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Summaries the key findings, outcomes or information in your report

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Are the actions you are suggesting should take place bearing in mind your conclusion

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Effect of Coaching Program on Parents' Awareness regarding Caring of their children with Hearing Loss

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Abstract

Background: The most common sensory deficit in children today is hearing loss. It can cause significant adverse effects on the acquisition of speech and language, academic achievement as well as social and emotional development. **Aim of the study:** This study aimed to determine the effect of a coaching program on parents' awareness regarding caring of their children with hearing loss. **Research design:** A quasi-experimental research design was utilized to accomplish the aim of this study. **Setting:** The study was conducted at Alshamla Audiology clinics of Tanta University Hospital and Audiology Clinic of International Teaching Hospital, in Tanta City. **Subjects:** A convenient sample composed of 150 parents having children suffering from hearing loss**. Tools of data collection: Tool (1)** Interviewing questionnaire about ADHD, **Tool (2)** Parents' reported practices about their children with ADHD and **Tool (3)** Parents' attitude to deafness scale**. Results:** The majority of the studied sample (75%) had poor level of knowledge before the coaching program implementation, which improved for most of them (90%), to have good knowledge immediately post and at the follow up phases of coaching program implementation. While, most of parents (90%) had unsatisfactory level of practice before the coaching program, also the same percent of them (90%) had satisfactory practice immediately post and at follow up phases of coaching program. Also, the majority of the studied parents (73.3% and 66.7%) showed positive attitude about caring of their children with hearing loss after coaching program implementation. **Conclusion:** The study findings concluded that, there are significant improvements in parents' total knowledge, reported practices and attitude regarding caring of their children suffering from hearing loss after the implementation of coaching program than before. **Recommendations:** Periodical coaching programs should be provided for parents of children with hearing loss for continuous education.

Key words: Coaching Program, Parents' Awareness, Children, Hearing Loss.

Introduction

Deafness is the general name for hearing loss (HL). It is a hidden handicap; it is difficult to determine a child with hearing loss until interacting with or noticing hearing aids. Hearing loss or deafness is a serious disabling condition worldwide. Congenital and acquired HL have a variety of etiologies, including meningo-encephalitis, otitis media and malnutrition (mostly a lack of vitamin A and iodine**)**, and these mainly affect poor families. The morbidity and burden of HL on parents and their children are enormous [1, 2]. For children, learning spoken language,

performing academically and engaging in social works depending on hearing abilities are the most burdens, as a barrier to education and social integration is hearing difficulty. Around 360 million individuals (5% of the world's population) suffering from HL, which is considered disabling; of these, just about 32 million are children. Approximately 60% of childhood HL could be avoided through effective preventative measures [3, 4].

Non-genetic causes of HL include birth circumstances such as hypoxia, low birth weight, and hyperbilirubinemia; diseases as meningitis, measles, and mumps; infections during pregnancy such as, Cytomegalovirus (CMV), rubella, and toxoplasmosis; and head injuries. No matter the source, untreated HL from birth or infancy affects a child's ability to speak, hear, learn, and develop socially and emotionally [5, 2].

The public health care system includes screening for the early detection of health disorders like HL or any problem. The phrase screens mean all types of exams without taking accuracy or speed into account. According to this definition, an investigation is a part of a public health management process that is started by an administrative system rather than a patient initiative. In this sense, screening is a procedure that identifies asymptomatic cases of diseases or abnormalities that a child may have and have not yet been identified or are unknown. Assistance for additional years to help children achieve hearing abilities is our major aim [1].

The improvement of speech, hearing, knowledge, practices and attitude acquisition in children with hearing loss depends on early detection of HL and early use of hearing aids or cochlear implants. In fact, infants with HL who used a hearing aid or cochlear implant and rehabilitation services a year later developed hearing abilities comparable to those of infants in their age with normal hearing. This was prior to the key period for the development of hearing, which began at approximately six months of age [6].

Pediatric nurses play a basic and vital role in educating and teaching or training the parents how to investigate and analysis home safety measures to protect their hearing -impaired children from harm. The pediatric nurse's primary responsibility and main role is to teach parents how to care for their children with HL and to provide them with knowledge and skills at the appropriate time. Because parents may require constant supervision as they adjust to their child's HL diagnosis usually progresses through a number of emotional states, including shock, recognition, denial, acknowledgement, and positive acts. An emotional phase of grieving is anticipated to be after the diagnosis. It's crucial to resolve any anger, sadness, or grief may be experiencing in response to diagnosis, as failing to do so could lead to depression. Parents who are depressed are less attentive to their children's needs and less successful at fostering their children's language and psychosocial development [7].

Coaching is one of the few decision making available to aid promote the development of professional [8]. This is advantageous to learners, recent graduates, and practitioner nurses. This strategy is a sort of assistance for people who want to recognize their full potential, set goals and ways to accomplish them, as well as advance their knowledge and abilities. Pediatric nurses can strengthen their actual knowledge and gain new skills

through with coaching. The atmosphere that coaches create fosters the improvement of knowledge and skills between the learners [9, 10].

Significance of the study

Hearing is one of the five senses that God has endowed us with, and it is crucial for young children to be aware of their surroundings. As a result, any disruption in this sense may result in delays in speech and schooling as well as have an impact on how well they interact with others. From this point on, parents' knowledge is vital since it aids their kids by allowing for early detection and action that have an impact on their social and physical growth and development. H Hearing loss is a neglected chronic otological problem with varying etiology. It is one of the commonest sensory disabilities worldwide and Egypt. The incidence of HI in Egypt reaches 16.02%. The HL is a permanent disability and 75% of those who suffer from it living in the developing countries [7]. Therefore, there is a need to conduct this study on parents to increase their awareness about hearing loss children caring.

Aim of the study

This study aimed to evaluate the effect of a coaching program on parents' awareness about caring of their children with hearing loss through:

- Assessing parents' knowledge, attitude and reported practices about caring of their children with hearing loss
- Design and implement a coaching program for parents about caring of children with

Research hypothesis

- Parents' knowledge, reported practice and attitudes are expected to be improved after receiving coaching program
- Coaching program is expected to have a positive effect on parents' awareness regarding their children with hearing loss.

Subjects and Methods

Research design

A quasi-experimental design was utilized in this study.

Setting

The study was conducted at Alshamla Audiology clinics of Tanta main University Hospital that located at 1st floor, and Audiology Clinic of International Teaching Hospital that located at 5th floor. These units specialized in determining the degree of hearing, speech training program and providing the management.

Subjects

A convenient sample of 150 parents (mothers or fathers), and their children with hearing impairment, regardless of their demographics.

Tools of data collection

Data was gathered using three tools before, immediately after, and three months after the coaching program's implementation.

Tool (1): Hearing loss knowledge interview questionnaire: It was created by researchers and written in straight forward Arabic on the basis of a review of the scientific literature. It is divided into the following parts:

Part I. It was concerned with traits of:

- Age, sex, education, place of employment, marital status, and parents' sources of information regarding hearing loss.
- Children, including: Age, gender, level of schooling, birth order, and hearing loss severity.

Part II. Parents' knowledge about hearing loss: It was adapted from [11, 2] ,it featured 28 questions concerning hearing loss, including definitions, types, hearing loss degree, early identification of hearing loss and early detection, causes, clinical

manifestations, risk factors, complications, preventing methods and interventions. It assessed parents' level of knowledge about hearing loss.

Scoring system

According to the answers provided by the parents, a scoring system was used, with (1) awarded for each correct answer and (0) for each incorrect answer. 28 grades make up the questionnaire's total score. The overall of a parent's knowledge will be categorized into the following categories based on the sum of their scores, divided by the total, and converted to percentages:

- High level 75% ≤ 100%
- Moderate level 50% < 75%
- Low level <50%

Tool (2) Parents' reported practice about hearing loss: It was adapted from instructions of [12, **2]:** It focuses on parents' practices for caring for their kids who have hearing loss and is divided into 6 parts (46 steps): hearing screening test (7 points), physical practise (3 points), hearing aid care (7 points), hearing aid use (8 points), communicating practices (18 points) and follow-up practices (3 points).

Scoring system:

A scoring system was developed based on the feedback provided by the parents, with each step that was completed receiving a score of (1) and each step that was not completed receiving a score of (0), for a total practices score of 46 grades. The total reported practices by the parents was then added together and converted to a percentage, and was afterwards divided into:

- Satisfactory ≥ 60%
- Unsatisfactory < 60%

Tool (3) Parents' attitudes regarding hearing loss scale: It was developed by **[13, 7]** to evaluate attitudes towards hearing loss. It included 22 statements about HL children which encompass equality, ability, cultural and linguistic issues. Items were rated on five points Likert scale.

Scoring system

Regarding the parents' responses were assessed on a 5-point Likert scale " The studied parents' attitudes were classified into strongly agree (5), agree (4), slightly agree (3), disagree (2), strongly disagree (1)" severally. The item scores were added up, and the amount was divided by the total number of things. These ratings were turned into percentages.

Consequently the total parents' attitude was categorized into:

- Positive attitude 50 % ≤ 100%
- Negative attitude < 50%

Operational Design

Three phases made up the operational design for this study, namely preparatory phase, pilot study, and fieldwork.

Preparatory Phase

During this stage, literature on parents' awareness of and concern for children with hearing loss was reviewed. As a result, the data gathering tools for the study were developed. The tools were created under supervision, guidance and experts' opinions.

Content, Face Validity and Reliability:

Three experts in the field of pediatric nursing used test-retest reliability to verify the content validity and application of the material, The questionnaire Alpha Cronbach's reliability test equal 0.84 The checklist's Alpha Cronbach's reliability test equal 0.86.

Pilot Study

To assess the applicability of the developed tools and the clarity of the included questions on hearing loss, a pilot research was conducted on 10% (15 parents) of children with hearing loss who attend the aforementioned settings.

Fieldwork

The actual fieldwork for this study took place over a six-month period, specifically from early September 2022 to late February 2023.The researcher was available for the aforementioned setting shift two days per week. To acquire the essential information for the study, each father or mother underwent an individual interview. The interview with the illiterate parents takes longer because they require more explanation of tool items. According to the research tools, the parents were asked to provide their comments. It took roughly 45 minutes to collect information from each parent. The interviewing questionnaire took an average of 15 minutes to complete, the attitude scale evaluation took 10 minutes, and the parent-reported checklists took 20 minutes. The researchers visited the aforementioned locations three days a week (Saturdays, Mondays, and Wednesdays) from 9.00 a.m. to 2.00 p.m.

Coaching program phases

This program was carried out on five consecutive phases, assessing, developing, implementing, evaluating, and follow-up.

Phase I: An assessment of the pre-coaching program was performed. In order to determine the needs of parents, this phase assessing their knowledge, attitude and reported practices of parent regarding hearing loss in their children.

Phase II: Based on existent parents' need assessment about knowledge, attitude and practices of caring children with hearing loss program, a coaching programme was created. The theoretical content covered the following items: hearing loss definition, early detection of hearing loss, causes, risk factors, and interventions.

The content of the practical part included the following: The practical procedures of caring of children with hearing loss such as; simple hearing screening, physical therapy and physical exercise, care of hearing aids, use of hearing aids, communicating practices and follow up of all parent practical procedure .

Phase III: Implementation of the program:

Implementation of the coaching program was carried out at the previously mentioned settings. At the beginning of the first session, an orientation of the coaching program and its purpose was presented. Parents were divided into groups, and each group consisted of 8-10 parents approximately. Each session started with a summary about what had been given through the previous sessions and the objectives of the new topic, taking into consideration the use of simple language to suit the level of parents' qualifications. As well, the session ended by a summary of its content and a feedback gained from parents.

The coaching program was delivered over the course of five sessions, with each session lasting between 30 and 45 minutes depending on the requirements of the parents and the dynamics of the group. The theoretical component of the coaching program was provided over the course of three lectures and conversations/discussions, and was then followed by the practical component, which was shown over the course of two sessions using role playing, a

simulator, actual objects, discussions, and brainstorming. Power point presentations and posters were two efficient information-delivery tools employed by the researchers. After the coaching programme was implemented, parents were given a handout to use as a reference.

Phase IV and V: Evaluation phases:

The evaluation phases was done immediately post implementation of the coaching program and at follow up one month later by comparing changes in parents' knowledge, attitudes and practices regarding coaching program for caring of children with hearing loss .

Administrative Design

The directors of the audiology clinics in the Alshamla clinics of Tanta University Hospital and the audiology clinic at International Teaching Hospital received approval through a letter issued by the dean of the nursing faculty at Tanta University. The researchers then met with the directors to discuss the goals and procedures for gathering the data.

Ethical Consideration

Before beginning the investigation, the faculty ethical committee approved the research. Before include the parents in the study, their consent was obtained; a concise explanation was given based on their knowledge level and level of physical and mental preparation. They made sure that all collected data was private and solely used for research. The parents were advised that they could opt to participate in the study or not, and that they might leave the study at anytime.

IV. Statistical Analysis

Using a PC, the data gathered from the study sample was revised, coded, and input. The Statistical Package for Social Sciences (SPSS) version 22 was used for statistical analysis and computerized data entry. Descriptive statistics were used to show the data as frequencies and percentages. The correlation between variables was examined using the correlation co-efficiency method and the chi-square test (X2) for comparing qualitative variables. At a p-value of 0.05, statistical significance was deemed to exist.

Results:

Table (1) demonstrates that 40% of the studied children their age less than 6 years with a mean age 5.62±1.22 years. Concerning their educational level, 54.7% of them were illiterate & primary education. As regards gender, 58% of them were females. In relation to birth order of children 50% of them were third or more.

Figure (1) shows the degrees of hearing loss, as 36% of children having moderate degree, 30 % severe and 13% profound degree of hearing loss, the mild degree constitute 20% only .

Table (2) illustrates the characteristics of the studied parents. It indicates that, 36.7% and 34.70% ranged between 20 < 25 and 25< 30 years old respectively, with mean age **24.82 ± 3.33** years. Regarding the level of education, more than half (51.3%) of the parents were illiterate & primary grade. According to residence of parents, this table showed that 90% of parents were from rural area and 86.7% of them were working.

Figure (2) reflects the sources of parents' information, as the health care team constitute 40% of the parents' sources of information, followed by other families (30%), then mass media (20%) and friends (10%).

Table (3) portrays that, there are highly statistically significance improvements within parents' knowledge immediately-post

and at follow-up phases of coaching program implementation as regards all knowledge items about hearing loss children caring.

Figure (3) indicates the total knowledge score of the studied parents, the majority of them (75%) had low level of knowledge before the implementation of the coaching programme, which improved to good in 90% immediately post and 85% at the following-up phase of the coaching programme implementation

Table (4): Points out that there are highly statistically significance improvements in parents reported practices immediately post and at follow-up phases of a coaching program implementation as regards all practices items.

Figure (4) illustrates the studied parents' total reported practices score, most of the studied parents (90%) had unsatisfactory level before the coaching program implementation, which improved for most of them (90%) to have satisfactory practices immediately post coaching program implementation. Furthermore, the same figure shows that, majority of studied parents (85%) had satisfactory level in their total scores of practices in the follow up phase of coaching program implementation with a highly statistically significant difference ($P < .0001$).

Table (5) reveals that, there is an improvement in parents' total attitude immediately after, and at follow up phase of coaching program, the majority (73.3% & 66.7%) respectively of studied parents showed positive attitude toward caring of their children with hearing loss. While, at the pre coaching program implementation, the majority (80%) of them, was negative. Additionally, this data demonstrates a change in parents' overall attitude both immediately following and at follow-up following the execution of the coaching programme, with a highly statistically significant difference ($P < 0.001$).

Table (1): Characteristics of the Studied Children with Hearing Loss (n=150)

Characteristics	No	%
Age/years		
< 6	60	40.0
6 -12	55	36.7
12 < 18	35	23.3
Mean ±SD	**5.62±1.22**	
Education level		
Illiterate & primary	82	54.7
Preparatory	43	28.7
Secondary	25	16.6
Sex		
Male	63	42.0
Female	87	58.0
Birth order		
First	38	25.3
Second	37	24.7
Third or more	75	50.0

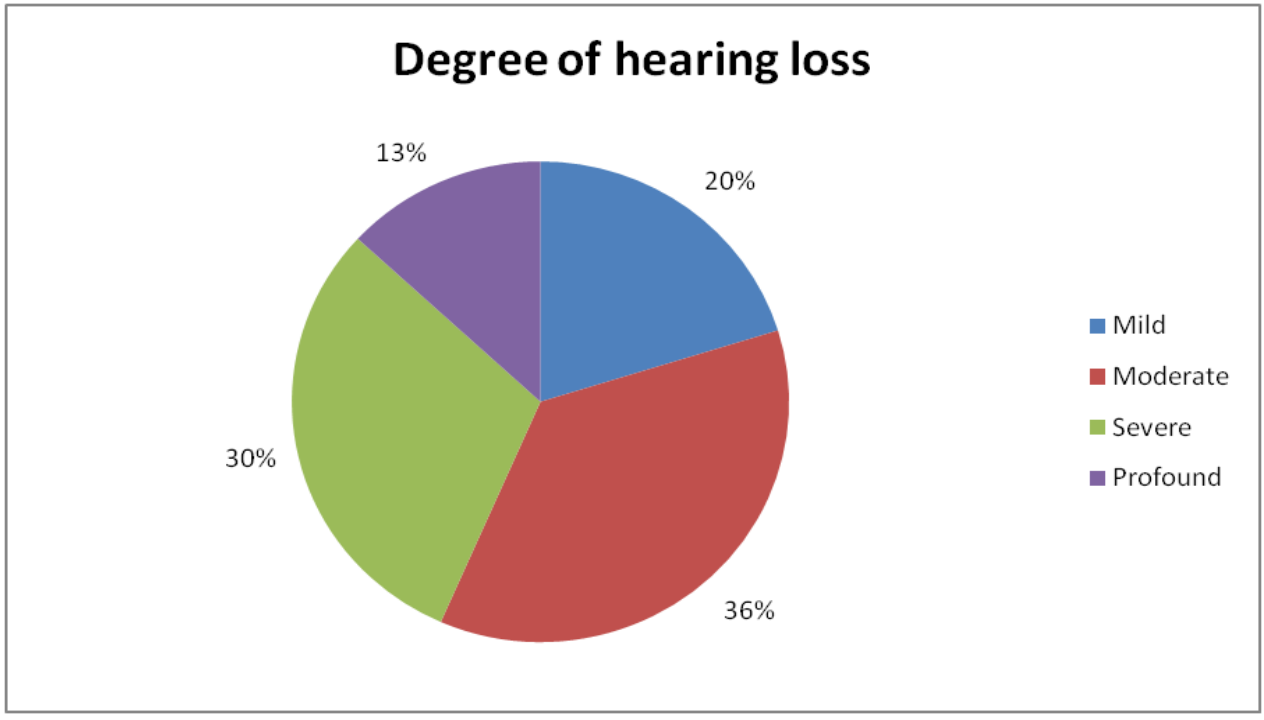

Figure (1): Distribution of Children based on the Level of Hearing Loss (n=150)

Table (2): Characteristics of the Studied Parents of Children with Hearing Loss (n=150)

Characteristics	No	%
Age/years		
< 20	19	12.6
20 < 25	55	36.7
25 < 30	52	34.7
≥ 30	24	16.0
Mean ±SD	**24.82 ± 3.33**	
Educational level		
Illiterate & primary	77	51.3
Secondary	46	30.7
High	27	18.0
Residence		
Urban	60	40.0
Rural	90	60.0
Parents' occupation		
Working	130	86.7
Not working	20	13.3

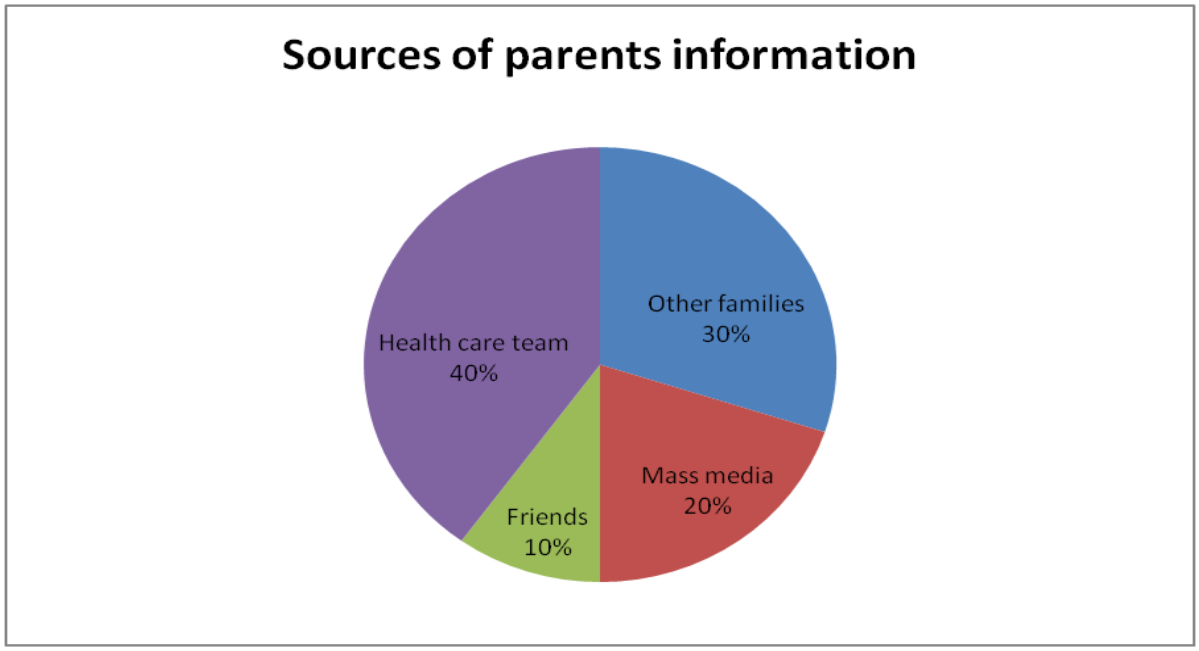

Figure (2): Distribution of Parents regarding their Sources of Information about Hearing Loss (n=150).

Table (3): Percentage Distribution of the Studied Parents According to their Knowledge about Hearing Loss (n = 150).

Parents' Knowledge	Pre- coaching program			Post- coaching program			Follow up		
	Poor	Average	Good	Poor	Average	Good	Poor	Average	Good
	%	%	%	%	%	%	%	%	%
Definition of hearing loss	5.0	35.0	60.0	0.0	6.0	94.0	0.0	7.0	93.0
Types	65.0	35.0	0.0	5.0	12.0	83.0	6.0	10.0	84.0
Degree of hearing loss	60.0	20.0	10.0	0.0	5.0	95.0	5.0	10.0	85.0
Causes	75.0	20.0	5.0	5.0	10.0	85.0	6.0	8.0	86.0
Clinical manifestation	25.0	35.0	40.0	0.0	7.0	93.0	0.0	10.0	90.0
Early detection	45.0	40.0	15.0	0.0	7.0	93.0	0.0	10.0	90.0
Preventing methods	70.0	20.0	10.0	4.0	12.0	84.0	7.0	9.0	84.0
Complications	62.0	38.0	0.0	5.0	11.0	84.0	5.0	10.0	85.0
Intervention	53.0	32.0	15.0	0.0	9.0	91.0	0.0	13.0	87.0
T-test	**$X^2$1 = 17.8 pre versus post-a coaching program**								
P-value	**X^2 2=22.9 pre a coaching program versus follow -up**							**P-value**	
	$X^2$3=13.4 post a coaching program versus follow -up							**<0.001****	

<0.001** highly statistically significant

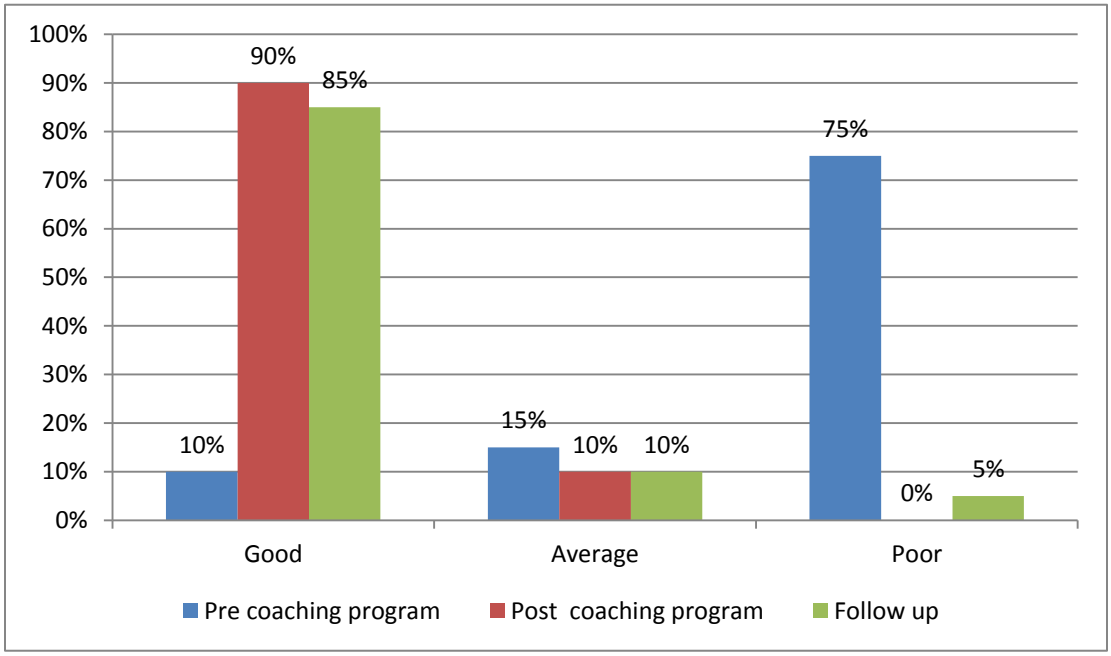

Figure (3): Percentage Distribution of Parent Total Knowledge about Hearing Loss throughout the Coaching Program Phases **(n= 150)**.

Table (4): Distribution of Studied Parents according to their reported Practices about Caring of their Children with Hearing Loss throughout the Coaching Program Phases **(n = 150)**.

Parents' Reported Practices	Pre- coaching program		Post- coaching program		Follow up	
	Satisfactory	Unsatisfactory	Satisfactory	Unsatisfactory	Satisfactory	Unsatisfactory
	%	%	%	%	%	%
Simple Hearing screening	10.0	90.0	85.0	15.0	82.0	18.0
Physical Therapy and Physical Practice	5.0	95.0	90.0	10.0	85.0	15.0
Nausea /vomiting relief	65.0	35.0	95.0	5.0	90.0	10.0
Care of hearing aids	70.0	30.0	96.0	4.0	95.0	5.0
Using of hearing aids	75.0	25.0	93.0	7.0	90.0	10.0
Communicating practices	45.0	55.0	92.0	8.0	90.0	10.0
Follow up of parents' practical procedure	40.0	60.0	95.0	5.0	90.0	10.0
T-test	$X^2$1= 26.6 pre versus post coaching program					P-value
P value	$X^2$2 = 44.2 pre coaching program versus follow-up					<0.001**
	$X^2$3 = 20.6 post coaching program versus follow- up					

<0.001** highly statistically significant

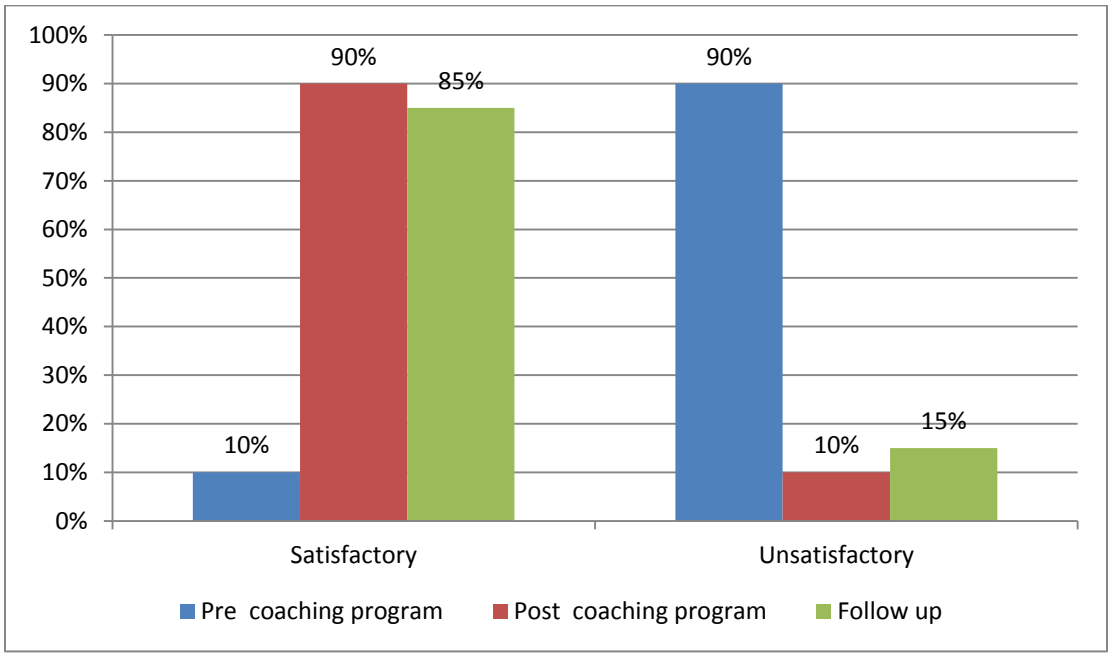

Figure (4): Distribution of Parents' Total Practice regarding Caring of their Children with Hearing Loss throughout Coaching Program Phases (n = 150).

Table (5): Total Parents' Attitude Toward Coaching Program about Caring Children with Hearing Loss throughout Implementation Phases (n=150).

