderate (60 - <80%)	29	13.0	94	42.2	66	29.6	<0.001*
High (≥80%)	4	1.8	61	27.4	140	62.8	
Critical thinking decision making and synthesizing skills							
Low (<60%)	140	62.8	9	4.0	14	6.3	
Moderate (60 - <80%)	66	29.6	46	20.6	68	30.5	<0.001*
High (≥80%)	16	7.2	167	74.9	140	62.8	
Developing yourself as a critical thinker							
Low (<60%)	156	70.3	58	26.1	57	25.7	
Moderate (60 - <80%)	-	-	-	-	-	-	<0.001*
High (≥80%)	66	29.7	164	73.9	165	74.3	

SD: **Standard deviation**

p: p value for comparing between the **different periods**

*: Statistically significant at $p \leq 0.05$

Table (4): Students mean of each dimension of concepts mapping skill for problem solving at pre, post and follow up program (N=222)

Mean of concept mapping dimension for problem solving	concepts mapping skill assessment			p
	Pre	Post	Follow up	
Structure (4 – 16)				
Min. – Max.	4.0 – 13.0	9.0 – 16.0	12.0 – 16.0	<0.001*
Mean ± SD.	5.55 ± 1.80	12.54 ± 1.15	13.91 ± 1.25	
Relationships (4 – 16)				
Min. – Max.	4.0 – 12.0	9.0 – 15.0	11.0 – 16.0	<0.001*
Mean ± SD.	5.44 ± 1.03	12.27 ± 1.50	13.77 ± 1.04	
Exploratory (4 – 16)				
Min. – Max.	4.0 – 12.0	8.0 – 15.0	12.0 – 16.0	<0.001*
Mean ± SD.	4.90 ± 1.46	13.21 ± 1.40	14.21 ± 1.07	
Communication (4 – 16)				
Min. – Max.	4.0 – 12.0	8.0 – 16.0	12.0 – 16.0	<0.001*
Mean ± SD.	6.09 ± 1.49	13.25 ± 1.47	14.12 ± 1.14	
Organization (4 – 16)				
Min. – Max.	4.0 – 12.0	11.0 – 16.0	12.0 – 16.0	<0.001*
Mean ± SD.	5.30 ± 1.31	13.55 ± 1.46	14.23 ± 1.30	

SD: **Standard deviation**

p: p value for comparing between the **different periods**

*: Statistically significant at $p \leq 0.05$

Table (5): Students total level of critical thinking skills for solving 5 problems pre, post and follow up program (N=222)

Critical thinking skills for problem solving	Pre		Post		Follow up		p
	No.	%	No.	%	No.	%	
Leadership							
Level one	91	41.0	-	-	-	-	<0.001*
Level two	124	55.9	6	2.7	-	-	
Level three	7	3.2	139	62.6	84	37.8	
Level four	-	-	77	34.7	138	62.2	
Time management							
Level one	72	32.4	-	-	-	-	<0.001*
Level two	141	63.5	6	2.7	-	-	
Level three	9	4.1	138	62.2	96	43.2	
Level four	-	-	78	35.1	126	56.8	
Motivation							
Level one	101	45.5	-	-	-	-	<0.001*
Level two	108	48.6	6	2.7	-	-	
Level three	13	5.9	106	47.7	89	40.1	
Level four	-	-	110	49.5	133	59.9	
Delegation							
Level one	105	47.3	-	-	-	-	<0.001*
Level two	114	51.4	12	5.4	-	-	
Level three	3	1.4	75	33.8	67	30.2	
Level four	-	-	135	60.8	155	69.8	
Nursing shortage							
Level one	78	35.1	-	-	-	-	<0.001*
Level two	103	46.4	6	2.7	-	-	
Level three	41	18.5	113	50.9	91	41.0	
Level four	-	-	103	46.4	131	59.0	

p: p value for comparing between the different periods

*: Statistically significant at $p \leq 0.05$

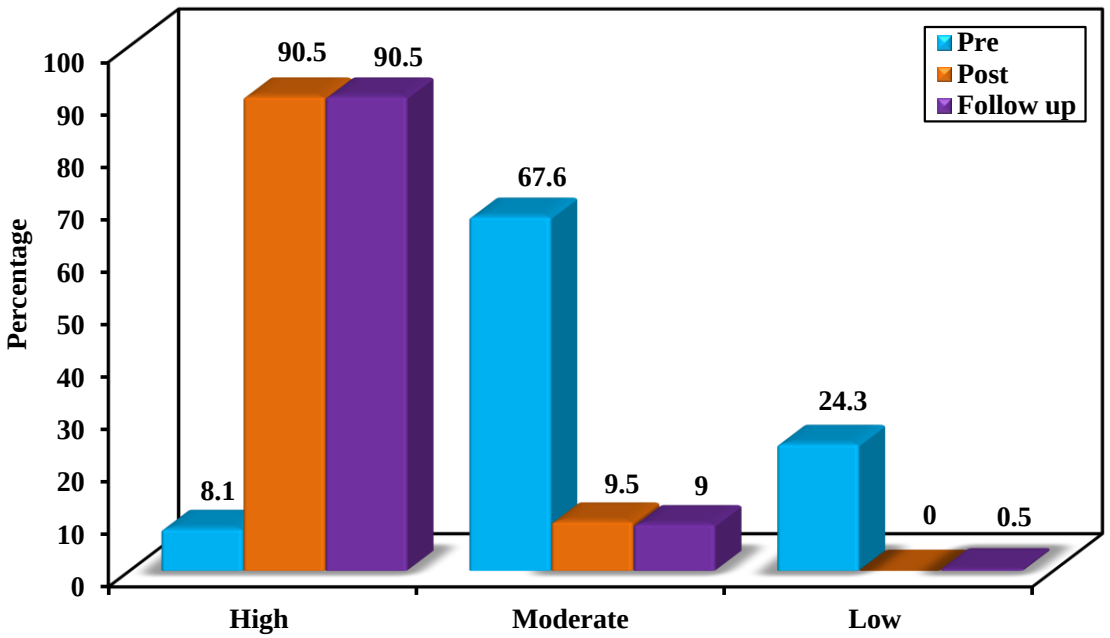

Figure (1): Levels of student's total concept mapping knowledge at pre, post and follow up program (N=222)

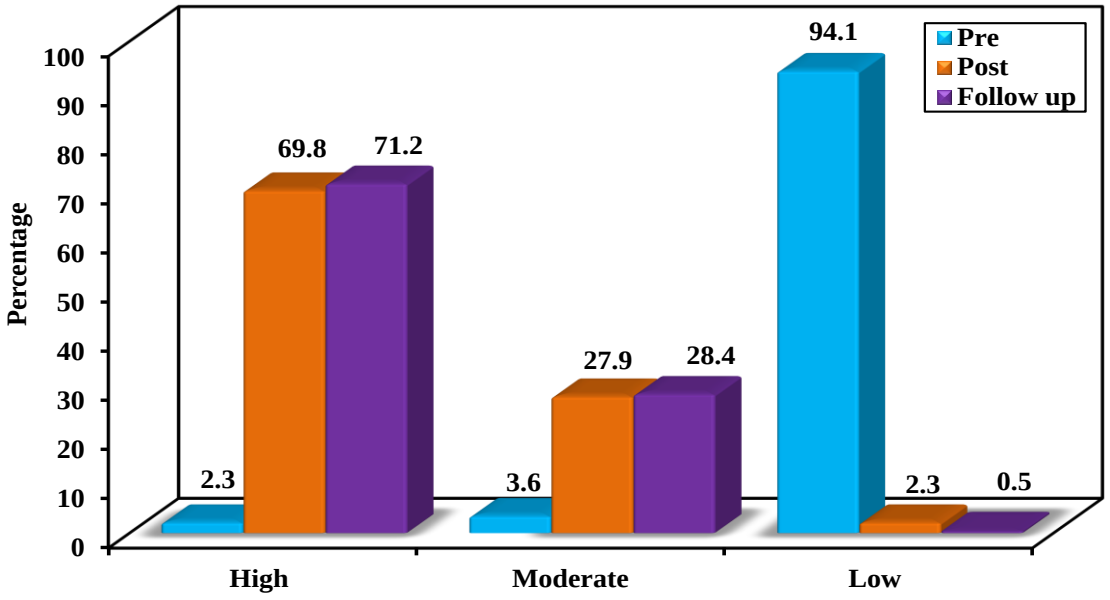

Figure (2): Students levels of total knowledge about critical thinking at pre, post and follow up of program (N=222)

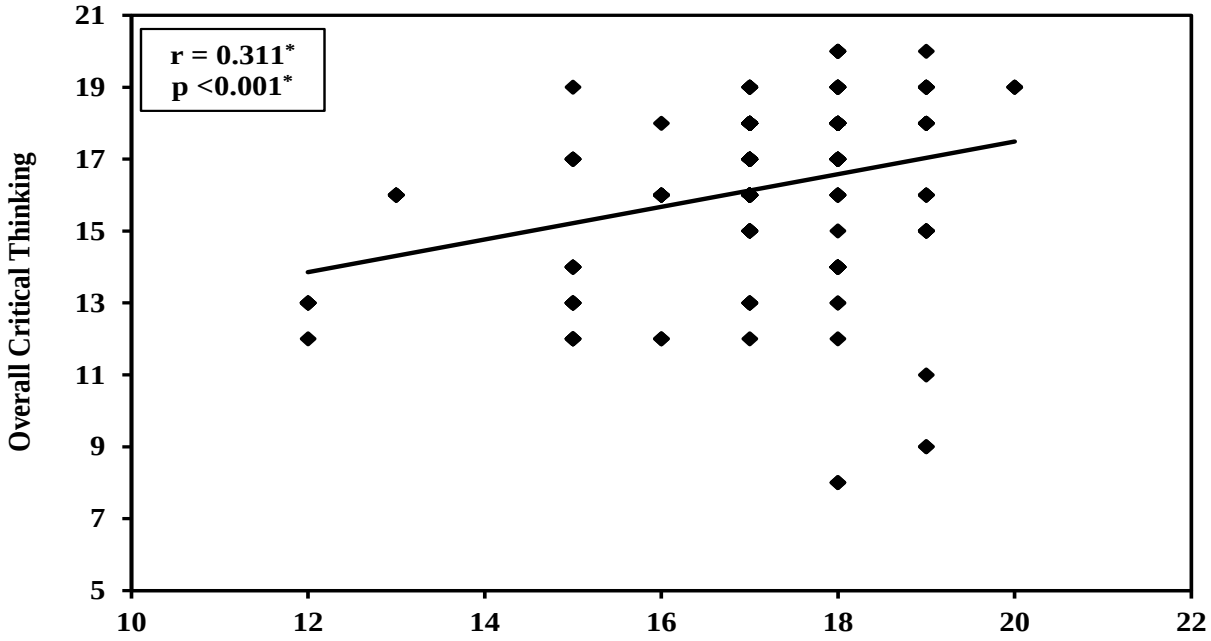

Figure (3): Correlation between post program total critical thinking knowledge and post program total critical thinking skills of problem solving (N=222)

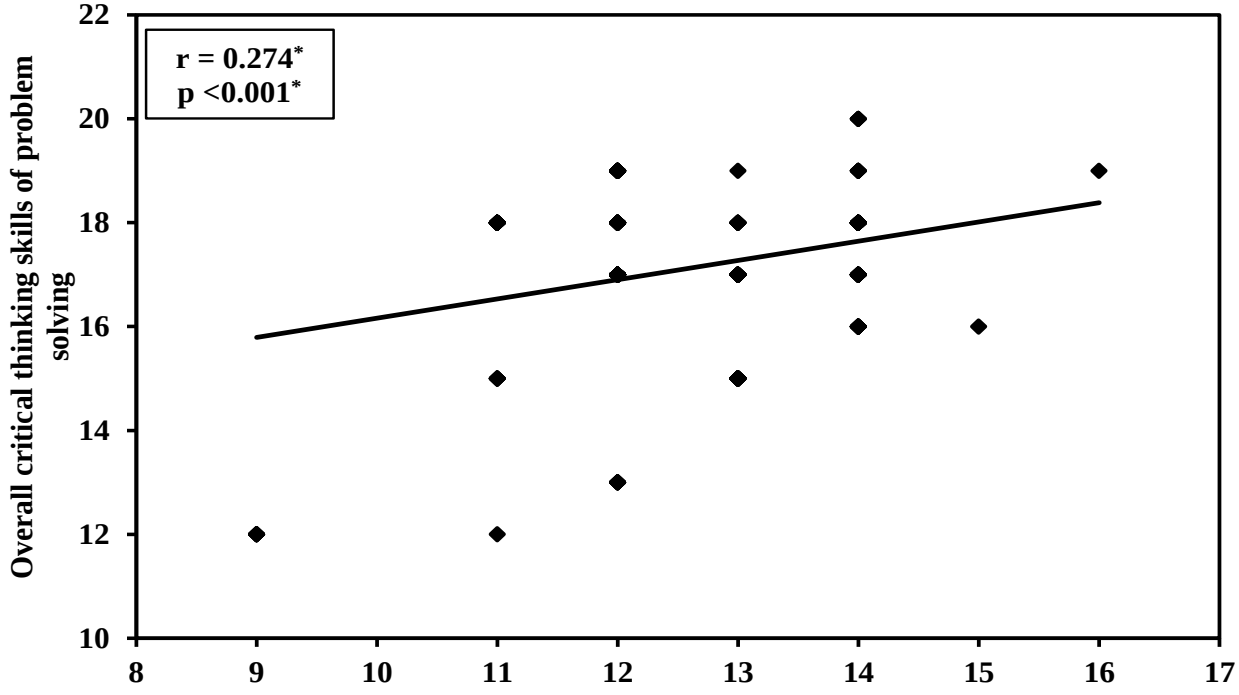

Figure (4): Correlation between post overall critical thinking skills of problem solving with post concept map structure (N=222).

Discussion

Concept mapping educational program can facilitate nursing administration students to be able to prioritize patient needs, organize data, link patient medical disease and nursing intervention, and improve clinical reasoning that led to safe clinical judgments (**Ennaciri, Droui & Chigr 2024).** Therefore, the study aims determine the effect of educational program about concepts mapping on critical thinking skills for nursing administration students

Results of present study preprogram showed that majority of students can't identify that concept map is a visual representation of a concepts or ideas, nor identifying principles of concept mapping. Most probably this result was due to student's nonattendance of any training program or workshops about concept mapping. But they improved post program which suggest program success

This finding aligns with **Mahmoud, Ouda & Adly (2021)** who stated that most of the students in the study group had poor level of knowledge regarding concept mapping pre intervention. While, there was an improvement in the level of knowledge about concept mapping among the students post intervention**.**

Present study students acknowledged that concept maps educational program helped them in building their critical thinking education, which reached maximum of their correct answer at post and follow up program than preprogram. Similarly, they believed that the concept map encourages them for brainstorming and improved it significantly post and at follow up of program. Also students' knowledge of how to create concept maps developed. These results affirm the value of incorporating concept maps as a tool to support critical and creative thinking among nursing administration students.**Thapa, Devi & Mishra, (2025) supported the study findings and emphasized that concept mapping enhances knowledge retention, critical thinking, and the ability to integrate new information effectively.**

Majority of students showed low levels of total critical thinking knowledge, preprogram. Most probably due to their limited knowledge about its logical reasoning skills, application and analytical thinking, decision making and synthesizing skills or developing themselves as critical thinkers. These results align with

(Bowen, 2022) who emphasized that students often confuse critical thinking with memorization or passive knowledge recall.

Yet present study program enhanced students' abilities to construct and interpret concept maps and provided students with opportunities to refine their concept mapping skills, as well through solving of learning activities. Students recognized how well information is organized hierarchically and logically. However, after the program, the students not only improved their structural organization skills but also retained them afterprogram

Kusumadewi & Kusmaryono, (2022) supported the present study results and showed that the aspects assessed from a concept map include main ideas, propositions, hierarchies, cross-links, and examples. All aspects of the concept map assessment were in a good category.

Significant improvement recognized in students' ability to use concept mapping as a tool for solving poor communication, conflict, human resources management and waste management problems. The five assessed dimensions (structure, relationships, exploratory approach, communication, and organization) showed notable progress from preprogram to post program and follow-up, suggesting the effectiveness and retention of the educational program. **Teo, Wang, Tan & Lee, (2023); Doustinouri, Sadeghy, Hatefi, Mallahigar & Khastar, (2024)** supported the study findings and stated that concept maps can be used as a solution option or alternative to solve problems**.**

Present study results indicate significant improvement in students' critical thinking skills in solving the five managerial problems namely leadership, time management, motivation, delegation, and nursing shortage across the three measurement points: pre-program, post-program, and follow-up. **While pre-program**, the majority of students exhibited lower levels of critical thinking, within **level one** and **level two** across all problem domains. This reflects an initial limitation in students' abilities to problems analyze, generate appropriate solutions, and make effective decisions within administrative nursing contexts. **While post-program there was marked improvement**, with significant progression of students up to **level three** and **level four** across all five problem domains. Reflecting enhanced capacities for structured analysis, effective

problem evaluation, and evidence-based decision-making.

Jimenez, Lopez, Castro, Martin-Gil, Cao & Fernandez-Castro, 2021) stated that the students of the four academic years were positively disposed towards critical thinking. The students of the final courses obtained higher average scores.

Really present study results indicate that concept mapping significantly enhances student's critical thinking skills for problem-solving, particularly in the post program. However, a decline in correlation during follow-up illustrates that continuous practice is necessary to maintain these skills. Among all components, exploratory thinking showed the strongest long-term effect, whereas structure and relationships declined, over time. This result highlights the need for reinforcement of strategies such as ongoing exercises, feedback, and real-world applications to sustain critical thinking and problem-solving skills.

Nuraini & Antika, 2024); Fonseca et al., (2024) supported the present results and indicated that concept mapping were considered as a tool to promote critical thinking, both in the perception of students and tutors, as well as in assessing students' knowledge and/or skills. In addition to their role as facilitators of knowledge integration and critical thinking, and were considered as teaching and learning methods.

Conclusion

Nursing administration students at Tanta University had a low level of knowledge about concept mapping and unsatisfactory level of critical thinking skills to solve management problems, which reflected on their demand of concept mapping educational program. The concept mapping program significantly enhanced nursing students' knowledge about concept mapping and critical thinking domains. The program also fostered their higher-order cognitive skills and ability to resolve administrative problems.

Recommendations

-Concept mapping need to be formally embedded into nursing administration theoretical education curriculum.

-Concept mapping need to be formally embedded into nursing administration practice.

-Use concept mapping in clinical training for solving problem to help students connect theoretical knowledge with real-life administrative decision-making scenarios.

-Establishing summer training programs on concept mapping to consolidate student's skills and

ensure successful knowledge retention and practice sustainability.

-Students need to receive regular, constructive evaluation on their level concept maps skill.

- Encourage students to use concept maps as part of their critical thinking habits and project planning to deepen understanding and encourage self-directed learning.

-Adopting standardized tools for regularly assessing critical thinking skills to monitor students' progress and adapt teaching strategies accordingly.

-Peer assessment can also be encouraged as a collaborative tool to broaden perspectives and foster reflective thinking

-Incorporating concept mapping as a core teaching strategy to enhance students' critical thinking abilities.

-Providing continuous workshops and training sessions on concept mapping for both students and faculty members to ensure the effective and sustained use of this method in both academic and clinical settings.

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Effect of Nursing Care Guidelines on Nurses' Performance regarding Preterm Labor

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Abstract:
Background: Preterm Labor is a leading cause of perinatal morbidity and mortality worldwide. The care of women with preterm labor needs skillful and well-prepared nurse, so the implementation of nursing care guidelines can significantly improve nurse performance by enhancing their knowledge and practice. **Aim:** To determine the effect of nursing care guidelines on nurses' performance regarding preterm labor. **Subjects and method: Design:** Quasi-experimental research was used. **Settings:** In-patient antenatal units of obstetric department of Tanta University Hospital and El-Menshawy General Hospital. **Subject:** All nurses (80) who were working at the previously mentioned. **Tools:** Two tools were used: (tool I): Nurses' knowledge regarding preterm labor, consisting of two parts; part (one): socio-demographic characteristics, and part (two): nurses' knowledge regarding preterm labor. (tool II): Observational checklist for nurses' practices regarding care of women with preterm Labor. **Results***:* High level of nurses' knowledge and satisfactory practices regarding preterm labor were reported immediately and one month after implementation of the nursing care guidelines in contrast to low knowledge and unsatisfactory practices before nursing care guidelines implementation. **Conclusion:** The nursing care guidelines regarding preterm labor had positive effect on improving the level of knowledge and practices among the studied nurses working at the previous mention settings. **Recommendation:** Planning and conducting in-service training programs for all nurses regarding preterm labor to improve and refresh nurses ' knowledge and enhance their practices dependent on recent evidence-based practices.

***Keywords*:** Nursing care guidelines, Performance, Preterm labor

Introduction:

Labor is a series events that take place in the genital organs to expel the viable products of conception (fetus, placenta and the fetal membranes) out of the uterus through the vagina into the outer world **(Garg, 2024).** Typical normal pregnancy lasts about (38-42) weeks. The initiation of normal labor process starts with physiological hormonal changes that trigger regular uterine contractions, leading to cervical dilatation. Prostaglandins are key components to the labor process that are produced in the decidua of fetal membranes. The release of prostaglandins before term plays a critical role in the initiation of labor and leads to serious condition called preterm labor **(Fanaroff & Martin, 2024)**.

Preterm labor (PTL) is defined as the birth that occurs before 37 weeks of gestation. Globally, PTL accounts for 85% of neonatal morbidity and mortality and is responsible for nearly one million deaths per year **(Naser, Al-Shehri, Altamimi, Alrasheed & Albalawi, 2023).** Risk factors for PTL include maternal demographics, socioeconomic, physical or clinical, and behavioral factors. They also include obstetrics, gynecological, fetal, and environmental risk factors (**Mohamed, Mesabah, Haroun & Mousa 2022**).

Causes of PTL include pre labor rupture of membranes, intra-amniotic infection (chorioamnionitis), ascending uterine infection (commonly due to group B streptococci), multiple pregnancy, fetal or placental abnormalities, uterine abnormalities, pyelonephritis, and sexually transmitted infections (STIs). Sometimes, the cause may not **be evident (El Shahed, et al., 2025).**

There are associated PTL signs and symptoms which include four or more uterine contractions per hour before the 37^{th} week of pregnancy, cervical dilatation and effacement, intense pelvic pressure, and back or abdominal pain. Preterm labor is unplanned, but it can be prevented through controlling the modifiable risk factors **(Ferri's, 2024; Raul, 2022).**

Preterm labor, if not successfully managed, can lead to maternal and neonatal complications. Maternal complications of PTL include increased risk for its recurrence in future pregnancies, premature rupture of membranes, chorioamnionitis, endometritis, as well as being a stressful experience for the mother, and leading to negative perception towards labor and birth **(Dulay, 2024).**

On the other hand, neonatal complications involve respiratory distress syndrome, kernicterus,

dysplasia, abdominal bleeding, intraventricular hemorrhage, retinopathy, bacterial or fungal sepsis, and necrotizing enterocolitis problems, visual, hearing and learning problems or disabilities, which raise the healthcare costs and society overload **(Jin, Lee, Youk, & Yoon, 2023).**

Therefore, nurses play a crucial role in the care and management of preterm labor. Their responsibilities span from early assessment to administering treatments and providing emotional support to the mother. They also monitor uterine contractions closely, fetal heart rate continuously, especially during using of tocolytic drugs to distinguish the side effect for both the fetus and the mother **(Ali, Mohamed, Abd-Elmalak, & Ali, 2023**).

Significance of the study:

Preterm labor is the most common cause of death among infants worldwide. About 15 million babies are born too early every year. In Egypt, PTL is estimated as 136,900 neonates and 8,100 neonates' death from preterm birth hazards **(Abdelaliem, Hassan, & Hassan, 2023).** Most of the PTL studies in Egypt emphasized on medical interventions, while little is thought about implementation of proper nursing care guidelines regarding PTL to help in reducing risk factors related to PTL, and its adverse outcomes. So, it is critical to determine the effect of nursing care guidelines on nurses' performance regarding preterm labor.

Aim: To determine the effect of nursing care guidelines on nurses' performance regarding preterm labor.

Study hypotheses:

-Nurses′ Knowledge is expected to be improved after implementation of the nursing care guidelines regarding preterm labor.

-Nurses′ practice is expected to be improved after implementation of the nursing care guidelines regarding preterm labor.

Subjects and method:

Design: A quasi-experimental research design was used to conduct this study.

Settings: The study was conducted at in-patient antenatal units of obstetric department of: Tanta University Hospital affiliated to Ministry of High Education and Scientific Research, and El-Menshawy General Hospital affiliated to Ministry of Health and Population.

Subjects: All nurses (80 nurses) who were working at the previously mentioned study settings during the time of data collection were included in the study as follows: (50 nurses) from Tanta University Hospital, and (30 nurses) from El-Menshawy General Hospital.

Tools: Two tools were developed and used by the researcher to achieve the aim of the present study.

Tool I: Nurses' knowledge regarding preterm labor: This tool was developed by the researcher based on related literatures **(Abd El Rhman, Hassan& Khedr, 2019; Abd-Elhakam, Ramadan, El-Houfey, & Abd El haliem, 2020; Abdelaliem, et al., 2023)** to assess nurses' knowledge before and after implementation of the nursing care guidelines. It is comprised of the following two parts:

Part one: **Socio-demographic characteristics of the studied nurses** that was used to collect nurses' basic data such as age, marital status, residence, level of education, years of experience, place of work, attendance of any previous training programs regarding preterm labor, workshops regarding preterm labor, as well as having educational materials about preterm labor in the workplace.

Part two: Assessment of nurses' knowledge regarding preterm labor. It included two parts: **part (a)** included nurses' knowledge regarding normal labor (8 questions) such as definition, normal gestational age, characteristics, and stages of normal labor. **The part (b)** included nurses' knowledge regarding preterm labor. It involves (15 questions) as definition, causes, risk factors, signs and symptoms, diagnostic test, complication, nursing instructions that can be given to reduce the incidence of preterm labor during pregnancy.

Scoring system of the nurses' knowledge regarding preterm labor: It was categorized as follows:

- Correct and complete answers were scored as (2).
- Correct and incomplete answers were scored as (1).
- Incorrect answers or don't know were scored as (0).

The total score of nurses' knowledge was calculated as follows**:**

- High level of knowledge ≥ 80 – 100%**.**
- Moderate level of knowledge: 60 - <80%**.**
- Low level of knowledge: < 60%.

Tool II: Observational Checklist for Nurses' Practices Regarding Care of Women with Preterm Labor:

This tool was adapted by the researcher from (**Ait-Allah, Moustafa & Shady, 2021; Dilys, et al., 2023; Nayak., 2019; Ricci, Kyle &Carman, 2024)** and used to assess nurses' practices before and after implementation of the nursing care guidelines regarding preterm labor. It comprised two procedures:

-Procedure (I): Immediate care of preterm women on admission that include three main tasks as follows:

-Pre-procedure tasks, which included preparations of the equipment, the woman, the environment, the nurse, and review the doctor's prescription on the woman's sheet.
-Procedure tasks that included the following four main subtasks:
-Place the women on the left side to enhance placental perfusion**.**
-Take a complete history, which included the following six, items such as medical and surgical, family history of preterm labor and obstetrics history.
-Assessment of signs and symptoms of preterm labor.
-Physical examination included six items, which are assessment of vital signs, inspect woman's abdomen, assessment of amniotic fluid, assistance of the physician in speculum examination to visualize the amniotic fluid passing from the birth canal and pooling into the vagina, assessment of uterine contractions, as well as documentation of fetal heart rate on the woman's sheet based on the doctor's observation of her ultrasound.
-Post-procedures tasks: that included five items, which are redress the woman, help her and being in a comfortable position, remove the equipment, wash hands, and document the findings.
-**Procedure (II):** Care of woman actually diagnosed with preterm labor observational checklist that included three main tasks as follows:
-Pre-procedure tasks, which included preparations of the equipment, the woman, the environment, the nurse, and review the doctor's prescription on the woman's sheet.
-Procedures tasks that included two main tasks, which are:
-Place the women on the left side to enhance placental perfusion.
-Administer medication that included the following five medications according to women's condition and doctor order. First: magnesium sulfate that involved nine items. Second: indomethacin (prostaglandin inhibitor) that involved four items. Third: Procardia (calcium channel blocker) that involves three items. Fourth: Celestone (beta methasone) that involved three items. Fifth: Administer antibiotic therapy as doctor order.
-Post procedure tasks that included five items, which are help the woman to be in a comfortable position, remove the equipment and gloves, wash hand, document the findings, as well as give health instructions to prevent preterm labor during current and next pregnancy.

The scoring system for nurses' practices was classified as follows:
-Done correctly and completely was scored as (1).

-Done incorrectly or not done was scored as (0).

The score of each item of practice skills were summed up and converted into percent score as follows:

-Satisfactory practice: ≥ 80%

-Unsatisfactory practice: (< 80%).

Method:

The study was implemented according to the following steps: -

Administrative approval

-An official letter clarifying the purpose of the study was obtained from the Faculty of Nursing Tanta University and submitted to the responsible authorities of the selected study settings for permission to carry out the study.

Ethical consideration:

-An approval of the ethical committee at Faculty of Nursing was obtained (**code 377/2/2024**).

-All participants were informed about the purpose of the study.

-An informed consent was obtained from every participant in the study including the right to withdraw at any time.

-The researcher ensured the participants that the nature of the study will not cause any harm or pain for the entire sample.

-Confidentiality and privacy were taken into consideration regarding data collection, and that the collected data will only be used for the purpose of this study.

Tools development:

-Tool I was developed by the researcher and translated into Arabic language and Tool II was adapted in English after reviewing related literatures.

-The study tools were tested for content and construct validity by a jury of five experts in the field of Maternal and Neonatal Health Nursing and modification were done accordingly

Pilot study:

-A pilot study was carried out on 10% (8 nurses) of the sample and they were not excluded from the current study sample because no major change had occurred. The reliability of the study tools was tested by using Cronbach's Alpha test. They were (0.799 and 0.813) respectively for knowledge questionnaire and practice checklist.

Data collection (field work):

-Data collection was conducted in a period of (6) months ranged from the beginning of July 2024 to the end December.

-Tool I part one was used to collect one time before the program implementation. Tool (I) part two and Tool (II) were used three times before, immediately and one month after implementation of the nursing care guidelines regarding preterm labor.

The nursing care guidelines included the following four phases

(Assessment, planning, implementation and evaluation):

Phase I: Assessment phase:

-The researcher met with the studied nurses who were working at the obstetrics and gynecological units of the previously mentioned study settings in the morning and afternoon shifts.

-They were asked to participate in the study after an explanation of the aim of the study before the beginning of the first session. Tool (I) parts (1) and (2) were self-fulfilled by the studied' nurse. The time needed to fulfill tool (I) was 15 minutes. Tool (II) was used by the researcher to observe nurses' practices individually. The time needed to fulfill tool (II) was 20 minutes for each nurse

Phase II: Planning phase:

Preparation of the studied nursing care guidelines sessions:

-The total number of nurses was 80 nurses (50 at Tanta University Hospital and 30 at Elmenshawy General Hospital). They were divided into 10 subgroups. Six groups at Tanta University Hospital (four groups included 8 nurses and two groups included 9 nurses) and four groups at El- Menshawy General Hospital (two groups included 8 nurses and two groups included 7 nurses).

-The nursing care guidelines regarding preterm labor included four sessions for each group (two theoretical and two practical). They were conducted over four days per week during morning and afternoon shifts. The duration of each session ranged from 30 to 45 minutes including periods of discussion.

Setting the goals and objectives of the nursing care guidelines:

-The goal of the nursing care guidelines was to enhance nurses' performance regarding care of women who have preterm labor.

-The objectives of the nursing care guidelines were to enhance the studied nurses' knowledge regarding definition, characteristics, stages, signs and symptoms of normal labor, differentiation between true and false labor pain, definition of preterm labor, risk factors, causes, signs and symptoms, management, and prevention of preterm labor.

-Enhancement of the studied nurses' practices by application of the nursing care guidelines in their management of preterm labor.

-Preparation of the content of the nursing care guidelines based on the studied nurses′ performance from the assessment phase, an educational booklet was developed by the researcher, using recent relevant literatures available locally and internationally as (**Ricci, Kyle, &Carman, 2024**).

-The booklet was submitted to the studied nurses individually to

increase their knowledge about preterm labor and care measures needed, as well as for encouragement and being a reference.

Phase III: Implementation phase:

The nursing care guidelines were implemented by the researcher through the following four sessions:

-The first session included knowledge regarding normal labor as definition, stages, signs and symptoms of normal labor and characteristics of false labor pain and true labor pain.

-The second session included knowledge regarding preterm labor as definition, causes, risk factors, signs and symptoms, diagnostic test, complication, and nursing instructions that can be given to reduce the incidence of preterm labor during pregnancy.

-The third session included demonstration by the researcher and re-demonstration by the studied nurses of proper and needed practical skills regarding immediate care of preterm women on admission.

-The fourth session included demonstration by the researcher and re-demonstration by the studied nurses for proper and needed practical skills regarding care of woman actually diagnosed with preterm labor.

Phase IV: Evaluation phase:

Evaluation of the implemented nursing care guidelines was done through:

-Tool (I) part two and Tool (II) were used three times before, immediately and one month after implementation of the nursing care guidelines regarding preterm labor to evaluate nurses' performance regarding preterm labor.

-Comparison was done between the three times of evaluation before, immediately and one month nursing care guidelines to identify the effect of nursing care guidelines on nurses' performance regarding preterm labor.

Statistical analysis:

-The collected data were coded, entered, tabulated and analyzed using SPSS (Statistical Package for Social Science) version 25 (IBM Corporation, Armonk, NY, USA).

Results

Table (1): Shows distribution of the studied nurses according to their socio-demographic characteristics. It revealed that the studied nurses' age ranged from 24-59 years, exactly one half (50%) had secondary nursing education, slightly more than one half (52.5%) of the studied nurses were from urban community, the majority (87.5%) were married, exactly one half (50%) had more than 20 years' experience, as well as all nurses

(100%) reported that their workplace didn't provide enough educational material or training program /workshops regarding preterm labor.

Figure (1): Shows distribution of studied nurses according to their total score level of knowledge regarding normal labor before, immediately and one month after implementation of the nursing care guidelines. It shows that slightly less than three-quarters (70%) of studied nurses had low level of knowledge regarding normal labor before implementation of nursing care guidelines, which increased to the vast majority (92.5%) of them had high level of knowledge immediately and 87.5% one month after implementation of nursing care guidelines. The difference was statistically significant (P= 0.0001*).

Figure (2): Shows distribution of studied nurses according to their total score level of knowledge regarding preterm labor before, immediately and one month after implementation of the nursing care guidelines. It shows that the vast majority (92.5%) of studied nurses had low level of knowledge regarding preterm labor before implementation of nursing care guidelines, which increased to the vast majority (90%) of them, had high level of knowledge immediately after implementation of nursing care guidelines, and 77.4 % one month after implementation of nursing care guidelines. The difference was statistically significant (P= 0.0001*)

Figure (3): Reveals the studied nurses' total score level of practices regarding immediate care of preterm women on admission before, immediately and one month after implementation of the nursing care guidelines. It clarifies that (13.8 %) of the studied nurses had satisfactory level of practices regarding immediate care of preterm women on admission before implementation of the nursing care guidelines, while the score level significantly improved to 91.3% immediately after the sessions and 88.8% on month late. The difference was statistically significant (P= 0.0001*)

Figure (4): Reveals that studied nurses' total score level of practices regarding care of woman actually diagnosed with preterm labor before, immediately and one month after implementation of the nursing care guidelines. It was noticed that less than one tenth (8.8%) of the studied nurses had satisfactory score level of practices regarding care of woman actually diagnosed with preterm labor before implementation of the nursing care guidelines, while the score level significantly improved to 91.3% immediately after the sessions and 86.3% one month after

implementation of the nursing care guidelines.

Figure (5): Reveals the studied nurses' total score level of practices regarding preterm labor before, immediately and one month after implementation of the nursing care guidelines. It was observed that the minority (13.8%) of studied nurses had satisfactory level of clinical practice regarding preterm labor before implementation of the nursing care guidelines, which increased to 90 % immediately and 86.3% one month later.

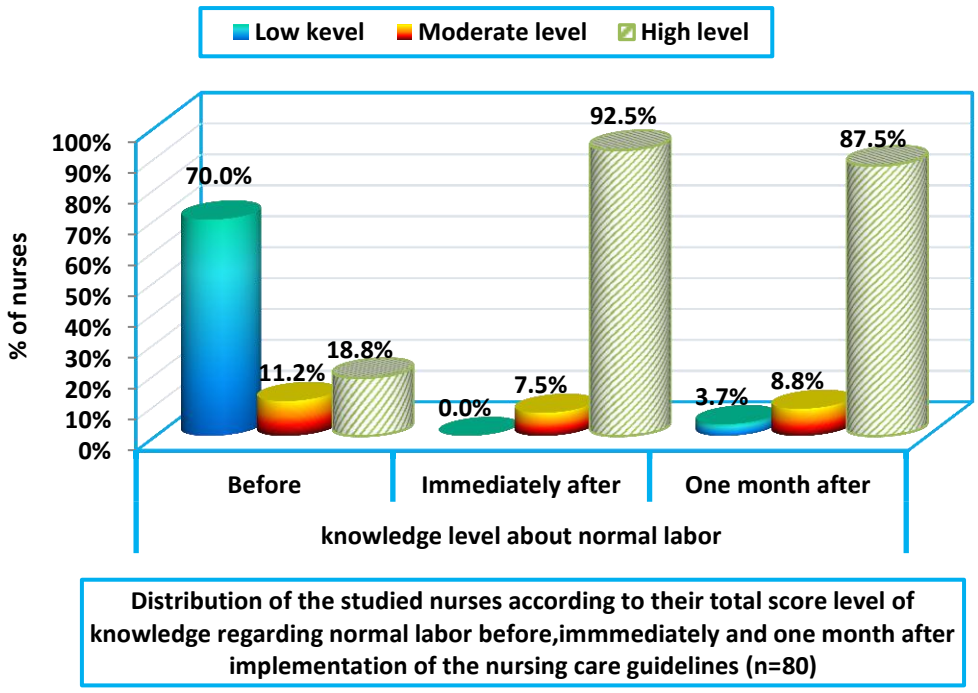
Table (2): Displays the relation between the studied nurses' socio-demographic characteristics and their total mean score of knowledge before, immediately and one month after implementation of nursing care guidelines. It shows that there is a significant relationship between the studied nurses' total mean knowledge score and their age, educational level, residence, marital status, place of work and experience years before implementation of nursing care guidelines regarding preterm labor where (p- value = (0.0001*), P- value = (0.0001*), P-value = (0.002*), P- value = (0.001*), P- value = (0.042*), P-value = (0.0001*) respectively), as well as immediately and one month later except for the place of work was only significant before the nursing care guidelines implementation (p=0.042*) **.**

Table (3): Displays relation between the studied nurses' socio-demographic characteristics and their total mean scores of practices before, immediately and one month after implementation of nursing care guidelines. It was observed that there is a significance relationship between the studied nurses' total practice mean score and their age, educational level, residence and experience years before implementation of nursing care guidelines regarding preterm labor where (p- value = (0.0005*), p-value = (0.0001*), p- value = (0.0001*), p- value = (0.001) respectively), Moreover, it is observed that there is significance relationship between studied nurses' total practice score with their age , marital status and years of experience immediately after implementation of the nursing care guidelines where (p-value = (0.003), p-value = (0.001) p-value = (0.0001) respectively) .

In addition, it is observed that there is a significant relationship between studied nurses' total practice score and each of their age, educational level, residence, marital status and years of experience one month after implementation of the nursing care guidelines with p-value = (0.0001).

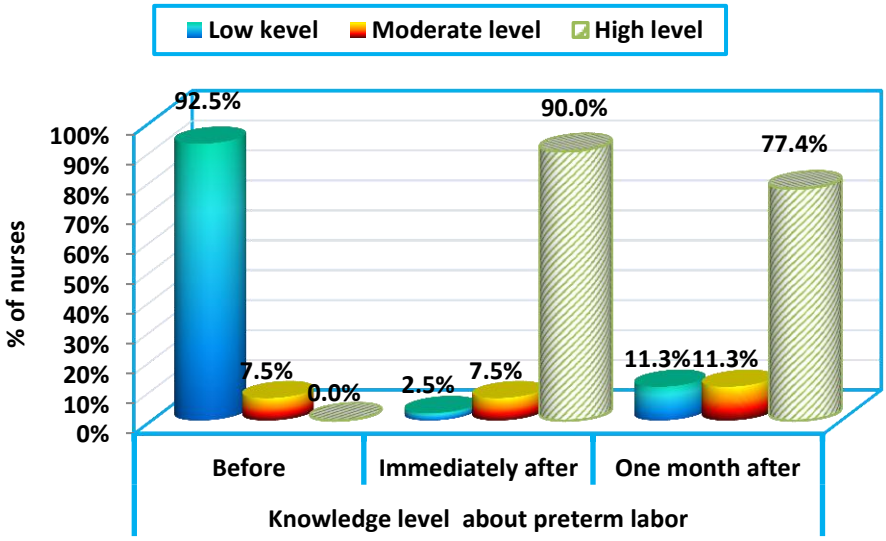
Table (1): Distribution of the studied nurses according to their sociodemographic characteristics. (n=80).

Socio-demographic characteristics	The studied nurses (n=80)	
	N	%
Age years		
24-35	35	43.7
>35-45	26	32.5
>45-59	19	23.8
Range	24-59	
Mean±SD	39.11±9.89	
Level of education		
Secondary nursing (Nursing diploma 3 years)	40	50.0
Technical nursing institute	27	33.7
Technical health institute	7	8.8
Bachelor of nursing	6	7.5
Residence		
Rural	38	47.5
Urban	42	52.5
Marital status		
Single	3	3.7
Married	70	87.5
Widow	7	8.8
Place of work		
El-Menshawy General Hospital	30	37.5
Tanta University Hospital (Main Hospital)	50	62.5
Experience years		
<5	13	16.2
5-10	10	12.5
>10-20	17	21.3
>20	40	50.0
Attend training program /workshop regarding the preterm labor		
Yes	0	0
No	80	100
Availability of educational materials about preterm labor in work place		
Yes	0	0
No	80	100



Distribution of the studied nurses according to their total score level of knowledge regarding normal labor before,immmediately and one month after implementation of the nursing care guidelines (n=80)

Figures (1): Distribution of the studied nurses according to their total score level of knowledge regarding normal labor before, immediately and one month after implementation of the nursing care guidelines (n=80).



Distribution of studied nurses according to their total score level of knowledge regarding preterm labor before, immediately and one month after implementation of the nursing care guidelines. (n=80)

Figure (2): Distribution of studied nurses according to their total score level of knowledge regarding preterm labor before, immediately and one month after implementation of the nursing care guidelines (n=80).

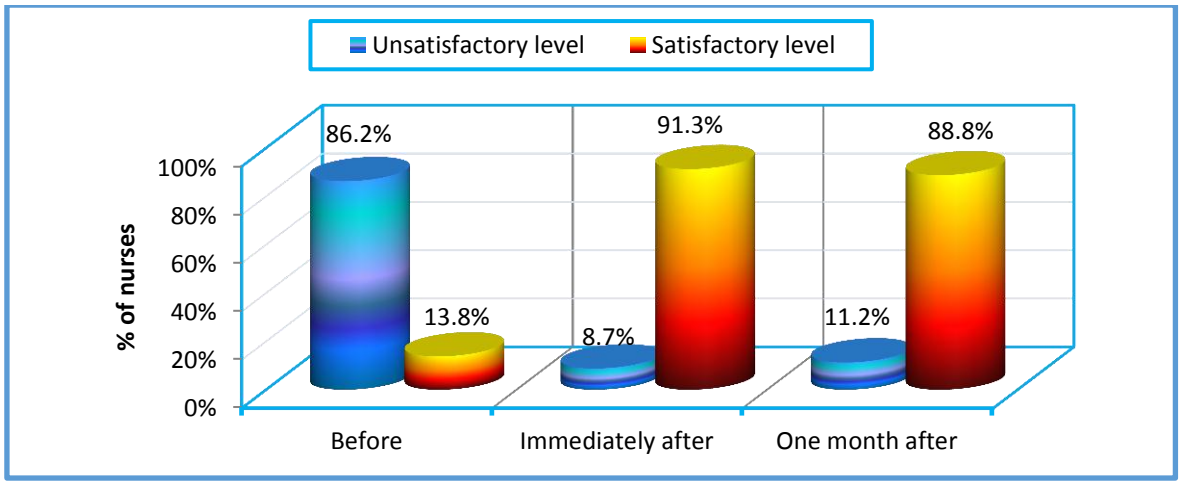


Figure (3): The studied nurses' total score level of practices regarding immediate care of preterm women on admission procedure before, immediately and one month after implementation of the nursing care guidelines (n=80).

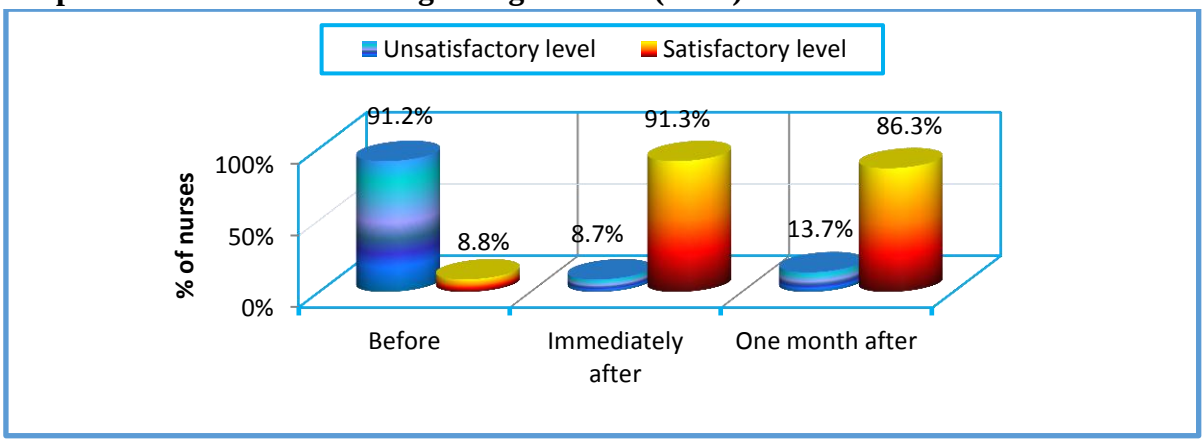


Figure (4): The studied nurses' total score level of practices regarding care of woman actually diagnosed with preterm labor procedure before, immediately and one month after implementation of the nursing care guidelines (n=80).

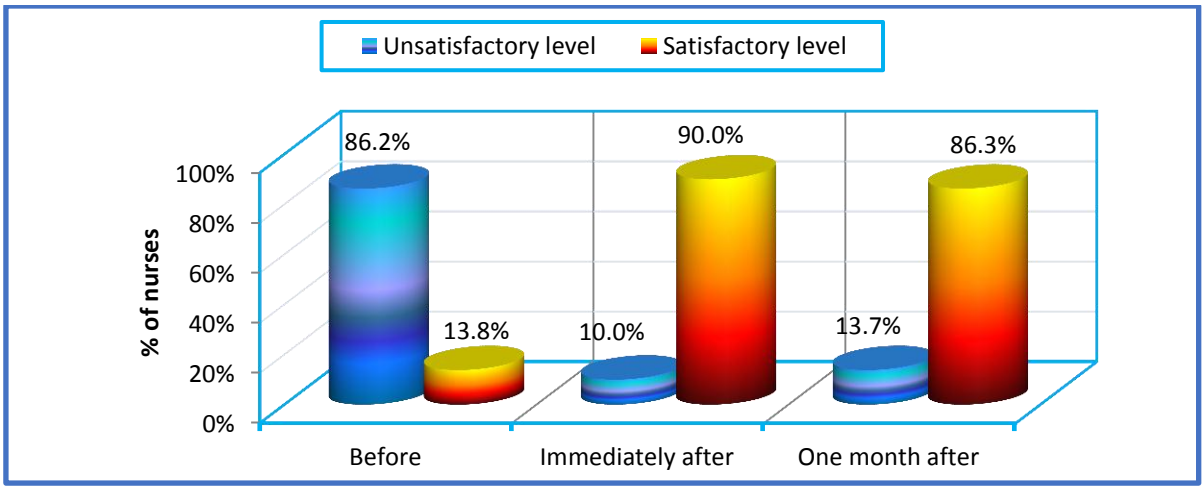


Figure (5): The studied nurses' total score level of practices regarding preterm labor before, immediately and one month after implementation of the nursing care guidelines (n=80).

Table (2): Relation between the studied nurses' total knowledge mean scores regarding preterm labor and their socio – demographic characteristics before, immediate and one month after implementation of nursing care guidelines. (n=80)

Socio-demographic characteristics	No.	Total knowledge mean scores of the studied nurses before, immediately and after nursing care guidelines (n=80)					
		Before		Immediately after		One month after	
		Mean±SD	Z value or χ^2 value P value	Mean±SD	Z value or χ^2 value P value	Mean±SD	Z value or χ^2 value P value
Age years							
24-35	35	22.08±8.95	20.729	40.23±1.52	40.506	37.20±1.86	31.759
>35-45	26	14.96±4.22	0.0001*	37.27±1.51	0.0001*	34.54±3.01	0.0001*
>45-59	19	11.10±4.93		34.47±5.10		29.79±6.97	
Level of education							
Secondary nursing (Nursing diploma 3 years)	40	12.77±4.62	28.042 0.0001*	35.80±3.84	39.983 0.0001*	32.10±5.71	32.019 0.0001*
Technical nursing institute	27	18.59±8.31		39.70±1.70		36.70±1.96	
Technical health institute	7	27.33±7.50		40.43±1.27		38.14±1.46	
Bachelor of nursing	6	28.00±4.08		40.83±1.17		37.33±1.37	
Residence							
Rural	38	20.42±9.22	3.054	39.00±3.65	3.948	35.71±4.42	2.982
Urban	42	14.21±5.76	0.002*	36.90±3.30	0.0001*	33.54±5.13	0.003*
Marital status							
Single	3	29.33±7.02	13.217	40.67±1.53	8.458	38.00±3.00	11.406
Married	70	17.43±7.84	0.001*	38.20±3.19	0.015*	35.16±3.96	0.003*
Widow	7	9.28±3.09		33.71±5.28		27.28±7.76	
Place of work							
Tanta University Hospital (Main Hospital)	50	16.06±8.51	0.042*	37.23±3.74	0.118	34.78±4.21	0.710
El-Menshawy General Hospital	30	19.00±7.35	4.118	38.30±3.50	1.565	34.23±5.93	0.372
Experience years							
<5	13	26.00±6.85	35.080	40.92±1.04	46.954	37.92±2.02	38.736
5-10	10	27.00±6.56	0.0001*	40.90±0.74	0.0001*	37.90±1.29	0.0001*
>10-20	17	14.53±6.27		38.70±1.53		36.00±1.27	
>20	40	12.95±4.77		35.82±3.85		32.05±5.68	

***Significant (P<0.05).**

Table (3): Relation between the studied nurses' total practices mean scores regarding preterm labor and their socio – demographic characteristics before, immediate and one month after implementation of nursing care guidelines. (n=80)

Socio-demographic characteristics	No.	Total practice mean scores of the studied nurses before and after nursing care guidelines (n=80)					
		Before		Immediately after		One month after	
		Mean±SD	Z value or χ^2 value P value	Mean±SD	Z value or χ^2 value P value	Mean±SD	Z value or χ^2 value P value
Age years							
24-35	35	45.00±17.67	10.451	79.17±3.66	11.449	74.97±3.31	24.680
>35-45	26	32.81±2.98	0.005*	79.15±3.16	0.003*	72.69±1.64	0.0001*
>45-59	19	34.63±9.27		69.00±11.69		62.79±10.39	
Level of education							
Secondary nursing (Nursing diploma 3 years)	40	32.85±3.32	21.798 0.0001*	74.25±9.72	6.501 0.090	68.05±8.77	19.552 0.0001*
Technical nursing institute	27	39.70±15.21		78.92±3.39		74.70±3.03	
Technical health institute	7	46.86±16.30		78.86±3.76		72.28±1.80	
Bachelor of nursing	6	65.50±14.50		81.17±3.65		77.00±4.15	
Residence							
Rural	38	43.97±16.50	3.521	76.95±6.57	0.696	71.92±6.36	0.131
Urban	42	34.19±8.94	0.0001*	76.57±8.64	0.486	70.81±8.20	0.896
Marital status							
Single	3	47.00±21.70	1.592	77.67±6.35	13.189	75.67±5.51	13.442
Married	70	38.93±14.21	0.451	77.78±6.68	0.001*	72.27±6.45	0.0001*
Widow	7	34.43±14.21		65.14±8.80		60.14±7.69	
Place of work							
Tanta University Hospital (Main Hospital)	50	38.16±13.53	0.199	75.82±8.34	0.155	71.18±8.11	0.621
El-Menshawy General Hospital	30	39.98±14.65	1.649	78.30±2.26	1.421	71.60±3.04	0.495
Experience years							
<5	13	26.00±6.85	35.080	40.92±1.04	46.954	37.92±2.02	38.736
5-10	10	27.00±6.56	0.0001*	40.90±0.74	0.0001*	37.90±1.29	0.0001*
>10-20	17	14.53±6.27		38.70±1.53		36.00±1.27	
>20	40	12.95±4.77		35.82±3.85		32.05±5.68	

***Significant (P<0.05)**

Discussion

Preterm labor constitutes a significant contributor to neonatal morbidity and mortality across both developed and developing nations, with statistical data indicating that European and North American rates fluctuate between 5–10% of all deliveries. Preterm labor is estimated to be less than 10% among the general population in Egypt **(Anto, et al., 2022; Abdelaliem, et al., 2023; Ohuma, et al., 2023).**

Most studies on PTL emphasized medical interventions such as tocolytics, corticosteroids, and progesterone supplementation. On the other hand little attention has been given to the implementation of structured nursing care guidelines specifically targeting PTL prevention and management **(Ali, et al., 2023).** Therefore, this study was conducted with the aim of determining the effect of nursing care guidelines on nurses' performance regarding preterm labor.

Concerning sociodemographic characteristics of the studied nurses, more than two fifths of them were 24-35 years old, exactly one half of them had secondary nursing education and also they had more than 20 years' experience. In addition, more than one half of the study nurses were from urban areas and almost all of them didn't attend any workshop and didn't have educational materials about preterm labor in the workplace.In relation to the studied nurses total score level of knowledge regarding normal labor, the present study illustrated that slightly less than three-quarters of them had low level of knowledge regarding normal labor before implementation of the nursing care guidelines, while after implementation of the nursing care guidelines most of them had high level of knowledge immediately and one month later. The findings strongly agree with **Moni, (2025) who assessed** future midwives perceived on management of normal labor at selected nursing school of Bangladesh. They concluded that three fifths of their participants had low level of knowledge regarding normal labor**.** Furthermore, **Ebrahim, Aglan, El-adham, Gaheen, & Elagamy (2024),** who studied "Effect of Implementing Training Program Based on Simulation versus Video on Nursing Students' Performance Regarding Care during Normal Labor". They revealed an improvement in the total score level of knowledge of their subjects regarding normal labor immediately and one month later, compared to before

implementation of the training program. From the researchers' point of view, lack of knowledge about normal labor before implementation of the nursing care guidelines in the present study may be due to absence of in-service training education, lack of time because of overwork load and lack of education technology about preterm labor at the workplace.

In contrast, the finding of current study is dissimilar with **Mateus, Emvula & Nashandi (2023)** who assessed student nurse-midwives' knowledge and practice conducting normal labour in Windhoek, Namibia. They reported that most of their participants had an adequate level of knowledge regarding normal labor.

Concerning the total score level of knowledge regarding preterm labor among the studied nurses, in the current study also revealed that the majority of the studied nurses had low level of knowledge regarding preterm labor before implementation of nursing care guidelines, while significant improvement was revealed among the vast majority of them as reported high level of knowledge immediately and one month after implementation of the nursing care guidelines. This finding is in line with **Hassan & Nasr (2017)** who studied "improving nurses' knowledge and skills regarding tocolytics for inhibiting preterm labor". They assessed nurses' knowledge regarding preterm labor and revealed that most of their subjects had incorrect knowledge about preterm labor pre-test, while they had good knowledge in the post-test after attending guidelines.

Additionally, **Boobpamala, Jindapaisan, Wanniyom & Thessawadwong. (2024)** who evaluated the effectiveness of the preterm labor prevention program for high-risk pregnant women, reported that the score level of knowledge in the experiment group was significantly increased immediately and four weeks after program completion and also concluded that nurses and midwives knowledge regarding preterm labor can be improved by using preterm labor prevention program to assess the high-risk pregnant women as early as possible. From the researchers' point of view, this lack of knowledge about preterm labor before implementation of the nursing care guidelines may be due to their level of education, where most of the studied nurses were secondary nursing school and graduated a long time ago. This might lead them to lose too much of their basic graduation knowledge

and skills. The improvement of knowledge in the current study is attributed to the effect of the nursing care guidelines, as well as the ability and interest of the studied nurses to gain and update their knowledge.

On the other hand, this finding is dissimilar to **Nasr (2022)** who revealed that most of the study nurses had good level of knowledge regarding preterm labor.

Additionally, **Beyazoglu, Paro-Panjan, Šušteršič, & Kodrič (2024)** who determined the knowledge about long-term consequences of preterm birth among health professionals, educational professionals, and parents in Slovenia. They concluded that the majority of their subjects were knowledgeable about the long-term consequences of preterm birth.

From the researcher's point of view, the difference between the findings of the current study and this study might be related to their level of education.

Concerning, the study nurses' total score level of practice regarding immediate care of preterm women on admission before, immediately and one month after implementation of the nursing care guidelines. The current study clarifies that most of the studied nurses had unsatisfactory score level of practices regarding immediate care of preterm women on admission before implementation of the nursing care guidelines. However, immediately after implementation of the nursing care guidelines most of the study nurses had satisfactory level of practices, while one month later the percentage slightly decreased but still significant. The result of the current study is matching with **Choi & Kim (2023) who studied "**Does a preterm labor-assessment algorithm improve preterm labor-related knowledge, clinical practice confidence, and educational satisfaction? "**.** They revealed that there was a significant improvement in clinical practices regarding preterm labor among participants but decreased after 8-week post program.

Moreover, the findings of this study supported by **Achola etal., (2022)** conducted study for implementing the WHO safe childbirth checklist modified for preterm birth: lessons learned and experiences from Kenya and Uganda. They reported that there was a significant improvement in clinical practices among participants after implementation of WHO safe childbirth checklist modified for preterm birth.

From the researcher's point of view, there might be several reasons for unsatisfactory practice regarding

immediate care of preterm women on admission. First, it may be due to the low knowledge score regarding preterm labor among most of the study nurses that in turn affected their capabilities to be proficient regarding immediate care of preterm women. Second, it might be related to the fact that minority of the study nurses had Bachelor of Nursing. So, the study nurses had limited qualifications where the nurse's role is limited to only assistance (take vital sign, give medication and documentation) as mentioned by them during the sessions. Plus, lack of continuous in–service training program regarding preterm labor.

Concerning the study nurses' total score level of practice regarding care of woman actually diagnosed with preterm labor, most of them had unsatisfactory level of practices before implementing of the nursing care guidelines**.** On the other hand, most of the study nurses had satisfactory level of practices immediately after implementation of the nursing care guidelines, while the percentage slightly decreased one month later but still significant. The result of the current study is in line with **Hassan & Nasr (2017)** who noticed that the pre-test showed unsatisfactory performance compared to post-test, all nurses performed skills satisfactorily. In addition, **Stelzl et al., (2022)** who studied "Do obstetric units adhere to the evidence-based national guidelines? A Germany-wide survey on the current practice of initial tocolysis" concluded that guideline recommendations should timely be implemented into internal standards of each obstetric unit to offer best clinical care for mother and child.