Items	Total Attitude					
	Pre coaching program		Post coaching program		Follow up	
	No	%	No	%	No	%
Positive	10	6.7	110	73.3	100	66.7
Indifferent	20	13.3	30	20.0	35	23.3
Negative	120	80.0	10	6.7	15	10.0
Mean ±SD	0.768±0.64		246±1.42		2.12±0.82	
T-test P value	X^2 1= 15.05 pre-versus post implementation X^2 2 = 21.66 pre implementation versus follow up X^2 3 = 12.88 post implementation versus follow up				**P-value < 0.001****	

<0.001** highly statistically significant

Discussion

The current study composed of 150 parents having children suffering from hearing loss**.** This study aimed to determine the effect of a coaching program on parents' awareness regarding caring of their children with hearing loss.

Regarding parents' information about hearing loss, the present study showed that the most common sources of their information were the health care team, followed by other families and the least sources were mass media and friends. This result contradicted with the result of **Movallali et al., (2015) [14]** who studied "The Effectiveness of Positive Parenting Program (triple P) on Mental Health of Parents of Hearing Impaired Children", and found that other parents of children with hearing loss were the sources of parents' knowledge about hearing loss. This result may be related to a failure of mass media in medical and nursing fields so; there are medical ignorance and lack of awareness about this handicap and its management in the country.

Concerning children understudied based on the level of hearing loss. The present study showed that, less than one third of studied children had severe hearing loss while more than one third of them had moderate and profound hearing loss degree. The result of the current study supported by **Mohamed et al., (2022) [2]** who studied "Assessment Mothers Awareness toward Care of their Children Suffering from Hearing Loss" and reflected that, more than one third of the studied children have moderate and sever while, 23.3% of them have mild hearing loss. But these findings were unsupported by **Ouida, et al., (2016) [7]** about "Assessment of Mothers' Knowledge and Attitude towards their Children Suffering from Hearing Impairment" and confirmed that, more than three quarters of the studied children have bilateral HI and more than half of them have profound HI. This may point that, moderate and severe HI are communal between school-aged children who are hearing loss.

As regards parents' knowledge about hearing loss, the current study portrayed that the majority of parent had low level of

knowledge before the program, and there are highly statistically significant improvement in the parents' knowledge immediately post and at follow-up phases of coaching program implementation as regards all knowledge items about hearing loss. This finding agreed with the findings of the study done by **Eyalati, et al., (2013) [15],** entitled "Effects of Parental Educational Level and Economic Status on the Needs of Families of Hearing-Impaired Children in the Aural Rehabilitation Program", who claimed that the mothers in the study had a limited understanding of HI. This might be due to the parent's lack of knowledge about the nature of the issue, the media's inadequate portrayal of the effects of disabilities, and the inadequate counseling programs at rehabilitation facilities. In addition, **Erbasia, et al., (2019) [16]** entitled " Parental Involvement in the Care and Intervention of Children with Hearing Loss" and who indicates that parental involvement in the intervention of children with hearing loss is multifaceted in nature and incorporates a broad range of behavior and practices. These results have essential implications for the provision of family-centered practices.

Concerning the studied parents' total reported practices score, most of the studied parents had unsatisfactory level of practice before the coaching program implementation, which improved to satisfactory practices immediately post and at follow up phases of coaching program implementation. In the same line, the study done by **Mohamed, et al., (2022)[2]** about "Assessment Mothers Awareness toward Care of their Children Suffering from Hearing Loss", revealed that, two thirds of the studied sample give inadequate care practices about their hearing loss children. Additionally, **Movallali et al., (2015) [14]** who confirmed that, positive parenting training is an effective program that can enhance mental health of mothers with hearing impaired children.

Regarding parents' total attitude, there is an improvement in parents' total attitude. The majority of them had positive attitude towards caring of their children with hearing loss at immediate post and follow up phases, while, at the pre-program phase, the majority behaved negatively. This result agreed with the study by **Kumar & Rao, (2015) [18],** entitled "Parental Attitudes Towards Children with Hearing Impairment", who reported that, mothers exhibit less favorable attitudes towards their children with HI. This could be attributed to the parents' expectation of an ideal child and may also be a reflection of parents' mourning for their imperfect child.

According to the researcher point of view, the caring of children with hearing loss is a parents' primary duty, parents should be aware of the knowledge, attitude and practice required to care for their children who suffering from HL. This strengthens the contention. Given the current study's main study's findings, it is clear that education and training programs are essential for enhancing parents' understanding, attitudes, andpractices regarding caring of children with HL.education The outcome of the current study also showed that after the implementation of the coaching program, the parents' knowledge, attitude, practices regarding HL children caring all improved. This may be due to the value and efficacy of training program in strengthening of the parents' knowledge, practice, attitude, all of which are crucial for high-quality parents and successful children outcomes.

Conclusion

Based on the study's findings, it can be concluded that once the coaching programme was put in place, parents' overall knowledge, their reported practices and attitude towards caring of their children with hearing loss was significantly improved.

Recommendations

- Periodical coaching programs should be provided for parents of children with hearing loss for continuous education.
- Coaching programs regarding hearing loss and how to manage it should be made available to parents of children who have hearing impairment.
- A regular evaluation of parents' practice with their hearing loss children should be conducted.
- Children with hearing loss should undergo regular hearing evaluations.
- Mass media should be a key player in raising awareness about hearing loss, as well as ways to prevent and manage it.

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Effectiveness of Lifestyle Intervention on Recovery of Patients with Bipolar Disorders

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Abstract

Background: The basis of care in patients with bipolar disorder is lifestyle evaluation and treatments, which can serve as a starting point for therapy and can be used in conjunction with psychological and pharmaceutical therapies to enhance positive outcomes and lessen negative ones. Additionally, integrating several lifestyle-based methods (such food and exercise therapies) may improve the effectiveness of treatment and the healing process**. Aim:** evaluate the effectiveness of lifestyle intervention on recovery of patients with bipolar disorders. **Design:** Quasi experimental design. **Setting:** The inpatient psychiatric department of Tanta University, and The Neurology, Psychiatry, and Neuro-Surgery Center. **Subjects:** A convenient sample of 60 patients with bipolar disorders were allocated randomly to experimental and control group (30 patients in each group). **Tools: Tool I:** Socio-demographic and clinical characteristics, Tool **II:** Simple lifestyle indicator questionnaire (SLIQ). Tool **III:** bipolar recovery questionnaire (BRQ). **Results**: there was statistical significant difference between experimental and control group after implementing lifestyle intervention in all dimensions of lifestyle scale except smoking subscale. **Conclusion:** lifestyle intervention promotes recovery and enhances daily life activities in patients with bipolar disorders except smoking habit needs more effort and variety of interventions to eliminate it. **Recommendation:** Different interventions directed to modifying lifestyle activities need to be planned and implemented for patients with bipolar disorders to improve their mental well-being and enhance their recovery.

Key words: lifestyle intervention, bipolar disorder, mental health recovery

Introduction

Bipolar disorder (BD) is a chronic and cyclic mental disorder, characterized by irregular mood swings between mania/hypomania and depression with a 3% to 5% lifetime prevalence. The condition causes numerous limitations in daily functioning, increasing the expenditures for sufferers as well as society. [1-3]. Because of its early onset and chronic nature throughout the lifespan, it is regarded as the second most common cause of disability. Bipolar disorders are characterized by increasing in the frequency and severity of affective episodes, as well as recurrence rates of 50–90%. [4,5].

BD is linked to a high incidence of medical disorders such obesity, type 2 diabetes (T2D), cardiovascular disease (CVD), and stroke in addition to mood and cognitive abnormalities. [6,7]. Unfortunately, these health issues could have a detrimental effect on how the disease progresses. for example, concomitant T2D is linked to a higher risk of recurrent episodes, frequent hospital stays, suicidality, and a subpar response to traditional mood stabilizers. The significant

percentage of obese patients who experience a depressed recurrence suggests that obesity may be a risk factor for depression relapse. [8-10].

There are many factors that contribute to the development and maintenance of BD, among these factors is an unhealthy lifestyle [9,14] . Unhealthy lifestyle habits such as smoking, substance misuse, physical inactivity especially in depressive phases, poor dietary choices, and sedentary life contribute to the development and severity of the physical ailments and clinical symptoms in BD. Consequently, contribute to poor health outcomes and reduce cost-effectiveness of therapeutic interventions in BD [15].

Health-promoting lifestyles consist of a multidimensional pattern of perceptions and activities that are self-initiated and are involved in maintaining and promoting health and self-improvement. Healthy lifestyles mean to engage in regular physical activity, to refrain from smoking, limit alcohol consumption, manage life stressors, and to eat healthy food in order to prevent overweight. These behaviors contribute to not only better physical health, but also foster mental well-being [16].

Although these activities do not always prevent BD, they frequently assist people in maintaining or improving their health through a holistic strategy that involves lowering body mass index and other risk factors for metabolic syndrome. Additionally, it reduces the risk and morbidity of bipolar disorder individuals who are overweight, have cardiovascular disease, or have diabetes, which are illnesses that can be avoided. [17].

Therefore, the promotion of healthy lifestyles among patients with bipolar disorder is an integral part of their recovery [16]. In this regard, the notion of recovery as a new medical paradigm for psychiatry emerged, which denotes the growth beyond the devastating effects of mental illness, including symptomatic recovery (resolution of symptoms), and the formation of new meaning and purpose in one's life [18]. Recovery is the ability to live a fulfilling, hopeful, and productive life despite the constraints brought on by sickness. [19]. Such healing or recovery means that people with bipolar disorder believe they are regaining their sense of identity and purpose, both inside and outside the boundaries of their condition. Recovery is characterized by its key components of hope, optimism, and positive identity[20].

In literature, there are guiding principles to define mental health recovery instead of a sole definition; it includes the ability to regulate one’s life rather than returning to premorbid level of functioning. Instead of emphasizing complete symptom relief, it places an emphasis on resilience and control over challenges and daily life. [21] . The goals of recovery are to assist those who are struggling with mental diseases to see beyond merely existing and surviving. It motivates them to advance and establish new objectives. It promotes the idea that they should move on with their life, engage in activities, and form relationships with people who will give them significance. [22,23].

Acceleration of recovery process has become the aim of mental health systems worldwide for people with psychiatric disorders. There is data emphasized on the significance of healthy life style as a key technique to nurture recovery in people with psychiatric disorders [24] .

Significance of the study

Adults with BD have increased rates of morbidity and mortality, which pose a public health emergency because they often die 25 years earlier than the normal population primarily as a result of medical diseases that can be avoided, such diabetes and cardiovascular disease.

High rates of smoking, poor eating patterns, obesity, and a sedentary lifestyle are all modifiable risk factors that contribute to and exacerbate their physical health. Moreover, the high frequency of medical comorbidities and poor health outcomes are a result of drug side effects, such as secondary weight gain. [9,10]

patient's physical and mental health outcomes will be improved by adopting healthy lifestyle behaviors including quitting smoking, refraining from abusing drugs or alcohol, making wise dietary decisions, and engaging in more physical activity. The signs of a patient's improved recovery will therefore be taken into account by these alterations.

Operational definition

Lifestyle intervention in this study focused on good mental hygiene factors such as dietary habits, exercises, smoking habits, substance use, sedentary life, and stress reduction. In addition to other mental hygiene factors as building social relationships, fostering hope, and how to maintain medication compliance and prevent relapse.[12]

Aim of the study

To evaluate the effectiveness of lifestyle intervention on recovery of patients with bipolar disorders.

Research hypothesis

Lifestyle intervention is expected to improve recovery of patients with bipolar disorders.

Subjects and method

Research design

This study utilized a quasi-experimental design.

Setting

The inpatient psychiatric department of Tanta University. It has a capacity of 31 beds divided into two wards for male (17 beds) and two wards for female (14 beds) as well as Neurology, Psychiatry, and Neuro-Surgery Center. It has a capacity of 28 beds divided into one ward for male (18 beds) and one ward for female (10 beds). Both hospitals are under the supervision and direction of the ministry of higher education.

Subjects

The sample size calculation was done using EPi-Info software based on the following criteria: 95% confidence limit, 80% power of the study, ratio between treatment and control group of 1: 1 and expected level of recovery - of 30% before intervention that will be improved to 70% after --intervention. Based on the above-mentioned criteria, a convenient sample of 60 patients with bipolar disorders were allocated randomly by simple random sampling technique to experimental and control group (30 patients in each group).

The selected patients were chosen based on the following inclusion criteria

- Diagnosed with bipolar disorder according to DSM-5 criteria,
- During remission,
- Willing to participate in the study.

The exclusion criteria include:

-Current or past substance-use disorder,

- Neurological illness, acute medical illness, or mental retardation.

Tools of the study

Tool I: Socio-demographic and clinical characteristics

It was developed by the researchers after reviewing the related literature. Socio-demographic data includes patient's age, sex, level of education, occupation, marital status, and residence. Clinical characteristics include duration of illness and number of previous admission.

Tool II: Simple Lifestyle Indicator Questionnaire (SLIQ)

It was developed by **Godwin et al., (2008)** [25] and adopted in the current study. Five lifestyle factors that have been found to have an impact on physical health were measured. The SLIQ has 12 questions: three on diet, three on physical activity, three on alcohol consumption, two on smoking, and one on stress. A raw score and a category score can be computed for each component. The five category scores are used to calculate the overall SLIQ score, giving each component an equal amount of weight. Overall SLIQ scores can range from 0 to 10, with each component having a category score of 0, 1, or 2. A higher raw score denotes healthier behaviour for all dimensions except alcohol consumption.

According to the grading guide, the raw scores are transformed into category scores ranging from zero to two, with 0 signifying a subpar score in that dimension, one an average score, and two a healthy score. On a scale from 0 to 10, the category scores are added to get the total score, which is then divided into three categories: unhealthy (scoring 0-4), intermediate (score 5-7), and healthy (score 8–10).

Tool III Bipolar Recovery Questionnaire (BRQ)

The was developed by **Jackson (1967)** [26] and adopted in the existing study. It was used to evaluate individual experiences of bipolar disorder recovery and has 36 items. Each response is evaluated on a 100 mm visual analogue scale from 0 to 100, with the anchors "strongly disagree" (zero), "disagree" (twenty-five), "agree" (seventy-five), and "strongly agree" (one hundred) for affirmative responses, and the opposite for negative responses. The total BRQ score is determined by adding up the individual scores for each of the 12 reverse-scored items (strongly disagree = 100, strongly agree = 0).

- Less than 50% indicate poor self-related recovery.
- A score of 50-75 indicates fair self-related recovery.
- A score greater than 75% indicates high self-related recovery.

Procedure

- An official letter was addressed from the Dean of the Faculty of Nursing to the Director of the Psychiatric Department of Tanta University Hospital and Neuropsychiatry and Neurosurgery center to request their permission and cooperation for data collection.
- The researchers translated tools II and III into Arabic language then translating them back. Results indicated that the back translation and the original were comparable. A panel of five specialists in the disciplines of psychiatric medicine and nursing conducted a content validity assessment, and the necessary adjustments were made as a result.
- A pilot study was carried out on 10% of patients with bipolar disorder to ensure the

clarity and applicability of the study tools. These patients were excluded later from the actual study.

- The reliability of the validated tools was then evaluated using Cronbach's alpha, and it was determined to be reliable (0.841 & 0.869, respectively).
- The study was carried out in four stages: assessment, planning, implementation, and evaluation phase.

Assessment phase: It was done for both groups (experimental and control group) before implementing the lifestyle intervention using study tools as a pretest. The control and experimental group were assigned randomly by using concealed sealed envelopes. Once the patient has consented to enter the trial an envelope is opened to randomly assign patients to (experimental group 30 patients) or (control group 30 patients).

Planning phase

-This phase was formulated based on the assessment phase.

-The general and specific objectives of lifestyle intervention were formulated.

Objectives of lifestyle intervention:

At the end of the intervention the patients will be able to:

- Explain the different component of lifestyle intervention.
- Differentiate between physical and psychological elements.
- Follow steps that are necessary to practice this intervention.
- Apply what had been learned in the daily life.

-Content of the intervention was developed after a thorough review of the literature [16,26,27]. It included the necessary systematic skills that will be taught during the twelve sessions. Skills to be taught gradually moved from a simple and basic to a more complex one.

- The sessions were transcripted in Arabic language. Each session covered the following outline:

- Specific objectives of the session.
- Importance of the session.
- Examples from real life.
- The specific steps needed to learn the skill.
- Role play by the researcher and patients to practice the skill.

-The content of each session was revised and approved by all researchers after making sure of its applicability to the intended patients.

Implementation phase

-Patients in the experimental group were divided into 6 subgroups. Each subgroup ranged between 4 and 6 patients. Each subgroup attended twelve sessions, three sessions per week with a duration of 60 to 90 min.

-Before each session, the seats were arranged in circular shape and the researchers gathered the patients from their wards to a specific room in the hospital.

-The intervention sessions were conducted as a follow:

-**In the first session**, the researchers met the patients in a quiet room, greeted them, allowed the patients to take their seats and introduced themselves to the patients as well as each patient to the others. The researchers then provided detailed information in relation to:

a) Number of group members, place of meeting, duration of the intervention, frequency of meetings and length of each session.

b) Clarification of the specific goals of the intervention.

c) Grounded rules of the group e.g., confidentiality and honesty. What to expect in the group in terms of their own roles e.g., listen attentively to each other, there are no right or wrong answers, and everyone has an equal chance to participate.

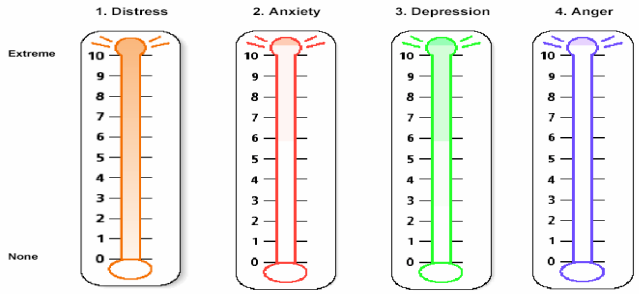
Second session: it includes giving information about bipolar disorders (definition, causes, types, symptoms, and treatment). In addition to relate all of this to each patients to help them identify their own conditions and realize that it may be different from other patients. Consequently, know how to deal with their situations effectively.

Third session: focused on helping patients to recognize early warning signs of relapse. This session is covered by three training exercises that help the patient to recognize his or her signs of relapse.

Exercise one: symptoms checklist (each patient is asked to select all the symptoms that happened before the relapse and all symptoms that happened at the beginning of relapse.

Exercise two: color cards (help patients to determine the most important and specific symptoms of his or her relapse: red cards include the symptoms that happened before relapse and the patient is asked to select the most annoying symptoms, while the blue cards include the symptoms that happened at the beginning of relapse and the patient is asked to select the most annoying symptoms.

Exercise three: by using emotion thermometer to determine how do he/she feel today? There are five thermometers listed from zero to ten, a thermometer one measures stress, thermometer two measure anxiety, thermometer three measure depression, thermometer four measure anger, and the last one measure the degree of help that were provided to yourself to get out of this bad mood. The patients were asked to put a mark on the degree he feels in each thermometer, and by the way, it may be only one feeling that he felt it today and it is not necessary to have all these feelings in one day.



Fourth session: centered around medication compliance and involves instruction about the meaning of compliance, importance of it, causes that lead to noncompliance and effective strategies to increase compliance with medication. The session also included a part about common side effects of drugs that may be a factor of noncompliance and how to deal with these side effects.

Fifth session: focused on a healthy diet. Definition of healthy food and its importance, healthy eating habits, nutrition pyramids. Additionally, the session contained a segment about unhealthy food and its risks. Also, the association between bad dietary habits and mental health problems was elaborated. Measuring the body mass index for each patient to determine whose weight was above or below or within normal range then teach patients how to make a balanced diet.

Sixth session: centered on physical exercise. Physical and psychological benefits of exercise were illustrated. In cooperation with physical education coach an optimal program for patients were developed with

specific guidelines to help patients how and when practice physical exercise regularly. Moreover, time allotted during session to practice physical exercise with all patients to increase their motivation and enhance patients' participation and practice.

Seventh and eighth session: the main core of these sessions is how to cope with stress and teach about stress management techniques. The sessions initiated with an introduction about stress and its effect on physical and psychological health, stress triggers, and the relationship between stress exposure and exacerbation of symptoms of bipolar disorders. Additionally, the intervention included how to maintain healthy ways to cope with stress, how to deal effectively with triggers of stress and helping patients to start a regular habit of relaxation strategies and meditation to manage stress. Different videos that show how to practice stress management techniques were introduced to the patients followed by modeling by the researchers and practicing role plays by the patients during the sessions to learn different relaxation techniques.

Ninth session: targeted smoking and substance abuse. The relationship between abuse and symptoms of mental illness were illustrated. In addition to, the adverse effects of abuse/smoking, triggers of substance abuse and smoking, and benefits of quitting both of them were illuminated. Furthermore, some suggestions about how to cope with cravings and how to stop smoking/substance abuse were demonstrated. Also, during the session the association between increased level of stress, smoking\substance abuse and increase symptoms of illness were shown and effective ways to overcome all of this. (refer to the previous session)

Tenth session: addressed fostering hope. The session aimed to teach the patients about the meaning of hope, its importance in the recovery process and how to practice hopeful views in daily life. As well, the relationship between positive\hopeful thinking and enhancement of psychological wellbeing were presented. Asking the patients to give real examples about people with hopeful thinking is encouraged to be role models for them. Moreover, the researchers encouraged the patients to remember certain situations in their life in which they practice hopeful thinking and its effect on the outcomes of the situations.

Eleventh session: focused on building social relationships. The aim of this session was to help patients to recognize the benefits of healthy social relationships and their effects on the recovery process. How to maintain healthy relationships and give them some tips to improve social competence to build and nurture social relationships with others. In addition, the patients were encouraged to give real examples from their own life about supported relationships and how it affects their quality of life as a whole. To increase effectiveness of this session, the researchers start to demonstrate how to initiate and maintain relationships with others. Then, role plays were done by all patients to master this skills. Positive and corrective feedback was given to the patients to enhance their performance.

Twelfth session: the last session centered on recovery. The meaning of mental health recovery, essential elements of it and specific steps that are applied by some other patients and found to be successful with them were recommended to follow it to move towards recovery. Moreover,

obstacles to recovery were also discussed and effective measures to deal with these difficulties.

-Throughout the training intervention, the researchers used brainstorming to encourage wide and creative thinking about the topic of the sessions. This was done through stating a problem to the group, listening to their ideas, and recording it on the whiteboard. When all ideas were listed, the researcher allowed the patients to discuss the responses with each other. Also, the researchers gave examples from the patients' daily life and from their own experience to encourage patients to participate during the sessions.

-At the end of each session, the researcher made a summary of what has been going on.

-At the end of the whole intervention a closing session was done to get the patients' feedback and opinions about the intervention and the benefits they gained from it. In addition to their recommendations for further improvement.

-The educational strategies that have been used in the training program were

- Brain storming
- Group discussion
- Role play

-In order to ensure that the control group will not be affected by the learned skills taught to the study group, the researcher had to wait to finish the whole intervention and start the process of surveying patients for recruitment of the control group, making sure to consider appropriate matching in relation to age, education, duration of illness, and numbers of hospitalization. Study tools were applied on those patients as a pre-test.

Evaluation phase

- Immediately at the end of the intervention and after 3 months, posttest was done for the experimental group using the study tools on each patient on an individual basis.

-As for the control group a post test was done after a matched number of days compared to the study group.

-According to the baseline scores on the study tools, comparison was done between pre and posttests in both the experimental and control groups.

Ethical consideration

-Study procedure was revised and approved by the Ethical Committee of the Faculty of Nursing code 195-1-2023.

-Written consent was obtained from both study subjects after explanation of the study purpose.

-Privacy and confidentiality were assured to all study subjects.

-Both study subjects had the right to quit this study at any time and this should be respected and assured.

Statistical analysis

The data normality was assessed using the Kolmogorov-Smirnov test. The range, mean, and standard deviations for numerical values were computed. The student's t test was performed to compare the differences between two mean values. Analysis of variance ANOVA (F) was used to test whether there were any differences in mean values between more than two groups. When the normal distribution of the data could not be confirmed, Mann-Whitney analysis was utilized. For categorical variables, the number and percentage were determined, Chi square and Fisher Exact tests were used to determine whether there were any differences between

subcategories. At p .05. statistical analyses were deemed significant.

Results

Table (1) presents the distribution of the studied patients according to their sociodemographic and clinical characteristics. In relation to age, the mean age was 30.20 ± 7.49 years for study group and 30.53 ± 7.23 for control group with the highest percent being in the age group ranging from 20 to less than 30 years.

Concerning sex, study and control groups had equal percent for both male and female 46.7 & 53.3 respectively. In relation to residence, study and control groups also had the same percentage for rural and urban area (60 % &40% respectively for both groups).

As for marital status, around half of the studied subjects were married represented by 56.7% for control group and 50 % for study group. Regarding educational level, more than half had primary and preparatory level of education (60 % control & 53.3% study). As regards occupation, around two thirds of subjects were not working with a percent 70% for study group and 66.7% for control group.

Speaking about number of previous admissions, more than half of the studied subjects were admitted to the hospital one or two times as shown by 60% for study group and 53.3% for control group.

Comparing the experimental and control groups, no statistical significant difference was found in relation to all sociodemographic and clinical data using Pearson Chi-Square Test and Fisher's Exact Test. The absence of any statistical significant difference between the studied groups can reflect that both groups are matched.

Table (2) presents the comparison of the total lifestyle among experimental and control group throughout phases of the intervention. The table shows that the mean score of lifestyle among the study group increased after implementing the training program. In this respect, the mean score was 4.5 ± 2.8 before conducting the training program and increased to 7.1 ± 2.87 after terminating the program. This increment was statistically significant (P = 0.001*). Additionally, the mean score of lifestyle among the study group increased at the follow up. The mean score was 4.5 ± 2.8 before the program and increased to 6.3 ± 3.0 after three months from the implementation of the program with statistical significant difference (P = 0.003*). On the other hand, there was an increase in the mean score of lifestyle among the control group on the post-intervention compared to the prior figure (3.89 ± 2.4 before & 4.6 ± 2.9 immediately after). But without any statistical significant difference (P = 0.139). Moreover, there is no statistical significant difference between the lifestyle score before intervention and after three months at follow up (3.89 ± 2.4 before & 4.03 ± 2.5 at follow up) (P = 0.093). Comparing the mean differences in both the study and control groups at pre and post intervention (2.6 ± 1.85 & 0.71 ± 0.96 for study and control group respectively) a statistical significant difference was found between both of them (Z_{MW} = 3.024, P = 0.025*). Furthermore, when comparing the mean differences at pre and follow up for both groups (1.8 ± 1.31 study group & 0.14 ± 0.54 for control) also a statistical significant difference was detected (Z_{MW} = 2.349, P=0.041*).

Table (3) shows the comparison of the total recovery among experimental and control group throughout phases of the intervention.

The table shows that the mean score of recovery among the study group increased after implementing the training program. In this regard, the mean score was 67.23 ± 25.10 before conducting the training program and increased to 104.3 ± 31.67 after terminating the program. This increase was statistically significant (P = 0.001*). Additionally, the mean score of recovery among the study group increased at the follow up. The mean score was 67.23 ± 25.10 before the program and increased to 97.70 ± 24.20 after three months from the implementation of the program with statistical significant difference (P = 0.003*). On the other hand, there was an increase in the mean score of lifestyle among the control group on the post-intervention compared to the prior figure (58.33 ± 18.01before & 74.0 ± 28.45 immediately after). But without any statistical significant difference (P = 0.139). Moreover, there is no statistical significant difference between recovery score before intervention and after three months at follow up (58.33 ± 18.01before & 73.40 ± 28.42 at follow up) (P = 0.093). Comparing the mean differences in both the study and control groups at pre and post intervention (37.07 ± 18.54& 15.67 ± 12.52 for study and control group respectively) a statistical significant difference was found between both of them (Z_{MW} = 8.521, P = 0.001*). Furthermore, when comparing the mean differences at pre and follow up for both groups (30.47 ± 17.32 study group & 15.07 ± 12.08 for control) also a statistical significant difference was detected (Z_{MW} = 3.754, P=0.012*)

Table (1) Distribution of the studied patients regarding their sociodemographic and clinical data

Sociodemographic and clinical data		Experimental		Control		X^2	P-value
		N	%	N	%		
Age	20 – 30	18	60	17	56.7	X^2= 0.081	0.960
	31 – 40	9	30	10	33.3		
	> 40	3	10	3	10		
	Range	20 – 48		22 – 48		T: 0.175	0.861
	Mean ± SD	30.20 ± 7.49		30.53 ± 7.23			
Sex	Male	14	46.7	14	46.7	X^2= 0.0	1.0
	Female	16	53.3	16	53.3		
Residence	Rural	18	60.0	18	60.0	X^2= 0.0	1.0
	Urban	12	40.0	12	40.0		
Education	Illiterate	9	30.0	9	30.0	F^{ET}= 2.118	0.548
	Primary /preparatory	16	53.3	18	60.0		
	Secondary	3	10.0	3	10.0		
	University	2	6.7	0	0.0		
Occupation	Not worked	21	70.0	20	66.7	F^{ET}= 0.101	0.951
	Craft man	6	20.0	7	23.3		
	Professional business	3	10.0	3	10.0		
Marital status	Single	9	30.0	9	30.0	F^{ET}= 0.525	0.769
	Married	15	50.0	17	56.7		
	Divorced	6	20.0	4	13.3		
Duration of illness (years)	1 – 4	16	53.3	17	56.7	F^{ET}= 0.230	0.891
	5 – 10	11	36.7	11	36.7		
	11 – 15	3	10	2	6.7		
	Range	1 – 15		1 – 15		T: 0.490	0.626
	Mean ± SD	5.87 ± 4.28		5.37 ± 3.60			
No of previous admission	1 – 2	18	60	16	53.3	X^2= 0.403	0.817
	3 – 4	6	20	8	26.7		
	5 – 7	6	20	6	20		
	Range	1 – 7		1 – 7		T: 0.271	0.787
	Mean ± SD	2.80 ± 1.92		2.93 ± 1.89			

F^{ET}= Fisher's exact test T= student t- test X^2= Chi-square test *Significant at level P≤0.05

Table (2) comparison of total lifestyle among experimental and control group throughout phases of the intervention.

Total lifestyle		Experimental	Control	Test of significance	
Pre-intervention	**Range**	1 – 10	1 – 10	T= 1.086	
	Mean ± SD	4.5 ± 2.8	3.89 ± 2.4	P= 0.282	
Immediately post	**Range**	2 – 10	2 – 10	T= 3.411	
	Mean ± SD	7.1 ± 2.87	4.6 ± 2.9	P= 0.001*	
Follow up. After 3 months	**Range**	1 – 10	1 – 10	T= 3.199 P= 0.002*	
	Mean ± SD	6.3 ± 3.0	4.03 ± 2.5		
Test of significance		^{F} P1 = 0.001* ^{F} P2= 0.003* ^{F} P3= 0.874	^{F} P1 = 0.139 ^{F} P1 = 0.093 ^{F} P1 = 0.943		
Mean difference					
Pre-post intervention		2.6 ± 1.85	0.71 ± 0.96	Z_{MW} = 3.024	P=0.025*
Pre- follow up		1.8 ± 1.31	0.14 ± 0.54	Z_{MW} = 2.349	P= 0.041*

Z_{MW} Mann-Whitney test **T:** student t- test **F:** ANOVA test

*****Significant at level p≤0.05

P1= comparison between pre and immediately post intervention

P2= comparison between pre intervention and follow up

P3= comparison between immediately post intervention & follow up

Table (3) comparison of total recovery among experimental and control group throughout phases of the intervention.

The Bipolar Recovery Questionnaire		Experimental	Control	Test of significance
Pre-intervention	**Range**	43 – 125	42 – 120	T= 1.578 P= 0.120
	Mean ± SD	67.23 ± 25.10	58.33 ± 18.01	
Immediately post	**Range**	53 – 139	44 – 136	T= 3.898 P= 0.001*
	Mean ± SD	104.3 ± 31.67	74.0 ± 28.45	
Follow up. After 3 months	**Range**	58 – 135	44 – 136	T= 3.566 P= 0.001*
	Mean ± SD	97.70 ± 24.20	73.40 ± 28.42	
Test of significance		^{F} P1= 0.001*	^{F} P= 0.139	
		^{F} P2= 0.003*	^{F} P= 0.093	
		^{F} P3= 0.874	^{F} P= 0.943	
Mean difference				
Pre – post intervention		37.07 ± 18.54	15.67 ± 12.52	Z_{MW} = 8.521 P= 0.001*
Pre – follow up		30.47 ± 17.32	15.07 ± 12.08	Z_{MW} = 3.754 P=0.012*

Z_{MW} :Mann-Whitney test **T:** student t- test **F:** ANOVA test

*****Significant at level p≤0.05

P1= comparison between pre and immediately post intervention

P2= comparison between pre intervention and follow up

P3= comparison between immediately post intervention & follow up

Table (4) comparison of lifestyle subscales among experimental and control group throughout phases of the intervention.

Diet		Experimental	Control	t. test	p. value
Pre intervention	Range	0 – 7	1 – 9	2.011	0.065
	Mean ± SD	3.37 ± 1.92	4.67 ± 1.94		
Immediately post	Range	10 – 15	1 – 9	15.001	0.001*
	Mean ± SD	12.40 ± 1.50	6.07 ± 1.76		
Follow up	Range	8 – 13	3 – 8	13.326	0.001*
	Mean ± SD	10.10 ± 1.27	5.53 ± 1.38		

Continue table (4)

Activity scale		Experimental			Control			t. test	p. value
Pre intervention	Range	0	–	16	0	–	16	0.945	0.348
	Mean ± SD	4.67	±	5.54	3.47	±	4.20		
Immediately post	Range	17	–	37	0	–	19	13.585	0.001*
	Mean ± SD	25.50	±	5.12	7.00	±	5.42		
Follow up	Range	7	–	31	0	–	14	8.952	0.001*
	Mean ± SD	16.13	±	5.58	4.53	±	4.39		

Continue table (4)

Substance		Experimental			Control			t. test	p. value
Pre intervention	Range	0	–	2	0	–	2	0.348	0.729
	Mean ± SD	1.33	±	0.76	1.40	±	0.72		
Immediately post	Range	2	–	2	1	–	2	2.112	0.039*
	Mean ± SD	2.00	±	0.00	1.87	±	0.35		
Follow up	Range	1	–	2	0	–	2	1.537	0.130
	Mean ± SD	1.77	±	0.43	1.57	±	0.57		

Continue table (4)

Stress		Experimental			Control			t. test	p. value
Pre intervention	Range	1	–	3	1	–	2	0.479	0.634
	Mean ± SD	1.50	±	0.57	1.43	±	0.50		
Immediately post	Range	4	–	6	1	–	3	17.914	0.001*
	Mean ± SD	4.60	±	0.62	1.60	±	0.67		
Follow up	Range	3	–	5	1	–	3	13.981	0.001*
	Mean ± SD	3.77	±	0.68	1.50	±	0.57		

Continue table (4)

Smoking		Study		Control		X^2	P-value
		N	%	N	%		
Pre intervention	**Yes**	14	46.7	13	43.3	X^2= 0.069	0.795
	No	16	53.3	17	56.7		
Immediately post	**Yes**	12	40.0	13	43.3	X^2= 0.073	0.793
	No	18	60.0	17	56.7		
Follow up	**Yes**	10	33.3	13	43.3	X^2= 0.632	0.426
	No	20	66.7	17	56.7		

Discussion

The enhancement of patients' lifestyle activities can be correlated with a decline in morbidity and mortality rate and a significant improvement in quality of life in the long-term [27,28]. Numerous helpful interventions, including nutritional and daily life components, have been developed in the past decades, with the intention to alter patients' lifestyle activities [29, 30]. Nonetheless, the evidence to confirm the effectiveness of lifestyle interventions is still limited [31]. Some studies reported significant benefits while others failed to demonstrate that [32]. Moreover, personal recovery has been the focus recently, rather than drug therapy in the management of serious mental disorders. Considering their well-being and quality of life[33] .

Hence, based on this new focus and the inconsistency in the findings, the current study aimed to assess the effect of lifestyle intervention on recovery of patients with bipolar disorders.

The present study findings support the study hypothesis and demonstrate a significant effect of lifestyle intervention on total lifestyle activities and almost all its subscales (namely activity level, diet, stress response and substance use). This significant improvement may be attributed to the content of the intervention. Regarding diet, the patients received a lot of information about the importance of a healthy diet, its components, and different examples about sources of healthy food. In this respect, there are conclusions in the literature that healthy promotion interventions involving healthful nutrition enhanced the quality of life as well as weight loss in individuals with BD [28,34]

In relation to activity, the significance of regular exercise was introduced to the patients and its role in preventing various physical illness. In addition to practicing physical exercise during the session with guidance from a physical education coach to develop an optimal program for patients with bipolar disorder. In this regard, Jackson et al., (2015) reported that it is important that the physical health of people with bipolar disorder be taken into consideration in the treatments by the clinicians. This action can reduce their risk of developing physical health problems in later life (26). Moreover, De Hert et al., (2022) found that lack of physical activity is one factor of the unhealthy lifestyle behaviors that increase risks of developing metabolic syndrome among patients with bipolar disorders compared to the general population[35]

As for stress response, the patients have learned during the intervention how to cope effectively with stress, types of stress, its manifestation, and harmful effect of stress on patients' health. Also, the patients were informed about the association between frequent exposure to stressful situations and the occurrence and exacerbation of symptoms of the disorders. In the same respect, the National Institute of Clinical Excellence (NICE, 2016) reported that the high rate of relapse and reported experienced residual symptoms by many patients with bipolar disorders implies that there is a gap in the present treatment. Recommends another approach involving stress management as a relapse prevention approach for those patients[36] .

As regards substance use, the destructive effects of substance use were illustrated to the patients and the association between abuse and exacerbation of disease symptoms.

Furthermore, different examples about aggravating factors to substance use and how to deal effectively with these situations were also handled during intervention sessions. Along the same line, the literature indicated that patients with bipolar disorders recurrently adopt unhealthy lifestyle behaviors, as lack of physical activity, unhealthy diet, heavy smoking and use of alcohol or illicit substances and this style could contribute to poor physical health [37-39] .

Another important factor that might explain the findings of the present study is that the intervention sessions attempted to combat the effect of sedentary life that are appealing on the patients and had a detrimental effect on their wellbeing. Factually, the status of the subjects in the existing study is being hospitalized, have limited activity level, monotonous and repeated routine and the scarce of leisure time activities. All these factors imposed on them due to the closed environment in the hospital with its negative consequences.This deskbound regimen makes the patients in need of any innovations and changes in their daily routine. In this respect, Lee (2012) reported that physical inactivity increases the risk of many adverse health conditions and is a significant cause of premature mortality [40]. On the other hand, Schuch (2018) informed that being physically active has the potential to protect against depression [41].

Furthermore, the researchers in the current intervention make all efforts to overcome several barriers that affect patients' readiness to modify daily activity such as low levels of motivation, lack of knowledge, and inexperience/lack of competence. The researchers frequently encourage the patients to participate actively in all activities carried out in the sessions, giving them more than one chance to practice with the presence of group climate characterized by trust, security, and sense of belonging. These therapeutic elements create a peaceful environment in which patients feel open, relaxed and willing to do anything within the group. Firth (2016) & Schuch (2016) found that the presence of good social and peer support networks and the recognition of the psychological and physical benefits of lifestyle intervention is among the aspects that help facilitate its conduction [42,43].

Additional factor is documented and may play a role in the justification of the current results which is the effect of group on the patients' behaviors. It is well known that the experience within the group has many benefits for the participants as it creates a feeling of friendship, mutual support, acceptance, and decreases feeling of alienation. Additionally, the participants within the group feel easy to expose themselves and discuss their experiences with colleagues without hesitation or suspiciousness. Moreover, feeling of hope and optimism in the recovery can be enhanced which makes the patients feel enthusiastic to practice in the group. These benefits might explain the significant improvement in patients' lifestyle [44] .

Dor et al. (2019) stated that the group is not only a cost-effective method of remedying many patients concurrently; but it is a necessary component to facilitate the recovery process [45]. Mashinter (2020) added the recognition that the patient is not alone is the power of group therapy. Furthermore, the acknowledgement that other people have similar conditions is one of the first steps to feeling healthy again. Moreover, group work provides meaningful connections with others in similar situations, so clients can support each other [46].

The only subscale that is not affected and not improved after lifestyle intervention is smoking. Factually, smoking can be a very difficult and destructive habit for patients, and it is very hard to control it. Additionally, the patients may resort to use smoking as a way to deal with different stressors they face on a daily basis and might be used as a self-medication strategy to overcome symptoms of mental illness. Along the same line, John et al., (2004) & Zammit et al., (2003) documented that smoking can be utilized as a self-medication coping strategy to alleviate cognitive deficits, minimize medication side effects, improve attention and concentration and relieve depressive and anxiety symptoms[47,48].

The present study findings go in the same line with the findings of Väänänen et al., (2020) who reported that lifestyle interventions improved depressive symptoms, weight, physical activity, and serum lipids in individuals with bipolar disorders [49]. Furthermore, Ashton et al., (2020) found that individuals with a diagnosis of bipolar disorders who participated in physical activity reported less depression and better quality of life. In addition, earlier randomized controlled trials found that leisure-time physical activity could reduce depression, anxiety, and insomnia symptoms [44, 50]

Speaking of the second main finding of the present study which is the significant effect of lifestyle intervention on recovery of patients with bipolar disorders. This result could be attributed to the enhancement of lifestyle and its domains. Empirically, when the patients gained improvement in their daily routines and activities and acquired healthy habits and applied it in their life this consequently equipped them with the necessary elements for recovery. In addition, help them to live their life with optimum functioning and decreases tremendous effects of chronic illness. Furthermore, during the intervention the patients learn hopeful and optimistic thinking and tried to apply it within the session as well as learned how to create social networks which support and help them to deal with their illness. These components foster patients' recovery and promote wellbeing.

These findings are in line with a recovery approach which claims that treatments should focus on supporting people with bipolar disorder to live meaningful lives despite the challenges they face, rather than simply eliminating the symptoms of bipolar disorder. Consequently, these steps may have a large effect on clinical outcomes and the quality of life of adults with bipolar disorder [51].

Similarly, Slade et al., (2014) differentiate between the concept of personal recovery which means living a satisfying, optimistic, and beneficial life even with restrictions caused by the illness and the clinical recovery that focuses on continued remission and rebuilding of functioning and does not change across patients with mental illness [52] .

Another important factor that may explain the improvement in recovery is the effect of intervention atmosphere on the patients. More specifically, during conduction of the sessions the researchers tried to create home like environment to promote feeling of independence, socialization, and gain mastery of environment. Moreover, the intervention involved a separate session about recovery and how to achieve it. Additionally, during the intervention the patients had been learned how to comply with their medications and how to recognize early signs of relapse. Both of them have a positive effect on recovery and decrease the burden of the illness on the

patients and their families. This explanation goes in the same line with Iseselo & Ambikile (2020) they found that when patients' adherence to psychotropic medication is good, symptoms of mental illness are reduced, and social participation or involvement in different activities is improved [(53)]. These deliberations are important to boost recovery and reintegration in the community after discharge from hospital. This justification is goes in agreement with the factors that facilitate recovery from a mental illness as the presence of independent lifestyle, patient participation in daily activities, and self-care [(54,55)].

The results of the present study go in accordance with other results reported that occupying a person with mental illness in daily activities plays a key role in the measurement of functional health which is the component of the recovery process. A systematic review has shown that regular physical activity is widely recognized as a protective factor against the overall burden of disease and hence promotes recovery from mental illness [(55)]. On the contrary to our study results, Reynolds (2020) & Speyer et al., (2016) reported that they did not found any effect of lifestyle intervention[(56.,57).]

Conclusion

Based on the results of the present study it can be concluded that lifestyle intervention promote recovery and enhance daily life activities in patients with bipolar disorders except smoking habit needs more effort and variety of interventions to eliminate it.

Recommendations

-Different interventions directed to modifying lifestyle activities need to be planned and implemented for patients with bipolar disorders to improve their mental well-being and enhance their recovery.

-Sedentary lifestyle that takes place in the hospital need to be changed and substituted with more energetic regimen to increase patients' activity level and decrease possible negative consequences of inactivity.

-Recovery from mental illness ought to be the first and highest priority therefore, the implemented hospital routine should involve a variety of interventions directed to enhance patients' recovery such as physical activity program.

-Advanced intervention needs to be thought of and applied to patients with bipolar disorders to help in decreasing smoking habits and eliminate its negative effects.

-Future research should be done to investigate the potentially modifiable factors that might be beneficial in reducing the rate and frequency of smoking among patients.

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Compliance of Rural Mothers with Preventive Behaviors of Respiratory Tract Infection to Their Children

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Abstract

Background: Respiratory tract infections are one of the most common causes of under-five morbidity and mortality. So, it is necessary for mothers to comply with preventive behaviors of respiratory tract infections. **The aim of the study:** was to assess the compliance of rural mothers with preventive behaviors of respiratory tract infection to their children. **Subjects and methods:** A descriptive research design was used in the study , and it was conducted in rural health unit at Nawag rural village – Tanta center - El Gharbia Governorate. **Subjects:** A convenience sample of 300 of rural mothers who are attending to the previous setting were included in the study. **Tool of the study:** One tool **(**a structured interview schedule) was used to obtain the necessary data for the study. It consisted of three parts as following: part (1): Socioeconomic status of rural mothers and health history of their under-five children. Part (2): Knowledge of rural mothers about respiratory tract infections (RTIs). Part (3): Assessment of compliance degree of rural mothers regarding preventive behaviors of respiratory tract infections (RTIs). **Results:** There was statistically significance positive correlation between total knowledge score, total compliance score of the studied rural mothers and family socio-economic status as (p=<0.001). **Conclusion and recommendations:** more than one-third of rural mothers had low level of knowledge, about one-third of them had moderate level of knowledge, and only one-quarter of them had high level of knowledge about RTIs. Furthermore, more than one-third of the studied rural mothers had moderate and higher compliance to preventive behaviors of RTIs while, only (17.3%) of them were having lower compliance with preventive behaviors of RTIs. So, we recommended continuous education and orientation programs for parents especially rural mothers of under-five children with RTIs to increase their knowledge and compliance with preventive behaviors regarding respiratory tract infections.

Key words: Compliance, knowledge, rural mothers, preventive behaviors, Respiratory tract infections.

Introduction

Respiratory tract infections among under-five children are a leading cause of illness, morbidity and mortality worldwide. The burden of respiratory tract infections has been estimated to be more than four million deaths per year internationally, with influenza infections accounting for an additional 250000 to 500000 deaths per year in 2019.[1,2]

Acute respiratory infection is an inflammation of the respiratory tract anywhere from nose to alveoli with a wide range of combinations of signs and symptoms. The infection may interfere with the normal breathing of the individual. [3,4] Respiratory infections are quite virulent and easily transmitted between populations. Due to the nature of respiratory disease, pathogens are easily aerosolized and are quite contagious. It is important to recognize signs and symptoms of respiratory illness early to prevent rapid spread of respiratory illness.[5,6]

Respiratory infection constitutes upper respiratory infection (URI) and lower respiratory infection (LRI). Upper respiratory infection (URI) present mainly with rhinitis (common cold), tonsillitis, sinusitis and ear infections. While main presentation of LRI is pneumonia, asthma and bronchitis. [7,8]

Infant and young children less than five years are more vulnerable to respiratory infections due to immaturity of their immune system. Also, the presence of allergy and family history of atrophy of lung increase in under- five children who are vulnerable to RTIs. [9,10] Moreover, socio-economic conditions such as rural mothers' level of education, lack of health services, overcrowding, environmental factors, and absence of ventilation are associated with increased risk of ARI among under-five children. [11.12]

The most common signs and symptoms of respiratory infection among under-five children according to study published in 2016 were 40% of children had cough followed by 34% had fever, 9% had wheezing, 12% had sneezing and other symptoms like earache, lethargy, inability to play, and retraction of ribs.[11]

Most of symptoms are quite and non-specific. Respiratory specific symptoms such as cough, sneezing, shortness of breathing and congestion are often indicative of a respiratory infection. Less specific symptoms as fever, malaise, body aches, headache, rashes, and gastrointestinal upset may also accompany respiratory infections.[1,9]

The most common complications of respiratory infection among under-five children are pneumonia and chronic bronchitis. Annual incidence of pneumonia is reported to be 27%- 40% of community acquired pneumonia (CAPs) in children. Children under - five years are commonly affected making it the highest contributor of death due to LRTIs. According to WHO community acquired pneumonia (CAP) has annual incidence of 14% of all deaths of children under five years old in 2019. The mortality rate of CAP increases progressively with the severity of illness, killing 740180 children under -age of five in 2019 accounting for 22% of all deaths in children aged one to five years. [12]

Compliance of rural mothers with preventive behaviors regarding RTIs means that the process of adherence and following of rules, practices and behaviors that promotes health of their children and

protects them from RTIs. People have response differentially, some follow the rules of recommendations with great care, and others are laxer or simply refuse to comply. These differences occur as a result to number of factors including personal, social, mental, culture, and economic factors. (13-15)

Prevention of acute respiratory tract infection among under-five children is very important to reduce morbidity and mortality among them. So that, compliance of mothers especially rural mothers with preventive behaviors regarding respiratory tract infection is most effective and life saving for under -five children. Preventive behaviors for acute respiratory tract infection focus on hand washing, cough etiquette, and oral hygiene.(16)

Community health nurse can play an important role in primary level of prevention of ARTIs through helping and facilitating rural mothers to gain knowledge and adhere to preventive behaviors regarding acute respiratory tract infections among under-five children.(17) The nurse needs to provide comprehensive health education on the etiology or causation, prevention, and management of ARTs. This will increase the capability of rural mothers of under- five children to identify the danger signs of acute respiratory infection in their children and to encourage appropriate and early compliance of them with respiratory tract infections preventive measures.(18)

Significance of the study

Respiratory tract infection affects large number of children and causes high morbidity and mortality rate. A study conducted in Egypt by Abd-El Mohsen et al., in 2020 revealed that 36.7% of under-five years fulfill the WHO criteria of ARI, with higher incidence (48.8%) among infants below 6 months and (58.6%) among male children.(19)A study conducted in Egypt by El-Koofy N et al, in 2022 revealed that 60.4% of under five children had RTIs and severe acute RTIs lead to hospitalization and mortality in 15% of them and half of infections in under five children with respiratory tract infections were lower RTIs.(20) Also, there is lack of rural mothers' knowledge about preventive behavior regarding respiratory tract infection. Therefore, the aim of the present study was to assess the degree of compliance of rural mothers with preventive behaviors regarding respiratory tract infections

The aim of the study was to:

Assess the levels of compliance of rural mothers with preventive behaviors of respiratory tract infections to their children.

Research question: -

What are the levels of compliance of rural mothers with preventive behaviors of respiratory tract infections to their children?

Subjects and Method

Study design:

Descriptive study design was used in this study.

Study setting:

This study was conducted at rural health unit at Nawag rural village- that affiliated to Tanta district – El Gharbia Governorate.

Study subjects:

A convenience sampling was utilized in this study. The total number of the studied subject was 300 of rural mothers who were attending to the previous setting for any reasons including (immunization, child checkup, treatment or follow up). The average number of rural mothers who were attending to the previous setting monthly was about 200 mothers.

Tools of data collection:

A structured interview schedule was used in this study in order to collect the necessary data. It was included the following parts:

Part (1): Socioeconomic status of rural mothers and health history of their under-five children:-

This part included data about

a- Family socioeconomic status was measured by using the scale for measuring family socioeconomic status (SES) for health research in Egypt which was developed by Fahmy and El-Shrbini ,1983 and updated by Fahmy et al., 2015 [(21)]. The scale included ten variables such as (parent education and occupation, number of children, family income and mothers' age).

The total score of family socioeconomic status (SES) is 48, a higher score was indicating better SES.

The total score of family socioeconomic status (SES) was categorized as follows:

- High: ≥ 70% (33.5-48) from the total score.
- Medium: 40 to <70% (19.2 to < 33.6) from the total score.
- Low: < 40% (< 19.2) from the total score.

b- **Health history of under-five children** included previous history of respiratory tract infections, types of RTIs, number of recurrence and previous hospitalization due to RTIs, previous compulsory immunization and history of annual influenza pneumococcal vaccination, type of feeding, weight and height of the child and father's smoking.

Part (2): Knowledge of rural mothers about respiratory tract infections (RTIs):- (22,23)

This part was developed by the researcher after reviewing related literature review to assess rural mothers' knowledge about RTIs. It included the following items: definition, causes, risk factors, signs and symptoms, mode of transmission, complications, treatment and methods of prevention of RTIs.

The scoring system: The items of the questionnaire was checked with a model key answer, which was prepared by the researcher. Each question of the knowledge was coded as "zero" for an incorrect answer or a "don't know", and "one" for the correct answer. The total score was obtained by summing the scores of all questions and the total score was converted into a percent score.

The scoring system for knowledge was classified as follows: -

- Low knowledge: a scoring of < 50 % from the total score.
- Moderate knowledge: a scoring of 50 to 70 % from the total score.
- High knowledge: a scoring of >70 % from the total score.

Part (3): Assessment of compliance degree of rural mothers regarding preventive behaviors of respiratory tract infections (RTIs):-

It was developed by the researcher to assess rural mothers' reported practices to RTIs preventive behaviors which included the following items: hand washing, cough and sneezing etiquette, oral hygiene, ventilation and cleaning house, compliance of child vaccination, compliance to breast feeding and healthy nutrition, compliance to child weaning and monitoring to child weight.

- **Hand washing** which included: (techniques, time, frequency, indications and duration of hand washing).
- **Coughing and sneezing etiquette** which included: (cover mouse and nose with

tissue or with elbow during coughing or sneezing).

- **Oral hygiene** which included: (care of the mouse of under-five children and using tooth brush).
- **Compliance with home ventilation and hygiene** which included: (opening windows continuously, cleaning floors and exposed linen to sunlight).
- **Prevent kissing children from mouth.**
- **Compliance with immunization schedule** which included: (given kids obligatory immunization, taken care of symptoms after immunization and following up instructions after immunization).
- **Compliance with feeding (breast feeding and bottle feeding)** which included: (continuous breast feeding and ensure good nutrition to the child).
- **Compliance with growth monitoring (weight and height)** which included: (following up for weight and height during immunization and every 2 months). It is also included monitoring weight if there were changes in weight.
- **Compliance with healthy weaning practice and healthy nutrition** which included: (beginning weaning after 6 months, giving kids natural juices and giving the same food to kids for 2 months).

The scoring system for reported practices

The score for each reported practice was calculated as follows: always done was scored "two", sometimes done was scored "one" and never done was scored "zero". These scores were summed up and the total score was converted into a percent score. The higher score indicated a greater degree of rural mothers' compliance.

The scoring system was as follow:

- Low compliance: a scoring of <50 % from the total score.
- Moderate compliance: a scoring of 50% < 75% from the total score.
- High compliance: a scoring of 75 % to 100% from the total score.

Method

1- Obtaining approval

Before conducting the study, an official permission letter was obtained from the Dean of Faculty of Nursing to the manager of rural health unit of Nawag in order to obtain his permission to collect data from selected setting.

2- Ethical and legal considerations:

a) Approval of ethical committee of Faculty of Nursing, Tanta University was obtained before conducting the study.
b) The study was conducted with careful attention to ethical standards of research and rights of the participants.
c) An informed consent was taken from all selected mothers after providing appropriate explanation about the purpose of the study.
d) Each participant was informed that she has the right to withdraw from the study at any time she wanted.
e) Anonymity was considered.
f) The researcher ensured that the nature of the study didn't cause any harm or pain for the entire subjects.
g) Every mother was ensured about the privacy and confidentiality of all information collected.

3- Developing the tool of data collection:-

Study tool was developed by the researcher based on literature review.

4-The study tool was tested for face and content validity by a jury of five experts in

the field of Community Health Nursing before conducting the study.

5- A pilot study

A pilot study was carried out by the researcher on 10% of the sample (30 rural mothers) for testing the tools for its clarity, applicability and to identify obstacles that may be encountered with the researcher during data collection. Accordingly, the necessary modification was done. This sample was excluded from the study sample.

6- Reliability of the study tool was done:

Cronbach's Alpha test was used and it was found to be (0.84) for a structured interview schedule.

7- Actual study:

- The data were collected by the researcher over a period of six months starting from October 2020 to the end of March 2021.
- The researcher met with the rural mothers only two days per week (Saturday and Monday) in the waiting areas at rural health unit at Nawag village – Tanta district - El Gharbia Governorate.
- Each rural mother was interviewed individually at rural health unit at Nawag village – Tanta district - El Gharbia Governorate.
- The questionnaire was filled by the researcher according to the answers of rural mothers.
- The average number of rural mothers interviewed per day ranged from 5-7 mothers.
- The average time spent for collecting data from each mother ranged from 30-45 minutes.

8- Statistical analysis

The collected data were organized, tabulated and statistically analyzed using SPSS software statistical computer package version 26. For quantitative data, the range, mean and standard deviation were calculated. For qualitative data, comparison was done using Chi-square test (χ^2). For comparison between means for two variables in a sample, paired samples T-test was used. For comparison between means for more than two variables, the F-value of analysis of variance (ANOVA) was calculated. Correlation between variable was evaluated using Pearson and Spearman's correlation r. A significance was adopted at $P<0.05$ for interpretation of results of tests of significance (*). Also, a highly significance was adopted at $P<0.01$ for interpretation of results of tests of significance (**).

Results

Table (I) Represent the distribution of the studied rural mothers according to their family socio- economic status. This table shows that more than one- quarter (28.7%, 28.7%) of the studied rural mothers received secondary education and universal education respectively. Regarding fathers' educational level, more than one-third (37.3%) of them received universal education and less than one- quarter of them (21.3%) received secondary education.

Concerning the working status of the studied rural mothers, about two-thirds (61%) of them were working and more than one-third (39%) of them were housewives. Concerning the working status of the fathers, most (97.7%) of them were working. Regarding the family use of computer, more than one-third (38.7%) of them were never used it, while nearly half (48.7%) of them were sometimes used it.

Regarding family income, slightly less than one-third (31.7%) of thewere had enough family income and 7.7% of them reported

that, their family income wasn't enough. Regarding the crowded index, about three-quarters (76.7%) of them were having crowded index of < 2 and the remaining 23.3% were having crowding index of > 2. Regarding sewage and refuse disposal, the higher percentage (95.3, 93%) of them reported that, they had sewage and refuse disposal respectively.

Table (II) represents the distribution of the studied rural mothers according to their levels of socio-economic status, it illustrates that more than half (58.3%) of the studied rural mothers had high socio-economic status, while about more than one-third (36%) of them had medium level of socio-economic status and only 5.7% of them had low socio-economic status.

Table (III) represents the distribution of the studied rural mothers according to their correct answer regarding their knowledge about (RTI). It indicates that, about two-thirds (64%, 62.7%, 67.7%, 61.3% and 66%) of the studied mothers didn't know the meaning, causes, risk factors, symptoms, and complications of RTIs respectively. In the opposite, more than one-third (43% and 41.3%) of them known the correct answer for mode of transmission, drugs, and methods of prevention of RTIs respectively.

Table (IV) represents the distribution of the studied rural mothers according to their knowledge levels about respiratory tract infection (RTI). It illustrates that, slightly more than one-third (41.7%) of rural mothers had low level of knowledge, about one-third (32.3%) of them had moderate level of knowledge and only 26% of them had high level of knowledge about RTIs.