From the researcher s' point of view, this unsatisfactory practices regarding care of woman actually diagnosed with preterm labor before implemention of the nursing care guidelines may be due to lack of a system for supervision and evaluation of nursing practices. The findings significantly improved immediately and one month after implemention of the nursing care guidelines may probably be due to the use of different audiovisual materials, colored booklet and power point presentation enhanced the retention of the knowledge which has positive impact on their practices.

Regarding the total scores level of practices among the study nurses regarding preterm labor, it was observed that most of them had unsatisfactory level of clinical practices regarding preterm labor before implementation of the nursing care guidelines, compared to the vast majority of them had

satisfactory practice level immediately after implementation of the nursing care guidelines and the percentage slightly decreased but still significant one month after implementation of the nursing care guidelines.

This result corresponded with **Obead & Abbas (2021)** who clarified that there were significant differences between pretest and posttest for study sample after implementation of the educational program for midwives regarding preterm labor. Furthermore, this result is similar to **Miller et al., (2023**) who studied **"**Simulation and team training to improve preterm birth knowledge, evidence-based practices, and communication skills in midwives in Kenya and Uganda.**"** They reported that post intervention, the total score of maternal related evidence-based practice among midwife was improved compared to pre-intervention.

The homogeneity between the studies may be attributed to the effectiveness of the nursing care guidelines that improved nurses' knowledge which enhanced their practical skill or performance regarding preterm labor. The nursing care guidelines also give opportunities for nurses to access learning sessions for acquiring knowledge and new practices or skill motivating feeling of achievement as well as assuming roles beyond primary responsibility. This enhances the need for continuing education and training regarding preterm labor.

On the other hand, this finding is dissimilar to **Nasr (2022)** who assessed the evaluation of nursing staff's knowledge and practice regarding care of women with preterm birth revealed that most of the study nurses had high level of practice in the care of women with preterm birth.

Concerning the relation between the studied nurses' socio- demographic characteristics and their total score level of knowledge. It is noticed that there was a significant relationship between the studied nurses' total knowledge score and their age, educational level, residence, marital status, place of work and experience years before implementation of nursing care guidelines regarding preterm labor**,** as well as immediately and one month later except for the place of work was only significant before the nursing care guidelines implementation.

This finding agreed with **Granés, Torà-Rocamora, Palacio, De la Torre, L& Llupià, (2023) who** determined maternal educational level and preterm birth: Exploring inequalities in a hospital-based

cohort study. They showed a highly statistically significant difference between total score knowledge and educational qualification was detected among participants. As well as **Boobpamala, et al., (2024)** who assessed effectiveness of the preterm labor prevention program for high-risk pregnant women**,** found that there is significant relationship between total knowledge score and demographic characteristics of participants. It is also observed that there is a significant relationship between the studied nurses' total practice score level and their age, educational level, residence and experience years before implementation of nursing care guidelines regarding preterm labor.

The similarity between the pre-mentioned studies and present study may be justified by the higher educational level and years of experience of the studied nurse which tended to have higher significant total knowledge score.

This result was consistent with **Tesfalul, et al., (2021)** study titled patient and provider perspectives on preterm birth risk assessment and communication. They found that there was a highly statistically significant relation between participants' performance and certain socio-demographic variables (age and year of experience). In the same line **Idris & Lindrayeni, (2019)** who determined the impact of level of Education, teaching experience and gender on professionalism and performance. They has found that the level of education affects the learning process, the higher the level of education the easier it is for a person to receive information.

Therefore, based on the findings of the current study, the research hypotheses has been achieved after implementation of the nursing care guidelines regarding preterm labor which resulted in significant improvement of nurses' knowledge and practices immediately and one month later compared to before implementation of the nursing care guidelines.

Conclusion

Based on the findings of the present study, a significant improvement of the nurses' knowledge regarding preterm labor were found immediately and one month after implementation of the nursing care guidelines among the studied nurses. In addition, significant improvement of the nurses' practices regarding immediate care of preterm women on admission as well as care of women actually diagnosed with preterm labor were found immediately and one month after implementation of the nursing care

guidelines. Therefore, the result of the current study indicated that the research hypotheses had been achieved and supported.

Recommendations

-Planning and conducting in-service training programs for all nurses regarding preterm labor to improve and refresh their knowledge and qualify their practices dependent on recent evidence-based practices.

-Orientation programs should be provided for all newly appointed maternity nurses about proper evident nursing care of woman with preterm labor.

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Perception of Adolescents in Orphanage Regarding Reproductive Health

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Abstract

Background: Reproductive health (RH) is a crucial aspect of general health; it is a reflection of health during adolescence and adulthood. Meeting the reproductive health needs of adolescents is a serious challenge that frequently becomes overwhelming, particularly for orphaned adolescents. **Aim:** To assess the perception of adolescents in orphanage regarding reproductive health. **Design:** A descriptive study design was utilized. **Setting:** The present study was conducted at two orphanage home at El-Fayoum city namely (Aisha Hassanein House and Social Care Association in EL-Hadqa). **Sample:** A convenience sample of 47 adolescent orphans (30 male and 17 female), they aged up to 21 years. **Tools of data collection:** The data was collected by using two tools. A structured questionnaire sheet to assess knowledge of adolescent orphans' regarding Reproductive health and attitude rating scale to assess their attitude regarding Reproductive health. **Results:** The study revealed that (70.2%) had poor level of knowledge and (57.4%) had negative attitude regarding Reproductive health. There was highly statistically significant relation between total knowledge regarding RH and their educational level and length of stay at the orphanage home. **Conclusion:** Over two-thirds of the adolescent orphans in the study lacked adequate knowledge about reproductive health issues and nearly three-fifths of them had negative attitude towards Reproductive health. **Recommendation:** Create programs for educating adolescents who are orphans about reproductive health in order to meet their needs and motivate them, further researches to evaluate and examine the barriers to using reproductive health services among adolescent orphans.

***Key words*:** Perception, Adolescent orphans', Orphanage, reproductive health.

Introduction

Reproductive health is defined as "A state of complete physical, mental, and social wellbeing and not merely the absence of disease or infirmity, in all matters related to the reproductive system and to its functions and process". It addresses the human sexuality and reproductive processes, functions and system at all stages of life and implies that people are able to have "a responsible, satisfying and safe sex life and that they have the capability to reproduce and the freedom to decide if, when and how often to do so **(World Health Organization, 2023)**. As a key component of human development, reproductive health is a significant indicator of overall health. In order to address the reproductive health requirements of adolescents, it is necessary to not only offer services but also to overcome community resistance, foster understanding, and inform adults about the needs of young people in terms of reproductive health **(Abobaker, R. M., S Elbarbary, H., & M Elian, D. 2020).** Sexual and reproductive health rights are the rights of anyone, regardless of age, sex, or other characteristics, to make decisions regarding their own sexuality and reproductive issues. These rights include access to sexual and reproductive health care and information, as well as autonomy in sexual and reproductive decision-making. These rights are universal, indivisible, and indisputable; they are based on other fundamental human rights, such as the right to health, the right to be free from discrimination, the right to privacy, the right not to be tortured or subjected to ill-treatment, the right to choose the number and spacing of one's children, and the right to be free from sexual violence **(Mohan, V., & Ngunjiri, E. W. 2025).**

According to **UNICEF,** an orphan is "anyone aged 0-17 who has lost one parent." Of the almost 153 million orphans in the world, 14 million have lost both of their parents, and 116 still have a live parent **(UNICEF, 2021).** In 2022, the Egyptian Ministry of Social Solidarity reported that there were 1,430,000 orphans in Egypt. Seventy percent of these orphans had lost their fathers, 27% had lost their mothers, and 3% had lost both parents **(Ministry of Social Solidarity, 2022).** The World Health Organization **(WHO)** defines an adolescent as any individual between the ages of 10 and 19. Adolescence and puberty are closely related, and most teenagers exhibit risk-taking behaviors throughout this developmental phase.

Adolescents around the world struggle greatly to meet their reproductive health needs, that frequently becomes overwhelming, particularly for orphaned adolescents **(Faramade, I. O., Olugbenga-Bello, A. I., & Goodman, O. O. 2023**).

Compared to teenagers living with their parents, adolescents living in orphanages face more serious issues. Their resources are extremely limited. Adolescents who don't learn enough about the changes that come with puberty will feel anxious, ashamed, and uneasy about themselves **(Fidora, I., Putri, S. A., & Ningsih, R. 2020).** Parents and educators have always shared responsibility for educating children about sexuality, however, the consequences are frequently insufficient **(Punjani, N. S., Papathanassoglou, E., & Hegadoren, K. 2020).**

Significance of the Study:

250 orphanages in Egypt are home to 7749 children aged 6 to 18, including 102 orphanages that house 2068 children aged 1 to 6. Children aged six to eighteen are presumed to be accepted into government orphanages. For children who lack family care, these orphanages or shelters offer social and medical support as well as educational, religious, and recreational opportunities. However, the orphaned residents typically face more obstacles and hardships than their peers who live with their parents (**Osamy Zaid Anbar, H., Mahmoud Elewa, S., & Elias Abdel-Aziz, A. 2023).**

Furthermore, the majority of orphans experience social exclusion or lack of basic financial support, which makes them vulnerable to a range of health, social, psychological, and developmental issues. They have unmet emotional and sexual cognitive needs, limited access to reproductive health experiences, and a lack of information about sexuality and dangerous sexual behaviors. Adolescents in developing countries lack certain fundamental rights, according to the majority of research conducted there. Many adolescents have misconceptions about their sexuality and reproductive health needs because they don't know enough about reproductive health, especially contraception. There is little information on the sexual risk behavior and reproductive health care of orphaned adolescents despite the abundance of information on the major challenges they meet. **(Fidora et al., 2020).** Because of their susceptibility and need for reproductive health services, adolescent orphans must have

knowledge about these services in order to obtain and use the services that are provided. Therefore, this study will conduct to assess the reproductive health knowledge and attitude among adolescent in orphanage.

Operational definitions:

Perception of Adolescents means male and female adolescents' knowledge and attitude.

Orphanage is a residential institution that provides care and housing for children who have lost their parents or are unable to live with their biological families due to various reasons.

Aim of the study:

This study aimed to assess the perception of adolescents in orphanage regarding reproductive health. **This aim was achieved through:**

-Assessing knowledge of adolescent orphans about reproductive health.

-Assessing attitude of adolescent orphans regarding reproductive health.

Research questions:

-What is the male and female adolescent orphans' knowledge regarding reproductive health?

-What is the male and female adolescent orphans' attitude regarding reproductive health?

Subjects and Methods:

Research design:

A descriptive study design was adopted to accomplish the aim of this study.

Setting:

The study was conducted at two orphanage home at El-Fayoum city namely (Aisha Hassanein House and Social Care Association in EL-Hadqa), affiliated with the Social Solidarity Directorate in Fayoum City.

Sample type: Convenience sample technique was utilized in this study.

Sample size: The study was included all adolescents in the orphanages. The total number of adolescent orphans were (47), (30 male and 17 female), 30 adolescents from Aisha Hassanein House and 17 adolescents from Social Care Association in EL-Hadqa will be recruited for this study, they aged up to 21 years.

Tools of Data collection:

The data was collected by using two tools.

Tool I: Structured Interviewing Questionnaire:

This tool was developed by the researcher after reviewing the national and international related literature. It was written in a simple Arabic language, it was divided into two parts.

Part 1: Socio-demographic characteristics: It was designed to assess the orphan's characteristics such as sex, age, level of education, and duration of stay in orphanage.

Part 2: Adolescent orphans' knowledge regarding reproductive health:

It was divided into many parts;

-Assessment knowledge regarding reproductive health issues as the concept of reproductive health, components of reproductive health, goals of reproductive health services, personal rights in reproductive health, factors affecting on reproductive health, problems affecting on reproductive health and negative behavioral factors in reproductive health.

-Orphans' knowledge regarding nutrition and the effects on reproductive health such as component of healthy diet and importance of healthy diet on one's reproductive health.

-Adolescent knowledge regarding marriage such as proper age for marriage, importance of pre-marital examination, places offer pre-marital examination and source information about pre-marital examination.

-Adolescent knowledge regarding normal pregnancy such as proper age of pregnancy, aim from follow up during pregnancy, warning signs of pregnancy and places offer care during pregnancy.

-Adolescent knowledge regarding sexual and reproductive diseases such as definition of sexual disease, symptoms of sexual transmitted diseases and Protection ways from sexual transmitted diseases.

-Adolescent knowledge regarding contraceptive methods such as types of contraceptive methods, source of information regarding contraceptive method.

Scoring system:

The complete correct answer was given score 3, the correct but incomplete answer was given score 2, and the wrong answer was given score 1. These scores was summed and converted into a percent score

It was classified in to 3 categories;

-**Good** knowledge if score > 80%.

-**Average** knowledge if score from 70 to 80%.

-**Poor** knowledge if score < 70%**.**

Tool II: attitude rating scale

Likert Rating Scale, utilized in this study was adopted by psychologist Rensis Likert. (**Likert, R, 1932)** It was translated into Arabic language to help students understand and easy fulfill statement it was designed to assess attitude of the adolescent orphans towards

reproductive health. It contained (17) statements and was rated by the three-point scale; agree, uncertain and disagree.

Scoring system:

A scoring system was followed to be assessing adolescent orphan attitudes toward reproductive health. Each statement was assigned a score according to adolescent orphans' responses and attitude; they will be classified to positive and negative attitude.

-Agree response was assigned as 3

-Uncertain response was assigned as 2

- Disagree response was assigned as 1

The scores of the items was summed up and converted into a percentage score.

It will be classified into 2 categories:

- **Positive** attitude if score ≥ 60%.
- **Negative** attitude if score < 60%

Validity:

The study tools were tested and evaluated for their face and content validity by a panel of expertise composed of 3 professors of Maternal and Newborn Health Nursing to ascertain relevance, clarity, understanding, completeness and applicability of the tools. The required corrections and modifications were done by adding, modifying, and rearranging some questions.

Reliability:

The Cronbach's Alpha was used to determine the internal reliability of the tools, it is indicated that the questionnaire is reliable to detect the objectives of the study.

Pilot study:

The pilot study was carried out on 10% of the sample which equal (5) adolescent orphans from the studied sample to test the feasibility, clarity, applicability and the efficiency of the tools in addition to estimate the time needed to fill in the tools. Based on the results, no modifications done. Subjects included in the pilot study were included in the sample.

Ethical approval:

Ethical aspects were considered before starting the study as the following:

-Approval from the Ethical Research Committee of Fayoum University was obtained before conducting the study.

-An official permission from the selected study settings was obtained for the fulfillment of the study.

-Prior the study, oral consent was obtained from each participated adolescent orphan and the researcher clarified the aims and objectives of the study.

-The researcher informed the participant that the information they had gathered would be kept private,

and each participant had a right to withdraw at any time without giving a reason.

-The study didn't harm dignity, tradition and religious aspects of the participant.

-Anonymity, privacy, safety and confidentiality will absolutely assured throughout the whole study.

Field work:

-After attaining the approval to conduct the study, sample was collected 2 days weekly from the Aisha Hassanein House from 12 pm to 3 pm and the Social Care Association in EL-Hadqa from 2 pm to 5 pm.

-Actual field work was carried out in the period from March 2024 up to June 2024.

-At the beginning, the researcher introduced herself to the adolescent orphan and explained the purpose of the study to establish trust and encourage their participation. Oral consent will be obtained from each participated adolescent orphan after clarification of the study nature.

-The assessment process was conducted individually by the researcher and other time in group according the adolescent orphan free time. A structured interviewing questionnaire sheet was used to gather information about the adolescent orphan's characteristics, as well as knowledge regarding reproductive health. Tool I took from 10-15minutes.

-The attitude of the adolescent orphans toward reproductive health was assessed using the Likert rating scale (Tool II). Tool II took from 5-10 minutes.

-The total time needed to fill in the questionnaire was about 15 to 25 minutes.

-The researcher gave 10 minutes health education on reproductive health issues to the adolescent orphans who are interviewed at the end of every data collection.

Limitations of the study:

-Some students were not available most of the time because they were outside the orphanage for recreational activities or to attend courses related to their studies, which led the researcher to go more than several times in order to be able to collect the research tools

-Some of studied sample had poor Arabic reading and writing skills which led to wasting more time from the researcher to collect the research data and also some of them had poor communication skills.

Statistical design:

-The statistical analysis of data was done by using the computer software of Microsoft Excel Program and

Statistical Package for Social Science (SPSS) version 25. Data were presented using descriptive statistics in the form of frequencies and percentage for categorical data, the arithmetic mean (X) and standard deviation (SD) for quantitative data. Qualitative variables were compared using chi square test, P-value to test association between two variables. Correlation coefficient test (r) was used to test the correlation between studied variables. Reliability of the study tools was done using Cronbach's Alpha.

-Degrees of significance of results were considered as follows:

- P-value ≥ 0.05 Not significant (NS)
- P-value < 0.05 Significant (S)
-P-value < 0.01 Highly Significant (HS).

Administrative design:

An official letter to carry out this study clarifying the purpose and setting of the study was obtained from the Dean of the Faculty of Nursing, Fayoum University to the directors of the previously mentioned-setting as an approval to obtain permission and cooperation.

Results:

Table (1): shows that, slightly more than three fifth (61.7%) of the studied adolescents orphans were in the age group 16-18 years, the Mean SD of age was 16.04±1.61 years. As regard to gender, more than three fifth (63.8%) of them were male. Also, 61.7% of them have secondary education. Moreover, slightly more than one third (34.0%) of them stayed at orphans' home from 5<10 years, the Mean SD of stay was 9.96±5.89 years.

Table (2): shows that, more than half of the studied adolescent orphans (53.2% and 51.1%) had complete correct knowledge about the definition of reproductive health and target population for reproductive health services, respectively. While, near to three fifth of them (57.4% and 59.6%) had incomplete correct knowledge about the personal rights in reproductive health and factors affecting on reproductive health, respectively. Also, 55.3% and 53.2% of them don't know the problems affecting on reproductive health and negative behavioral factors in reproductive health, respectively.

Figure (1): shows that, near to three fifth of the studied adolescent orphans (57.4%) have information regarding reproductive health from internet and social media. Also, slightly more than one fifth of them (21.3%) have information from friends.

Figure (2): shows that, more than two-third of the studied adolescent

orphans (70.2%) had poor level of total knowledge score. While, slightly more than one fifth of them (21.3%) had average level of total knowledge. Also, (8.5%) of them had good level of total knowledge.

Table(3):shows that, near to three fifth and more than half of the studied adolescent orphans (59.6% and 51.1 %) agreed that, education raises awareness of the concept of reproductive health and lifestyle affects reproductive health. respectively. Also, more than three fifth of them (63.8% and 68.1%) not sure that, providing information about reproductive health in early adolescence and before marriage contributes to healthy sexual attitudes and reproductive tract infections have a negative impact on reproductive health, respectively. While, more than half of them (55.3% and 51.1%) disagreed that, periodic examination helps to ensure reproductive health and circumcision negatively affects reproductive health, respectively.

Figure (3): shows that, near to three fifth of the studied adolescent orphans (57.4%) had negative attitude regarding reproductive health. While, more than two fifth (42.6%) of them had positive attitude.

Table (4): displays that, there was highly statistically significant relation between total adolescent orphans' knowledge regarding reproductive health and their educational level and length of stay at the orphanage home at (P= < 0.01). Also, there was statistically significant relation with their age at (P= < 0.05). While, there was no statistically significant relation with their gender at (P= > 0.05).

Table (5): indicates that, there was highly statistically significant positive correlation between total knowledge and total attitude regarding reproductive health among the studied adolescent orphans at (r= 0.723, p=0.000).

Table (1): Distribution of the studied orphans adolescents according to their socio-demographic characteristics (n=47).

Socio-demographic characteristics	No.	%
Age (years)		
12<14	2	4.3
14<16	16	34.0
16-18	29	61.7
Mean ± SD 16.04±1.61		
Gender		
Male	30	63.8
Female	17	36.2
Educational level		
Illiterate	0	0.0
Basic education (primary and preparatory)	18	38.3
Vocational education	0	0.0
Secondary education	29	61.7
High education	0	0.0
Length of stay at the orphanage home		
<1 year	2	4.3
1-<5 years	5	10.6
5-<10 years	16	34.0
10-<15 years	11	23.4
15-≤18 years	13	27.7
Mean ± SD 9.96±5.89		

Table (2): Distribution of the studied orphans adolescents according to their knowledge regarding reproductive health (n=47).

Knowledge regarding reproductive health	Complete correct answer		Incomplete correct answer		Don't know	
	No.	%	No.	%	No.	%
Definition of reproductive health	**25**	**53.2**	5	10.6	17	36.2
Components of reproductive health	18	38.3	12	25.5	17	36.2
Target population for reproductive health services	**24**	**51.1**	19	40.4	4	8.5
Goals of reproductive health	13	27.7	26	55.3	8	17.0
Personal rights in reproductive health	10	21.3	**27**	**57.4**	10	21.3
Factors affecting on reproductive health	10	21.3	**28**	**59.6**	9	19.1
Problems affecting on reproductive health	11	23.4	10	21.3	**26**	**55.3**
Negative behavioral factors in reproductive health	11	23.4	11	23.4	**25**	**53.2**

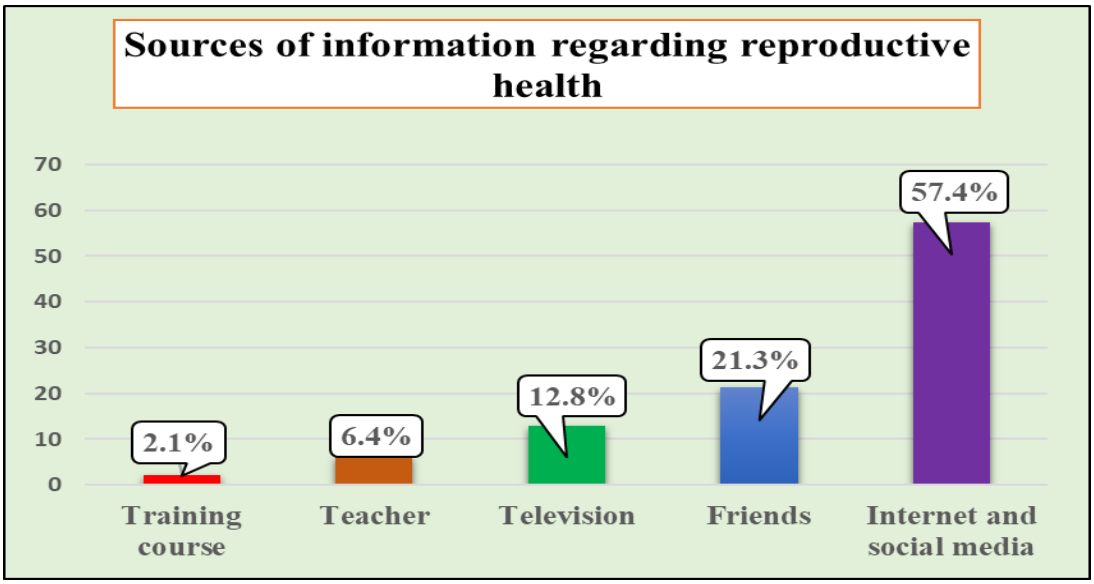

Figure (1): Percentage distribution of the studied orphans adolescents according to their sources of information regarding reproductive health (n=47).

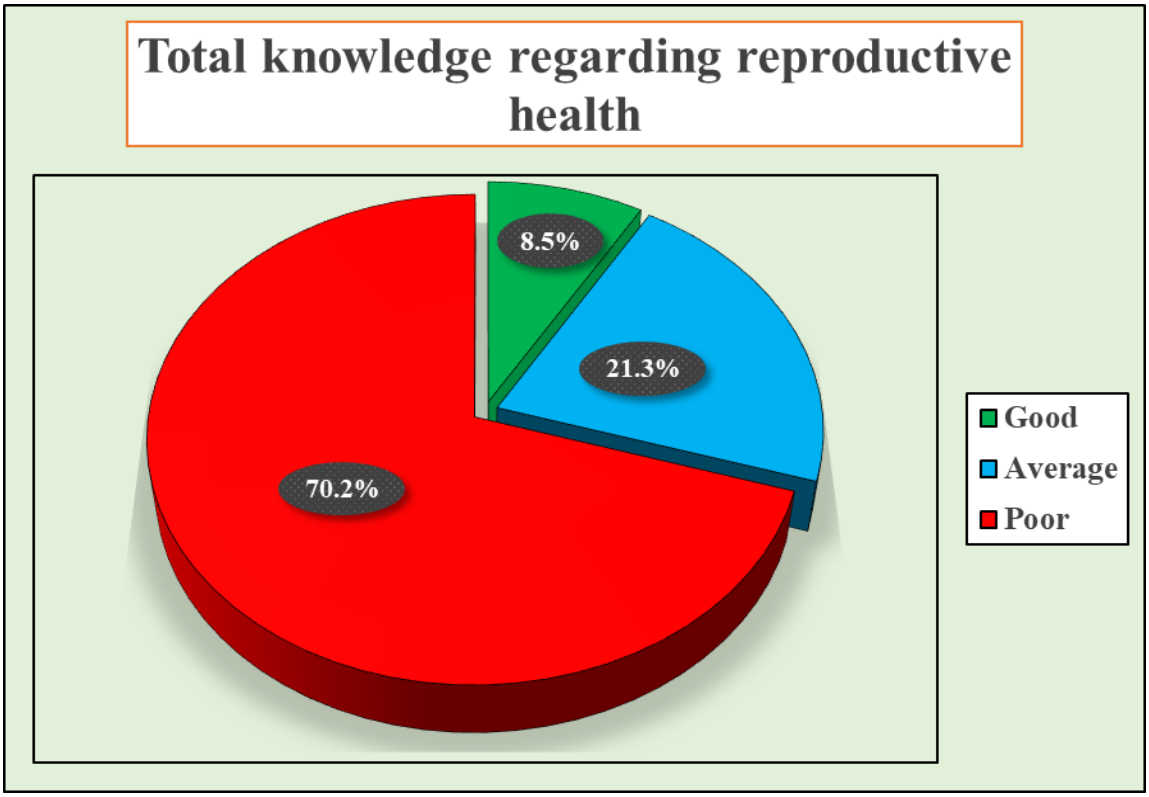

Figure (2): Percentage distribution of the studied orphans adolescents according to total knowledge regarding reproductive health (n=47).

Table (3): Frequency distribution of the orphans adolescents's attitude regarding reproductive health (n=47).

Statements	Agree		Not sure		Disagree	
	No.	%	No.	%	No.	%
Education raises awareness of the concept of reproductive health	28	59.6	16	34.0	3	6.4
Lifestyle affects reproductive health.	24	51.1	11	23.4	12	25.5
Providing information about reproductive health in early adolescence and before marriage contributes to healthy sexual attitudes	14	29.8	30	63.8	3	6.4
Disseminating information among young people and increasing religious awareness is the best way to prevent sexually transmitted diseases and AIDS	16	34.0	28	59.6	3	6.4
Follow-up with reproductive health care services provides important information to maintain reproductive health.	14	29.8	29	61.7	4	8.5
Both men and women should use reproductive health services.	13	27.7	21	44.6	13	27.7
Early marriage has harmful effects on reproductive health.	14	29.8	28	59.6	5	10.6
Premarital counseling and testing are components of reproductive health.	13	27.7	28	59.6	6	12.7
Reproductive tract infections have a negative impact on reproductive health.	12	25.5	32	68.1	3	6.4
Regular check-ups help detect reproductive health problems.	16	34.0	24	51.1	7	14.9
The nurse has a major role in spreading awareness of reproductive health.	14	29.8	21	44.7	12	25.5
Family planning methods maintain reproductive health.	14	29.8	26	55.3	7	14.9
Addiction affects reproductive health	15	31.9	26	55.3	6	12.8
Smoking is harmful to health, especially reproductive health.	13	27.7	18	38.3	16	34
Good nutrition leads to good reproductive health.	14	29.8	15	31.9	18	38.3
Periodic examination helps to ensure reproductive health.	10	21.3	11	23.4	26	55.3
Circumcision negatively affects reproductive health.	7	14.9	16	34.0	24	51.1

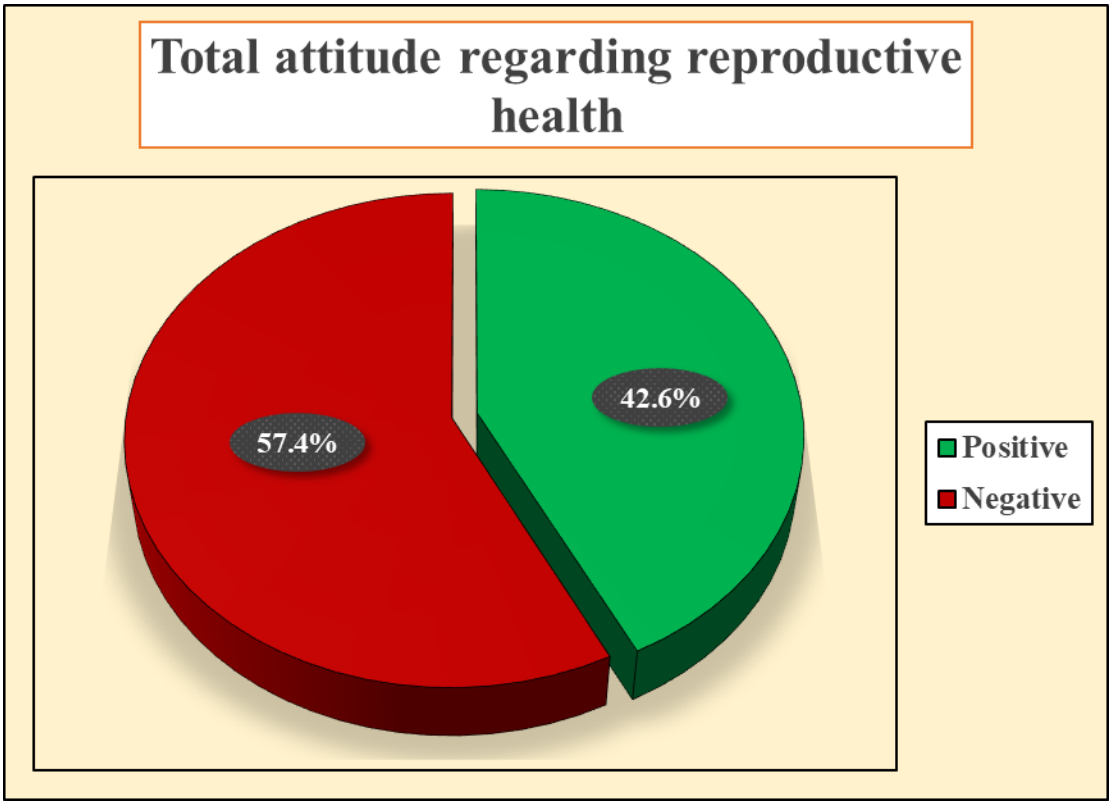

Figure (3): Percentage distribution of the studied orphans adolescents according to total attitude regarding reproductive health (n=47).

Table (4): Relation between socio-demographic characteristics of the studied orphans adolescents and their total knowledge regarding reproductive health (n=47).

Socio-demographic characteristics		Total knowledge regarding reproductive health						X^2	P-Value
		Good (n=4)		Average (n=10)		Poor (n=33)			
		No.	%	No.	%	No.	%		
Age (year)	12<14	0	0.0	0	0.0	2	6.1	12.37	0.015*
	14<16	0	0.0	0	0.0	16	48.5		
	16-18	4	100.0	10	100.0	15	45.4		
Gender	Male	1	25.0	7	70.0	22	66.7	2.892	0.235
	Female	3	75.0	3	30.0	11	33.3		
Educational Level	Basic education (primary and preparatory)	0	0.0	0	0.0	18	54.5	12.37	0.002**
	Secondary education	4	100.0	10	100.0	15	45.5		
Length of stay at the orphanage home	<1 year	0	0.0	0	0.0	2	6.1	21.67	0.006**
	1-<5 years	0	0.0	0	0.0	5	15.1		
	5-<10 years	1	25.0	2	20.0	13	39.4		
	10-<15 years	1	25.0	0	0.0	10	30.3		
	15-≤18 years	2	50.0	8	80.0	3	9.1		

X^2= Chi-square test. No statistically significant at p > 0.05.

* Statistically significant at p ‹ 0.05. ** Highly statistically significant at p ‹ 0.01.

Table (5): Correlation between total knowledge and total attitude regarding reproductive health among the studied orphans adolescents (n=47).

Variables	Total knowledge	
Total attitude	**r**	**p-value**
	0.723	0.000**

r= Pearson correlation coefficient test. **Highly statistically significant at p ‹ 0.01.

Discussion:

Understanding reproductive health is crucial for both men and women, particularly youth. Adolescence, on the other hand, is a time when children grow up and become adults. A number of physical, psychological, and social changes take place in teenagers throughout this time. Adolescents frequently face this transitional phase in confusing situations, lacking a sense of belonging, and not fitting in with either the child or adult groups **(Dinengsih, S., & Hakim, N. 2020).** Upon reaching puberty, adolescents will undergo rapid physical changes. One of these physical changes is the ability to carry out the reproductive process. However, the phenomenon indicates that some teenagers do not know and understand reproductive health, including menstruation and pregnancy **(Astarani, K., Richard, S. D., Taviyanda, D., Rose, S., & Amallo, M. P. 2023).**

Regarding socio-demographic characteristics of the studied sample, the current study revealed that the age of slightly more than three fifth of the studied adolescents' orphans were in the age group 16-18 years, with the mean age (16.04±1.61) years. These findings are in the same line with **Kumalasari, N., Kuswardinah, A., & Deliana, S. M. (2020)** who assessed " The Influence of Reproductive Health Education to Knowledge and Perceived Behavior Sexual Adolescent Control "and revealed that, the majority of respondents aged 17 years.

Concerning the Gender, the results revealed that more than three fifth of the sample were male. These findings are corresponding with **Menshawy et al., (2021)** who reported in a published study conducted in Egypt, entitled as " Break the Silence: Knowledge and Attitude Towards Sexual and Reproductive Health Among Egyptian Youth" that more than half 53% of our sample were males.

From the researcher point of view, the number of boys in orphanages is often higher than girls because boys are more likely to be placed in institutional care, while girls may be taken by extended families due to cultural or protective reasons.

On the other hand, these results are incongruent with **Klu et al., (2023)** who evaluated " Adolescent perception of sexual and reproductive health rights and access to reproductive health information and services in Adaklu district of the Volta Region, Ghana" and clarified that nearly to three

fifth of the respondents were females.

As regard to the level of education, the results showed that, slightly more than three fifth of the studied sample have secondary education. The current finding matches with **faramade et al., (2023)** who studied Sexual knowledge, risk behavior, and access to reproductive health services among orphaned adolescents in Southwest Nigeria: implications for institutionalized care, illustrated that over three-quarters of the group under study finished secondary school.

Moreover, more than one third of them stayed at orphans' home from 5<10 years, the Mean SD of stay was 9.96±5.89 years. These findings are reinforced by **Sapkal, D. A. B., Shah, D. A. K., Deshpande, D. S., More, D. A., & Swami, D. A. (2025)** who evaluated "Personal Hygiene Status of Adolescent Girls Living in Orphanages of a Metropolitan City", reported that near to one third the studied sample were staying at the orphanage for 6-10 yrs.

From the researcher point of view, the teenagers who live in orphanages for a long time often know less about reproductive health. This is because they do not have parents to guide them, and most orphanages do not teach about these topics clearly. Also, talking about reproductive health seen as shameful, so no one discusses it, so many teens learn from friends or internet, which can give them wrong information.

Concerning the knowledge regarding reproductive health, the results of the current study illustrated that more than half of the studied adolescent orphans had complete correct knowledge about the definition of reproductive health and target population for reproductive health services, respectively. These results are supported by **Hamdi Mabrouk, H., Elsaad Farouk, O., & Sarhan Eldesoky, A. (2022)** who evaluated "Fayoum University Students Perception Regarding Reproductive Health" and revealed that fewer than half of the study group correctly defined RH, and that more than half of them correctly identified the RH services target population.

In contrast, this result is disagreed with **Abobaker et al., (2020)** who carried out a study titled " Study of Knowledge of Adolescent Female Students regarding their Reproductive Health" and showed that almost three-fifths of the groups had the right answer on the definition and purpose of RH, however, fewer than one quarter had

accurate information regarding the RH services target group.

The present study showed that, near to three fifth of the studied sample had incomplete correct knowledge about the personal rights in reproductive health and factors affecting on reproductive health, respectively. This finding is matched with **Abobaker et al., (2020)** who reported that more than three fifth the studied sample had incorrect answer about the personal rights and factors affecting on reproductive health.

On the other hand, this result is contradicted with **Hamdi Mabrouk et al., (2022)** who reported that near to the majority of the studied sample had correct knowledge about the rights in RH and the factor affect RH.

As well as the present study revealed that more than half of the adolescent orphans don't know the problems affecting on reproductive health. This result is in alignment with **Abobaker et al., (2020)** and also with **Ebrahim, E., Fahmy, N., & Ahmed, S. (2017)** who assessed "Knowledge of Adolescent Female regarding their Reproductive Health." and reported that more than four fifth the studied sample had incorrect knowledge about the Reproductive health problems face adolescent.

As regard to the source of information about reproductive health, the results of the current study illustrated that more than half of the studied sample reported that the internet and social media was the main source of their information about RH followed by friends, television and then the minority were from teachers and training course. This study is agree with **Nashat, N. N., Kabbash, I., & Attalla, A. O. (2020)** who studied " Reproductive health Knowledge needs among secondary school students in Mid Nile Delta Region, Egypt." and revealed that, the primary data sources were internet, media, friends, schoolbooks and relatives.

From the researcher point of view, this outcome may be attributed to lifestyle choices, the rapid growth of technology, and the prevalence of social media platforms like Google, Facebook, WhatsApp, Twitter, and Instagram, as well as global mass media like TV, radio, and newspapers. It can also be because they are orphans and lack the direction of their families.

Regarding the total reproductive health knowledge score the present study indicated that, more than two-third of the studied adolescent orphans had poor level of total

knowledge score. While, slightly more than one fifth of them had average level of total knowledge. Also, minority of them had good level of total knowledge. These findings are in the same line with **Nashat et al., (2020)** who reported that, adolescents' alarmingly low levels of sexual and reproductive knowledge.

The researcher believes that the current study's low level of awareness on reproductive health can be partially explained by the absence of parents' roles in explaining these subjects, the absence of appropriate health education in the orphanages, the fear or shyness associated with asking questions, and the lack of reliable information.

Similarly, **Gausman et al., (2019)** in a concept mapping study protocol about how do Jordanian and Syrian youth living in Jordan envision their sexual and reproductive health needs? which reported that Jordanian had poor RH knowledge and stressed that youth need more study about reproductive health-related information.؟

Concerning the adolescent orphans' attitude regarding reproductive health, the findings of the current study showed that more than half of adolescent orphans in the survey believed that, education raises awareness of the concept of reproductive health and lifestyle affects reproductive health, respectively. Also, more than three fifth of them not sure that, providing information about reproductive health in early adolescence and before marriage contributes to healthy sexual attitudes and reproductive tract infections have a negative impact on reproductive health, respectively. While, more than half of them disagreed that, periodic examination helps to ensure reproductive health and circumcision negatively affects reproductive health, respectively with total score, near to three fifth of the studied adolescent orphans had negative attitude regarding reproductive health. While, more than two fifth of them had positive attitude.

The present study is congruent with , **Kashefi, F., Bakhtiari, A., Pasha, H., Amiri, F. N., & Bakouei, F. (2021)** in A Cross-Sectional Study that assess Student Attitudes About Reproductive Health in Public Universities, who showed a poor reproductive health attitude in study group, indicated that the students' level of attitude on reproductive health was not satisfactory and stressed about the importance of Intervention programs related to reproductive health taking into

account the cultural aspects of Iranian society can protect young people from risky behaviors and unwanted pregnancies by creating a positive attitude.

On the other hand, the findings are contrasted with **Alegado, V. M., Domingo, A. P., Rogayan, D. V., & Albeza, J. (2025)** who studied " College Students' Knowledge, Attitudes, and Practices Regarding Reproductive Health: Implications to Science Education Curriculum" and reported that, the level of attitude among teacher education students towards reproductive health was very favorable.

Regarding the relation between socio-demographic characteristics of the studied adolescent orphans and their total knowledge regarding reproductive health, the present study showed that there was highly statistically significant relation between total adolescent orphans' knowledge regarding reproductive health and their educational level and length of stay at the orphanage home. Also, there was statistically significant relation with their age. With regard to their gender, however, there was no statistically significant relation.

These results are similar to **Cameron, A., Smith, E., Mercer, N., & Sundstrom, B. (2020)** who performed a study titled "It is our duty: understanding parents' perspectives on reproductives on and sexual health education" and noted that the personal characteristics of the students under study were positively related with their knowledge.

The previous findings are in contrast with study carried out by **Gebremichael, M. A., & Chaka, E. E. (2015)** who studied" Assessment of Knowledge, Attitude and Practices on Reproductive Health among Ambo University Students in Ambo, Oromia National Regional State"mentioned that, the relationship between the age of adolescents and their overall reproductive health knowledge score was not statistically significant. Cultural differences could be the cause of this difference.

Regarding the correlation between total knowledge and total attitude regarding reproductive health among the studied adolescent orphans the present study indicated that, there was highly statistically significant positive correlation between total knowledge and total attitude regarding reproductive health among the studied adolescent orphans. This result is in alignment with **Ashry, F. K., Elaty, A., Hasan, I., Abo Shabana, K. R., & Ali, M. R. (2020)** who evaluated "

Effect of educational Guideline on student Nurse Knowledge and Attitude Regarding women reproductive Rights" and stated that, there was a positive correlation between the knowledge and attitude of the participants in the study. Further matching was also observed in a study by **DeBeaudrap et al., (2019)** who assessed " Disability and access to sexual and reproductive health services in Cameroon: a mediation analysis of the role of socioeconomic factors" and discovered that attitudes and knowledge on reproductive rights were positively correlated.

Conclusion:

Based on the research and research questions, the present study concluded that:

Over two-thirds of the adolescent orphans in the study lacked adequate knowledge about reproductive health issues and nearly three-fifths of the adolescent orphans in the study had a poor attitude towards reproductive health. Also, among the adolescent orphans within study, there was a very statistically significant positive correlation between their overall knowledge and attitude towards reproductive health. Overall, the findings of the current study achieved the study's aim and answered the research questions.

Recommendations:

Based on the findings of this study the following recommendations are derived and suggested:

-The needs of students in orphanages should be regularly evaluated.

-Create programs for educating adolescents who are orphans about reproductive health in order to meet their needs and motivate them.

-Encourage medical experts, including physicians and nurses, to visit orphanages on a regular basis to provide guidance and counselling regarding reproductive health.

-**Further researches:**

-Additional research is required to evaluate and examine the barriers to using reproductive health services among adolescent orphans.

-Additional studies to educate caregivers caring for orphans about reproductive health and how to address the reproductive health issues of the adolescents living in the orphanage.

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Assessment of Nurses' Knowledge Regarding Short Term Symptoms of Neonates with Neonatal Abstinence Syndrome

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Abstract

Background: Nurses' knowledge significantly impacts the care of neonates with Neonatal Abstinence Syndrome. Adequate knowledge allows nurses to accurately assess short symptoms and provide the neonates with appropriate interventions and can reduce complication. **Aim:** The present study was aimed to assess nurses' knowledge regarding short term symptoms of neonates with neonatal abstinence syndrome. **Design:** A descriptive research design was utilized. **Setting:** The study was conducted at Intensive Care Unit of El Menshawy and Tala hospital, which are affiliated to Ministry of Health and population **Subject:** sixty nurses and neonates who attended the previously mentioned settings were involved. **Tools:** two tools were used, **Tool I**: Nurses' knowledge regarding Neonatal Abstinence Syndrome questionnaire.**Tool II:** Modified Finnegan Neonatal Abstinence Syndrome Scoring tool. **Result:** the majority of studied nurses had low level of knowledge regarding Neonatal abstinence syndrome. there was no statistically significant relation between neonates' total score of modified Finnegan neonatal abstinence syndrome and their socio-demographic characteristics of studied neonates **Conclusion:** the total level of knowledge of the studied nurses were unsatisfactory regarding short term symptoms of neonates with neonatal abstinence syndrome. **Recommendation:** educational program should be applied at Neonatal Intensive Care Units as one of the nursing interventions aiming to improve nurses' knowledge to provide high quality care for neonates with neonatal abstinence syndrome.

Keywords: Knowledge, Neonatal abstinence syndrome, short term symptoms

Introduction

Neonatal Abstinence Syndrome (NAS) is a classification for the group of problems that occur in a newborn due to withdrawal symptoms from in utero exposure to opioid drugs or after delivery. Regular maternal drug use during the last two weeks preceding birth is a risk factor for neonatal abstinence syndrome **(Shan& MacVicar, 2020)**.The impact of opioid drugs in a pregnant woman is profound, not only on her health and wellbeing, but also on that of her fetus and subsequent newborn.

Over the past few decades, the United States has been during an opioid epidemic. A widespread epidemic has impacted individuals across all demographics, including pregnant women. As a result, there has been a rise in the number of newborns exposed to drugs either during pregnancy or shortly after delivery. Many of these infants experience withdrawal symptoms soon after birth, a condition referred to as neonatal abstinence syndrome. **(Jilani & Jones, 2021)**

The incidence of the neonatal abstinence syndrome has increased 82% nationally from 2010 to 2017 It was diagnosed every 1,000 neonates, One study suggests there is one neonate diagnosed with neonatal abstinence syndrome every 25 minutes, which equals between 2 to 7 neonates out of every 1,000 births. Approximately one neonate is diagnosed with neonatal abstinence syndrome every 19 minutes in the United Satiates. **(Daniel et al., 2020)**

Neonatal abstinence syndrome is a condition affecting multiple body systems, caused by the sudden discontinuation of drug exposure in newborns whose mothers used or misused substances during pregnancy. Substance use by mothers during pregnancy poses a significant risk for adverse outcomes in both the pregnancy and the newborn. Infants who are vulnerable to Neonatal Abstinence Syndrome also face higher chances of being born prematurely, having a low birth weight, or experiencing restricted growth in the womb. Additionally, drug use during pregnancy often reflects broader social and

environmental challenges that may lead to mental, physical, and developmental difficulties for the infant **(Patrick, 2020).**

Neonates exposed to opioids either before birth (in utero) or after delivery due to medical conditions may experience a broad range of negative symptoms. These symptoms can impact multiple body systems, including the autonomic and central nervous systems, as well as the respiratory and gastrointestinal systems. The severity of these symptoms can vary from mild to severe **(Petrich et al., 2022).**

Withdrawal symptoms in affected newborns may include fever, rapid breathing, sweating, tremors, difficulty feeding, weight loss, seizures, persistent crying, frequent sneezing and yawning, excessive sucking, vomiting, diarrhea, and skin irritation across the body. These symptoms can appear with different levels of intensity or may not appear at all. In more severe cases, infants often need extended and expensive care in neonatal intensive care units **(Pahl et al., 2020).**

The first line of treatment of Neonatal Abstinence Syndrome includes both pharmacological and non-pharmacological interventions, Morphine is the most common pharmacological interventions are used and non-pharmacological interventions care which is less controversial, more cost-effective, and may help shorten the average duration of hospitalization **(Lee H. & Cho H. 2023)**

Conducting assessments and utilizing standardized scoring tools enable healthcare providers to implement suitable interventions for managing neonatal abstinence syndrome (NAS). The Finnegan Neonatal Abstinence Scoring Tool (FNAST) is the most widely used method, helping to evaluate the severity of NAS symptoms and inform treatment decisions accordingly **(Kocherlakota et al., 2020**)

The Finnegan Neonatal Abstinence Scoring Tool is also used to assess the effectiveness of treatment and recovery of the neonates. Assessment is performed and then scored. A daily score is calculated.

The decision to treat the neonate may be based upon a higher score and help the clinician experience to guide treat. **(Goyal S& Saunders KC, 2020)**

The nurse professional has a responsibility of creating and healing environment. conducive to the healing process in monitoring and reducing noise levels, Lighting should be adjustable, neonate's should be provided with developmentally supportive positioning to optimize musculoskeletal development and behavioral response organization, provide opportunities for kangaroo care when possible, minimize stress by reduce the neonate's exposure to noxious. **(Blackwood & Cadet 2021)**

Significance of the study:

Nurses' knowledge was direct impact on neonate's quality care and improving outcome of neonates with neonatal abstinence syndrome. The first line of treatment should always be non-pharmacological interventions included, developmental supportive care as comfort measure, tight swaddling with light weight blankets, providing quite environment, manage lighting environment, comfortable position, encouraging frequent uninterrupted rest periods and appropriate breast feeding **(Haaland et al, 2022)**

The number of cases of Neonatal Abstinence Syndrome (NAS) has steadily increased in recent years, emphasizing the importance of healthcare providers being equipped to identify and effectively address its complications. Infants with NAS face considerable risks of long-term neurodevelopmental issues and increased mortality **(Curran et al., 2020).**

The Aim of the Study

The present study was aimed to assess nurses' knowledge regarding short term symptoms of neonates with neonatal abstinence syndrome

Research questions

1- What is nurses' knowledge regarding short term symptoms of neonates with neonatal abstinence syndrome?

2- What are nurses' knowledge regarding Modified Finnegan

scorning tool of neonates with neonatal abstinence syndrome?

Subjects and methods:

Research design:

A descriptive research design was used in the current study.

Setting:

The present study was conducted at two Neonatal Intensive Care Unit at El- Manshawy Hospital El-gharbia Governorate and Tala Hospital EL-Menoufia Governorate, which are affiliated to Ministry of Health and Population.

Subject:

A Purposive sampling of (60) nurses and neonates who was admitted in the previously mentioned setting at the time of data collection

40 nurses and neonates at Neonatal Intensive Care Unit (NICU) of tala hospital and 20 at Neonatal Intensive Care Unit of El Manshawy hospital.

Tools of the study

Three tools were utilized as follows:

Tool (1): Structured interview schedule regarding neonatal Abstinence Syndrome.

It was prepared by the researcher after extensive reviewing of recent literatures to collect data. **(Chiang & Grossman, 2019)** It was consisted of three parts:

Part (1): Socio demographic characteristics of nurses:

It was covered the characteristics of the nurses which include age, sex, level of education and attendance of clinical training courses.

Part (2): Socio demographic characteristic of neonates

It covered the characteristics of the neonates which include gestational age, birth weight, length, post-natal age and type of delivery.

Part (3): Nurses' knowledge regarding neonatal abstinence syndrome.

It was developed by the researcher after reviewing the related literature **(Anderson C& CacolaP. 2017)** which includes:

-Nurses' knowledge about neonatal abstinences syndrome such as definition, causes, short term symptoms, behavior response, complications and management of neonates with

neonatal abstinence syndrome.

The total scores of Nurses' knowledge were calculated as follow:

-Less than 60% was considered low level of knowledge. (0-24)

-From 60- 80% was considered moderate level of knowledge. (24-32)

-From 80% and more was considered high level of knowledge. (32-40).

Tool (II): Modified Finnegan Neonatal Abstinence Syndrome Scoring tool.

The Modified Finnegan Neonatal Abstinence Scoring Tool. **(Kunswa M. & Bayoumi O, 2018**) used to assess short symptoms that include: - Central nervous system disturbances, Gastrointestinal disturbances and Respiratory disturbances.

Modified Finnegan Neonatal Abstinence Syndrome was calculated as follows:

Less than 20 were considered mild symptoms-

Less than 30 were considered moderate symptoms–

More than 30 were considered sever symptoms.

Methods:

The study was accomplished through the following steps:

Administrative Process

To carry out this study, an official permission for data collection was obtained from the Dean of the Faculty of Nursing, Tanta University directed to administrators responsible for the selected hospitals.

Ethical considerations

-Ethical approval was taken from the Scientific Research Ethics Committee of the Faculty of Nursing, Tanta University before conducting the study code No. 239/4/2023

-Confidentiality and privacy were taken into consideration regarding the data collection and was maintained by coding number

-Nature of the study didn’t cause any harm or pain to the entire sample.

-Nurses' informed consents to participate in this study were obtained after explanation of the aim and benefits of the current study. The nurses had the right to withdraw from the study at any time.

Tools development

Two tools were developed by the researcher after reviewing of recent literatures and under the supervision of the supervisors.

Content validity

A jury of five experts in the field of Pediatric Nursing to check content validity and clarity of the questionnaire. Modifications were carried out accordingly.Content validity index 98.5%.

Reliability test

Testing reliability of proposed tools was done by using Cronbach's alpha coefficient test. It was 0,762 for tool (I) "Nurses knowledge" and 0.861 for tool (II) "Modified Finnegan neonatal abstinence syndrome" Which indicates that the two tools were reliable to detect the objectives of the study.

Pilot study:

A pilot study was carried out on 10% of nurses and neonates (6 nurses and neonates). It study was done to test the tool for its clarity, applicability, feasibility to determine any obstacles that my encountered the researcher during the period of data collection. Pilot study was excluded from the total sample.

Statistical analysis

Data was entered and analyzed by using SPSS statistical package version 27. Graphics were done using Excel program. Quantitative data were presented by mean ($\bar{X}$) and Standard Deviation (SD). Qualitative data were presented in the form of frequency distribution tables, number and percentage. It was analyzed by chi-square ($\chi 2$) test, ANOVA test (F), Pearson's correlation ®, and Friedman test (Fr). Level of significance was set as P value <0.05 for all significant tests.

Result:

Table (1): Shows percentage distribution of the studied nurses according to their biosocial characteristics. It was revealed that 48.3% of the studied nurses aged between 30<40 years old with the mean age of 31.17±5.63 years Moreover, 95% of them were female, and 56.7% of them had bachelor's degree of nursing science. Also, half of the studied nurses (50%) had 5-10 years of experience in Neonatal Intensive

Care Unit. This table also revealed that all the studied nurses didn't attend any courses related to neonatal abstinence syndrome.

Table (2): Shows percentage distribution of the studied neonates according to their biosocial characteristics. It was clear that 75% of the studied neonates their gestational age were in between 37 to less than 42 weeks gestation with the mean age of 37.13± 1.94 weeks. Moreover, 55% of them their birth weights were between 2500 to less than 4000 gram and 61.7% of them their length at birth were between 48 and less than 50 cm. This table also reveals that 56.7% of studied neonates were delivered by the cesarean section.

Table (3): Shows percentage distribution of studied nurses related to their knowledge regarding neonatal abstinence syndrome. It was observed that all of studied nurse's answer were incomplete and corrected about definition of neonatal abstinence syndrome, while all nurses and 46.7% of them gave complete and correct answer. Regarding causes of neonatal abstinence syndrome it was found that 48.3% of studied nurses gave incomplete correct answer, while all nurses and 60% of them gave complete and correct answer. Concerning manifestation of neonatal abstinence syndrome it was found that 75% of studied nurses gave incomplete correct answer, while all nurses and 56.7% of them gave complete and correct answer

Table (4): Illustrates percentage distribution of studied neonates regarding disturbances of modified Finnegan neonatal abstinence syndrome. This table reveals that more than three quarters of studied neonates had moderate disturbance of modified Finnegan about central nervous system while 6.6% of them had sever disturbances. It was observed that 38.3% of studied neonates had moderate disturbance of modified Finnegan about metabolic, vasomotor and respiratory disturbances. While one quarter of them had sever disturbances.

Regarding gastrointestinal disturbances. It was observed that

80% of studied neonates had severed disturbance of modified Finnegan while 8.3% of them had moderate disturbances.

Table (5): Shows relation between the socio-demographic characteristics of the studied neonates on their total score of modified Finnegan neonatal abstinence syndrome. It was noticed that there was no statistically significant relation between neonates' total score of modified Finnegan neonatal abstinence syndrome and their socio-demographic characteristics of studied neonates.

Table (1): Percentage Distribution of the Nurses Studied According to their Biosocial Characteristics.

Socio- demographic characteristics	(n=60)	
	No	**%**
Age in years		
20<30 yrs.	25	41.7
30<40 yrs.	**29**	**48.3**
≥40 yrs.	6	10
Mean ±SD 5.63±31.17		
Gender		
Male	3	5
Female	**57**	**95**
Qualifications		
Diploma	14	23.3
Bachelor of Nursing Science	**34**	**56.7**
Postgraduate studies	12	20
Years of experience		
<5 years	20	33.3
5-10 years	**30**	**50**
>10 years	10	16.7
Mean ±SD 3.91 ± 6.70		
Previous training courses about neonatal abstinence syndrome		
Yes	0	0
No	60	100

Table (2): Percentage distribution of the studied neonates according to their biosocial characteristics.

Socio- demographic characteristics	(n=60)	
	No.	%
Gestational age		
< 37 weeks.	15	25
37-<42 weeks	**45**	**75**
≥42 weeks	0	0
Mean ±SD 37.13± 1.94		
Birth weight		
<1000 gram	0	0
1000-< 1500 gram	2	3.3
1500-<2500 gram	25	41.7
2500-<4000 gram	**33**	**55**
Mean ±SD 2432.50± 450.31		
Birth length		
48-<50 cm	**37**	**61.7**
50-<52 cm	23	38.3
52-<54 cm	0	0
≥54 cm	0	0
Mean ±SD 49.28± 0.90		
Type of delivery		
Normal	26	43.3
Cesarean section	34	56.7

Table (3): Percentage Distribution of Studied Nurses related to their Knowledge regarding Neonatal Abstinence Syndrome. (n= 60)

Total knowledge level about neonatal abstinence syndrome	Complete correct answer		Incomplete correct answer		Incorrect answer	
	No	%	No	%	No	%
Definition	0	0	60	100	0	0
Causes	0	0	29	48.3	31	51.7
Manifestation	0	0	45	75	15	25
Behavioral responses	0	0	15	25	45	27
feeding behavior	0	0	45	75	15	25
Short-term complication	6	10	51	85	3	5
Long-term complication	0	0	41	68.4	19	31.7
goal of nursing care	0	0	43	71.7	17	28.3
Nursing care	0	0	53	88.3	7	11.7
Factor that determines choice & duration of medication	2	3.3	45	75	13	21.7

Table (4): Percentage Distribution of Studied Neonates regarding Disturbances of Modified Finnegan Neonatal Abstinence Syndrome (n= 60)

Disturbances of modified Finnegan related to studied neonates with neonatal abstinence syndrome		No	%
Central nervous system disturbances	**Mild**	10	16.7
	Moderate	46	76.7
	Severe	4	6.6
Metabolic, vasomotor and respiratory disturbances	**Mild**	22	36.7
	Moderate	23	38.3
	Severe	15	25
Gastrointestinal disturbances	**Mild**	7	11.7
	Moderate	5	8.3
	Severe	48	80

Table (5): Relation between the Socio-Demographic Characteristics of the Studied Neonates on their total Score of Modified Finnegan Neonatal Abstinence Syndrome.

Socio-demographic characteristics related to studied neonates	Total score of modified Finnegan neonatal abstinence syndrome (60) Mean±SD
Gestational age	
< 37 weeks.	25.53 ± 3.14
37-<42 weeks	27.47 ± 4.98
t, P-value	1.409, **0.164**
Birth weight	
1000-< 1500 gram	26.50 ± 0.71
1500-<2500 gram	28.16 ± 5.58
2500-<4000 gram	26.12 ± 3.81
F, P-value	1.402, **0.254**
Birth length	
48-<50 cm	27.54 ± 5.21
50-<52 cm	26.09 ± 3.46
t, P-value	1.183, **0.241**
Type of delivery	
Caesarian section	27.18 ± 3.61
Normal vaginal delivery	26.73 ± 5.79
t, P-value	0.366, 0**.716**

Discussion

Neonatal abstinence syndrome (NAS) occurs due to abrupt discontinuation of chronic fetal exposure to substances that were used or abused by the mother during pregnancy. Signs typically manifest 48 to 72 hours after birth but may not occur until 14 days after birth. Opioid exposure is the most common cause of Neonatal abstinence syndrome. Withdrawal signs in these neonates can include Central nervous system disturbances signs such as tremors, seizures and excessive crying. Gastrointestinal disturbances signs include vomiting, diarrhea and poor feeding. Metabolic, vasomotor and respiratory disturbances signs such as fever, nasal stuffiness, yawning and sweating (**McCarty & Braswell, 2022).**

The major role of neonatal nurses in the Neonatal Intensive Care Unit is to promote normal neurological, physical, and emotional development, otherwise, they aim to prevent disabilities and improve outcomes for neonates **(Kolomboy et al., 2022).**

Therefore, nurse's knowledge and practice significantly impact the care of neonates with Neonatal Abstinence Syndrome. Adequate knowledge allows nurses to accurately assess symptoms and provide the neonates with appropriate intervention, effective support and can reduce complication. **(Romisher et al., 2018).**

Regarding the studied nurses' socio-demographic characteristics, the present study revealed that less than half of the studied nurses were in the age category 30-<40 years old with the mean age of (31.17±5.63). Moreover, majority of them are female, and that more than half of them had Bachelor of Nursing. Also, half of the sample had 5-10 years old of experience with mean of (6.70±3.91). While none of them had received previous training courses about neonatal abstinence syndrome **(Salameh & Polivka, 2020).**

This finding in the previous paragraph is consistent with **(Romisher et al., 2018)** who conducted a study "Neonatal abstinence syndrome, exploring nurses' attitudes, knowledge, and practice" in USA, and concluded that the majority being female, and bachelor's prepared. Also, these results were not match with **(Salameh & Polivka, 2020)** who conducted a study on "Knowledge of and perceived competence in trauma-informed care and attitudes of neonatal intensive care unit nurses toward mothers of newborns

with neonatal abstinence syndrome" in USA, and reported that most of participants were in the age group of 30-40, females and didn't receive training courses about neonatal abstinence syndrome.