Table (V) represents the distribution of the studied rural mothers according to their degree of compliance with each item of preventive behaviors of respiratory tract infection (RTI). It was noticed that, more than one-third (38.7%) of the studied rural mothers were had lower compliance with follow up to child weight. In the opposite, slightly and more than half (50.7%, 57.7%, 55%, 57.3%, and 63%) of them had moderate compliance to hand washing, coughing and sneezing etiquette, avoidance of kissing kids, breast feeding and healthy nutrition and child weaning respectively. Moreover, nearly three-quarters (73.7% and 74.3%) of them had higher compliance with ventilation, cleaning house and with vaccination respectively.

Table (VI) represents the relation between levels of knowledge of the studied rural mothers regarding RTI and their degree of compliance with preventive behaviors of RTI. It illustrates that, more than half (57.7%) of the studied mothers with low level of compliance showed low level of knowledge, while more than one-third (38.1%) of them showed moderate level of compliance and knowledge regarding preventive behaviors of RTIs with highly statistically significant relation between them p- value ($p<0.001^{**}$)

Table (VII) represents the relation between levels of family socio-economic status of studied rural mothers and their levels of knowledge regarding RTI. It shows that, highest percentage (82.1%) of rural mothers with high level of knowledge had high level of socioeconomic status. Also, more than two-thirds (68.0%) of mothers with moderate level of knowledge showed high level of socioeconomic status. In addition, more than half (57.6%) of them with low level of knowledge had moderate socioeconomic status, with highly

statistically significant relation between them at ($p<0.001^{**}$).

Table (VIII) represents the relation between levels of family socio-economic status of studied rural mothers and their degree of compliance with preventive behaviors of RTI. It shows that, about two-thirds (65.8%) of studied rural mothers with high level of compliance with preventive behaviors of RTIs had higher degree of socioeconomic status. Also, more than half (54.5% and 51.9%) of them with moderate and low degree of compliance with preventive behaviors of RTIs had high level of socioeconomic status with highly statistically significant relation between them at ($p<0.05^{*}$).

Table (IX) represents the correlation between total score of knowledge and total compliance score of the studied rural mothers regarding RTI and family socio-economic status score. It illustrates that, there was statistically significance positive correlation between total knowledge score, total compliance score of the studied rural mothers and family socio-economic status as ($p=<0.001$).

Table (I) Distribution of the studied rural mothers according to their family socio-economic status

Family socio-economic status of the studied rural mothers	Studied rural mothers (300)	
	No.	%
Mother's educational level		
- Illiteracy /Reads and Writes	16	5.3
- literacy education	15	5.0
- Primary Education	15	5.0
- Preparatory education	30	10.0
- Secondary education or diploma	86	28.7
- University education	86	28.7
- Post-graduate studies	52	17.3
Father's educational level		
- Illiteracy /Reads and Writes	30	10.0
- Primary Education	21	7.0
- Preparatory education	37	12.3
- Secondary education or diploma	64	21.3
- University education	112	37.3
- Post-graduate studies	36	12.0
Mother's work		
- Working	183	61.0
- House wives	117	39.0
Father's work		
- Working	293	97.7
- Not working	7	2.3
Family use of computer		
- Never	116	38.7
- Sometimes	146	48.7
- Most of time	38	12.7
Family income		
- Not enough and not repaid	23	7.7
- Enough and big loan	80	26.7
- Enough and small loan	29	9.7
- Enough only	95	31.7
- Enough and saving	73	24.3
Number of family members		
▪ Consisting of 6 members	7	2.3

Table (I) Continue.

Family socio-economic status of the studied rural mothers	Studied rural mothers (300)	
	No.	%
Number of family members		
- Consisting of 5 members	81	27.0
- Less than 5 members	212	70.7
Number of house rooms		
- <3	100	33.4
- ≥3	200	66.7
Crowding index		
- <2	230	76.7
- >2	70	23.3
Sewage disposal		
- Yes	286	95.3
- No	14	4.7
Refuse disposal		
- Yes	279	93.0
- No	21	7.0

Table (II) Distribution of the studied rural mothers according to their levels of socio-economic status

Levels of family socio-economic status of the studied mothers	Studied rural women (300)	
	No.	%
- **High**	175	58.3
- **Moderate**	108	36
- **Low**	17	5.7

Table (III) Distribution of the studied rural mothers according to their correct answer regarding their knowledge about (RTI)

Mother's knowledge about RTI	Studied rural mothers (300)			
	Correct		Incorrect	
	No.	%	No.	%
- Meaning of respiratory tract infections	108	36.0	192	64.0
- Cause of respiratory tract infection	112	37.3	188	62.7
- Risk factors causing respiratory tract infection to children	97	32.3	203	67.7
- Mode of transmission of respiratory tract infections	129	43.0	171	57.0
- Symptoms of respiratory infection on children	116	38.7	184	61.3
- Complications of respiratory infection	102	34.0	198	66.0
- Drugs used for child suffering from respiratory tract infection	129	43.0	171	57.0
- Methods of prevention of respiratory tract infection among children	124	41.3	176	58.7

Table (IV) Distribution of the studied rural mothers according to their knowledge levels about respiratory tract infection (RTI)

Levels of mother's knowledge	Studied rural mothers (300)	
	No.	%
- **High**	78	26
- **Moderate**	97	32.3
- **Low**	125	41.7

Table (V) Distribution of the studied rural mothers according to their degree of compliance with each item of preventive behaviors of respiratory tract infection (RTI)

Preventive behaviors of RTI	Studied rural women (300)					
	High		Moderate		Low	
	No.	%	No.	%	No.	%
- Hand washing	84	28.0	152	50.7	64	21.3
- Cough and sneeze etiquette	69	23.0	173	57.7	58	19.3
- Mouth clean	114	38.0	135	45.0	51	17.0
- Ventilation and cleaning house	221	73.7	66	22.0	13	4.3
- kissing kids	51	17.0	165	55.0	84	28.0
- Vaccination compliance	223	74.3	61	20.3	16	5.3
- Compliance to breast feeding and healthy nutrition	95	31.7	172	57.3	33	11.0
- Complain to child weaning	82	27.3	189	63.0	29	9.7
- Follow up child's weight	73	24.3	111	37.0	116	38.7

Table (VI) Relation between levels of knowledge of the studied rural mothers regarding RTI and their degree of compliance of preventive behaviors of RTI

Levels knowledge	Studied rural mothers (300)						Chi-square	
	Levels compliance							
	High (n=114)		Moderate (n=134)		Low (n=52)			
	No.	%	No.	%	No.	%	χ^2	P-value
High	57	50.0	11	8.2	10	19.2	65.967	<0.001**
Moderate	34	29.8	51	38.1	12	23.1		
Low	23	20.2	72	53.7	30	57.7		

<0.001* High significant

*Significant at p≤ 0.05

Table (VII) Relation between levels of family socio-economic status of studied rural mothers and their levels of knowledge regarding RTI

Levels of family socioeconomic status	Studied rural mothers (300)						Chi-square	
	Levels of knowledge							
	High (n=78)		Moderate (n=97)		Low (n=125)			
	No.	%	No.	%	No.	%	χ^2	P-value
High	64	82.1	66	68.0	45	36.0	54.589	<0.001**
Moderate	14	17.9	22	22.7	72	57.6		
Low	0	0.0	9	9.3	8	6.4		

<0.001* High significant

Table (VIII) Relation between levels of family socio-economic status of studied rural mothers and their levels compliance with preventive behaviors of RTI

Levels of family socioeconomic status	Studied rural mothers (300)						Chi-square	
	Total compliance							
	High (n=114)		Moderate (n=134)		Low (n=52)			
	No.	%	No.	%	No.	%	χ^2	P-value
High	75	65.8	73	54.5	27	51.9	11.308	0.023*
Moderate	30	26.3	53	39.6	25	48.1		
Low	9	7.9	8	6.0	0	0.0		

<0.05* Significant

Table (IX) Correlation between total score of knowledge and compliance of the studied rural mothers regarding RTI and family socio-economic status score

	Family socioeconomic status score		Total compliance score	
	r	P-value	r	P-value
Total compliance score	0.799	<0.001**	-	-
Total knowledge score	0.659	<0.001**	0.749	<0.001**

<0.001* High significant

Discussion

Acute respiratory tract infection among under-five children is a major health problem in developing countries as it is responsible for majority of morbidity and mortality of children under-five years of age. Up to 13% of children deaths in pediatric wards are due to acute respiratory tract infection. The proportion of mild to severe disease varies between high- and low-income countries and because of difference of etiology and risk factors. Also, the proportion of death due to acute respiratory infections in the community is high as many children die at home. [24]

Globally, ARTIs are responsible for 12 million morbidities and 1.3 million fatalities in children under-five with three-fourths occurring in sub–Saharan Africa. The incidence of ARTIs in children aged less than five years is estimated to be 0.29 and 0.05 episodes per child-year in developing and industrialized countries respectively. Although respiratory tract infection among under-five children is responsible for forty-two percent of childhood deaths in Africa, however it can be prevented. [23,25] So, the aim of the current study was to assess the compliance of rural mothers with preventive behavior of respiratory tract infection to their children.

Knowledge of the studied rural mothers played vital role in prevention of respiratory tract infections (RTIs) as mothers are the main caregiver for their children. The knowledge, attitude and practices of rural mothers directly effect on health status and survival of their under-five children. Comprehensive health education about RTIs will help mothers to identify the dangerous signs, facilitate early management, and prevention of ARTIs in their children. [25]

With regards to the distribution of the studied rural mothers according to their correct answer about (RTI). It indicated that about two-thirds of the studied mothers didn't know the meaning, causes, risk factors, symptoms, and complication of RTIs respectively **(Table III)**. This may be because they didn't attend educational program about RTIs with specialized person and their information about RTIs was from the public.

On the other hand, this result is in the opposite to **Bham et al., (2016)** who conducted a study about knowledge, attitude and practice of mothers on acute respiratory infection in children under-five years in the department of pediatrics, Darual Sehat hospital in Ghana and revealed that, good knowledge of mothers about ARI symptoms as more than one-third of them reported that, cough and fever were the most common symptoms of RTIs respectively. Also, most of the studied mothers know that pneumonia is the most common complication of RTIs and had good knowledge about risk factors. [26]

In addition, slightly more than one-third of rural mothers had low level of knowledge, about one-third of them had moderate level of knowledge and only one-quarter of them had high level of knowledge about RTIs **(Table IV).** This may be because they didn't attend educational programs about RTIs with specialized person and their information about RTIs was from the public. Also, about one-third of them had primary, preparatory education or were illiterate. This result is in the same line with **Saeed et al., (2020)** who conducted study about knowledge, attitudes, and practice among mothers of under-five children about acute lower respiratory tract infections in Al-Haj Yousuf administrative, Sharg-Alneel locality, Khartoum state, and found that, more than one-quarter of mothers had good knowledge and the rest of them had poor knowledge. Furthermore, this result is in the contrast with **Suganya et al., (2018)** who carried out a study about knowledge on

management of respiratory tract infection among mothers of under-five children in Kakatur village at Nellore District and showed that, one-fifth of mothers of under-five children had inadequate knowledge, about three-quarters of them had moderate knowledge and few of them had adequate knowledge about RTIs. [26, 27]
Also, this result agrees with **Malla (2020)** who conducted a study of knowledge regarding acute respiratory infection and its management among mothers of under-five children attending pediatric OPD of teaching hospital, Birgunj and demonstrated that, more than half of the studied mothers had inadequate knowledge and more than one-third had adequate knowledge. In the contrary, **Abozed et al., (2020)** who conducted a study on the effectiveness of learning package application on the use of antibiotics for mothers of children with upper respiratory tract infection carried out at Mansoura University Children's Hospital and stated that, most of the studied mothers had poor knowledge, few of them had fair and good knowledge about RTIs. [23,28]
Concerning rural mothers' degree of compliance with each item of preventive behaviors of respiratory tract infection (RTI). It was noticed that more than one-third of the studied rural mothers had lower compliance with follow up to child weight. In the opposite, slightly and more than half of them had moderate compliance to hand washing, coughing and sneezing etiquette, avoidance of kissing kids, breast feeding and healthy nutrition and child weaning respectively. Moreover, nearly three-quarters of them had higher compliance with ventilation, cleaning house and with vaccination (**Table V**). This may be due to the higher level of awareness of mothers about the importance of some actions in prevention of infectious diseases among their children and more than half of studied mothers had knowledge about respiratory tract infections (table VII).
This result agrees with **Alhazmi et al., (2019)** who conducted a study about community's compliance with measures for the prevention of respiratory infections in Riyadh, Saudi Arabia and reported that, more than half of studied subject were always washing their hands with soap and water and about two-thirds of them were following coughing and sneezing etiquette. Furthermore, this result is in contrast with **Akteruzzaman et al., (2021)** which found that, less than one-third of the studied subject were following regular hand washing with soap, following cough etiquette, and a few keeping their houses clean, and more than half of mothers followed exclusive breast feeding, but this study was in the same line of our result in the part of children vaccination as the majority of them vaccinated their children. [29,30]
Concerning, the relation between levels of knowledge of the studied rural mothers regarding RTI and their degree of compliance with preventive behaviors of RTI, the results of the present study showed that, more than half of mothers with low level of compliance showed low level of knowledge, while more than one-third of mothers showed moderate degree of compliance and knowledge regarding preventive behaviors of RTIs with highly statistically significant relation between them as p-value ($p<0.001$**) **(Table VI)**. This may be due to the direct impact of knowledge on practices as when the person knows, they will do. Also, more than one-quarter of mothers had secondary and universal education (table I). This result agrees with **Abdelatty et al., (2022)** who found that there was statistically significant correlation between mothers' total knowledge score about RTIs and their total preventive practices while, this result is in the contrast with **Kim α Oh (2021)** who found that, the correlation between mothers' knowledge and practice level was not statistically significant. [31,32]

Regarding the relation between levels of family socio-economic status of studied rural mothers and their levels of knowledge regarding RTI. The findings of the present study showed that, highest percentage of rural mothers with a high level of knowledge had high socioeconomic status. Also, more than two-thirds of mothers with moderate level of knowledge showed high level of socioeconomic status. More than half of them with low level of knowledge had moderate socioeconomic status, with highly statistically significant relation between them at (p<0.001**) **(Table VII)**. From the researcher's point of view, this may be due to direct impact of socioeconomic status on the knowledge of the mothers as it easy for them to seek the information through different ways. This result is in the line with a study conducted by **Mutalik, (2018)** about association of maternal education and socioeconomic status with knowledge, attitudes, and practices of the studied mothers regarding acute respiratory infections and found that there was a significant association of socioeconomic status with maternal knowledge, attitudes, and practices (p <0.05). [33]

Regarding the correlation between total score of knowledge and total compliance score of the studied rural mothers regarding RTI and family socio-economic status score**.** The results illustrated that, there was statistically significance positive correlation between total knowledge score, total compliance score of the studied rural mothers and family socio-economic status as (p=<0.001) **(Table IX)**. This may be due to the socioeconomic factors affecting directly on the health as it facilitates easy access to health care information and services. Higher socioeconomic status led to higher health literacy and sought more web-based information. Both were associated with high adherence to guidelines for preventive behaviors. Also, educational levels and income were considered as indicators for socio-economic status (SES) as more than half of rural mothers had high socioeconomic status and one-quarter of them had high level of knowledge and more than one-third of them had high level of compliance with preventive behaviors.

Therefore, researcher recommended that continuous education and orientation programs about RTIs and its preventive measures for rural mothers of under-five children with RTIs to increase their knowledge and compliance with preventive behaviors regarding RTIs.

Conclusion and recommendations

Conclusion:

Based on the findings of the present study slightly more than one-third of rural mothers had low level of knowledge, about one-third of them had moderate level of knowledge, and only one-quarter of them had high level of knowledge about RTIs. Furthermore, more than one-third of the studied rural mothers had moderate and higher compliance to preventive behaviors of RTIs while, only (17.3%) of them were having lower compliance with preventive behaviors of RTIs.

In addition, there was a higher statistically significant relation between all elements of family socio-economic status and level of knowledge and degree of compliance with preventive behaviors of RTI (p =<0.001) except for father's work, number of family members and sewage disposal. Finally, there was a statistically significance positive correlation between total knowledge score, total compliance score of the studied rural mothers and family socio-economic status as (p=<0.001).

Recommendation

Based on the findings of the present study, the following recommendations were suggested:

1. Continuous education and orientation programs for parents' especially rural mothers of under-five children with RTIs to increase their knowledge and compliance with preventive behaviors regarding respiratory tract infections.

2. Development of a concise and feasible online information booklet for mothers about respiratory tract infections and its prevention as a tool for prevention of disease.

3. Health instructional guidelines about respiratory tract infections should be applied on a wide range through different social media to help disseminating information to large sector of the community about RTIs.

4. Further researches are required to investigate all factors associated with increased incidence of respiratory tract infections, especially among under-five children.

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Association between Health-Related Quality of Life, Mental Health and Academic Performance among Adolescent Students

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Abstract:

Background: Mental health and health-related quality of life (QOL) are strictly related. Scientific interest in student's mental health experiences has been increasing in the last years due to their influence on students' learning processes and academic performance. **Aim:** Assess the association between quality of life, mental health and Academic performance among adolescent students. **Subjects & Methods:** This cross-sectional study was conducted on adolescent student's schools (prep and secondary schools) during the academic year 2022-2023, at Mansoura city, Dakhlia Governorate. **Sample:** A convenience sample of 665 students over a period of three months was included. **Tools:** Four tools were used to collect data: **Part I:** Characteristics of studied adolescent students **Part II:** Academic quality of life student scale **Part III:** Mental health symptom Checklist-90. **Part IV:** Academic Performance Rating Scale. **Results:** 74% of studied students had low quality of life, while 26% had high quality and 50.9% of studied students had low mental health and 23.3% of them had moderate mental health. Also, 60% of studied students had high academic performance, while 20.3% of them had low academic performance. **Conclusion:** There was high negative correlation between students' Academic performance and mental health Also, high negative correlation between students' Mental health and quality of life While there was high positive relation between students' Quality of life and Academic performance **Recommendation:** Health education and promotion of quality of life should be integrated into the educational strategies and policies of all educational centers.

Key words: Academic performance, Adolescent students, Mental health, Quality of life.

Introduction

Issues related to mental health are often propaganda in mass media in recent years not only in a country and even around the world. Mental health is a way of thinking, feeling and behavior in a person's daily lives. A person with a healthy mental health can recognize himself on the ability, willing to accept failure, able to control the emotions and appreciate self. Mental health may deteriorate, and its negative effects will affect the daily lives without treatment [(1)].

Mental health is defined as a state of harmony among emotional, social, and psychological well-being [(2)]. World Health Organization defined mental health as a state of well-being in which individuals use their potentials to perform their duties properly, use the coping skills to deal with the stressors of life, and become an influential member of his community.

Hence, mental health is not merely the absence of mental illness. World Health Organization (2012) estimated that in a year, one out of four adolescents aged 12 to 24 suffers from a mental health problem such as depression and schizophrenia [3].

Mental health is considered as one of the main criteria used to evaluate public health. Mental health is defined as subjective well-being, perceived self-efficacy, autonomy, competence, intergenerational dependence, self-actualization of one's intellectual and emotional potential, etc. Moreover, according to the World Health Organization, mental health is achieved when a person has a complete state of physical, mental, and social well-being. Mental health plays an important role in dynamism and efficiency of every community [4].

Mental health issues often occur among students and create a negative impact on students. The literature widely recognized that students who had mental difficulties or disabilities, either treated or untreated, experience lower grade point average (GPAs) and more drop out than other students [5].

Students with mental health problems have a higher probability of developing a life-long mental disorder due to delays in acquiring the required skill for a successful life [6].

Most of the research related to adolescent students pay attention to mental disorders, not mental problems, as adolescent life is a transitory time where many students experience mental issues that do not meet the full mental illness criteria [7].

Relationship between mental health and academic performance of students has been investigated for a long time, but information on this relationship is still controversial. Most studies have reported an inverse association between mental health and academic performance [8].

Health related quality of life (HRQoL) is a subjective concept frequently applied to describe people's physical, mental, social, psychological, and functional aspects of health. Healthy behaviors are associated with academic achievement in adolescents, which suggests that practicing unhealthy lifestyles might lower cognitive function and, in turn, the likelihood of succeeding in school. Investigating health-related quality of life (QOL) is used to predict health care needs for identifying the most important dimensions of children's health that are at risk, or for identifying children in need of support in the early stages of life [9].

Several factors affect the QOL and the academic achievement of adolescents, including religion, social relationships, social participation, and mother-child attachment. Among these factors, the mother's employment, due to its growing growth, needs to be further explored. During adolescence, many behaviors affecting the health and lifestyle of individuals are shaped; attitudes and behaviors shaped during adolescence determine the healthy lifestyle habits of adulthood [6].

QOL of students can predict children with potential problematic behavior and help to identify those who need help from mental health agencies. Psychological, emotional, and social domains of QOL were shown to be related to a level of anxiety of students. In adolescents with high anxiety level,

poor QOL was constated in all QOL domains (10)

Significance of the study:

Students' lack of personal effect and time is also one reason for not seeking mental health support. They have a perception of not enough time for themselves. Students are not taught management skills in school and college life that is why they are not able to cope with the independence and autonomy, which resulted in mental health problems. Another problem is the knowledge of having a support system and help. The students, who identify their problems and overcome their fear of stigmatization, usually do not have the experience about support availability [(11)].

Therefore, mental health problems can lead to the loss of adolescents' students' ability to perform routine tasks, the loss of social coexistence, and decreased QoL. The high prevalence of depressive symptoms in high school and university students is a matter of concern, because it negatively interferes with learning, and academic success [(12)], and contributes to the increase in the global disease burden.

The assessment of QoL is important for a broader understanding of the nature of the diseases to which individuals are exposed. Little is known about the relationship between QoL and mental health in high school students, especially when considering the different domains of QoL (13). Thus, this study aimed to assess the association between quality of life, mental health and Academic performance among adolescent students.

Aim of the study:

To assess the association between quality of life, mental health and Academic performance among adolescent students.

Research questions

To fulfill the aim of this study the following research questions are formulated:

Q1: What is the level of quality of life among adolescent students?

Q2: What is the level of mental health among adolescent students?

Q3: What is the level of academic performance among adolescent students?

Q4: Is there association between quality of life, mental health and academic performance among adolescent students?

Subjects and Methods

Research design:

A cross-sectional study design was utilized to accomplish the aim of this study.

Setting:

This study carried out during the period of from first of January to the end of March 2023, at Mansoura, the capital of Dakahlia Governorate, Egypt, which is located on the Nile River in the northeastern region of the Delta. The study was conducted among preparatory and secondary schools' students enrolled in public schools.

Preparatory and secondary schools in both educational zones (eastern and western zones) of Mansoura city as well as the rural sector were included. Four public preparatory and secondary schools were randomly selected, one preparatory school for girls and one for boys from each zone of an urban and rural sectors (i.e., four schools, one preparatory and one secondary school from the urban sector and the other two preparatory and secondary schools from the rural sector).

Sample:

The sample size was calculated the MedCalc software program using (www.medcalc.org/ index.php) at 5% α

error (95% significance) and 20% β error (80% power of the study), this distribution covered all social strata of both sexes, and both urban and rural sectors of the community. From each selected school, one class (cluster) from each grade was randomly selected. The response rate in this study was 89.3%, where 665 students participated in the study out of the total registered 745 students in these classes. The others were either absent (8.0%), refused to complete the questionnaire (2.5%), or excluded from the study due to neuropsychiatric disorder (0.7%). With the consent of the school authorities, the investigators spent 45–60 min in each class. Students were briefed about the study and were encouraged to participate and to express their experiences. It was emphasized that all collected data would be strictly confidential, and the students should give fully informed verbal consent to participate.

Tools of Data Collection

Structure Questionnaire Sheet consists of four parts as the following:

Part I: Demographic characteristics of studied adolescents' students: included age, residence, stage, number of siblings, and income.

Part II: Academic quality of life scale:

It was developed by **Pedro et al., (2016)** [14] was used to assess a student's perception of own QoL. It included 62 items under two main domains, namely general and self. The" general "domain involved 4 dimensions as following. The health and healthy environment dimension had 10 items such as "I feel active and vital" and "I care for the cleanliness of my surrounding environment". The family environment dimension had 11 items such as "I have a good standard of living" and "I have difficulty communicating with my parents". The school environment dimension had 10 items such as "There is good transportation to the school" and "I suffer discrimination at the school". The social/emotional dimension 11 items such as "My friends and neighbors like me" and "I get support from my family". The "self "domain had two dimensions, namely mental wellbeing, and psychological QOL. The mental wellbeing dimension had 10 items such as" I feel comfortable at school" and "I enjoy my life". The psychological QOL dimension had 10 items such as "I feel lonely" and "I do not easily cope with new matters

Scoring system: The items were on a 3-point Likert scale Yes, Sometimes, and No. These were scored 2, 1 and zero. The scoring was reversed for negative items so that a higher score indicates better QoL. For each dimension and domain and the total scale, the scores of the items were summed-up and the total divided by the number of items giving a mean score for the part. These scores were converted into percent scores. The student's QoL was considered high if the percent score was 60% or more and low if less than 60%.

Part III: Mental health Symptom Checklist-90 (SCL90)

The Symptom Checklist-90 (SCL90) is a 90-item questionnaire used to assess psychological problems. It adapted from **Wei et al., (2018)** [15] and included physical health, (11) items Depression (12) items, aggression (6) items, Anxiety (10) items, phobia (7) items, sensitive (9) items, paranoid (6) items, psychosis (10) items.

Scoring system: Each item is scored on a scale from 0 to 4 based on how much an

individual was bothered by each item in the last week: 0 = Not at all, 1 = A little bit, 2 = Moderately, 3 = Quite a bit 4 = Extremely. The total was categorized by severe >66%, moderate 33 to 66% and low if score <0.33%, and None if score 0.

Part IV: Academic performance of adolescents' students:

Academic Performance Rating Scale was adapted from **DePaul et al., (1991) [16]**, it included 19 items distributed on three domains as academic success (6 items), academic productivity (10 items), and Impulse control (3 items).

Scoring system: Each item is scored on a scale from 0 to 4 based on how much an individual was bothered by each item in the last week: 0 = Not at all, 1 = A little bit, 2 = Moderately, 3 = Quite a bit 4 = Extremely. The total was categorized by high >70%, moderate 50 to 70% and low if score <0.50%.

Validity and Reliability:

Five experts in the psychiatric nursing, community health and pediatric nursing ascertained the content's validity; their opinions were elicited regarding the format, layout, consistency, accuracy, and relevancy of the tools. The validity was depended on research data and expert clinical judgments and its reliability tested resulting Cronbach's α for quality of life as good (.0.857), mental health Symptom emerged as good (.0.826), academic performance scale emerged as excellent (.0.913).

Pilot study

It was carried out on 10% of the sample (67 preparatory and secondary students) who were included in the main study sample. It was conducted to test the study process, evaluate the applicability, and test the content clarity, the feasibility and the time needed to fill in the tools. Consequently, minor adjustments were made, and the pilot research sample was not incorporated in the study.

Fieldwork:

Researchers explain purpose, aim, and tools of data collection and process of the study to the students. A review of recent national and international related literature using journals, periodicals, textbooks, internet, and theoretical knowledge of the various aspects concerning the topic of the study. Preparation of data collection tools was carried out over a period of three months from first of January to the end of March 2023; the researchers prepared the tools and translated them into Arabic form to become ready for use.

The questionnaire used in the study was administered in classrooms under the guidance of the researchers. Students were briefed about the study, encouraged to participate and motivated to express their experiences. The students give fully informed verbal consent to participate. It was emphasized that all data collected was strictly confidential. Efforts were made to minimize under-reporting, strongly emphasizing to the student that the questionnaire was anonymous, and that the data would be used for scientific purposes only. The questionnaires were distributed and recollected in the same setting. The time required to fill the questionnaires sheet was from 20 to 25 minutes. The filled forms were collected in time and revised to check their completeness to avoid any missing data.

Ethical Considerations:

The researcher obtained ethical approval from the Research Ethics Committee,

Faculty of Nursing, and Mansoura University. As well, the researcher obtained another approval from the participants. The researcher was introduced herself and a simple explanation about the aim of the study was provided to them. They were assured that their participation in the study was voluntary, that collected data was treated confidentially. Participants were informed that they have the right to ask any question related to the study and withdraw at any time from the study without any responsibility, and without giving any reason.

Statistical Analysis:

Data was sorted, classified, and the results were shown in tables. The Statistical Package for the Social Sciences was used to analyze the data on a suitable personal computer (SPSS Inc; version 21; IBM Corp., Armonk, NY, USA). The one-sample Kolmogorov–Smirnov test was used to determine the data's normality. Numbers and percentages were used to describe quantitative data. Continuous variables were presented as means ± standard deviation. Pearson correlation coefficient was used to measure of linear correlation between two sets of data. A linear regression model is a linear approach to modeling the relationship between a scalar response and one or more explanatory variables. The results were considered significant when the probability of error is less than 5% ($p< 0.05$) and highly significant when the probability of error is less than 0.1% ($p< 0.01$).

Results:

Table (1) presented that the mean age and standard deviation were determined to be 13.947±1.825 years. Of this cohort, over 54.4% of the students were identified as female, and 60% of them were found to reside in rural areas. It was observed that a considerable proportion of the cohort, specifically 69.2%, was enrolled in preparatory school. Additionally, more than half of the students, (56.7%) reported sufficient income.

Table (2) revealed that 65.4% and 57.6% of studied students had high quality of health and a healthy environment and school quality of life. While, 71%, 85.9%, and 86.8% of studied students had low Quality family environment, quality of subjective life, and psychological quality of life, respectively. Additionally, 74% of studied students had low quality of life, while 26% had high quality of life.

Table (3) detected that 57.1% of studied students had low somatization and 29.3% of them had moderate obsessive-compulsive. In addition, 28.7% of studied students had moderate anxiety, 53.1% of them had low depression. According to total mental health, 50.9% of studied students had low mental health and 23.3% of them had moderate mental health.

Table (4) showed that 70.2% of studied subjects had high academic success, 41.9% of them had high impulse control, and 67.8% of studied subjects had high academic productivity. According to total academic performance, 60% of studied subjects had high academic performance, while 20.3% of them had low academic performance.

Table (5) stated that high significant model detected through F test value was 6.998 with p value. 007. This model explained 39% of the variation in total mental health detected through R2 value

0.390. Also, explained that gender and number of siblings had no effect on mental health at p value >0.05. While, stage and age had slight negative effect on mental health at p value <0.05.

Table (6) showed that there was high negative correlation between anxiety level and quality life at p value <0.01 Also, there was high negative correlation between obsessive-compulsive and total mental health with quality of life at p value <0.01. Additionally, there was high negative correlation between somatization, conduct disorder and total mental health with academic performance at p value <0.01**.

Table (7): Revealed that there was high negative correlation between Academic performance and mental health at p value <0.01. Also, high negative correlation between Mental health and quality of life at p value <0.01. While there was high positive relation between Quality of life and Academic performance at p value <0.01.

Table (1): Distributions of the studied students according to their demographic characteristics (n=665).

Variables	N	%
Stage		
Preparatory school	460	69.2
Secondary school	205	30.8
Gender		
Male	303	45.6
Female	362	54.4
Age group		
12- 15 years	502	75.5
16-18 years	163	24.5
Mean SD		13.947±1.825
Number of siblings		
The first and the second	321	48.3
The third - and the fourth	263	39.5
Fifth - and more	81	12.2
Residence		
Rural	399	60.0
Urban	266	40.0
Income		

Table (2): Distribution of quality-of-Life Items among studied student (n=665).

Variables	High quality		Low quality	
	N	%	N	%
Quality of health and a healthy environment	435	65.4	230	34.6
Quality family environment	193	29.0	472	71.0
School quality of life	383	57.6	282	42.4
psychological satisfaction	319	48.0	346	52.0

quality of subjective life	94	14.1	571	85.9
Psychological quality of life	88	13.2	577	86.8
Total quality of life	173	26.0	492	74.0

Table (3): Distribution of studied students according to their mental health (n=665).

Mental health	N	%
Somatization:		
Severe	40	6
Moderate	155	23.3
Low	380	57.1
None	90	13.6
Obsessive-compulsive:		
Severe	78	11.7
Moderate	195	29.3
Low	297	44.7
None	95	14.3
Anxiety:		
Severe	46	6.9
Moderate	191	28.7
Low	326	49
None	102	15.4
Depression:		
Severe	20	3
Moderate	83	12.5
Low	353	53.1
None	209	31.4
Interpersonal sensibility:		
Severe	48	7.2
Moderate	190	28.7
Low	240	36.9
None	187	28.2
Anger-hostility:		
Severe	39	5.9
Moderate	78	11.7
Low	343	51.6
None	205	30.8
Phobic anxiety:		
Severe	42	6.3
Moderate	70	10.5
Low	352	52.9
None	201	30.3
Paranoid ideation:		
Severe	29	4.4
Moderate	68	10.2
Low	120	18
None	448	67.4
Psychoticism:		
Severe	18	2.8
Moderate	34	5.1
Low	76	11.4
None	537	80.7

Total:		
Severe	47	7.1
Moderate	155	23.3
Low	339	50.9
None	124	18.7

Table (4): Distribution of studied students regarding their academic performance (n=665).

Domains	**N**	**%**
Academic success		
High	467	70.2
Moderate	93	13.9
Low	105	15.9
Impulse control		
High	279	41.9
Moderate	190	28.6
Low	196	29.5
Academic productivity		
High	451	67.8
Moderate	105	15.8
Low	109	16.4
Total academic performance		
High	399	60
Moderate	131	19.7
Low	135	20.3

Table (5): Multiple Linear regression model for total mental health among studied students (n=665).

	Unstandardized Coefficients	Standardized Coefficients		
	B	*B*	**T**	**P. value**
Gender	.242	.055	.952	.342
Stage	-.661	.228	2.908	.011*
Number of siblings	-0.346	-.055	-1.174	.241
Age	-0.335	0.106	2.528	.012*

Model	**R2**	**Df.**	**F**	**P. value**
Regression	**0.390**	3	6.998	.007**

a. Dependent Variable: **Total mental health**

b. Predictors: (constant): Gender, Stage, Number of siblings, and Age.

Table (6): Correlation between quality of life, academic performance and mental health among studied students (n=665).

All items of mental health		Quality of life	Academic performance
Depression	r.	.047	-.002
	p. value	.229	.962
Anxiety	r.	-.104**	-.025
	p. value	.007	.523
Somatization	r.	-.078*	-.106**
	p. value	.044	.006
Obsessive-compulsive	r.	-.163**	.153**
	p. value	.000	.000
Total Mental health	r.	-.107**	.187**
	p. value	.006	.000

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

Table (7): Correlation matrix between quality of life, mental health and academic performance among studied students (n=665).

Correlations				
		Quality of life	Academic Performance	Mental health
Quality of life	R.	1	.345**	-.307**
	P. Value		.006	.006
Academic performance	R.	.345**	1	.487**
	P. Value	.006		.000
Mental health	R.	-.307**	-.487**	1
	P. Value	.006	.000	

Discussion:

Mental health problems of adolescents have an important influence on their schooling, particularly their academic achievement, which in turn may create important lifelong consequences. Due to a growing interest in mental health of adolescents in recent years, a meta-analysis seems timely, not only to demonstrate the association between mental health and academic achievement, but also to identify moderators that should be articulated in more depth in future research. Although there is a body of research on the relationship between mental health and academic achievement across the world, the literature is missing a meta-analysis of this relationship **Cavioni et al., (2021) [(17)],** so the current study aimed to explore relation

between quality of life and mental health on academic performance among adolescents' students.

Regarding to characteristics of studied students, the mean age and standard deviation were determined to be 13.947±1.825 years. More than half of the students were female, and from rural areas. Also, more than two thirds of them were enrolled in preparatory school. Additionally, more than half of the students had sufficient income. These results supported with the study conducted by **Jiang et al., (2023)** [18] titled in association of emotional and behavioral problems with sleep disturbance among Chinese adolescents: The moderation effect of academic performance, who stated that the mean age was 14.8 (SD: 1.7) years. Also, cohort with the study by **Qi et al., (2020)** [19] titled in Association of academic performance, general health with health-related quality of life in primary and high school students in China, who reported that the mean (SD) age was 13.9 (2.5) years and half of them were girls. More participants resided in rural areas.

According to academic quality of life, the current study mentioned that more than half of studied students had high quality of health and a healthy environment and school quality of life. While the majority of studied students had low quality of subjective life, and psychological quality of life, respectively. Additionally, about three quarters of studied students had low academic quality of life, while one quarter had high academic quality of life. These results may be due to school problems are common in the pre-teen and teenage years and school problems include lack of engagement, poor results, lack of confidence, problems with peers and so on.

These results inconsistent with the study by **Hidalgo-Rasmussen et al., (2018)** [20] about Bullying and health-related quality of life in children and adolescent Mexican students, who stated that the majority of studied student had high quality of life. While, supported with the study by **Mastorci et al., (2021)** [21] titled in Health-related quality of life in Italian adolescents who found that more than half of children had low quality of life.

Regarding to mental health, the current results revealed that more than half of studied students had low somatization and more than one quarter of them had moderate obsessive compulsive. Also, more than one quarter of studied students had moderate anxiety, more than half of them had low depression. According to total mental health, about half of studied students had low mental health and about one quarter of them had moderate mental health. These results attributed to adolescents are at greater risk of mental health conditions due to their living conditions, stigma, discrimination or exclusion, or lack of access to quality support and services. These results cohort with the study performed by **Carpi et al., (2022)**[22] about sleep quality and its associations with physical and mental health-related quality of life among adolescent students and found that students reporting higher perceived stress scores and lower physical and mental HRQoL scores. Also, **Albaladejo-Blázquez et al., (2019)** [23] who conduct study titled in "Health-related quality of life and mental health of adolescents involved in school, found that

mean score of depression was 2.85 (3.47) and anxiety was 2.94 (3.68).

Additionally, more than two thirds of studied subjects had high academic success, more than one third of them had high impulse control, and more than two thirds of studied subjects had high academic productivity. According to total academic performance, more than half of studied subjects had high academic performance, while one fifth of them had low academic performance. These results may be due to about half of studied students had low mental health and about one quarter of them had moderate mental health which negatively effect on academic process. These results regular with the study by **Lumley et al., (2015) [(24)]** about Self-reported extracurricular activity, academic success, and quality of life in UK medical students, who showed that about one quarter of students had low academic scores and face difficult at finished tasks.

Regarding to linear regression model or study detected 39% of the variation in total mental health detected through R2 value 0.390. Also, explained that gender and number of siblings had no effect on mental health at p value >0.05. While stage and age had slight negative effect on mental health at p value <0.05. These results inconsistent with the study by **Li et al., (2018) [(25)]** who reported that there was positive effect between age and emotional exhausting. Also, **Bastaminia et al., (2016) [(26)]** at their study about mental health and quality of life among adolescent students who detected that the Multiple linear regression showed that total mental health score is significantly correlated with physical health, social relationships, and environment dimensions of QOL, and gender and number of available rooms (P<0.05). Additionally, **Cavioni et al., (2021) [(17)]** found that quality of school relations and mental health declined with age.

Moreover, there was high negative correlation between anxiety level and quality life at p value <0.01**. Also, there was high negative correlation between obsessive-compulsive and total mental health with quality of life at p value <0.01**. Additionally, there was high negative correlation between somatization, conduct disorder and total mental health with academic performance at p value <0.01**. These results supported with the study by **Shareef et al., (2015)[(27)]** who reported that the high academic performance of students positively correlated with good physical ($r = 0.23$, $p < 0.001$), good psychological health ($r = 0.29$, $p < 0.001$), social relations ($r = 0.11$, $p = 0.03$) and environment ($r = 0.23$, $p < 0.001$). Also, **Gougis, (2020)[(28)]**at study about the effects of prejudice and stress on the academic performance of Black-Americans and found that Stress decreases academic performance level.

Finally, there was high negative correlation between Academic performance and mental health at p value <0.01**. Also, high negative correlation between Mental health and quality of life at p value <0.01**. While there was high positive relation between Quality of life and Academic performance at p value <0.01**. These results consistent with the study by **Zada et al., (2021) [(29)]** about Effect of mental health problems on academic performance among adolescent students in Pakistan who showed that the results of the study reveal that there is a

strong positive association between mental health and improvement in academic performance. Mental health problems negatively affect the academic performance of adolescent students.

Likewise, **Drum et al. (2019)[30]** conducted a study on 26,000 students from 70 school. Its results revealed that mental health problems such as suicidal thoughts, intent, and actions influence students' professional and personal lives. Furthermore, **Qi et al. (2020)[19]** at their study about Association of academic performance, general health with health-related quality of life in primary and high school students in China who found that both self-rated academic performance and general health status were positively associated with HRQoL among Chinese students, and such relationships were independent of lifestyle-related behaviors and body weight status. Also, the study by **Parvizi et al., (2021)[31]** about Relationship of pupils' quality of life and academic achievement with the employment status of their mothers, who detected that high positive correlation between pupils' quality of life and academic achievement.

Conclusion:

About three quarters of studied adolescent students had low quality of life. In addition, half of studied students had low mental health. Likewise, less than two thirds of studied subjects had high academic performance. Furthermore, there was high negative correlation between Academic performance and mental health at p value <0.01**. Also, high negative correlation between Mental health and quality of life at p value <0.01**. While there was high positive relation between Quality of life and Academic performance at p value <0.01**.

Recommendations:

Finally, it should be considered that the mentioned association may be affected by different factors, so it recommended similar studies by controlling the effect of a more probable confounder. Further, health education and promotion of quality of life should be integrated into the educational strategies and policies of all educational centers. It is necessary to carry out longitudinal studies in adolescents to reinforce these findings and begin to fill the knowledge gaps identified in this research. Providing education program for improving mental health and quality of life among adolescents' students.

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Relation between Occupational Hazards and Nurses' Job Burnout at Intensive Care Units

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Abstract

Background: Intensive care units like other dangerous workplaces are characterized by a high amount of exposure to hazardous substances, which gravely threatens nurses' safety, stress and burnout. **Aim:** Assess the relation between occupational hazards and nurses' job burnout at Intensive Care Units. **Subjects and method: Design:** A descriptive correlation research study design. **Setting:** It conducted in intensive care units at Tanta university hospitals including, Tanta Main University Hospital and Emergency Hospital. **Subject:** All nurses (n=390) who were working in Tanta hospitals. **Tools:** Data were collected by using Occupational Hazards Structured Questionnaire and Nurses' Job Burnout Scale. **Results:** More than half (56.2%) of nurses perceived had moderate level of occupational hazards. Also, almost half (51.3%) of nurses had a low level of job burnout. **Conclusion**: There was a statistically significant positive correlation between occupational hazards and nurses' job burnout. **Recommendation**: Hospital administration create ICU hospitals policies and guidelines for safety practices. Hospital /unit managers should gain consciousness of the existence of burnout and thus to take corrective action to reduce its occurrence, nurses follow up the implementation of excellent care aspects in daily work to prevent workplace occupational hazards. Nurses conduct workshops on resolving stress and design strategies to improve and solve burnout among nurses.

Keywords: Intensive care unit, occupational hazards, job burnout, nurses.

Introduction

In hospital's intensive care units (ICU) is a key division. The ICU is a distinct culture, with sophisticated technology, it is a specialized unit that supplies care for critically ill patients. Hence, increasing influx of infected patients as a result ICUs put nurses under extreme tension **(1)**. Nurses in ICU are more susceptible to accidents and occupational hazards because of their work in the health-care sector. There are stressful considerations for intensive care unit's nurses as the frustration of not being able to successfully recover the patients, coping with the imminence of their death **(2)**. The intensive care unit environment is considered a crucial factor that affects the motivation and work satisfaction of nursing staff **(3)**.

The intensive care unit nurses responsible for tasks related to patient care directly, that are most exposed to the physical workloads due to working conditions are hazardous in the ICU setting **(2,3).** The workplace environment must be considered carefully because it is affecting the inspiration and capability of ICU nurses to perform the tasks. There is evidence about the impact of poor work environments on ICU nurses and patient outcomes. Negative outcomes for the ICU nurses can be related to job satisfaction and burnout. However, there

are some other negative outcomes for the patients such as inadequate safety, impaired quality of care, medical errors and increased mortality [(4)].

The ICU environment may cause a number of risks with regard to occupational hazards. The workplace hazards include the physical environment of the ICU such as lighting, conditioning, noise, equipment and workspace [(5)]. Working conditions such as daily workload, working in shifts, standing for long hours, caring for patients with co-morbidities and inadequate income. Also, psychosocial factors such as dissatisfaction with work, workplace stress, often encountered deaths, interaction with families of patients and workplace violence. Ergonomic as factors repositioning the patients and repeating movements such as pushing, pulling, elevating and bending. As well as biological factors being exposed to infectious organisms during invasive and non-invasive procedures. Chemical factors being exposed to antiseptic and disinfectants or inhaling their gases [(6)].

Nursing is a demanding profession that puts nurses under a lot of emotional and physical stress. There are numerous factors that increase the risk of physical and mental illnesses in nurses, as well as job burnout. ICU nursing teams may be characterized by ambiguity, fluctuating situations, and the need for speedy reaction, mandating prominent levels of knowledge, skill, and competence, as well as psychomotor, emotional, and cognitive control, all of which can contribute to tiredness, stress, and burnout [(7)].

Burnout is one of the consequences of professional stress that is caused by chronic psychological stress brought on by an imbalance between demands of the environment and individuals' ability to cope with these requirements. Burnout results from growing environmental expectations that nurses cannot oversee and the resulting psychological pressure [(8)]. Occupational burnout reduces patients' satisfaction due to their poor-quality services given. Therefore, recognizing burnout and preventing it enhances both the staff's mental health and the standard of the services offered. It is characterized by the reaction to ongoing interpersonal and emotional triggers of stress at work, which affect many health professionals [(9)].

Burnout is a multifaceted idea that includes emotional exhaustion, a decline in personal accomplishment, and depersonalization of others. Professionals may feel more frustrated and tense due to emotional exhaustion, which is accompanied by a lack of energy and enthusiasm, fatigue, and a sensation of having drained up all their emotional resources in dealing with the challenging circumstance [(10)]. The decline in personal accomplishment is a sensation of diminishing abilities and frustration with a person's achievements and successes at work, as well as growing unhappy and dissatisfied with their professional development. As a result, one's sense of competence and success declines as does one's ability to interact socially. Depersonalization is the term for negative attitudes, insensitivity, and lack of regard for other people that cause professionals to treat their patients, colleagues, and coworkers inhumanely [(11)].

The strenuous nature of providing patient care in an intensive care unit taxed the body and mind of the nurses. Patients hold nurses

in high regard, yet it is possible that they lack the resources or authority to fulfil all the demands placed upon them [12]. The burnout syndrome is especially pronounced in nursing professions because of demand, workload, multiple shifts, occupational hazards, precariousness of material resources, shortage of qualified nurses, and conflictual interpersonal interactions. The gradual exposure to various stressors causes physical and mental tiredness, impairing living quality as well as the interaction with their functions and the workplace which triggers the medical condition. Burnout can cause a wide range of physical, psychological, and cognitive symptoms, necessitating prolonged adaptive responses including overcoming, tolerating, or adjusting to stressors, which can undermine the person and the organization and cause the burnout syndrome [13].

Significance of the Study

Occupational hazards management have become the primary focus of healthcare development. Nurses are prone to occupational hazards in the intensive care unit of their day-to-day care that is provided to severally ill patients [14]. So, the occupational hazards management have highlighted the hazards that nurse face when providing health care for comatose and sever ill patients that may effect on patient's outcome [15]. Furthermore, hazards have a negative impact on nurses' quality of life, with economic consequences in terms of costs of treatment and with potential for lost days of work**.** Whereas, unsafe workplace not only can lead to nurses' job burnout and decreased job satisfaction, but also affects patient outcome and increases the cost of treatment [16]. In light of a previous study, the examination of the relation between work hazards among nurses and factors affecting their productivity was recommended [17]. Moreover, another study concluded that investigating the area of nurses' job is necessary to prevent it [18]. So, this study needs to be addressed to assess occupational hazards and its effect on job burnout among intensive care nurses.

The aim of study is to

Assess the relation between occupational hazards and nurses' job burnout at Intensive Care Units.

Research Questions:

1. What are the levels of occupational hazards and nurses' job burnout at Intensive Care Units?
2. What are the relations between occupational hazards and nurses' job burnout at Intensive Care Units?

Subjects and method

Study design

A descriptive correlation research study design was used in the present study.

Study setting

The present study was conducted in intensive care units at Tanta University Hospitals including Tanta Main University Hospital and Emergency Hospital. Main University Hospitals include the following units: Medical Care Unit, Cardiac Care Unit, Ophthalmology Anesthesia Care Unit includes Chest Care Unit, Neonates Intensive Care Units and Pediatric Intensive Care Unit. The Emergency Hospitals includes Trauma of Emergency Car Unit, Anesthesia Care Unit and Neurological care unit.

Subject

All convenience sample of nurses(n=390) who were working in Tanta University

Hospitals, Main University Hospital contained nurses (n=243) and Emergency University Hospital contained nurses (n=147) were included in the present study the previously mentioned setting.

Tools of data collection

To achieve the aim of study, the following tools were used.

Tool I: Occupational Hazards Structured Questionnaire

This tool was developed by the researcher guided by Souza et al. (2017) [19] Thangaraj (2017) [20] and recent related literature to assess the levels of occupational hazards in intensive care units. It was consisted of two parts as follows:

Part 1: Personal characteristics of nurses such as age, years of experience, department, marital status and qualification.

Part 2: Occupational hazards Questionnaire. This part included six subscales as follows:

- Hazards related to physical environment 10 items.
- Hazards related to working conditions 4 items.
- Psychosocial hazards 11 items.
- Ergonomic hazards 5 items.
- Biological hazards 12 items.
- Chemical hazards 9 items.

Scoring system

Nurses' responses were measured on three points Likert Scale ranging from (1-3) where always =3, rarely=2 and never=1.

The total score was calculated by summing of all categories and high score indicated high level of occupational hazards based on cut off value as follows:

- High level of occupational ≥75%.
- Moderate level of occupational hazards 60% - <75%.
- Low level of occupational hazards <60%.

Tool II: **Nurses' Job Burnout Scale**

This tool was developed by Maslach (1996) [21] was modified by Lim et al. (2019) [22] and adapted by the researcher to assess nurses' job burnout. This tool included three subscales as follow:

- Emotional exhaustion 9 items.
- Depersonalization 5 items.
- Personal achievement 8 items.

Scoring system

Nurses' responses were measured on a five-points Likert Scale ranged from (1-5) where never = 1, a few times a year or less =2, once or a few times a month =3, once or a few times a week =4, and every day =5. The total scores calculated by summing of all categories into levels of nurses' job burnout as follows:

- High level of nurses' job burnout ≥ 75%
- Moderate level of nurses' job burnout 60% - <75%,
- Low level of nurses' job burnout <60%.

Method

1. Official permission to conduct the study was obtained from the Dean of Faculty of Nursing to Tanta University Main Hospital and submitted to the responsible authorities of the selected setting.

2. **Ethical consideration**:

a) Approval of Ethical Committee obtained of Faculty of Nursing.

b) Nature of the study was not causing any harm or pain to the nurses.

c) Nurses consent to participate in the study obtained after informed them about the privacy of information, nature of the study, their right to withdraw and confidentiality of their data.

d) Confidentiality and privacy were taken into construction regarding data collection.

3- Tools I and II were translated into Arabic and presented to a jury of five experts in the area of specialty to check their content validity and clarity of questionnaire.

– The face validity value of tool (I) part 2: Occupational Hazards Structured Questionnaire 90.37%, tool (II) part 1: Nurses' Job Burnout Scale 97.95%.

4. Reliability of tools was tested using Cronbach Alpha Coefficient test. Reliability of tool (I) part (2): Occupational Hazards Questionnaire were reliable was 0.748 and reliability of tool (II) part (2): Nurses' Job Burnout Scale were reliable was 0.818.

5. A pilot study was carried out on a sample (10%) of nurses (n=39) nurses, and they excluded from the main study sample during the actual collection of data. The pilot study was done to test clarity, sequence of items, applicability, and relevance of the questions and to determine the needed time to complete the questionnaire. The estimated time needed to complete the questionnaire items from nurses was (20 -30) minutes.

6. Data collection phase: the data were collected from nurses by the researcher. The researcher met the respondents' nurses in different areas under study during working hours to distribute the questionnaire. The subjects recorded the answer in the presence of the researcher to ascertain that all questions were answered**.** The data was collected over a period of two months started from October 2021until December 2021.

Results

Table (1): Represents percentage distribution of nurses' personal characteristics. It was noticed that the age of nurses ranged between 20 to 45 years old, with a mean age 29.83 ±7.33, where two thirds (60.8%) of nurses were less than 30 years old. The majority (90.3%) of nurses were female. Regarding their hospital the table shows that 62.3% of nurses were distributed in Main hospital and 37.7% of them were distributed in Emergency hospital.

Regarding their departments the table shows that 22.8% and 15.4 % of nurses were distributed in Neonates ICU and Anesthesia ICU respectively. Also, 13.6% and 13.3% of them were distributed in Medical ICU and Neurological ICU respectively. More than half (52.1%) of nurses had Bachelor Nursing Degree, more than one third (39.7%) of nurses had Nursing Technical Deplume, only 3.3%and 4.9% of them had Diploma Nursing Degree and Postgraduate degree respectively. Around two thirds 63.1% of nurses had <10 years of experience with mean 6.26 ± 4.18. Additionally, a high percentage (65.9%) of nurses were married.

Figure (1): Demonstrates overall nurses' perception regarding occupational hazard. This figure revealed that more than half (56.2%) of nurses had a moderate level of perception about occupational hazards and one third (32.6%) of them had low level perception about occupational hazards. While a minority (11,2%) of them had a high level of perception regarding their occupational hazards.

Table (2): Demonstrates levels of nurses' perception regarding occupational hazards dimensions. The table was clear that almost half (50.0% and 47.4%) of nurses perceived moderate levels about chemical and physical hazards respectively. Also, a high percent and more than half (86.2% and 54.6%) of nurses perceived low their level about biological hazards and working conditions

respectively. Also, around three quarters and more than half (77.7%and 56.9%) of nurses perceived a high level about ergonomic and psychosocial hazards respectively.

Figure (2): Demonstrates overall nurses' perception regarding levels of job burnout. As evident from the figure, more than half (51.3%) of nurses had a low level of job burnout and more than one third (35.4%) of nurses had a moderate level of job burnout. While a minority (13.3%) of them reported that they had a high level of job burnout.

Table (3): Displays nurses' job burnout dimensions. This table clears that nearly three quarters and more than half of nurses (70.5% and 54.1) perceive high levels about their emotional exhaustion and personal accomplishment respectively. Also, most nurses (86.4%) believe had a low level of depersonalization.

Table (4): Represents correlation between occupational hazards and job burnout dimensions among nurses. As noticed from this table that overall occupational hazards and overall burnout had positive statistically significance. Also, all dimensions of job burnout had statistically significant correlation with all dimensions of occupational hazards except between ergonomic and chemical hazards with depersonalization and working condition with personal accomplishment as perceived by nurses and r ranged between 0.134 and 0.306 at $p<0.001$.

Table (1): Percentage distribution of nurses' personal characteristics (n = 390)

Demographic data	nurses	
	No	**%**
Age		
<30	237	60.8
30 – 45	149	38.2
>45	4	1.0
Min – Max	20.0 – 48.0	
Mean ± SD.	29.83 ± 7.33	
Median	28.0	
Gender		
Male	38	9.7
Female	352	90.3
Hospital name		
Main	243	62.3
Emergency	147	37.7
Unit name		
Trauma of Emergency ICU	35	9.0
Anesthesia ICU	60	15.4
Medical ICU	53	13.6
Neurological ICU	52	13.3
Cardiac ICU	25	6.4
Ophthalmology Anesthesia ICU	20	5.1
Chest ICU	16	4.1
Neonatal ICU	89	22.8
Pediatric ICU	40	10.3

Educational qualification		
Bachelor of Nursing	203	52.1
Nursing Technical Deplume	155	39.7
Technical Secondary School		3.3
Diploma in Nursing	319	4.9
Postgraduate degree		
Years of experience in nursing		
<10	246	63.1
≥10	144	36.9
Min – Max	1.0 – 21.0	
Mean ± SD.	6.26 ± 4.18	
Median	5.0	
Marital status		
Married	257	65.9
Unmarried	125	32.1
Divorced	8	2.0

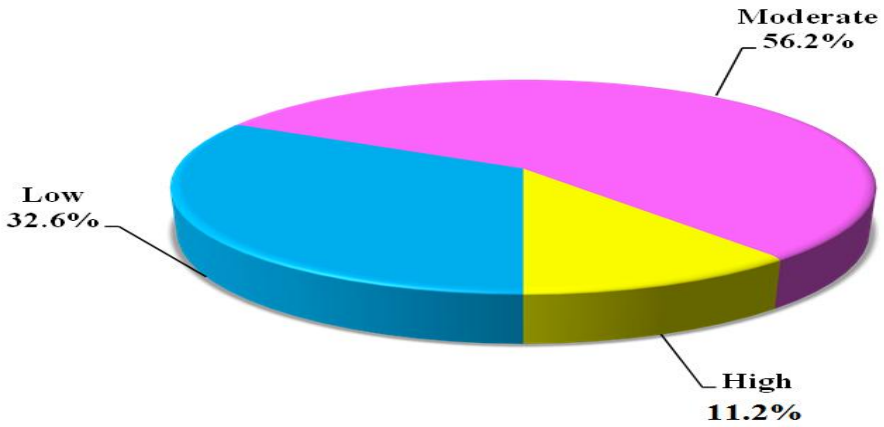

Figure (1): Overall nurses' perception regarding occupational hazard

Table (2): Levels of nurses' perception regarding occupational hazard dimensions (n= 390)

Occupational hazards dimensions	nurses' perception					
	High		Moderate		Low	
	No	%	No	%	No	%
Physical hazards	161	41.3	185	47.4	44	11.3
Working condition	54	13.8	123	31.6	213	54.6
Psychosocial hazards	222	56.9	116	29.7	52	13.4
Ergonomic hazards	303	77.7	37	9.5	50	12.8
Biological hazards	32	8.2	22	5.6	336	86.2
Chemical hazards	74	19.0	195	50.0	121	31.0
Overall occupational hazards	**44**	**11.2**	**219**	**56.2**	**127**	**32.6**

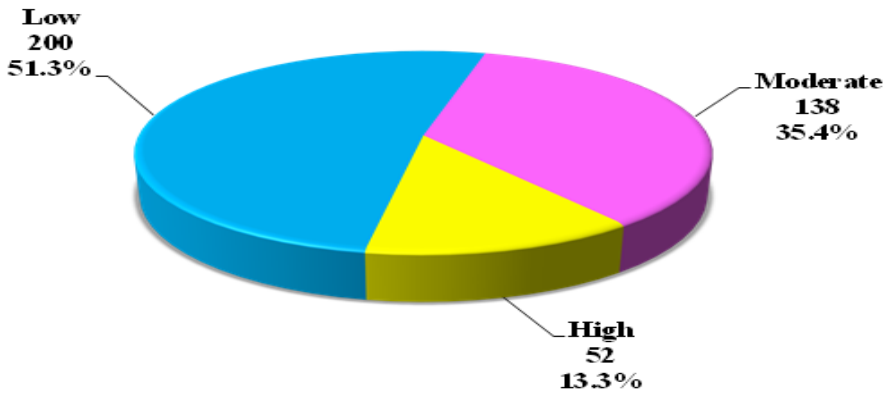

Figure (2): Overall nurses' perception regarding levels of job burnout.