Regarding the socio-demographic characteristics of studied neonates. The result of the current study related that three quarters of the studied neonates were in the gestational age group 37 to less than 42 weeks, more than half their birth weight were 2500 to less than 4000 gram and their length at birth were between 48 and less than 50 cm. Also, more than half of them were delivered by the cesarean section. The researcher can justify this result as most of them were normal birth weight.

These results are on the same line with **(Kushnir et al., 2023)** entitled "Neonatal abstinence syndrome in infants with prenatal exposure to methadone versus buprenorphine" in USA and concluded that most of neonates were more than 37wks with mean age of (38.5 ± 1.8), and most of them their mean birth weight were (2857 ± 457). Also, more than half of them delivered by the cesarean section.

Nurses' Level of Knowledge regarding Neonatal Abstinence Syndrome

Concerning the acquisition of knowledge the result of current study had, no one answered complete correct answers about definition, causes, manifestation, behavioral and feeding responses, long term complication, the main goal of nursing care and nursing procedures. This may be due to lack of in-service educational program about neonatal abstinence syndrome, no accurate sources of acquisition knowledge and lack of training courses.

This result is supported by **(Draper, 2020)** who studied "developing training to address neonatal nurse knowledge, practice, and perceived attitude for neonatal abstinence syndrome" in USA and stated that registered nurses not correctly answered about symptoms, nursing care and treatment for neonatal abstinence syndrome. Also, **(Tobin, 2018)** was in the same line with the result of current study, who conducted a study entitled "Changing neonatal nurses' perceptions of caring for infants experiencing neonatal abstinence syndrome and their mothers" in Oman with a sample size of 112 nursing students and stated that zero was increased percentage of incorrect answer of the definition, causes, signs and symptoms, and

caring of neonates with neonatal abstinence syndrome.

Concerning the total nurses' knowledge about neonatal abstinence syndrome, the current study revealed that samples studied had low level of knowledge about neonatal abstinence syndrome this may be attributed to the studied nurses had a lack of information about with neonatal abstinence syndrome.

The result of the current study was consistent with **(Draper, 2020)** who concluded that the nurses knowledge about neonatal abstinence syndrome was low. Also, **(Regimbal, 2022)** who studied "Neonatal abstinence syndrome educational intervention and nursing protocol: nursing knowledge and perceptions" in USA was in the same line with the results of the current study and mentioned that nurse's knowledge about neonatal abstinence syndrome was unsatisfied

This result was in congruent with **(El-Ziady et al., 2017)** who conducted a study entitled "Effect of implementing an educational intervention about family centered developmental care on neonatal nurses' knowledge and practices at neonatal intensive care units" in Egypt and reported that more than two fifths of the studied nurses did not know the definition, components, or the importance care of neonates. As well as, less than half, and more than one third of them didn't know the principles of care of neonatal abstinence syndrome.

The studied Neonates' about disturbances of Modified Finnegan Neonatal Abstinence Syndrome scoring system.

Concerning disturbances of modified Finnegan neonatal abstinence syndrome. The present study revealed that the studied neonates' central nervous system, metabolic, vasomotor and respiratory, and gastrointestinal disturbances severity level. This may be due to the neonate's need crucial care early intervention can greatly affect outcomes. Also, the nursing knowledge about modified Finnegan neonatal abstinence syndrome scoring system to determine short symptoms had a lasting effect, which is important for establishing the efficacy and sustainability of the treatment methods used in the study. **(Disher, T., et al 2019)**

These findings done by **(Miller PA & Willier T. 2021)** who conducted a study about "Early detection of neonatal abstinence syndrome by neonatal intensive care unit nurses" in Minnesota was in the same line

with result of current study and concluded that establishing a training program for nurses to care can improve neurodevelopmental and gastrointestinal disturbances of neonates with Neonatal Abstinence Syndrome. Also, the study conducted by **(Mohammed et al., 2024)** reported that neonates exhibited stable behavioral cues, neurological stability and less stress signs after implementation of the developmental supported care.

The present study revealed that there was no statistically significant relation between studied neonates' total score of modified Finnegan neonatal abstinence syndrome and their socio-demographic characteristics This may be due to causes of increase total score of modified Finnegan neonatal abstinence syndrome related to types and amount of used by their mother and period of time the neonates had exposed to the drug while in his mother's pregnant or after birth. **(Anbalagan et al., 2024**)

Finally, considering this discussion, the current study affirms that the nurses had insufficient knowledge and short term symptoms for neonates with neonatal abstinence syndrome. Moreover, the current study showed that revealed the studied neonates' total score of modified Finnegan neonatal abstinence syndrome level.

Conclusion

The current study concluded that the studied nurses had low level and unsatisfactory knowledge of neonatal abstinence syndrome and practices regarding care for neonates with neonatal abstinence syndrome. Finally, the research findings support and answer the research question.

Recommendations

-Neonatal intensive care units should include updated policies related nursing care for neonatal abstinence syndrome.

-Proper pre-service and in-service training for newly recruited nurses and in- service training program for nurses about neonates with neonatal abstinence syndrome to improve their performance

-Encourage research on the long-term outcomes and benefits of nursing educational programs regarding neonatal abstinence syndrome.

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Effect of Educational Program Based on Health Belief Model for Elderly regarding Diabetic Retinopathy

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Abstract

Background: Diabetic retinopathy is a leading cause of vision loss among the elderly, often attributed to limited awareness and inadequate preventive behaviors. **Aim:** this study aimed to evaluate the effect of educational program based on health belief model for elderly regarding diabetic retinopathy. **Design:** A quasi-experimental research design was utilized. **Sample**: A purposive sample of 399 diabetic elderly who agreed to participate in the study was utilized. **Setting**: The study was conducted at the outpatient clinic of the National Institute of Diabetes and Endocrinology**. Tools**: Data were collected using one instrument. Elderly belief on diabetic retinopathy questionnaire, which consisted of: Part 1: elderly demographic data; Part 2: elderly medical history; part 3 elderly belief on diabetic retinopathy questionnaire. **Results:** The results revealed that, 35% of the elderly had positive total belief score pre-educational program which improved to be 75% post educational program. **Conclusion:** The educational program based on the Health Belief Model significantly enhanced health beliefs regarding diabetic retinopathy among the elderly. **Recommendations:** Continuous educational program for elderly regarding diabetic retinopathy.

Keywords: Diabetic Retinopathy, Educational Program, Elderly, health belief model.

Introduction

Type 2 diabetes mellitus is a chronic and progressive metabolic and cardiovascular disorder, acknowledged as one of the most prevalent causes of illness, disability, and death across the globe. According to the International Diabetes Federation, in 2019 there were already 463 million people with diabetes and is projected to reach 700 million by 2045 **(Sun et al., 2022).**

Diabetic retinopathy (DR), one of the most common and serious microvascular complications associated with diabetes mellitus, is a major contributor to vision loss among older adults. In recent years, a noticeable rise has been observed in both the incidence of DR and the number of blindness cases it causes, posing a serious challenge to the quality of life of elderly individuals with diabetes **(Teo et al., 2021).**

The pathophysiology of diabetic retinopathy (DR) is characterized by intricate processes, including oxidative stress and inflammation, which play a central role in retinal cell dysfunction and apoptosis. In addition, prolonged hyperglycemia can contribute to other ocular complications such as glaucoma and cataracts, further increasing the risk of vision loss. Timely diagnosis and effective regulation of blood glucose levels are essential to prevent these severe outcomes and to safeguard visual health in individuals with diabetes. Managing DR in the elderly necessitates a comprehensive strategy that considers both the progression of the condition and the specific health challenges associated with aging **(Kowluru & Mishra, 2015).**

The basic premise is that elderly people require education and assistance in order to identify illnesses and healthcare interventions and modify their health-related habits. The appropriate use of behavioral science theories is essential to educational effectiveness. The health belief model, which holds that an individual's behavior is influenced by their knowledge and viewpoint, is one of the most effective forms of health education. Additionally, by helping people understand health-threatening conditions, this strategy encourages them to adopt healthy behaviors **(Power et al., 2020).**

Gerontological nurse plays a pivotal role in the management of diabetic retinopathy among the elderly, serving as key facilitators in early detection, education, and ongoing care. Gerontological nurse are instrumental in conducting regular screenings, providing education on

the importance of eye health, and helping patients manage diabetes to prevent or delay the progression of retinopathy. Their role extends to coordinating care with ophthalmologists, ensuring adherence to treatment plans, and supporting patients in understanding the impact of diabetic retinopathy on their vision and daily life. By addressing both medical and emotional needs, nurses significantly contribute to improving outcomes and quality of life for elderly affected by diabetic retinopathy **(Boucher, Nguyen & Qian, 2020).**

Significance

Diabetic retinopathy affects 55.7% of people with type 2 diabetes, according to recent statistics from Egypt. More than 75% of those who have had type 2 diabetes for more than 20 years' experience this problem. As the fifth most common cause of vision impairment and the fourth most common cause of blindness, diabetic retinopathy is one of the most prevalent and dangerous side effects of diabetes mellitus. In addition to causing vision loss, it also lowers productivity and degrades the quality of life for senior citizens, increasing the socioeconomic strain on the community. Additionally, the older population in Egypt is experiencing increased diabetic eye issues due to a lack of health education and common misunderstandings **(Abd Elmouty & Mohammed, 2022).**

Diabetic retinopathy (DR) is a serious eye complication caused by prolonged high blood sugar levels that damage the retina's blood vessels. This condition is characterized by increased vascular permeability, leading to microaneurysms, hemorrhages, and the growth of abnormal blood vessels that can ultimately cause vision loss or blindness if left untreated. Approximately 60% of individuals with diabetes will develop some form of DR within their lifetime, with the risk increasing with the duration of diabetes (**Morya et al, 2024).**

The Health Belief Model (HBM) posits that an individual's likelihood of engaging in recommended health behaviors increases when they perceive themselves as susceptible to a disease and recognize its potential severity. This model emphasizes several key constructs that influence health-related decision-making. First, perceived susceptibility refers to an individual's belief about their risk of developing a health issue, while perceived severity reflects their assessment of the seriousness of that condition. Additionally,

understanding the benefits of taking specific health actions is crucial. Finally, cues to action, which can be reminders or prompts that encourage individuals to take action, play a significant role in initiating health behaviors **(Mehrabizadeh et al., 2024).**

Given the rising prevalence of diabetic retinopathy and the elderly's heightened vulnerability, there is a growing need for targeted educational interventions. However, few studies have explored how structured programs—especially those grounded in the Health Belief Model (HBM)—can improve elderly individuals' understanding and preventive behaviors toward this condition. Age-related factors such as cognitive decline, limited access to health information, and long-standing diabetes often hinder awareness and action. Therefore, applying an HBM-based educational approach may effectively enhance knowledge, correct misconceptions, and motivate preventive practices among this at-risk population.

Aim of the study

The aim of the study was to evaluate the effect of educational program based on health belief model for elderly regarding diabetic retinopathy.

Research hypothesis

The educational program for elderly regarding diabetic retinopathy will improve their beliefs.

Subjects and Method

Research Design

A quasi-experimental research design was used in this study.

Study Setting

The study was conducted in the outpatient clinic of the National Institute of Diabetes and Endocrinology, affiliated to the General Organization for Teaching Hospitals and Institutes, and located in Cairo Governorate. The institute provides services for all Egyptian population**.**

Sampling technique

A purposive sample of 399 elderly with diabetes was recruited.

Inclusion criteria:

-Elderly aged 60 years old and above.
-Free from mental disorder as Alzheimer, depression, etc.
-Have a history of diabetes disease.
-Willing to participate in the study.

Sample size

The sample size calculated based on the previous year (2022) attendance report in the above-mentioned setting by using the following equation by **(Glenn, 1992)**:

$$n = \frac{N}{1 + N(e)^2}$$

Where: n =sample size
N= population size
E=, 05 is the level of precision
When formula is applied to the above sample, we get equation:
n=5556/ (1+ 5556(.0025) = 399.
Based on the above equation, the actual sample size was 399

Data Collection Tools:

One tool for data collection utilized to conduct the present study included the following:

Elderly belief on diabetic retinopathy questionnaire: Included 3 parts*:*

Part (1): Elderly demographic data included age, gender, educational level, marital status, number of children, working status, work type, monthly income, source of income & residence with.

Part (2): Elderly medical history as

-Present history included current diseases, regular medication used and retinal problem.

-Past history included diabetic duration, surgery operation and surgery type.

-Family history included diabetes hereditary in the family and if yes diseased relative.

Part (3): Elderly belief on diabetic retinopathy questionnaire: questions used in this study was constructed based on the Health Belief Model and included components: **Perceived susceptibility** (6 items) (risk factors, likelihood of developing DR, concern about DR, ignoring tests without symptoms, family history, high blood sugar).

Perceived severity (11 items) (blindness, financial burden, hopelessness, social limitation, emotional distress, fear, life changes, surgery, disability, seriousness of DR and total blindness). **Perceived benefit** (5 items) (prevention of blindness, life-saving potential of tests, importance of regular check-ups, early detection, prevention of complications).

Perceived barrier (8 items) (knowledge about annual tests, awareness of testing locations, fear of diagnosis, cost of testing, difficulty accessing care, anxiety about tests, lack of time, lack of motivation).

Cues to action (6 items) (regular exercise, annual check-ups, healthy behaviors, diabetic diet, seeking health information, following medical advice) .

Scoring system: It was contained 36 questions. The Responses were assigned points as follows: 2 for

"agree," 1 for "disagree," and 0 for don't know. The total score of HBM 72 points for diabetic retinopathy classified into two levels:

-Negative attitude < 75% (<54 points)

-Positive attitude (75%- 100 %) (>54 points)

Validity: Three community health nursing specialists from Helwan University's Faculty of Nursing evaluated the produced tool's content validity; no changes were made.

Reliability: To ascertain how closely the questionnaire items connect to one another, the tool's reliability was examined. Cronbach's Alpha was calculated to evaluate reliability, and it was 0.80 for HBM with relation to DR.

Pilot Study: A pilot study was conducted involving 10% of the elderly sample (39 participants) to evaluate the clarity of the questions and the time required to complete the study instruments. Following the pilot, no adjustments were necessary, and the participants in this phase were included in the main study.

Ethical considerations: The study was officially approved by Helwan University's Faculty of Nursing's Scientific Research Ethical Committee. Subjects were fully told about the study and their involvement prior to completing an informed consent form, and participation in the study was entirely voluntary. The ethical considerations included describing the nature and goal of the study, mentioning the option to withdraw at any moment, and guaranteeing the confidentiality of the data so that no other party could access it without the participants' consent. Respect was shown for ethics, morals, culture, and beliefs.

Field work:

-After obtaining official permission from the manager of National Institute of Diabetes and Endocrinology to conduct this study, the researcher met the elderly.

-Data was collected within 6 months (from beginning of October 2023 to end of March 2024) and the researcher was available two days per week (Tuesday and Thursday) from 8 am – 1 pm in the study setting till completion of the data collection. After the researcher introduced herself and explained the purpose of the study to the elderly, also informed consent was taken from them. The researcher conducted the study by distribution of the questionnaire as pretest.

-Educational program was developed based on the results obtained from the pretest questionnaire.

-The effect of the educational program was assessed immediately after the end of the program by using the same questionnaire, one time only. Teaching method was used as lecture, group discussion, and brain storming.

-The educational program was conducted in four phases:

-Preparatory, assessment, planning & implementation and evaluation.

-First, preparatory phase: Tool for data collection development: review of the current and past, local and international related literature.

-Second, assessment phase: The researcher met the elderly and filled out a pre-testing questionnaire to assess beliefs based on health belief model. The data obtained during this phase are considered the basis evaluation of educational program (pretest). The assessment phase took 4 weeks, the researcher interviewed elderly in the waiting area of outpatient clinic. In the first session, researcher filled out the elderly demographic data and medical history questionnaire in addition to session included assessment of elderly belief regarding to diabetic retinopathy.

-**Third, planning and implementation phase:** Based on results of assessment phase designing educational program regarding diabetic retinopathy with simple Arabic language to be suitable for the elderly level. Diabetic retinopathy program general objective was to improve the elderly beliefs based on HBM regarding diabetic retinopathy and the aim was explained to all elderly based on the result of pre-test questionnaire, the researcher utilized multiple theoretical sessions (3 sessions) and only one session for clinical, each session took from 30-40 min.

-The content of an educational program booklet helped to increase belief about diabetic retinopathy as: Meaning of diabetic retinopathy, causes, risk factors, symptoms, complication, diagnosis, treatment, and advices to decrease DR and how to measure blood glucose and exercising to maintain blood glucose normal. Each session was started by summary of essential points. In the last session each elderly took one of guide booklet. The fourth session included clinical part for demonstration and redemonstration about measuring blood glucose and exercising that reduce blood glucose. This session lasted 35 minutes. Teaching methods used were discussion, booklet, pictures, screen, videos and sharing experience.

-Fourth, evaluation phase: After implementation of the educational

program for elderly regarding diabetic retinopathy, post-test was done once immediately to evaluate the effect of educational program using the same tool of pretest evaluation also.

III: Administrative item:

After explanation of the study aim and objectives, an official permission was obtained from the Dean of the Faculty of Nursing, Helwan University to the manager of National Institute of Diabetes and Endocrinology to conduct the study, asking for cooperation and permission to conduct the study.

Statistical analysis:

Upon completion of data collection, data was computed and analyzed using Statistical Package for the Social Science (SPSS), version 24 for analysis. The P value will be set at 0.05. Descriptive statistics tests as numbers, percentage, mean ± standard deviation (± SD), were used to describe the results. Appropriate inferential statistics were used such as Chi square test for difference between pre and post percentages.

Results

Table (1): Clarifies 57.9% of the studied elderly were in age group 60 < 65 with mean ± SD 64.04±3.4, 58.4% were female and 50.1% couldn't read and write. Also, 68.9% were married and 92.7% had more than 2 children. Additionally, 58.4% of them were housewife and 75.2% reported enough income. According source of income, 55.6% reported from son or daughter and 39.6% were resident with their wives.

Table (2): Represents the present medical history of the diabetic patients. The results revealed that 71.7%, 37.3%, 32.3%, and 25.8% of the studied elderly suffer from constipation, hypertension, glaucoma, & cataract respectively and 68.4% of them take analgesic. In addition, 61.4% of them currently suffered from retinal problem.

Table (3): Represents the past and family history of the diabetic patients. The results revealed that 50.1% of the studied elderly had DM from 10 years and more and 81.7% of did cataract. In addition, 77.7 % of them had no family history of diabetes before while 57.3% their mothers had diabetes.

Table (4) :Shows that, there were highly statistically significant difference between studied elderly health belief model pre and post educational program in all domains for diabetic retinopathy as evidenced by (0.5% & 0.5%) of elderly had positive health belief pre-program regarding perceived severity and cues

to action, which improved to (97.7% & 96.5%) post program respectively.

Table (5) :Reveals that, there were no statistically significant relation between all items of demographic data of the studied elderly and total health belief model pre-educational program except for educational level and monthly income as evidence by p value (0.59, 0.95, 0.1, 0.07, 0.81, 0.34, 0.9 &0.07) respectively.

Table (6) :Shows that, there was a statistically significant association among the elderly participants and their overall health belief model score after the educational program, in relation to educational level, marital status, number of children, type of work, and monthly income ($p = 0.01$, 0.00, 0.00, 0.001, and 0.005, respectively).

Figure (1): Illustrates that, pre-educational program implementation 35% of elderly had positive total belief score. This improved to 75% of elderly had positive total belief score at post educational program.

Table (1): Frequency Distribution of Studied Elderly according to their Demographic data (n = 399).

Elderly demographic data	No.	%
Age (years)		
60 < 65	231	**57.9**
65 <70	160	40.1
≥70	8	2.0
Mean ±SD 64.04±3.4		
Gender		
Male	166	41.6
Female	233	**58.4**
Educational level		
No read and write	200	**50.1**
Read and write	151	37.8
Basic education	16	4.0
Secondary and diploma education	12	3.0
University education or more	20	5.1
Marital Status		
Single	3	0.8
Married	275	**68.9**
Divorced	20	5.0
Widowed	101	25.3
No. of Children		
None	3	0.8
1	20	5.0
2	6	1.5
>2	370	**92.7**
Work Status		
No	233	58.4
Yes	166	41.6
Work type		
Craft working	12	3.0
Professional work	74	18.5
Housewife	233	**58.4**
Employee	80	20.1
Monthly Income		
Not enough	79	19.8
Enough	300	**75.2**
Enough and save	20	5.0
Source of Income		
Retirement	174	43.6
Son or daughter	222	**55.6**
One of the relative	3	0.8
Residence with other		
No	3	0.8
Yes	396	**99.2**
Residence with		
Husband	132	33.4
Wife	157	**39.6**
One of children	105	26.5
Others (sisters and brothers	2	0.5

Table (2): Frequency Distribution of Studied Elderly according to Present Medical History (n = 399).

Present history	No.	%
***Current disease**		
Hypertension	149	37.3
Cardiac disease	79	19.8
Allergy	64	16
Arthritis	45	11.3
Constipation	286	**71.7**
Cataract	103	25.8
Glaucoma	129	32.3
***Regular medication used**		
Antihypertensive drug	149	37.3
Cardiac medication	79	19.8
Arthritis medication	35	8.8
Analgesic	273	**68.4**
Eye drops	109	27.3
Laxatives	110	27.6
Current retinal problem		
Yes	245	**61.4**
No	154	38.6

***= more than one response.**

Table (3): Frequency Distribution of Studied Elderly according to Past and Family History (n = 399)

Past history	**No.**	**%**
Diabetic duration		
1<5	41	10.3
5 < 10	158	39.6
10 >	200	**50.1**
Do operation		
Yes	126	31.6
No	273	**68.4**
*** Operation type**		
Appendectomy	50	39.7
Cataract	103	**81.7**
Glaucoma	20	15.9
Others (gallbladder)	3	2.4
Family medical history		
Diabetic heredity in the family		
Yes	89	22.3
No	310	**77.7**
***Diseased relative in the family(n=89)**		
Mother	51	**57.3**
Father	33	37
Brother	5	5.6
Others (grandfather)	6	6.7

***= more than one response**

Table (4) Frequency Distribution of Studied Elderly regarding Total Health Belief Model Construct related to Diabetic Retinopathy Pre & Post Educational Program (n = 399).

HBM Construct	Pre				Post				X2	P
	Negative		Positive		Negative		Positive			
	No.	%	No.	%	No.	%	No.	%		
Perceived Susceptibility	338	84.7	61	15.3	30	7.5	369	92.5	257.78	0.00**
Perceived Severity	397	99.5	2	0.5	9	2.3	390	97.7	370.80	0.00**
Perceived Benefits	369	92.5	30	7.5	0	0.0	399	100.0	369.00	0.00**
Perceived Barrier	349	87.5	50	12.5	110	27.6	289	72.4	124.45	0.00**
Cues to Action	397	99.5	2	0.5	14	3.5	385	96.5	356.91	0.00**

**Highly statistically significant at p value≤0.001

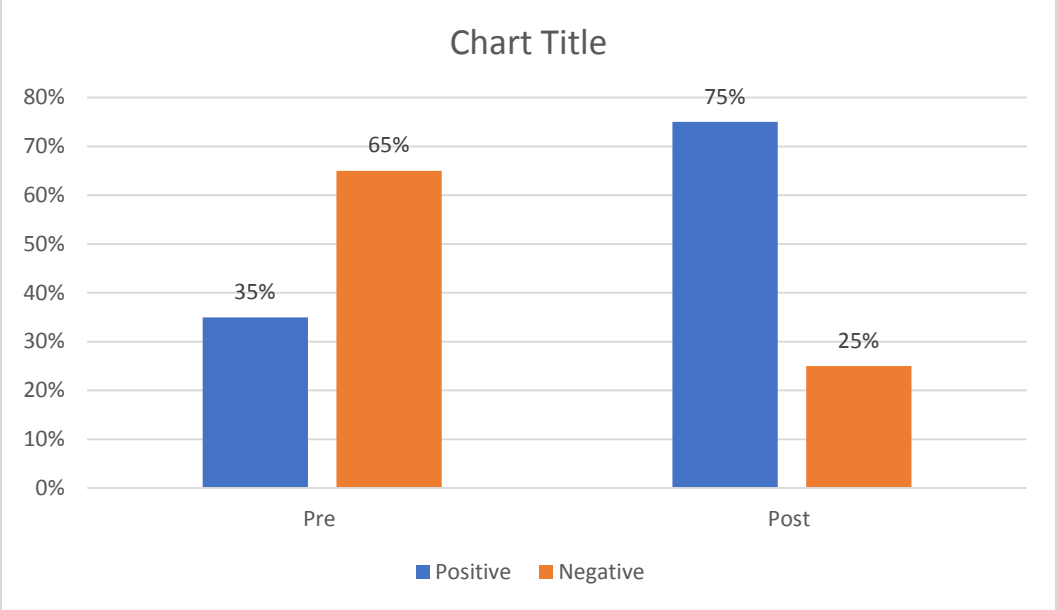

Figure (1): Frequency Distribution of Studied Elderly according Total Health Belief regarding Diabetic Retinopathy Pre, and Post Educational Program (n=399)

Table (5): Relation between Demographic Data of Studied Elderly and Health Belief Model Level Pre-Program regarding Diabetic Retinopathy (n=399)

Demographic data	Pre				X2	P Value
	Negative		Positive			
	No.	%	No.	%		
Age (years)						
60 < 65	225	97.4	6	2.6	1.1	0.59
65 < 70	158	98.8	2	1.3		
≥70	8	100.0	0	0.0		
Gender						
Male	163	98.2	3	1.8	0.05	0.95
Female	228	97.9	5	2.1		
Educational level						
No read and write	200	100.0	0	0.0	15.5	0.004**
Read and write	146	96.7	5	3.3		
Basic education	14	87.5	2	12.5		
Secondary and diploma education	12	100.0	0	0.0		
University education or more	19	95.0	1	5.0		
Marital Status						
Single	3	100.0	0	0.0	6.1	0.1
Married	272	98.9	3	1.1		
Divorced	20	100.0	0	0.0		
Widowed	96	95.0	5	5.0		
No. of Children						
None	3	100.0	0	0.0	6.9	0.07
1	18	90.0	2	10.0		
2	6	100.0	0	0.0		
>2	364	98.4	6	1.6		
Work Status						
No	230	98.7	3	1.3	0.05	0.81
Yes	161	97.0	5	3.0		
Work Status						
Craft working	12	100.0	0	0.0	3.4	0.34
Professional work	71	95.9	3	4.1		
Housewife	228	97.9	5	2.1		
Employee	80	100.0	0	0.0		
Monthly Income						
Not enough	79	100.0	0	0.0	8.1	0.01**
Enough	294	98.0	6	2.0		
Enough and save	18	90.0	2	10.0		
Source of Income						
Retirement	171	98.3	3	1.7	0.2	0.9
Son or daughter	217	97.7	5	2.3		
One of the relative	3	100.0	0	0.0		
Residence with						
Husband	132	100.0	0	0.0	6.8	0.07
Wife	157	98.1	3	1.9		
One Of children	100	95.2	5	4.8		
Others (sisters& brothers)	2	100.0	0	0.0		

**Highly statistically Significant at p value≤0.05 Non-significant at p value≥0.05

Table (6): Relation between Demographic Data of Studied Elderly and Health Belief Model Level Post Educational Program regarding Diabetic Retinopathy (n=399).

Demographic data	Post				X2	P Value
	Negative		Positive			
	No.	%	No.	%		
Age(years)						
60 < 65	1	0.4	230	99.6	0.11	0.94
65 < 70	1	0.6	159	99.4		
≥70	0	0.0	8	100.0		
Gender						
Male	2	1.2	164	98.8	2.8	0.09
Female	0	0.0	233	100.0		
Educational level						
No read and write	0	0.0	200	100.0	11.8	0.01**
Read and write	1	0.7	150	99.3		
Basic education	1	6.3	15	93.8		
Secondary and diploma education	0	0.0	12	100.0		
University education or more	0	0.0	20	100.0		
Marital Status						
Single	0	0.0	3	100.0	30.1	0.00**
Married	0	0.0	275	100.0		
Divorced	2	10.0	18	90.0		
Widowed	0	0.0	101	100.0		
No. of Children						
None	0	0.0	3	100.0	41.4	0.00**
1	1	5.0	19	95.0		
2	1	16.7	5	83.3		
>2	0	0.0	370	100.0		
Work Status						
No	0	0.0	233	100.0	2.8	0.09
Yes	2	1.2	164	98.8		
Work Type						
Craft working	1	8.3	11	91.7	17.4	0.001**
Professional work	1	1.4	73	98.6		
Housewife	0	0.0	233	100.0		
Employee	0	0.0	80	100.0		
Monthly Income						
Not enough	1	1.3	78	98.7	10.5	0.005*
Enough	0	0.0	300	100.0		
Enough and save	1	5.0	19	95.0		
Source of Income						
Retirement	1	0.6	173	99.4	0.04	0.97
Son or daughter	1	0.5	221	99.5		
One of the relative	0	0.0	3	100.0		
Residence with						
Husband	0	0.0	132	100.0	1.1	0.76
Wife	1	0.6	159	99.4		
One of children	1	1.0	104	99.0		
Others (sisters& brothers)	0	0.0	2	100.0		

**Highly statically Significant at p value≤0.05 Non- significant at p value≥0.05

Discussion

One of the most prevalent and serious side effects of diabetes mellitus is diabetic retinopathy, which is also the fourth most common cause of blindness and the fifth most common cause of visual impairment. It has a detrimental effect on the quality of life of the elderly in addition to reducing productivity, which adds to the socioeconomic burden on the community. The development of diabetic eye problems in the older population of Egypt is negatively impacted by a lack of health education and the prevalence of false ideas. **(Khalaf et al., 2019).**

The present study showed that, more than half of the elderly were in the age group of 60 to less than 65 years, with a mean age of 64.04 ± 3.4 years **(table 1)**. This finding was in line with **Cigolle et al., (2022)** in USA (n= 7739) the study titled "Associations of age at diagnosis and duration of diabetes with morbidity and mortality among older adults**"** who reported that, most of **elderly** participants were in the age group of 60 to less than 65 years. In addition, this is contrast with **Nordström et al., (2016)** in Swedish (n= 1393) his study about "Higher prevalence of type 2 diabetes in men than in women is associated with differences in visceral fat mass**"** who reported that, the elderly participants were in the age group 70 years.

Regarding to elderly gender, the present study showed that, more than half of the elderly were female. This finding was in line with **Shalihin et al., (2022)** in Malaisia (n= 269) his study about "Diabetes Quality of Life among Elderly Diabetic Patients and Its Associations" who reported that, 61% of elderlies were female. In addition, according to the marital status 68.9% of elderly were married. This finding was in agreement with **Yan et al., (2022)** in China (n= 430) about "Prevalence, awareness and control of type 2 diabetes mellitus and risk factors in Chinese elderly population", who reported that A majority of the participants were married.

As regard to, elderly educational level, the present study showed that, more than half of the elderly could not read and write. This finding was in disagreement with **Bai et al., (2021)** in China (n= 12.458) about "Prevalence and risk factors of diabetes among adults aged 45 years or older in China", who reported that 14.52% of elderly were illiterate.

Regarding work type of elderly**,** the present study showed that, more than half were housewives. This finding was in agreement with **Roshan, Hosseinkhani & Norouzadeh (2023)** in Iran about **"**Health literacy

and self-efficacy of the elderly with diabetes" (n= 430) who reported that 58.7% were housewives.

Concerning, elderly medical history, the current study revealed that, less than three quarter of the elderly suffer from constipation **(table 2)**. The current study results in contrast with **Du et al., (2022)** in China in their study " Epidemiology of constipation in elderly people " who reported that, the prevalence of constipation in the elderly people was 17.60%, who diagnosed with constipation.

The current study revealed that 37.3% of elderly diabetic patients were suffering from hypertension. This finding is in agreement with the results of **Hashemi et al. (2024)** in their cross-sectional study entitled "High prevalence of comorbidities in older adult patients with type 2 diabetes: a cross-sectional survey", published in BMC Geriatrics. In their study, which included 2.770 older adults (≥65 years) with type 2 diabetes, 54.4% of participants were found to have hypertension.

The current study revealed that 25.8% of elderly diabetic patients had cataract and 32.3% had glaucoma. These findings are in agreement with the results of **Khan and Shaw (2023)**, who conducted a large cross-sectional study entitled "Risk of cataract and glaucoma among older persons with diabetes in India", based on data from 31.464 elderly individuals (≥60 years). Their study reported a higher prevalence of cataract (29%) and a lower prevalence of glaucoma (23%) among diabetic patients. Diabetes was significantly associated with increased risk for both conditions.

Regarding regular medications use, the current study revealed that more than two thirds of the diabetic elderly take analgesics. This result was in agreement with **Karjalainen et al., (2020)** in Finland in their study " Use of pain-relieving drugs in community-dwelling older people with and without type 2 diabetes" (n=389) who reported that, 66% of the elderly take analgesic due to persistent chronic pain.

Regarding to current retinal problems the study findings revealed that more than three fifths of the elderly had retinal problem. This finding in contrast with study conducted in Nepal by **Thapa et al. (2020)**, which revealed that 52.37% of elderly individuals aged 60 years and above had at least one retinal disorder.

Regarding to past history, the study revealed that more than half of the elderly had been living with diabetes mellitus (DM) for ten years or more (**table 3**). This finding aligns with a study conducted in China by **Li et al., (2021)** similarly reported that

٢٨.6% of elderly diabetic patients had DM over 10 years, highlighting the long-term burden of diabetes in aging populations. Conversely, a study conducted in Nigeria by **Akinlua, Umar & Freemantle (2017)** found that the majority of elderly diabetic patients had been diagnosed within the past five years.

In relation to operation type, the study revealed that more than three quarters of the elderly had cataracts. This finding contrasts with that of **Du et al. (2022),** who found that 45.15% of older people in China had cataracts in their study "Knowledge of cataracts and eye care utilization among adults aged 50 and above in rural Western China.

Regarding to family history of diabetes, the current study revealed that, more than three quarters of the elderly had no family history of diabetes, while more than half has a maternal history of diabetes. In Contrast with **Yan et al., (2022)** who reported that, there were 18.80% of the elderly in China had no family history of diabetes.

The current study indicated that there was highly statistically significant difference between all items of the health belief construct pre and post educational program **(table 4)**. This result also is agreement with **Hosseini et al., (2021)** in Egypt, in their study "The effect of educational program based on theory of planned behavior on promoting retinopathy preventive behaviors in patients with type 2 diabetes " (n= 94 patients) who showed that, the program effectively enhanced preventive behaviors related to retinopathy among patients with type 2 diabetes. Also, data revealed that the powerful impact of a well-designed educational program on the beliefs and attitudes of elderly participants regarding DR. The shift from mostly negative to devastatingly positive beliefs highlighted the program's effectiveness in enhancing knowledge, correcting some misconceptions, and promoting healthier behaviors in **figure (1).**

The comprehensive improvement across all domains of the HBM constructs underscores the multifaceted benefits of the educational program. The HBM posits that health-related behaviors are influenced by several key beliefs, including perceived susceptibility, perceived benefits, perceived barriers, and self-efficacy, in addition to perceived severity and cues to action. The significant changes observed in this study suggested that the educational program addressed these beliefs effectively, leading to a more holistic understanding of DR and its management among the participants.

The study results indicate there was highly statistically significant relation between educational level and monthly income of the studied elderly and their total level of health belief model pre-educational program **(table 5)**. Also, in contrast with **Shabibi et al., (2017)** in Iran (n= 70) about "Effect of educational intervention based on the Health Belief Model on promoting self-care behaviors of type-2 diabetes patients" who reported that, no significant pre-intervention relationship between educational level or income and health beliefs regarding diabetic retinopathy.

This indicates that this finding highlighted the importance of health literacy in shaping health beliefs. While education is a critical factor, the lack of positive HBM levels among highly educated groups indicates gaps in targeted health education. It is possible that even educated individuals lack specific knowledge about diabetic retinopathy, highlighting the need for specialized educational program that address this condition explicitly.

The study results indicate there was highly statistically significant relation between educational level, marital status, No. of children, work type, monthly income among elderly participants and overall level of health belief model following educational program **(table 6)**. This finding in the same line with scientific review by **Hill-Briggs et al., (2020)** in USA "Social determinants of health and diabetes: a scientific review" who reported that, the demographics characteristics is associated with better health outcomes and increased adherence to health recommendations. Educated individuals are more likely to understand and follow health advice leading to improved self-management of diabetes. These results support the role of social determinants in shaping health beliefs and behaviors as measured by the health belief model.

These findings highlight the critical importance of addressing sociodemographic factors when designing educational interventions based on the Health Belief Model. Understanding that variables such as education, marital status, and income significantly influence health beliefs can help tailor programs to better meet the needs of elderly. This targeted approach is likely to enhance the effectiveness of health education, leading to improved adherence to diabetes management and overall better health outcomes.

Conclusion

This study found that beliefs about diabetic retinopathy among the elderly is generally low, with most

elderly showing negative beliefs and this is improved post educational program. This highlights the urgent need for continuous education and awareness programs to promote early detection and prevention of vision loss.

Recommendation

Based on the findings of this study, it is recommended that healthcare providers incorporate diabetic retinopathy education into routine diabetes care for the elderly. Community-based awareness campaigns, visual aids, and culturally appropriate educational materials should be developed to improve understanding. Additionally, regular screening programs and counseling sessions should be promoted to encourage early detection and timely management of diabetic eye complications among the elderly population.

For further research:

-Further researches in large sample of elderly should be available about diabetic retinopathy and in different settings.

-Ongoing researches were required for enhancing elderly' belief about diabetic retinopathy.

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Effect of Implementing Nursing Interventions on Clinical Outcomes for Patients Undergoing Cardiothoracic Surgeries

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Abstract

Background: Cardiothoracic surgeries are frequently performed for patients with cardiothoracic diseases. Improvements in long-term outcomes, recovery, complication risk, and quality of life for patients having cardiothoracic procedures can only be achieved by postoperative nursing interventions in the Intensive Care Unit (ICU). **Aim:** Compare the clinical results of patients having cardiothoracic surgery before and after the introduction of nursing interventions. **Design:** A quasi-experimental study design. **Setting:** The Cardio-Thoracic ICU at Tanta Main University Hospital was the site of this research. **Subjects:** An 80-person sample, consisting of 40 patients in each of the two groups, was randomly assigned to participate in this study after undergoing cardiothoracic surgery. **Tools:** The data was collected using three different instruments. **First Tool:** Open Heart Surgeries Patient Evaluation Form. **Instrument II:** Assessment of Sleep Quality Assessment Tool. **Third Instrument:** Numerical Rating Scale for Pain Assessment. **Results:** Both the study and the control group showed a substantial difference in sleep quality on days 2 and 3, with $p < 0.05$. There was a noticeable difference in the quality of sleep between the study and the control group on days two and three, with $p < 0.05$, respectively. **Conclusion:** Improvements in physiological indicators, sleep quality, and the degree of post-operative pain were some of the beneficial clinical outcomes demonstrated by nursing interventions for patients having cardiothoracic procedures. **Recommendations:** Healthcare providers should be encouraged to apply eye masks and earplugs regularly as part of routine nursing care and incorporating them into standard ICU protocols may enhance patient recovery, reduce stress, and support better overall outcomes.

Key words: Cardiothoracic Surgeries, Clinical Outcomes, Nursing Intervention.

Introduction:

Cardiothoracic surgeries represent a complex and highly specialized area of medical practice, involving surgical procedures on the heart and lungs other organs within the chest. These surgeries, often lifesaving, are typically performed in response to conditions such as coronary artery disease, heart valve disorders, and thoracic malignancies. Emergency medicine with their vigilant monitoring, rapid issue identification, and generous support, nurses are vital in facilitating patients' optimal postoperative recovery **(Urden, Stacy, & Lough, 2021)**.

Critical care nurses must possess advanced clinical knowledge and technical skills to manage hemodynamic instability, respiratory distress, and pain control in the immediate post-operative period. Their contribution significantly influences recovery pathways and overall patient safety following cardiothoracic procedures. In England, cardiovascular disease affects seven million individuals overall and is the cause of 27% of all fatalities. **(Smood, Nguyen, Kelly, & Han, 2020)**.

Cardiovascular disease (CVD) most commonly involves valve replacement or repair, as well as coronary artery bypass grafts (CABGs). Between 35,000 and 50,000 cardiac surgery procedures are carried out annually in Iran **(Urden et al., 2021)**.

Data collected from the cardiothoracic surgeries unit at Tanta University shows that approximately twenty patients undergo open heart surgery each month. Also, on the subject of coronary artery bypass grafting, it was found that approximately 53% of individuals. **(Statistical health record, 2021; El-gafour et al., 2021)**. Acute pain is prevalent after heart surgery due to skin incisions, dissections, sternal retraction, internal mammary artery graft preparation, chest drain installation, endotracheal intubation, and sternal wires. Persistent thoracic discomfort was observed by 35% of patients one year following cardiac surgery, demonstrating that pain after surgery can sometimes linger for long periods of time **(Wynne et al., 2024)**. Research has shown that light and noise are the two most disruptive variables to sleep for patients in the intensive care unit (ICU). World Health Organization (WHO) recommendations from 1999 state that hospitals should keep noise levels below 35 dB at night (with the lower limit applied to those with normal hearing ranges) and 40 dB during the day. Research has shown that light and noise are the two most disruptive variables to sleep for patients in the ICU **(Bani, Hayajneh, & Alshraideh, 2021)**. In the

cardiothoracic ICU, earplugs and eye masks are two of the most effective non-pharmacological treatments for improving physiological parameters and the quality of sleep. Also, using breathing exercise that helps to improve post- operative pain level. When combined with a peaceful setting, these devices can assist regulate physiological aspects **(Kocak & Arslan, 2021)**.

Significance of the study:

Patients with open heart surgeries admitted to ICU are susceptible to sleep disturbance and agitation due to post-operative pain. Internal and external factors both have an impact on how severe the pain is. Because of these factors, patients may notice changes in their vital signs (such as blood pressure, heart rate, and oxygen saturation) and end up spending more time in the hospital **(Shorofi, Dadashian, Arbon, & Moosazadeh, 2024)**. Early detection and intervention by critical care nurses have been linked to a 30% reduction in serious adverse events following cardiac surgeries in order to ensuring patient safety, promoting recovery, and reducing healthcare costs through timely and accurate clinical interventions.

In this study, we set out to determine whether and how nurse interventions improved clinical outcomes for patients having cardiothoracic surgery.

Research hypothesis:

Study group who will be exposed to nursing interventions are expected to have good quality of sleep, physiological parameter within normal range and decrease severity of pain than control group who were not exposed.

Clinical outcomes: Patients in critical illness were determined to decrease pain severity, improve sleep quality, and maintain physiological parameter within normal range such as heart rate, blood pressure, and oxygen saturation.

Subjects and method:

Study design: Quasi-experimental research design.

Study settings: Research was conducted at Tanta Main University Hospital's Cardio Thoracic Intensive Care Unit, which is affiliated to Ministry of Higher Education and Scientific Research. Three of the seven rooms in this unit contained six beds, while the other four have just one. In all, ten beds can be accommodated.

Study subjects:

We selected eighty (80) patients admitted to the previously mentioned setting. Estimating the sample size, the statistical tool Epi Info 7 made use of the following parameters: a confidence level of 95%, an expected frequency of 50%, a confidence level of 99.9%, a tolerable error rate of 5%, and 250 patients each year.

The participants were split evenly into two groups:

Control group: Critical care nurses provided conventional intensive care unit treatment to 40 patients who matched inclusion criteria and were continuously monitored for vital signs and hemodynamic parameters. Medications were delivered according to instructions.

Study group: Forty patients who fulfilled the inclusion criteria were nursed in various ways by the researcher, including making the environment comfortable, providing earplugs and eye masks, promoting a natural circadian rhythm, providing nighttime centralized nursing care, and managing pain.

-**Inclusion criteria of selected subject:**

Patients aged from 21 and above, of both sex, one day before the operation, conscious, and able to communicate and participate.

Data collection tools: Three tools were employed in this investigation

Tool (I) Open Heart Surgeries Patient Assessment Tool:

The researcher created it after scoping out relevant recent literature **(Anand, Yu, Lowe, & Kalra, 2021; Atiaa, Mohamed, &Aly, 2021; Philip & Ponchitra, 2023)** in order to gather information for the present investigation. The following components were included:

Part (A): Patient Bio-Sociodemographic Characteristics:

The patient's age, gender, marital status, degree of education, profession, diagnosis, present and previous medical history, and medicines were all taken into account in this area of the record.

Part (B) Physiological Parameters Assessment:

At this point, we measured the patient's pulse, respiration rate, oxygen saturation, and blood pressure.

Tool II: Sleep Quality Assessment Tool:

For the purpose of evaluating the quality of sleep, the researcher created it. Two sections were comprised of it:

Part (A): Pre-operative Sleep Assessment Sheet (Van Zuylen et al., 2022):

The patient's sleep history was assessed using this component before open heart surgery. It included number of sleeping hours per day, dyspnea during sleep, number of pillows used during sleep, pain during sleep, comfortable position used to sleep, and habits followed to help to fall asleep.

Part (B): The Groningen Sleep Quality Scale:

The researcher utilized it to evaluate the participants' subjective experiences with the quality of their sleep the night before; it was

originally created by **(Meijman, Thunnissen, & De Vries-Griever, 1990)** and translated into Arabic by **(shaban, 2008)**.

Scoring system: Fifteen items were scored as true or untrue; a score of fourteen points signaled that the responder had an awful night's sleep; the first question was not included in the final total. Use a scale from 0 to 14 to measure the quality of your sleep. In this study, good sleep was characterised as 0–5, fair as 6–8, and poor as 9–14.

Tool III: The Numerical Rating Scale for the Evaluation of Pain.

After its development by **(McCaffery & Beebe, 1989)**, this instrument was Adapted by **(Gorrall, Curtis, Little, and Panko 2016)** to assess the intensity of pain felt after surgery. Patients described pain levels ranging from barely perceptible to agonizingly severe. Typically, the patient would put a point on a 10-centimeter-long horizontal line that represented their perception of their current state.

The scoring system was constructed as follows: 0 signifies no pain, 1–3 mean mild pain, 4–6 mean moderate pain, and 7–10 mean severe pain.

Method

Following these steps allowed the study to be completed:

Obtaining approval:

After obtaining official permission to collect data from the Faculty of Nursing after deciding on a location for the study, the researchers contacted the appropriate authorities there to get permission to perform the research.

Ethical consideration:

-The scientific research committee of approval was sought and granted with the code number 355/12/2023.

-No one in the study was ever in danger or discomfort because of the way it was designed.

-When collecting this data, we were very careful to protect the privacy of our patients and their information.

-Names were replaced with code numbers.

-The patient was asked to provide their informed consent once the study's purpose was explained. Everyone who took part in the study was informed of its goals and given the option to stop at any moment.

Tools development:

The researcher developed study instrument (1) after examining pertinent literature. Part (b) of tool (II) and tool (III) were first developed by **Meijman et al. (1990)** and **McCaffery and Beebe (1989)**, respectively; the second tool was produced by the researcher.

Pilot study:

Eight patients representative of the research population served as pilot testers to guarantee the devices'

usability and applicability. This allowed us to identify potential problems that may arise during data collection and make necessary adjustments. Revisions were made to the pilot study, and then it was segregated from the main research's subjects.

Content validity of the tools:

Just before each instrument was presented to the Jury, a group of five Critical Care Nursing and medical professionals reviewed it for clarity and content validity.

Reliability of tools:

The reliability of Tool II component (a) and Tool I was assessed using Cronbach's α coefficient test; the results were 0.89 and 0.88, respectively.

- Also, the reliability of tool II part (b) & tool III was 0.90 & 0.95 respectively **(Serrano-Fernández et al., 2020; Alghadir, Anwer, Iqbal, & Iqbal, 2018).**

Duration of data collection:

During the time span beginning in March 2024 and ending in August 2024, data was collected for the current study.

Phases of the study

Assessment phase: -

All patients in both groups were evaluated by the researcher using tool (I), which is the Open Heart Surgery Patient Assessment Tool. Section (a): Patient Bio-Social Data to evaluate demographic details such age, gender, marital status, degree of education, profession, diagnosis, current and previous medical conditions, and medications. Section (b): Biomarkers for Health an assessment to measure vital indicators including pulse, breathing rate, blood pressure, and oxygen saturation levels. The second tool is the sleep quality assessment instrument. There were two sections to it. Part (a) objective is to gather information about the patients' sleeping patterns prior to generalized cardiac surgery. Part (b) The Groningen Sleep Quality scale is one tool for evaluating the quality of one's slept the night prior.

Tool (III) The researcher measured the level of pain in both the control and study groups immediately following the operation using a numerical rating pain assessment scale. This was done before any nursing care was given.

Planning phase: -

The results of the evaluation and the predetermined criteria for expected outcomes informed this step of the patient care planning process.

Expected outcomes:

- Improved quality of sleep.
- Maintain physiological parameters within normal range.
- Decreased severity of post-operative pain.

During this phase, the researcher prepared the equipment that were

used during the study such as eye mask and earplugs, and also prepared the environment by (avoiding unnecessary noise around the patient, close the door and promote patient comfort position).

Implementation phase: -

A- Control group:

The cardiothoracic intensive care nurses continued to provide medications to patients as prescribed and monitor their vital signs and haemodynamic indicators as part of their standard of care in the intensive care unit.

B- Study group:

Nursing measures were implemented after surgery by the researcher and continued for three days after surgery during morning and afternoon shifts, while at the night shift, it was applied by the critical staff nurses at cardiothoracic intensive care unit after they were trained by the researcher.

The nursing measures that applied by the researcher were started immediately post-operative.

Nursing measures included the following:

-Environmental preparation (Bani et al., 2021).

-Avoid unnecessary noise around the patient.

-The patient's room door should be closed.

-The alarm settings of the monitor were modified to match the clinical picture of the patient.

-Promote patients comfort positioning, making environment calmer.

-Eye mask and ear plug (Bahcecioglu et al., 2024).

-In order to help the patient fall asleep more easily, we put earplugs in their ears.

- Patients were given earplugs in the hopes that they would help them sleep by dampening their sense of auditory stimuli.

-The earplugs used were 3M polyurethane foam earplugs made in Bengaluru, 560, India, which have a 29 dB noise reduction rating (NRR) and a 37 dB SNR. A narrow piece of dark-coloured (blue and black) fabric measuring 18.5 × 8.5 cm served as the eye mask, which concealed both eyes. The mask was secured in place by elasticized straps that blocked all light and promoted complete darkness. Throughout the day, nursing personnel provided care, and researchers gave participants earplugs and face masks in the morning (12 p.m. to 1 p.m.), afternoon (6 p.m. to 7 p.m.), and night (10 p.m. to 7 a.m.) shifts.

-Eye and ears of cardiothoracic patients were prepared before applying mask and ear plugs as following:

a- Preparation of eye (Dalaq, Melo, Sgard, Doutres, & Wagnac, 2023):

- Perform hand hygiene and wear gloves.
- Gather equipment.
- Explain procedure to the patient.
- Ensure good lighting.
- Position the patients comfortably with head supported.
- Examine the eyes for signs of infection as (swelling, pain, yellow or green discharge, redness of the eye and increased sensitivity to light).
- Clean the eyes with saline or sterile warm water and soaked gauze. Starting from the medial corner of the eye and work outwards.
- Make sure there is no cross-contamination between the eyes and always use a fresh piece of gauze.
- Instil 1 - 2 drops of lubricating eye drops to each eye if ordered.
- Read ear plug manufacture instructions before using.
- Ensure that the lashes were outside of the eye.
- Ask the patient to close his both eyes.
- Ensure the eyelid was fully closed.
- Position the eye mask over the closed lids.
- Adjusted eye mask well around the patient eyes and forehead.
- Ask the patient if there is any external light to replace mask again.
- Remove gloves and wash hands.
- Help patient to return to comfortable position.

b- Preparation of ear (Dalaq, Melo, Sgard, Doutres, & Wagnac, 2023).

- Hand washing and wear gloves.
- Gather equipment.
- Explain procedure to the patient.
- Ensure adequate lighting.
- Positioning the patient so that they are at ease, with their head slightly turned away from the researcher, in the semi-Fowler position.
- Examine the ear for signs of infection as (earache, trouble hearing, ear discharge, outer ear redness, itching of the outer ear and blistering on the outer ear).
- Clean external ear by using a warm wet washcloth and dry ears with dry gauze.
- Read ear plug manufacture instructions before using.
- When inserting soft foam earplugs, keep in mind to roll, pull, and hold for optimal protection.
- Ask the patient if there is any external voice to replace earplugs again.
- Remove gloves and wash hands.
- Help the patient to return to comfortable position

-Promote a natural circadian rhythm (Ruan, Yuan, & Eltzschig, 2021)

- Minimize the amount of light in the patient's room at night.
- Make sure there is adequate light throughout the day.

- Avoid having the patient lie down in low light for long periods of time while they are awake.
- Permit the patient to experience an appropriate amount of daily stimulation in accordance with their functional level.
- If possible, mobilize the patient in the afternoon/ evening to improve nighttime sleep.
- The nurse informs the patients of the date and time regularly to help promote natural circadian rhythms and support orientation of environment.

-Clustering nursing care activities at night (Aparício & Panin, 2020).

- Nursing activities were organized at night.
- Minimize disruptions during the night to give patients more time to rest.
- Patient take rest periods between nursing activate which include (vital signs, medication administration, nutrition and assessment of pain).

- Control of pain (Wynne et al., 2024)

-Assess pain (site, onset, character and intensity, etc.).

-Assess pain at rest and on movement.

-Assess severity of pain by using numerical rating pain assessment scale.

-Put patient in comfortable position.

-When it comes to pain management, there are pharmacologic options like analgesics and non-pharmacologic therapies like deep breathing exercises that target the psychological, emotional, and cognitive aspects of pain perception.

-**Deep breathing technique (Yosi & Hendri, 2023):**

- Put patient in a comfortable position usually upright position.
- Instruct the patient to keep chest and shoulders relaxed
- Ask him to breathe in slowly and deeply through nose while chest extending to its maximum capacity, lower rib cage expanding, and belly moving forward.
- Reassess pain after interventions given.

Evaluation phase: -

- Patients in both groups were evaluated in the Cardiothoracic Intensive Care Unit on the first, second, and third day following treatments using tools I part (b), II part (b), and III.
- Clinical outcomes of patients undergoing cardiothoracic surgery were compared between the two groups in order to ascertain the effectiveness of nursing interventions.

Results:

Table (1): Demonstrated that a total of 55% of the control group and 47.5% of the study group, spanning the age bracket of 50 to 60, had mean ± standard deviation values of 47.65±8.90 and 48.23±7.53,

respectively. **Regarding gender**, we can observe that whereas 72.5% of the patients in the study group were male, 67.5% of the patients in the control group were.

Crucially, whereas 82.5% of patients in the control group were married, slightly less than 75% of patients in the experimental group were. The control group were illiterate in education level of 45.0% while the study group had a level of 32.5%. A comparison of the two groups shows that just 12.5% of the study group and 7.5% of the control group had finished secondary education.

Figure (1): Shows the percentage of working patients in the control group was 60.0%, whereas in the study group it was 65.0%.

Table (2): Shown clinical data distribution. Researchers found that 72.5% of the study group did not have any respiratory issues, but 55.0% of the control group did. A total of 55.0% of patients in the control and experimental groups experienced cardiac problems. On the flip side, a minor number of both the control group 12.5% and the study group 15.0% experienced renal issues. We discovered that 50% of the control group and 60% of the study group have antihypertensive drugs in their prescription histories. On top of that, compared to the control group's 62.5% analgesic use, the study group's 42.5 % is less. Over half of the patients in both the control and study groups utilized bronchodilators (52.5% and 57.5 %, respectively).

Furthermore, only a small percentage of patients in the study and control groups take diuretics about 15% and 25%, respectively.

Figure (2): Demonstrated that over 50% of the control group's participants suffer from co-occurring respiratory and cardiovascular disorders. Despite this, little under half of the individuals in the research group suffer from respiratory illness, while over half (52.0%) have cardiovascular disease.

Table (3): Shows assessment of physiological parameters of the studied patients undergoing cardiothoracic surgeries throughout periods of intervention.

According to the data in the table, the control group had a higher heart rate (87.68±15.47 vs. 83.30±12.23) on the third day, whereas the study group had a lower rate. On the third day in particular, the study group had better respiration than the control group, with a mean of (18.00±1.77) and (18.83±3.12) respectively. Furthermore, the control group had average oxygen saturation values of 97.03±1.72, whereas the study group had 97.90±1.53. This case demonstrated a statistically significant difference (p = 0.000*).

The study group's oxygen saturation levels, heart rates, and breathing rates were significantly different from the control group's (p = 0.048*, 0.001*, and 0.000*). Temperature (p=0.017*), systolic blood pressure (p=0.040*), and oxygen saturation (p=0.047*) were also significantly different in the study group on day two compared to the control group.

Table (4): Shows assessment of pre-operative sleep of the studied patients undergoing cardiothoracic surgeries, the total number of participants who slept less than 6 hours per night was 65.0% in the study group and 55.0% in the control group. Furthermore, around 65.5 percent of patients in the research group and 62.5% in the control group experienced dyspnea during sleeping, correspondingly. In relation to number of pillows used during sleep, more than half (57.5%) of patients in control group and less than two thirds (62.5%) of patients in study group were used 3-4 pillows during sleep. Furthermore, a large percentage of patients in both groups had pain during sleep.

Also, whereas only 15.0% of patients slept in supine position in either group, 52.5% of those in the control group and 7.5% of those in the research group slept in the semi-Fowler position.

In reference to habits followed to help to fall asleep, just 12% of patients in both the control and trial groups read any book at all. Also, whereas just 42.0% of people in the study listened to the Quran, 52.5% of people in the control group actually did so. To top it all off, not even half of the sample used relaxation techniques or deep breathing exercises to assist them fall asleep; that is 35.0% in the control group and 42.5% in the research group.

Table (5): Shows sleep quality for patients undergoing cardiothoracic surgery. On day three, 80% of patients in the study group reported satisfactory sleep quality, but only 37.5% in the control group did so. This suggests that the study group had better sleep quality overall compared to the control group.

Furthermore, we found that there was a statistically significant difference (p = 0.000*) between the two groups. Furthermore, there was a statistically significant difference between the two groups on days 2 and 3, with p = 0.004* and 0.000*, respectively, for the research group.

Table (6): Shows assessment of pain severity of the studied patients. When comparing the two groups on day one, we found that 57.5% of the research group and 67.5% of the control group suffered from significant pain.

In comparison, by the third day, hardly a quarter of the control group and almost none in the research group had reported experiencing any

significant pain. In contrast to the majority of patients in the study group (85.0%), less than one-third of patients in the control group (32.5%) reported no discomfort on the third day. A p value of 0.000* indicates that there was a statistically significant difference between the two groups.