Table (3): Nurses perception regarding job burnout dimensions (N=300)

Job burnout dimensions	nurses' perception					
	High		Moderate		Low	
	No	%	No	%	No	%
Emotional Exhaustion	275	70.5	51	13.1	64	16.4
Depersonalization	15	3.9	38	9.7	337	86.4
Personal Accomplishment	211	54.1	21	5.4	158	40.5

Table (4): Correlation between occupational hazards and job burnout dimensions among nurses (n= 390)

Occupational hazards dimensions	**Job Burnout dimensions**							
	Emotional Exhaustion		**Depersonalization**		**Personal Accomplishment**		**Overall burnout**	
	R	**P**	**R**	**P**	**R**	**P**	**r**	**P**
Physical hazards	0.209*	<0.001*	0.222*	<0.001*	0.164*	0.001*	0.306*	<0.001*
Working condition	0.109*	0.031*	0.292*	<0.001*	-0.016	0.746	0.134*	0.008*
Psychological hazards	0.175*	0.001*	0.116*	0.022*	0.210*	<0.001*	0.290*	<0.001*
Ergonomic hazards	0.274*	<0.001*	0.088	0.081	0.147*	0.004*	0.288*	<0.001*
Biological hazards	0.251*	<0.001*	0.145*	0.004*	-0.022	0.669	0.163*	0.001*
Chemical hazards	0.130*	0.010*	0.026	0.612	0.116*	0.021*	0.168*	0.001*
Overall occupational hazard	**0.292***	**<0.001***	**0.200***	**<0.001***	**0.152***	**0.003***	**0.335***	**<0.001***

r: Pearson coefficient *: Statistically significant at $p \leq 0.05$

Discussion

Occupational hazards are one of the most serious dangers that nursing in ICU face daily duty. However, nurses encounter a variety of occupational hazards. ICU burnout is a communal problem that has gained increasing attention within the last few years because it has been associated with personal suffering, absenteeism, turnover, major medical errors, and lower patient satisfaction[23].

The present study results revealed that more than half of nurses had a moderate level of overall occupational hazards. These findings may be interpreted by two thirds of nurses aged under thirty years and had years of experience less than ten years. Additionally, the nature of the intensive care unit work environment is stressful and included more hazardous that expose nurses to danger during their work. Also, nurses worked long shifts with repetitive movements in lifting and aiding critically ill patients that effect on nurses' safety. The same result found by **Şanlıtürk (2021) [24], Zarrini et al. (2018) [25]** and **Ghahremani et al. (2018) [26]** they reported that the level of occupational hazards for the nurses in the ICUs was moderate. Also, **Elewa** and **El Banan (2016) [27]** on their study notice that there is a high level of exposure to occupational hazards. In contrary, the current study disagreed with **Shamkh et al. (2022) [28]** they confirmed that about three quarter of nurses have a low level of occupational hazards among nurses. They found that two thirds of nurses have years of experience or more than fifteen years.

In the present study revealed that the majority of nurses were highly or moderately exposed to physical hazards. These results may be due to nurses being exposed to radiation that led to fetal malformation which affects. When nurses transported patients to another department, they were exposed to physical hazards from aggressive relatives. Also, there is a shortage of staff and nurses' aids considered a main cause of physical hazards. On the line with this study **Umoh (2020) [29]** and **Yesilgul et al. (2018) [30]** their results revealed that physical hazards were considered moderate among nurses. Also, similarity of the current study **Elbilgahy et al. (2019) [31]** who reported that a high incidence rate of physical hazards among nurses, this was biggest issues as these hazards were identified by more than three quarters of nurses.

The present study results show that half of nurses had a low level of job burnout and around a third of them had a moderate level. This finding may be due to nurses handling and dealing very calmly with their work problems in the present of excessive workload in ICU, and different hazards especially ergonomic and psychosocial hazards. Furthermore, nurses had a prominent level about their emotional exhaustion and personal accomplishment, but they had low level of depersonalization. The findings are in line with the study of **Durand et al. (2019) [32]** who revealed that the majority of nurses have low level of job burnout. Also, **Nassar et al. (2019) [33]** who clarified that ICU nurses and trainee interactions demonstrated low level of burnout. Also, **Nogueira et al. (2018) [34]**, **Sillero (2018) [35]** and **Mazhar et al. (2019) [36]** who found that the degree of general nurses' burnout was moderate. This result is contraindicated with **Friganović et al.**

(2019) [37] and **Abbas et al. (2019)** [38] results who find high level of job burnout. Their results were high due to factors as work-life imbalance, long work hours, perceived workload, distress caused by complaints and lack of reciprocity in relationships with patients may lessen satisfaction and consequently increase the risk of burnout. Also, **Wilson et al. (2017)** [39] revealed nurses' perception was high to a moderate level of burnout.

The findings of the presents study reflected that nurses perceive highly statistically significant found between overall work occupational hazards and overall their job burnout. This means that nurses' job burnout due to present of work occupational hazards. This result may be due to stressful work environment of ICU, long work hours and their emotional strain from patient care. Also, critical care nurses practice in units where patients require more complex interventions. In the line with the result of this study, **Du Peihong** and **Li et al. (2021)** [40]**, Saravanabavan et al. (2019)** [41] and **Lee CY (2019)** [42] who revealed that there was a highly statistically significance relation between nurses' overall of occupational stress and overall of their job burnout. They clarified that nurses' occupational hazards and their job burnout are also mutually interactive. Also**,** **Nantsupawat et al. (2016)** [43] revealed that there was a relation between occupational stress and job burnout among ICU nurses. Moreover, different ICU occupational hazards as a factor may lead to different health problems and a reduced quality of life.

Conclusion

In light of the current study findings, it can conclude that more than half of nurses had perceived moderate level of overall occupational hazards, and almost half of nurses had perceived low level of job burnout in ICU at Tanta University Hospitals. Moreover, there was a statistically significant positive correlation between overall occupational hazards and overall nurses' burnout.

Recommendations

On the line of the finding of the current study the following recommendation are suggested:

For hospital administration

1. Creation and dissemination of ICU hospitals policies and guidelines for safety practices.
2. Establish continuous training programs about occupational hazards for ICU nurses, especially protective measures.
3. Organizational interventive programs for preventive to take avoiding action and reduce burnout syndrome in ICUs.
4. Hospital /unit managers should gain awareness of the existence of burnout and thus take corrective action to reduce its occurrence.

For nurses

1. Participate in training programs to update ICU nurses' knowledge and practice about occupational hazards.
2. Follow up the implementation of quality care dimensions in daily work to prevent workplace occupational hazards.
3. Involve in solving unit problems to improve their depersonalization and facilitate its applicability.

4. Creating an appropriate work environment that prevents conflict among nurses and encourages a more productive and constructive environment.

Further research to be conducted.

Assess organizational strategies to improve occupational hazards training program knowledge.

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Knowledge and Believes of Nurses about Preventive Measures of Violence at Work Place at Tanta University Hospitals

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Background: Workplace violence is one of the most significant and hazardous issues faced by nurses all over the world. Nurses are the most vulnerable health group to violence from other health group as they are responsible for providing 24 hours of direct, continuous care to the patients. **Aim of the study** was to assess knowledge and believes of nurses about preventive measures for violence at work place at Tanta university hospitals. **Design:** This study used a descriptive study design. **Setting:** It was completed at Tanta University hospitals. **Subjects:** 384 nurses were used as a convenience sample size for the study. **Tools of the study:** A single data collection tool has four parts and covered socio-demographic information about nurses, history of violence at workplace, knowledge of nurse about policies and measures to prevent violence in work place and believe of nurses about the degree of benefits of preventive measures of violence at the workplace. **Results:** More than three-quarters of the studied nurses (78.9%& 75.8%) had poor knowledge score and positive believes about preventive measures for violence and its benefits at the work place respectively with statistically significant relation between them. Regarding preventive measures for workplace violence, there was a positive correlation between total knowledge and total believes scores. **Conclusion and recommendations:** Although more than 75% of the nurses who participated in the study had poor knowledge score about measures to deal with violence at the work place, more than three-quarters of them had positive believes about degree of benefits of preventive measures of violence. Therefore, it is recommended to conduct health education program to raise nurses' knowledge and awareness about preventive measures of violence at the work place.

Key words: Nurses, work place violence, preventive measures, Knowledge and believes.

Introduction

Healthcare workplace violence is recognized as a major global workplace problem. Workplace violence is any detrimental act, such as a physical assault or non-physical behavior, that takes place inside the employee's workstations while they are on the clock. In any clinical care situation, nurses are more vulnerable than other staff members [(1-3)]. Since they work on the front lines and are frequently in contact with patients and their families, nurses make up a substantial section of the healthcare workforce. As a result, they frequently bear the brunt of the burden. Additionally, nurses spend the majority of their working hours in close proximity to patients while providing continuous 24-hour direct care to patients; as a result of these variables, nurses are particularly susceptible to workplace violence. However, many assaults may not result in serious harm, some have left some nurses with fractured bones, black eyes, and other injuries. Occasionally, nurses have been killed. [(4,5)].

Nurse advocacy groups and organizations have long been concerned about violence against healthcare professionals, but

research reveals that what was already a dangerous pattern may be growing worse [6].

The American Federation of Labor and Congress of Industrial Organizations study on worker safety at 2021 states that since 2010, the rates of workplace violence in healthcare and social support settings have nearly doubled [7].

In Egypt, numerous studies have been conducted to reveal the prevalence of violence among nurses in health care settings. Among them a study conducted by Mohammed et al., (2021) to assess the nurses' perception job violence and it is relation to their absenteeism and demonstrated that the majority of staff nurses (86.1%) were victims of workplace violence. Another study conducted by Ewis and Arafa (2014) who study violence against nurses: an epidemiological study for nurses in municipal, health insurance and university hospitals of Beni Suef governorate, Egypt and showed that 92.8% of nurses reported being exposed to workplace violence. 97.6% and 74.6% of nurses were exposed to verbal and psychological aggression respectively and it is considered the most prevalent form of violence that nurses have experienced.[8,9].

Physical and mental violence are both considered forms of workplace violence in the healthcare setting. Physical assault is undoubtedly the most severe type of aggressiveness, whereas psychological assault encompasses verbal abuse, threats, bullying, and sexual and racial harassment. Due to their front-line position in healthcare settings, nurses may be vulnerable to a variety of workplace violence, although verbal abuse is by far the most common form of violence against nurses. Compared to physical violence, it is three times as likely to happen [10-13].

Workplace violence has a variety of causes. Severe head injuries, dementia, substance misuse, and developmental delays are all direct causes of patient illness or condition [12]. Other identified factors were general dissatisfaction with the health care delivery system, lengthy wait times, and the application of hospital policies like the limited number of visitors allowed at a patient's bedside. [15].

Workplace violence can have negative consequences on communication between nurses and patients, as well as lower productivity, a lower quality of life, and lower job satisfaction. It can also increase nurses' turnover, which can increase medical errors and patient care deficiencies. [16,17].

When there is a crisis, emergency, or disaster involving huge groups of individuals who are even more overburdened with panic attacks, shock, uncertainties, anxieties, or worries about the conditions they or their family members are going through, violence in healthcare settings gets worse [18]. Healthcare professionals consequently become the targets of people who are angry or frustrated. Nurses and paramedics working in emergency rooms as well as staff directly involved in inpatient treatment are the most susceptible healthcare employees that are assaulted [19].

Reporting systems, work place violence response policies, and organizational support policies have been created and put into practice to help reduce the prevalence of work place violence. Even though certain institutions may have a formal procedure in place for reporting system, many of them go

unreported, particularly when they involve bullying, verbal abuse, or harassment. Underreporting occurs for a variety of reasons, including a lack of reporting guidelines or policies, inadequate management, a lack of management awareness, a lack of trust in the reporting system, and fear of retaliation [18].

A community health nurse has a unique responsibility and a crucial part to play in preventing workplace violence. First, his/her role should be observed in assessing and screening of knowledge and believes of nurses about preventive measures for violence at work place. Then his/her role can be completed through conducting educational training for nurses in the hospitals on violence awareness and prevention. Also, she/ he might give knowledge of hospital safety policies, practices, and crisis plans to nurses and keep it up to date. In addition, she/he educates nurses how to report violence, speak up when they experience an incident or witness violence against someone else. Furthermore, she/he educates nurses how to press charges when they are assaulted. Finally, she/ he supports co-workers who experience violence and educate nurses the importance of seeking solutions for work place violence as a team[20].

Significance of the study

Nowadays, violence against nurses becomes one of the most popular and global health problems that have received greater attention in the recent years. Compared to other healthcare professionals, nurses are more vulnerable to workplace violence since they provide direct patient care, continuous care to patient and their risk for violence increases at the time of conflict and disaster. So, it is necessary to identify knowledge, and believes of nurses towards workplace violence preventive measures.

Aim of the study

The aim of this study was to:

Assess knowledge and believes of nurses about preventive measures of violence at work place at Tanta university hospitals

Research questions:

1. To what extent are nurses aware of workplace violence prevention strategies?
2. What are the believes of nurses about degree of benefits of preventive measures for violence at work place?

Subjects and methods

Subjects

Research Design

This study used a descriptive study design.

Setting

This study was carried out at Students hospital, Emergency hospital, Ophthalmology Hospital, Medical Hospital, in some departments of Tanta University Hospitals (orthopedic, cardiology, and neuro-psychiatric departments) as well as in Tanta University Hospitals' outpatient clinics.

Subject

384 nurses from previous setting were included in the study as a convenience sample size. The World Health Organization and the Centers for Disease Control and Prevention, Atlanta, Georgia, USA, version 2002's Epi-Info software statistical tool was used to compute the sample size and power analyses. These were the requirements: The cross-sectional study design has a 5% error margin and a 95% confidence limit.

Tool of the study

Questionnaires for Workplace Violence in the Health Sector Country Case Studies (WPVHS)

Concerning workplace violence in the healthcare industry, the ILO, the ICN, WHO, and the PSI jointly produced the WPVHS for the first time in 2003 [21]. It was adapted by researchers and The questionnaire's original English version was modified. It was used in this study. In this study, a questionnaire was used and which included four parts:

Part I: **Socio-demographic information about nurses**, such as age, marital status, educational attainment, years of experience and residence.

Part II: History of nurses about violence at workplace: it included information on violence exposure over the previous 12 months, including how often it occurred at work, its forms, how people responded to it, persons who attacked, place in which incident take place and how the victims were affected by the accident. It is also includes worries of nurses about violence at workplace, use of procedures and encouragement for reporting violence at the work place.

Part III: **knowledge of nurses about policies and measures to prevent violence at the work place:** It composed of 13 measures used to prevent violence in workplace such as improving the environment, restrict public access and implementing security measures (e.g. guards, alarms, portable telephones). Correct response received a score of (1) and the incorrect response received a score of (0). A total score was summed up and ranged from 0-13.

- **The total knowledge score was categorized as follows:**
- **Good knowledge→≥75%of total score.**
- **Fair knowledge →60-75% of total score.**
- **Poor knowledge→<60% of total score.**

Part IV: Believes of nurses about the degree of benefits of preventive measures of violence at the workplace. It consisted of 13 items that was used by the researchers to assess nurses believes about the degree of benefits of preventive measures of violence at the workplace. The subjects responded on a four-point Likert scale with "not at all," "little," "moderate," and "very" as the options. Each item received a score between 0 and 3, where 0 equaled not at all, 1 little, 2 moderate, and 3 very. **The total score ranged from 0-39**

The total believe score was categorized as:

Positive believe→ ≥70% of total score.

Negative believe→ <70% of total score.

Method

-Administrative process

An official letter to conduct the study was obtained from the Dean of the Faculty of Nursing and directed to the managers of the Tanta University Hospitals.

-Ethical consideration

- The study's conduct was given approval by the ethics committee. Approval Code: 210-2-2023
- Respondents' confidentiality and identities were respected. Respondents were fully informed of the study's background and goals on the first page of the online questionnaire. The completion of the survey and submission of the completed form constituted consent to participate in the study.

-Validity and reliability

Five professionals in the field of community health nursing received the translated tool to evaluate its face and content validity. The necessary modifications and omissions of some details were done. The history of violence, knowledge, and beliefs questionnaire's Cronbach's alpha coefficients after being translated into Arabic were (0.96, 0.72, and 0.85) in our sample, demonstrating a satisfactory level of internal consistency.

-Data collection

- The four components of the study questionnaire were generated on Google Form; the first part was for socio demographic characteristic data, and the other three were for knowledge, believes, and history of violence.
- Through their WhatsApp group, the researchers talked with the nurses. Following the development of a rapport based on trust and an explanation of the study's objectives, the subjects were requested to participate..
- The subjects were asked to respond to the questions using the links of the questionnaire
- Data was gathered between January 2023 and March 2023.

-Statistical analysis

Statistical Package for Social Studies (SPSS) version 23 was used to arrange, tabulate, and statistically analyze the data. Quantitative data were calculated using the mean, standard deviation, and range. The Pearson's correlation coefficient (r) was used to determine whether two variables were correlated. In order to evaluate the findings of significance tests, a significance level of $P<0.05$ was selected.

Results

Table (1) displays the socio- demographic characteristics of the studied nurses. The table reveals that, half of the studied nurses (50%) their age ranged from (21-25) years old with a mean of 25.95± 3.377. Also, about three-quarters of them (74.2% & 71.8%) were married and were living in rural areas respectively. In addition, the highest percentages of them (94.5& 96.1) completed technical nursing institute education and had less than 15 years of experience respectively.

Table (2) reveals the levels of worries of the studied nurses about violence at work place. It shows that, more than and less than one-third of the studied nurses (35.9 & 30.5) had simple to moderate worry about violence in the current work place respectively. In addition, about three quarter (81.2%, 72.2% & 74.2%) of them reported that, they know the procedures for reporting violence in the workplace, they know how to use it and they agree about there was encouragement for reporting violence at the work place respectively.

Table (3) clarifies the history of the studied nurses about physical violence in the last 12 months in the work place, it is observed that, more than one-quarter (28.9%) of the studied nurses exposed to physical violence in the work place, and all (100%) of the exposed nurses to physical violence reported that, they exposed to it without weapon. Furthermore, more than two-thirds of them (70.1%) saw it to be atypical event of violence in the workplace. Higher percentage (89.2%) of them reported that, relatives of patients/clients attacked them and three-quarters (75.7%) of them

explained that this event occurred inside health institution.

Table (4) illustrates the history of the studied nurses about verbal abuse in the last 12 months at the work place. It is noticed that, about two-thirds (66.4%) of the studied nurses were verbally attacked in the work place, more than half (56.2%) of them reported that they exposed to verbal abuse one time in the last 12 months, and more than two-thirds (68.2%) of them considered it a typical incident of violence in the workplace. Furthermore, more than three-quarters (76.5% & 84.7%) of them reported that, patients, relatives of patients/clients attacked them, and this event occurred inside health institution respectively. In addition, more than half of them (51.8% &56.8%) responded to verbal abuse by telling to the person to stop and by telling to their colleague respectively.

Table (5) shows the effect of violence at the work place on nurses. It is observed that more than and about one-third of the studied nurses (39.8% & 31.8%) respectively suffered from a little bite regarding repeated, disturbing memories, thoughts, or images of the event and a little bite regarding avoiding thinking about or talking about the event or avoiding having feelings related to it. While, about one-fifth were having moderate bite regarding being "super-alert" or watchful and on guard.

Table (6) shows the levels of knowledge of the studied subject about measures to deal with violence at the work place. It is noticed that, more than three-quarters (78.9%) of them had a poor level of knowledge about measures to deal with violence and only 9.4% of them had a good level with statistically significant relation between them.

Table (7) shows the levels of believes of the studied nurses about the degree of benefits of preventive measures for violence at the workplace. It is observed that, about three quarters (75.8%) of them had a positive believes about benefits of preventive measures for violence at the work place. While, the remaining one-quarters (24.2%) of them had a negative believes with statistically significant difference between them.

Table (8) shows the correlation between studied nurses' total knowledge score and total believes score about measures to deal with violence at the work place. It illustrated that, there was positive correlation between total knowledge score and total believes scores about preventive measures for the violence at the work place.

Table (1): Socio- demographic characteristics of the studied nurses

Variables	The studied nurses (n= 384)	
	N	%
Age		
21-25	192	50.0
26-30	162	42.2
31-35	27	7.0
36-42	3	0.7
Range	21- 42	
Mean ± SD	25.95± 3.377	
Social status		
Single	93	24.2
Married	285	74.2
divorce	6	1.6
Place of residence		
Urban	108	28.1
Rural	276	71.9
Level of education		
Diploma degree of nursing	12	3.1
Technical nursing institute	363	94.5
Bacaloric degree of nursing	9	2.3
Years of experience		
Less than 15 years	369	96.1
15 years	9	2.3
More than 15 years	6	1.6

Table (2): Levels of worries of the studied nurses about violence at work place

Variables	The studied nurses (n=384)	
	n	%
Concern of the nurses about violence at the current workplace.		
Not worried	69	18.0
Simple worry	138	35.9
Moderate worry	117	30.5
Severe worry	24	6.2
Very severe worry	36	9.4
Procedures for reporting violence at the workplace		
Yes	312	81.2
No	72	18.8
Nurses' knowledge on how to use the procedures for reporting violence at the workplace.		
Yes	279	72.7
No	105	27.3
Encouragement for reporting violence at the workplace		
Yes	285	74.2
No	99	25.8

Table (3): History the studied nurses about physical violence in the last 12 months in the work place

Physical work place violence	**The studied nurses (n=384)**	
	N	**%**
In the last 12 months, have you been physically attacked in the workplace?		
- Yes	111	28.9
- No	273	71.1
Nurses exposed to physical violence (n=111)		
Description of violence		
- Physical violence without weapon	111	100
This is saw to be a typical event of violence in the workplace		
- Yes	78	70.3
- No	33	29.7
#Persons who attacked you		
- Patient	21	18.9
- Relatives of patient/client	99	89.2
- Staff member " management / supervisor	3	2.7
- External colleague/worker " general public	9	8.1
- Other	18	16.2
Places in which the event occurred:		
- Inside health institution or facility "	4	75.7
- At patient's/client's home	3	2.7
- Outside (home / on way to work)	24	21.6

 # More than one answer

Table (4): History the studied nurses to verbal abuse in the last 12 months in the work place

Verbal work place violence	The studied nurses (n=384)	
	No	%
In the last 12 months, have you been verbally attacked in the workplace?		
- Yes	255	66.4
- No	129	33.6
Number of verbal abuses in the last 12 months?		
- Not exposed	129	33.6
- One time	216	56.2
- All time	39	10.2
Nurses being exposed to verbal abuse (n=255)		
This is considered to be a typical incident of violence in the workplace		
- Yes	174	68.2
- No	81	31.8
# Persons who attacked you		
- Patient, Relatives of patient/client	195	76.5
- Staff member " management / supervisor	36	14.1
- External colleague/worker " general public	12	4.7
- Other	12	4.7
Place in which the event occurred:		
- Inside health institution	216	84.7
- At patient's/client's home	18	7.1
- Outside (home/ on way to work)	21	8.2
# Responses of nurses to verbal abuse		
- Took no action	48	18.8
- Tried to pretend it never happened	45	17.6
- Told the person to stop " told friends/family	132	51.8
- Told a colleague "Reported it to a senior staff member	144	56.5
- Ask help from the union or transferred to another position	126	49.4

(# More than one choice)

Table (5): Effect of violence at the work place on nurses

Effect of violence at work place on nurses	The studied nurses (n=384)	
	No	%
Repeated, disturbing memories, thoughts, or images of the event		
- Not at all	171	44.5
- A little bite	153	39.8
- Moderately bite	45	11.7
- Extremely bite	15	3.9
Avoiding thinking about or talking about the event or avoiding having feelings related to it		
- Not at all	162	42.2
- A little bite	120	31.3
- Moderately bite	60	15.6
- Extremely bite	42	10.9
Being "super-alert" or watchful and on guard		
- Not at all	129	33.6
- A little bite	111	28.9
- Moderately bite	81	21.1
- Extremely bite	63	16.4

Table (6): levels of knowledge the studied nurses about measures to deal with violence at the work place.

Levels of knowledge of the studied nurses about measures to deal with violence at the work place.	The studied nurses (n=384)	
	No	%
Poor knowledge	303	78.9
Fair knowledge	45	11.7
Good knowledge	36	9.4
Mean ± SD	4.81± 3.188	
t	29.582	
P	0.000*	

*Significant at ($p < 0.05$)

Table (7) Levels of believes of the studied nurses about the degree of benefits of preventive measures of violence at the workplace.

Levels of believes of the studied nurses about the degree of benefits of preventive measures of violence at the workplace.	**The studied nurses (n=384)**	
	N	%
Positive believe	291	75.8
Negative believe	93	24.2
Mean ± SD	32.28± 7.906	
T P	80.224 0.000*	

*Significant at ($p < 0.05$)

Table (8): Correlation between studied nurses' total knowledge score and total believes score about measures to deal with violence at the work place

Variables	**Nurses total knowledge score** **r** **P**	**Nurses total believes score** **r** **P**
Nurses total knowledge score about **measures to deal with violence at the work place**	-	0.255 0.004*

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

Discussion

Violence at the work place refers to any act or threat directed toward workers or employees inside or outside the workplace. This act may be begin by verbal abuse, harassment, bullying to physical assaults and may end by homicide. Although workplace violence has become the most worrying and disturbing issue to staff worldwide and become the most prevalent, it is still not addressed adequately. This may be due to lack of awareness of staff especially health staff about reporting system for violence in the health care settings. In addition this may be due to lack of health workers staff awareness about preventive measure for violence inside their work institution. Therefore, the aim of this study was to assess knowledge and believes of nurses about preventive measures for violence at work place at Tanta University Hospitals [(22)].

Regarding levels of worries of the studied nurses about violence at work place, more than and less than one-third of the studied nurses had simple to moderate worry about violence in the current work place respectively. In addition, about three-quarters of them reported that, they know

the procedures for reporting violence in the workplace and they know how to use it **(Table 2)**. This may be due to, it is ordinary when person exposed to violence in the work place as a result, it is normally to have worry from this situation. Also, about three-quarters of the studied nurses agreed that, there were encouragement for reporting violence in the work place **(table 2)**. This is in line with the results of the studies conducted by **Li Lu** and **Min Dong (2020)**, who studied the prevalence of workplace violence against health-care professionals in China: a comprehensive meta-analysis of observational surveys, and found that, one-third of the studied nurses had simple to moderate worry about violence in the current work place, they know the procedures for reporting violence in the workplace and they know how to use it [(23)].

Concerning history the studied nurses about physical violence in the last 12 months in the work place, it is noticed that, more than one-quarter of the studied nurses have been exposed to physical violence in the workplace, and all of them reported that, they exposed to physical violence without weapon. Also, more than two-thirds of them is saw to be a typical event of violence in the workplace. In addition, most of them reported that, relatives of patients/clients attacked them and three-quarters of them reported that the event occurred inside health institution or facility **(Table 3)**. This may be related to poor application of preventive measures to violence in the work place. In addition, security measures may be inadequate. Similarly with **Hahn et al., (2010)**, who conduct a study to assess factors associated with patient and visitor violence experienced by nurses in general hospitals in Switzerland: a cross-sectional survey and found that, most of their studied groups were exposed to physical violence in the workplace. In addition, most of them reported that, relatives of patient/client attacked them [(24)].

Every day, nurses are being exposed to different forms of violence in their work place. Most of this violence directed to nurses from the patients and their family caregivers. Verbal abuse is one of the most common forms of violence against nurses in health care context and the highest percentage of nurses reported this form in their work place. This doesn't mean that they exposed to verbal abuse only, but they also may be exposed to physical violence, bullying, threats sexual harassment, rape and murder [(25)].

According to the findings of this study, there was about two-thirds of the studied nurses were verbally attacked in the work place and more than half of them reported that they exposed to verbal abuse one time in the last 12 months,. Furthermore, more than three-quarters of them reported that, patients, relatives of patient/client attacked them, and this incident took place inside health institution or facility **(Table 4)**. This may be due to lack of security measures to protect nurses from violence in the work place. Also, poor reporting of violence by nurses in the work place. In addition, their roles as direct caregivers to patients in hospitals facilitate their exposure to violence. Finally, management system in some hospitals permits to patient relatives to be present with them and in turn this may increase nurses' chance to violence. This research is in the same way of the findings of **Zainal et al., (2018)**, who applied a study to evaluate

risk factors of workplace violence among healthcare workers in public hospital, and found that, most of the studied groups were verbally attacked in the work place, more than two-thirds of them reported that, they exposed to verbal abuse [26].

Also, this result is in agreement with **Assil etal., (2022)** who conducted a study about workplace violence at emergency departments, Ain Shams University Hospitals, Cairo, Egypt and illustrated that, the highest percentage of the studied subject reported that verbal violence was the most common type of violence and Patient relatives were the most common perpetrator of all types of violence [27].

In addition, it was observed that, about two-fifths and about one-third of the studied nurses were suffering from a little bite regarding repeated, disturbing memories, thoughts, or images of the event and a little bite regarding avoiding thinking about or talking about the event or avoiding having feelings related it **(Table 5)**. This may be due to violence always is associated with harmful effect on persons especially on their thoughts and memories. This is in the same line with **Duma et al., (2016)** who studied Violence against nurses in the southern region of Malawi and found that, most of the studied groups suffered from a little bite regarding repeated, disturbing memories, thoughts, or images of the event and avoiding thinking about or talking about the event [28].

Nurses in their work place at hospitals are often at greater risk to violence. They may be exposed to any form of violence either mild or severe which it may put their health at greater risk or may be end nurses' life. This may be due to lack of nurses' awareness about policies, procedures and preventive measures that protect them from violence. So, it is necessary to raise nurses' awareness about preventive measures of violence and to enhance their knowledge about the latest evidence- based intervention that can minimize the incidence of work place violence among nurses [29].