Lastly, the research group outperformed the control group statistically on days 2 and 3, respectively (p = 0.003* and 0.000*).

Table (7): Illustrates correlation between sleep quality level of the studied patients undergoing cardiothoracic surgeries and their pain severity throughout periods of intervention. It showed that in the control group, there is a negative and statistically significant correlation between the degree of discomfort and the quality of sleep on the third day (r & p = 0.518, 0.001**).

Statistical analysis revealed a negative and statistically significant link between pain intensity and sleep quality on days 2 and 3, for the research group, with r & p values of (0.446, 0.004**) and (0.619, 0.000**) respectively.

Table (1): Distribution of the studied patients undergoing cardiothoracic surgeries regarding their socio-demographic characteristics.

Characteristics	The studied patients (n=80)				χ^2 P
	Control group (n=40)		Study group (n=40)		
	N	%	N	%	
Age (in years)					
(21-<30)	3	7.5	1	2.5	
(30-<40)	3	7.5	3	7.5	2.13
(40-<50)	12	30.0	17	42.5	0.545
(50-60)	22	55.0	19	47.5	
Range **Mean ± SD**	**(29-60)** **47.65±8.90**		**(29-60)** **48.23±7.53**		t=0.09 P=0.756
Gender					
Male	27	67.5	29	72.5	FE
Female	13	32.5	11	27.5	0.808
Marital status					
Single	5	12.5	3	7.5	
Married	33	82.5	28	70.0	5.93
Divorced	1	2.5	3	7.5	0.115
Widow	1	2.5	6	15.0	
Educational level					
Illiterate	18	45.0	13	32.5	2.85
Read & write and primary education	19	47.5	21	52.5	0.584
Secondary education	3	7.5	6	15	
	16	40.0	14	35.0	0.818

FE: Fisher' Exact test

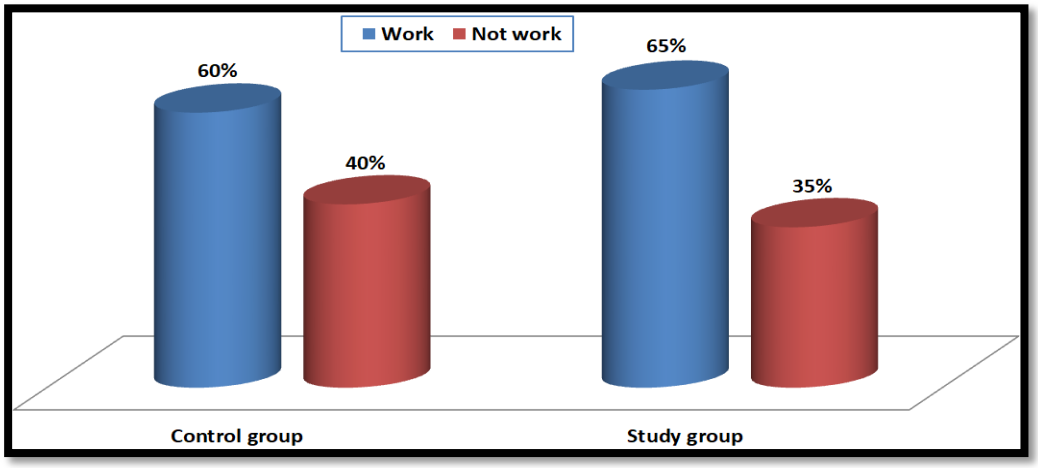

Figure (1): Distribution of the studied patients undergoing cardiothoracic surgeries regarding their occupational status.

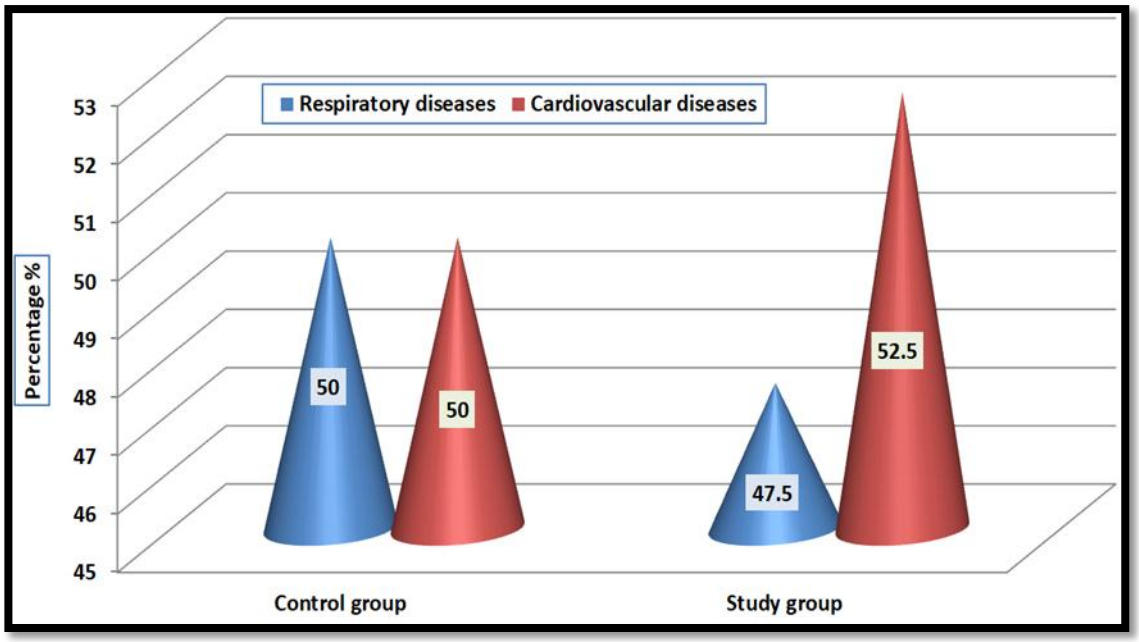

Figure (2): Distribution of the studied patients undergoing cardiothoracic surgeries regarding their diagnosis.

Table (2): Distribution of the studied patients undergoing cardiothoracic surgeries regarding their clinical data.

Clinical data	The studied patients (n=80)				χ^2 P
	Control group (n=40)		Study group (n=40)		
	N	%	N	%	
Past medical history					
Respiratory disorders	22	55.0	29	72.5	0.562 0.755
Cardio vascular disorders	22	55.0	22	55.0	
Gastro intestinal disorders	6	15.0	10	25.0	
Renal disorders	5	12.5	6	15.0	
Endocrine & metabolic disorders	9	22.5	7	17.5	
History of medication					
Anti-hypertensive drugs	24	60.0	20	50.0	0.220 0.639
Analgesics	25	62.5	17	42.5	
diuretics	6	15.0	10	25.0	
Bronchodilators	21	52.5	23	57.5	
antibiotic	11	27.5	11	27.5	

Table (3): Assessment of physiological parameters of the studied patients undergoing cardiothoracic surgeries throughout periods of intervention.

Physiological parameters	The studied patients (n=80) Range Mean ± SD							
	Control group (n=40)			F P	Study group (n=40)			F P
	1st day	2nd day	3rd day		1st day	2nd day	3rd day	
Heart rate	(45-135) 96.73±19.88	(51-126) 91.63±15.14	(62-122) 87.68±15.47	2.86 0.061	(43-135) 93.45±25.47	(52-118) 86.38±15.69	(55-120) 83.30±12.23	**3.11** **0.048***
Control Vs Study t , P	0.64 , 0.523	1.52 , 0.132	1.40 , 0.164					
Temperature	(35-39) 37.55±0.82	(37-39) 37.57±0.51	(36.9-38.5) 37.33±0.43	1.96 0.146	(35-38.5) 37.24±0.93	(35-39) 37.23±0.70	(36.9-38.3) 37.18±0.31	0.08 0.925
Control Vs Study t , P	1.59 , 0.117	**2.44 , 0.017***	1.71 , 0.092					
Respiration	(13-34) 20.18±4.19	(17-30) 19.90±3.00	(16-29) 18.83±3.12	1.68 0.190	(14-33) 20.90±4.72	(16-30) 18.68±2.96	(16-25) 18.00±1.77	**8.09** **0.001***
Control Vs Study t , P	0.73 , 0.470	1.84 , 0.070	1.46 , 0.150					
Blood pressure								
Systolic	(80-160) 119.88±18.62	(90-155) 120.03±15.34	(90-130) 112.35±8.50	**3.53** **0.032***	(90-153) 116.33±16.83	(90-140) 114.13±9.19	(100-140) 114.00±8.93	0.46 0.633
Control Vs Study t , P	0.89 , 0.374	**2.09 , 0.040***	0.85 , 0.400					
Diastolic	(50-98) 68.75±11.64	(60-80) 71.08±6.03	(50-90) 71.80±6.76	1.40 0.251	(50-90) 67.00±13.63	(50-90) 71.75±7.47	(60-80) 72.00±5.16	**3.55** **0.032***
Control Vs Study t , P	0.62 , 0.539	0.45 , 0.658	0.15 , 0.882					
Oxygen	(91-98) 95.13±2.29	(92-99) 96.30±1.70	(93-99) 97.03±1.72	**9.97** **0.000***	92-98) 94.98±1.76	(93-100) 97.08±1.73	(94-100) 97.90±1.53	**32.32** **0.000***
Control Vs Study t , P	0.33 , 0.743	**2.02 , 0.047***	**2.41 , 0.019***					

* Statistically significance at level P<0.05

Table (4): Assessment of pre-operative sleep of the studied patients undergoing cardiothoracic surgeries.

Pre-operative sleep assessment	The studied patients (n=80)				χ^2 P
	Control group (n=40)		Study group (n=40)		
	N	%	N	%	
Sleeping hours/day					
<6	22	55.0	25	62.5	FE
(6-8)	18	45.0	15	37.5	0.650
Dyspnea during sleep					
Present	25	62.5	26	65.0	FE
Absent	15	37.5	14	35.0	1.00
Number of pillows used during sleep					
(1-2)	17	42.5	15	37.5	FE
(3-4)	23	57.5	25	62.5	0.820
Pain during sleep					
Present	31	77.5	31	77.5	FE
Absent	9	22.5	9	22.5	1.00
# Comfortable position used to sleep					
Left side position	7	17.5	12	30.0	
right side position	5	12.5	17	42.5	
Supine position	6	15.0	6	15.0	0.215
upright position	12	30.0	17	42.5	0.650
fowler position	16	40.0	15	37.5	
Semi fowler position	21	52.5	19	47.5	
# Habits followed to help to fall asleep					
Read a book	5	12.5	5	12.5	
Take a warm shower	8	20.0	9	22.5	
Listen to Quran	21	52.5	16	40.0	0.211
Listen to music	6	15.0	5	12.5	0.743
Relaxation and breathing exercise	14	35.0	17	42.5	
Others	2	5.0	6	15.0	

* Statistically significant at level P<0.05

More than one answer was chosen

Table (5): Distribution of the studied patients undergoing cardiothoracic surgeries regarding their sleep quality level throughout periods of intervention.

Sleep quality level	The studied patients (n=80)													
	Control group (n=40)						χ^2 P	Study group (n=40)						χ^2 P
	1st day		2nd day		3rd day			1st day		2nd day		3rd day		
	N	%	N	%	N	%		N	%	N	%	N	%	
Good	0	0.0	6	15.0	15	37.5	77.25 0.000*	0	0.0	6	15.0	32	80.0	117.95 0.000*
Fair	3	7.5	16	40.0	23	57.5		7	17.5	27	67.5	8	20.0	
Poor	37	92.5	18	45.0	2	5.0		33	82.5	7	17.5	0	0.0	
Range	(6-11)		(4-11)		(2-10)		F=59.38	(6-11)		(4-11)		(3-7)		F=176.47
Mean ± SD	10.53±1.26		8.43±2.23		5.98±1.98		P=0.000*	10.35±1.41		7.13±1.67		4.10±1.37		P=0.000*
Control Vs Study														
t	0.59		2.95		4.92									
P	0.559		0.004*		0.000*									

Table (6): Assessment of pain severity of the studied patients undergoing cardiothoracic surgeries throughout periods of intervention.

Pain severity	The studied patients (n=80)													
	Control group (n=40)						χ^2 P	Study group (n=40)						χ^2 P
	1st day		2nd day		3rd day			1st day		2nd day		3rd day		
	N	%	N	%	N	%		N	%	N	%	N	%	
No pain	0	0.0	6	15.0	13	32.5		0	0.0	9	22.5	34	85.0	
Mild pain	4	10.0	6	15.0	17	42.5	63.62	3	7.5	19	47.5	4	10.0	122.83
Moderate pain	9	22.5	18	45.0	9	22.5	0.000*	14	35.0	11	27.5	2	5.0	0.000*
Sever pain	27	67.5	10	25.0	1	2.5		23	57.5	1	2.5	0	0.0	
Range	(3-10)		(0-9)		(0-7)		F=50.35	(3-10)		(0-7)		(0-5)		F=118.09
Mean ± SD	7.63±2.23		4.73±2.56		2.43±2.16		P=0.000*	6.70±1.98		3.13±2.12		0.48±1.24		P=0.000*
Control Vs Study														
t	1.97		3.05		4.95									
P	0.053		0.003*		0.000*									

Table (7): Correlation between sleep quality level of the studied patients undergoing cardiothoracic surgeries and their pain severity throughout periods of intervention.

Pain severity	The studied patients (n=80) Sleep quality level					
	Control group (n=40)			Study group (n=40)		
	1st day	2nd day	3rd day	1st day	2nd day	3rd day
r	0.145	0.250	0.518	0.186	0.446	0.619
P	0.372	0.120	0.001**	0.250	0.004**	0.000**

r: Pearson' correlation coefficient

Discussion

Cardiovascular diseases are the leading cause of global disease burden, with common treatments like PCI and CABG often involving median sternotomy, which may delay recovery. Sleep disturbances affect about 50% of heart surgery patients and can persist for months, worsening recovery. These disturbances are closely linked with anxiety and post-operative pain, forming a vicious cycle that negatively impacts healing and overall outcomes **(Xu et al., 2024)**.

Thus, in light of the current research concerning the impact of nurse interventions on clinical outcomes for patients following cardiothoracic surgeries, nursing intervention has positive impact on participants in improving sleep quality and decrease severity of post-operative pain and improve physiological parameter.

Part I: Bio-Sociodemographic characteristics in the current study, found that patients ranging in age from 50 to 60 made up the majority of both study groups. It can be justified that aging significantly affects the cardiovascular system, increasing the risk of diseases like atherosclerosis, hypertension, and myocardial infarction. (**Camafort et al., 2025)**.

This result was in the same line with **Dağcan, Özden, and Gürol Arslan (2024) in a study about "Pain perception of patients in ICU after cardiac surgery"** who reported that mean age and standard deviation of patients undergoing cardiac surgery was (51.62 ± 12.08). On the other hand, this finding was disagreed with **Elsayegh, Omara, Elfiky, AbouTaleb, and Amin (2023)** who stated that a mean age of patients were 26.64 years.

Regarding gender, Males made up more than two-thirds of the trial's participants in the control group, whereas females made up less than three-quarters of the trial's participants in the experimental group. Estrogen and progesterone, which are more prevalent in women prior to menopause, may have a role in this by promoting healthy blood vessels and reducing the likelihood of cardiovascular disease. Guys do not receive the same level of heart protection since there are fewer of these hormones in males.

Karahan, Demirtaş, Çelik, and Dolu (2024) also noted that most of the patients receiving heart surgery were males, which was consistent with this conclusion. Although women constituted more than half of the patients examined for cardiac surgery, these results contradicted those of **Sigdel et al. (2020)**.

In contrast to the control group, where the majority of patients were married, just under three quarters of the study group were. This suggests that married persons may be more likely to suffer

from cardiovascular disease, especially if marital stress is continuing.

Conflicts or overwhelming family responsibilities can lead to increased stress hormone levels, such as cortisol, which contribute to high blood pressure and increased cardiovascular strain **(Rusu et al., 2025)**. **Doğan and Saritaş (2021)** found that 93.2% of the participants were married in their study on "The effects of neuro-linguistic programming and guided imagery on the pain and comfort after open-heart surgery." This finding is corroborated by previous research. This result was in disagreement with **Hameed and Dawood (2022)** to whom it was revealed that 75% of the nursing staff is unmarried.

Although a small percentage of patients in both the control and study groups had finished secondary school, the control group had a lower illiteracy rate, according to the current study. This can be attributed to many patients with cardiovascular disease tend to have a low level of education. This is due to limited health literacy, which can negatively affect their ability to recognize risk factors, adopt healthy lifestyle behaviours, and seek preventive care. This finding corroborated that of **Reafaat (2024)**, who found that over a third of the control group's patients were illiterate. According to **Elgazzar, Qalawa, and Ali Hassan (2023)**, half of the patients had completed secondary education.

Less than two-thirds of the patients in both the control and research groups had jobs, according to the data on occupation. Worryingly, there are a number of risk factors for cardiac illnesses, including work-related stress and lifestyle choices. For example, the release of adrenaline and cortisol is triggered by extremely stressful work situations. **Elgazzar et al. (2023)** also found that less than two-thirds of the individuals were employees, which is consistent with our results. On the other hand, the current study contradict with **Khoddam, Maddah, Rezvani Khorshidi, Zaman Kamkar, & Modanloo (2022)** who brought out the fact that unemployment affected the majority of survey participants.

Part II: Clinical data of the studied patients post cardiothoracic surgeries.

For patients with a history of respiratory problems, research showed that although less than 75% of the study group experienced this problem, over 50% of the control group did. Regarding the specifics, it should be noted that the control and research groups each included over 50% individuals with cardiovascular disease. These findings were consistent with **Filipovic et al. (2024)** discovered that many patients undergoing cardiothoracic surgery already suffer from pulmonary and cardiovascular

issues, most often as a consequence of chronic diseases such as smoking, diabetes, and hypertension. Conversely, **Laimoud et al. (2023)** who discovered that in assessing surgical risk, renal and gastrointestinal problems were more important than respiratory disorders. **In reference to medication history**, Due to the importance of analgesics in controlling chronic pain and suffering in cardiac patients and the fact that a bronchodilator promotes breathing by relaxing the muscles of the lungs and opening up the airway, the most commonly utilized medications are anti-hypertensive, painkiller, and bronchodilator. This result consistent with **Miller & Pardo (2023)** who founded that a high prevalence of hypertension in patients requiring cardiothoracic interventions.

Additionally, the use of bronchodilators was slightly higher in both groups, reflecting the impact of respiratory comorbidities. Which aligns with the findings of **Beasley et al. (2024)**, who noted that a significantly higher number of patients with respiratory diseases used bronchodilators.

Several physiological measures were shown to improve in the study group compared to the control group after nursing interventions were applied, according to the current study. Pulse rate, oxygen saturation, and heart rate were some of the metrics used. The use of nursing interventions, such as breathing exercises and pulse oximeter monitoring of oxygen saturation, may be to blame. Earplugs and eye masks have additional benefits, including better haemodynamic parameters, less pain, and better sleep quality.

These results were similarly to **Bahcecioglu et al. (2024)** According to a randomized controlled trial titled "The effects of eye masks and earplugs on sleep quality, anxiety, fear, and vital signs in patients in an intensive care unit: A successful intervention," patients' heart rates, systolic blood pressure, and diastolic blood pressure decreased considerably following the intervention.

Part III: Assessment of pre-operative sleep and sleep quality level among the studied patients undergoing cardiothoracic surgeries throughout period of intervention.

According to the results of the pre-operative sleep test, many patients in both groups did not get enough sleep the night before the operation. Furthermore, less than 70% of research participants and more than 50% of control group participants slept for less than 6 hours. This could be due to preoperative anxiety and physiological conditions often disrupt sleep. This result in the same line with **Lin, Huang, Sun, Wei, and We (2021)** reported a remarkably high level of sleep disturbance throughout the period leading up to the operation. Although **dyspnea was prevalent in both**

groups, the research group may have had a somewhat higher prevalence due to reduced lung function and cardiac strain during sleep. This is consistent with findings by **Javaheri et al. (2024),** who reported that patients with cardiothoracic conditions frequently experience breathing difficulties at night.

Another interesting finding is that whereas the control group had more than half of its patients utilize three or four pillows while they slept, the research group had less than two thirds of its patients do so. As a result of alterations in the alveolar membrane, gas exchange is improved, oxygen consumption is reduced, and quality of sleep is enhanced when one sleeps in the semi-Fowler position, an angle of 45 degrees. These results agree with **Purnamayanti, Tondok, Susasnto, and Rohmani (2023)** found that the semi-fowler position significantly improved physiological metrics, particularly respiratory parameters, in patients with chronic heart failure (CHF). **Also**, **pain during sleep** was a common issue, with more than three quarters of patients in both groups experiencing pain and discomfort related to pre-operative anxiety. This aligns with the work of **Husak & Bair (2020)** who found that chronic pain significantly disrupts sleep quality.

Besides that, **comfortable position that used to asleep**, the majority of patients preferred a semi-fowler position that aids to sleep, elevated upper body positioning can aid breathing in patients with cardiovascular conditions that help to improve sleep quality. This is supported by **Sumiarty et al. (2022)** studies that showed cardiothoracic patients did best when placed in a semi-Fowler position.

Regarding sleep-promoting habits, these findings suggest that whereas half of the patients in the research group listened to the Quran, more than half of the patients in the control group did not. Patients who read were few in both the study and control groups. Furthermore, patients in the control group utilized relaxation and breathing techniques at a rate greater than one third, in contrast to less than 50% in the research group. This is because these techniques biologically create a relaxation response by increasing the vagal tone of the autonomic nervous system.These findings were supported by **Ahmed, Gendy, and Mahrous (2023)** who shown that relaxation practices helped surgical patients obtain a more restful night's sleep.

Sleep quality level among the studied group

Using the Groningen Sleep Quality Scale, the current study found that nursing interventions considerably enhanced sleep quality over three days in patients undergoing cardiothoracic surgery. On day three, most patients in the research group reported high-quality sleep, but more than a third of those in

the control group reported low-quality sleep each day. This could be attributed to received nursing interventions that include (reducing environmental disturbance as light and noise, application of eye mask and ear plug and promote a natural circadian rhythm).

These findings parallel to **Dagcan et al. (2024)** demonstrated that a simple, safe, and effective nursing intervention to improve sleep quality and manage discomfort after coronary artery bypass grafting (CABG) surgery is to wear an earplug and eye mask.

On the opposite, some studies present conflicting perspectives. For instance, **Lin et al. (2021)** argued that while nursing interventions can contribute to marginal improvements in sleep quality, factors such as pain, anxiety, and postoperative complications remain predominant determinants of sleep disturbances in ICU patients, making it challenging to achieve substantial improvements through nursing care alone that suggest using some medication to improve post-operative sleep.

Part IV: Assessment of pain severity of the studied patients undergoing cardiothoracic surgeries throughout periods of intervention.

The numerical rating scale for pain evaluation showed that the study group showed a considerable improvement in pain after the nursing measures were implemented. While a small number of patients in the control group complained severe pain on the third day, none of the research group patients. On the first day, the number of patients experiencing severe pain was more than double that of the research group. This related to implementation of nursing measures as (putting patient in comfort position, using breathing exercise as deep breathing technique), The parasympathetic nervous system, which is activated by deep breathing, reduces stress, relaxes muscles, and lowers heart rate, all of which serve to lessen pain levels. This result was in accordance with **Yıldız, Oyuktaş, and Avcu (2024)** A small number of patients in the control group complained significant discomfort on the third day, while none of the study group patients did.

This finding different with **Hasken, Tanabe, and Alber (2024)** revealed that all non-pharmacological interventions showed a reduction in anxiety but no improvement in pain postoperatively.

Part V: Correlation between sleep quality level of the studied patients undergoing cardiothoracic surgeries and their pain severity throughout period of intervention.

At the end of the third day, the study found a negative and statistically significant association between the control group's pain severity and sleep quality. The research group showed a negative correlation between pain

intensity and sleep quality on days 2 and 3. Inflammation in the brain and spinal cord following surgery is a known contributor to postoperative sleep disruptions; hence, as pain levels dropped, patients were able to get a better night's rest. This finding was in agreement with **Akutay & Yilmaz (2021)** showed a negative and statistically significant correlation between the duration of pain on days one, two, and three and the amount of restful sleep on those same nights.

Conclusions:

Results from patients undergoing cardiothoracic surgeries were substantially improved when nurses recommended the use of earplugs, eye masks, and relaxation techniques.

These non-pharmacological strategies contribute to better regulation of vital signs, enhanced sleep quality, and reduced post-operative pain levels. By minimizing environmental disturbances and promoting relaxation, such interventions support the recovery process and improve overall patient well-being in the postoperative period.

Recommendations:

-Studying methods for assessing cardiothoracic pain and sleep disturbance and different techniques for controlling them such as (eye mask, ear plug and breathing techniques) more broadly in the nursing specialty.

-Improving the study's generalizability requires conducting it again with a larger probability sample in a different location.

-Research in the future should look at a wider range of people to see whether there are any commonalities in the factors that cause sleep disruption and postoperative pain.

Limitation of the study: -

Limited generalizability of the research finding due to:

-Small sample size (80) and may not be representation of general population

-The research was carried out at the main Tanta university hospital's CCICU (Cardiac and Cardiothoracic Intensive Care Unit).

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Women's Knowledge and Attitudes regarding Cesarean Section Deliveries

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Abstract

Background: Cesarean Section (CS) involving abdominal and uterine incisions after 28 weeks is increasingly common worldwide despite higher maternal risks compared to vaginal delivery. **Aim:** to assess women's knowledge and attitudes toward cesarean section deliveries. **Design:** The study design was descriptive**. Subjects and Method:** The study was carried out at the postpartum units of Tanta University Hospitals, El-Menshawy General Hospital, and El-Mabara Hospital. A purposive sample of 300 post-cesarean section women were involved. **Two tools** were utilized for data collection. **Tool (I):** Women's knowledge regarding cesarean section deliveries**:** It consists of three parts: **Part (1):** Socio-demographic characteristics. **Part (2):** Obstetric profile. **Part (3):** Women's knowledge regarding cesarean section deliveries. **Tool (II):** Women's attitudes toward cesarean section deliveries. **Results:** The majority of women (91%) had a low level of knowledge regarding cesarean section, while, less than three quarters (74.0%) of them had positive attitudes. A significant relationship with negative correlation was observed between total attitudes and knowledge scores ($r= -0.038$, $p < 0.001$). **Conclusion:** Women exhibited poor knowledge and positive attitudes regarding cesarean section deliveries. **Recommendations:** Implementing structured, mandatory second opinion from senior obstetrician concerning cesarean section indication as well as applying evidence-based clinical practice guidelines for cesarean section.

Key words: Knowledge, Attitude, Cesarean Section

Introduction

World widely, the majority of women and their families were considered childbirth as a life-changing event. Pregnant women could birth their children either through normal spontaneous vaginal delivery or CS **(Ayalew, Mengistie, Dheressa & Demis, 2020; Sandall et al., 2018).**

Fetus and other products of conception delivered through an abdominal incision followed by incision of the uterine wall after 28^{th} weeks of gestation refers to CS, for preserve the health of both the mother and the fetus **(Aljohani, Al-Jifree, Jamjoom, Albalawi & Alosaimi, 2021).** CS has become the most prevalent surgical procedure for women during their reproductive years, despite the fact that it is associated with a greater risk than vaginal delivery **(Aljabri, Al-Jifree & Abudoraehem, 2021)**.

Recently, Egypt witnessed a significant rise in CS rate in the African region and represented the third highest country worldwide and there was a sharp increase in the CS rate from 4.6% in 1990 to 68.8% in 2021 **(Sharara, Elsayed & Mosaad, 2024; Ibrahim et al., 2021).** Meanwhile, WHO recommended that CS rate must be lower than 15% (**WHO, 2018)**.

Commonly, CS is recommended when the health of mother, fetus or both at risk during normal labor or vaginal delivery **(Kietpeerakool et al., 2019).** Generally, CS is performed for a variety of reasons, including obstetrical or non-obstetrical reasons, as well as a history of previous CS, labor dystocia, prenatal distress, breech presentation, or maternal request **(Ayalew et al., 2020).**

High rates of CS are associated with substantial health-care costs, and potential medical consequences. The most prevalent maternal complications of CS involve; hemorrhage, infection, pulmonary embolism, thrombophlebitis, bladder injury, reaction to anesthesia, aspiration, paralytic ileus or abnormal placentation or uterine rupture in subsequent pregnancy. While, neonatal complications involve; immature lung and respiratory problems **(Aboushady et al., 2024; Yaqoub et al., 2022; Aljabri et al., 2021).**

Nurses play crucial role in the provision of appropriate care, which is a necessary for reduction of morbidity and mortality among women who undergoing CS and their children. In addition, nurse can improve women's awareness related to CS and its consequences as well as ensuring unbiased full disclosure for the women before obtaining informed consent and subsequently develop strategies to overcome this unnecessary CS increased rate **(Aboushady et al., 2024; Mosaad, Abo Shabana &**

Mohamad, 2022; Yaqoub et al., 2022).

Significance of the study

The WHO reports that CS rate continues to increase globally, with over 1 to 5 (21%) of all deliveries. It is also anticipated that the number of births will continue to rise over the coming decades, with nearly a third (29%) of all births by 2030 **(WHO, 2021)**. The countries with the highest CS rates are Mexico (58.6%), Turkey (57.3%) whereas the lowest rate country is Israel (14.8%) as reported by the Organization for Economic Cooperation and Development (**OECD, 2022**).

Egypt is one of only five countries where CS out the number normal delivery, the others being the Dominican Republic, Brazil, Cyprus and Turkey (**WHO, 2021**). Also, it reported that CS accounted for 72% of births in Egypt in 2021, according to data from the country's statistics agency. The CS rate in Egypt varies by more than 50% across rural and urban areas. Egypt had the highest CS rate (54%) in Eastern Mediterranean Region (EMRO). The CS rate continue to rise in Egypt and reached 56.6% in 2024 **(Abdo, Kamel & Ahmed, 2024; WHO, 2021).**

In 2022 a study was conducted to detect the CS prevalence in six Egyptian governorates, which revealed that the CS rate was 55.1% for the three years prior the study, while in Behira governorate it was 67.8% as the greatest rate and the lowest was 49.0% in Assiut governorate (**Wahdan et al., 2022)**. The CS rate was lower in urban than in rural areas in the majority of governorates. While, according to a survey in 2021, Al-Gharbia was one of the governorates that have the highest CS rates. Also, at Tanta University hospitals the incidences of CS were 27.4%, 46% and 48.4% in 2010, 2015 and 2017 respectively (**Shaaban, 2020).**

The aim: Identify women's knowledge and attitudes regarding CS deliveries.

Research questions:

1-What is the women's knowledge regarding CS deliveries?

2-What are the women's attitudes regarding CS deliveries?

Subjects and method: -

Study Design: - A descriptive research design was utilized. It is an approach which used by the researcher to gain a comprehensive understanding of phenomena or an experience under investigation **(Siedlecki, 2020)**. This design supports the answering of current research questions.

Setting: - The study was conducted in:

1. Tanta University Hospitals are affiliated with Ministry of Higher Education and Scientific Research.
2. EL-Menshawy General Hospital affiliated to Ministry of Health and Population.

3. El-Mabara Hospital affiliated to Health Insurance.

Subjects: Based on the women's number attending at each setting, a purposive sample of 300 post-cesarean section women were recruited from the previously mentioned settings, within 6 months according the following inclusion criteria:

-Age more than 21 years.

-Women recently delivered by CS.

Tools of data collection: Two tools were used:

Tool (I): Women's knowledge regarding cesarean section deliveries:

An interview questionnaire sheet was developed by the researcher after searching the recent related literatures (**Aljabri et al., 2021; Al-Rifai et al., 2021; Wali, Taher, & Abd-EL-Fatah, 2020).** It included three parts; **Part (1): Socio-demographic data of the women**: This part accomplished to gather basic women's data including their age, marital status, religion, residence, occupation, level of education, the education and occupation of their husband, number of family members, type of family and family income. **Part (2): Obstetric profile of the women**: It included items such as; gravidity, parity, number of abortions, time of antenatal visits and inter-pregnancies space. **Part (3): Women's knowledge regarding Cesarean Section Deliveries:** it utilized to evaluate women's knowledge regarding CS deliveries. It consist of items such as; definition, types, reasons for undergoing CS (maternal and fetal), maternal, fetal, and neonatal complications (short term and long term), measures used to relieve associated pain and their source of knowledge (**Aljabri et al., 2021; Wali et al., 2020; Abdel-Tawab, Oraby, Hassanein, & El-Nakib, 2018).**

The scoring system of women's knowledge regarding CS was classified as follows:

-Correct and complete answer was scored as (2).

-Correct and incomplete answer was scored as (1).

-Incorrect and didn't know was scored as (0).

The total score of women's knowledge were calculated as follows:

-High level of knowledge ≥ 75% of the total score.

-Moderate level of knowledge 50- < 75% of the total score.

-Low level of knowledge <50% of the total score.

Tool (II): Women's attitudes regarding Cesarean Section Deliveries: This tool was adapted from **Wali et al. (2020), Banaem, Ahmadi, Kazemnejad, Abbaspoor, (2017); Ashimi, Amole, & Aliyu (2013).** It was used to assess women's attitudes

toward CS. It consisted of 20 statements in which the women were chosen one of them to score their attitudes regarding CS deliveries. It was included statements such as; I believed that CS helped the women to avoid the shameful normal vaginal delivery (NVD) position (lithotomy position), I believed that NVD affected sexual relation, I thought that some women preferred NVD than CS, I believed that its enjoyable for the mother to see her newborn immediately after NVD.

The scoring system of women's attitudes towards CS was calculated as follows: A three-point Likert scale was employed to evaluate each statement, where:

-Agree was scored as (2).

-Uncertain was scored as (1).

-Disagree or didn't know was scored as zero (0).

The total score of women's attitudes was calculated as follows:

-The score of women's attitudes range from (0-40).

-Positive attitude ≥ 60% (24-40 degree) of the total score.

-Negative attitude 60% (0- 24) of the total score.

Method:

The study was applied according to the following steps: -

Administrative approval: An official permission was obtained from the Faculty of Nursing directed to the responsible authorities of the selected settings clarifying the purpose of the study to obtain their approval and cooperation for carrying out the study.

Legal and ethical considerations were regarded throughout the study as the following:

-Permission from the scientific research ethical committee was obtained **(code 162-12-2022).**

-The researcher was introduced herself to the participants, explained the aim of the study, obtain their informed consent.

-The study's nature did not cause any harm or pain to the entire sample, and the freedom to abstain or finish sharing at any moment was preserved. It also had been certain that the data obtained would be exclusively used for the study's purposes and ensured that the women's privacy and confidentiality would be maintained.

Tools' development: Tool (I) part (1), part (2), and part (3), were developed by the researcher after reviewing the recent related literatures **(Aljabri et al., 2021; Wali et al., 2020). Tool (II)** was adapted from **(Wali et al., 2020; Banaem, 2017; Ashimi 2013)**

Validity and reliability: The study tools were then translated into Arabic and subsequently assessed for construct and content validity by jury of five expertises in the field of maternal and neonatal health nursing.

The reliability of the developed tools was tested by using Cronbach's Alpha test. They were (0.816, 0.899 and 0.895) for socio-demographic, obstetric history, knowledge and attitudes of the women regarding the CS questionnaire, which demonstrated the high reliability of the study tools.

A pilot study was conducted on ten percent of the entire sample (30 women) from the aforementioned settings prior to the actual data gathering. The data from the pilot study was included as there were no major changes or modifications in the tools were occurred. **The purpose of the pilot study aimed to:** Ascertain the feasibility and applicability of the tools that have been developed.

Data was collected through structured, face-to-face interviews, each interview was conducted individually with women who had undergone CS, in the postpartum units of the aforementioned study settings from 9:00 a.m. to 1.00 p.m., and three days a week till the predetermined sample size was collected, with each interview lasting approximately 45 minutes.

- Interviews were held during morning shifts in the obstetrics and gynecology departments. The researcher met with an average of 2 to 3 women per day, approximately 13 cases per week. Across the six-month data collection period, data were gathered from 300 women. Distribution of cases per week among the settings was approximately as follows: El-Mabara Hospital (5 cases), Tanta University Hospital (6 cases), and El-Menshawy Hospital (2 cases).

- Prior to each interview, the researcher introduced herself and clarified the study's purpose. The following tools were utilized for data collection: **Tool (I): Part (1) & part (2)** was developed to gather the socio-demographic characteristics, obstetric history of studied women as well as assessed their knowledge regarding CS deliveries. **Tool (II):** was utilized to evaluate women's attitudes toward CS deliveries.

-The questionnaire required approximately 15-20 minutes to be completed.

-This structured approach ensured consistent, comprehensive data gathering throughout the study period.

-The data was collected over six-months, beginning in October 2023 and ending in March 2024.

Statistical analysis:

-SPSS (Statistical Package for Social Science) version 25 (IBM Corporation, Armonk, NY, USA) was employed to code, register, organize, and analyze the collected data (**Dawson & Trapp, 2001).**

Results

Table (1): Illustrates that 50% of the studied women were over than 25 to 30 years old with a mean age of 31.58±

6.58.The table additionally demonstrated that (100.0%) of them were currently married. It was noticed (64.7%) of the women were from rural areas.

Regarding women's and their husband's educational level, it was reported that (65.0%) of both of them had secondary /diploma education. In addition, less than two thirds (64.0%) of the studied women were housewives. While, (48.0%) of husband had a handicraft work. As regard to number and type of family, it was found that (47.0%) of women had 4 to 5 family member and (65.0%) of them lived in extended family and (92.0%) of them didn't have enough family income from the women's view.

Table (2): Represents (38.0%) of the studied women were pregnant two times as well as had given birth twice. Moreover, no history of abortion was found among (89.7%) of women who participated in the study.

Regarding antenatal care (ANC), it was noted that (86.0%) of women went to the first ANC visit at first trimester. It was also revealed that the duration of last pregnancy among (64.0 %) of the studied women ranged between 38-40 weeks. In addition, (90.0%) of the studied women had an inter-pregnancy space of 1-2 years a part.

Figure (1): Displays that (91.0%) of the women participated in the study had low level of knowledge regarding CS, meanwhile only (8.0% and 1.0%, respectively) of them had moderate and high level of knowledge regarding CS.

Figure (2): Presents that (88.7%) of the women mentioned that their previous personal experience was the primary source of knowledge regarding cesarean sections followed by relatives and friends, who were recalled by (57.3% and 54.3%, respectively) as other sources of knowledge regarding cesarean section. On the other hand, (33.0% and 30.3%, respectively) of women reported doctors or nurses as their source of knowledge regarding CS.

Figure (3): Illustrates that slightly (26.0%) had negative attitudes, while (74.0%) of the women had positive attitudes towards CS.

Table (3): Demonstrates significant relationships between women's age, residence, women's occupation, education level, and husband's education level with their total mean score of knowledge (p0.001, 0.004, 0.001, 0.001 and 0.001, respectively).

Table (4): Highlights several significant relationships between total mean score of attitudes and women's age, residence, women's occupation, women's educational level, and husband's educational level (P 0.004, 0.001, 0.001, 0.001, and 0.001, respectively).

Figure (4): Indicates that women with a low level of knowledge demonstrated

both positive and negative attitudes toward CS, as reported by (81.3% and 18.7%) respectively, while women with moderate and high level of knowledge had solely positive attitudes. This means that there was significant relationship between total score of attitudes and total score of knowledge regarding CS among the women.

Table (5): Shows a significant negative correlation was found between the total score of attitudes and the total score of knowledge regarding CS ($r = - 0.038$, P value <0.001).

Table (1): The socio-demographic characteristics of the studied women (n=300).

Socio-demographic data	The studied women (n=300)	
	N	%
Age (years):		
21-25	36	12.0
>25-30	150	50.0
> 30	114	38.0
Range	22-48	
Mean±SD	31.58±6.58	
Current marital status:		
Married	**300**	**100**
Residence:		
Rural	194	64.7
Urban	106	35.3
Women's educational level:		
Illiterate	3	1.0
Read and write	3	1.0
Primary / Preparatory	36	12.0
Secondary/ diploma	195	65.0
University / Higher	63	21.0
Women's occupation:		
Housewife	192	64.0
Working	108	36.0
Type of women's occupation:	**(n=108)**	
Governmental employee	70	64.8
Non-governmental work	38	35.2
Husands' educational level:		
Illiterate	9	3.0
Read and write	3	1.0
Primary / Preparatory	30	10.0
Secondary	195	65.0
University /Higher	63	21.0
Husbands' occupation:		
Governmental work	45	15.0
Non-governmental work	111	37.0
Handicraft work	144	48.0
Number of family members:		
2 – 3	93	31.0
4 – 5	141	47.0
6 -15	66	22.0
Type of family:		
Nuclear family	105	35.0
Extended family	195	65.0
Family income from the women's view:		
Enough	24	8.0
Not enough	276	92.0

Table (2): The obstetrical history of the studied women (n)=(300).

Obstetrical history	The studied women (n=300)	
	N	%
Gravidity:		
One**.**	87	29.0
Two.	114	38.0
Three.	39	13.0
More than three.	60	20.0
Parity:		
One**.**	84	28.0
Two.	114	38.0
Three.	82	27.3
More than three.	20	6.7
History of abortions:		
None**.**	269	89.7
One.	29	9.7
Two.	1	0.3
Three or more.	1	0.3
First antenatal care (ANC) visit during pregnancy:		
First trimester.	258	86.0
Second trimester.	36	12.0
Third trimester.	6	2.0
Duration of last pregnancy (gestational Weeks):		
<38	90	30.0
38-40	192	64.0
>40	18	6.0
Range	38-43	
Mean±SD	38.17±1.27	
Inter-pregnancy space (Year):		
<1	6	2.0
1-2	270	90
>2	24	8.0

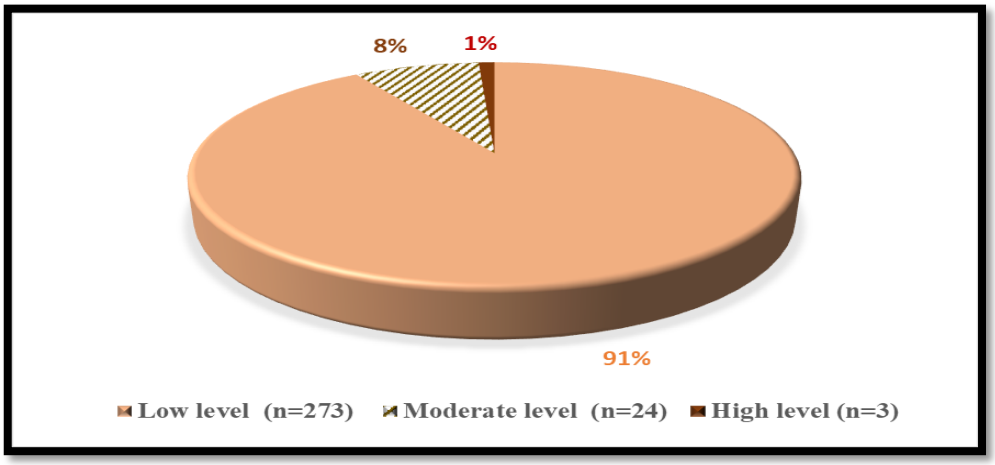
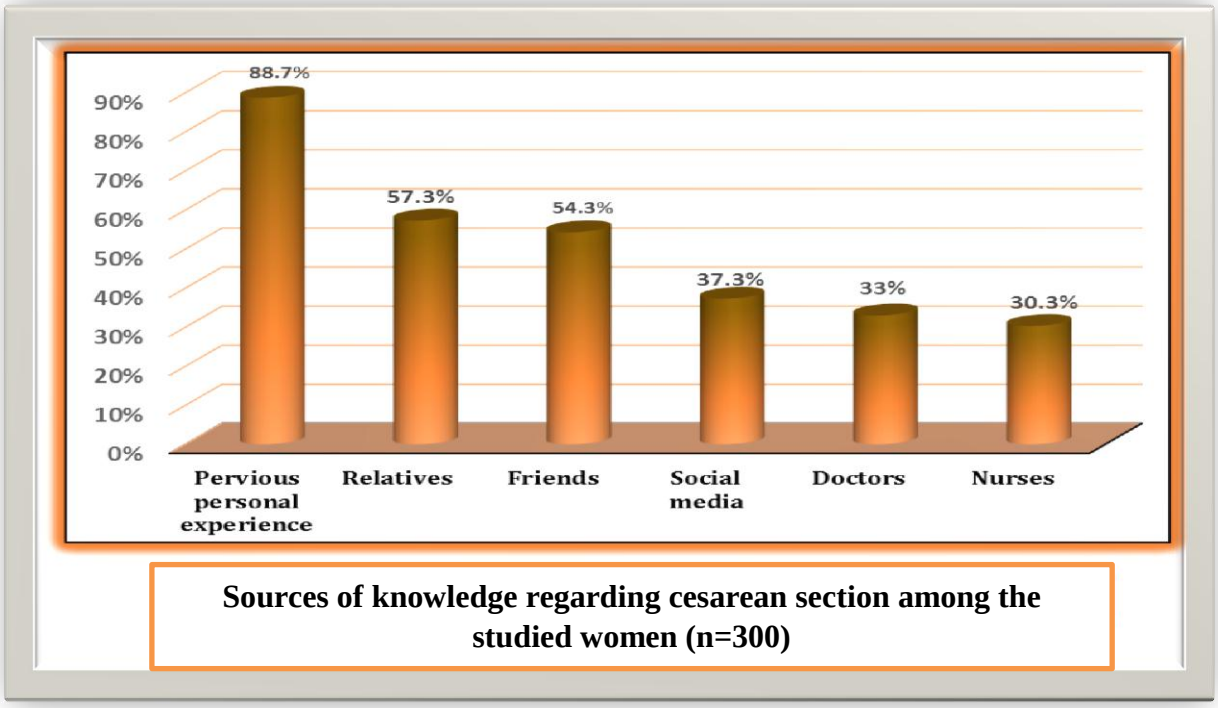


Figure (1): The total score of the studied women's knowledge regarding CS (n)=(300).



 # (More than one answer).

Figure (2): The sources of knowledge regarding cesarean section among the studied women (n)=(300).

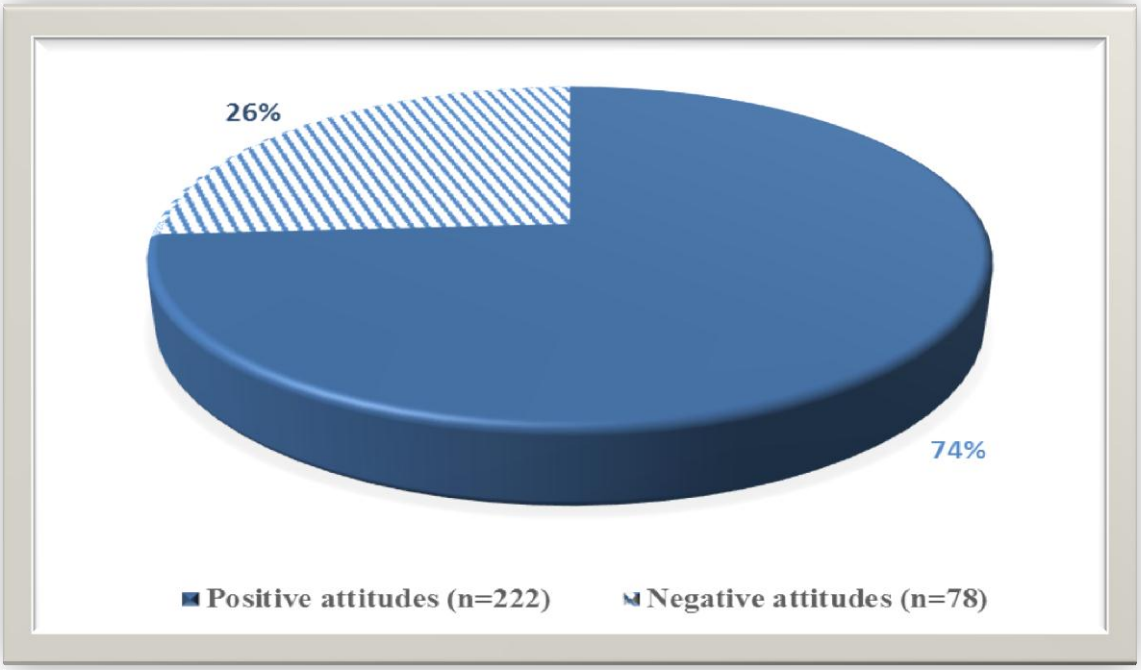


Figure (3): The total score of the studied women regarding their attitudes towards CS (n)=(300).

Table (3): The relationship between total mean score of knowledge regarding CS among the studied women and their socio-demographic data (n)=(300).

Socio-demographic data	Total mean score of knowledge of the studied women (n=300)			
	Mean±SD	Z value	χ^2 values	P value
Age (years):				
21-25	4.74±2.49			
>25-30	6.31±3.71		**24.514**	**0.001***
> 30	2.36±2.23			
Residence :				
Rural	3.24±1.04	**3.827**		**0.004***
Urban	5.75±3.58			
Women's educational level:				
Illiterate	0.50±0.78			
Read and write	1.50±1.36			
Primary / Preparatory	1.77±1.87		**78.015**	**0.001***
Secondary/ diploma	2.97±2.81			
University / Higher	7.29±3.56			
Women's occupation:				
Housewife	4.35±3.14	**5.002**		**0.001***
Working	10.22±4.86			
Husbands' educational level:				
Illiterate	0.50±0.58			
Read and write	1.60±1.36			
Primary / Preparatory	1.77±1.24		**68.364**	**0.001***
Secondary	2.33±2.16			
University /Higher	6.29±3.05			
Husbands' occupation:				
Non-governmental work	2.00±0.78			
Governmental work	2.00±1.02		**7.148**	**0.067**
Handicraft work	2.76±1.63			
Type of family:				
Nuclear family	2.96±2.36	**3.001**		**0.002***
Extended family	4.00±3.78			
Family income:				
Not enough	2.96±2.23	**3.429**		**0.001***
Enough	4.00±2.97			

***Statistically significant (P<0.05)**

Table (4): The relationship between total mean score of attitudes regarding CS among the studied women and their socio-demographic data (n)=(300).

Socio-demographic data	Total mean score of attitudes of the studied women (n=300)			
	Mean±SD	Z value	χ^2 values	P value
Age (years):				
21-25	26.95±4.05			
>25-30	27.81±4.63		**10.603**	**0.004***
> 30	24.14±4.02			
Residence:				
Rural	25.19±3.35	**4.189**		**0.001***
Urban	30.16±4.64			
Women's educational level:				
Illiterate	20.04±3.78			
Read and write	26.45±4.36			
Primary / Preparatory	26.67±4.07		**28.068**	**0.001***
Secondary/ diploma	31.97±4.61			
University / Higher	27.32±3.93			
Women's occupation:				
Housewife	26.91±3.17	**5.252**		**0.001***
Working	31.60±3.93			
Husbands' educational level:				
Illiterate	23.03±3.68			
Read and write	24.34±2.34		**26.364**	**0.001***
Primary / Preparatory	24.65±2.08			
Secondary	30.86±3.41			
University /Higher	26.22±2.93			
Husbands' occupation:				
Non-governmental work	25.00±0.68			
Governmental work	25.02±1.04	**1.432**		**0.152**
Handicraft work	25.16±1.23			
Type of family:				
Nuclear family	25.06±2.36	**1.667**		**0.096**
Extended family	25.12±2.78			
Family income:				
Not enough	24.56±1.65	**1.630**		**0.103**
Enough	25.36±2.49			

***Statistically significant (P<0.05)**

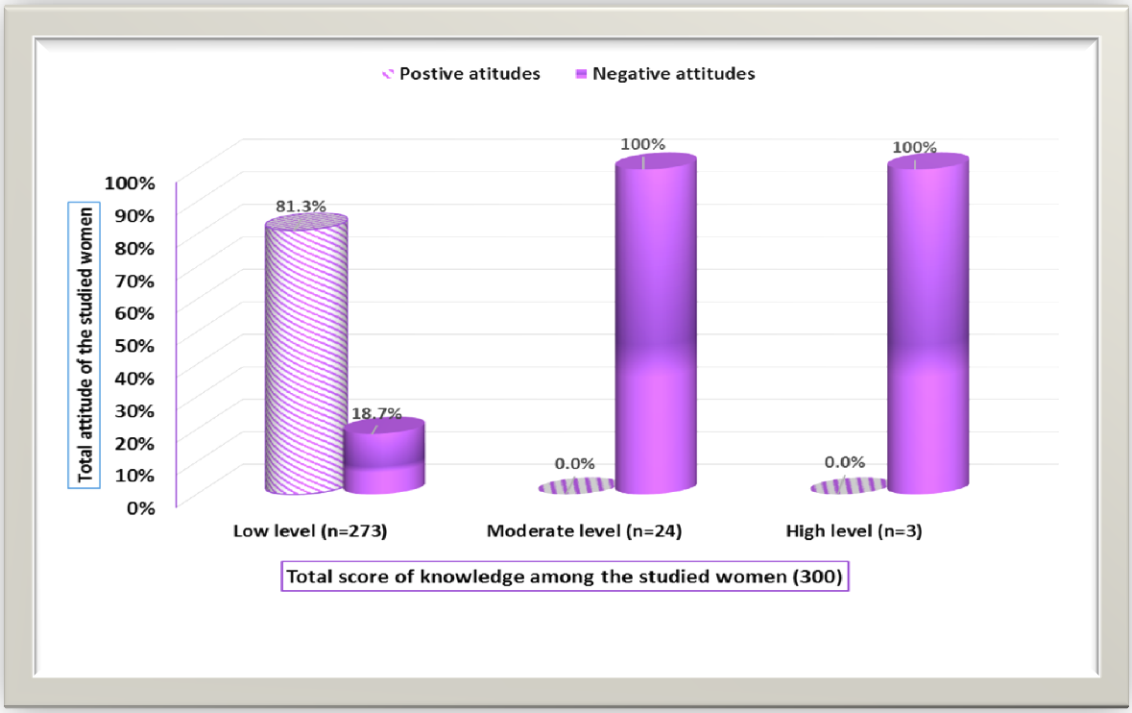


Figure (4): The relationship between total score of knowledge and total score of attitudes regarding CS among the studied women (n)=(300)

Table (5): Correlation between the total score of attitudes and the total score of knowledge regarding CS among the studied women (n)=(300).

Variables	Total score of attitudes toward CS	
Total score of knowledge regarding CS	r	- 0.038
	P	<0.001*

r = Pearson's coefficient. ***Statistically significant *P<0.05**

Discussion

Childbirth significantly impacts women's lives and can occur via vaginal delivery or CS. While CS is a vital alternative when vaginal delivery is not feasible, its global rate has risen unnecessarily, increasing associated risks. Women's knowledge plays a crucial role in shaping attitudes and health outcomes, making it essential to assess their understanding of CS to inform strategies aimed at reducing unnecessary procedures.

Concerning the socio-demographic characteristics, half of the studied women ranged in age from 25 to 30 years old and nearly two fifths were more than 30 years, with mean age of 31.58± 6.58. Partially agree with these findings, **Alkalash, El Kelany & Zayed, (2021)** who studied CS rate and maternal knowledge and attitude towards the mode of delivery in Egypt, declared that over four fifths of the studied participants were above 25 years old, whose mean age was of 32.14± 6.02.

From the perspective of the researcher, a higher maternal age is a contributing factor for rising CS rate in Egypt as increased maternal age can predispose to a high risk pregnancy such as; gestational diabetes, preeclampsia and placenta previa / abruption, as well as assisted reproductive technology with over care of a precious baby that subsequently can be either absolute or relative indication for CS.

As regards place of residence, less than two thirds of women participated in this study came from rural areas. This result is in agreement with **Aboushady et al., (2024)** who assessed knowledge and beliefs of pregnant women towards the effect of CS delivery on women's health, found that less than two thirds of the women were from rural areas. Also, the present study finding was supported by **Alkalash et al., (2021)**, revealed that over half of their participants were from rural areas. On contrast, **Naeam, Jebur, Burhan & Shahad, (2022)** who presented knowledge and attitudes of women about mode of delivery and frequency of CS in Bint Al-Huda teaching hospital in Thi-Qar, they revealed that more than three quarters of women were from urban areas.

Regarding the educational level of women and their husband, less than two thirds of both of them had secondary /diploma education and more than one fifth of both of them had university education. This finding is in consistent with **Alkalash et al., (2021)**, who declared that about half of women as well as their husbands

had secondary education and less than two fifths of both of them had university education.

From the researcher's perspective, higher education of women is another key factor which significantly associated with increasing CS rate, because increasing educational level of women has offered them independence as well as more control over their birth plan, however, better education of women may not provide them with better knowledge regarding short and long term complications of CS on both women and their offspring.

Regarding the women's occupation, less than two thirds of the women in the present research were housewives. This finding matched with **Alkalash et al., (2021)**; **Ayalew et al., (2020)** as well as **Abd-Elmonem & Kamel, (2019)**, who assessed Egyptian women's attitude toward mode of delivery, they revealed that about two thirds of their subjects were housewives. While, this finding is dissimilar to **Hathout, Elsaid & Gabr, (2021)**, who assessed prevalence of CS delivery and associated risk factors, they found that less than two thirds of their subjects were working. According to the researcher's point of view, this discrepancy can be explained as the majority of women in this research came from rural areas where lack of job opportunities is present so they usually were housewives.

As regard to family income, it was found that the majority of them didn't have enough family income from the women's point of view. This finding contradicting with **Rai & Pokhrel, (2020)** who studied knowledge and attitude regarding mode of delivery among antenatal mothers, they mentioned that CS deliveries were higher among richer women with high income. From the researcher's point of view, this argument was attributed to the fact that our study subjects were gathered from public hospitals with low income attendances.

Regarding number of previous pregnancies, it was noticed that more than one third of the studied women were pregnant two times as well as had given birth twice. Moreover, no history of abortion was found among the majority of women who participated in the study.

. In the same line, **Aboushady et al., (2024)** found that more than one third of the studied women were pregnant two times and more than half of them had no history of abortion.

Regarding antenatal care (ANC), it was noted that most of the studied women in this study went to the first

ANC visit at first trimester. This finding was supported by **Dhakal-Rai et al., (2022)** who studied the factors contributing to rising CS rates in south Asian countries, they stated that early and higher number of antenatal checkup (3 or more visits) was found to be a factor significantly associated with CS. From the researcher's point of view, however women attained early and adequate antenatal care, there was a lack of adequate counseling on mode of childbirth and/ or lack of information on risks verses benefits of CS during these visits which perhaps encourage women to choose CS.

Women's knowledge regarding CS can empower them to make informed decisions towards undergoing CS. This in turn, can be an effective strategy for reducing the unjustifiable higher rate of CS. **Concerning the total score of knowledge regarding CS,** the majority of studied women had low level of knowledge regarding CS. This finding consistent with **Aboushady et al., (2024)**, who stated that the majority of their participants had unsatisfactory knowledge level regarding CS. Also, **Hameed et al., (2021)**, concurred with the result of present study, they noted that the majority of their study sample had poor knowledge about CS.

Partially agree with the current study findings, **Sultana, Fatima, Muzaffar & Akram, (2020)** who assessed knowledge and attitude of pregnant women regarding CS reported at a tertiary care hospital, they found that more than half of the studied women had inadequate knowledge regarding CS.

On the other hand, **Hussein, Mahamed & Mahamed, (2024)** who evaluated knowledge, attitude and perception towards CS in Burao, declared that the majority of women in their study had good knowledge about CS. Also, **Maitanmi et al., (2023)** who studied knowledge, attitude and perception of CS among women attending antenatal clinic at Babcock university teaching hospital, reported that more than three quarters of studied women had a high level of knowledge about CS. The researcher's point of view is that this discrepancy with previous studies could be explained by the difference in knowledge scale and types of the studies questions as well as difference in setting.

Regarding women's sources of knowledge regarding CS, the majority of them reported that their previous personal experience was the primary source of their knowledge followed by relatives and friends, who

were recalled by more than half and only less than one third of them reported doctors or nurses as the source of their knowledge. These findings partially agree with **Ibrahim et al., (2021)** who studied the preferred mode of delivery among women in childbearing period in Egypt and factors affecting it, they reported that the main source of their information was their friends, followed by their obstetricians and the internet.

While, **Wali, Taher & Abd-El-Fatah, (2020)** reported that one-third of women chose the healthcare provider and another one-third chose family and friends followed by reading, radio, internet, and television as source of their knowledge regarding CS. Regarding the researcher's point of view, the result of the present study may be recognized to the truth that every woman had previous CS. Also, these findings reflect the need for more effective relationship between health care providers (nurses and doctors) and the women to receive their knowledge about the CS mainly from them.

Relating to the total score of studied women's attitudes towards CS, nearly less than three quarters of the women had positive attitudes towards CS. According to the viewpoint of the researcher, this finding could be due to that the majority of the women in the present study had a lack of knowledge regarding the effect of CS on their health and the health of their offspring. Similar finding was found in a study conducted by **El□shrqawy, Elnemer & Elsayed, (2024)** who investigated the effect of antenatal education on pregnant women`s knowledge, attitude and preferences of delivery mode, they found that slightly less than three quarters of the women among control group in their study experienced positive attitudes towards CS pre-program. On the same context, **Keshk et al., (2024)** revealed that about three quarters of women in their study had positive attitude toward CS.

Conversely, the current study's results contradicted with **Alkalash et al., (2021)** they found that over half of women in their study had neutral attitude toward CS. While, **Poongodi & Renuka, (2021)** who studied the primigravid women attending antenatal outpatient department at Mahatma Gandhi medical college and research institute, Puducherry in India, reported the majority of their participants had neutral attitude regarding CS.

Regarding the relationship between women's total mean score of knowledge regarding CS and their socio-demographic data, a significant relationship was found between women's age, residence, women's occupation, education level, and husband's education level with their total mean score of knowledge.

These findings are in harmonized with **Naeam et al., (2022)** who demonstrated that educational level and residence of their study subjects were in actual relationship with knowledge of women about CS.

Also, **Jamil et al., (2022)** who assessed knowledge, attitude, and perception of women regarding CS during their antenatal period, showed that there was a significant relationship between knowledge level of their study subjects and their residence, occupation and level of education. Also, **Sultana et al., (2020)** demonstrated that there was a significant association between women's knowledge and their educational status.

Concerning the relationship between the women's total mean score of attitudes regarding CS and their socio-demographic characteristics, a significant relationship was detected between, women's age, residence, women's occupation, women's educational level, and husband's educational level with their total mean score of attitudes. Congruent with the current study, **Alkalash et al., (2021)** mentioned that there was a statistically significant relationship between women's attitude regarding CS, their residence, occupation, and education level.

Again, this finding in accordance with **Rai & Pokhrel, (2020)** who studied knowledge and attitude regarding mode of delivery among antenatal mothers, they presented a significant relationship between women's attitudes toward CS and their occupation and residence. In the same line, **Jamil et al., (2022)** showed that there was a significant relationship between attitude of their study subjects and their residence, occupation and level of education.

As regard the correlation between the women's total scores of attitudes and the total scores of knowledge regarding CS, a negative correlation between total score of knowledge and total score of attitudes regarding CS. This result consistent with **Rai & Pokhrel, (2020)** who pointed that the women's knowledge and attitude scores regarding CS was negatively correlated to each other. Also, this finding was in harmony with **Sultana**

et al., (2020) who demonstrated that even though the respondents had inadequate knowledge about CS, they were willing to have CS than normal delivery.

From the researcher's perspective, knowledge about CS can prompt to modify women's attitudes towards it, as a knowledgeable woman may understand that however there are certain medical indications for undergoing CS, overuse of it expose women and their offspring to unwanted complications. While, a lack of knowledge can influence woman's attitudes and increase the requests for unnecessary CS, so assessment of women's knowledge and attitudes regarding CS should be a pivotal part of nursing care which will have paramount merit for improving quality of care rendered to them as well decreasing the higher rate of CS.

Conclusion: Based on the findings of the current study: The majority of the studied women had low level of knowledge regarding CS. While, slightly less than three quarters of them had positive attitudes regarding CS. A significant relationship with negative correlation was confirmed between women's knowledge level and attitude score regarding CS. Thus, the research questions of this study had been clearly answered about women's knowledge and attitudes regarding cesarean section deliveries.

Recommendations:

-Enhancing the role of healthcare providers in educating pregnant women about both vaginal and cesarean deliveries, ensuring that women receive accurate and evidence-based information prior to making decisions related to delivery mode.

-Developing protocols for obtaining and maintaining the stock of supplies and providing appropriate incentives enhancing normal vaginal deliveries.

-Training midwives to assist pregnant women in safe natural childbirth and collaborating midwifery-obstetrician model of care.

-Supporting financial interventions such as; equalizing physician fees for vaginal births and CS, and financial incentive for vaginal delivery.

-Further studies are needed in this field to assess the impact of evidence-based instructional guidelines on pregnant women's knowledge and attitudes toward CS and their influence on maternal and neonatal health outcome.

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Effect of an Educational Program on Knowledge and Practice of Paramedical Personnel Regarding Safety Measures

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Abstract

Background: Paramedical staff (like nurse aides and housekeepers) play a vital role in the functioning of the healthcare settings and are also exposed to several occupational hazards as biological, chemical, physical, and psychological hazards. **Aim:** This study aimed to evaluate the effect of an educational program on paramedical personnel regarding safety measures. **Research design:** A quasi-experimental research design was used in this study. **Sample:** A purposive sample of 73 paramedical Personnel **Setting:** It was conducted at Baheya Hospital (Haram branch) in Giza Governorate. **Tools:** Two tools were used**: Tool I: (Knowledge assessment for paramedical personnel of safety measures interviewing questionnaire):** included two parts: **1st part:** Demographic characteristics and medical history, **2nd part:** Knowledge assessment for paramedical of safety measures**, Tool II: Direct Observational paramedical safety measures checklist.Results:** The study's findings revealed that there was a highly significance improvement in knowledge scores of paramedical personnel increasing mean of 29.7 ± 5.3 to 43.2 ± 5.1 (t=38.2, p value<0.001) and the practice scores improved from 38.9 ± 7.2 to 78.1 ± 6.9 (t=21.530, p value 0.000).**Conclusion:** Paramedical knowledge and practices about safety measures improved post applying an educational program. **Recommendations**: Continue an educational program for paramedical regarding safety measures in all healthcare settings.

Key words*:* Educational program, Occupational Hazards, Paramedical, Safety Measures

Introduction

Paramedical workers, a vital part of healthcare workers, form the backbone of the healthcare system, dedicating their time and expertise to enhancing the high-quality care in environments that often expose them to several health hazards. In addition to work-related hazards, workplace activities, materials, substances, processes, or conditions can probably increase the risk of illness and injury. It can arise from one's employment. **(World Health Organization (WHO), 2021).**

Occupational health hazards are the potential dangers to a paramedical's wellbeing and safety associated with their work environment, as physical hazards, which include noise, temperature, electricity, and radiation, chemical hazards, as detergent and cleaning products; ergonomic hazards as heavy lifting and carrying, awkward postures, stretching, vibrations and excessive repetitive motions **(Abd El-Wahed et al., 2020).**

A work-related hazard is defined as a risk to a person's health that is caused by their job. It refers to the process or condition in which workers are exposed to accidents or sickness at work. Unsafe working conditions and dangerous work activities cause health risks. There is an unsafe working environment. Workplace dangers and injuries can be avoided by using adequate personal protective equipment and applying safety measures (**Kalejaiye, 2021)**

The occupational hazards were classified as biological, physical, chemical and psychological. The biological hazards include sharp-related injuries, direct contact with infected specimens/biohazardous materials, and nosocomial infection. The non-biological hazards include physical/ergonomic, chemical, and psychosocial hazards. The physical/ ergonomic hazards include radiation, noise, light, temperature, ventilation, and pressure extremes. Finally, the ergonomic hazards are related to the design of tools, inappropriate lifting, poor posture, and the work environment. Chemical hazards are frequent and include vapors, gases, solids, dust, and disinfectants **(Çoban & Ortabag, 2023).**

Health care organizations, like other high-danger work environments, are described by exposure to an elevated level of occupational hazards that significantly endanger the health status and life of healthcare workers, and occupational hazards may be the

leading cause of death and mortality. The WHO confirms that hospitals are the primary priority in preventing workplace hazards **(Eyi, 2020).**

Nursing aides and housekeepers serve as the backbone of daily patient care by providing essential, hands-on support under the supervision of registered nurses and doctors. Their responsibilities include helping patients with mobility, maintaining personal hygiene, assisting with meals, and ensuring a clean and safe environment. Paramedical personnel often build strong relationships with patients, offering emotional support and companionship, which can greatly enhance patients' mental and emotional well-being. Additionally, paramedical play a key role in infection control by following safety protocols as hand hygiene and proper handling of medical waste. Through their commitment and hard work, these paramedical staff members contribute significantly to the overall quality and continuity of patient care **(Hamid et al., 2022).**

Occupational Health and Safety (OHS) education program is an important part of any health care setting for safety strategy; the basic goal of any occupational safety education program is to decrease workplace injuries and illnesses by teaching workers methods for work safely and to identify and manage any probable hazards. To achieve this goal, the program should tailor to meet the needs of the workplace and its employees. This can be achieved through training sessions, online resources, and other educational materials. OHS education programs play a vital role in enhancing the safety and health of workers in different work settings. **(Alqahtani et al., 2024)**

Occupational Health Nurses (OHNs) are specialists who practice in industrial and community settings to help improve the health and safety of workers and other community groups. Some of the most common roles and responsibilities of OHNs include observation of workers doing their job tasks, development of health and safety programs, and management of work-related diseases, disaster and emergency planning, environmental health planning, assistance with rehabilitation, coordination of employee treatments and referrals .in addition to play an important role in health promotion, protection, disease prevention, and control **(Madkour et al., 2023).**

Significance of the study:

According to the World Health Organization and the International Labor Organization's projects on the global burden of occupational injuries and diseases, more than 2.9 billion employees worldwide are exposed to mechanical, chemical, physical, and mental hazards. Every year, 140.000 to 355.000 people die as a result of workplace injuries. In Egypt in 2020, the total number of workplace injuries was 19.7% **(Madkour et al., 2023).**

In Egypt and worldwide, most HCWs give maximum attention to infection and biological hazards without giving much care to physical hazards. Deficient infrastructure for old university hospitals subjects HCWs to many health hazards in their workplaces. Workplace hazards are, therefore, a threat to a large proportion of the world population. It was estimated that around 1.2 million work-related deaths, 250 million accidents, and 160 million work-related diseases occur worldwide each year **(WHO, 2020).**

Paramedical staff provides essential support in patient care by assisting with daily tasks and environmental hygiene around the patients. These workers ensure patient comfort, hygiene, and safety. Paramedical staff help reduce the burden on nurses and doctors, enhance the efficiency of care, and contribute to a more compassionate and responsive healthcare environment **(Ahram, 2021).** Therefore, it was important to evaluate the effect of an educational program on the knowledge and practice of paramedical personnel regarding safety measures

Aim of the study:

This study aimed to evaluate the effect of an educational program on the knowledge and practice of paramedical workers regarding safety measures through:

1. Assess paramedical knowledge and practices about safety measures.
2. Design an educational program regarding safety measures for paramedical workers.
3. Implement an educational program regarding safety measures for paramedical workers.
4. Evaluate the effect of an educational program regarding safety measures on the knowledge and practice of paramedical personnel.

Research Hypothesis:

Improvement of knowledge and practices among paramedical about safety measures is expected to occur after implementing the educational program.

Subject and Methods:

Research design :

A quasi-experimental pretest-posttest design was used for this study due to the nature of the available sample. The quasi-experimental design was used because there is no control group and no randomization (**Ewusie et al., 2020)**.

Research setting:

The current study was applied at Baheya Hospital (Haram branch) in Giza Governorate, a donation and non-governmental organization (NGO) affiliated with the Ministry of Health, which depends on donations for financial support.

Study Sample:

A purposive sample of 73 paramedical. The inclusion criteria were paramedical personnel who agreed to participate and could communicate effectively, ensuring active engagement with the researcher.

Data collection tools:

To achieve the aim of this study, after reviewing a national and international review of the literature and recent articles, two tools were developed by the researcher.

Tool (I): Paramedical structured interviewing questionnaire:

Part 1: Demographic data and medical history of the studied paramedical consisted of 8 items, included age, and job, place of residence, sex, educational level, and years of experience.

Part 2: Knowledge assessment for paramedical about work hazards and safety measures: It is divided to 5 sub-items:

A- Paramedical knowledge about general safety consisted of 5 closed-ended questions included the purpose of safety protocols, identify a potential health hazard, and review the hospital's safety guidelines, common workplace health hazards.

B- Paramedical knowledge about infection control consisted of 15 closed-ended questions, included the purpose of hand hygiene, duration for washing hands, method of infection control**,** wearing gloves in a hospital environment**, and** disposal of PPE**.**

C- Paramedical knowledge about chemical safety consisted of 10 closed-ended questions, included precautions before using a new cleaning chemical**,** the purpose of a material safety data sheet, whether chemicals should be stored in the hospital, the correct action if a chemical spill occurs, and PPE should

be worn when handling hazardous chemicals**.**

D- Paramedical knowledge about waste management consisted of 14 closed-ended questions. These questions included the type of waste that should be disposed of in a biohazard bag, what is considered biohazardous waste, the proper way to dispose of sharps waste, and the replacement of bags. Color-coded bags are typically used for biohazardous waste.

E- Paramedical knowledge about personal protective equipment consisted of 10 closed-ended questions included necessary to wear PPE**,** the correct order for donning PPE**,** importance to wear gloves when handling chemicals**.**

Scoring system it included 54 questions; the answer score 1 point for a correct answer, and zero points to incorrect answer. The total score of paramedical 54 points of knowledge regarding safety measures divided into two levels as the following:

- Inadequate knowledge < 60 % (< 32 scores).
- Adequate knowledge ≥ 60 % (≥ 32 scores).

Tool II: safety practice observational checklist of the studied paramedical regarding safety measures: It divided to 11 sub-items:

A- Paramedical general practices consisted of 9 items to be observed including closed ended questions included follow the hospital's cleaning schedule, check and restock the cleaning supplies before starting shift, use hospital-approved cleaning products at all times, report any maintenance issues (e.g., leaks, broken equipment) that come across during cleaning duties, clean patient rooms from clean to dirty areas as per protocol.

B- Paramedical infection control practices consisted of 19 items to be observed, including closed-ended questions, included change gloves between cleaning different areas or rooms, perform hand hygiene after removing gloves, disinfect high-touch surfaces in patient areas with the appropriate disinfectant, and strictly follow isolation protocols when cleaning isolation rooms.

C- Paramedical chemical safety practices consisted of 9 items to be observed, including closed-ended questions included read the label and material safety data sheet, handle chemical spills properly, store chemicals in their designated storage area after use, wear appropriate PPE

when handling cleaning chemicals, check the expiration dates on cleaning chemicals before use.

D- Paramedical environmental safety practices consisted of 10 items to be observed, including closed-ended questions included place wet floor signs after mopping, dispose of sharp objects in the specific safety box container, keep electrical cords away from water sources while cleaning, report frayed or damaged electrical cords immediately, and using proper body mechanics when lifting heavy objects.

E-Paramedical PPE Practices consisted of 10 items to be observed, including closed-ended questions, included wear gloves when handling waste, wear appropriate footwear to prevent slips and falls, change my gloves immediately if they become damaged, remove PPE properly to avoid contamination, wear PPE during all cleaning tasks that involve chemicals**.**

F-Paramedical personal hygiene practices consisted of 9 items to be observed, including closed-ended questions, included washing hands before and after handling waste, keeping nails short and clean, changing uniform/work clothes daily, avoiding wearing jewelry, and following proper hand hygiene before and after eating.

G- Paramedical waste management practices consisted of 14 items to be observed, including closed-ended questions, such as disposing of regular waste in the correct trash bins, handling biohazardous waste according to hospital protocols, checking that sharp containers are not overfilled, and segregating different types of waste.

H-Paramedical hazardous materials handling practices consisted of 7 items to be observed, including closed-ended questions that included access the MSDS for any chemical use, use PPE when handling hazardous chemicals**,** dilute chemicals according to the manufacturer's instructions, and never mixing different chemicals.

I- Paramedical radiation practices consisted of 5 items to be observed including closed-ended questions, included awareness of areas in the hospital where radiation is used, and the application of the safety protocols for entering areas with radiation.

J-Paramedical ergonomics practices consisted of 5 items to be observed including closed-ended questions, included adjust the work environment to reduce strain and

injury, take rest to prevent fatigue and decrease the risk of injury.

K- Paramedical safe work practices consisted of 5 items to be observed, including closed-ended questions included avoid running in the hallways to prevent accidents, always use proper lifting techniques to avoid injury, and reporting slippery floors or spills immediately.

Scoring system, it included 102 questions; 1 point for done, and 0 point to not done answers. The whole scores of paramedical 102 points practices about safety measures classified into two levels:

-Competent practices ≥ 60 % (≥ 61 points).

-Incompetent practices < 60 % (< 61 points).

Content validity and reliability

Validity of the tools: The study tools were constructed based on a scientifically relevant review of the existing English-related literature and using the available textbooks, articles, journals, and evidence-based scientific research. A panel of five professors in two fields of oncology and three in Community Health Nursing evaluated the content validity of the produced instruments.

Pilot study:

The pilot study was done on 10 % of the sample, equal to 7 paramedical to observe the clarity of questions and time needed to complete the study tools. Paramedical in pilot study were included in the main study sample because no modifications were done.

Reliability of tools:

Reliability was applied for testing the internal consistency of the tools by administration of the same tools to the same subject under similar conditions two times. Cronbach alpha was used to assess the internal consistency of the tools. It was found to be 0.91 for knowledge tool and equal to 0.87 for practices.

Ethical Consideration:

Official permission to conduct the proposed study was obtained from the Committee of Scientific Research Ethics of Helwan -Faculty of Nursing approval (Number 20230516,34) and also official permission from the Baheya Hospital Ethical Committee to conduct the study in it(IRB number:202401150003). The researcher explained the purpose and nature of the study, and emphasis was made that participation in this study is voluntary; each healthcare worker has the right to withdraw from the study at any time. Written informed consents were obtained from the

participants. Anonymity and confidentiality were assured through coding the data. Paramedical personnel were assured that this data would not be reused in another research without their permission, and the data collected was used for the current research only.

Operational phases:

Preparatory phase:

It included revising related literature and theoretical knowledge of several aspects of the study using books, articles, the internet, and magazines to develop tools for information collection.

Field work:

A written approval letter was obtained from the Dean of the Faculty of Nursing, Helwan University, for practicing the study in the Faculty of Nursing. Written letter should be sent to director of Baheya Hospital (Haram branch) in Giza Governorate, a donation and Non-Governmental Organization (NGO) affiliated with the Ministry of Health for conducting the study including the aim of the study to obtain the permission to visit the hospital and conduct the study, including the aim of the study, obtained from paramedical workers after the researcher introduces her for them and after explaining the purpose of the study.

The researchers collected data 3 days per week (Tuesday, Wednesday, and Thursday) delivered over a total of 9 months, the 9 sessions completed for every group. that consisted of 8 paramedical personnel and post practice evaluations also done; formal acceptance to be included in the study was obtained after explaining the purpose and the nature of the study.

The interviewing questionnaire took about 30 minutes, according to the paramedical personnel's tolerance, and every nurse-aid and housekeeper was allowed to ask any questions to clear up any misunderstandings and to fill out the questionnaire.

Educational program conducted in the following phases:

Preparatory phase: Tools of information collection based on review of the past & current related literature reviewing several aspects of nurse aid and housekeepers including education at Baheya Hospital (Haram branch) in Giza Governorate, a donation and non-governmental organization (NGO) affiliated with the Ministry of Health, done using available books, journals, articles, and magazines. The aim was to become

acquainted with the research problem to develop the study tools.

Assessment phase: Using a pre-testing survey to assess paramedics' knowledge and practices about safety measures. The researcher first met the paramedical personnel and explained the purpose of the study briefly. Paramedical personnel were assured that got information would be kept confidential and used only for the study.

Planning phase: Based on the results obtained from the assessment phase, the researchers planned the educational program contents according to the paramedics' needs. Noticed needs, requirements, and were illuminated and discussed in the form of a booklet. Fillings of the booklet were selected on the basis of identified needs. The booklet involved of knowledge about safety measures as the concept of hospital hazards, importance of occupational safety measures, the benefits of implementing safety practices in healthcare facilities, common hospital hazards and their potential risks, safety measures effectively across various departments in health care facilities, proper use of PPE in clinical and non-clinical settings, safety measures for handling all type of examination, chemical spillage and waste segregation, operating eye wash stations, and managing hazardous materials, the educational program in their daily practice, infection control practices to minimize biological hazards, physical and ergonomic risks in the workplace, and effectiveness and outcomes of the educational program. Teaching methods used as lectures, open discussion, brainstorming, demonstrations, and role play as a simulation were frequently applied during sessions. Media as PowerPoint, data-show, pictures, video, and a booklet prepared by researchers.

Implementation phases: After developing the health education program contents.

- Actual field work carried out in the period from February 2024 to September 2024, three days per week for three weeks for every group (Tuesday, Wednesday, and Thursday), divided into 9 groups, sessions 45 minutes, and made sessions according to the available time of the paramedical to provide their educational program.
- The educational program improved paramedics' knowledge and practices about safety measures and aimed to explain to all participants. Based on

the result of the pre-test questionnaire, the researchers.

- Post-test done later after sessions. The study sample, 73 paramedical personnel divided into 9 groups, contained about 8 paramedical personnel.

-The educational program includes 9 sessions (five theoretical and four practical sessions).

- Five theoretical sessions by the end of these sessions, each paramedical known the knowledge about safety measures as concept of hospital hazards, types of work hazards importance and objectives of occupational safety measures, the benefits of implementing safety practices in healthcare facilities, common hospital hazards and their potential risks, and safety measures effectively across various departments in healthcare facilities.

- Four practical sessions by the end of this session every paramedical personnel applied practices proper use of PPEs in clinical and non-clinical settings, apply safety measures for handling all type of hazards ex: chemical and biological spillages, operating eye wash stations, and managing hazardous materials, infection control practices to minimize biological hazards, waste segregation practice, physical and ergonomic risks in the workplace and proper lifting and transferring.

- By the end of every session, the paramedical personnel were informed about the content of next sessions and its time.

-Feedback was given at the beginning of each session about the previous one and at the end of each session about the current session, and different methods of evaluation were selected to be suitable for the paramedical personnel's needs and the aim and contents of the educational program.

Evaluation phase: This phase aimed to evaluate the paramedical personnel's knowledge and practices, after applying an educational program for paramedical regarding safety measures.

Administrative item:

After explanation of the study aims and objectives, an official letter from the Dean of the Faculty of Nursing, Helwan University, was directed to the director of Baheya Hospital in Giza, Egypt, to obtain permission to conduct the study after explaining its purpose.

IV) Statistical item:

Recorded data were analyzed using the Statistical Package for Social Sciences, version (± 29). Quantitative

data were expressed as mean ± standard deviation (±SD). Qualitative data were expressed as frequency and percentage. The following tests were done:

-The Chi-square test was used to compare qualitative data .

-Pearson's correlation coefficient (r) test was used to assess the degree of association between two sets of variables.

-Cronbach's Alpha: Reliability statistics were used to assess using Cronbach's Alpha test: used to assess the reliability of the tools.

The confidence interval was set to 95% and the border of error accepted was set to 5%. So, the p-value was considered significant as follows:

Probability (P-value)

≤ 0.001 (highly significant).

≤ 0.05 (significant.)

> 0.05 (insignificant)

Results:

Table (1): Enumerated that the mean age of the studied paramedical was 27.4 ± 6.7 years & 57.5 % of them were married. Also, 93.2 %of them had a diploma in the education level. Additionally, 83.6 % of them were from urban areas, and 64.4 % of the studied nurses' jobs were nurse aides.

Figure (1): Shows that 59.3 % of paramedical had adequate knowledge pre apply an educational program, which improved and became 65.8 % of them had adequate knowledge post applying an educational program, where 29.7 ± 5.3 to 43.2 ± 5.1 (t=38.2, p value<0.001).

Figure (2): Shows that the total practices of 23.0% of the studied paramedical staff for radiation safety practice pre-educational program, which improved and became 65.1% of them post educational program, and 64.5% of them used personal protective equipment pre-educational program, which improved and became 91.0 % of them post educational program.

Figure (3): Illustrates that 91.8 % of the studied paramedical had incompetent with total practices pre applying the educational program. While 97.3 % of them had competent total practices after applying the educational program, where 38.9 ± 7.2 to 78.1 ± 6.9 (t=21.530, p value 0.000).

Table (2): Shows that there was a statistically significant relation among the studied paramedical's total knowledge about safety measures post- educational program through all

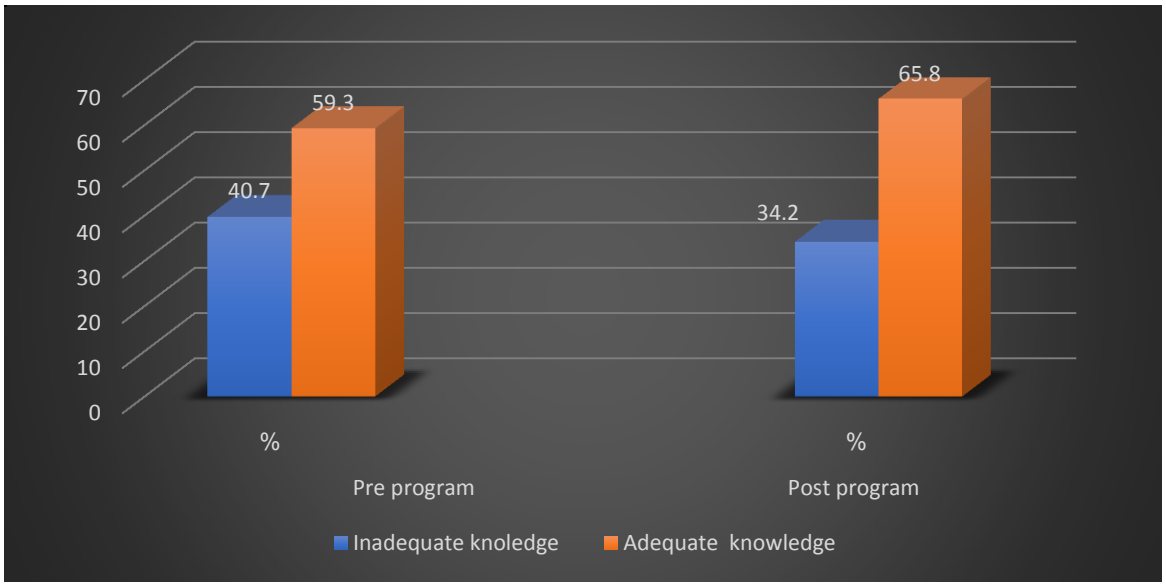
items where p-value = 0.005, respectively.

Table (3): Shows that there was a statistically significant relation among the studied paramedics' total practices about safety measures after-educational program through all items, where p-value = 0.005, respectively.

Table (4): Shows that there is a significant direct positive correlation among knowledge of studied paramedical and their practices with R 0.51 & P 0.00.

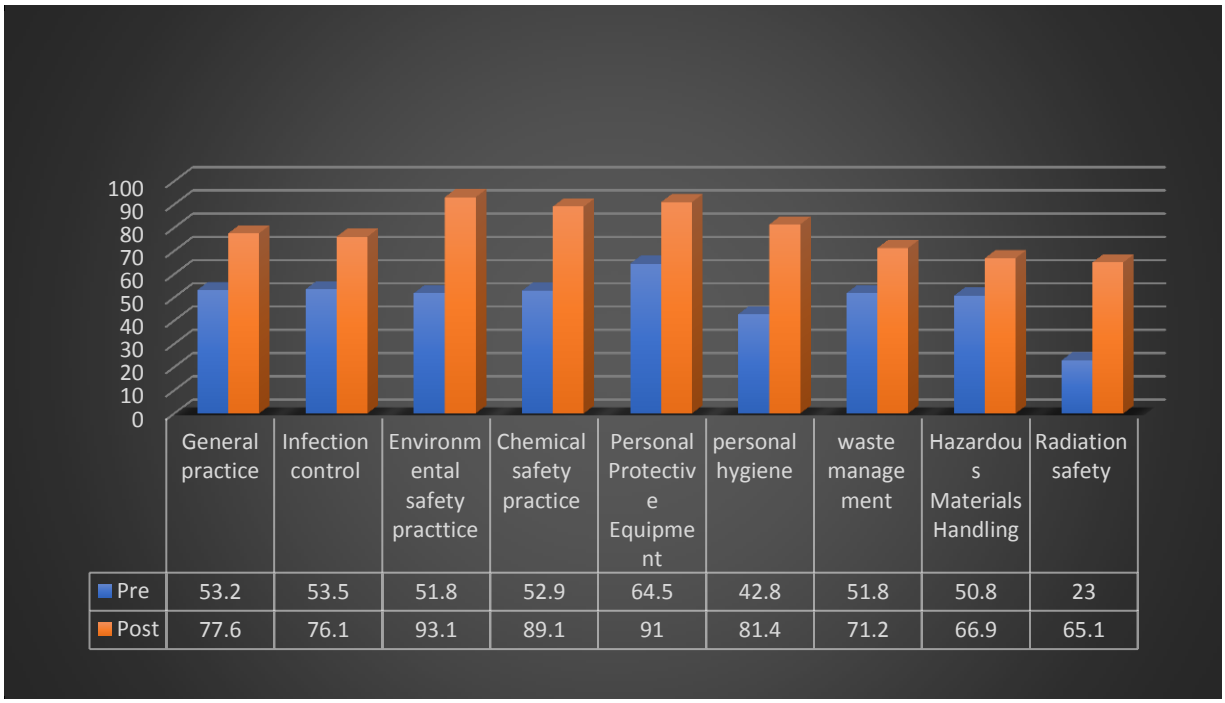
Table (1): Frequency Distribution of Demographic Data and Medical History of Studied Paramedical (n=73).

Demographic data	No.	%
Age		
20≥29	42	57.5
30≥39	20	27.4
40≥49	11	15.1
Mean ±SD 27.4 ± 0.7		
Job		
Housekeeper	26	35.6
Nurse aid	47	**64.4**
Residence		
Rural	12	16.4
Urban	61	**83.6**
Education		
Bachelor degree	4	5.5
Diploma	68	**93.2**
Preparatory school	1	1.4
Marital status		
Married	42	**57.5**
single	31	42.5
Years of experience		
1>5	53	**72.6**
5≥10	20	27.4
Mean ±SD 4.3±3.5		
Medical condition	**No.**	**%**
No complain	51	**69.9**
Back pain	8	10.9
Needle stick	5	6.8
DM	4	12.4
Hypertension	3	4.1
Asthma	2	2.7



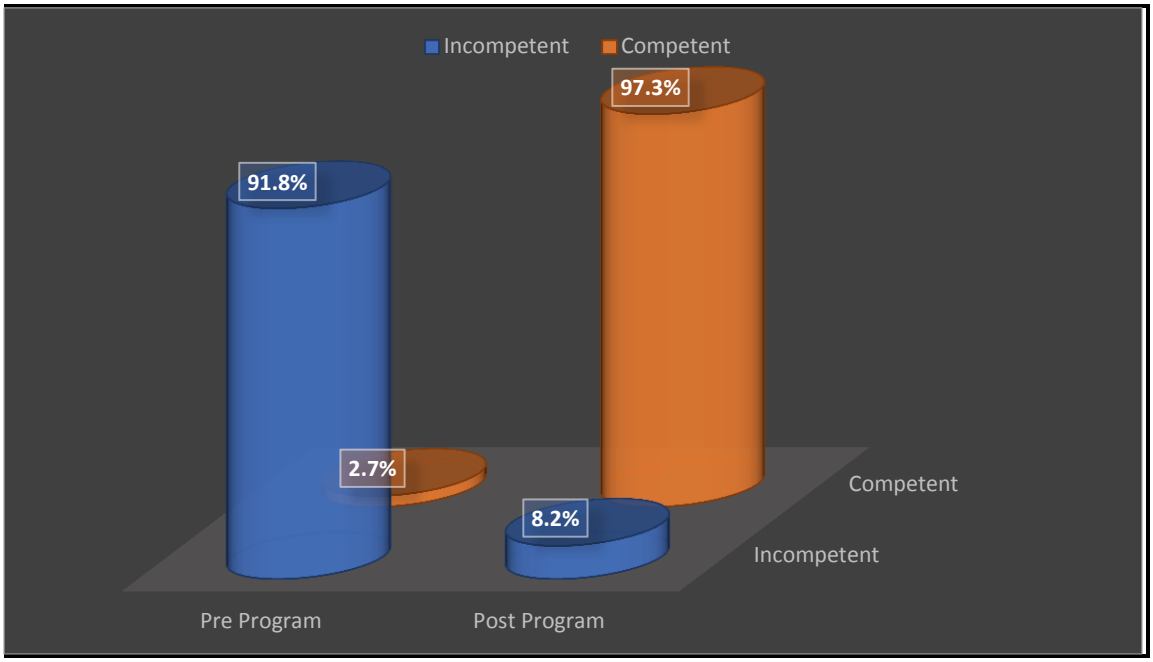
**χ2=21.1 **P value=0.000

Figure (1): Percentage Distribution of Total Knowledge among Studied Paramedical regarding Safety Measures Pre & Post Applying Educational Program (N=73).



	General practice	Infection control	Environmental safety practtice	Chemical safety practice	Personal Protective Equipment	personal hygiene	waste management	Hazardous Materials Handling	Radiation safety
Pre	53.2	53.5	51.8	52.9	64.5	42.8	51.8	50.8	23
Post	77.6	76.1	93.1	89.1	91	81.4	71.2	66.9	65.1

Figure (2): Percentage Distribution of Safety Practice among Studied Paramedical regarding Safety Measures Pre & Post Applying Educational Program (N=73).



**χ2=61.2 **P value=0.00*

Figure (3): Percentage Distribution of Total Practices among Studied Paramedical Regarding Safety Measures Pre and Post Applying Educational Program (N=73).

Table (2): Relative between Demographic Characteristics and Total Knowledge of Studied Paramedical Post-Educational Program (N=73).

Demographic Characteristics	The studied paramedical Post-Educational Program				χ^2	P value
	Adequate (n=48)		Inadequate (n=25)			
	No.	%	No.	%		
Age (Years)						
20≥29	40	83.3	2	8.0	5.421	0.000
30≥39	0	0.00	20	80.0		
40≥49	8	16.7	3	12.0		
Job						
Housekeeper	20	41.7	6	24.0	6.254	0.000
Nurse aid	28	58.3	19	76.0		
Place of residence						
Rural	10	20.8	2	8.0	9.210	0.002
Urban	38	97.2	23	92.0		
Educational level						
Bachelor degree	0	0.00	4	16.0	9.001	0.001
Diploma	48	100.0	20	80.0		
Preparatory school	0	0.00	1	4.0		
Marital Status						
Married	20	41.7	22	88.0	6.559	0.000
Single	28	58.3	3	12.0		
Years of experience						
1> 5	48	100.0	5	20.0	8.112	0.000
5>10	0	0.00	20	80.0		
Medical condition						
No complain	40	83.3	11	44.0	9.658	0.005
Back pain	3	6.3	5	20.0		
Needle stick	0	0.00	5	20.0		
DM	4	8.3	0	0.00		
Hypertension	0	0.00	3	12.0		
Asthma	1	2.1	1	4.0		

Table (3): Relation between Demographic Characteristics and Total Practices of Studied Paramedical Post- Educational Program (N=73).

Demographic Characteristics	The studied paramedical Post-Educational Program				χ^2	P value
	Competent (n=67)		Incompetent (n=6)			
	No.	%	No.	%		
Age (Years)						
20≥29	42	62.5	0	0.00	3.246	0.000
30≥39	20	30.0	0	0.00		
40≥49	5	7.5	6	100.0		
Job						
Housekeeper	20	29.9	6	100.0	6.321	0.001
Nurse aid	47	70.1	0	0.00		
Place of residence						
Rural	6	9.0	6	100.0	5.410	0.000
Urban	61	91.0	0	0.0		
Educational level						
Bachelor degree	4	6.0	0	0.00	6.666	0.000
Diploma	62	92.5	6	100.0		
Preparatory school	1	1.5	0	0.00		
Marital Status						
Married	40	59.7	2	33.3	6.985	0.005
Single	27	40.3	4	66.7		
Years of experience						
1> 5	50	74.6	3	50.0	8.214	0.001
5>10	17	25.4	3	50.0		
Medical condition						
No complain	51	76.0	0	0.00	7.510	0.001
Back pain	4	6.0	4	66.7		
Needle stick	5	7.5	0	0.00		
DM	2	3.0	2	33.3		
Hypertension	3	4.5	0	0.00		
Asthma	2	3.0	0	0.00		

Table (4): Correlation between Total knowledge and Total Practices of Studied Paramedical (n=73).

Scores	Practice of paramedical	
Knowledge of paramedical	**r**	**p**
	0.51	0.00*

*Significant at p-value<0.05

Discussion:

Paramedical personnel play a vital role in supporting the healthcare system by assisting medical professionals in delivering patient care. This group includes nursing aides, lab technicians, radiology staff, ambulance workers, and other support personnel. Staff helps in performing diagnostic tests, monitoring patient conditions, and maintaining a safe and hygienic environment. Although staff do not hold medical degrees, their skills and responsibilities are essential for the smooth functioning of hospitals and clinics. Paramedical personnel often serve as the bridge between patients and physicians, especially in emergency and routine care settings. Their commitment and efficiency contribute significantly to patient outcomes and healthcare quality. Investing in their training and well-being is essential for ensuring safe and effective care delivery **(Ozimek et al., 2025).**

Evaluating the effect of an educational program on paramedical staff regarding safety measures is essential to enhance their knowledge, skills, and performance in healthcare settings. Paramedical personnel, including nursing aides and support workers like housekeepers, are frequently exposed to occupational hazards such as infections, injuries, and chemical exposures. Before the implementation of the program, many exhibited inadequate awareness and inconsistent practices related to safety protocols. The educational sessions focused on infection control, safe handling of equipment, emergency preparedness, and use of personal protective equipment (PPE). The program also emphasized the importance of reporting incidents and following institutional guidelines. Interactive learning methods such as demonstrations, discussions, and role-plays were used. Initial assessments highlighted knowledge gaps that guided the content of the intervention **(Malakoutikhah et al., 2024).**

Regarding socio-demographic characteristics of the studied paramedical, the findings of this study revealed that, marital status of the

studied paramedical more than half of them were married, these results matched with the results of conducted by **Bandery-Elsayed et al., (2024)** were 200 workers conducted a study in EL Sharqia governorate, Egypt about "Occupational Health Hazards among Workers in Chemical Factories in Egypt" and showed that, more than half of study sample were married. **From a researcher's point of view,** many people desire a life partner to share experiences, offer emotional support, and build a deep personal connection. Marriage can provide financial advantages, legal rights, and social security benefits.

Regarding medical condition of the studied paramedical, these findings indicate that, more than one quarter of them no complain, these results disagree with the results of conducted by **Strandås et al., (2024)** where 239 paramedics conducted a study in Madrid about "An integrative systematic review of promoting patient safety within prehospital emergency medical services by paramedics: a role theory perspective" and mentioned that, more than one quarter of study sample were suffer from back pain and varicose veins. **From a researcher's point of view,** some paramedical staff may perform tasks that are less physically intensive compared to nurses, leading to fewer musculoskeletal issues or other work-related conditions.

Regarding the effective of the program on total knowledge, the present study revealed that, more than half of paramedical had adequate total knowledge pre apply an educational program which improved and become, nearly two thirds of them had adequate total knowledge post apply an educational program and this finding was disagree with **Alakrawi et al., (2024)** whose conducted published study at Saudi Arabia under title of " Evaluating the efficacy of full-scale and tabletop exercises in enhancing paramedic preparedness for external disasters: A quasi-experimental study" showed that, 57.6 % of paramedical had adequate total knowledge pre apply an educational program which improved and become, 66.2 % of them had adequate total knowledge post apply an educational program. **From researchers' points of view,** the program was likely designed to directly address gaps in knowledge, focusing on appropriate and practical topics that paramedical staff encounter in their daily duties. This alignment with their real-world needs made the learning more effective.

Regarding the safety practice among studied paramedical regarding safety

measures, the present study revealed that, less than quarter of paramedical hadn't apply radiation safety practice pre-educational program, which improved and became less than two thirds of them post educational program and this finding was disagree with **Hasan et al., (2022)** whose conducted published study at Baghdad governorate under title of " Attitudes and practices regarding occupational hazards among a sample of medical and paramedical staff in Baghdad governorate: A quasi-experimental study" revealed that, 57.6 % of paramedical hadn't apply radiation safety practice pre-educational program, which improved and became 89.9 % of them post educational program. **From researchers' points of view,** the educational program likely enhanced the paramedical staff's understanding of the risks associated with radiation exposure and the importance of protective measures (e.g., lead aprons, shielding, distance, and time limitations).

Concerning the effectiveness of the program on total practices, the present study revealed that most of the studied paramedical personnel had incompetent results with total practices pre applying the educational program. While most of them had competent total practices post apply educational program, and this finding was agreed with **Strandås et al. (2024),** revealed that 88.9 % of the studied paramedical staff had incompetent total practices pre apply educational program. While 96.1 % of them had competent total practices post-applied the educational program. **From researchers' points of view,** the program included simulations, demonstrations, or real-life scenarios; these methods are highly effective in improving practical skills. Paramedical staff could practice techniques in a safe environment before applying them in actual settings.

Regarding the relation of the program on total knowledge and demographic characteristics, the present study showed that, there was statistically significant relation between studied paramedical total knowledge about safety measures post- educational program with all items and this findings was agreed with **Carnicelli et al., (2024)** whose conducted published study at Australia under title of "Paramedic Education and Training for the Management of Patients Presenting with Low-Acuity Clinical Conditions: A Scoping Review " revealed that, there was statistically significant relation between studied paramedical's total knowledge about safety measures post- educational

program with all items. **From researchers' points of view,** younger staff or those with less experience might have absorbed new knowledge more quickly, while older or more experienced staff may have related new information to existing practices, enhancing their understanding. This variation contributes to a significant relationship.

Concerning the relation of the program on total practices and demographic characteristics, the present study revealed that, there was statistically significant relation between studied paramedical total practices about safety measures post- educational program with all items and this finding was agreed with **Harwani, (2023)** published study at north India under title of "Impact of educational intervention on sensitization and ADR reporting among paramedics in a teaching hospital in north India" revealed that, there was statistically significant relation between studied paramedical's total practices about safety measures post- educational program with all items. **From researchers' points of view,** in some cases, variation in learning styles, motivation, or engagement between male and female staff might affect how well they react and change after educational interventions.

Regarding correlation between total knowledge and total practices post apply educational program, the present study showed there was a significant direct positive correlation between the knowledge of studied paramedical and their practices and this finding agreed with **Ygiyeva et al., (2024)** who published study at Kazakhstan under title **"**Evaluating the effectiveness of a first aid training program for individuals without a background in medical education", who reported there is a significant direct positive correlation between the knowledge of studied paramedical and their practices. **From a researcher's point of view,** increased knowledge enables staffs to make better, safer, and more confident decisions in clinical situations, which directly translates into improved practices.

Conclusion

In light of the current study, it could be concluded that:

More than half of the paramedical had adequate total knowledge pre apply an educational program which improved and become, less two thirds of them had adequate total knowledge post apply an educational program. While most of studied paramedical had incompetent with total practices pre apply educational program. While, most of them had competent total

practices post-applied educational program.

Recommendations

In light of the results of the present study, the following recommendations are suggested:

-Ongoing health educational program for paramedical regarding safety measures in all health care settings.

- Provide paramedical with a booklet about safety measures and methods to reduce risks.

-Make posters or banners about practices of safety measures and put them in Outpatient clinics at Baheya Hospital in Giza under the observation of a community health nurse**.**

-Encourage group discussion sessions for paramedical about safety measures under the supervision of a community health nurse.

-Apply further research in a large sample and other settings for generalization**.**

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Effectiveness of Nurse-Led Interactive Video Education on Seizure First Aid and Stigma Reduction among Mothers of Children with Epilepsy

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Abstract

Background: Caring for a child with epilepsy poses significant challenges for mothers, particularly when managing seizures and coping with stigma. **Aim**; This study aimed to evaluate the effectiveness of a nurse-led interactive video education program in reducing internalized stigma and improving seizure first aid knowledge and practices among mothers of children with epilepsy. **Methods**: A quasi-experimental pre-post design was conducted with 105 mothers received a structured educational intervention consisting of four nurse-led sessions supported by interactive videos. **Results**: post-intervention findings revealed a significant improvement in epilepsy-related knowledge (Mean ± SD: 11.20 ± 3.10 to 16.45 ± 2.5) and seizure first aid practices (10.75 ± 3.20 to 15.90 ± 2.70). Internalized stigma scores also declined significantly (34.10 ± 6.80 to 26.30 ± 5.90). **Conclusion**: The nurse-led interactive video education program was effective in enhancing seizure-related knowledge and practices while significantly reducing stigma among mothers of children with epilepsy. The findings support integrating such educational interventions into routine care to empower caregivers and promote safer home-based epilepsy management.

***Keywords*:** Epilepsy, Seizure First Aid, Nurse-Led Education, Stigma, Interactive Video**.**

Introduction:

Epilepsy is a common chronic neurological disorder that affects more than 50 million people worldwide, with children representing a significant proportion of this population **(Eslamian et al., 2024).** For pediatric patients and their families, the burden of epilepsy extends beyond clinical symptoms to include substantial social, psychological, and educational challenges **(Al-Worafi, 2024).** Mothers, often primary caregivers, are particularly impacted as they shoulder the dual responsibility of managing their child's health while navigating societal misconceptions and stigma surrounding the condition **(Mohamed et al., 2023).**

Despite medical advancements, epilepsy continues to be widely misunderstood across many cultures. Persistent myths and inaccurate beliefs about seizures contribute to discriminatory attitudes and social exclusion **(Willie, 2025)**. This stigma can have far-reaching effects undermining self-esteem, limiting social participation, and impeding access to education and support services for children with epilepsy **(Kishk et al., 2024)**. Mothers, as both advocates and caregivers, often internalize this stigma, which can affect their emotional well-being and reduce their confidence in managing seizures effectively **(Kaçan & Sakız, 2025).**

Moreover, a substantial gap remains in public and caregiver knowledge regarding appropriate seizure first aid. Inadequate or incorrect responses during seizures may exacerbate the risk of injury and create preventable complications **(Sun et al., 2025).** These knowledge deficits, combined with emotional stress and societal pressure, highlight the urgent need for comprehensive, accessible, and supportive educational interventions for caregivers **(Wang et al., 2024)**.

Interactive video-based education has emerged as an effective and engaging method in health promotion. By combining audiovisual learning with guided reflection and peer interaction, this approach can enhance knowledge retention, correct misconceptions, and empower caregivers with both practical skills and emotional resilience **(Wang et al.,2025).** Nurse-led education in particular offers added value, leveraging nurses' expertise and trusted roles in community health to provide accurate information, emotional support, and skill-based training **(Pouresmail et al.,2023)**.

Furthermore, this study recognizes the pivotal role that nurses play in community-based health promotion.

By placing nurses at the forefront of epilepsy education, the program reinforces their capacity as accessible educators and trusted advocates. The empowerment of mothers through this approach has the potential to create a ripple effect enhancing caregiver capability, improving child outcomes, and fostering more informed, compassionate communities (**Abdelgawad et al.,2025**).

Significance of Study

Epilepsy, though medically manageable in many cases, remains one of the most stigmatized neurological conditions globally (**Moore et al., 2025**). The misconceptions surrounding epilepsy often led to social exclusion, discrimination, and emotional distress not only for children diagnosed with the condition but also for their primary caregivers, particularly mothers. These challenges are compounded by the lack of public awareness and caregiver training in seizure first aid, which is crucial for ensuring child safety and reducing seizure-related harm (**Pitta et al.2025**).

This study is significant in its dual focus on stigma reduction and skill enhancement, addressing both the emotional and practical dimensions of epilepsy caregiving. By implementing a nurse-led interactive video education program, the study provides a holistic, evidence-based strategy to empower mothers with the knowledge, confidence, and social support needed to care for their children more effectively.

Aim of study:

To evaluate the effectiveness of nurse-led interactive video education on seizure first aid and stigma reduction among mothers of children with epilepsy.

Specific objectives:

-Assess baseline epilepsy knowledge and practical skills related to seizure first aid among participating mothers.

-Identify internalized stigma associated with epilepsy in mothers of affected children.

-Design and implement a nurse-led interactive video education program focused on epilepsy and first aid.

-Evaluate post-intervention changes in knowledge, skills, and stigma to determine program effectiveness.

Research Hypotheses

H1: Mothers participating in the nurse-led interactive video education program will demonstrate significantly improved knowledge and practical skills related to seizure first aid post-intervention.

H2: Mothers will report lower levels of internalized stigma after the intervention compared to their pre-intervention scores.

Operational definition:

Interactive Video Education: A structured, nurse-led learning method combining short educational videos (2–5 minutes) with live discussion, reflection, and guided application. Videos include personal caregiving narratives, seizure first aid demonstrations, and stigma-challenging segments **(**Lopez et al**., 2025)**

Seizure First Aid: Knowledge and application of evidence-based steps to respond safely and effectively to seizures, minimizing harm and ensuring timely medical intervention **(Sun et al., 2025).**

Ethical Considerations

The study was approved by the **Research Ethics Committee** of the Faculty of Nursing, Suez Canal University (Approval No.86-7/2020). Informed consent was obtained from all participants mothers. Participation was voluntary, confidentiality was guaranteed, and participants had the right to withdraw at any point without penalty.

Intervention Procedures

The intervention was delivered over a structured timeline consisting of **three phases**: baseline assessment, interactive video education, and post-intervention evaluation. The study was conducted from **October 2021 to June 2022**.

Phase 1: Baseline Assessment (Pre-Intervention)

Following ethical approval and administrative clearance, eligible mothers were invited to participate through face-to-face recruitment at the pediatric neurology outpatient clinic. Those who consented were scheduled for a structured orientation session. During this session, mothers completed the following baseline tools: (socio-demographic questionnaire, epilepsy first aid knowledge and practice assessment, and ISES). These assessments were administered in a private setting by researchers to ensure participant comfort, confidentiality, and data accuracy. The baseline findings were used to identify knowledge gaps, misconceptions, and emotional challenges. These insights informed the content and emphasis of the subsequent video education sessions, ensuring the program was responsive to the specific needs of the participants.

Phase 2: Nurse-Led Interactive Video Education

Participants mothers were enrolled in a four-week nurse-led educational program based on interactive video modules and small-group discussions. Sessions were conducted once per week (20–30 minutes per session) in groups of 6–

8 mothers. Each session was built around core educational themes delivered through short, interactive video segments, followed by researcher's discussions and reflection exercises.

Session 1: Understanding Epilepsy causes and seizure sings seizure first aids and its safety child during attack through animated video overview of highlights awareness of infantile epilepsy animated power point presentation followed by group discussion of mothers about epilepsy definition, causes and its physiological brain change resulting from seizure epilepsy.

Session 2: Seizure Recognition and First Aid; the researchers demonstrated Video of real-life seizure scenarios and first aid steps from British Red Cross (2022) video clarify how to protect child from injury, do not restrain, when the seizure is over and help child to rest on their side with their head titled back. Nurse researchers guided role-play and Q&A: Clarifying misconceptions and safe responses.

Session 3: Breaking the Stigma; the researchers demonstrated create a short video that features real caregiver stories, focusing on overcoming stigma, building confidence in seizure response and Advocating for their child at school or in public. Ensure the video is culturally relevant and available in the mother's language Video. After viewing, ask mothers "Which part of this story did you relate to most?" and "What does empowerment mean to you as a caregiver?". The researchers emphasize that they are change-makers not only in their families but in the wider community. The videos were delivered via tablets or laptops, supported by printed handouts and verbal explanations from nurses. Participants engaged in discussions, peer validation, and feedback activities to enhance emotional support and learning retention.

Phase3:Post-Intervention Evaluation

One week after completing the final session, participants were re-assessed using the same tools from the baseline phase. The post-intervention assessments were administered individually in a confidential setting to ensure consistency and reduce response bias.

Data Analysis

Data was analyzed using SPSS (version 26). Descriptive statistics summarized demographic data and baseline scores. To assess the intervention's effectiveness, **paired t-tests** compared pre- and post-intervention scores for seizure first aid knowledge and internalized

stigma. The **Shapiro-Wilk test** assessed data normality; if violated, the **Wilcoxon signed-rank test** was used. **Effect sizes** (Cohen's *d* or *r*) measured the magnitude of changes. A significant level of **p < 0.05** was applied. Results were presented in tables and charts for clarity.

Results

This section presents the findings of the study evaluating the effectiveness of a nurse-led interactive video education program on reducing stigma and enhancing seizure first aid knowledge and practices among mothers of children with epilepsy.

Table (1): shows that the mean age of mothers was 30.93 ± 0.83 years, with most residing in urban areas, 61.9%. Regarding educational background, 44.8% of mothers had a secondary education, while 34.3% were university graduates. In terms of employment, 59% of mothers were employed, while 41% were homemakers.

Most mothers 61% reported having two to three children, and 51.4% of their children with epilepsy were aged 5 to 10 years. Males accounted for 57.1% of the affected children, and more than half 56.2% had been diagnosed with epilepsy for a significant 1 to 3 years, highlighting the need for long-term care and support.

Table (2): demonstrate a significant improvement in mothers' knowledge related to epilepsy and seizure first aid following the nurse-led interactive video education program. The mean scores increased across all measured domains. Notably, knowledge about epilepsy treatment and management showed the most significant gain, rising from baseline score (2.84 ± 2.31) to (6.85 ± 2.62), with a highly considerable t-value of 12.21 ($p < 0.001$). Similarly, significant improvements were observed in mothers' understanding of seizure symptoms ($t = 2.40$, $p = 0.017$) and causes of epilepsy in children ($t = 7.86$, $p < 0.001$).

Table (3): Shows the intervention led to statistically significant improvements in all measured seizure first aid practices. The greatest improvement was seen in placing the child in a safe position during a seizure, where the mean score increased from 5.12 ± 1.85 to 8.45 ± 1.40 ($t = 10.21$, $p < 0.001$). Other key practices, such as protecting the child's head, avoiding harmful interventions (e.g., putting objects in the mouth), and timing the seizure duration, also demonstrated strong post-intervention gains.

Table (4): Show that there was a statistically significant reduction in all dimensions of internalized stigma among mothers following the nurse-

led interactive video education program. Among the stigma subdomains, the feelings of guilt and shame subscale showed the greatest reduction (t = 8.12), followed by social withdrawal and isolation (t = 7.75). Additionally, perceptions of public judgment and discrimination were significantly lower after the intervention (t = 6.48), reflecting increased confidence and reduced fear of societal stigma.

Table (5): illustrates that a significant increase in both the seizure first aid knowledge score (from 11.20 ± 3.10 to 16.45 ± 2.50, t = 10.54, p < 0.001, Cohen's d = 0.85) and the practice score (from 10.75 ± 3.20 to 15.90 ± 2.70, t = 9.78, p < 0.001, Cohen's d = 0.80), both with large effect sizes. Importantly, there was also a substantial reduction in internalized stigma (mean decrease = −7.80, t = −8.67, p < 0.001, Cohen's d = 0.75), indicating that the intervention was not only educational but also emotionally empowering.

Table (1): Sociodemographic Characteristics of Participating Mothers and Their Children (N = 105)

Items	Number	Precent
Mother age (year)		
20 – 25	11	10.5%
25-30	53	50.5%
< 30	41	39%
Mean±SD: 30.93±0.83		
Residence:		
Urban	65	61.9%
Rural	40	38.1%
Mother education level:		
Illiterate	13	12.4%
Elementary	9	8.6%
Secondary	47	44.8%
University graduate	36	34.3%
Mother job		
Working	62	59%
Housewife	43	41%
Number of children		
One	12	11.4%
Two to three	64	61%
More than three	29	27.6%
Child age with epilepsy		
Under 5 years	20	19%
5 – 10 year	54	51.4%
More than 10 year	31	29.5%
Child with epilepsy gender		
Male	60	57.1 %
Female	45	42.9%
Duration of epilepsy (child)		
1-3 year	59	56.2%
>3 year	46	43.8%

Table (2): distribution Epilepsy Knowledge Scores Before and After Intervention among participant mothers (n=105).

Knowledge Domain	Before Intervention Mean ± SD	After Intervention Mean ± SD	t-test	p-value
Understanding the concept of epileptic seizures	6.23 ± 1.54	8.34 ± 1.20	6.35	<.001*
Knowledge of epilepsy causes in children	4.87 ± 1.84	7.18 ± 1.79	7.86	<.001*
Recognition of seizure signs and symptoms	4.29 ± 2.39	8.25 ± 2.56	2.40	.017*
Awareness of epilepsy treatment and management options	2.84 ± 2.31	6.85 ± 2.62	12.21	<.001*

Table (3): distribution of seizure first aids practices Scores Before and After Intervention among participant mothers (n=105).

Practice Item	Before Intervention Mean ± SD	After Intervention Mean ± SD	t-test	p-value
Placing child in a safe position during seizure	5.12 ± 1.85	8.45 ± 1.40	10.21	<.001 *
Protecting child's head and removing nearby hazards	4.85 ± 2.10	8.10 ± 1.65	9.78	<.001 *
Avoiding putting objects in the child's mouth	3.92 ± 2.30	7.76 ± 1.95	8.65	< .001 *
Timing the seizure duration accurately	2.75 ± 1.98	6.85 ± 1.70	9.33	< .001 *
Seeking medical help appropriately after seizure	6.30 ± 1.60	8.90 ± 1.20	8.88	<.001 *

Table (4): Comparison of Internalized Stigma Dimensions Before and After the Intervention (N = 105)

Stigma Domain	Before Intervention Mean ± SD	After Intervention Mean ± SD	t-test	p-value
Feelings of guilt and shame	13.20 ± 3.10	9.85 ± 2.80	8.12	< .001 *
Social withdrawal and isolation	11.40 ± 2.90	8.60 ± 2.55	7.75	< .001 *
Perceived public judgment and discrimination	9.50 ± 2.60	7.85 ± 2.40	6.48	< .001 *

Table (5): Comparison of mothers' knowledge, practice, and stigma scores before and after the intervention (n=105)

Outcome Variable	Before intervention Mean ± SD	After intervention Mean ± SD	Mean Difference	t-test	p-value	Effect Size
Seizure First Aid Knowledge Score	11.20 ± 3.10	16.45 ± 2.50	+5.25	10.54	< .001*	0.85
Seizure First Aid Practice Score	10.75 ± 3.20	15.90 ± 2.70	+5.15	9.78	< .001*	0.80
Internalized Stigma Score	34.10 ± 6.80	26.30 ± 5.90	–7.80	8.67	< .001*	0.75

Discussion

This study evaluated the effectiveness of a nurse-led interactive video education program on improving seizure first aid and practices, as well as reducing internalized stigma among mothers of children with epilepsy. The results strongly support both research hypotheses, revealing statistically significant improvements in maternal knowledge and practical caregiving skills, alongside meaningful reductions in internalized stigma following the intervention. Consistent with earlier findings **(Wang et al., 2025; Mohamed et al., 2025),** the intervention significantly enhanced mothers' understanding of epilepsy, particularly in areas related to seizure recognition, causes, and management. The most pronounced improvement was observed in awareness of treatment and management options, an area frequently overlooked in routine care. This result highlights the effectiveness of visual and interactive formats in correcting misconceptions and reinforcing evidence-based knowledge. Notably, the overall knowledge score improved from 11.20 to 16.45 out of 20, indicating significant cognitive gains as well as the accessibility and cultural relevance of the nurse-led video content. This finding aligns with previous research that emphasizes the benefits of educational tools combining audiovisual elements, peer experiences, and practical demonstrations to enhance long-term knowledge retention and engagement **(Lopez et al., 2025).** Additionally, a study conducted in Egypt by **Elshafie et al., (2021)**

demonstrates that multimedia-based education for mothers positively impacts their knowledge and practices regarding first aid management of convulsions.