In relation to levels of knowledge of the studied nurses about measures to deal with violence at the work place, about three-quarters of the studied nurses had poor level of knowledge about measures to deal with violence and only 9.4% of them had good level of knowledge with statistically significant relation between them **(Table 6)**. This may be due to lack of educational program for nurses about measures to deal with work place violence. In addition lack of nurses motives to self-learn for nourishing their knowledge and their practice about preventive measures to violence at work place. Similarly with **Arnetz et al., (2018)** who demonstrate a study about organizational determinants of workplace violence against hospital workers, and exhibit that, nearly three-quarters of the studied groups had poor level of knowledge about measures to deal with violence [30].

The frequency of workplace violence has been increased among health care workers, especially among nurses across different countries. As nurses are being the main responsible persons for providing 24 hours assistance and care to patients. This lead to nurse to change their believes about preventive measures to violence in the work place and make nurses more sensitive to the importance of preventive measures to violence. Also, it encourages nurses to adopt

and apply preventive measures for violence to protect their lives [31].

Furthermore, about three-quarters of the studied nurses had positive believes about benefits of preventive measures for violence at the work place **(Table 7)**. This indicated their inside concept to follow preventive measures in the future to prevent work place violence**.** This research is supported by the findings of **Zhao et al.,** (2015) who studied Coping with workplace violence in healthcare settings: social support and strategies, and found that, nearly three-quarters of the studied groups had positive believes about benefits of preventive measures for violence at the work place [32].

At the end, this study presented that, there was positive correlation between total knowledge score and total believes scores of the studied nurses about preventive measures for the violence at the work place **(Table 8)**. This result is supported by the findings of **Al-Shiyab et al., (2018)** who conducted a study on consequences of workplace violence behaviors in Jordanian public hospitals and found that, there was positive correlation between total knowledge score and total believes scores about preventive measures for the violence at the work place [33].

Therefore, researchers recommended conducting health education program to raise nurses' knowledge and awareness about preventive measures of violence at the work place. This will encourage nurses to use and apply preventive measures of violence in health care setting and intern level of nurses' exposure to violence will be minimized.

Conclusion and recommendations

Based on the findings of the current study, it was noticed that, more than three-quarters of the studied nurses had poor knowledge score and positive believes about preventive measures for violence and its benefits at the work place respectively with statistically significant relation between them. In addition, there was positive correlation between total knowledge score and total believes scores about preventive measures for the violence at the work place. Therefore, the following recommendations were suggested which included:-

1. Health education programs to raise nurses' knowledge and awareness about preventive measures of violence at the work place.
2. Booklets and handouts about preventive measures for violence at work place written in simple language should be developed, disseminated and used as information and educational materials for nurses in the hospitals.

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Effect of Hand Massage on alleviating Pain after Abdominal Surgery

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Abstract:

Background: Pain considers the fifth vital signs; it is a major postoperative problem. Management of postoperative pain is vital role of nurses. Reflexology is a standalone nursing intervention that can be used to relieve pain. Hand massage, is a method of reflexology. **The aim of** this study was to evaluate the effect of hand massage on reducing pain after abdominal surgery. **Design:** A quasi-experimental, two groups study design was utilized. **Setting:** General Surgery departments at Qena University Hospitals. **Sampling**: Convenience sample of sixty patients according to the inclusion criteria. **Tools:** two tools were used including; Patients' assessment sheet and. Numeric Pain Rating Scale. **Results:** Main results for this study showed that 26.7% of study group and only 6.7% of control group had mild pain. In addition, 50% of study group and 66.7% of control group had moderate pain. Statistically significant differences were found among the two groups in term of level of pain immediately and 60 minutes following intervention P value = 0.001. **Conclusion:** Hand massage along with routine care can decrease pain among patients undergoing abdominal surgery. **Recommendations:** Hand massage should be included in the nursing mangement. Thus, it can be used with pharmacological approaches to manage pain following abdominal surgery.

Key words: Abdominal surgery, Hand massage, Pain, Reflexology, Complementary therapies.

Introduction

Pain is an intolerable sensation and often triggered by harsh or noxious stimuli. It is an unpleasant emotional and sensory experience resembling or associated with potential or actual tissue injury [(1,2)].

Pain, also known as the fifth vital sign, is a major postoperative issue [(3,4)]. Post- surgical pain is usually visceral pain caused by peritoneal irritation caused by surgical procedures and the entrapment of dissolved CO2 within the abdomen [(5,6)]. Pain related to surgery that not alleviated is not benign and can affect patient mobility, coughing and respiratory exercises, and predisposing patients to complications for example pneumonia, atelectasis and deep venous thrombosis [(7)].

Abdominal surgery can cause chronic abdominal and pelvic neuralgia. Abdominal and pelvic nerves can cut, damaged, or stretched during gynecologic surgery,appendectomy, or repair of hernia. This complication, called surgical neuropathic pain, can be debilitating and stressful [(8,9)]. After abdominal surgery, release of neuropeptides and ischemia cause pain at the surgical site, and moderate to severe pain is common [(10)].

Many efforts are now being made to reduce the severity of postoperative pain and the need for narcotic analgesics in other ways. In the field of treatment, there has been an increase in the use of complementary medical methods, such as massage, which is associated with relaxation, anxiety and pain relief. Until now, there is no scientific consensus on the mechanism of action of these methods [(11)]. Complementary therapies used as adjunctive therapies combined with conventional treatments to improve general health and encourage quicker recovery. Massage therapy is a form of complementary medical care and considered an

essential component of wellbeing and health [12].

For centuries, massage therapy has used to treat pain. When it combined with drug therapy has found to help manage acute postoperative pain [13]. It involves manipulating soft tissues by hand to have a beneficial effect on how various body systems works. Additionally, a combination of specialized stroking motions, friction, and application of varying intensities of pressure applied to the body's soft tissues to reduce postoperative pain [14].

The purpose of hand massage, a form of reflexology, is to stimulate endings of the nerves that are though t to belong to various organs in the hands by rubbing the hands in certain areas with the knuckles, fingertips, and blunt [15]. Because hands contain the majority of pain receptors, stimulating neurons can be an excellent method for reducing pain. It can be performed for a minimum of 10 minutes on each extremity as a single treatment or in combination with other treatments performed exclusively by a health care professional such as a physiotherapist or nurse [16,17].

Significance of the study:

Postoperative pain is a chief concern for healthcare providers and patients. Therefore, appropriate management is essential. Reflexology is a powerful component of pain management. It considers alternative and complementary medicine used to relieve pain; hand massage is one form of reflexology applied to relief pain after abdominal surgery. As a result, this research was conducted.

Study aim

To evaluate the effect of hand massage on reducing pain after abdominal surgery.

Hypothesis:

Patients who will receive routine care and hand massage will experience significantly less pain than patients who will receive only routine care.

Subject and Methods

I-Technical design

Research design: A quasi-experimental research design used to conduct this research.

Study Setting:

The research carried out in General Surgery departments at Qena University Hospitals.

Sample size: Convenience sample composed of sixty patients (30 control and 30 study) their age18-60 years of both sexes, capable to communicate clearly and give oral consent who had undergone abdominal surgery.

Exclusion criteria:

- Patients with damaged skin, inflammation , eczema on their hands.
- Obstetrical and orthopedic surgeries.
- Critically ill patient.
- Amputation of the hand.

Tools: data was collected by using two tools:

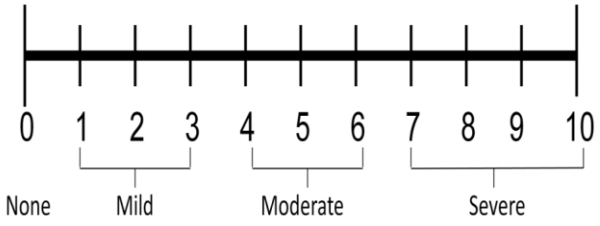
Tool I- Patients' assessment sheet: This tool was developed and utilized by the researchers. It involved two parts as the following:

Part 1: Socio demographic data (name, age, sex, education, marital status and employment).

Part 2: Medical data include (Past medical history, preoperative diagnosis, types of abdominal surgery, previous history of surgery and prescribed analgesics).

Tool II- Numeric Pain Rating Scale (NPRS):

It is adopted by **McCaffery and Beebe (1989)** [18]. This is an 11-point evenly divided scale for self-rating pain in adults and children 10 years or older.



Scoring system: The following ratings represented the range of scores, which were between 0 and 10:

0 (no pain), 1–3 (mild pain), 4–6 (moderate pain), and 7–10 (severe pain).

Tools Validity: Three experts in the medical surgical field from the Faculty of Nursing and two experts in the physical therapy and general surgery fields from the Faculty of Medicine evaluated the content validity.

Tools reliability: According to the Cronbach's test reliability of tool, one was 0.81, whereas tool two was 0.84.

Pilot study: was conducted on 10% of the entire sample (6 patients) to determine the applicability of the tools and the time essential to complete it. In addition, to determine any problems or difficulties that may occur during collection of data. The pilot study's data was investigated; no changes were made, so, patients from the pilot study also participated in the main study.

Procedure: The actual fieldwork began from November 2021 until of April 2022. The study conducted through preparatory, implementation, and evaluation phases.

Preparatory phase

It lasted about two months, beginning in November 2021 and ending in December 2021, and included a review of related literature. The researchers translated the tools into Arabic language and retranslated them into English to ensure accuracy.

Implementing Phase

It started from the beginning of January 2022 to end of April 2022. The researcher met with each patient individually, explained the study's aim, and the patients gave their verbal consent to participate in the study.

- For both groups pretest was conducted **Tool I (Patients' assessment sheet**) and **Tool II (Numeric Pain Rating Scale)** were filled by the researcher.

- Hand massage was done for 20 minutes 10 minutes for each hand by the researcher to the study group and the control group was given analgesics only.

Hands massage technique: 1. Place the patient's hand in appropriate position. 2. Stood at the right side to the patient. 3. Applied 5 ml of coconut oil. Massage the left hand gently. 4. Face the palm down. Make little circles around the wrist bone through pressing with the thumbs. 5. Turn the wrist over and stroke the inside of the wrist with the thumbs. 6. Press hard and stroke in the direction of the palms and back to the wrist.7. The stroke should begin at the knuckles and end at the wrist. 8. Then give each finger a massage. 9. Stroke the palm away from the wrist with firm, even strokes. After that, massage the center of the palm in a circular motion before moving on to the right hand. For the right hand, the steps 1 to 9 were repeated [19].

Evaluation phase

Post-test for pain (Tool II) was evaluated immediately and sixty minutes after hand massage for the study group. For control group patients were under their routine care, and after twenty minutes, posttest level of pain was evaluated. After sixty minutes of interval, posttest of pain level was evaluated again

II. Administrative Design: It attained by the submission of a formal letter from the dean of Faculty of Nursing, South Valley University in Qena to the directors of Qena Hospitals University. An exploratory visit carried out to general surgery departments to assess the appropriate time for data collection and admission rate.

Ethical Consideration

During the research, there was no risk to the subjects. Ethical principles in clinical research were followed. After clarifying the aim and nature of the study oral consent was gained

from patients who were willing to participate in the study, anonymity and confidentiality were assured, patient had the right to leave the study at any time and for no reason, and privacy of patient was considered during data collection.

Statistical Analysis

The Anderson-Darling test was used to test data for normality and for homogeneity variances prior to further statistical analysis. Categorical variables were described by number and percent (N, %), where continuous variables described by mean and standard deviation (Mean, SD). Chi-square test and fisher exact test used to compare between categorical variables where compare between continuous variables by t-test \and A nova Test. We are Used Person Correlation to Appear the Association between Numeric Rating Scale During the study Phases (Pre, Immediately and after 60 minutes) with demographic data for each group. A two-tailed $p < 0.05$ considered statistically significant. The software IBM SPSS 20.0 was used for all analyses.

Results:

Table 1: reveals that, the highest percentage in study and control groups their age was more than 40 years (73.3% and 43.3%) respectively. As regard sex, slightly more than half (53.3%) of both groups were female. Looking at marital status, slightly more than half (56.7%) of the study group and about two fifth (40 %) of the control group were married. In addition, near half (46.7%) of the study group were housewives while more than one fifth (26.7%) of the control group were retired.

Table 2: mentions that, more than one third of the study group and slightly less than three quarters of control group did not have any chronic diseases (40% and 70%) respectively. Looking at preoperative diagnosis, more than one third (36.7%) of the study group had cholecystitis while one-third (33.3%) of control group had appendicitis. Concerning types of abdominal surgery, slightly less than half (43.3%) of the study group had a cholecystectomy and more than one quarter of the control group (26.7%) had hernioplasty. In addition, Ketofen was the analgesic that used by majority of the study and control groups (83.3% and 90%) respectively.

Table 3: illustrates that, there was statistically significant differences between the control and study groups regarding level of pain immediately and 60 minutes following intervention P value = 0.001**.

Table 4: reveals that, there was statistically significant correlation between the control and study groups as regard level of pain immediately and 60 minutes following intervention.

Fig (1): shows that, slightly more than one quarter (26.7%) of study group and only (6.7%) of control group had mild pain. In addition, about half of study group and two thirds of control group had moderate pain (50% and 66.7%) respectively. Also, there was no statistically significant difference between the study and control groups regarding level of pain at baseline.

Table (1): Distribution of Socio demographic data for patients in the study and control group (n= 60).

Items	Study (n=30)		Control (n=30)		X2
	No	%	No	%	
1-Age groups					
Less than 20 year	2	6.7	6	20.0	10.26
From 20-30 year	1	3.3	8	26.7	
from 30-40 year	5	16.7	3	10.0	
More than 40 year	22	**73.3**	13	**43.3**	
Mean ±SD(range)	49.40±13.02(19-60)		37.47±16.80(8-60)		
2-Sex					
Male	14	46.7	14	46.7	0.00
Female	16	**53.3**	16	**53.3**	
3-Level of Education					
Illiterate	10	**33.3**	10	**33.3**	0.59
Read and write	6	20.0	4	13.3	
Primary	6	20.0	7	23.3	
Secondary	4	13.3	4	13.3	
University	4	13.3	5	16.7	
4-Marital status					
Single	4	13.3	10	33.3	3.77
Married	17	**56.7**	12	**40.0**	
Divorced	2	6.7	1	3.3	
Widowed	7	23.3	7	23.3	
5-Employment					
Employee	2	6.7	6	20.0	6.80
Unemployed	3	10.0	3	10.0	
Retired	8	26.7	8	**26.7**	
House wife	14	**46.7**	6	20.0	
Student	3	10.0	7	23.3	

Table (2): Distribution of Medical data for patients in each group (n= 60).

Items	Study (n=30)		Control (n=30)		X2
	No	%	No	%	
1-Past medical history:					
- No	12	**40.0**	21	**70.0**	7.43
- Diabetes mellitus (DM)	7	23.3	5	16.7	
- Hypertension (HTN)	7	23.3	1	3.3	
- DM and HTN	4	13.3	3	10.0	
2-Preoperative Diagnosis:					
- Appendicitis	2	6.7	10	**33.3**	12.29
- Cholecystitis	11	**36.7**	3	10.0	
- Hernia	5	16.7	8	26.7	
- Severe abdominal Pain	7	23.3	3	10.0	
- Abdominal hemorrhage	1	3.3	1	3.3	
- Penetrating abdominal stab	1	3.3	1	3.3	
- Gall stone	2	6.7	2	6.7	
- Peptic ulcer	1	3.3	2	6.7	
3-Types of abdominal surgery:					
- Hernioplasty	5	16.7	8	**26.7**	14.51
- Cholecystectomy	13	**43.3**	4	13.3	
- Appendectomy	2	6.7	10	33.3	
- Abdominal exploration surgery	9	30.0	4	13.3	
- Splenectomy	1	3.3	2	6.7	
- Subtotal gasterectomy	0	0.0	2	6.7	
4- Previous history of surgery:					
- Yes	15	50.0	13	43.3	0.27
- No	15	**50.0**	17	**56.7**	
5-Analgesics:					
- Ketofen	25	**83.3**	27	**90.0**	11.47
- Nalfin A	5	16.7	3	10.0	

Table (3): Comparison between Study and Control group related to Numeric Rating Scale Immediately and After 60 minutes. **(n=60)**

Items	Immediately					After 60 minutes				
	Study (n=30)		Control (n=30)		P. value	Study (n=30)		Control (n=30)		P. value
	No	%	No	%		No	%	No	%	
Numeric Rating Scale (NRS)										
- No pain	0	0.0	0	0.0	<0.001 **	7	23.3	0	0.0	<0.001**
- Mild	16	**53.3**	3	10.0		17	**56.7**	6	20.0	
- Moderate	11	36.7	14	**46.7**		5	16.7	13	**43.3**	
- Severe	3	10.0	13	**43.3**		1	3.3	11	36.7	
Mean ±SD(range)	3.9±2.02 (1-8)		6.1±2.58 (1-10)		0.001**	1.77±1.92 (0-7)		5.8±2.3 (2-10)		<0.001**

****Significant at P value < 0.01**

Table (4): Correlations between Numeric Pain Rating scale and selected demographic data for each group **(n=60).**

Items	Numeric Rating Scale						
	Group	Pre		Immediately		After 60 minutes	
		r	P	R	P	r	P
-Age	Study	-.369-*	0.045	-0.162	0.393	0.088	0.645
	Control	-0.109	0.567	-0.230	0.222	-0.158	0.403
-Sex	Study	0.019	0.920	0.087	0.646	-0.009	0.961
	Control	-0.190	0.314	-0.253	0.177	-0.261	0.164
-Past medical history	Study	-0.245	0.192	-0.093	0.626	0.093	0.623
	Control	-0.161	0.397	-0.182	0.337	-0.055	0.772
-Preoperative Diagnosis	Study	-0.124	0.515	-0.065	0.733	-0.065	0.734
	Control	-0.097	0.612	-0.107	0.575	-0.065	0.734
-Types of abdominal surgery	Study	0.330	0.075	.383*	0.037	0.244	0.195
	Control	-0.033	0.861	-0.051	0.789	-0.172	0.364
- Previous history of surgery	Study	0.264	0.158	.385*	**0.035**	.559**	**0.001**
	Control	0.340	0.066	.592**	**0.001**	.496**	**0.005**

*Statistically Significant at P. value <0.05 **Statistically Significant at P .value <0.01

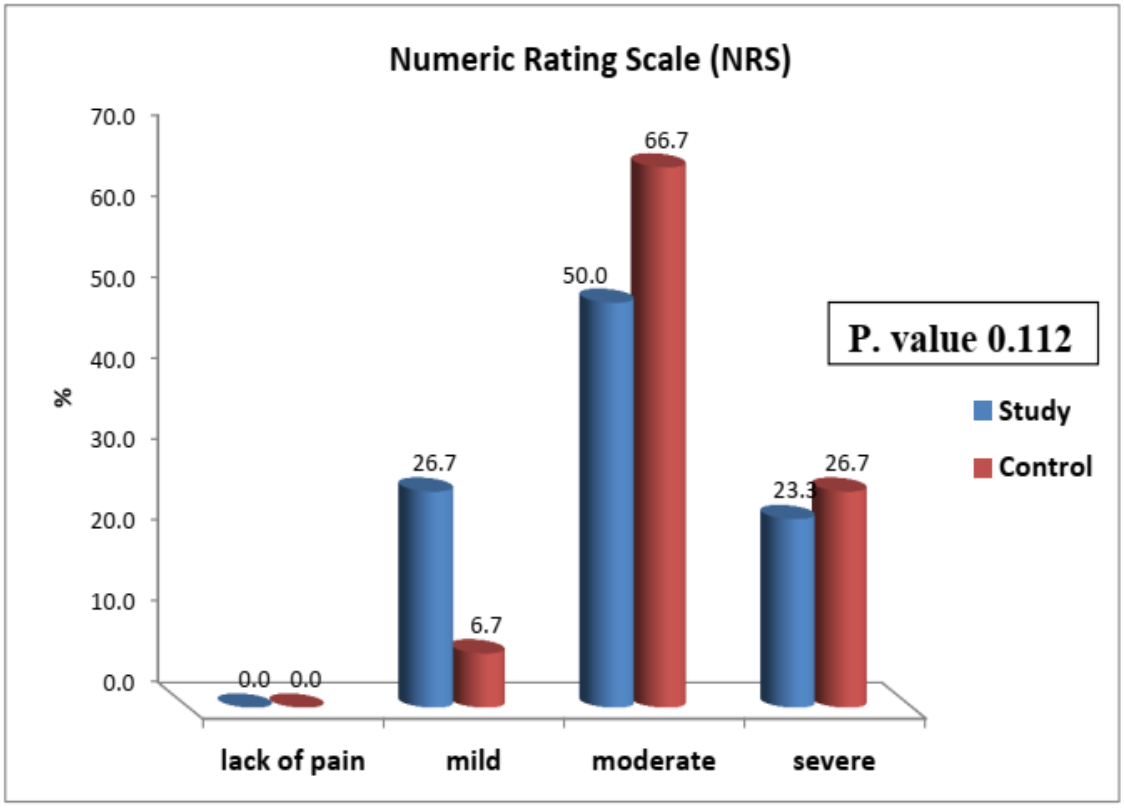


Figure (1): Comparison of baseline pain scores in study and control groups. (n=60)

Discussion:

Pain is one of the most common post-operative complaints among patients worldwide. Despite the availability of medications and anesthetics, post-operative pain is still common [(20)]. Reflexology has been shown to be a safe and non-invasive nursing intervention in recent studies. Hand reflexology can use to improve psychological and actual protests in patients with differed kinds of medical issue [(21)]. Thence, this study carried out to evaluate the effect of hand massage on reducing pain after abdominal surgery.

This study revealed that, the highest percentage in study and control groups were over 40 years old. This result was in line with the study of **El Shehata et al** [(22)] who found that slightly more than half were in age group of 30 - 40 years and inconsistent with **Rejeh et al** [(21)] who stated that the average age of the participants in study and control groups were 60.

Regarding gender, the current study illustrated that slightly more than two quarters of both groups were female. This result was in agreement with study by **Soniya** [(19)] who reported that the patients' sex was equal half for males and females. Looking at marital status, slightly more than half of study group and about two fifth of control group were married. This result consistent with **Koras and Karabulut** [(6)] who found that, the majority of the experimental and control groups were married.

This study showed that, the highest percentage of both groups was housewife and slightly more than one quarter in the two groups were retired. This finding was consistent with **Koras and Karabulut** [(6)] who found that slightly more than half of both groups were housewife and less than one quarter of experimental group and minority of control group were retired. he

findings of this study mentioned that, highest percentage in study and control groups did not have any chronic diseases. This result is contradicting with **Taman et al** [23] who reported that majority of both groups had other comorbidity.

Looking at preoperative diagnosis, this study showed that more than a third of study group had Cholecystitis while one-third of control group had appendicitis. Concerning types of abdominal surgery, slightly less than half of the study group had a cholecystectomy and more than quarter of control group had hernioplasty. This disagreed with study of **Soniya** [19] who reported that more than one third in intervention group diagnosed as inguinal hernia and in study group slightly less than half of patients diagnosed as cholecystitis. In addition, this finding supported by **El Shehata et al** [22] who found that slightly over two third of study group had cholecystectomy and less than half of control group had appendectomy.

Our study mentioned that, Ketofen was the analgesic that used by the majority of the two groups. This finding confirmed with **Youssef and Hassan** [24] who reported that all patients took non-steroidal anti-inflammatory pain drugs.

This study showed that, slightly more than quarter of study group and the minority of control group had mild pain and, about half of study group and two thirds of control group had moderate pain at baseline. In addition, there was no statistically significant difference between the two groups regarding level of pain at baseline. Our findings concur with **Youssef and Hassan** [24] who mentioned that there was no significant difference between the intervention and control groups' pain severity at baseline.

The current study illustrated that, there was statistically significant differences between the two groups concerning level of pain immediately and 60 minutes following intervention. This agrees with **Demira and Saritasb** [25] who found that the mean scores of pain intensity level decreased with a statistical significance in study group comparison with control group pre and post intervention.

The current study revealed that, a statistically significant correlation was found between study and control groups as regard level of pain immediately and 60 minutes following intervention for whom had history of previous surgery. This explained by the fact that subjects who had previously undergone surgeries had a better response to hand massage than other.

Conclusion

The findings of this study concluded that use of hand massage along with routine care could decrease pain among patients undergoing abdominal surgery.

Recommendations

The study suggested the following recommendations:

- Application of the study on various operations and a larger sample to broaden the scope of the findings.
- Hand massage should be involved in the nursing management. Thus, it can be used with pharmacological approaches to manage post-operative pain following abdominal surgery.
- Nurses should be educated and trained on reflexology to be able to use it to manage post abdominal surgery pain.

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Effect of Educational Guidelines Program on Nurses Performance for Caring of Neonates Receiving Continues Positive Airway Pressure Ventilation

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Abstract

Background

Continuous Positive Airway Pressure refers to the application of positive pressure to the airway of a spontaneously breathing neonate throughout the respiratory cycle. It is a respiratory support method for neonates with either upper airway obstruction or respiratory failure. **The** present study was aimed to evaluate the effect of educational guidelines program on nurses performance for Caring of neonates receiving Continues Positive Airway Pressure ventilation . **Research design:** A quasi- experimental research design was used in the present study. The study was conducted at Neonatal Intensive Care Unit of Tanta University Hospital .**Subjects:** Convenience sampling of 60 nurses who working at the above previously mentioned setting . **Two tools** were used to collect data: Structured interview schedule for nurses' knowledge regarding Continues Positive Airway Pressure and Observational checklist for nurses caring of neonates receiving Continues Positive Airway Pressure**. Results :** Represented that more than half of nurses had poor knowledge and the majority had unsatisfactory reported practices before educational guide line program implementation . **Conclusion :** There was a significant improvement of total level of nurses' knowledge and practice regarding nursing care of neonate receiving Continues Positive Airway Pressure immediately and after one month from educational guidelines program implementation . **Recommendations:** In -service training program should be conducted periodically and regularly for teaching nurses working at Neonatal Intensive Care Unit for caring of neonate receiving continuous positive airway pressure and manual log book about care of neonates and **Continues Positive Airway Pressure Ventilation** should be available for nurses at Neonatal Intensive Care Unite

Keywords : Continuous Positive Airway Pressure , Educational guideline program , nurses' performance

Introduction

Major function of the respiratory system is to provide oxygen for metabolism and remove carbon dioxide. The metabolic demands of tissues remain unfulfilled and body systems rapidly fail, without an adequate exchange of oxygen and carbon dioxide ,.When oxygenation and ventilation are inadequate Continuous Positive Airway Pressure is needed. [(1-3)] Continuous Positive Airway Pressure refers to the application of positive pressure to theairway of a spontaneously breathing neonate throughout the respiratory cycle. It is a means of providing respiratory support to neonates with either upper airway obstruction or respiratory failure. Respiratory failure constitutes either failure of ventilation or failure of lung function. It delivers oxygen concentrations and distending airway pressures via the ventilator without the hazards associated

with full endotracheal intubation and mechanical ventilation. [4]

Delivery of constant positive pressure to the airway of a spontaneously breathing neonate maintains adequate functional residual capacity within the alveoli to prevent atelectasis and improves oxygen and carbon dioxide exchange within the pulmonary circulation[5].

Continuous Positive Airway Pressure machine delivers a constant flow of air through tubing and into neonatal airway. It creates enough pressure in neonatal airway to hold the tissue open, so there airway doesn't collapse. The soft, steady jet of air from the CPAP machine creates enough pressure to keep the airway open .[6]

Continuous Positive Airway Pressure acts by improving the functional residual capacity of the lungs by exceeding the closing capacity of the lungs, which steady and prevents the collapse of alveoli, making inflating the lungs easier. It also provides a splint to the chest wall and airway, producing in increased lung volumes, recruitment of atelectatic alveoli, and prevention of further atelectasis. Majority of infants who are having respiratory problems as distress, lung collapse when CPAP is indicated, it decreases the compliance of the chest wall and allows for easy breathing, causing in a decreased effort of breathing, improved gas exchange and improved cardiac function. [6-7]

Continuous Positive Airway Pressure is indicated for early onset of respiratory distress in preterm neonates (<34 weeks gestation) with good respiratory effort. One of the most common respiratory complications is respiratory distress syndrome (RDS). Moreover, it is a major cause of neonatal respiratory morbidity and mortality. Neonates with it can be managed by using of Continuous Positive Air way Pressure to maintain alveolar distention during spontaneous breathing.

Continuous Positive Airway Pressure also used following extubation , use for majority of neonates of less than 32 weeks, 'Rescue' CPAP can be used for other neonates who have apnoeas or desaturations and an increasing in their oxygen requirement within first few hours after extubation .[8]

Continuous Positive Airway Pressure contraindicated in cases of chest pneumothorax ,congenital anomalies as diaphragmatic hernia , nasal deformity , cleft lip , cleft palate , neonatal apnea , stomach disorders . In these cases the invasive devices more appropriate .[9]

Complications of NCPAP in preterm neonates which result from the fixation devices include; nasal tube when it didn't fit the nostrils, resulting in gas leak and inability to maintain a baseline pressure. Moreover, the set CPAP level is rarely maintained in the pharynx. It may also include nasal leaks because the nasal tube fits loosely in the nostrils and nasal trauma which considered a common problem with CPAP. It also include increasing O2 requirement or episodes of desaturation and apnea , excessive bradycardia with movement , excessive nasal irritation ,significant apnea or increasing respiratory acidosis or O2 requirement of 80-100%.[7-9]

Nurse has a vital role in caring for neonate receiving CPAP. which includes; assess the heart rate, respiratory rate, SpO_2% range, CPAP settings (water level, temperature, pressures, size of nasal prongs/mask in use),check of equipments such as suction, resuscitation devices ,the

ventilator, intravenous syringe drivers/pump , monitor alarms, blood gases should also be requested to assess the neonates response to CPAP.[8]

Nurses should checked axillary temperature at least every four hours , apply skin probe to continuously monitor temperature, changes in the neonates condition including response to handling, changes of skin integrity, administration of medications, maintain fluids balance,. Always maintain optimal humidity for the inspired gases to facilitate mucociliary action, clear secretions to optimize gas exchange and minimize the risk of infection, if suction is required the color, consistency, and quantity of secretions should be recorded[8].