In terms of practical caregiving, mothers showed significant improvements in applying safe seizure first aid techniques. The most notable advancements included placing the child in a safe position, avoiding inserting objects into the mouth, and seeking appropriate medical help key indicators of real-world readiness to manage seizures. These improvements are consistent with recommendations by **Sun et al. (2025)** and reflect the value of interactive education in enhancing critical behavioral responses. and underscore the importance of interactive learning in fostering critical behavioral responses. The findings of an Egyptian study by **Shasha et al. (2022)** are consistent with our own, which indicate that interactive learning significantly contributes to improved practices because it is grounded in lived experience.

The impact of the intervention was far-reaching, going beyond the mere acquisition of knowledge and skills. The study also documented a significant decrease in participants' internalized stigma. The total stigma score decreased from 34.10 to 26.30, with substantial improvements in guilt, social withdrawal, and perceived overall judgment. These findings underscore the potential of psychoeducation to alleviate the emotional burden that stigma places on caregivers, especially mothers, as highlighted by **Keshk et al. (2024)** and **Kashan and Sakiz (2025)**. This potential was further confirmed by **Ibrahim and Shata's (2017)** study, which found that improvements in knowledge and practices regarding epilepsy and its first aid led to a reduction in stigma. This inspiring potential of psychoeducation should motivate further research and interventions in this area.

The success of the intervention in reducing stigma may be attributed to its emphasis on emotional empowerment, normalization of caregiving experiences, and exposure to peer narratives. However, it's important to recognize the integral role of our audience in this success. By creating a safe, supportive learning environment, the program ensures that participants feel secure and valued. This, along with presenting mothers as capable and valued advocates for their children, fosters a sense of confidence and agency. This approach is consistent with the empowerment model described by **Abdelgawad et al. (2025),** which

highlights the importance of caregiver role. This emphasis on role is designed to make our audience feel recognized and appreciated, promoting sustained behavior change.

When viewed collectively, these findings affirm that nurse-led interactive video education is a highly effective, scalable, and culturally adaptable strategy for empowering caregivers of children with epilepsy. The observed improvements in knowledge outcomes and first aid practice highlight the dual benefits of this intervention: as an educational tool and a means of reducing social stigma. The findings are consistent with the **2024 study by Manzanares et al.,** which found that increased health education about epilepsy improves emotional well-being and increases satisfaction with the child's health.

Study limitations:

While the findings are promising, several limitations should be acknowledged. The study was conducted in a single geographic and cultural context, which may limit generalizability to other populations or regions. The use of interview questionnaires may be subject to response bias or overestimation of knowledge and practice improvements. Outcomes were measured shortly after the intervention; long-term retention of knowledge and sustained behavioral changes were not assessed.

Conclusion

This study demonstrated that nurse-led interactive video education is an effective and practical approach for enhancing epilepsy-related knowledge, improving seizure first aid practices, and reducing internalized stigma among mothers of children with epilepsy. The intervention resulted in statistically significant improvements across all measured domains, highlighting the critical role of nurses in caregiver education and support. By combining evidence-based content with culturally relevant visuals and interactive methods, the program empowered mothers not only with knowledge but also with confidence and advocacy skills. These findings underscore the importance of structured, accessible, and emotionally supportive education for caregivers managing chronic pediatric conditions.

Recommendations

Based on the results, the following recommendations are proposed:

-Hospitals and outpatient clinics should incorporate nurse-led interactive video education as part of routine care for families of children with epilepsy.

-Provide periodic refresher sessions or mobile-accessible materials to reinforce learning and maintain practice improvements over time.

-Involve other family members or caregivers in the education sessions to broaden understanding and support within the household.

Acknowledgment:

I sincerely thank my supervisor for their guidance and support throughout this study. Gratitude is extended to the participating mothers and the hospital staff for their cooperation.

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Relation between Mental Health Literacy and Psychological Distress among Family Caregivers of Patients with psychiatric Disorders

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Abstract:

Background: Family Caregivers of patients with psychiatric disorders frequently experience high levels of psychological distress due to demands of care-giving. Mental health literacy (MHL), which encompasses knowledge, attitudes, and beliefs about mental health, plays a vital role in how caregivers understand and manage these challenges. **Aim of the study:** this Study aim to explore the relation between mental health literacy and psychological distress among family caregivers of patients with psychiatric disorders. **Subject:** A Convenience sample of 200 family caregivers of patients with psychiatric disorders was involved. **Settings:** The study was conducted at the outpatient psychiatric clinic at Tanta Mental Health Hospital which affiliated to Ministry of Health and population .**Study design**: A descriptive correlational research design was utilized. **Study tools:** Two tools were used: **Tool I**: Family caregiver's Mental Health Literacy Scale (MHLS) : This tool consists of two parts:- **Part 1** : Socio- demographic data of family caregivers , **Part 2:** Mental Health Literacy Scale (MHLS) **Tool II:** Kessler Psychological distress Scale (K10) . **Results:** The finding revealed that there was statistical significant negative correlation between total mental health literacy score and total psychological distress score which means that increasing caregiver' Mental Health Literacy leading to decrease their level of psychological distress. **Conclusions :**The study's findings led to the conclusion that family caregivers of patient with psychiatric disorders who had high level of MHL were more likely to experience low level of psychological distress and vice versa .Lack of MHL is thought to be a major contributor to increase the risk of psychological distress among family caregivers of patients with psychiatric disorders (PWPD) .**Recommendations**: Psychiatric nurses should assess the level of MHL and psychological distress of caregivers periodically and participate in conducting educational workshops related to them.

***Keywords*:** Family caregivers, Patient with psychiatric disorders, Mental health literacy, Psychological distress.

Introduction

Psychiatric disorders are threats to the psychological, behavioral, functional and sociological well-being of individuals often resulting in visible changes (**Stelnicki & Carleton , 2020)** . These changes often demand prolonged period of care and support from family caregivers to bring about return to normalcy (**Agyapong et al., 2021)**.

Family caregivers are individuals who are involved in the daily care for relatives that have psychiatric disorders (**Sahoo,Brahma,&Mohapatra ,2019).**

Over the past three decades, the responsibilities of family caregivers in caring for patients with psychiatric disorders (PWPD) have expanded, largely due to a shift towards community care and the de-institutionalization of these individuals. The transition has resulted in family members assuming responsibility for the daily care of patients with psychiatric disorders **(Marimuthu, Prashanth , John , & Russell ,2020) .**

As a result, up to 90% of (PWPD) now live with relatives who assume full responsibility for providing long-term practical and emotional support to their chronically ill psychiatric patients. Regrettably the family caregivers of PWPD are becoming among humanity's most disadvantaged group and face additional stressors that have detrimental impact on caregiver's mental health **(Li J., Zhang M., Zhao L., Li Q., Mu L., & Zhang H. 2018) .**

Evidence indicates a year-on-year decline in the mental health of caregivers, manifesting in various psychological issues such as depression, anxiety, feelings of helplessness and hopelessness, and an overwhelming sense of psychological distress (**Keyes,Gary,O'Malle,Hamilton,Schulenberg , 2019) ,(Marimuthu , Prashanth , John ,& Russell , 2020) .**

According to **Gebremedhin (2022**) , psychological distress is an uncomfortable subjective state of negative emotions such as anxiety and depression , Studies have linked that there an increasing the rates of psychological distress among caregivers of PWPD (**Keyes , Gary, O'Malley, Hamilton, & Schulenberg, 2019)** , (**Kazemi et al ., 2021)** .

The psychological distress experienced by caregivers is a significant risk factor for psychiatric disorders, negatively affecting interpersonal relationships, increasing the likelihood of self-injury and suicidal ideation, and

ultimately diminishing the quality of life for both caregivers and their patients (**Hashim , Freddy , & Rosmatunisah , 2020).**Therefore, in recent years, caregiver's mental health has become an urgent problem which has aroused widespread concern of professionals in mental health sector (**Kazemi et al .,2021)** . Exploring the influencing factors of caregiver's psychological distress is one strategy which will help in finding effective ways to intervene caregivers' psychological distress **(Gazibara, Cakic, Cakic, Grgurevic,& Pekmezovic. 2020)** . One of the most growing influencing factors for the prevalence of psychological distress among caregivers is Mental Health Literacy (MHL) (**Fernando, & Pai, 2018)**.

Mental health literacy encompasses the knowledge, attitudes, and beliefs that facilitate mental health promotion and the management of mental illness for oneself and others **(Nobre et al., 2022).** Mental health literacy (MHL) was introduced in the psychiatric field by **Jorm (2000)**, an Australian psychiatrist. He identified seven components of MHL: the ability to recognize specific disorders, knowledge of how to obtain information about mental health, awareness of risk factors for mental illness, understanding of its causes, knowledge of self-treatment options, awareness of available professional assistance, and attitudes that promote the recognition and pursuit of appropriate help.

The seven components are generally categorized into three groups: recognition, knowledge about mental health, and beliefs and attitudes regarding mental diseases (**Skea , Treweek , & Gillies , 2017) ; (O'Connor , Casey , & Clough , 2021) .**

Recent studies have established a significant correlation between caregiver psychological distress and mental health literacy. Increasing evidence indicates that mental health literacy is positively associated with mental health status, happiness, and psychological well-being, while exhibiting a negative correlation with psychological distress (**Fernando , & Pai , 2018)** ; (**Moss, Gorczynski,Sims-Schouten Heard-Laureote , & Creaton , 2021) ,**

Research indicates that caregivers possessing high mental health literacy exhibit superior health and psychological well-being compared to their counterparts with low mental health literacy (**Apfel & Tsouros , 2019) ; (Sun , Jia , Hou ,& Liu , 2021).**

Significance of the study:

The care of patients with psychiatric disorders imposes considerable

distress on family caregivers and significantly impacts the psychological well-being of the family **(Derajew, Tolessa, Feyissa, Addisu,&Soboka,2019).**

The families of patients with psychiatric disorders are undoubtedly impacted by the condition of their relatives. Families provide practical assistance and personal care, as well as emotional support to relatives with mental disorders. The demands placed on caregivers can lead to considerable stress, adversely impacting their overall mental health **(Singh & Dubey , 2020) .**

Mental health literacy is significantly associated with mental health outcomes. Low health literacy adversely affects the mental health of family caregivers, leading to significant psychological distress. The recognition of mental health literacy and its relationship with the psychological distress of family caregivers is now acknowledged as a critical prerequisite for the provision of services to individuals with mental disorders who depend on long-term care from their relatives.

Aim of the study

This study was aimed to:-

Explore the relation between mental health literacy and psychological distress among family caregivers of patients with psychiatric disorders.

Research questions:-

1-What are the levels of mental health literacy among family caregivers of patients with psychiatric disorders?

2-What are the levels of psychological distress among family caregivers of patients with psychiatric disorders?

3-What is the relation between mental health literacy and psychological distress among family caregivers of patients with psychiatric disorders?

Subjects & Method

Subjects

Research design:-

A descriptive correlational research design was employed in the current study.

Setting:-

The study was conducted at the outpatient psychiatric clinic at Tanta Mental Health Hospital which affiliated to Ministry of Health and population. Outpatient psychiatric clinic provides services of screening new cases and inpatient referral. Mental Health Hospital provide mental health services for Al-Gharbiah , Menoufia and Kafr- Elshikh Governorates.

Subjects:

A Convenience sample of 200 family caregivers of patients with psychiatric disorders was

recruited from previous setting. The sample size and power of analysis was calculated using Epi-Info software statistical package. The criteria used for sample size calculation were as follows:

- 95% confidence level
- 5% margin of error
- 80% power of study.

The average rates of family caregivers who come with their relatives of patient with psychiatric disorder yearly are 400 patients in the previous mentioned setting.

The sample size based on the previously mentioned criteria should be N=196 and it was increased to 200 family caregivers to increase reliability of the study results. The subjects were selected from the previous setting according to the following criteria:

Inclusion criteria:

-Age: 18-60 years old.

-Family members who live in the same household and responsible for providing physical, financial, and/or emotional care for the patient.

Exclusion criteria:

-Any evidence of organic brain disease, mental retardation, substance use disorder and other psychiatric problems.

Tools of the study: -The data was collected by using the following tools:-

Tools of the study:

The data was collected by using the tools following:

Tool I: Family caregiver's Mental Health Literacy Scale (MHLS):

This tool consists of two parts:-

Part 1: Socio- demographic data of family caregivers:

It was developed by the researcher to elicit data about age, sex, level of education, occupation, family size, family income duration of caregiving and keen relationship.

Part 2: Mental Health Literacy Scale (MHLS)

Mental Health Literacy Scale (MHLS) was developed by **(O'Connor, Casey, & Clough , 2015)** and was adopted by researcher. It was designed to measure Mental Health Literacy among individuals and it consists of 35 items distributed in six attributes which namely:-

-Ability to recognize disorders (8 items) as "To what extent do you think it is likely that the diagnosis of disease."

-Knowledge of where to seek information (4 items) as "I am confident using the computer or

telephone to seek information about mental illness."

-Knowledge of risk factors and causes (2 items) as To what extent do you think the disease is related to ".

-Knowledge of self- treatment (2 items) as "To what extent do you think it would be helpful for someone to improve their quality of sleep".

-Knowledge of professional help available (3 items), "To what extent do you think it is likely that Cognitive Behavior Therapy (CBT) is a therapy based on challenging negative thoughts and increasing helpful behavior.'"

-Attitudes that promote recognition or appropriate help-seeking behavior (16 items) as A mental illness is a sign of personal weakness.

The first 15 items are scored on a 1-4 likert scale. Items 16-35 are scored on a 1-5 likert scale. The sum of all the components yields the final score. Questions with a 4-point Likert scale are rated from 1 (very unlikely/unhelpful) to 4 (very likely). Questions with a 5-point Likert scale are rated from 1 (strongly disagree/definitely unwilling) to 5 (strongly agree/definitely willing). The total score is produced by summing all items, it ranges from 35 to 160, with a higher score indicates higher mental health literacy.

The total score was calculated and transferred to percentage reflecting the levels of MHL as follows:

-< 50% is indicated low MHL level.

-50% -75% is indicated moderate MHL level.

-> 75% is indicated high MHL level

Tool II: Kessler Psychological distress Scale (K10):

Kessler Psychological distress Scale was developed by (**Kessler, Barker, Colpe, Epstein, Gfroerer, & Hiripi E, 2003)** and was adopted by the researcher. This scale designed to measure the psychological distress among caregivers of patient with mental disorders.

The K10 scale consists of 10 questions like "In the past 4 weeks, about how often did you feel tired out for no good reason?".

Each item is scored from one ‘none of the time’ to five ‘all of the time’. Scores of the 10 items are then summed, yielding a minimum score of 10 and a maximum score of 50. Low scores indicate low levels of psychological distress and high

scores indicate high levels of psychological distress.

The scoring system:

-10 – 19 is indicated psychological well-being.

-20 - 24 is indicated mild psychological distress.

-25 - 29 is indicated moderate psychological distress.

-30 - 50 is indicated severe psychological distress.

Method

The study was implemented according to the following steps:

-Administrative process: - An Official permission letter was obtained from the dean of the Faculty of Nursing to the director of setting of study to obtain their permission and cooperation for data collection.

-Ethical and legal considerations: -

-Approved from Scientific Research and Ethical Committee of the Faculty of Nursing was obtained with code 405-3-2024.

-Informed consent was obtained from the study subject after explanations of the purpose of the study to obtain accept and cooperation of the family caregivers.

-The subjects was reassured about the confidentiality of obtained information and their privacy and also code numbers was used instead of names.

-Respecting the right of the subjects to withdraw and terminate the participation at any time during data collection.

-The nature of the study wasn't cause any harm or pain to the subjects of the study.

-Content validity: The tools of the study were presented to a jury of five experts in the area of psychiatric nursing field, to check content validity and clarity of questionnaire. Modifications were carried out based on their revision.

-Content reliability:- The suitable statistical test analysis was used for testing the reliability of all tools using Cronbach's alpha test. Cronbach's alpha values were 0. 721 for psychological distress scale 0.793 for total mental health literacy scale.

-Pilot study:- Pilot study was carried out on 20 family caregivers (10% of the study subjects) to ascertain the clarity and applicability of the study tools .It served to estimate the approximate time needed for interviewing the participants as well as recognizing obstacles that may be faced during the actual study. There was no modification on the tools therefore subjects of pilot study were included into actual study.

- Actual study: The researcher was selected the study subjects who met the inclusion criteria.

These subjects were invited to participate in the study after being informed for the nature of the study, and the researcher collected the data of the research through face-to-face interview with each caregiver on an individual basis.

The researcher met the study subjects within range of three to four days per week on the individual basis. The time of interviewing with participant ranged from 45 to 60 minutes according to his \ her tolerability to answer the questions. The duration of data collection was six months starting from July 2024 to the end of January 2025.

Statistical analysis:

The data were organized, tabulated and statistically analyzed using statistical package for social studies (SPSS) version 23. The mean, standard deviation and range were calculated for quantitative data. For comparison between means of two variables independent sample t test was used for comparing more than two means One Way Anova test was used. For categorical variables numbers and percent were calculated. 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): clarifies distribution of studied caregivers according to their socio-demographic. In relation to age, about one third of studied caregivers (38%) aged 30 : 40 years old with Mean ± SD35.95 ± 10.78 . Regarding to sex, more than half of studied caregivers (55%) were males. Concerning residence, about two thirds of studied caregivers (68.5%) were living in rural, While (63.5%) of studied caregivers were un employed and more than half of studied caregivers (57.5%) had income not enough. In relation to Duration of care provided to patient, about half of studied caregivers (50%) more than 10 years while the minority of them (20%) less than 6 years with Mean ± SD 8.03 ± 4.03.

Figure (1): Demonstrates total mean score of Mental Health Literacy sub-scale for the studied caregivers. It was noticed that the highest ranking Mental Health Literacy sub-scale among the studied caregivers was attitude that promote recognition with mean (43.84) while the least ranking Mental Health Literacy sub scale was knowledge of self-treatment, its mean was (4.44).

Figure (2): presents distribution of the studied caregivers according to

Levels of Mental Health Literacy scale. It emphasized that (43%) of the studied caregivers had low Mental Health Literacy while (40%) of them had high Mental Health Literacy and about (17 %) had moderate Mental Health Literacy.

Figure (3): illustrates distribution of the studied caregivers according to their total level of psychological distress scale. It emphasized that 45 % of the studied caregivers had psychological well-being while 31% of them had sever psychological distress, 19 % had mild psychological distress and 5 % had moderate psychological distress.

Table (2): demonstrates correlation between Mental Health Literacy scale and psychological distress Scale of the studied caregivers. It was showed that there is a highly negative statistical significant correlation between total Mental Health Literacy score and total psychological distress score which means that increasing caregiver' mental health literacy leading to decrease their level of psychological distress and vice versa where (r = -0.901, p = 0.000**)

Table (3): illustrates relationship between socio-demographic characteristics and mean score of mental health literacy of the studied caregivers.

This table showed that there is a highly statistical significant relationship between mean score of mental health literacy and all socio-demographic characteristics except type of care provided to patient there is non-statistical significant .

In relation to age, the studied caregivers aged (50-60) years had low level of mental health literacy than other aged groups. In relation to sex, male caregivers had more level of mental health literacy. Regarding educational level, caregivers who had post graduate studies were having high level of mental health literacy than other groups.

As regard to residence, it was found that urban area had more level of Mental Health Literacy, In relation to occupation; it was found that employed caregivers had more level of Mental Health Literacy.

Table (4): illustrates relationship between socio-demographic characteristics and total level of psychological distress of the studied caregivers.

This table showed that there is a highly statistical significant relationship between mean score of psychological distress and all Socio-demographic Data except type of care provided to patient there is not statistical significant.

In relation to age, the studied caregivers aged (50-60) years had

low level of psychological distress than other aged groups. In relation to sex, female caregivers had more level of psychological distress. Regarding educational level, caregivers who had post graduate studies were having low level of psychological distress than other groups.

As regard to residence, it was found that urban area had low level of psychological distress, In relation to occupation; it was found that employed caregivers had low level of psychological distress.

Table (1): Distributions of The Studied Caregivers According to Their Socio-demographic Characteristics (No= 200).

Socio-Demographic characteristics	Number	%
Age		
18 : 30	56	28
30 : 40	76	38
40 : 50	36	18
50 : 60	32	16
Mean ± SD	35.95 ± 10.78	
Range	(60-18)	
Sex		
Male	110	55
Female	90	45
Educational Level		
Illiterate	23	11.5
Read & Write	40	20
Secondary Edu	64	32
University Degree	69	34.5
Post graduate studies	4	2
Residence		
Rural	137	68.5
Urban	63	31.5
Keen Relationship		
His Sons	27	13.5
Husband / Wife	55	27.5
Brother / Sister	57	28.5
Father /Mother	61	30.5
Occupation		
Employed	73	36.5
Un employed	127	63.5
Income		
Enough	85	42.5
Not enough	115	57.5
Type of care provided to patient		
Financial	15	7.5
Emotional	24	12
Physical	69	34
All of the above	92	46
Duration of care provided to patient		
<6 years	40	20
6:10 Years	60	30
>10 years	100	50
Mean ± SD	8.03 ± 4.03	
Range	(20-2)	
Number of family members		
<3	47	23.5
3:4	146	73
>4	7	3.5

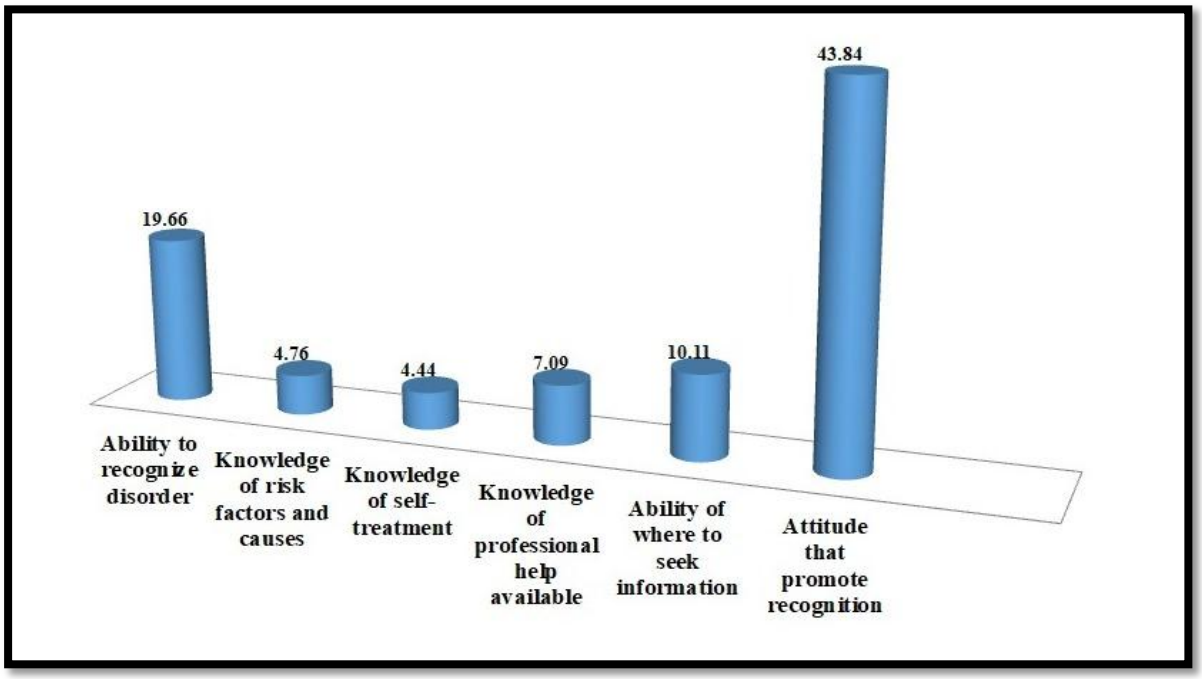

Figure (1): Mean Score of Mental Health Literacy Subscales for the Studied Caregivers.

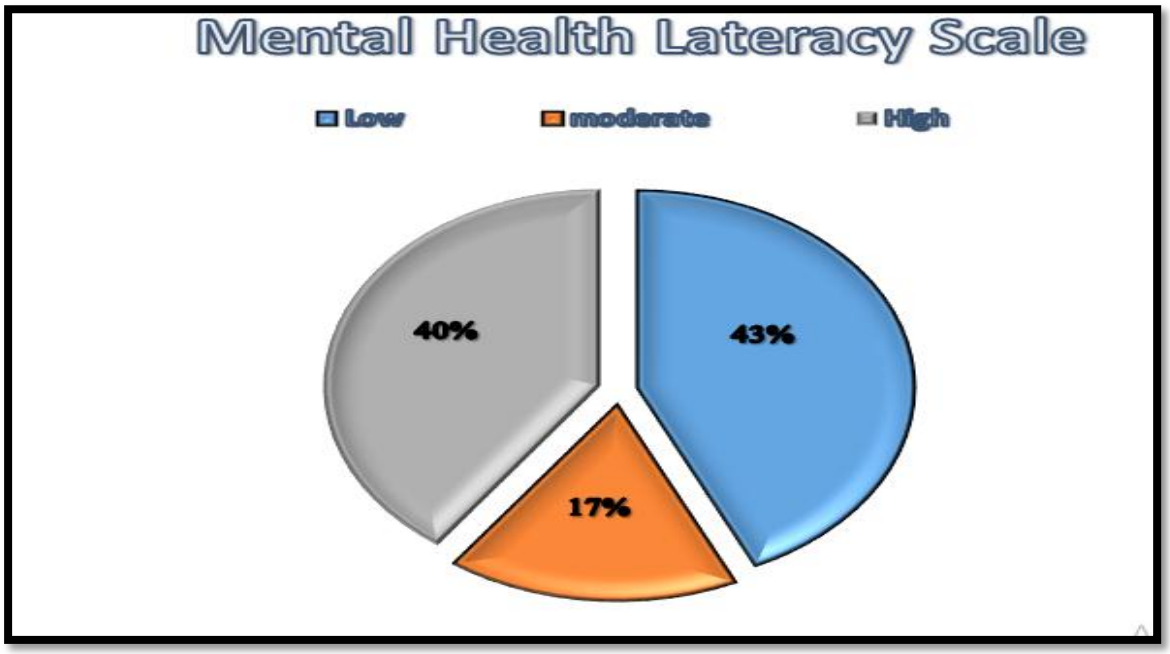

Figure (2): Distributions of the Studied Caregivers According to Levels of Mental Health Literacy Scale (No= 200).

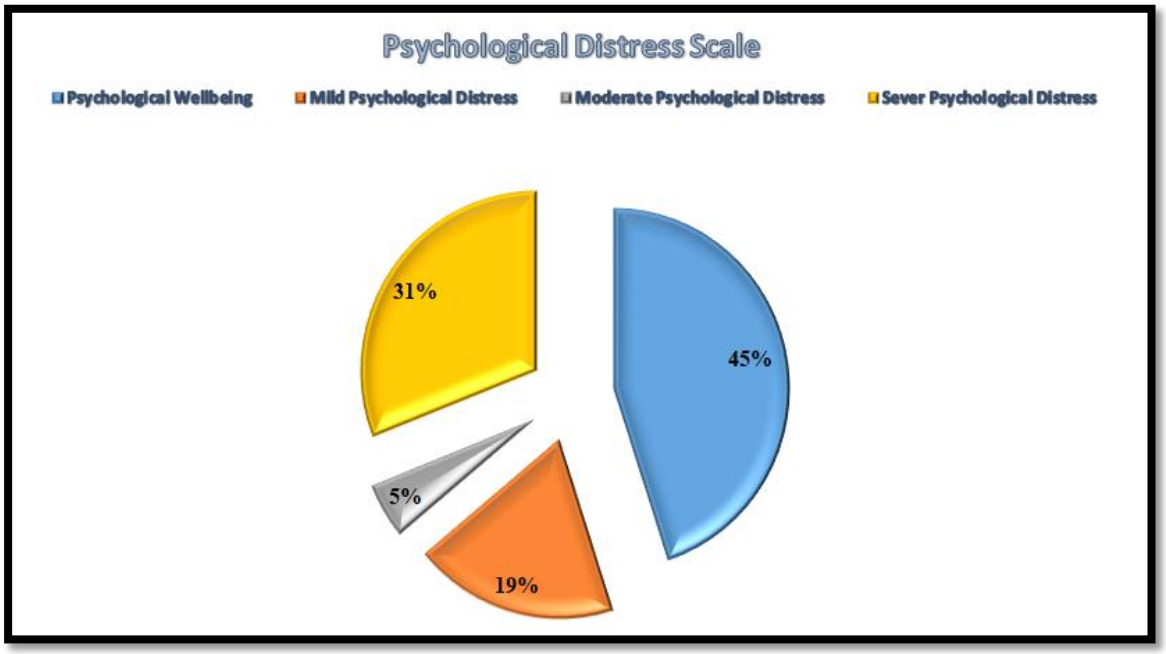

Figure (3): Distributions of the studied caregivers according to levels of Psychological Distress Scale (No= 200).

Table (2): Correlation between Total Mental Health Literacy Scale and Total Psychological Distress Scale (No= 200).

	Total Mental Health Literacy Score	
	r	p
Total Psychological Distress Score	-0.901	0.000**

Table (3): Relationship between mean score of Mental Health Literacy Scale and socio-demographic data among the studied caregivers (No=200).

Socio-Demographic characteristics	Mental Health Literacy Scale	t / f p
Age		
18:<30	114.79±48.84	**21.59 0.000**
30:<40	114.14±40.66	
40:<50	66.11±43.18	
50: 60	35.53±2.83	
Sex		
Male	96.20±51.45	**2.41 0.122**
Female	85.05±49.18	
Educational Level		
Illiterate	37.50±11.70	**129.37 0.000**
Read & Write	35.00±0.00	
Secondary Edu	98.45±36.54	
University Degree	142.90±18.74	
Post graduate studies	146.0±0.000	
Residence		
Rural	67.84 ± 42.13	**140. 32 0.000**
Urban	136.50±31.36	
Relationship		
His Sons	87.60±53.58	**34.05 0.000**
Husband / Wife	90.17±40.89	
Brother / Sister	129.96±36.36	
Father /Mother	52.42±39.95	
Occupation		
Employed	122.97±40.86	**71.08 0.000**
Un employed	69.99±45.22	
Income		
Enough	139.56±25.02	**512.11 0.000**
Not enough	53.16±28.11	
Type of care provided to patient		
Financial	92.37±57.53	**0.331 0.803**
Emotional	99.00±39.20	
Physical	87.51±48.41	
All of the above	92.07±54.79	
Duration of care provided to patient		
<6 years	94.97±41.70	**14.94 0.000**
6:10 Years	119.28±41.46	
>10 years	75.52±52.17	
Number of family members		
<3	117.27±48.61	**15.10 0.000**
3:4	87.79± 48.79	
>4	36.25±4.33	

Table (4): Relationship between mean score of Psychological Distress and Socio-demographic Data among the Studied Caregivers (No=200).

Socio-Demographic characteristics	Psychological Distress Scale	f / t p
Age		
18 - 30	40±18	**21.08**
30 - 40	13.55±4.764	**0.000**
40 - 50	36.50±16.74	
50 - 60	48.39±9.31	
Sex		
Male	28.15±10.189	**1.09**
Female	30.34±17.89	**0.276**
Educational Level		
Illiterate	47.97±9.96	
Read & Write	42.83±15.93	**176.5**
Secondary Edu	28.29±17.91	**0.000**
University Degree	13.20±5.32	
Post graduate studies	17.41±10.36	
Residence		
Rural	36.65±16.25	**94.66**
Urban	15.66±10.04	**0.000**
Relationship		
His Sons	30.71±18.54	
Husband / Wife	25.31±12.70	**27.03**
Brother / Sister	19.02±12.87	**0.000**
Father /Mother	48.75±7.07	
Occupation		
Employed	18.50±12.08	**58.62**
Un employed	38±15.58	**0.000**
Income		
Enough	14.37±7.31	**284.03**
Not enough	41.41±13.57	**0.000**
Type of care provided to patient		
Financial	32.50±18.70	**0.715**
Emotional	25.00±11.03	**0.673**
Physical	30.02±16.90	
All of the above	28.55±15.20	
Duration of care provided to patient		
<6 years	27.70±14.87	**17.98**
6:10 Years	16.24±5.593	**0.000**
>10 years	31.64±9.345	
Number of family members		
<3	22.27±17.30	**15.61**
3:4	30.34±17.89	**0.000**
>4	31.01±17.01	

Discussion

Mental Health Literacy (MHL) is increasingly recognized as a key determinant of mental health outcomes, particularly in care-giving for patients with psychiatric disorders. Recent studies have expanded the concept of MHL to include not only awareness of symptoms and treatment options, but also the ability to navigate mental health systems and apply appropriate coping strategies **(Abdullah , Yusof , & Ishak , 2023) ; (Gorczynski , Sims-Schouten , Hill ,& Wilson , 2021).** For family caregivers of patient with psychiatric disorders, higher levels of MHL are associated with increased confidence in handling crisis situations, improved communication with patients, and reduced stigma **(Wei , Hayden , Kutcher , Zygmunt , & McGrath , 2020).**

From the perspective of positive psychology, the survival and development of family caregivers is a process of constantly facing challenges, as well as a process of growing up in adversity (**Nguyen Thai & Nguyen (2018).** This study aimed at identified the relation between MHL and psychological distress.

Regarding MHL sub-scales, the current finding revealed that the highest ranking MHL sub-scales among studied caregivers was attitude that promotes recognition sub-scale, this result may be related to more than one attribution.

Educational background of the studied subjects may be attributed to this result as the current results presented that more than half of studied caregivers had high educational level either secondary education , university degree and post graduate ,which the high education is generally associated with more positive attitudes and greater understanding of mental health . The assumption is that educated family caregivers may be more aware of mental health issues, more accepting of psychiatric diagnoses and more proactive in accessing care for their relatives.

This finding suggests that educational background may influence not only awareness and attitudes toward psychiatric disorders but also patterns of care-giving engagement, highlighting the need to consider educational background factor into the design of family caregivers support and education program. Additionally this attribution is supported by the result of present study that emerged that positive correlation between mental health literacy and educational level.

This is partly due to those with more education are generally more willing to seek help from mental health professionals, they are also less influenced by mental health stigma, also the educated caregivers are more

likely to consult trusted sources like books, healthcare professionals, and academic websites. They are better able to distinguish myths from facts regarding mental illness, also the higher education correlates with greater openness to treatments such as therapy and medication. In this point (**O'Connor et al. 2021)** study supported the current findings by demonstrating that highly educated caregivers had high level of MHL .

Accessibility of information may be another attribution that the family caregivers may have a variety of sources for obtain accurate information and facts about mental health that enhancing attitude and recognition about mental health. Knowledge which now becomes more available than another due to the easily of access from different resources such as health care providers whether nurse , psychologists or psychiatrist and in some instances family education can be conducted. Additionally beside availability and accessibility of information , the role of technology and social media cannot be ignored in easy access to information which may have major role in change attitude about mental health.

In the light of this to the findings of a study by **(Jorm , Christensen , & Griffiths , 2016) ,** a variety of mental health services, such as assistance from mental health professionals, psychotherapy, drugs, and psychiatric hospitalizations, were more likely to be used by those who could identify and change the attitude about schizophrenia and depression more easily . Furthermore **, (Riebschleger , Grové , Kelly , & Cavanaugh , 2022) ,** reported when mental health content is clear , understandable, and easy to access, individuals are more likely to: recognize symptoms of mental health disorders , know how and where to seek help and challenge stigma and misconceptions that enhancing attitude and recognition of mental health.

In contrast with current result (**Gulliver , Griffiths , & Christensen , 2020)** who viewed that there are number of obstacles to improve the attitude that promote recognition among family caregivers, including social stigma , humiliation associated with mental illnesses , anti-help-seeking views, a propensity for independence, and a lack of awareness of mental health decline .

On the other hand the current result revealed that the least ranking MHL sub-scale among studied caregivers was knowledge of self-treatment scale. This result may be related to family caregivers often prioritize the needs of the patient over their own well-being and their tendency to ignore their own health and self-care needs due to the overwhelming demands of care-giving

role . The focus on the patient's well-being often leads caregivers to neglect their personal health, which in turn affects their awareness and application of self-treatment strategies.

Also the intensive nature of care-giving responsibilities often leaves caregivers with limited time, energy, or flexibility to attend educational programs seek medical advice for their own health issues. Additionally this result may be due to the most available services focus on the patient's condition and treatment and neglecting the health well-being needs of caregivers.

Moreover in some cultural contexts, caregivers especially females may feel obligated to sacrifice their own health for the benefit of the family, viewing self-care as selfish or secondary. These beliefs can discourage them from engaging in self-treatment practices or seeking mental health support.

Additionally lack of caregiver-centered interventions within psychiatric healthcare settings may contribute to the absence of structured support or education regarding caregivers' self-care and self-treatment options .This current result is supported by the result of **(Almanasef. 2021)** demonstrated that around a quarter of the caregivers in his study have fears of asking for help and self-treatment when they are experiencing personal or emotional issues. Regarding the levels of mental health literacy, the current study showed that more than half of studied caregivers regarded from moderate to high **MHL**.

Beside previous mentioned attributions as education and accessibility of information, duration of care-giving may be considered as additional attribution to this present result. Current study revealed that half of caregivers had a duration of care-giving provided to patient more than 10 years, this long period of caring may help the caregivers to acquire more knowledge and information about mental health also duration of caring may lead to the caregivers becoming more contact with mental health problems and how to manage it .

This also may be due to long care-giving periods typically mean more exposure to the patient's symptoms, treatments, and healthcare professionals, This exposure enhances caregivers' recognition of psychiatric symptoms and improves their understanding of diagnosis, prognosis, and treatment options .

Over time, caregivers tend to develop better coping mechanisms and become more proactive in seeking information or support services , The longer a caregiver is involved, the more likely they are to interact with psychiatrists, psychologists, and social workers leading to increased MHL through direct contact. In the same stream, study carried by **(Alsubaie , Stain ,**

Webster , & Wadman , 2019) supported the current findings by demonstrating that the more care-giving period to patient, the high level of MHL. Furthermore current study found positive correlation between MHL and duration of caring.

Additional results of MHL levels may be rationalized to age of studied caregivers, the current result pointed out that majority of caregivers aged between (18-40) years .This may be due to younger caregivers aged 18 to 40 are typically in a life stage characterized by active personal and professional development. This age group is often more motivated to seek knowledge and skills that support both their care-giving role and their broader life goals and tends to have greater digital literacy, allowing them to access accurate and diverse mental health information through social media, websites, podcasts, and mobile applications. Their comfort with online platforms increases their motivation and ability to seek out reliable sources of mental health knowledge.

For caregivers in this age range, the role of care-giving often intersects with a developing sense of identity and responsibility. They may view care-giving as part of their purpose, which motivates them to be informed and effective. Seeking mental health knowledge becomes a way of affirming their care-giving competence and protecting their own emotional resilience. The study of **(Abd Elaziz , Hamed , & Salem. 2023)** supported the current findings by demonstrating that caregivers aged between (20-40) years old had high level of MHL. Also Support these result by (**Zare et al., 2024)** found that caregivers aged between 20 and 40 years were more likely to accompany patients with psychiatric disorders to outpatient visits , suggesting that this age group is often functionally positioned to fulfill this role due to proximity, energy, and family expectations and also has high level of MHL.

Psychological distress is a multifaceted construct encompassing symptoms of anxiety, depression, and emotional exhaustion. It is particularly prevalent among family caregivers who are exposed to chronic stress, emotional burden, and limited support while caring for patients with psychiatric disorders **(Lee, Chien , &Chou , 2021).** Studies have shown that caregivers often report elevated distress levels due to lack of coping resources, disrupted daily life, and feelings of helplessness. In the contrast to this statement, the current results revealed that more than half of studied caregivers had either psychological well-being or mild psychological distress. **Opposite the current results**, in Argentine, **(Pehlivan , Tokur Kesgin , & Uymaz , 2020)**

determined the psychological distress from a sample of 4,408 family caregivers, majority of the respondents 41% were found to have severe psychological distress.

This current finding may be related to educated caregivers have a greater number of choices and thus more control over their lives and better security as mentioned before majority of the studied caregivers are educated. Meanwhile, lower education is associated with "a lack of psycho-social resources" among family caregivers such as a sense of control, resilience, the ability to delay gratification, and access to cultural activities and exposure to more day-to-day stressors , these negative factors have been strongly correlated with the onset of psychological distress (**Neimeyer, 2020)** .

Assari, 2024 supported the current findings by demonstrating that low educated caregivers had severe psychological distress.

Additionally caregivers aged 30 -40 had the least level of Psychological distress, this may be due to the family caregivers in this age range are typically more physically able, emotionally resilient, and adaptable to the dynamic needs of care-giving.

Empirical evidence supports the notion that increased mental health literacy is associated with reduced psychological distress among caregivers illness (**Moss et al. , 2021) ; (Sun et al. 2021) .** Along with this result ,current study revealed y revealed that there was a highly statistically significant negative correlation between mental health literacy and psychological distress among family caregivers of patients with psychiatric disorders , this finding indicates that caregivers with higher levels of mental health literacy tend to experience lower levels of psychological distress , this relationship may be explained by the fact that higher mental health literacy equips family caregivers with better understanding of the nature, causes, and treatment of psychiatric disorders .

Mental health literacy also facilitates more effective communication with healthcare providers, improved adherence to treatment plans, and reduced stigma all of which can buffer against psychological distress. The current result is in consistent with **(Wei,Hayden,Kutcher,Zygmunt,& McGrath,2020)** indicated that caregivers who understand psychiatric symptoms and treatment options report greater psychological resilience and lower psychological distress and recommended that enhancing mental health literacy could thus be a protective factor, and a key target for interventions aiming to reduce caregiver psychological distress.

Also, in this respect studies (**Moss et al., 2021) (Sun et al. 2021)** supported

the current correlation between MHL and psychological distress which have linked a strong correlation between psychological distress of caregiver's and mental health literacy. Additionally this correlation may be due to the following three attributions:**First,** high-level mental health literacy enhances the ability to identify, diagnose, and prevent mental disorders, as well as improves relationships with patients experiencing these conditions. **Second,** low-level mental health literacy will hinder the promptness of individual psychological help-seeking and diminish the efficacy of mental health services. **Third** ;- lack of mental health literacy may elevate the risk of mental illness and other long-term adverse effects, particularly psychological distress, among caregivers of individuals with mental health conditions .

A study by (**Yu, et al., 2021)** found that caregivers who received structured psycho education about psychiatric disorders reported significantly lower levels of anxiety and psychological distress symptoms. Similarly, **(Cagande,2023)** noted that caregivers with higher MHL scores exhibited better emotional regulation and lower psychological distress .

Conclusion & Recommendations

Conclusion

The study's findings led to the conclusion that family caregivers of patient with psychiatric disorders who had high level of MHL were more likely to experience low level of psychological distress and vice versa .Lack of MHL is thought to be a major contributor to increase the risk of psychological distress among family caregivers of patients with psychiatric disorders (PWPD) .

Recommendations

Psychiatric nurses should periodically assess the levels of mental health literacy and psychological distress among family caregivers in clinical settings.

-Structured psycho educational workshops should be offered to caregivers to enhance their understanding of mental health, psychiatric conditions, and appropriate coping mechanisms.

-Mental health professionals must establish a supportive and informative environment that enables caregivers to acquire accurate, evidence-based knowledge relevant to their care-giving roles

-Programs aiming to raise awareness about psychiatric disorders and caregiver mental well-being should be implemented to reduce stigma and promote caregiver resilience.

-Further empirical studies are recommended to explore the effectiveness of specific therapeutic or educational interventions aimed at

improving MHL among caregivers of psychiatric patients.

-Studies should be conducted to address the challenges in seeking MHL related information among caregivers.

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Effect of Preoperative Nutrition Educational Intervention for Colorectal Cancer Patients on Postoperative Clinical Outcomes

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Abstract

Background: Colorectal cancer is the second most prevalent type of cancer in the world. Nutrition plays a pivotal role in both the prevention of colorectal cancer and the management of patients undergoing treatment. **Aim of the present study** is to evaluate the effect of implementing preoperative nutrition educational intervention on colorectal cancer patients' postoperative clinical outcomes. **Subjects and method:** A quasi-experimental study was conducted , in department of surgery at Tanta University Educational Hospital, Tanta Cancer Center affiliated to Ministry of Health and Population and Damanhur Educational Hospital **Tools: Three tools** were used for data collection as follow; **Tool (1)** Structure assessment interview sheet of colorectal cancer patient" **Part (one)**:Bio Sociodemographic data: such as patient's code, name, age, sex, marital status, educational level, and occupation, Residence Body mass index (BMI)weight, height. **Part (two):** "**Nutritional needs assessment of colorectal cancer patient. Part three**: "Preoperative colorectal cancer patient nutritional intake assessment sheet **Part Four:** "Laboratory investigations .**Tool (II):** knowledge assessment tool of colorectal cancer patient about nutritional information. **Tool (III)** Postoperative clinical outcomes evaluation tool for colorectal cancer patient. **Results;** There was statistical significant improvement, information about nutritional status of patients in the study group. These results suggest Infective complications were reported in 72% of the control group compared to only 28% in the study group. The intervention may have contributed to improved recovery time and reduced hospitalization.**Conclusion and recommendations**: Preoperative nutrition educational intervention enhances patient clinical outcome and enhancing recovery for future Long-Term Nutritional maintenance. Future study of patients should prioritize long-term nutritional care.

Key wards: Colon, pre-operative, post-operative care, colorectal cancer.

Introduction:

Colorectal cancer (CRC) is cancer of the colon and rectum. It arises from the mucosa that lining the colon, rectum or both. Colorectal cancer (CRC) is one of the most common malignant neoplasms. Depending on the location, type of cancer or gender, it is ranked 2nd to 4th in terms of incidence in the world. CRC, year by year, shows an increasing tendency in terms of both morbidity and deaths. Colorectal cancer (CRC) is a leading cause of death worldwide, despite progress made in detection and management through surgery, chemotherapy, radiotherapy and immunotherapy **(Baidoun et al., 2021).** Colorectal cancer is the third most commonly diagnosed cancer globally, with over 1.9 million new cases reported annually. It is also the second leading cause of cancer-related deaths, accounting for approximately 935,000 deaths each year. The incidence of CRC varies by region, with higher rates observed in developed countries due to lifestyle factors such as diet and physical inactivity. However, early detection and advances in treatment have improved survival rates in recent years **(Ferlay et al., 2023).**

The symptoms of colorectal cancer often depend on the tumor's location and size. Common signs include changes in bowel habits, blood in the stool, unexplained weight loss, abdominal pain and fatigue. However, early-stage CRC may be asymptomatic, highlighting the importance of regular screening. Diagnostic methods include colonoscopy, biopsy, imaging studies like CT scans and blood tests to detect tumor markers such as carcinoembryonic antigen (CEA**) (Sawicki et al., 2021).**

Treatment for colorectal cancer depends on the stage and location of the tumor. Surgical resection, such as colectomy, is the primary treatment for localized cancer. Advanced cases may require chemotherapy, radiation therapy or targeted therapies. Multimodal approaches, combining surgery with adjuvant therapies, are often used to improve outcomes. The choice of treatment is tailored to the patient's condition and overall health **(Naguib, M., et al. 2022).**

Colorectal cancer significantly impacts patients' physical, emotional and social well-being. The disease and its treatment can lead to complications such as malnutrition, fatigue and psychological distress. Patients often face challenges related to changes in bowel function, body image and quality of life. Supportive care, including nutritional interventions and psychological support, is essential to address these challenges and improve patient outcomes (**Almeida-Lousada,**

Mestre,Ramalhete&Price,2021).

Nutrition plays a critical role in the management of colorectal cancer. Malnutrition is common among CRC patients due to the disease itself and the side effects of treatment. Proper nutrition helps maintain muscle mass, support immune function and enhance recovery after surgery. Nutritional interventions, including dietary counseling and supplementation, are integral to improving clinical outcomes and reducing postoperative complications **(Lewandowska et al., 2022).** Preoperative Nursing preparation is a crucial step in the management of colorectal cancer. It involves optimizing the patient's physical and nutritional status to reduce the risk of complications during and after surgery. Preoperative assessments, including nutritional screening, help identify patients at risk of malnutrition. Interventions such as dietary modifications oral nutritional supplements and immunonutrition are often implemented to improve surgical outcomes **(Piekarska et al., 2024).**

Colectomy is a surgical procedure to remove part or all of the colon, often performed to treat colorectal cancer. Depending on the tumor's location and extent, colectomy can be performed as a partial, total or hemicolectomy. The procedure may be done using open surgery or minimally invasive techniques such as laparoscopy. While colectomy is effective in removing cancerous tissue, it carries risks such as infection, bleeding and changes in bowel function. Preoperative optimization, including nutritional support, is essential to minimize these risks and improve recovery **(Keller et al., 2021).**

Nurses play a vital role in the preoperative, postoperative care of colorectal cancer patients, particularly in implementing and monitoring nutritional interventions. They are responsible for conducting nutritional assessments, providing dietary counseling and ensuring that patients adhere to preoperative nutrition plans. Nurses also collaborate with dietitians and surgeons to optimize patient outcomes. Their holistic approach, combining clinical expertise with patient education and support, is essential for improving postoperative

Significance of the study:

Colorectal cancer patients suffer of many nutritional problems that may lead to several complications which may affect post-operative outcomes. Little researches in nursing about specific nutrition intervention and education of this intervention for colorectal cancer patient either pre or post operation. Many methods of nutrition intervention are known and encompass continuous, cyclic, intermittent and immune enhancing formula. Also many medical

researches internationally were done about effect of uses those different formulas on gastrointestinal cancer and little in nursing. So this study will be done to prevent and overcome complications and improve health nutritional status of those patients

The aim of the study was: to

Evaluate the effect of implementing preoperative nutrition educational intervention on colorectal cancer patients' on postoperative clinical outcomes.

Research hypothesis:- The study group of colorectal cancer patients who will receive preoperative educational intervention will exhibit reduction of post-operative complications than control group, and will improve postoperative clinical outcomes than control group. The study was used a quasi- experimental research design.

Setting:

The study was carried out at the department of surgery at Tanta University Educational Hospital, Tanta Cancer Center affiliated to Ministry of Health and Population and Damanhur Educational Hospital. Tanta Cancer Center

The Study group : The study subjects comprised fifty (50) patients of both sexes scheduled for colectomy surgery and evaluated after the implementation of preoperative nutrition teaching intervention, they will be divided into two equal groups by randomly selected methods, each group consist of 25 patients will represent study group and control group.

-Confidence level of error 5% type 1 error .05 and power of test 95% of confidence on Epi info.software program.

-Equation for determining patient sample size at 95% confident power of the study Steven Thimpsona equation

$$n = \frac{N \times P(1-P)}{(N-1 \times (d2 / z^2) + P(1-P)}$$

N= total society size

D= error percentage (0.05)

Z= the correspond stander class of significant 95% (1. 69)

P= percentage of availability of the objectivity = (0. 1)

-Subjects were selected according to the following criteria

Inclusion criteria for patient: the patient will be selected according to the following criteria:-

- Conscious Patients of Both sexes and able to communicate.
- Patients (aged ≥18 years).

-Confirmed diagnosis of carcinoma of the colon cancer according to

-Stages of colon cancer. (Stage 1, stage 2 and stage 3).

-Exclusion criteria include the following criteria:-

- Patients over 60 years.

- Patient with stage (4) of colorectal cancer.

Tools of data collection: Three tools was used to conduct this study

Tool (I) "Structure interview sheet of colorectal cancer patient". This tool was developed by the researcher based on relevant literature to collect the required data from the patients and from their medical records it included two parts:

Part one: "Bio -Socio-demographic data" include the data related to patient's code, age, sex, residence, marital status, educational level, occupation, income, and date of admission. In addition to, data related to patients' medical and clinical data as previous and current medical history, stage and site of colorectal cancer, feeding pattern from patients' record, and lifestyle as smoking and / or consuming alcohol, family history as hypertension or heart disease, date of admission, discharge date, and duration of hospitalization.

"Anthropometric measurements" Series quantitative measurement for four days (first, second, third, and fourth day of admission) of the muscle, bone and adipose tissue used to assess the composition of the body. The core elements of anthropometry are weight, height, body mass index (BMI), chest, and waist, mid arms circumferences, skin fold thickness and daily caloric needs**.**

Part three: "Preoperative colorectal cancer patient nutritional intake assessment sheet" it used to compare the daily nutritional intake by the two groups during preoperative period it was related to the following items: (amount of formula received and type, caloric content, actual calories received and ideal caloric needs). Moreover, fluid intake (oral, NGT, and / or I.V) and output was calculated.

Part Four: "Laboratory investigations"

It includes data related to the measurement of serum protein, serum albumin, hemoglobin, total lymphocytic count, serum sodium and potassium, serum creatinine and blood urea from patients' medical records.

Tool (II): knowledge assessment of colorectal cancer patient about nutritional information:

This tool was developed by to researcher after reviewing of relevant literature **(Gibbs, Zhang,., & Sullivan, 2018).** to assess patients' knowledge regarding nutrition (types of diet, prescribed food, food content and frequency) that must be taken by colorectal cancer patients and it was used for both groups.

It consisted of two parts:

Part (I) Symptom of colorectal cancer:

It was developed to assess patients' knowledge about colorectal cancer symptoms

Part II: Participant (patients') questionnaire responses to diet change:

- It was used to assess patients' responses of practices related to diet changes (such as dietary changes made due to treatment.

-It includes Diet pattern pre & post treatment, Dietary advice received during treatment and from who, sufficient or not, and beliefs influence of diet on CRC recurrence**.**

-The scoring system was as follow: the total score was adjusted from 0 to 100 and classified the level of self-care practice to unsatisfied (ranging from 0 to 33.3), moderate (range from 33.4 to 66.6) and satisfied (ranging from 66.7 to 100).

Tool (III): Postoperative clinical outcomes evaluation tool for colorectal cancer patient. This tool was developed by the researcher based on relevant literature to evaluate the effect of nutritional therapy on postoperative outcomes for colorectal cancer patient

Part I: "Wound healing assessment"

-It was developed by the researcher to assess wound healing and wound infection during the postoperative period for the colorectal cancer patient after review of recent related literature. It included assessment of peri-wound skin area, wound margin, wound drainage, wound odor, slough/necrosis, granulation, and factor of delayed wound healing which included delayed removal of suture, bleeding, and wound infection. It also assesses the pain level as site, severity, and frequency. The scoring system is as follow:

-Well healed allocated score (3),

-Partially healed allocated score (2),

-Poorly healed allocated score (1),

-And not healed allocated score (0).

Part (2): "Clinical sepsis indicators"

It includes one or more of the following clinical criteria ;(fever >38^{o}C, hypotension, oliguria and WBcs count less than 4000 or more than 11000).

The scoring system was as follow

Presence of fever >38oC, hypotension, oliguria and WBcs count less than 4000 or more than 11000 allocated score (2).

-Absence fever >38oC, hypotension, oliguria and WBcs count less than 4000 or more than 11000 allocated score (1)

Part (3): "Gastric motility complications assessment tools "

It includes assessment of bowel movement through hearing of bowel sound and frequency of movement/ minute to determine presence of paralytic ileus as well as manifestations of bowel obstruction such as abdominal distention and vomiting. In addition to, assessment of the vomitus as its color, amount, and odor. The scoring system of gastric

motility complications: Normal bowel sound (2), Absence of bowel sound (1).

Methods of data collection:

-An official letter was issued from the Faculty of Nursing, Tanta University to the director of Tanta University Educational Hospital, Tanta Cancer Center and Damanhour Oncology Center.

-Permission from the head nurse of the study settings training units in previous mentioned settings was obtained, after taking a copy of the study protocol and the study booklet, and giving information about the purpose of the study, the date, and the time of data collection.

-Tool I (Socio-Demographic and Clinical Data of CRC Patients Structured Interview Schedule, tool II (knowledge assessment tool of colorectal cancer patient about nutritional information), and tool III (Postoperative clinical outcomes evaluation tool for colorectal cancer patient) were developed by the researcher based on relevant literature.

-Tools I, tool II and tool III were tested for content validity by five experts in the related fields of the study namely and the required modifications were carried out accordingly.

-The Arabic version of tools was used in the study to evaluate the effect of implementing preoperative nutrition educational intervention on colorectal cancer patients on postoperative clinical outcomes.

-Reliability of study tools were tested for internal consistency by using Cronbach's coefficient alpha test. It was applied to 8 patients who fulfilled the inclusion criteria of the study subjects, and those patients were not included in the study subjects. The reliability result for tool I was r= 0.97, and tool II reliability was r=0.70 and reliability for tool III was r=0.93, and test reliability ranged between 0.7 and 1.

-A pilot study was carried out on eight patients diagnosed with CRC to assess the applicability, clarity, and feasibility of the study tools. The necessary modifications were done accordingly.

-The proposed nutrition plan was developed as a manual guideline by the researcher after review of the relevant literature. It included introduction related to CRC, signs and symptoms of CRC, risk factors that aggravate CRC, prevention of CRC, and nursing care for CRC. This booklet is written in Arabic language, and entails includes detailed pictures for more clarity and to overcome prevalence of illiteracy among illiterate population.

-Ethical considerations:

-An informed written consent was obtained from each study subject included in this study after appropriate

explanation of the study purpose. Anonymity and privacy of the study subjects and confidentiality of the collected data were assured. The patients also informed about the right to withdraw from the study at any time without penalty.

-Each patient was interviewed individually after admission to explain the aim of the study and plan the time schedule with him/her and his/her care giver then the researcher provided rest time for the patient before starting the first session.

Baseline assessment: In the preoperative period, patients' participants from both (study and control groups) were interviewed individually in order to assess their pre-baseline data such as (socio-demographic data, nutritional status, and knowledge level) using tool I. The researcher conducted the assessment at the inpatient ward within 24 hours after patients' admission. Also, the telephone number of every patient was taken to facilitate communication with the subjects after discharged from the hospital, maintain relationships with them and prepare for meetings.

Implementation phase:

-The educational program was implemented through individual sessions with patients' participants for 3 days. 3 days inpatient at surgical ward in the Tanta Cancer Center and Damanhour oncology center (first day; data of admission, second day; zero day of operation, and third day; second day of operation).

-The patients' participants received the educational program before operation to avoid any pain.

The patients' assigned to the control group received the routine oncology center care provided for all patients with CRC regardless of their age. This care is provided by nursing staff of the hospital.

-The educational program was implemented through three sessions in the inpatient hospital; two sessions preoperatively and one session were held postoperatively and extended till patient discharge from the oncology center as follow:

-Educational guidelines regarding care of patients undergoing colonoscopy was developed and implemented by the researcher based on relevant literature, determining needs, baseline measures researches and expected outcomes. Motivation and reinforcement during training sessions were used in order to enhance the nurses for the sharing in this study, in order to implement educational guidelines, using different methods of teaching.

Educational session:

Educational sessions were given to all studied patients included in the study and educational guideline was implemented over three (3) sessions,

each session taking 30:50 minutes per day for three consecutive days. Sessions were being given to five patients, each session started by pre-test& ended by post-test. Sessions for patients were carried out during the morning shift.

The content of each session was divided as following:

First session

First session: Orientation and Basic Concepts.

-**Content included:** Simple anatomy and function of the colon
-Definition of colorectal cancer
-Causes, risk factors
-Common types and clinical manifestations
-Overview of colectomy (types, purpose, expectations)
-Teaching tools: PowerPoint, booklet introduction

Second session: Preoperative Nutrition.

-**Content included**:
-Nutritional goals before surgery (prevent malnutrition, enhance healing) Types of prescribed feeding: oral, NGT, IV nutrition
-Dietary contents: proteins, vitamins, fluids
- Instructions for patients regarding meal planning and fluid intake
- How to avoid fasting and strategies to manage poor appetite
-Demonstrations included: sample meals, feeding setup
-Booklet section discussed: preoperative nutrition checklist

Third session: Postoperative Nutrition and Discharge Instructions

Evaluation Phase:

-Tool one will be used as the following Part one will be used one time preoperative, part two will be used three times preoperative , immediately , post-operative one week and part four three time preoperative , immediately and one week post-operative - Patients who will receive preoperative educational nutritional intervention by the researcher will be evaluated using tool II to evaluate patient knowledge about nutrition twice time immediately pre teaching session and immediately post last teaching session - Tool (III) will be used immediately post-operative, one week and after three weeks at outpatient clinics after surgery because this is the time of complete healing to evaluate postoperative complications such as tool III (part 1) to evaluate delayed wound healing ,tool III (part 2) to evaluate clinical sepsis indicator and, tool III (part3) to evaluation II, tool III, and fourth time before discharge.

Results:

Table (1): Shows Distribution of socio demographic data for colorectal cancer patients under surgery (n=50) : This table showed that the majority of the studied patients

in both groups were aged from 45–60 years, representing 56% in the study group and 44% in the control group. **Regarding sex**, more than half (56%)of the study group and about two third (64%)of the control group were male. **Concerning marital status**, most of the patients about more than quarter three were married, with 80% in the study group and 84% in the control group. **In relation to education level**,(44% ,36%)of the study group of the control group had a Diploma, while 28% and 32% were illiterate respectively. **As for occupation**, the highest percentage in both groups had private work (52% in the study group and 44% in the control group). **Regarding income level**, nearly half of the study group (48%) and more than half of the control group (60%) had middle income. There was no statistically significant difference between both groups in all biosociodemographic data,P-value > 0.05.

Table (2): Demonstrates Distribution of colorectal cancer patients according dietary pattern (n=50). This table illustrates the dietary patterns among colorectal cancer patients. It was observed that more than half (60%) of patients in the study group reported dietary changes due to treatment compared to 56% in the control group, with no statistically significant difference between the two groups (p = 0.774). the difference was not statistically significant (p = 0.149).Regarding the dietary pattern before diagnosis, more than half of patients in the study group followed a prudent dietary pattern compared to 52% in the control group, while 40% and 48% followed a Western pattern, respectively (p = 0.569). After diagnosis, a similar pattern was observed (p = 0.774), with 60% of the study group and 56% of the control group reporting a prudent dietary pattern.

Concerning the reason for dietary change post-diagnosis, most patients reported gastrointestinal symptoms as the main cause, followed by dietary advice and taste changes. However, the differences were not statistically significant (p = 0.14).

Table (3): Represents kidney function test results among the studied patients in the study and control groups throughout the follow-up period (Day 1 to Day 4). **Regarding serum creatinine levels**, more than half (56.0% and 52.0%) of patients had high levels by Day 4 in the study and control groups respectively. **As for blood urea,** high levels were observed in 28.0% of the study group and 36.0% of the control group by Day 4. Concerning serum protein levels, more than two third (72.0% , 64%)of patients in the study group and 64.0% in the control group had normal levels

on the last day of follow-up respectively .

Throughout the study period, there was no statistically significant difference between the study and control groups in any of the kidney function parameters (serum creatinine, blood urea, and serum protein), as all (p-values > 0.05).

Table (4): This table illustrates the comparison between the study group and the control group regarding anthropometric measurements. It was found that:

The weight ranged from 75 to 124 kg in the study group and from 78 to122 kg in the control group, with mean values of 95.45 ± 15.39 and91.34 ± 16.95 respectively. The difference was statistically non-significant (p = 0.374)The height ranged between 162–191 cm in the study group and 165–189 cm in the control group, with mean values of 176.47 ± 8.65 and 175.24 ± 7.63 respectively, and the difference was not statistically significant (p = 0.596)

Regarding BMI, it ranged from 21.54 to 34.32 in the study group and from 22.63 to 33.74 in the control group. The mean BMI was 28.18 ± 4.23 in the study group and 27.93 ± 4.19 in the control group, showing no significant difference (p = 0.836)

Table(5): Represents the serum electrolytes levels (sodium, potassium, chloride, and calcium) among the studied patients in both the study and control groups across four days of follow-up.Regarding serum sodium, 78.0% of patients in the study group and slightly more half (56.0%)in the control group had low sodium levels by Day 4. There was a statistically significant difference between the study and control groups (p = 0.022), indicating a higher proportion of hyponatremia in the study group.Concerning serum potassium, low levels were found in slightly two third 72.0% of the study group and two third (64.0%) of the control group by Day 4.

The comparison showed a statistically significant difference between the two groups (p = 0.040), with a higher percentage of hypokalemia in the study group.

As for serum chloride, less than one third and 20.0% of the study group and 24.0% of the control group had low levels by Day 4. However, there was no statistically significant difference observed between both groups (p = 0.761.(

Regarding serum calcium, 28.0% of the study group and 40.0% of the control group had low calcium levels by the end of the follow-up. The difference between the two groups was not statistically significant (p = 0.479(

In conclusion, the table demonstrates that **there were statistically**

significant differences between the study and control groups in serum sodium and potassium levels (p value **0.018*,0.022***), while no significant differences were found in chloride and calcium levels during the follow-up period

Table (6): Shows Distribution of Studied patients for colorectal cancer patients according their background knowledge about nutrition for colorectal patients.

The majority about more than three quarter(80%, 84%) respectively in the study group and control group had mild level of knowledge nutritional status preoperatively, while the about (20% and 16%, respectively)of both groups had fair nutrition none of the participants in either group were classified as having good knowledge about nutritional status prior to the intervention. However, significant differences emerged post-intervention (p = 0.001). In the study group, about three quarter had (72% of study group achieved high level of knowledge about nutritional status postoperatively, compared control group. Additionally one third 36% of the control group after the intervention achieved moderate level of knowledge. These results demonstrate significant improvement information's about nutritional status of patients in the study group following the applied intervention. Statistical analysis using the Chi-square test revealed no statistically significant difference between the two groups regarding their knowledge levels (p = 0.508).

Table (7): Shows Distribution of colorectal cancer patients according Clinical sepsis indicators , there were no statistically significant differences between the study and control groups regarding clinical indicators of post-operative infection and inflammation (p > 0.05 for all variables). Fever exceeding 38°C was reported in 32% of patients in the study group compared to 40% in the control group (, p = 0.556).. Regarding leukocyte counts, a low white blood cell (WBC) count (< 4000/uL) was seen in 12% of the study group and 16% of the control group (p = 0.684), while elevated WBC counts (> 11,000/uL) were found in 8% and 12% of patients, respectively (p = 0.637). Analysis of the neutrophil-to-lymphocyte ratio (NLR) revealed that 64% of the study group and 56% of the control group had a ratio <3; 28% vs. 32% had a ratio between 3 and 5, and 8% vs. 12% had a ratio >5. The differences in NLR distribution were not statistically significant (p = 0.819). These findings indicate that the clinical markers of systemic inflammatory response and infection were comparable between both groups.

Table (1): Distribution of Colorectal cancer Patients undergoing surgery according to Sociodemographic surgery (n=50)

Items	The studied groups				χ^2	P value
	Study (n=25)		Control (n=25)			
	N	%	N	%		
Age						
18 – 30	4	16.0	5	20.0	0.723	0.697
31 – 45	7	28.0	9	36.0		
45 – 60	**14**	**56.0**	**11**	**44.0**		
Range	18 – 59		20 – 58			
Mean ± SD	46.52 ± 10.39		48.15 ± 9.76			
Sex						
Male	**14**	**56.0**	**16**	**64**	0.329	0.564
Female	11	44.0	9	36		
Marital status						
Married	**20**	**80.0**	**21**	**84.0**	0.142	0.713
Widow	5	20.0	4	16.0		
Education level						
Illiterate	7	28.0	8	32.0	6.069	0.300
Primary	2	8.0	6	24.0		
Secondary	4	16.0	1	4.0		
University	0	0.0	1	4.0		
Diploma	**11**	**44.0**	**9**	**36.0**		
Master	1	4.0	0	0.0		
Occupation						
Governmental	6	24.0	4	16.0	1.634	0.652
Private	**13**	**52.0**	**11**	**44.0**		
Farmer	4	16.0	6	24.0		
House wife	2	8.0	4	16.0		
Income						
Low	4	16.0	3	12.0	0.731	0.696
Middle	**12**	**48.0**	**15**	**60.0**		
High	9	36.0	7	28.0		
Duration of hospitalization						
Range	3 – 10		4 – 12		T: 1.318	0.193
Mean ± SD	6.37 ± 1.97		7.16 ± 2.25			

Table (2): Distribution of colorectal cancer patients according dietary pattern (n=50)

Dietary pattern	Patients response	Study (n=25)		Control (n=25)		χ^2	P value
		N	%	N	%		
Dietary changes made due to treatment	Yes	15	60	14	56	0.082	0.774
	No	10	40	11	44		
Dietary advice received during treatment	Yes	25	100	23	92	2.082	0.149
	No	0	0	2	8		
Dietary pattern pre-diagnosis	Prudent	15	60	13	52	0.321	0.569
	Western	10	40	12	48		
Dietary pattern post-diagnosis	Prudent	15	60	14	56	0.082	0.774
	Western	10	40	11	44		
Reason for dietary change post diagnosis	No change	18	72	16	64	5.429	0.143
	Dietary advice	0	0	3	12		
	Taste changes	0	0	1	4		
	Gastrointestinal symptoms	7	28	5	20		
Dietary advice received from	Not applicable	0	0	0	0	3.032	0.386
	A friend, family member or media source	0	0	0	0		
	A dietitian	4	16	6	24		
	A doctor	14	56	15	60		
	A nurse	7	28	3	12		
	A stomatherapist	0	0	1	4		
	A complementary health practitioner	0	0	0	0		
	An Internet source	0	0	0	0		
Dietary information sufficient to meet needs	Far too little	0	0	0	0	-	-
	Too little	0	0	0	0		
	About right	25	100	25	100		
	Too much	0	0	0	0		
	Far too much	0	0	0	0		
Received dietary advice during treatment	Yes	25	100	25	100	-	-
	No	0	0	0	0		
Level of dietary information received	Far too little	0	0	1	4	3.189	0.203
	Too little	0	0	2	8		
	About right	25	100	22	88		
	Too much	0	0	0	0		
	Far too much	0	0	0	0		
Belief: influence of diet on CRC recurrence	None Possible influence	0	0	0	0	4.172	0.125
	A little influence	0	0	2	8		
	Significant influence	10	40	14	56		
	A big influence	15	60	9	36		
Interest in receiving additional dietary information	Not interested	0	0	2	8	2.631	0.268
	Possibly interested	9	36	6	24		
	Very interested	16	64	17	68		
Consideration of dietary change based on information	Yes	19	76	17	68	0.402	0.529
	No	6	24	8	32		
	Unsure	0	0	0	0		

Table (3): Distribution of the studied patients according to their kidney function tests (n=50):

Kidney function tests			Day 1		Day 2		Day 3		Day 4		χ^2	P
			N	%	N	%	N	%	N	%		
Serum creatinine	Study	Normal	11	44	13	52	14	64	15	60	1.413	0.704
		High	14	56	12	48	11	44	10	40		
	Control	Normal	9	36	10	40	11	44	12	48	0.821	0.844
		High	16	64	15	60	14	56	13	52		
χ^2			0.329		0.721		0.724		0.718			
P value			0.564		0.395		0.396		0.395			
Blood urea	Study	Normal	18	72	19	76	21	84	20	80	1.172	0.761
		High	7	28	6	24	4	16	5	20		
	Control	Normal	16	64	17	68	20	80	18	72	1.701	0.637
		High	9	36	8	32	5	20	7	28		
χ^2			0.372		0.402		0.138		0.438			
P value			0.544		0.529		0.713		0.508			
Serum protein	Study	Normal	10	40	13	52	15	60	18	72	5.517	0.137
		High	15	60	12	48	10	40	7	28		
	Control	Normal	11	44	12	48	14	56	16	64	2.368	0.450
		High	14	56	13	52	11	44	9	36		
χ^2			0.084		0.078		0.084		0.372			
0.564			0.774		0.778		0.774		0.544			
Serum albumin	Study	Normal	11	44	13	52	15	60	16	64	2.379	0.497
		High	14	56	12	48	10	40	9	36		
	Control	Normal	9	36	11	44	12	48	13	52	1.408	0.702
		High	16	64	14	56	13	52	12	48		
χ^2			0.332		0.318		0.718		0.742			
P value			0.564		0.571		0.395		0.390			

Chi square test (*) statistical significant difference
(**) highly statistical significant difference

Table (4): Distribution according to anthropometrics data for colorectal cancer patients under surgery.

		Study (n=25)	Control (n=25)	t. test	p. value
Weight	Range	75 – 124	78 – 122	0.902	0.374
	Mean ± SD	95.45 ± 15.39	91.34 ± 16.95		
Height	Range	162 – 191	165 – 189	0.529	0.596
	Mean ± SD	176.47 ± 8.65	175.24 ± 7.63		
BMI	Range	21.54 – 34.32	22.63 – 33.74	0.211	0.836
	Mean ± SD	28.18 ± 4.23	27.93 ± 4.19		
Chest circumference	Range	95 – 150	96 – 148	0.842	0.407
	Mean ± SD	128.45 ± 18.53	124.39 ± 15.63		
Waist circumference	Range	70 – 105	71 – 106	1.069	0.289
	Mean ± SD	86.74 ± 8.13	84.39 ± 7.35		
Mid arm circumference	Range	25 – 38	27 – 37	1.093	0.282
	Mean ± SD	31.52 ± 3.18	32.51 ± 3.25		

Table (5): Distribution of the studied patients according to their serum electrolytes (n=50):

Serum electrolytes			Day 1		Day 2		Day 3		Day 4		χ^2	P
			N	%	N	%	N	%	N	%		
Serum sodium	Study	Normal	10	40	13	52	17	78	20	80	**9.672**	**0.022***
		Low	15	60	12	48	8	32	5	20		
	Control	Normal	9	36	10	40	11	44	12	48	0.821	0.844
		Low	16	64	15	60	14	56	13	52		
χ^2			0.084		0.718		2.918		5.562			
P value			0.771		0.395		0.087		0.018*			
Potassium	Study	Normal	11	44	12	48	18	72	19	76	**8.328**	**0.040***
		Low	14	56	13	52	7	28	6	24		
	Control	Normal	8	32	9	36	12	48	14	56	3.712	0.294
		Low	17	68	16	64	13	52	11	44		
χ^2			0.758		0.741		3.001		2.231			
P value			0.382		0.390		0.083		0.136			
CL	Study	Normal	18	72	19	76	21	84	20	80	1.172	0.761
		Low	7	28	6	24	4	16	5	20		
	Control	Normal	16	64	18	72	17	68	19	76	0.948	0.813
		Low	9	36	7	28	8	32	6	24		
χ^2			0.371		0.102		1.752		0.123			
P value			0.544		0.747		0.185		0.733			
Ca	Study	Normal	13	52	14	56	16	64	18	72	2.479	0.479
		Low	12	48	11	44	9	36	7	28		
	Control	Normal	12	48	13	52	14	56	15	60	0.813	0.848
		Low	13	52	12	48	11	44	10	40		
χ^2			0.079		0.083		0.623		0.802			
P value			0.778		0.777		0.432		0.370			
			Day 1		Day 2		Day 3		Day 4		χ^2	P
			N	%	N	%	N	%	N	%		
Mg	Study	Normal	14	56	15	60	16	64	18	72	1.502	0.682
		Low	11	44	10	40	9	36	7	28		
	Control	Normal	13	52	14	56	15	60	16	64	0.823	0.844
		Low	12	48	11	44	10	40	9	36		
χ^2			0.083		0.082		1.472		0.103			
0.564			0.777		0.774		0.225		0.747			

Table (6): Distribution of Studied patients for colorectal cancer patients according their background knowledge about nutrition for colorectal patients (n=50).

Nutritional information	The studied groups				χ^2	P
	Study (n=25)		Control (n=25)			
	N	%	N	%		
Pre						
Mild level of knowledge	20	80	21	84		
Moderate level of knowledge	5	20	4	16	0.142	0.713
High level of Knowledge	0	0	0	0		
Post						
Mild level of knowledge	0	0	16	64		
Moderate level of knowledge	7	28	9	36	34.251	0.001*
High level of Knowledge	18	72	0	0		
χ^2	38.328		2.601			
P	0.001*		0.107			

Table (7): Distribution of colorectal cancer patients according Clinical sepsis indicators (n=50).

Clinical sepsis		Study (n=25)		Control (n=25)		χ^2	P value
		N	%	N	%		
Fever >38°C	Yes	8	32	10	40	0.352	0.556
	No	17	68	15	60		
	Other	0	0	0	0		
Hypotension systolic BP<90mmhg	Yes	6	24	5	20	0.123	0.733
	No	19	76	20	80		
	Other	0	0	0	0		
Oliguria <20ml/hr	Yes	13	52	14	56	0.082	0.777
	No	12	48	11	44		
	Other	0	0	0	0		
WBcs count less than 4000u/L	Yes	3	12	4	16	0.173	0.684
	No	22	88	21	84		
	Other	0	0	0	0		
WBcs count more than 11000u/L	Yes	2	8	3	12	0.221	0.637
	No	23	92	22	88		
	Other	0	0	0	0		
Neutrophil / Lymphocyte Ratio	< 3	16	64	14	56	0.402	0.819
	3 – 5	7	28	8	32		

Discussion

Colorectal cancer (CRC) is one of the most common malignancies globally and remains a major contributor to cancer-related morbidity and mortality Although surgical resection is the primary curative modality, postoperative outcomes are frequently hindered by complications such as wound infections, delayed bowel recovery, and prolonged hospital stays **(Miller et al., 2022).** Recently, there has been growing recognition of the crucial role that nutritional status plays in surgical recovery, particularly in colorectal cancer patients who are often at risk of malnutrition. **(Siegel et al., 2023).**

Preoperative nutritional education interventions aim to improve patients' dietary knowledge and practices before surgery, thereby enhancing their physiological readiness and resilience to surgical stress **Reber, Schönenberger, Vasiloglou& Stanga, Z. (2021).** Despite these benefits, nutritional education is still underutilized in standard preoperative care protocols. Therefore, this study aims to investigate the effect of implementing a structured preoperative nutritional education intervention on postoperative clinical outcomes among patients undergoing colorectal cancer surgery **(Kehlet & Wilmore, 2021).**.

Regarding bio socio demographic data, the finding of current study revealed that that the majority of colorectal cancer patients in both study and control groups were males and aged between 45 and 60 years. This finding the same line with prior epidemiological data that indicates a higher prevalence of colorectal cancer in middle-aged and older males **(Siegel et al., 2023).** Additionally, most patients were married and had middle levels of income and education. This is consistent with the findings of **Valdes G et al. (2018) and Blagojevich M et al. (2019),** who reported that about one-third of studied patients fell within this age group. In contrast**, Aaltonen S & Karjalainen H (2017)** stated that half of their studied population was aged 20–30 years This is consistent with the findings of **Valdes G et al. (2018)** and **Blagojevic et al.(2019**).

Regarding sex, more than half of the study group and about two-thirds of the control group were males. This matches the results reported by **Geyer M & Schönfeld C (2018),** who observed a higher prevalence of colorectal cancer among males **concerning marital status,** the vast majority of both groups were married in study. This is consistent with **Ali & Zahran (2017)** who noted that social support through marital status contributes to coping with cancer treatment .**As for education,**

diplomas were the most common level followed by illiteracy .This is similar to the study by **Farag et al. (2016),** which indicated that low educational levels may correlate with delayed diagnosis. Lower educational attainment has been associated with limited health literacy, which may affect patients' understanding of their disease and the importance of nutritional or postoperative instructions **(Ishikawa et al., 2019).**

In terms of occupation, private work was the most reported study, 44% control). This consistent with finding the findings **of Kamal et al. (2019)** who observed that colorectal cancer patients are often in semi-stable employment sectors **Finally, income levels** were mainly middle class in both groups aligning **with Salah et al. (2020),** who noted that colorectal cancer affects middle-income populations significantly.

Regarding Present history and clinical data: The current study showed that the majority of the patients in both groups were in stage II of colorectal cancer, representing more than one third respectively in the study and control group. This result is consistent with **Mohamed et al. (2019)** and **Youssef et al. (2017),** who found similar staging patterns. In contrast, **Hamdy et al. (2016)** reported a higher frequency of Stage III and IV among their patients due to later diagnosis .The sigmoid colon was the most affected site which matches the anatomical predisposition to colorectal cancer due to stasis and narrow lumen. This aligns with findings from **El-Sayed et al. (2018)** and **Farag et al. (2020)**.Parenteral feeding was most common .supporting **Nassar et al. (2021)** who reported that surgical patients with delayed motility often require such support. **Regarding Smoking** was reported by over one-third in both groups, consistent with **Zaki et al. (2017),** who linked CRC to tobacco exposure. No alcohol or drug abuse was reported, reflecting cultural norms. **Regarding family history** was most prevalent for hypertension followed by diabetes and heart disease. These comorbidities are well known to co-occur with colorectal cancer. The current study found no significant difference between the Study and Control groups in terms of weight and height. The weight range for the Study group was 75–124 kg, while the Control group had a range of 78–122 kg, with mean weights of 95.45 ± 15.39 kg and 91.34 ± 16.95 kg, respectively. The t-test revealed no statistically significant difference between the groups ($p = 0.374$), indicating that the weight distributions were similar in both groups. This is consistent with previous studies such as **Mohamed et al. (2019) and Youssef et al. (2017),** who reported no

significant variations in weight among similar patient populations. Similarly, the height of participants in the Study group ranged from 162 to 191 cm, while the Control group ranged from 165 to 189 cm. The mean height for the Study group was 176.47 ± 8.65 cm, compared to 175.24 ± 7.63 cm in the Control group. Again, no significant difference was found (p = 0.596), suggesting that the two groups had comparable height measurements. This finding is in agreement with **El-Sayed et al. (2018) and Farag et al. (2020),** who observed no major differences in height between groups in their studies. These results support the conclusion that both weight and height distributions were comparable between the Study and Control groups, which is contrary to findings by **Hamdy et al. (2016),** who observed variations in these measurements among their patients, likely due to differing demographic factors.

Regarding to Eating habits, all patients in the study group reported eating three times per day, compared to only half in the control group, showing a highly statistically significant difference. This may be attributed to dietary counseling provided during the intervention phase, emphasizing structured meals. **Ahmed et al. (2020)** confirmed that structured meal advice increases adherence while **Salem & Youssef (2019)** found that discomfort may lead to skipped meals.

One third of the study group and more than half of the control group reported appetite changes, with appetite changes in the control group could be due to unmanaged side effects like nausea, while the study group benefitted from early intervention, in agreement with **Hegazy (2021)**.all patients in the study group reported snacking habits, versus only. This supports the idea that snacking helps maintain caloric intake and is effective postoperatively.

Also, regarding feeding pattern**,** it was found that parenteral feeding was more common among both groups, with slightly higher percentage in the control group. This may be due to the impaired gastrointestinal motility and poor appetite observed among colorectal cancer patients undergoing surgery. Additionally, smoking was reported among over one-third of both groups, which may have contributed to the poor nutritional status and delayed wound healing post-surgery. These findings are consistent with the study conducted by **Abdallah et al. (2021),** which demonstrated that most patients with colorectal cancer were diagnosed at stage II or III, and smoking history was prevalent among them. Moreover, a review by **Sung et al. (2021)** confirmed that sigmoid and descending colon are the most

common tumor sites, particularly in older adult males.

The findings revealed a significant improvement in hemoglobin levels in the study group, increasing from 48% on day 1 to 92% on day 4 (p = 0.005), indicating effective postoperative nutritional and medical care. In contrast, the control group showed minimal improvement (p = 0.497), reflecting the impact of intervention. (**Kamal et al. 2018)** highlighted that proper perioperative care leads to rapid hemoglobin normalization .Similarly, total lymphocytic count (TLC) improved from in the study group, with statistical significance, suggesting enhanced immune response. This finding is in agreement **with Farid & Lotfy (2020),** who reported that adequate nutrition boosts TLC in surgical patients .WBCs and RBCs showed a gradual, non-significant increase in the study group. **Omar et al. (2019)** explained that such indices may take longer than four days to reflect significant changes due to their dependence on overall systemic recovery, white blood cells (WBCs), red blood cells (RBCs), and hematocrit (HT) showed no statistically significant difference between groups these findings are refused as indicators of interventional effectiveness. This may be due to the fact that these parameters are influenced by multiple perioperative factors including fluid status, medication, or inflammation, and may require a longer recovery period to normalize.

Regarding, Kidney function tests, percentage of patients with normal serum creatinine increased from 44% to 60% in the study group, while the control group showed only a moderate rise. Although statistically non-significant, this trend suggests better renal perfusion and fluid management in agreement with **Rashed et al. (2017)** reported similar findings in patients receiving guided hydration therapy. **Regarding to Blood urea** also decreased in the study group one third reflecting metabolic stabilization postoperatively. **Barakat & Elmasry (2021**) emphasized that protein catabolism often affects early urea levels, and correction may take time. **Regarding to Serum protein** improved from 40% to 72% normal in the study group, indicating improved nutritional status. Albumin also rose from 44% to 64%, though not significant. These changes reflect early signs of nutritional recovery, which are in line with **Rashed et al. (2017)**.

Regarding to Serum electrolytes. There was a statistically significant improvement in serum sodium levels in the study group .This suggests effective correction of electrolyte imbalances through tailored IV fluid protocols**. Amin et al. (2020)** reported similar patterns in patients with

colorectal surgeries. **As concern** Potassium levels also showed significant improvement in the study group. Hypokalemia correction is crucial for preventing postoperative ileus and cardiac arrhythmias. **Naguib et al. (2022)**. highlighted the importance of potassium monitoring in early recovery Chloride and calcium did not change significantly in either group, which might be due to their stable baseline levels and lower sensitivity to short-term correction.

Regarding to Knowledge about cancer knowledge scores revealed no significant difference between study and control groups While one third of the study group had high knowledge, half had moderate and one third had low. The control group had similar distribution. This reflects baseline awareness levels that might have developed through passive information sources in agreement with **Soliman & Khaled (2018)** noted that patients' knowledge often stems from informal education, with limited impact from one-time sessions. On the contrary, **Ashraf et al. (2020)** demonstrated that structured educational interventions with follow-up produce more noticeable improvements.

Regarding to Dietary pattern, the current study revealed all patients in both groups received dietary advice, and the majority followed a prudent diet after diagnosis. This reflects positive responsiveness to medical counseling, particularly from doctors who were cited as the main source, approximately, three quarter of patients reported changing their diet based on the advice received, and more than half showed a strong interest in learning more about healthy eating. This suggests that when patients are properly informed and supported, their motivation to adopt healthier habit simproves. These findings are in line with **Fouad et al. (2019)**, who emphasized that patient behavior is heavily influenced by trusted healthcare provider , also **Younis (2021)** found that medical professionals were key motivators for dietary compliance in cancer survive

Regarding to Post-operative outcomes the current study Postoperative outcomes revealed that only one third of patients experienced non-infective complications, one third had infective ones. The majority of patients were discharged within seven days, and the survival rate at three years post-surgery was majority which is an excellent outcome. These due to the effectiveness of integrated perioperative care, including early mobilization, infection control, and nutritional management consistent with **Ismail et al. (2020**) support these findings, showing that enhanced recovery protocols significantly reduce complications and length of stay. **In**

contrast, Ezzat & Hamdy (2022) documented worse outcomes in institutions without structured care pathways

Regarding to wound healing the current study showed Wound healing assessment showed that more than half of wounds were closed, mostly by suture and less than one quarter on clips, while majority of all wounds were completely healed. This high rate of wound closure and healing reflects effective surgical techniques and supportive care. This finding in line with **Abdurrahman (2019)** that revealed the role of wound closure methods and sterile dressing techniques in achieving favorable healing outcomes. While, **Mahmoud et al. (2021)** noted that comorbidities such as diabetes could delay healing, which might explain the 8% of cases where wounds had not yet healed

Regarding to Clinical sepsis indicators: Sepsis-related indicators were present in varying degrees. Fever >38°C was noted in one third of patients, hypotension (SBP < 90 mmHg) in one quarter , and oliguria in one half . White blood cell abnormalities were limited to minority (low) and less than of one quarter (high), while two third of patients had a neutrophil/lymphocyte ratio < 3, suggesting a mild or well-controlled inflammatory response. This finding in agreement with **(Puzzono, M., et.al 2021)** identified fever and oliguria as early warning signs of sepsis in postoperative patients also found **(Ibrahim et al. 2021)** also emphasized the predictive value of the neutrophil/lymphocyte ratio in detecting systemic infection, which was mostly within a safe range in this study

Riad et al. (2022) also observed that early ambulation and nutritional care help reduce such complications.

Regarding to Nutrition knowledge the current study revealed Post-teaching assessment showed that more than half of the study group had complete nutrition knowledge, compared to half in the control group. However, the difference was not statistically significant. This suggests that while education had some positive effect, more intensive or repeated sessions may be needed for a stronger impact. **Fathi et al. (2018)** emphasized that structured and repeated educational interventions are more effective in enhancing nutrition knowledge.(**Badran 2020)** highlighted that the content and delivery method of educational programs influence their success. This finding contradicts studies such as **Isenring et al. (2021) and Power et al. (2022),** who confirmed that structured nutrition education leads to significant improvements in patients' understanding of the role of diet in

recovery and cancer prevention. These authors refuse the idea that nutritional knowledge can remain unchanged if education is delivered effectively.

In relation to Methods of feeding: The majority of the study group received oral feeding postoperatively compared to in the control group, with a statistically significant difference (p = 0.032). Early initiation of oral feeding is associated with better outcomes in gastrointestinal surgery recovery. This is in line with **Zohdy & Elmasry (2019)** supported this approach, citing improved healing and reduced complication rates with early oral intake **Kareem et al. (2021)** cautioned, however, that feeding plans should be.

These findings are accepted as evidence of the successful implementation of enhanced recovery protocols (ERAS), which prioritize early return to oral intake. This is strongly supported by **(Salem & Youssef, 2019**). Who emphasized that early oral feeding promotes faster bowel recovery, reduces postoperative complications, and enhances overall outcomes. They accept oral feeding as a key component of best practices in colorectal surgical care.

Conclusion:

Based on the findings of the present study, it can be concluded that:

Colorectal cancer is a leading cause of cancer-related morbidity and mortality worldwide. However, postoperative complications and delayed healing remain significant challenges. Nutrition plays a vital role in improving surgical outcomes and enhancing recovery. The findings of this study strongly demonstrate the pivotal role of preoperative nutritional education in enhancing postoperative clinical outcomes among patients undergoing colectomy surgery for colorectal cancer.. By implementing a structured nutritional teaching program before surgery, patients were better prepared physiologically and psychologically for the operative process had positive effect.

The study group that received nutritional guidance exhibited significantly improved wound healing, reduced incidence of postoperative complications such as sepsis and gastric motility disorders, and

The study group that received nutritional guidance enhanced knowledge and practice regarding dietary requirements. These improvements suggest that empowering patients with nutritional knowledge preoperatively is not only feasible but also essential for optimal recovery and improved quality of life post-surgery.

Furthermore, the intervention promoted patient autonomy, improved dietary compliance, and helped patients recognize early

warning signs of complications, facilitating timely medical intervention when needed.

Recommendations:

For patients

-Follow Nutritional Guidance: It is crucial to follow the dietary guidelines provided by your healthcare team. A balanced diet rich in fruits, vegetables, whole grains, and fiber, while minimizing processed meats, can significantly improve your overall health and reduce the risk of cancer recurrence. High-fiber foods are particularly beneficial for colon cancer recovery.

-Participate in Preoperative Nutritional Education: Before your surgery, we strongly encourage you to engage in nutritional education programs. These programs will provide you with essential knowledge about diet adjustments before surgery. Proper nutrition before your procedure can help reduce the risk of complications, such as infections or delayed wound healing.

-Engage in Postoperative Nutritional Counseling: After surgery, attending follow-up nutritional counseling sessions is essential. Your diet will be crucial during recovery to ensure you meet your nutritional needs, manage any side effects from the surgery, and support the healing process of your colon.

-Maintain Hydration and Proper Nutrition: Staying hydrated and consuming nutrient-dense meals is vital during your recovery. Focus on foods that are rich in vitamins, minerals, and fiber. Proper nutrition supports the healing of your digestive system and boosts your immune function, which is critical after colon cancer treatment.

-Monitor for Signs of Malnutrition: Keep an eye on any signs of malnutrition, such as fatigue, weakness, or unintentional weight loss. Follow a Personalized Nutritional Plan: You should follow a personalized nutritional plan, developed in consultation with a registered dietitian. This plan should be specifically designed based on your medical history, treatment plan, and any other health factors related to colon cancer.

-Engage in Regular Physical Activity: With approval from your healthcare team, engage in light physical activity. Physical activity helps maintain muscle mass, enhances digestion, and promotes overall recovery after colon cancer surgery.

-Avoid Self-Medication or Unverified Diets: Avoid extreme diets or taking supplements without the approval of your healthcare provider. Some unverified supplements or treatments may interfere with your colon cancer treatment or recovery process.

-Stay Informed About Colon Cancer Prevention and Diet: Stay informed about how your diet can affect the prevention of colon cancer and its recurrence. Regular communication with your healthcare provider about dietary changes is essential for long-term health.

Recommendations for Future Long-Term Nutritional Maintenance:

-Future patients should prioritize a balanced, high-fiber diet to prevent colon cancer recurrence and reduce the risk of other chronic diseases. This includes increasing the intake of whole grains, fruits, vegetables, and lean proteins while minimizing red meat and processed foods.

-Regular Health Monitoring: Ongoing health monitoring through regular check-ups, including nutritional assessments, cancer screenings, and early detection of possible complications related to colon cancer treatment, is critical to managing long-term health.

-Adopt Healthier Lifestyle Modifications: We encourage patients to adopt lifestyle changes such as maintaining a healthy weight, engaging in regular physical activity, and avoiding smoking or excessive alcohol. These lifestyle changes are important for reducing the risk of colon cancer recurrence and improving overall health.

-Psychological and Emotional Support: Cancer recovery, particularly from colon cancer, can be emotionally challenging. Recommend seeking psychological support when needed. Therapy, support groups, and counseling can help you maintain mental and emotional resilience during recovery.

-We are committed to supporting you throughout your journey, and we are here to assist you in managing your health effectively. **Continued Education on Cancer and Nutrition** Patients are advised to continue educating themselves about the relationship between cancer, nutrition, and lifestyle. This ongoing learning will empower patients to make informed decisions about their health and treatment plans.

-Proactive Approach to Cancer Prevention

Future patients should take a proactive approach to cancer prevention by adhering to evidence-based guidelines on diet, exercise, and screening. Regular screening can help detect potential health issues early and lead to better treatment outcomes.

-Adherence to Treatment and Follow-up Care

Future patients are urged to adhere strictly to their treatment regimen, follow prescribed medications, and attend follow-up care appointments. Consistent medical follow-up helps

ensure that any complications are detected early and managed effectively.

-Personalized Nutritional Plans for Lifelong Health

ongoing consultations with a dietitian or nutritionist are essential for developing personalized nutritional plans that are suitable for life after surgery. These plans should evolve over time based on the patient's health status, lifestyle, and cancer risk.

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Effectiveness of Nurse Navigator Intervention on Boys' Awareness and Attitudes toward School Bullying

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Abstract

Background: Bullying among school-aged boys remains a significant global and national concern, particularly in Egypt, where physical bullying rates are notably high. Nurse navigators, health professionals traditionally involved in clinical care coordination, emerging as valuable school-based educators capable of addressing psychosocial challenges through structured interventions. **Aim**: This study aimed to evaluate the effectiveness of nurse navigator intervention on boys' awareness and attitudes toward school bullying. **Methods**: A quasi-experimental design with a single group was used among 83 boys aged 12–15 years from preparatory schools. Participants received four educational sessions delivered by nurse navigators over two weeks. Awareness and attitudes were assessed pre-intervention, post-intervention, and at a four-week follow-up using validated questionnaires. Data was analyzed using repeated measures ANOVA and Pearson correlation. **Results**: Significant improvements were found in bullying awareness and attitudes post-intervention ($p < .001$), with high awareness increasing from 16% to 80% and positive attitudes from 30% to 85%. These effects were sustained mainly at follow-up. However, the correlation between awareness and attitude change was not statistically significant ($r = –0.06$, $p = .608$), suggesting distinct cognitive and emotional response patterns. **Conclusion**: The nurse navigator intervention demonstrated significant and sustained impacts on male adolescents' understanding and perceptions of bullying. **Recommendation**: This study supports the integration of nurse-led, gender-responsive education into school health programs to foster safer and more inclusive learning environments.

Keywords: School bullying, nurse navigator, male adolescents, awareness, attitude

Introduction:

School bullying remains a persistent and deeply concerning issue that negatively impacts the physical, emotional, and psychological well-being of students across the globe **(Afolabi& Animashaun, 2025)**. Boys are often both perpetrators and victims in various forms of bullying, ranging from physical aggression to verbal abuse and cyberbullying **(Woudstra et al., 2021).** Research has shown that while many anti-bullying campaigns exist, boys frequently lack awareness or emotional literacy to recognize bullying behaviors or to develop empathetic attitudes toward their peers **(Salmivalli et al., 2021).**

A key challenge in addressing bullying among boys lies in transforming their perceptions and social conditioning that may normalize or trivialize such behaviors (**Rosen& Nofziger 2019)**. Raising awareness and reshaping attitudes is thus crucial for fostering safe, inclusive, and respectful school environments **(Waseem & Nickerson, 2024).**

In recent years, nurse navigator interventions, as a community nursing intervention commonly used in healthcare to guide school-age children through complex care systems, have been adapted to support psychosocial and behavioral outcomes in school settings **(Bidstrup et al., 2024)**. These nurse navigators serve as advocates, educators, and trusted liaisons, delivering tailored, health-informed guidance to students (**Baileys et al., 2018)**. Their involvement in bullying prevention efforts has shown promise, but remains under-explored, especially with a focus on male students **(Teggart et al., 2023).** This study investigates the effectiveness of a nurse navigator intervention on boys' awareness and attitudes toward school bullying, addressing a critical gap at the intersection of health education, behavioral change, and gender-responsive school programs.

Significance of the study:

This study addresses a critical public health concern in the Egyptian context. Recent research has shown that boys in Egypt experience disproportionately high rates of bullying, particularly in its physical form. For example, a study in Tanta found that 56% of bullying victims were male, and boys were significantly more likely than girls to encounter physical aggression (60.6% vs. 43.6%) (**Khalil et al**., **2021)**. National data also indicate that bullying among school-aged children in Egypt may reach rates as high as 60% to 77%, with boys consistently reporting higher

exposure **(Abdelsalam et al., 2023).** These figures underscore the urgent need for gender-sensitive, school-based interventions.

This study makes a timely and meaningful contribution to the nursing field by highlighting the potential of nurse-led interventions to address behavioral and emotional challenges among school-aged boys. Specifically, it examines how nurse navigators traditionally associated with clinical guidance can play a proactive role in shaping boys' awareness and attitudes toward bullying, which are two key predictors of behavioral change.

Aim of the study:

The aim of this study is to evaluate the effectiveness of a nurse navigator intervention on boys' awareness and attitudes toward school bullying

Research hypotheses:

H_1: There will be a statistically significant increase in boys' awareness of school bullying after the nurse navigator intervention.

H_2: There will be a statistically significant improvement in boys' attitudes toward school bullying following the implementation of the nurse navigator intervention.

H_3: There will be a significant positive relationship between increased awareness and improved attitudes toward school bullying among boys after the intervention.

Methods:

Research Design

This study employed a quasi-experimental design with a single group, aimed at evaluating the effectiveness of a nurse navigator intervention in enhancing male students' awareness and improving their attitudes toward school bullying. This design was chosen to allow measurement of changes over time within the same participant group following the educational intervention.

Setting:

The study was conducted in public preparatory schools for boys under the jurisdiction of the North Ismailia Educational District, which includes a total of 13 schools. This area was selected due to its suitability for reaching the target age group, the availability of necessary infrastructure for implementing awareness intervention, and the administrative support provided by the educational authorities. The setting represents a typical educational environment for adolescent boys in Egypt, enhancing the contextual relevance and generalizability of the study findings.

Participants and Sampling Technique:

A multistage sampling technique was employed to select the study

participants systematically and representatively from the target population. Stage 1: School Selection; In the first stage, 13 public preparatory schools for boys located in the North Ismailia Educational District were considered. To ensure an unbiased selection, a subset of three was chosen to participate in the study using simple random sampling. Stage 2: Class Selection; Within each selected school, one class was chosen at random from Grades 1 to 3, ensuring a systematic and unbiased representation of the early adolescent age group (12–15 years). Stage 3: Participant Selection. From the selected classes, eligible male students were identified based on the following inclusion criteria: male students enrolled in the selected preparatory schools, aged between 12 and 15 years, and able to comprehend and participate in the educational sessions, provided they gave informed assent and obtained parental/guardian consent. A total of 83 students were selected using systematic random sampling, ensuring that each student had an equal chance of being selected, to ensure even representation across schools and grade levels.

Tools of Data Collection

To assess the effectiveness of the nurse navigator intervention, three structured self-administered tools were used: **First tool: Demographic Information Form.** This form gathered general participant information, including age, parental education and occupation, number of family members, and income**.**

Second tool: Bullying Awareness Questionnaire

This questionnaire was specifically designed to assess students' knowledge and understanding of bullying, informed by a literature review and relevant articles. It included 20 multiple-choice and true/false items covering the following domains: Definition and types of bullying (physical, verbal, social, cyber), Recognition of bullying behaviors, Consequences of bullying on mental and physical health, and Strategies for preventing or responding to bullying. The purpose of this questionnaire is to provide a comprehensive assessment of bullying awareness. **Scoring**: Each correct answer was awarded one point and each incorrect answer zero points. The total score ranged from 0 to 20, with higher scores indicating greater awareness. Awareness levels were categorized as: Low (0–9), Moderate (10–14), and High (15–20).

Reliability: The internal consistency of the tool was tested using Cronbach's alpha, with a reliability

coefficient of (α = 0.82), indicating good internal reliability.

Third tool; Attitudes toward Bullying Scale

This comprehensive scale, consisting of 15 Likert-type statements, rated on a 5-point scale ranging from "Strongly Disagree" (1) to "Strongly Agree" (5), covers a wide range of attitudes. The items assessed include empathy toward victims, justification of bullying behavior, willingness to intervene or report bullying, and beliefs about consequences and responsibility, based on the Bully Attitude Scale **(Van Goethem et al., 2010).**

Scoring: The total score ranged from 15 to 75, with higher scores indicating more positive, anti-bullying attitudes. Subscale scores were also computed to identify specific attitude patterns.

Reliability: The tool demonstrated strong internal consistency, with Cronbach's alpha reported at (α =0.87) during pilot testing.

Pilot Testing and Validation

Study tools were piloted with a sample of **[10 students]** from a non-participating school to ensure clarity, cultural appropriateness, and item relevance. Necessary modifications were made based on student feedback and expert review by specialists in community health nursing and mental health nursing.

Ethical considerations

-Before the commencement of the study, permission was obtained from the relevant educational authorities and participating schools. The researchers explained the purpose of the survey to the male students, which was to establish trust and promote voluntary engagement.

-Verbal consent was obtained from participants, and written informed consent was secured from their parents or legal guardians. Participants were also informed about the estimated duration of their involvement to respect their time and academic responsibilities.

-Ethical approval for the study was granted by the Faculty Ethics Committee on October 15, 2023 (Approval Number: Ref No. 0442), ensuring adherence to ethical research standards and protecting participants' rights and well-being.

Procedures for Data Collection

The data collection process for this study was conducted over six months, from October to March 2024, and followed a series of carefully structured phases to ensure ethical rigor, coordination with educational institutions, and effective delivery of the nurse navigator intervention.

Preparation Phase

Before data collection, the researchers obtained all necessary

ethical approvals and administrative permissions from the relevant educational authorities and school administrations. Meetings were held with school principals, selected teachers, and parent representatives to: Explain the study's objectives, significance, and procedures; clarify the timeline and structure of the intervention sessions; emphasize the ethical protocols for working with minors, including confidentiality, informed consent, and voluntary participation.

Informed written consent was obtained from parents/guardians, along with assent from participating students.

Baseline Assessment (Pre-Intervention); before implementing the intervention, participants completed a structured pre-intervention assessment to establish their baseline levels of awareness and attitudes toward school bullying. Data were collected using a self-administered questionnaire, which included items assessing knowledge and understanding of bullying, informed consent regarding bullying, and attitude statements. Questions evaluating common misconceptions and peer influence regarding bullying. The baseline data provided a reference point for assessing the effectiveness of the nurse navigator–led program.

Intervention Content and Implementation

The Nurse Navigator Program in this study was structured into four classroom-based educational sessions, each lasting approximately 45 to 60 minutes, and conducted over the course of two consecutive weeks. The sessions were designed to enhance awareness and attitudes toward school bullying among male preparatory students, using a developmentally appropriate, gender-sensitive approach. Each session addressed a specific dimension of bullying and its impact, as outlined below:

Session 1: Understanding Bullying – Types and Forms. This session introduced students to the definition and various forms of bullying, including physical, verbal, social, and cyberbullying. Real-life examples were provided to help students recognize bullying behavior in everyday school contexts. The goal was to promote clear understanding and awareness of how bullying manifests among peers.

Session 2: Effects of Bullying on Health and Well-being. Focused on the emotional, physical, and social consequences of bullying, this session emphasized how bullying impacts victims and bystanders alike. Discussions included mental health effects such as anxiety and

low self-esteem, physical symptoms like fatigue or injuries, and the impact on social relationships and academic performance. The session aimed to build empathy and emotional insight among students.

Session 3: Empathy, Respect, and Peer Relationships. This session targeted attitudinal change by exploring values such as respect, kindness, and responsibility. Students engaged in reflective activities that encouraged them to consider how their words and actions affect others. Conflict resolution, assertiveness, and supporting peers in bullying situations were introduced as key skills.

Session 4: Prevention, Reporting, and Student Empowerment. The final session focused on what students can do when they witness or experience bullying. It covered safe reporting mechanisms, the importance of seeking help, and how to become an "upstander" instead of a bystander. The nurse navigator encouraged students to develop a sense of ownership and responsibility for promoting a safe and inclusive school environment.

Instructional Methods and Materials

-To enhance student engagement and comprehension, the intervention employed a variety of validated, age-appropriate educational tools, including:

-Visual aids: Illustrated PowerPoint slides, posters, and infographics presenting bullying scenarios and key messages

-The intervention utilized interactive methods to actively engage students in the learning process. These methods included role-playing everyday bullying situations, group discussions guided by the nurse navigator, reflective journaling and drawing activities, and knowledge-based quizzes to reinforce key points.

Post-Intervention Assessment and Follow-Up Phase

Two weeks after the final educational session, the same instruments used in the pre-intervention phase were re-administered to all participants. The post-test scores were compared to the baseline (pre-test) scores to determine the degree of change in awareness and attitudes attributable to the intervention. Data collection was conducted during regular school hours in a supervised classroom setting to ensure consistency. The nurse navigator research team ensured that students, who were encouraged to be independent and honest, completed the post-test. A follow-up session was conducted four weeks after the post-test to

reinforce key messages and assess the retention of knowledge and bullying attitudes.

Statistical Analysis

Data was analyzed using IBM SPSS Statistics Version 27 to evaluate the effectiveness of the nurse navigator intervention on boys' awareness and attitudes toward school bullying. Descriptive statistics, including means, standard deviations, frequencies, and percentages, were used to summarize participants' sociodemographic characteristics as well as their awareness and attitude scores at the pre-intervention, post-intervention, and follow-up phases. To assess changes over time, a Repeated Measures Analysis of Variance (ANOVA) was conducted to compare mean scores across the three assessment points. Mauchly's Test of Sphericity was used to test the assumption of sphericity; when violated, the Huynh–Feldt correction was applied. The ANOVA model examined both within-subject effects (changes over time) and between-subject effects (group-level differences, where applicable). Post hoc analyses using the Least Significant Difference (LSD) method were carried out to determine the specific time points where statistically significant differences occurred. Additionally, Pearson's correlation coefficient (r) was computed to assess the relationship between changes in awareness and changes in attitudes. A p-value of less than 0.05 was considered statistically significant for all tests.

Results

Table (1): illustrates that the mean age was 13.13 ± .80 years. Most participants were in Grade 2 (Preparatory), and the majority resided in urban areas. About 50.6% of fathers and 54.2% of mothers had completed secondary education or higher. Household income varied, with 41% reporting low-income status.

Table (2): Shows Effect of the Intervention on Awareness Scores**.**

It revealed that a statistically significant improvement in students' awareness across all domains following the nurse navigator-intervention. Notably, the "meaning and types of bullying" domain showed a substantial increase from a pre-intervention mean of 3.94 ± 1.43 to 8.65 ± 0.97 post-intervention, with a slight decline at follow-up 8.17 ± 1.61. Similar trends were observed in the "Causes and Risk Factors" domain 4.19 ± 1.85 to 8.52 ± 1.13 post, 8.48 ± 1.07 follow-up and "Consequences of Bullying" (3.07 ± 1.59 to 7.89 ± 0.44 post, 7.37 ± 1.11 follow-up), indicating a sustained impact over time. The "how to

respond or report" domain also showed significant improvement, rising from 1.97 ± 0.70 pre-intervention to 3.80 ± 0.54 post-intervention, and slightly declining to 3.63 ± 0.61 at follow-up.

Figure (1): illustrates the shift in boy students' awareness levels categorized as high, moderate, and low over time in response to the nurse navigator intervention. A marked increase in the percentage of students with high awareness was observed to be post-intervention 80% compared to the pre-intervention phase 16%, indicating a significant immediate improvement. Although there was a slight decline at follow-up to 78.2%, the proportion remained substantially higher than baseline, suggesting sustained impact.

Table (3): displays the progression of students' attitudes toward school bullying across five key domains. Statistical analysis using repeated measures ANOVA revealed significant improvements ($p < 0.001$) in all attitude domains following the Nurse Navigator intervention, with large effect sizes (η^2 ranging from 0.50 to 0.79). The greatest effect was observed in the total attitude score ($\eta^2 = 0.79$), which increased markedly from 36.12 ± 5.91 pre-intervention to 67.27 ± 6.10 post-intervention, slightly declining to 65.19 ± 5.76 at follow-up, indicating sustained impact.

Figure (2): demonstrates that the proportion of students exhibiting positive attitudes increased from 30% at baseline to 85% post-intervention, with a slight decrease to 80% at follow-up. Conversely, negative attitudes declined sharply from 70% at pre-intervention to 15% post-intervention and remained low at20% during follow-up highlighting the sustained effect of the Nurse Navigator intervention.

Table (4): revealed a non-significant correlation ($r = -0.06$, $p = 0.608$), indicating that individual changes in awareness levels were not linearly associated with corresponding changes in attitude scores among the participants. Pearson correlation analysis showed no significant linear relationship between changes in awareness and attitude scores. The initial hypothesis proposing a positive association between awareness and attitude improvements was therefore rejected ($p > 0.05$).

Table (1): Socio-demographic characteristics of the study boys' participants (N = 83).

Items	Number (=83)	Precent
Mean age (years): Mean±SD	13.13 ± .80	
Residence		
Urban	43	51.8 %
Rural	40	48.2 %
Male Order		
1st	21	25.3%
2nd	43	51.8%
3rd	19	22.9%
Father education		
Basic education	5	6.0%
Secondary education	42	50.6%
High education	36	43.4%
Mother education		
Basic education	8	9.6 %
Secondary education	45	54.2%
High education	30	36.1%
Mother Job		
Working	58	69.9%
Housewife	25	30.1%
Father Job		
Government work	27	32.5%
Freelance work	45	54.2%
Pension / Not working	11	13.3%
Income		
Enough	35	42.2%
Enough and saving	14	16.9%
Not enough	34	41.0%

Table (2): Mean Scores of Bullying Awareness Domains Across Time Points among Boys (n=83)

Domain	Pre (Mean ± SD)	Post (Mean ± SD)	Follow-up (Mean ± SD)	F-value (p-value); η^2
Meaning and Types of Bullying	3.94 ± 1.43	8.65 ± 0.97	8.17 ± 1.61	277.11 (p <.001) * η^2 (0.63)
Causes and Risk Factors	4.19 ± 1.85	8.52 ± 1.13	8.48 ± 1.07	227.04 (p < .001) * η^2 (0.58)
Consequences of Bullying	3.07 ± 1.59	7.89 ± 0.44	7.37 ± 1.11	402.73 (p < .001) * η^2 (0.71)
How to Respond or Report	1.97 ± 0.70	3.80 ± 0.54	3.63 ± 0.61	138.94 (p < .001) * η^2 (0.63)

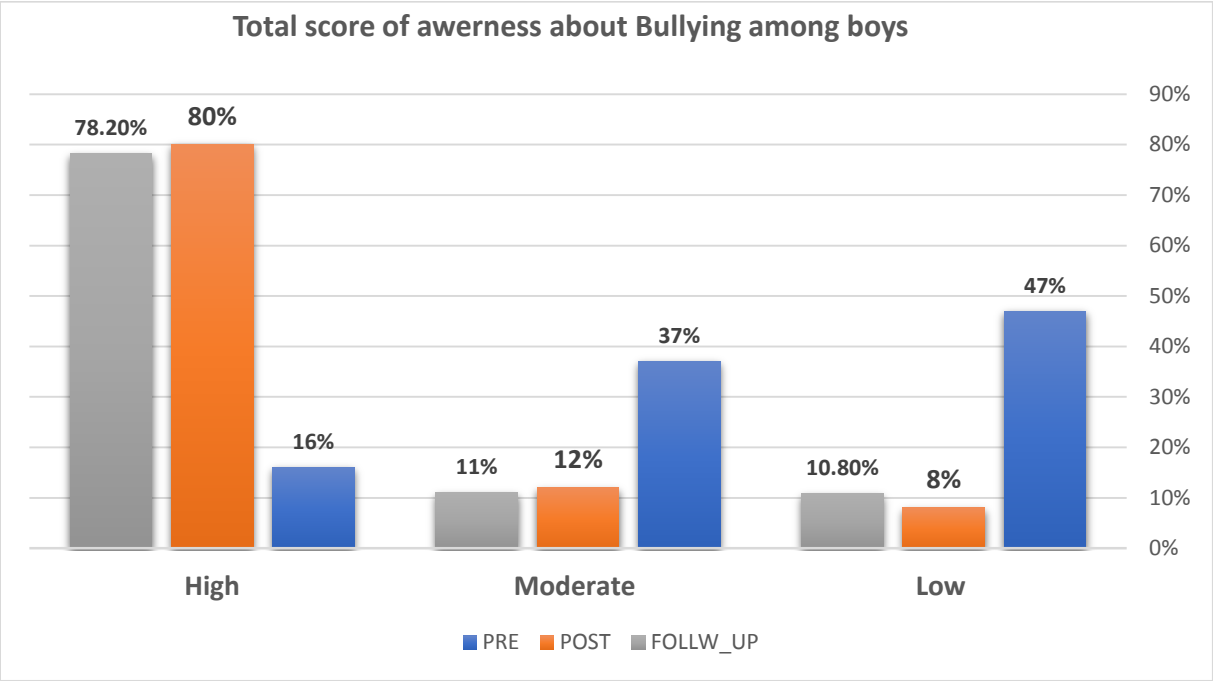

Figure (1): Distribution of boys' total awareness scores about school bullying across three time points (n=83).

Table (3): Mean Attitude Scores toward Bullying across Time Points among boy students (n=83)

Attitude Domain	Pre (Mean ± SD)	Post (Mean ± SD)	Follow-Up (Mean ± SD)	F (p-value)	η^2
Empathy toward Victims	8.32 ± 2.10	14.95 ± 1.88	14.48 ± 1.93	98.26 (<0.001)	0.54
Beliefs About Acceptability	6.80 ± 1.95	13.72 ± 1.60	13.01 ± 1.78	112.47 (<0.001)	0.57
Willingness to Intervene/Report	7.04 ± 2.22	12.68 ± 1.97	12.40 ± 1.85	87.39 (<0.001)	0.50
Attitude Toward Prevention Measures	6.95 ± 2.09	12.32 ± 1.82	12.05 ± 1.74	91.15 (<0.001)	0.51
Confidence in Dealing with Bullying	7.01 ± 2.14	13.60 ± 1.65	13.25 ± 1.62	103.23 (<0.001)	0.55
Total Attitude Score	36.12 ± 5.91	67.27 ± 6.10	65.19 ± 5.76	310.78 (<0.001)	0.79

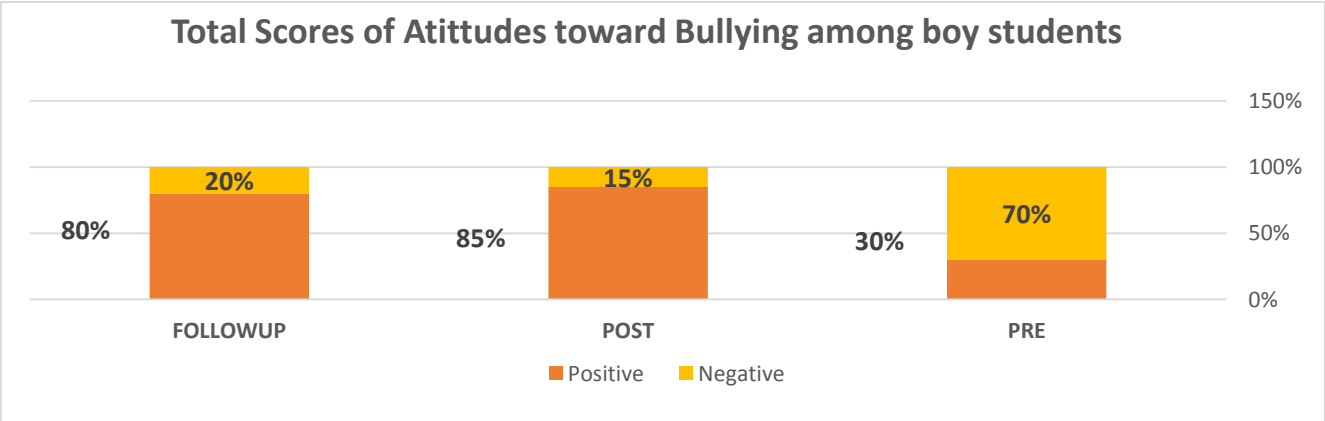

Figure (2): Percentage of total attitude score toward school bullying among students (N=83) across three time points.

Table (4): Correlation between Changes in Awareness and Attitude Scores Post–Pre Intervention (N = 83)

Variables	r	P-value
change in Awareness & Change in attitudes	**-0.06**	**0.608**

Pearson correlation analysis showed no significant linear relationship between changes in awareness and attitude scores. The initial hypothesis proposing a positive association between awareness and attitude improvements was therefore rejected ($p > 0.05$).

Discussion

This study evaluated the effectiveness of a nurse navigator–led intervention in enhancing male preparatory students' awareness and attitudes toward school bullying. The findings revealed statistically significant improvements across all measured domains, with sustained effects at the follow-up stage. These outcomes affirm the potential of structured, school-based health education delivered by qualified nursing professionals to positively influence adolescents' cognitive and emotional responses to bullying.

The significant increase in awareness scores for post-intervention aligns with findings from previous studies, which highlight the critical role of education in fostering recognition of bullying types, causes, and consequences **(Afolabi & Animashaun, 2024; Waseem & Nickerson, 2024).** Specifically, students showed marked improvements in understanding the various forms of bullying (physical, verbal, social, and cyber), as well as in their ability to identify appropriate responses and reporting strategies. A study by **Mohamed et al. (2022)** in Egypt demonstrated that health education had a positive effect on improving knowledge about bullying. This supports the idea that guided interventions, when developmentally and culturally tailored, can fill critical knowledge gaps, reassuring us about the effectiveness of this approach.

The significant gains in awareness scores among the intervention group suggest that the use of clear, interactive educational methods (such as role-playing, visual materials, and reflective exercises) helped demystify bullying concepts and increased students' recognition of bullying behaviors. This aligns with previous findings from **Hassan et al. (2024),** who emphasized that increased knowledge is a key predictor of behavioral change in adolescent health education.

The follow-up data confirmed the retention of intervention effects over time, indicating not only the immediate impact but also the sustainability of cognitive change. This supports the use of nurse navigators as school-based health educators, extending their role beyond clinical care into social and emotional development, a model reinforced by international literature **Teggart et al., (2023).**

In terms of attitudes, the intervention group demonstrated notable enhancements in empathy, willingness to intervene, and confidence in responding to bullying. These results are consistent with earlier work emphasizing that attitudinal change is often a product

of both cognitive awareness and emotional engagement **(Al Ali et al., 2025).** The structured sessions addressing empathy, respect, and peer relationships may have directly influenced these attitudinal shifts, especially among boys who often internalize norms that discourage emotional expressiveness or intervention **(Öztürk Çopur & Kubilay, 2022).**

The selection of boys aged 12 to 15 years was deliberate, targeting early adolescence a developmental stage characterized by heightened social sensitivity, identity formation, and increased vulnerability to peer pressure and aggression (**El-Shiekh et al., 2024)**. This age group is particularly susceptible to both experiencing and perpetrating bullying behaviors. Intervening during this critical window offers the potential to influence the trajectory of students' social attitudes and behavioral norms. The significant improvements observed among participants suggest that early adolescence is a developmentally appropriate period for delivering structured, school-based interventions aimed at fostering empathy, awareness, and prosocial decision-making skills (**Al-Hussein, & Shahba, 2024**). The findings reinforce the importance of implementing health education programs at this stage to instill lasting attitudinal and behavioral change.

Moreover, the strong positive correlation ($r = 0.69$, $p < 0.01$) between awareness and attitude scores suggests a reciprocal relationship, whereby increased knowledge facilitates more proactive and empathetic responses toward bullying. This finding supports the theoretical framework that cognitive understanding and emotional perspective-taking must co-exist for meaningful behavioral change to occur.

The sustained improvement observed at the four-week follow-up further underscores the retention and durability of the intervention's impact. While minor declines in mean scores were noted, they remained significantly higher than baseline, indicating lasting learning effects. These results support the inclusion of follow-up reinforcement sessions to maintain progress and suggest that nurse navigators can serve as valuable, ongoing resources within schools.

Study limitations

Despite the promising outcomes, this study had several limitations. First, the sample was limited to public preparatory schools for boys within a single educational district, which may affect the generalizability of the

findings to other regions or school types. Second, while self-administered questionnaires ensured privacy, they may have introduced social desirability bias, as students might have overstated their positive attitudes or awareness. Third, the relatively short follow-up period (four weeks) was sufficient to assess short-term retention but not long-term behavioral changes. Finally, while the intervention focused on cognitive and attitudinal dimensions, behavioral observations were not included, which limits our ability to assess the translation of knowledge and attitude into action.

Conclusion:

The findings of this study provide compelling evidence for the effectiveness of a nurse navigator–led intervention in enhancing the awareness and attitudes of preparatory schoolboys toward school bullying. The structured, gender-sensitive educational sessions delivered by trained nursing professionals led to significant and sustained improvements in both cognitive understanding and emotional responsiveness to bullying situations. By employing interactive, reflective, and evidence-based teaching strategies, the intervention successfully engaged male adolescents a population often underrepresented in psychosocial programs and addressed the multidimensional nature of bullying. The results underscore the critical role school nurses can play as educators and advocates in promoting a safe, respectful and inclusive school environment.

Recommendations

Based on the findings of this study, the following recommendations are proposed to support the integration and scalability of nurse-led anti-bullying interventions in school settings:

-Integrate Nurse Navigator Programs into School Health Services.

-Educational content should be tailored to the specific emotional and social needs of male adolescents, using relatable language, visuals, and interactive activities that resonate with their experiences.

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Effect of Educational Program Regarding Immunosuppressive Drugs on Nurses' Performance and Outcomes for Children Undergoing Liver Transplantation

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Abstract

Background: Paediatric liver transplantation has improved outcomes over the last years due to use of immunosuppressive agents to attain balance between minimizing the risk of Allo- graft rejection and infection aquired due to immunity supression. **Aimed of the study was to evaluate** the effect of educational program regarding immunosuppressive drugs on nures' performance and out comes for children undergoing liver transplantation**. Subject and method:** a convenience sampling of 50 nurses and children under going liver transplantation at outpatient pediatric liver clinic and post liver transplant care units of National liver Institute of Monofia University. **Tools:** Three tools were used to collect data: structured Interview Schedule, Observational Checklists and childeren out comes **Results**: the most of nurses had poor knowledge and three quarter of them had unsatisfactory level of practice before educational intervention, while immediate and one month after educational program the total scores of nurses 'knowledge and practice were improved.**Conclusion**: Educational program for nurses was effective in improving knowledge, and practice regarding immunosuppressive drugs and improved out comes for children as normal blood pressure, blood glucose level and child less exposure to infection post -liver Transplantation.**Recommendations:** Providing continues in service educational program regarding Immunosuppressive drugs should be implemented to nurses and mothers of children undergoing liver transplantation .

***Key wards*:** Children,Immunosuppressive Drugs, Liver Transplantation, Nurses, Performance, Outcomes , Program.

Introduction

Chronic Liver Disease (CLD) is a progressive destruction and regeneration of the liver parenchyma leading to fibrosis and cirrhosis. CLD is one of the most significant causes of morbidity and mortality among the pediatric age group **(Tewari,2019)**.End-stage liver disease is a pathological condition that has a great damage to the child liver and its complication liver failure **(Moon, Singal&Tapper., 2020).**

A number of etiologic factors have been identified in pediatric age group with CLD including a broad spectrum of disorders, which is largely different from adult group, as hepatitis B infections, abnormality in development as biliary atresia can lead to biliary cirrhosis if untreated, Wilson disease, autoimmune and neoplastic diseases leading to hepatic failure(**Eslam,etal,.2020)**. Liver transplantation is considered live saving treatment for pediatric patients who is suffering of acute liver failure and end stage liver disease, some hereditary metabolic disorders as familial hyper cholestrelemia selected cases of hepatic malignancies as hepatocellular and carcinoma **(Nielsen, et al 2019).**

Liver transplantation is a surgical procedure which replaces a liver that no longer functions properly end stage liver disease with a healthy one from a deceased donor following as brain or cardiac arrest or a portion of a healthy liver from a living donor **(Mohamed, Abouda&Awad,.2021)**

Nursing care management and new generation of immunosuppressive combination therapy post transplantation especially in pediatrics age groups. Now Graft survival is 90%-95 % at 1 year and more than 80% at 20 years post-transplant **(Thuong, Ruiz, et al ,.2016**)

Every year worldwide approximately 25, 000 liver transplants are being performed by the beginning of the 1980s. till present with approximately 90% one year survival. (**Ghelichi-Ghojogh. Rahimi, Moghaddam.,& Fayaz, (2022).**

In Egypt, cadaver transplant is not allowed and liver donor transplantation is the only option for these children , it was first performed in Egypt in 1991 by the surgical team at the National Liver Institute, Menoufeya University, there are thirteen Liver donor transplantation centers in Egypt, **(Amer, ., & Marwan, . 2016)**

Successful liver transplantation depends on multi-disciplinary team ,, the main focus of care of children with end stage liver disease was to find a liver transplant, however today the main concern is in long term follow up, with prevention of immunosuppression related

complications and promotion of new graft as normal as possible **(Vimalesvaran,.Verma, &Dhawan,. (2024).**

Assessment Medical, Surgical, Psychological, social, nutritional evaluation and many investigations serology, and blood tests with extended radiological procedures to make sure the child fit for transplant. The most concern in pre transplant management is prevention and treatment of malnutrition associated with increase pre and post-transplant mortality **(Kim, 2023)**

Nurses play a vital role in program pre, during and post transplantation, so that nurses should be oriented with the early potential complications mainly the warning sign of acute rejection and graft, sepsis, bleeding, fluid volume overload and electrolyte imbalance to take the immediate proper action and minimize the negative consequences and restore the recipient clinical status. **(Miloh,et al.2017)** .

During the immunosuppression therapy the nurse arrange the recipient child for periodically laboratory tests to monitor the drug side effect, drug interaction and protect the child from exposure to infections. Prior to discharge, nurses also give the children and their families' intensive instruction as isolation percussions, activity restriction, allowed nutrition, , medications vaccination, warning sign of infection and rejection, bleeding, care of wound and the importance of follow-up for the long term immune suppressive drug therapy to maintain successful graft transplant. Due to this area of complex and specific care demands, nurses need to be advanced in their knowledge and skills. to perform (**whealthy,.2017**).

Significance of the study

Immunosuppression drugs are the mainstay of rejection prevention in liver transplantation to prevent their long term toxicity, the child must adhere to prescribed regimen and compliance with close follow up for medication adjustment (**Dhwan,2019)**

Immune suppressive drug therapy is the higher quality and increased longevity of the graft and children life, prevent acute graft rejection that occur in the early period of transplantation (**Moini, 2015)**

Following transfer to a designated transplantation unit, the child should be closely followed by the surgical and medical team. The dose of immunosuppressive agents are adjusted according blood sugar levels and organ function during this period so significant improvements in graft and patient survival at 3 months, 1 year and 5 years post-transplant (Karaly **2019)**.

Aim of the Study

The aimed of the present study was to evaluate the effect of implementing

educational program regarding immunosuppressive drugs on nurses' performance and outcomes for children undergoing liver transplantation.

Research hypotheses:

1-Implementing educational program for nurse's knowledge regarding immunosuppressive drugs for children undergoing liver transplantation is expected to improve.

2-Implementing educational program for nurses practices regarding Immunosuppressive drugs of children undergoing liver transplantation is expected to be improved

3-Clinical Outcomes of Children undergoing liver Transplantation as blood glucose level and blood pressure are expected to be maintained within normal ranges and less acquired infection when taking immunosuppressive drugs.

Subjects

Research Design:

A quasi-experimental research design was used in the present study.

Study Setting:

The study was conducted at Outpatient pediatric liver transplantation unit of National liver Institute of Monofyia University which is affiliated to the Minster of higher education and scientific research.

Subjects:

A convenience sampling of (50) nurses who working at the previous mentioned sitting and provided direct care to the children undergoing liver transplantation and (50) children undergoing liver transplantation (pre and post liver transplantation surgery) were included in the study except nurses working at night shift

Inclusion Criteria for Children:

-Both sexes, aged from 6 months to15 years. Children undergoing liver transplantation

Exclusion Criteria:

-Children over 15 years, children have liver transplantation.

-Children with immunological disease and having receiving immunosuppressive drugs

Tools of data collection

Three tools were used in the current study as the following:

Tool I: structured interview schedule. It was developed by the researcher after reviewing the related literatures to collect knowledge about children and their mothers it was consists of two parts:

Part (1)-Socio-demographic characteristics which includes:

a) Characteristics of the studied children who administering immunosuppressive drugs undergoing liver transplantation as: age, sex, educational level, Residence, Date of admission, medical history

b) **Characteristic of Nurses' as** age, sex, Educational level, residence, years of experience at the care unit, marital status and attendance course related immunosuppressive drugs.

Part (2): Nurses' knowledge regarding immunosuppressive drugs: (Bahgat, 2014)

It was developed by the researcher to assess nurse's knowledge related to immunosuppressive drugs for children undergoing liver transplantation before, immediately and after one month of the implementation of the educational program.

Scoring system for Nurses' knowledge was as the following: -

-Correct and complete answer was scored (2).

-Correct and incomplete answer was scored (1).

-Wrong or don't know was scored (0).

Total scoring system for Nurse s' knowledge was categorized as the following: -

-less than < 60%**.**was considered Low level of knowledge

- From 60- < 75% was considered Moderate level of knowledge

- From 75 - 100% was considered High level of knowledge

Tool II: Observational checklist: to assess Nurses regarding immunosuppressive drugs for children undergoing liver transplantation. It was adopted by the researcher to assess nurses' provided to children actual post liver transplantation regarding immunosuppressive drugs for children undergoing liver transplantation which divided into

Part I: cyclosporine (**Sand immune, Neural**) used as a primary immunosuppressant agent, physician should consult with the transplant unit before making any adjustments in the cyclosporine dose (9 items).

Part II: at actual post liver transplant intensive care unit when child administer Tacrolimus (progrf), Mycophenolate Mofetil (cellcept) and (Myfortic) drugs includes (10 items).

Part III: **At post liver transplantation care unit** (In patient ward) when child administer (Cortisone - Hosatcortine) drugs include (7 items)

Scoring system for Nurses' practice by using observational checklist

-Done correct and complete was scored (2).

-Done correct and incomplete was scored (1)

- Not done was scored (0)

Total scoring system for Nurse s' Practice was calculated classified as the following

-less than 75% was unsatisfactory practice

-From 75%-100% was considered Satisfactory Practice

Tool (III): Children's clinical outcomes assessment check list:

This tool was developed by the researcher after reviewing the child daily records and checking the unit daily census to maintain normal blood pressure and blood glucose level and child exposure to infection post -liver Transplantation

Method

The study was accomplished through the following steps:

-Adminstrative process:

An official permission to conduct this study was obtained from faculty of nursing directed to responsible authorities of National liver institute Monofya University to obtain their approval and cooperation for carrying out this study.

-Content validity:

The tools of the study were presented to a jury of five experts in the field of pediatric nursing to check content validity and clarity of the questionnaire. Modifications were carried out accordingly. The face validity of the questionnaire was calculated based on experts 'opinion after calculating content validity index of its items and it was 98 %. **o**f the sample.

-Reliability:

Was calculated based on experts 'opinion after calculating content validity index of its items and it was 99. 1%.

-Apilot study:

A pilot study was conducted on 10 % of nurse's sample to test clarity; visibility and applicability of the study tools and the necessary modification were done. The Pilot study was excluded from the study

-**Phases of the study**: The present study was conducted on four phases:

I-Assessment Phase:

It was carried out by the researcher for all study nurses and children to collect baseline data, and to assess nurses' knowledge regarding immunosuppressive drugs for children under going liver transplantation before, immediately and after one month of the implementation of the educational program. (Tool I). The researcher was assessing the actual nurses' practice before, immediately and after one month of the implementation of the educational program. The researcher was available 2 days per week alternatively in the previously mention settings (Tool II). All nurses were observed pre and post children liver transplantation nursing care activities during morning shift.

II-Planning phase:

- Educational program was carried out for Nurses through conduction of successive sessions according to the actual needs assessment of the nurses.
- Different methods of teaching were used including interactive lectures, power point presentation, audiovisual material and booklet.

- The studied nurses were divided into small groups and each group was consisted of five nurses.

III: Implementation phase:

- Educational program was carried out for nurses through conduction of successive sessions according to the actual needs assessment of the nurses.
- Educational program was conducted of eighth sessions, two /week and scheduled in the morning. The time for each session will be about 30 -45 minutes including periods of the discussion according to the Nurses response and feedback.

The sessions covered the following topics:

-First session: It was focused on definition, indication, factors which increase action of drugs, complication and contraindication of immunosuppressive drugs

-Second session:

It was focused on infection control of Paediatric administered immunosuppressive drugs for children undergoing liver transplantation

Third session: It was focused on at perioperative care unit which cyclosporine (sand immune, Neural) is used as a primary immunosuppressant agent.

The fourth session:

It was focused on educational post liver transplantation to avoid acquired infection when taking immunosuppressive drugs**.**

The fifth session: It was focused on post liver transplant care when child administer Tarcolimus (prograf drugs).

The sixth session: It was focused on nurse's instructions when child administer Mycophenolat -Moftil (cellcept) drugs.

The seventh session: was focused on nurse's instructions when child administer Myfortic drugs.

The eights session was focused on nurses instruction when child administer steroids (cortisone, Hostacortine)

-Each session ended by a summary of its content and feedback from the nurses was obtained to ensure the maximum benefit from the program.

- The Data was collected over a period of 12 month from November 2021 to March 2023 and the study work took a period of 3 years.

VI- Evaluation phase:

Evaluation of the effects of educational program on Nurses knowledge and practice regarding immunosuppressive drugs was carried out using the same assessment tools (Tool I, II). Each Nurse was evaluated immediately after implementation of educational program and after one month and these was compared to pre-test level.

Children out comes as blood pressure and blood glucose level were maintained within normal ranges with less acquire of acquired infection

related to nursing practice when taking immunosuppressive drugs.

Statistical analysis:

Collected data were organized, tabulated and statistically analyzed using SPSS software (statistical package for the social sciences, version 23, SPSS Inc. Chicago, IL, USA). For quantitative data, the range, mean and standard deviation were calculated. For qualitative data, which describes categorical set of data by frequency, percentage or proportion of each category, comparisons between two groups and more was done using Chi-square test (x2), For comparison between means of two groups of parametric data of independent samples, student t-test was used for comparison between more than two means of parametric data, value of ANOVA test was calculated. **(Gerstman,.2021)**

Results

Table (1) represents Socio-demographic characteristics of studied children. It was observed that, the age of children was ranged from. 6-15 years with the mean of (8. 54±3. 91), As regards sex the majority of them 98% were female and (60%) were diagnosed with end stage of liver failure, while one third of them (30%) were diagnosed with Wilson disease before liver transplantation.

Table (2): Shows socio-demographic Characteristics of studied nurses. It was observed that, age of nurses ranged from 21-40 years with the mean of (28. 6 6 ± 5. 161), regarding their sex more than two third of studied nurses were female (74%) and 70% of them were married, in relation to the level of education, it was evident that, 82% of nurses had Technical Nursing Institution, while, 10% had bachelor's degree. As regards the residence of work, it was clear that, (60%) were worked at intensive care unit post liver transplantation, according years of experience at liver transplantation units about near to half of them (42%) ranged from 5-10 years of experience while all of them were not received training courses related to immunosuppressive drugs pre- liver transplantation.

Table (3): illustrates mean scores of Nurses' knowledge regarding immunosuppressive drug. It was found that, the highest mean score was during immediate phase (27. 10 ±2. 75) then after one month (25. 06 ±2. 83) of educational program.

Table (4): Clarifies the total scores of nurses' practices level regarding care of children undergoing liver transplantation before, immediately and after one month from Educational program implementation**.** It was apparent that, before the Educational program implementation the majority of nurses 98%had unsatisfactory practice level while immediately after

Educational program implementation, all of them (100%) had satisfactory level of practice and one month after implementation, majority of them (90 %) had a satisfactory practice level with highly statistically significance differences regarding total practice before, immediately and after one month with X^2=17. 64, P= <0. 001 respectively immediately after and after one month from educational program implementation.

Table (5): Show percentage distribution of children regarding their clinical outcomes before, immediately and after one month from educational program implementation. The study revealed that there was a highly significant improvement in children's blood pressure (P= **≤0. 001)** and blood glucose level where respectively (**P= ≤0. 001**)before, immediately after and after one month from educational implementation.

Table (6): Represents correlation between studied nurses' total scores of knowledge and practices before, immediately and after one month from EP implementation. The study showed that, there was statistically significant positive correlation between total scores of knowledge and practices before, immediately and after one month from EP implementation as (r=0.237 and p=0.025)and(r=0.123and p=0.032.

Table (1): Percentage distribution of Socio-demographic characteristics of studied children

Socio-demographic characteristics of children	The studied children (n=50)	
	No .	%
Age in years: < 6 6:12 > 12 **Range** **Mean ± SD**	 11 27 12 0. 6 – 15 8. 54 ± 3. 91	 22. 0 54. 0 24. 0
Sex:		
Male	1	2. 0
Female	49	98. 0
Educational level		
Nursery	12	24. 0
primary school	32	64. 0
preparatory school	6	12. 0
Sample place Out patient Icu Post transplantation word	 25 20 5	 50 40 10
Diagnosis		
Wilson disease Congenital & metabolic LF End stage LF	 15 5 30	 30. 0 10. 0 60. 0

Table (2): Percentage Distribution of the studied nurses according to their socio-demographic & professional characteristics.

Socio-Demographic characteristics	Number n = 50	%
Sex		
Male	13	26
Female	37	74
Age		
<20	17	34
20-30	19	38
>30	14	28
Mean ± SD	28. 66 ± 5. 161	
Range	(21-40)	
Marital status		
Single	11	22
Married	35	70
Divorced	2	4
Widow	2	4
Educational Level		
Diplome	4	8
Technical Institution	41	82
Bachelor's Degree	5	10
Work place		
Out patient	5	10
Icu	30	60
Post transplantation word	15	30
Years of experience		
<5	16	32
5-10	21	42
>10	13	26
Previous training		
No	50	100

Table (3): Total scores of nurses'-knowledge related to Immunosuppressive Drugs

Total scores of nurses' Knowledge	the studied nurses (n=50)						χ^2	P
	Before		Immediate after		After one month			
	No	%	No	%	No	%		
Low < 60%	36	72. 0	0	0. 0	1	2. 0		
Moderate 60-75%	11	22. 0	4	8. 0	8	16. 0	**108. 26**	**0. 0001***
High 75-100%	3	6. 0	46	92. 0	41	82. 0		
Range	8 - 27		18 - 30		17 - 30		**F value = 191. 75**	
Mean ± SD	14. 74 ± 4. 32		27. 10 ± 2. 75		25. 06 ± 2. 83		**P = 0. 0001***	

Table (4): Percentage distribution of total scores of studied nurses' practices regarding to immunosuppressive administration for children undergoing liver transplantation before, immediately and after one month from Educational program implementation

Total scores of studied nurses' practices related to immunosuppressive administration care for children undergoing liver transplantation	Studied nurses (n=50) Total practice level						χ^2 P1	χ^2 P2	χ^2 P3
	Before educational program implementation		Immediately after educational program implementation		After one month from educational program implementation				
	No	%	No	%	No	%			
Unsatisfactory <80%	49	98	0	0. 0	15	30	96. 07	50. 17	17. 64
Satisfactory ≥80 %	1	2	50	100. 0	35	70	≤0. 001*	≤0. 001*	≤0. 001*

*Statistically significant difference at (P<0. 05).

P1: Before and immediately aftereducational program

P2: Before and one month after educational program

P3: Immediate and one month after educational program

Table (5): Percentage distribution of children regarding their clinical outcomes before, immediately and after one month from Educational program

Children's clinical outcomes	Children (n=50)						
	Before educational program (N=50)		Immediately after educational program (n=50)		After one month from educational program (n=50)		χ^2 P
	No	%	No	%	No	%	
Blood pressure Normal	0	0. 0	40	80 .0	10	20	100. 06 ≤0. 001*
Hypotension	38	76. 0	10	20. 0	6	12. 0	
Hypertension	0	0. 0	48	96	2	4.0	
	38	76.0	10	20	2		
Blood sugar level Normal	**0**	**0 .0**	**48**	**96 .0**	**2**	**4.0**	113. 4 ≤0. 001*
Hypoglycemia	**35**	**70**	**0**	**0**	**15**	**30**	
Hyper glycaemia	**42**	**84**	**0**	**0**	**8**	**16**	

Table (6): Correlation between total scores of knowledge and practices of studied nurses regarding care of children undergoing liver transplantation before, immediately and after one month from educational program implementation

Total Practices Scores	Total knowledge scores													
	Before implementation		Immediately after implementation						After one month					
	Low knowledge		Low Knowledge		Moderate Knowledge		High Knowledge		Low Knowledge		Moderate Knowledge		High Knowledge	
	No.	%	No.	%	No	%	No.	%	No.	%	No.	%	No.	%
Unsatisfactory Practice	49	98..0	0	0.0	0.0	0.0	0.0	0.0	**2**	**4.0**	**0.0**	**0.0**	**0.0**	**0.0**
Satisfactory practice	1	2.0	**2**	**4.0**	**8**	**16**	**40**	**80**	**9**	**18.0**	**5**	**10.0**	**36**	**72.0**
r	0.172-		**0.237**						**0 .123**					
P	0.153		**0.025***						**0.032***					

r: Pearson' correlation coefficient

* Significant at level P<0. 05

Discussion

Immunosuppressive agents are drugs that suppress the immune system and reduce the risk of rejection of foreign bodies such as transplant organs. Different classes of immunosuppressive agents have different mechanisms of action. Now immunosuppressive agents are used as cancer chemotherapy, in AIDS as rheumatoid arthritis. As immunosuppressive agents' lower immunity there is an increased risk of infection **(Roberts, 2021)**

Immunosuppressant drugs are a class of drugs that suppress, or reduce, the strength of the body's immune system. Some of these drugs are used to make the body less likely to reject a transplanted organ as a liver, heart, or kidney. These drugs are called anti-rejection drugs. Other immunosuppressant drugs are often used to treat autoimmune disorders as lupus, psoriasis, and rheumatoid arthritis. (**Parlakpinar,2021)**

In line with the present results, was found that the highest percentage of the study sample was female. The highest percentage of the study sample was in the age group ranged between (20 - ≤30). Nearly half of the study sample had technical nursing diploma. It's clear the highest percentage of the study sample had years of experience ranged from (5 - ≤10). Nearly half of the study sample (48. 9%) was working at intensive care unit.

The current study revealed that nearly half of the staff nurses' years of experience ranged from five to ten years. Also, most of the sample age ranged from twenty to thirty. These results were matched with **Gabrielle (2021)** who found that more than half of the study sample were at the age ranged from twenty to thirty years old and most of them had from five to ten years of experience.

There were differences statistically significant regarding nurses ' knowledge regarding immunosuppressive drugs in all items of knowledge before, immediate and one month after educational program implementation. The study revealed that, There were statistically significant differences regarding nurses' knowledge about immunosuppressive drugs before drug administration, nursing instructions post transplantation discharge and follow up, this might be related to the fact that liver transplantation and immunosuppressed drugs post liver transplant are a new surgical field specialty, and the studied nurses were not properly prepared prior to their working and dealing with such children

This result corresponded with the findings of **Elgazar et al. (2020)** who mentioned that most of nurses within study had inadequate knowledge prior to the educational intervention and improved to a satisfactory level both immediately and post the program regarding patient care during the insertion and maintenance of central venous catheters.

The results of this study agreement with those of **Abo-El Ezz et al., (2019)** who investigated the foundational knowledge of nurses in a variety of specialties prior to implementing instruction training programs, all of results showed that nurses' knowledge levels were extremely low before being exposed to a defined training program, which enhanced significantly and rapidly after application but then slightly declined at follow-up.

Bahgat and Nada. (2017) found that percentage distribution of nurse's knowledge score before effective training program most of them are poor score in total knowledge while little of them are good score and only of nurse are fair score, and there was a sharp improvement of nurse knowledge immediately post training most of them are good score immediately post training.

Nada,(2014) who stated that most nurses have poor knowledge before application of training program.

Younis (2018) and **Urstand et al (2018)**.who in agreement with the present result mentioned that the nurses need an improved knowledge on immunology and pharmacology for transplantation, and infectious diseases.

Mathis et al. (2021) who supported the present result and found a high significant improvement in staff knowledge regarding urinary incontinence in a nursing home while using evidence-based educational programs.

Yang (2021) stated that using evidence-based education packages have a significant effect on knowledge, quality of life for satisfaction with care

There were statistically significant differences regarding nurses' practices regarding prepare drug and drug taken immediately and one month after educational program implementation **El Hennawy (2024)** who showed that, half of the studied nurses gave correct responses when assessing their level of knowledge, while none of them attained the competent level in their practice. **Innab(2022)**who agrees with the present results and finds a significant improvement after the

program application Also **El-Azazy (2012)** who is agreement with the present study and mentioned that the mean practice was low in pre-evidence guidance and increased immediately post-educational program .

Experience report Present the development of patients' education who participate in programs of organs transplantation and discuss their educational needs after application educational program on nurses to give teaching to children about transplant . Also **Guo et al.,2023)** who state that scientific knowledge on immunosuppressive drugs is essential for the nurse to implement efficient interventions in clinical practice Liver transplantation

Erian,(2017) stated that all nurses had poor practice score in pre-effective training program in prograf and cellecept and none of them were good or fair score while more of them were poor performance score in Myfortic and Cortisone . Most of nurses and had good practice score in post-effective training program in prograf and cellecept, Myfortic and Cortisone while only few percentage were fair in in celecept, Myfortic and Cortisone respectively.

The findings are in harmony with a study carried out by **Eldoushy (2023)** who reported that none of the studied nurses had good performance in general measurements for the children before application of educational program to nurses at premature unit . **Imtiaz(2023)** reported that approximately two-thirds of nurses were unsatisfactory in his study and mentioned that the majority of nurses don't make measurement before application of educational program .

There was statistically significant positive correlation between total scores of knowledge and practices before, immediately and after one month of educational program implementation, all of nurses had unsatisfactory level of practice and low knowledge level, while immediately after the implementation, all of them had satisfactory practice level and high knowledge level.

Abdel Fattah et al. , (2018) who discovered a positive correlation between the studied sample's overall knowledge levels and their degree of practice.

Conclusion

Educational program for nurses was effective in improving knowledge, and practice regarding immunosuppressive drugs and improved out comes for children as normal blood pressure, blood glucose level and child less exposure to infection post -liver Transplantation

Recommendations

-Providing continues in service educational programs regarding Immunosuppressive drugs should be implemented to nurses and mothers of children undergoing liver transplantation .

Educational booklet and handout should be avaliblee at pedia\tric liver transplantationunit at national liver institute

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Nursing Students' Knowledge and Preventive Measures Regarding Black Fungus Infection

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Abstract

Background: Black fungus infection is a life-threatening fungal infection associated with an increasing morbidity and mortality despite the availability of therapeutic tools. **Aim:** To assess nursing student's knowledge and preventive measures regarding black fungus infection. **Study design:** A descriptive cross sectional study design was used. **Study setting:** This study was conducted at Faculty of Nursing, Tanta University. **Study subjects:** A random sample of 1145 nursing students. **Tools:** Two tools were used. **Tool I**: A structured questionnaire schedule included two parts: Part (1): Socio demographic characteristics of the nursing students and part (2): Knowledge of the nursing students about black fungus diseases. **Tool II**: Self-reported measures of nursing students regarding preventive measures of black fungus diseases. **Results:** The majority (92.9%) of nursing students displayed low level of knowledge about black fungus infection. The study revealed that 58.5% of the students exhibited satisfactory practices. Total knowledge score positively correlated with total reported practices score. **Conclusion:** There was a highly statistically significant positive correlation between total knowledge score and total practices score. **Recommendations:** Organize workshops or webinars with infectious disease specialists or experts in mycology to update nursing students about emerging trends in the diagnosis, treatment, and prevention of mucormycosis.

Key words: Black fungus, knowledge, Nursing students, preventive measures.

Introduction:

Mucormycosis, vastly known as black fungus, has turn out to a major health attention in the awaken of the COVID-19 pandemic. This attacker fungal infection is characterized by its capability to infest blood vessels, causing tissue necrosis and serious complications, particularly among individuals with compromised immunity **(Haidry et al., 2022, Muthu, V. & Prakash et al., 2020).** The infection is caused by saprophytic fungi commonly found in soil and decaying organic matter. While these fungi are usually harmless to healthy individuals, they can become pathogenic under certain conditions, such as uncontrolled diabetes, immunosuppressive therapy, or prolonged steroid use.

Ensuring that nursing students possess adequate knowledge and awareness of emerging infectious diseases is essential for effective public health intervention. Their ability to engage in preventive measures depends on their understanding of the disease's transmission, symptoms, risk factors, and management. This makes educational strategies crucial, particularly during public health crises as COVID-19 pandemic **(Albaqawi et al., 2020).**

The World Health Organization **(WHO, 2024)** reports that the annual incidence rate of black fungus infection, also known as mucormycosis, ranges between 0.005 and 1.7 cases per 100 million people. Recently, the infection has been linked to a high mortality rate, particularly in low- and middle-income countries, where approximately 140 cases per million inhabitants are impacted by this severe condition. In India, the rate is nearly 80 times higher than in developed nations. Between May and July 2021, India recorded over 47,000 new cases of mucormycosis, surpassing the number of reported cases in other countries during the same period. **(Chander et al., 2018; Muthu, Rudramurthy, Chakrabarti & Agarwal, R 2021; WHO, 2024).**

A study conducted in Egypt during the third wave of the pandemic by **Farghly et al. (2022)** examined the prevalence and consequences of mucormycosis among COVID-19 patients. Out of 433 confirmed COVID-19 cases at Assiut University Hospital, 33 patients (7.63%) were diagnosed with mucormycosis. The research identified significant associations between mucormycosis and conditions such as diabetes mellitus, hypertension, smoking, and

high inflammatory markers. The study also reported a notably higher steroid dosage among infected patients and an alarming mortality rate, with only three out of 33 patients surviving. Although mucormycosis is typically categorized as an opportunistic infection affecting immunocompromised individuals, cases have also been reported among immunocompetent patients, particularly those with trauma **(Rocha et al., 2021).** The infection ranks third among deep fungal infections, following candidiasis and aspergillosis, and is known for its rapid progression and high mortality.

Preventive measures are critical in limiting the expansion of black fungus infection. These include suitable personal hygiene; utilize protective equipment during exposure to dust or soil, and careful management of underlying conditions. High-risk individuals, such as those undergoing organ transplantation, may also benefit from prophylactic antifungal treatments **(Dogra et al., 2022; Skiada et al., 2020).** Effective treatment typically combines antifungal therapy with surgical debridement of necrotic tissue.

Nurses, particularly in community health settings, perform a vital role in disease prevention and public education. They are key in raising awareness about black fungus, guiding individuals on risk avoidance, and promoting hygienic practices. Their educational efforts can significantly reduce disease transmission, especially during health crises like the COVID-19 pandemic **(Adhikari & Chakrabarti, 2021; Prakash & Yadav, 2023).**

Community health nurses teach individuals ways to lessen the odds of skin infection, such as cleaning skin injuries with soap and water, particularly if exposed to grime. Also, the community health nurse educates people about the importance of wearing gloves while handling materials like soil, moss, or compost to prevent black fungus infection. (**Dumit, 2017).**

Significance of the study:

Black fungus is a serious and ultimately deadly fungal infection that generally impacts patients with altered immunity. Usually, these fungi are non-pathogenic in immune-competent patients, but in the case of patients with immunocompromised (whether steroids or any other comorbidity like diabetes, cancers, malignant and hematologic disorders) can become life-threatening. The fatality rate in black fungus cases is very high; mortality is as high as 80%

if a patient goes untreated, or remains unaddressed for a long time. Even if treated, the mortality rate is still 40-50% in cases where the infection is caught at the sinus stage itself. Despite the fatality and severity of black fungus infection, its actual incidence couldn't be detected particularly in Egypt. This could be because of its under-reporting. However, it's so crucial to investigate knowledge and practices about this black fungus infection. So, this study aimed to assess nursing students' knowledge and their application of preventive measures concerning black fungus infection.

Aim of the Study: The study aimed to assess the nursing student's knowledge and preventive measures regarding black fungus infection.

Subjects and method:

Subjects

Study Design: A descriptive cross sectional study design was used to conduct this study. **Study settings:** This study was conducted at Faculty of Nursing, Tanta University.

Study subjects: The sample was selected from Faculty of Nursing at Tanta University. Equal proportion allocation sampling technique using 30% of all the students at the 1st, 2nd, 3rd and 4th academic years according to statistical procedure that showed the level of knowledge was expected to be at 50% with a 5% margin of error. The level of significance was 95% with 80% power of the study. The study sample was chosen randomly by stratified and systematic random sampling from the four academic years. The total number of the selected nursing students was 1145 at academic year 2023-2024 according to the following table:

Grade	Total number	Selected number
1st	644	193
2nd	1100	330
3rd	1038	311
4th	1037	311
Total	**3819**	**1145**

Tools of data collection:

The researcher used two tools to gather the data needed for this study.

Tool I: A structured questionnaire schedule: It consisted of two parts as follows:

Part (1): Socio demographic characteristics of the nursing students: This part included data about age, sex, academic year and residence.

Part (2): Knowledge of the nursing students about black fungus diseases: This part was developed by the researcher after reviewing the recent related literatures to collect data **Rajshekhar et al, (2024) and**

Simijaca, et al, (2022). The aim of this part was to assess student's knowledge about black fungus infection. It covered the following areas: source of information, previous knowledge about black fungus infection, definition, mode of transmission, risk factors, causes, signs & symptoms, types, complications, prevention and treatment of black fungus infection.

Scoring system:

-Every correct answer was scored one (1), the incorrect answer and don't know was scored zero (0). These scores were summed up and the total score was ranged from (0 – 79) point which was converted into a percentage score and classified as follows:

-low knowledge < 60 % (< 47 point) from the total score.

-Moderate knowledge 60% - 75 % (47 -59 point) from the total score.

-High knowledge > 75 % (>59 point) from the total score.

Tool II: Self-reported measures of nursing students regarding preventive measures of black fungus diseases: It was developed by the researcher to assess self-reported practices of nursing students regarding preventive measures of black fungus diseases. (**Alom et al., 2021; Alqarihi, et al., 2023; Baddley, 2022; Narayanan, Chua et al., 2022 & Rautemaa-Richardson et al., 2021).** It included the following items: personal hygiene such as oral care, skin care and scrub bath, wearing personal protective equipment such as wearing shoes, long trousers, long sleeve shirts and gloves when handling soil and caring of skin injuries which included clean the skin with warm water and by using antiseptic solution to avoid having skin infection.

The scoring system for student's self-reported practice was calculated as follows:

-Reported item of practice to be done was taken one point (1) and not done item of practice was scored zero point (0)**.** Theses scores were summed up and the total score was ranged from (0- 43) point which was converted into a percentage score and classified as follows:

-Satisfied practices ≥ 75% (≥32 point) from the total score.

-Unsatisfied practices < 75% (< 32 point) from the total score.

Methods:

Obtaining approval

An official permission to conduct the study was obtained from the Dean of the Faculty of Nursing.

Ethical considerations:

-Consent of the Scientific Research Ethical Committees of the Faculty of Nursing about the study was obtained. (81-8-2202).

-An informed consent was obtained from the chosen students to participate in this study after providing appropriate explanation about the purpose and benefits of the study at the beginning of the interview.

- Every nursing student was informed that he/she had the right to withdraw from the study at any time he/she wanted.

- Nature of the study didn't cause any harm or pain for the entire sample.

- Confidentiality and privacy were taken into consideration regarding the collected data.

Developing the study tools:

-The study tools were developed by the researcher based on reviewing of related literatures **(Gogineni et al., 2022; Rahman, et al., 2021; & Sholly, (2021).**

- Study tools were tested for content validity by a jury of five experts in the field of community health nursing before conducting the study.

- Cronbach's Alpha test was used, and it was found to be (0.849) for all the study tools, (0.726) for socio-demographic characteristics, (0.913) for knowledge items, and (0.910) for reported practices about black fungus infection

Pilot study:

-A pilot study was carried out by the researcher on 10% (106 students) of the nursing students from the four academic years to test the tool for its clarity, applicability and identify obstacles that might be encountered with the researcher during data collection. Accordingly, the necessary modifications were done. Those students were excluded from the study sample.

Actual study:

- The studied students were asked to fill the questionnaire in the faculty according to the schedule of their lectures. (Between and after lectures in the free time).

- The duration of the study was about 6 months.

Statistical analysis of the data:

The data were organized, tabulated and statistically analyzed using statistical package for social studies (SPSS) version 23. The mean, standard deviation and range were calculated for quantitative data. For categorical variables numbers and percent were calculated. Comparison was done using chi-square test (x^2), when chi square isn't appropriate Fissure Exact test was used. 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): Shows the distribution of the studied nursing students according to their socio-demographic characteristics. It was observed that, 66.1% of the studied students fell within the age of 20-21 years old, with a mean of 20.35 ± 1.235 years, 71.6% of them were females, 28.8% of the studied nursing students were second-year, followed by 27.2% were in third and fourth years, and 16.9% were in first year.

Additionally, 68% of studied nursing students lived in rural areas, 69.5% reported having enough income.

Figure (1): Shows Distribution of the studied nursing students based on their levels of knowledge about black fungus infection. It was observed that, the majority (92.9%) of nursing students displayed low level of knowledge about black fungus infection, while 6.9% exhibited a moderate level of knowledge and only 0.2% had a high level of knowledge with a mean of 27.28 ± 13.288**.**

Figure (2): Represents the distribution of studied nursing students according to their levels of reported practices regarding preventive measures against black fungus infection. It was noticed that 58.5% of the students exhibited satisfactory practices, while 41.5% had unsatisfactory category practices with a range of 0 to 47, and a mean of 34.29 ± 9.603.

Table (2): Illustrates the relation between socio-demographic characteristics of nursing students and levels of knowledge about black fungus infection. It was found that, there was a significant relation between age, previous hearing about black fungus infection and knowledge levels at (p<0.015, 0.011) respectively. In addition, academic year has statistically significant relation with level of knowledge at (p<0.001). On the other hand, there was no significant relation between sex, place of residence, family monthly income and nursing student's level of knowledge.

Table (3): Reveals the relation between socio-demographic characteristics of nursing students and levels of reported practices to preventive measures of black fungus infection. It was noticed that, there was statistically significant relation

between all elements of socio-demographic characteristics and nursing students' levels of reported practices at p<0.001, except for place of residence and family monthly income.

Table (4): Represents the relation between sources of nursing students' knowledge about black fungus infection and their levels of knowledge. It was revealed that; there was a highly statistically significant relation between all sources of nursing students' knowledge and their levels of knowledge at(p<0.001) except for family source and special training courses about infectious diseases.

Table (5): Shows the relation between sources of nursing students' knowledge about black fungus infection and their levels of reported practices about preventive measures for black fungus infection. It was noticed that, there was a significant relation between the studied students' levels of reported practices and the source of knowledge in relation to friends, family, special training courses about infectious diseases and internet at p= (0.009, 0.019, 0.016 and <0.001) respectively,While there was no significant relation regarding of books, medical magazine and media (radio and TV).

Table (6): Represents the correlation between age, academic years, total knowledge and total reported practices scores of nursing students. It was found that, there was a highly statistically significant positive correlation between age, academic year and total knowledge score and total practices score at (p=0.001). Additionally, total knowledge score positively correlated with total reported practices score (r=0.126, p=0.001).

Table (1): Distribution of the studied nursing students according to their socio-demographic characteristics

Socio-demographic of nursing students characteristics	The studied nursing students (n=1145)	
	No	%
Age of students		
Less than 20	200	17.5
From 20-21	757	66.1
More than 21	188	16.4
Range	17 – 23	
Mean ± SD	20.35 ± 1.235	
Sex		
Male	325	28.4
Female	820	71.6
Academic year		
First year	193	16.9
Second year	330	28.8
Third year	311	27.2
Fourth year	311	27.2
Place of residence		
Rural	779	68.0
Urban	366	32.0
Family monthly income		
Enough and save	143	12.5
Enough	796	69.5
Not enough	206	18.0

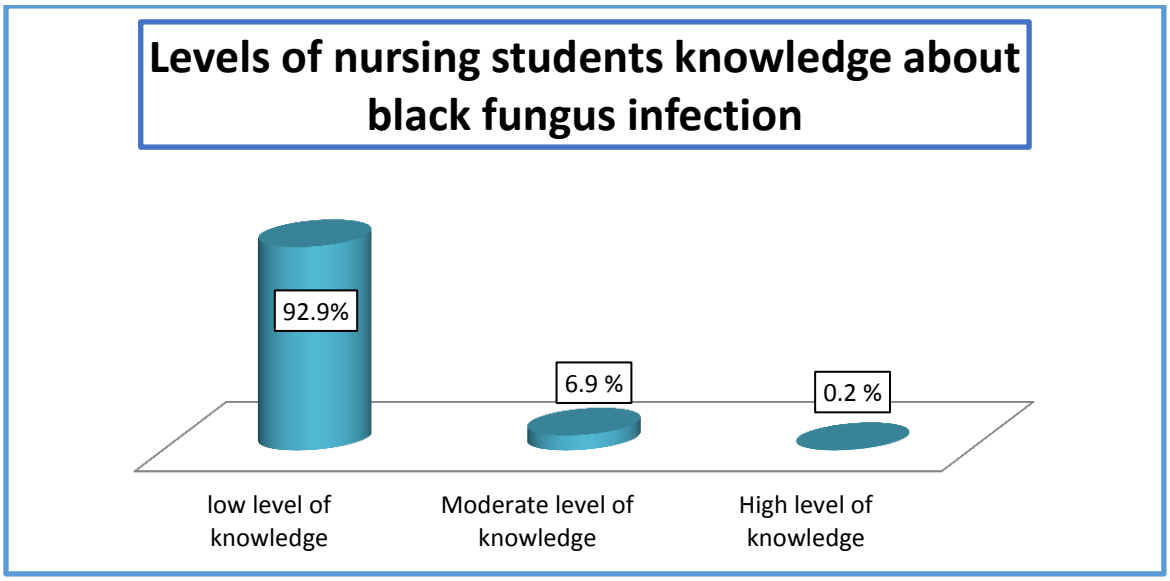

Figure (1): Distribution of the studied nursing students' levels of knowledge about black fungus infection

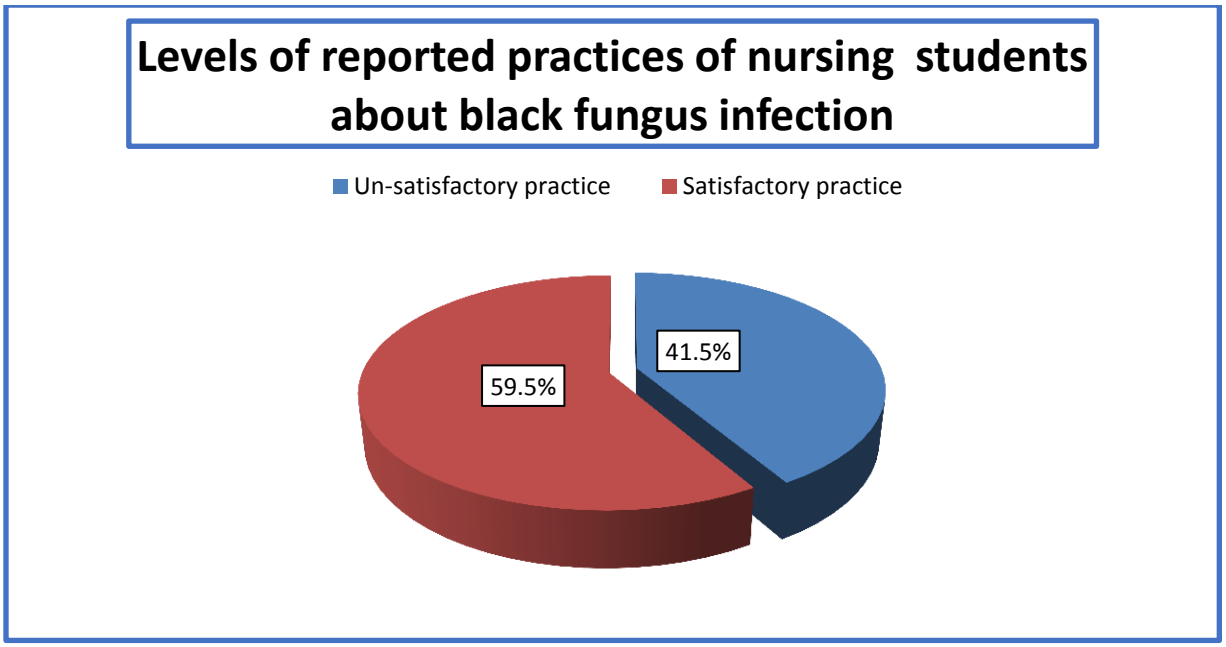

Figure (2): Distribution of the studied nursing students' levels of reported practices regarding preventive measures of black fungus infection

Table (2): Relation between socio-demographic characteristics of nursing students and levels of knowledge about black fungus infection.

Socio-demographic characteristics of nursing students	The studied nursing students (n=1145)						X^2 p
	levels of knowledge						
	low level of knowledge (n=1064)		Moderate level of knowledge (n=79)		High level of knowledge (n=2)		
	No	%	No	%	No	%	
Age							
Less than 20 n= (200)	192	96.0	8	4.0	0	0.0	FE 0.015*
From 20-21 n= (757)	690	91.1	65	8.6	2	0.3	
More than 21 n= (188)	182	96.8	6	3.2	0	0.0	
Sex							
Male n= (325)	302	92.9	21	6.5	2	0.6	FE 0.112
Female n= (820)	762	92.9	58	7.1	0	0.0	
Academic year							
First year n= (193)	185	95.9	8	4.1	0	0.0	FE <0.001**
Second year n= (330)	271	82.1	57	17.3	2	0.6	
Third year n= (311)	303	97.4	8	2.6	0	0.0	
Fourth year n= (311)	305	98.1	6	1.9	0	0.0	
Place of residence							
Rural n= (779)	723	92.8	54	6.9	2	0.3	FE 1.00
Urban n= (366)	341	93.2	25	6.8	0	0.0	
Family monthly income							
Enough and save n= (143)	132	92.3	11	7.7	0	0.0	FE 0.786
Enough n= (796)	743	93.3	51	6.4	2	0.3	
Not enough n= (206)	189	91.7	17	8.3	0	0.0	
Previous hearing about black fungus infection							
Yes n= (927)	852	91.9	73	7.9	2	0.2	FE 0.011*
No n= (218)	212	97.2	6	2.8	0	0.0	

p<0.05* significant p<0.01 highly significant FE (Fissure Exact test)**

Table (3): Relation between socio-demographic characteristics of nursing students and levels of reported practices to preventive measures of black fungus infection.

Socio-demographic characteristics of nursing students	The studied nursing students (n=1145) levels of reported practices				X^2 p
	Un-satisfactory practice (n= 475)		Satisfactory practice (n=670)		
	No	%	No	%	
Age					
Less than 20 n= (200)	138	69.0	62	31.0	101.411 0.001**
From 20-21 n= (757)	289	38.2	468	61.8	
More than 20 n= (188)	48	25.5	140	74.5	
Sex					36.119
Male n= (325)	180	55.4	145	44.6	
Female n= (820)	295	36.0	525	64.0	0.001**
Academic year					
First year n= (193)	137	71.0	56	29.0	167.439 0.001**
Second year n= (330)	181	54.8	149	45.2	
Third year n= (311)	63	20.3	248	79.7	
Fourth year n= (311)	94	30.2	217	69.8	
Place of residence					0.135 0.382
Rural n= (779)	326	41.8	453	58.2	
Urban n= (366)	149	40.7	217	59.3	
Family monthly income					
Enough and save n= (143)	52	36.4	91	63.6	1.870 0.393
Enough n= (796)	334	42.0	462	58.0	
Not enough n= (206)	89	43.2	117	56.8	
Previous hearing about black fungus infection					27.952 0.001**
Yes n= (927)	348	37.5	579	62.5	
No n= (218)	127	58.3	91	41.7	

p<0.05* significant p<0.01 highly significant FE (Fissure Exact test)**

Table (4): Relation between sources of nursing students' knowledge about black fungus infection and their levels of knowledge

Sources of nursing students' knowledge	The studied nursing students (n=1145)						X^2 p
	levels of knowledge						
	low level of knowledge (n=1064)		Moderate level of knowledge (n=79)		High level of knowledge (n=2)		
	No	%	No	%	No	%	
Books and medical magazine							
Yes	136	75.1	45	24.9	0	0.0	FE 0.001**
No	928	96.3	34	3.5	2	0.2	
Media (Radio and TV)							
Yes	229	83.0	47	17.0	0	0.0	FE 0.001**
No	835	96.1	32	3.7	2	0.2	
Friends							
Yes	129	83.8	25	16.2	0	0.0	FE 0.001**
No	935	94.3	54	5.4	2	0.2	
Family							
Yes	60	90.9	6	9.1	0	0.0	FE 0.512
No	1004	93.0	73	6.8	2	0.2	
Special training courses about infectious diseases							
Yes	71	95.9	3	4.1	0	0.0	FE 0.540
No	993	92.7	76	7.1	2	0.2	
Internet							
Yes	756	90.8	75	9.0	2	0.2	FE 0.001**
No	308	98.7	4	1.3	0	0.0	

p<0.05* significant p<0.01 highly significant FE (Fissure Exact test)**

Table (5): Relation between sources of nursing students' knowledge about black fungus infection and their levels of reported practices about preventive measures for black fungus infection

Sources of nursing students' knowledge	The studied nursing students (n=1145)				X^2 P
	levels of practice				
	Un-satisfactory practice (n=475)		Satisfactory practice (n=670)		
	No	%	No	%	
Books and medical magazine					
Yes	77	42.5	104	57.5	0.099
No	398	41.3	566	58.7	0.407
Media (radio and TV)					
Yes	114	41.3	162	58.7	0.005
No	361	41.5	508	58.5	0.501
Friends					
Yes	78	50.6	76	49.4	6.156
No	397	40.1	594	59.9	0.009**
Family					
Yes	36	54.5	30	45.5	4.922
No	439	40.7	640	59.3	0.019*
Special training courses about infectious diseases					
Yes	40	54.1	34	45.9	5.149
No	435	40.6	636	59.4	0.016*
Internet					
Yes	302	36.3	531	63.7	34.449
No	173	55.4	139	44.6	0.001**

p<0.05* significant p<0.01 highly significant FE (Fissure Exact test)**

Table (6): Correlation between age, academic years, total knowledge and total reported practices scores of nursing students

Variables	Total knowledge score	Total reported practices score
	R p value	R p value
Age of students	0.285 0.001**	0.338 0.001**
Academic year	0.282 0.001**	0.365 0.001**
Total reported practices score	0.126 0.001**	--

p<0. p<0.05* significant p<0.01 highly significant**

Discussion:

Mucormycosis largely affects people with existing health issues such as uncontrolled diabetes mellitus, accompanied by a compromised immune response because of drugs such as corticosteroids, which lessen the body's reaction to infections. Mucormycosis primarily affects the nasal and paranasal sinuses and the lungs. The entry point is via inhaling fungal spores from the environment. Additionally, following an injury, burn, cut, or abrasion, it may enter through the skin. **Khajotia., (2022).**

Information is crucial in preventing black fungus infections, as it helps in identifying risk elements, promotes early spotting, supports the treatment of underlying ailments such as diabetes, and encourages proper hygiene practices. Evaluating nursing students, public and healthcare professionals can significantly lower the occurrence of mucormycosis and improve patient results. **(Jayagayathri et al., 2022).** Thus, the present research sought to evaluate nursing students' understanding and precautionary actions concerning black fungus infection.

Regarding the scrutinized nursing students based on their overall levels of awareness about black fungus infection, this study observed that most nursing students demonstrated a low degree of knowledge regarding black fungus infection, whereas fewer than a tenth showed a moderate level, and only a small number possessed a high level of understanding. **(Figure 1)**.

This finding is similar to study conducted by **Khalil., (2022)** who conducted a study to assess health literacy and concerns among nursing staffs towards the COVID-19

vaccination and the associated mucormycosis: a quasi-experimental study and disclosed that the understanding scores of nursing personnel concerning black fungi were low. Conversely, this result is inconsistent with a study done by **Chongloi et al., (2022),** who disclosed that all the nursing students 100% (no=230) possessed good knowledge concerning mucormycosis. This may be due to the fact that Mucormycosis is a rare fungal infection, and while it is becoming more recognized due to increasing cases, particularly during the COVID-19 pandemic, it is still relatively uncommon in many regions. As a result, nursing programs may not dedicate much time to specific, less common diseases like black fungus, resulting in a gap in understanding regarding its causes, symptoms, transmission, and treatment.

Concerning the distribution of studied nursing students based on their levels of reported practices concerning preventive measures against black fungus infection, the present study demonstrated that a little more than half of the students display satisfactory practices, while the other half are in the unsatisfactory category. **(Figure 2)**.

This result is corresponding with **Elmetwaly, Esmat & Hassan, (2024),** who observed that, over half, 60.8% (no=162) of individuals, possessed sound practices concerning the prevention of Mucormycosis. On the other hand, this is conformable to the finding of a study done by **Gurjar, Kansagara, Chauhan & Savani, (2022),** who showed that over half 63.99% (no=503) of the participants had good practice. It can be linked to nursing students' thorough education in infection control, their awareness of the dangers associated with fungal infections, and their dedication to adopting preventive measures.

Regarding the relation between socio-demographic traits of nursing students and knowledge levels concerning black fungus infection, the present study showed that, there was a noteworthy relation between age, prior knowledge of black fungus infection, academic year and knowledge levels. Conversely, there was no considerable relation between sex, place of residence, family monthly income and nursing student's knowledge level. **(Table 2)**.

This is goes in the same line with **Kabir et al., (2021),** who discovered that there was a statistically significant association between participants' knowledge and their age. Furthermore, this is different with a study done by **Islam et al., (2022),** and demonstrated that, there was a substantial connection

between pupils' knowledge and their sex, living situation, and residence.

From the researcher's perspective, this could be a consequence of older students potentially having a better capacity to process and retain health data, leading to improved awareness and understanding of black fungus. Moreover, prior exposure and hearing about the illness allows students to forge connections between their learning and real-world concerns, which makes it simpler to recall specifics linked to black fungus infection.

Concerning the connection between socio-demographic traits of nursing students and levels of reported practices regarding preventive actions for black fungus infection, the current study indicated that there was a statistically significant relationship between all facets of socio-demographic characteristics and nursing students' levels of reported practices, aside from place of residence and family monthly income. **(Table 3)**.

This finding of the current study is supported by the result of **Islam et al., (2022),** study, who exhibited a noteworthy association between students' practice and their sex, living situation and residence. Furthermore, this result is corresponding with **Gurjar et al., (2022),** who asserted that there was no statistically significant connection between participants' practice and their place of residence?

From the researcher's perspective, this could be because nursing students generally experience continuous and comprehensive exposure to education and clinical training concerning infection control practices.

Concerning the connection between the origins of nursing students' information regarding black fungus infection and their understanding. It showed that, there was a very statistically significant association between all sources of nursing students' knowledge and their levels of knowledge apart from family source and special training programs concerning infectious diseases. **(Table 4)**.

Extensive media reporting, especially amid public health emergencies like the COVID-19 pandemic, turned black fungus infection into a subject of public conversation. Nursing students, as members of the general populace, are frequently exposed to this data, resulting in increased awareness and a higher understanding.

These findings disagreed to the **Ambiha et al., (2023)** study, that revealed the information source concerning mucormycosis hadn't demonstrated a statistically relevant

connection between knowledge levels about mucormycosis amongst nursing students. Those outcomes varied from the study carried out by **Khuntia & Thakur, (2023),** who disclosed that the connection between participants' knowledge and the source of information wasn't significant.

This could be due to media outlets, particularly news reports, documentaries, and public health initiatives, having a vital function in increasing consciousness concerning novel infectious illnesses such as black fungus.

Regarding the connection between nursing students' sources of information about black fungus infection and their reported practices of preventive measures for black fungus infection, the current study revealed that there was a significant link between students' reported practice levels and source of information, specifically friends, family, specific training courses on infectious diseases, and the internet. In contrast, no considerable association was found with books, medical journals, and media (radio and TV). **(Table 5)**.

Furthermore, the internet acts as an easily accessible and continually updated source of data. Nursing students often utilize online resources such as research papers, videos, and websites to augment their learning and remain current on present health matters. This platform permits them to access leading-edge information, research investigations, and expert views on novel topics, including black fungus infection. This result is different with **Islam et al., (2022),** who discovered that, the preventative practices of Black Fungus considerably differ among pupils considering media exposure.

This might be because it is common during any infection or pandemic of any infectious ailment. Family and friends are in constant encouragement to each other to implement preventive measures to avert disease infection.

Regarding the correlation between age, academic years, overall knowledge and total reported practices scores of nursing students, the current study indicated that, there was a highly statistically significant positive correlation between age, academic year and total knowledge score as well as total practices score. Furthermore, total knowledge score was positively correlated with the total reported practices score.

The finding of the current study is corroborative with **Elmetwaly et al., (2024)** study who found that, there was a statistically positive relationship between overall participant knowledge

and their reported practice. Furthermore, this result similar with a study done by **Zakaria & Alkuwaity, (2023),** who observed that the pupils' age and education was negligibly correlated with public knowledge level. This might be because knowledge provides the groundwork for informed action, empowering the nursing pupils to apply preventive measures.

Conclusion

Based on the findings of the present study, it can be inferred that, the majority of nursing students displayed low level of knowledge about black fungus infection, while minority of them exhibited a moderate to high levels of knowledge. Additionally, more than half of the students exhibited satisfactory practices, while less than half of them fall into the unsatisfactory category. Moreover, there was a highly statistically significant positive correlation between the total knowledge score and the total practices score.

Recommendations

The following recommendations are suggested in light of the results of the current study:

Organize workshops or webinars with infectious disease specialists or experts in mycology to update nursing students about emerging trends in the diagnosis, treatment, and prevention of mucormycosis.

Incorporate thorough, scientifically evidence-based information about mucormycosis, or black fungus, into nursing education programs. Make sure students comprehend the disease's biology, clinical signs, risk factors, and available treatments.

-Make clearly readable educational booklets and posters that emphasize the main symptoms and indicators of black fungus, along with the significance of prompt discovery and suitable treatment.

-Create online modules that describe preventive actions. These might be disseminated through educational platforms or institutional websites.

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