Significance of the Study:

Continuous Positive Airway Pressure (CPAP) distends the continuous pressure in a spontaneously breathing neonate and increases the functional residual capacity of the lung resulting in better gas exchange for neonates. Also it has been shown to reduce the risk of mortality by 48% and the need for surfactant and mechanical ventilation by about 50% . So, it has become the standard of care in managing sick neonates with respiratory distress .

Neonates need Continuous Positive Airway Pressure is estimated by 10%- 12% from neonates born in Egypt Meanwhile, neonates in Neonatal Intensive Care Unit (NICU) of Specialized Pediatric Hospital at Benha city at 2016 are estimated 920 as neonates with majority of them under CPAP ventilation .So, this intervention program is performed to improve the nursing care provided to neonates under going CPAP.

Aim of the study

The present study aimed to :

Evaluate the effect of educational guidelines program on nurses performance for caring of neonates receiving Continues Positive Airway Pressure ventilation .

Research Hypothesis:

Nurses' performance for caring of neonates receiving Continuous Positive Airway Pressure ventilation are expect to improve after receiving educational guideline program.

Subjects and Method

Research design:

A quasi- experimental research design was used in the present study.

Setting:

The study was conducted at Neonatal Intensive Care Unit of Tanta University Hospital It consists of four rooms (A,B,C,D) ,The unit contains 30 incubator ,24 monitors , 33 syringe pump , 30 mechanical ventilator and 8 Neonatal Continuous Positive Airway Pressure .

Subjects:

-Convenience sampling of all available nurses (60) who working in the above previously mentioned setting regardless of their age, years of experience and level of education.

Tools of Data Collection:

Two tools were used to collect data, they were included the following:

Tool I: **Structured interview schedule for nurses' knowledge regarding Continues Positive Airway Pressure**:

It was developed by the researcher after reviewing the related literature [49'50]to assess nurses' knowledge before, immediately and after one month from the implementation of educational guidelines program.

It was consisted of two parts:

Part 1: Sociodemographic characteristics of the studied nurses such as; age, educational level, years of experience at Neonatal Intensive Care Unit and attendance of related training courses

Part 2: Studied nurses' knowledge about Continues Positive Airway Pressure, it included: definition, purpose, indications, contraindications, methods of administration, complications and nursing interventions.

Scoring system:

It contained 7 questions **,** each question was scored from 0-2 grades :

Correct and complete answer was scored (2).

Correct and incomplete answer was scored (1).

Incorrect or didn't know was scored (0).

The total score of nurses' knowledge was classified as following:

- Less than 60% was considered poor knowledge.

- From 60- <75% was considered fair knowledge.

- From 75-100 % was considered good knowledge.

Tool II: Observational checklist for nurses caring of neonates receiving Continues Positive Airway Pressure.

It was developed by the researcher after reviewing the related literature [51-52] to assess nurses' practices before, immediately and after one month from implementation of the educational guidelines program. It included the following items:

Before caring of neonates receiving Continues Positive Airway Pressure**:**

Prepare safe environment , Humidifier chamber with temperature control set at invasive setting ,prepare resuscitation equipment correctly set-up and working , prepare CPAP machine and ensure that all connections work well, suction and a appropriate sized catheter ,scissors for cutting, endotracheal tube of appropriate sized , Pre-cut length to ensure external space, cotton sponge , Leucoplast tape : 2 pieces each cut into "trouser leg " , Lubricating gel or use neonatal saliva as lubrication and Comfeel protectant wafer :2 pieces each cut to fit under tapes on neonate's checks - cotton sponge for face wash : moist and dry[52-53].

During caring of neonates who receiving continues positive airway pressure**:**

Select the proper size of oropharyngeal or nasopharyngeal tube ,Suction oral and nasal secretion ,Place the neonate in proper position during the insertion of nasopharyngeal tube - lubricate the nasopharyngeal tube , Put orogastric tube to drainage the excessive air from the stomach and Connect to Continues Positive Airway Pressure CPAP. [54-55]

After caring of neonates who receiving continue positive airway pressure**:**

Monitor vital signs of the neonates as (respiratory rate , heart rate , chest rise and fall , work of breathing , oxygen requirements , pulse oximetry, capillary refill time)

,Monitor blood gases as required (determined by clinical condition and previous blood gases) , Monitor oxygen saturation ,Ensure patency of SNP: suction as necessary ,Maintain neutral thermal environment, Consider elective tube changes if secretions are thick or copious ,Ensure gastric decompression with naso/oro gastric tube, Ensure cardio –respiratory and pulse oximetry monitoring ,Correct alarm setting

parameters, and documentation., Care for pressure area : especially to nostrils and septum :

(Avoid nasal trauma/erosion by ensuring SNP is always secure and strapping is not loose, position tube in a downward arch to avoid pressure on the nares) ,Ensured CPAP circuit tubing appropriately supported /secure and Used of circuit holders /devises to prevent tension on tube ,Considered using alternate nostrils when changing tube to avoid pressure area development [57]

In addition to the following care : insertion of oropharyngeal tube (17 items) , nebulizer (11 items) , chest physiotherapy (11 items) , suction (17 items) , care of venous catheter (14 items) , IV infusion (26 items) , daily care of incubator (14 items) , infection control (9 items) , terminal care of incubator (18 items).

Scoring system for nurses' practice was as follows:

- Done correctly and complete was scored (1).
- Done incorrectly or diddn't do was scored (0).

The total score for nurses' practice classified as follow:

- Less than 75 was considered unsatisfactory.
- From 75-100 % was considered satisfactory.

Method

The study was accomplished through the following steps:

1-Administrative process :

An Official permission for data collection was obtained from the dean faculty of nursing directed to the administrators responsible at neonatal intensive care unit of Tanta University Hospital after explanation of the study aim.

2-Ethical and legal considerations:

a) Ethical approval was obtained from the Faculty of Nursing Scientific Researcher ethics Committee

b) Confidentiality and privacy will be taken into consideration regarding the data collection and will be maintained by coding number.

c) Informed consent will be taken from nurses and neonates parent consent to participate in this study.

d) Nature of the study will not cause any harm to the entire subjects and nurses have the right to with draw from the study at any time.

3-Tools development:

Two tools were developed based on recent literature: Interview schedule was filled in the clinical area by the studied nurses in presence of the researcher (Tool I).Observational checklist was filled out by the researcher to assess the actual nurses' practices before, immediately and after one month from application of educational guidelines program (Tool II).

4-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 tools. Modifications were carried out accordingly; the nominal validity of the questionnaire was calculated on the basis of expert opinion and was 99.1%.

5- Reliability of tools:

Test of reliability using Cranach's alpha was 0.890 that indicates high reliability of the tools used for data collection in the current study.

6-A pilot study:

A pilot study was carried out on six nurses (10%) to test the clarity and applicability of the study tools then the necessary

modification was done. This pilot was excluded from the study.

7- Phases of the study: The study was conducted on four phases:

1-Assessment Phase:

It was carried out by the researcher for all study subjects to collect baseline data, to assess the neonate who meets the inclusive and exclusive criteria of this study and to assess nurses' knowledge related to Continues Positive Airway Pressure. (Tool I).The researcher was assessed the actual nurses' practice before, immediately and after one month from application of the program (Tool II).

2- Planning Phase was included the following steps:

- Setting objectives of the educational program.
- Preparation of the content which was cover the reasons behind the application of the session.
- The education program was conducted into 4 sessions, two / week. The time of each session was about 30 minutes including periods of discussion according to the nurses' progress and feedback.
- Different methods of teaching were used including lectures, group discussion and demonstration.
- The education program implementation was carried out for nurses through conduction of successive sessions according to the actual need assessment of the nurses.

3) Implementation Phase:

Through teaching sessions for nurses and will be as the following:

The First Session:-

Focused on definition, purpose, and indications of Continues Positive Airway Pressure.

The Second Session:-

Focused on contraindications and complications of Continues Positive Airway Pressure

The Third Session:-

Focused on ways of administering Continues Positive Airway Pressure

The Fourth Session:

Focused on nursing care of neonates receiving Continues Positive Airway Pressure.

3-Evaluation Phase:

The evaluation of the educational guidelines program on nurses 'knowledge and practice was carried out using the same assessment tools (I,II) Each nurse was evaluated immediately after implementation of the program(post-test) and one month later (follow-up), and these were compared to pre-test levels.

-The data was collected over period of one year from December 2020 to November 2021 . The study work took a period of 2 year .

Statistical Analysis:

The collected data was organized, tabulated, and statistically analysed using SPSS software computer package version 20. For quantitative variables, mean and standard deviations were calculated. For qualitative variables, the number and percentage distribution were calculated. Chi-square test was used to examine the relation between qualitative variables. Fisher exact test (p) was used to compare observations before, immediately and after one month from the guide lines application. Significance was adopted at $p< 0.001$ for interpretation of results of tests of significance.[58]

Results

Table (1) illustrates percentage distribution of studied nurses regarding their socio-demographic characteristics. It was observed that 46% of studied nurses their age was between 30 and less than 35 years old . Regarding nurses' educational level it was found that 50% of them had bachelor of nursing science ,while 28.33% of them were graduated from technical nursing institute and the rest of them 21.67% graduated from secondary school of nursing .

Regarding nurses' years of experience at Neonatal Intensive Care Unit , it was found that 40 %of them had less than 5 years of experience and 68.3 % didn't attend any training programs related to continuous positive air way pressure.

Table (2) Shows percentage distribution of of studied nurses' knowledge regarding CPAP before, immediately and after one month after implementation of educational guide line program. It was observed that , there were highly statistical significant differences in nurses' knowledge related to definition, purpose , indications , contraindications , methods of CPAP, Complications , nursing care for neonate on CPAP before ,immediately ,and after one month after implementation of educational guidelines program with, x^2=120,000 ,p = ‹ 0.001, x^2=40.000, p = ‹ 0.001 respectively .

Table (3) Shows percentage distribution of the studied nurses' practice before connecting the neonate with continuous positive airway pressure before ,immediate and after one month of program . There were highly statistically significant differences in the studied nurses' practice as regarding , prepare scissors for cutting x ^{2}=32.175, ,p=‹0.001 respectively .

Moreover, it was found that there were statistically significant differences in the studied nurses' practice as regarding prepare CPAP machine and ensure that all connections work well x ^{2}=18.775 p=<0.001respectively .

On other hand it was observed that there were not statistically significant differences in the studied nurses' practice as regarding prepare suction and appropriate sized catheter x ^{2}=1.011 , p=0.603respectively

Table 4: Shows percentage distribution of studied nurses' practice during connecting neonate with continuous positive airway pressure before ,immediate and after one month of program ,there were highly statistically significant differences in the studied nurses' practice regarding place comfeel or cotton dressing on neonate's cheeks x ^{2}= 61.604, p=‹0.001respectively .

It was found that there weren't statistically significant differences in studied nurses' practice as regarding Connect neonate to CPAP x ^{2} =2.011, P =0.366 respectively .

Table (5) Shows percentage distribution of studied nurses' practice after connecting the neonate with continuous positive airway pressure before ,immediate and after one month of program . There were highly statistically significant differences in the studied nurses' practice as regarding Care for pressure area : especially to nostrils and septum x^2 =19.540, p=<0.001 respectively .

It was found that there statistically significant differences in the studied nurses' practice regarding measure and record respiratory rate x^2 =6.102 ,p=0.047, put pulse oximetry on neonate sole x^2 =6.102,p=0.047, maintain neutral thermal environment x^2 =9.216 ,p=0.010, ensure CPAP circuit tubing appropriately supported

and secured x^2 =8.704 , p=0.013 respectively .

On other hand, it was found that there were not statistically significant differences in the studied nurses' practice regarding measure and record heart rate x^2 =4.045 ,p=0.132, observe oxygen saturation x^2 =2.034, p=0.362,, ensure patency of tube : suction as necessary x^2 =3.151, p=0.207, ensure cardio-respiratory and pulse oximetry monitoring correct alarm setting parameters and documentation x^2 =0.137, p=0.934, , position nasopharyngeal tube in a downward arch to avoid pressure on the nares x^2 =2.807 ,p=0.246 , use alternate nostril when change nasopharyngeal tube to avoid pressure area development x^2 =2.607 ,p=0.272 respectively.

Table (6): there were statically significant relation between nurses educational level and their practice score before educational program p=0.011 as nurses who were bachelor of nursing had a higher mean scores of practice 31.81±4.38 .

there were statically significant relation between nurses attend training course and their practice score before educational program p=0.001 as nurses who were attend training course related to continuous Positive Airway Pressure had a higher mean score of practice 30.951 ± 4.159 .

Table 7 : there were statically significant relation between nurses years of experience and their knowledge score immediately after educational program p=0.015 as nurses who have 5- 10 years of experience had a higher mean scores of knowledge 13.647 ± 0.493.

Table (1): Percentage Distribution of Studied Nurses regarding their sociodemographic characteristics .

Sociodemographic characteristics of nurses	The studied nurse (n=60)	
	No	%
Age / years		
25 -	10	16.7
30 -	28	46.6
35 -	22	36.7
Range	22-38	
Mean ±SD	29.283±4.927	
Educational Level		
Secondary School of Nursing	13	21.7
Technical Institute of Nursing	17	28.3
Bachelor degree of Nursing	30	50.0
Range	2-18	
Mean ±SD	8.433±5.251	
Years of Experience inside Neonatal Intensive Care Unit /year		

< 5 5 - 10 -	24 17 19	40.0 28.3 31. 7
Attendance of any training programs Related to Continuous Positive Airway Pressure **Yes** **No**	 19 41	 31. 7 68. 3

Table (2): Percentage Distribution of Studied Nurses' knowledge regarding Continues Positive Airway Pressure.

Nurses' Knowledge regarding continuous positive airway pressure	**Nurses' knowledge (n= 60)**														**X^2**	**P-value**
	Before guidline Program (n=60)						**Immediately After guide line Program (n=60)**				**One Month After guide line Program (n=60)**					
	Incorrect answer		**Incomplete correct answer**		**Complete correct answer**		**Incomplet correct Answer**		**Complete correct answer**		**Incomplet correct Answer**		**Complete correct answer**			
	%	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**	**No**		
Definition	5	8.33	13	21.67	42	70.00	0	0.00	60	100.00	0	0.00	60	100.00	40.000	<0.001*
Purpose	8	13.33	48	80.00	4	6.67	7	11.67	53	88.33	9	15.00	51	85.00	108.816	<0.001*
Indications	26	43.33	5	8.33	29	48.33	1	1.67	59	98.33	4	6.67	56	93.33	65.975	<0.001*
Contraindications	24	40.00	35	58.33	1	1.67	2	3.33	58	96.67	1	1.67	59	98.33	163.156	<0.001*
Methods	14	23.33	46	76.67	0	0.00	28	46.67	32	53.33	28	46.67	32	53.33	66.353	<0.001*
Complications	5	8.33	54	90.00	1	1.67	14	23.33	46	76.67	12	20.00	48	80.00	96.711	<0.001*
Nursing care	3	5.00	42	70.00	15	25.00	0	0.00	60	10.00	0	0.00	60	100.00	120.000	<0.001*

***Statistically significant difference at (p ‹ 0.05)**

Table (3) : Percentage Distribution of Nurses' Practice before connecting The neonate with Continues Positive Airway Pressure.

Nurses' practice (n=60)														
Nurses' practice before connect neonate with CPAP	Before guide line program				After guide line program				One month after guide line program				Chi-Square	
	Not Done		Done		Not Done		Done		Not Done		Done			
	No	%	No	%	No	%	No	%	No	%	No	%	X^2	P-value
Prepare safe environment	52	86.67	8	13.33.	0	0.00	60	100.00	3	5.00	57	95.00	9.489	0.009*
Humidifier chamber with temperature control set at invasive setting	53	88.33	7	11.67	2	3.33	58	96.67	0	0.00	60	100.00	9.123	0.010*
Prepare resuscitation equipment	14	23.33	46	76.67	0	0.00	60	100.00	2	3.33	58	96.67	23.598	<0.001*
Prepare CPAP machine and ensure that all connections work well	39	65.00	21	35.00	4	6.67	56	93.33	7	11.67	53	88.33	18.775	<0.001*
Prepare Suction machine and appropriate sized catheter	59	98.3	1	1.67	0	0.00	60	100.00	1	1.67	59	98.33	1.011	0.603
Prepare Scissors for cutting	33	55.00	27	45.00	7	11.67	53	88.33	11	18.33	49	81.67	32.175	<0.001*
Prepare endotracheal tube of appropriate sized ,pre-cut length to ensure external space	58	96.67	2	3.33	0	0.00	60	100.00	2	3.33	58	96.67	2.045	0.360
Prepare leucoplast tape :2 pieces each cut into "trouser leg "	48	80.00	12	20.00	2	3.33	58	96.67	1	1.67	59	98.33	16.145	<0.001*
Prepare lubricating gel or use neonatal saliva as lubrication	55	91.67	5	8.33	3	5.00	57	95.00	1	1.67	59	98.33	2.807	0.246
Prepare comfeel protectant wafer :2 pieces each cut to fit under tapes on neonate's checks	25	41.67	35	58.33	4	6.67	56	93.33	7	11.67	53	88.33	26.875	<0.001*
Prepare cotton sponge for face wash : moist and dry	20	33.33	40	66.67	4	6.67	56	93.33	2	3.33	58	96.67	26.254	<0.001*

***Statistically significant difference at (p ‹ 0.05).**

Table (4): Percentage Distribution of Nurses' Practice During connecting neonate with Continues Positive Airway Pressure.

Nurses' practice during connect neonate with CPAP	Before guide lines program				After guide lines program				One month after guide lines program				Chi-Square	
	Not Done		Done		Not Done		Done		Not Done		Done			
	No	%	No	%	No	%	No	%	No	%	No	%	X^2	P-value
Select proper size of nasopharyngeal tube	58	96.67	2	3.33	0	0.00	60	100.00	2	3.33	58	96.67	2.045	0.360
Suction oral and nasal secretions	55	91.67	5	8.33	4	6.67	56	93.33	2	3.33	58	96.67	1.356	0.508
Place comfeel or cotton dressing on neonate's Cheeks	36	60.00	24	40.00	4	6.67	56	93.33	4	6.67	56	93.33	61.604	<0.001*
Lubricate tube with neonate's saliva or lubricating gel	54	90.00	6	10.00	1	1.67	59	98.33	3	5.00	57	95.00	4.024	0.134
Place the neonate in proper position during the insertion of nasopharyngeal tube	59	98.33	1	1.67	3	5.00	57	95.00	3	5.00	57	95.00	1.189	0.552
Put orogastric tube to drainage the excessive air from the stomach	54	90.00	6	10.00	1	1.67	59	98.33	0	0.00	60	100.00	9.216	0.010*
Connect to Constancies Positive Airway Pressure	60	100.00	0	0.00	0	0.00	60	100.00	0	0.00	60	100.00	2.011	0.366

***Statistically significant difference at (p ‹ 0.05)**

Table (5): Percentage Distribution of Nurses' Practice after Connecting The neonate with Continues Positive Airway Pressure.

Nurses' practice after connect neonate with CPAP	Before guide line program				After guide line program				One month after guide line program				Chi-Square	
	Not Done		Done		Not Done		Done		Not Done		Done			
	No	%	No	%	No	%	No	%	No	%	No	%	X^2	P-value
Monitoring blood gases as required	38	63.33	22	36.67	4	6.67	56	93.33	10	16.67	50	83.33	17.500	<0.001*
Measure and record respiratory rate	57	95.00	3	5.00	0	0.00	60	100.00	0	0.00	60	100.00	6.102	0.047*
Measure and record heart rate	58	96.67	2	3.33	0	0.00	60	100.00	0	0.00	60	100.00	4.045	0.132
Observe chest rise and fall	48	80.00	12	20.00	1	1.67	59	98.33	3	5.00	57	95.00	14.131	0.001*
Observe oxygen saturation	58	96.67	2	3.33	0	0.00	60	100.00	1	1.67	59	98.33	2.034	0.362
Put pulse oximetry on neonate sole	3	5.00	57	95.00	0	0.00	60	100.00	0	0.00	60	100.00	6.102	0.047*
Measure and record capillary refill time	34	56.67	26	43.33	5	8.33	55	91.67	6	10.00	54	90.00	28.645	<0.001*
Ensure patency of tube : suction as necessary	53	88.33	7	11.67	2	3.33	58	96.67	4	6.67	56	93.33	3.151	0.207
Maintain neutral thermal environment	54	90.00	6	10.00	0	0.00	60	100.00	1	1.67	59	98.33	9.216	0.010*
Change tube if secretions are thick or copious it	52	86.67	8	13.33	0	0.00	60	100.00	2	3.33	58	96.67	11.012	0.004*
Ensure gastric decompression with orogastric tube	51	85.00	9	15.00	0	0.00	60	100.00	1	1.67	59	98.33	15.459	<0.001*
Ensure cardio-respiratory and pulse oximetry monitoring correct alarm setting parameters .	54	90.00	6	10.00	5	8.33	55	91.67	5	8.33	55	91.67	0.137	0.934
Care for pressure area : especially to nostrils and septum	43	71.67	17	28.33	3	5.00	57	95.00	3	5.00	57	95.00	19.540	<0.001*
ensuring tube isalways secure and strapping is not loose	48	80.00	12	20.00	1	1.67	59	98.33	5	8.33	55	91.67	11.481	0.003*
Position nasopharyngeal tube in a downward arch to avoid pressure on the nares	55	91.67	5	8.33	1	1.67	59	98.33	3	5.00	57	95.00	2.807	0.246
Ensure CPAP circuit tubing appropriately supported /secured	49	81.67	11	18.33	4	6.67	56	93.33	2	3.33	58	96.67	8.704	0.013*
Use alternate nostril when change nasopharyngeal tube to avoid pressure area development	52	86.67	8	13.33	3	5.00	57	95.00	5	8.33	55	91.67	2.607	0.272

***Statistically significant difference at (p ‹ 0.05)**

Table (6): Relation between nurses' practice and the sociodemographic characteristics

Practices		N	Before	ANOVA or T-Test	Immediate	ANOVA or T-Test	After	ANOVA or T-Test
			Mean±SD		Mean ± SD		Mean ± SD	
Age	Less than 25 years old	10	31.700±3.860	0.225	37.200 ±3.011	0.274	37.100 ± 3.281	0.968
	25-30 years old	28	31.429±4.772		38.321 ±1.722		37.286 ± 3.495	
	More than 30 years	22	33.682±4.864		37.364 ±		37.045 ± 3.443	
Educational level	Nursing technician	13	34.308±5.154	0.011*	36.692 ± 3.146	0.128	37.385 ± 3.254	0.829
	Institute of Technical healthy	17	30.294±**3.965**		38.588 ± 1.698		36.529 ± 3.693	
	Bachelor of Nursing	30	31.808±4.382		37.615 ± 2.434		37.500 ± 3.302	
Years of Experience	Less than 5 years old	24	31.583±**4.717**	0.305	38.083 ±2.185	0.285	36.208 ± 3.945	0.186
	From 5-10 years.	17	31.765±4.493		38.176 ± 1.879		38.059 ± 2.657	
	More than 10 years.	19	33.684±4.854		37.053 ± 3.027		37.579 ± 3.043	
Have you ever attended training courses on Continuous positive airway pressure?	Yes	19	35.211±4.626	0.001*	38.105 ±2.233	0.488	37.842 ± 2.930	0.297
	No	41	30.951±4.159		37.634 ±2.517		36.854 ± 3.568	

***Statistically significant difference at (p ‹ 0.05)**

Table (7): Relation between nurses' knowledge and the sociodemographic characteristics

Knowledge		N	Before	ANOVA or T-Test	Immediate	ANOVA or T-Test	After	ANOVA or T-Test
			Mean±SD		Mean ± SD		Mean ± SD	
Age	Less than 25 years old	10	7.000±2.055	0.283	12.900 ±0.994	0.584	13.200 ± 0.789	0.491
	25-30 years old	28	6.679±2.435		13.107 ±0.994		13.214 ± 0.917	
	More than 30 years	22	7.727±2.229		13.273 ±0.883		12.909 ± 1.019	
Educational level	Nursing technician	13	7.769±2.421	0.076	12.615 ±1.193	0.101	12.846 ± 1.214	0.555
	Institute of Technical healthy	17	6.824±2.007		13.176 ±0.809		13.235 ± 0.752	
	Bachelor of Nursing	30	6.615±2.385		13.269 ±0.874		13.192 ± 0.801	
Years of Experience	Less than 5 years old	24	6.667±2.444	0.325	12.792 ±1.103	0.015 *	13.125 ± 0.900	0.441
	From 5-10 years.	17	7.059±2.358		13.647 ±0.493		13.294 ± 0.849	
	More than 10 years.	19	7.737±2.077		13.105 ±0.875		12.895 ± 1.049	
Have you ever attended training courses on Continuous positive airway pressure?	Yes	19	7.895±1.823	0.076	13.105 ±0.875	0.877	13.000 ± 1.202	0.577
	No	41	6.756±2.447		13.146 ±0.989		13.146 ± 0.792	

***Statistically significant difference at (p ‹ 0.05)**

Discussion

Continuous educational program for nurses keeps them up to date on the latest advances in nursing care provided for neonates who are receiving CPAP. Therefore the present study was conducted to evaluate the effect of educational guidelines program on nurses' performance for caring of neonates receiving Continuous Positive Airway Pressure.

Nurses use a wide range of theoretical and practical knowledge in their work. They should have a greater amount of recent knowledge to provide the appropriate care for neonates. Knowledge may be acquired by different means , some is hidden in practice but from whatever source it originates. The nurses' acquisition of knowledge should be evaluated frequently. .(12)

The finding of the present study revealed that , nearly two third of nurses had poor knowledge level related to CPAP before educational guideline program implementation . This finding could be attributed to more than two thirds of the studied nurses didn't attain training programs regarding to CPAP ventilation and work over load at NICU. Furthermore, nurses only remembered the items related to their clinical practices rather than the theoretical knowledge so they need continuous education and training program to increase their knowledge.

The findings were in agreement with **Chen, et al(2016)** who stated that nurses' knowledge and practice regarding CPAP application less than after program implementation.(12)

On the opposite immediately after educational guideline program implementation, nurses' knowledge improved and all of them had good knowledge level . This could be attributed to the content of program which was developed based on nurses' needs, its clarity and simplicity, using of audiovisual aids, availability of the researcher in the field for more clarification, using simple language, and frequent repetition to fix the knowledge.

The previous findings were in agreement with **Girvan L al., (2018)** who demonstrated that, there were statistically significant improvement in the nurses′ knowledge post program implementation. Also these findings were in accordance with **Ntigurirwa et al., (2017)**who showed that, nurses′ knowledge was improved post program which improved care of neonates on CPAP and mortality was reduced.(12-13)

Furthermore, one month after the program implementation, this percentage was slightly reduced and the majority of them had good scores in all items of knowledge. This indicated that the improvement in knowledge was partially lost one month after the educational guidelines program implementation. This result might be explained that, knowledge retention is usually affected by time.

Morehead &Rhodes (2016) who were in harmony with current finding, confirmed that information can be easily forgotten if they are not refreshed periodically. (14)

Concerning nurses' total level of practice , it was evident from the present study that , all nurses had unsatisfactory practice related to care of neonates receiving CPAP before educational guide line program . From researcher point of view, it my due to lack of training courses about NCPAP , less than half of them had less than 5 years of experience inside NICU , absence of

motivation from the administrators, no pre-employment orientation program, and insufficient number of nurses.

On the opposite, immediately and one month after implementation of the program it was observed that, the program had effectively achieved its expected objectives, nursing staff had significant higher practice level than before educational program implementation regarding CPAP. This may be attributed to effectiveness of this educational program.

This findings was in harmony with **Elsobkey& Amer, (2018)** who found that, the majority of the studied nurses had competent practice post program implementation. Moreover, in agreement with **Chen et al., (2016),** who stated that, nurses' knowledge and practice regarding CPAP application improved after implementation of guidelines. This result also in accordance with **Milligan & Goldstein, (2017)** who revealed that, after implementing program , the total nurses' practice improved which impact on neonatal careby decreasing unintended treatment complications.[11- 18-19]

As regards to relation between nurses knowledge and sociodemographic data and total practice score .the present study revealed that there was a statistically significant relation between total knowledge and total practice pre & post guideline with level of education. It was clear that ,more than one- third of nurses who had Bachelor degree had good level of knowledge and satisfactory practice. This may be explained by the fact that, the high qualified nurses who had Bachelor degree able to provide competent care .They usually had the right knowledge and skills to meet the needs of those high risk neonates compared by nurses who had diploma degree and secondary education .Furthermore those with university education had been exposed to wider curriculum and self-motivated learning .Moreover ,these nurses likely to had greater knowledge about diseases pathology and management than other nurses with lower academic qualifications .

These results disagree with **Aziz, & Abdul-Hamza (2017).** They showed that there was no significant relationship between nurses' knowledge and socio-demographic data .[20]

Moreover, the result of the present study demonstrated that the nurses had better knowledge and practice immediately and one month after educational guideline program and there was a highly statistically significant difference between pretest and post test. This could be attributed to the fact that any educational program increase nurses knowledge in turn, changes their practice.

Regarding to the relation between nurses' knowledge ,practice and their years of experience the current study clarified that , there were a significant positive relation between total nurses' knowledge ,practice and their years of experience .The finding of the present study was in the same line with **Adraa (2014)** who mentioned in their study that ,their was strong significant association between nurses' knowledge and years of experience .Most of the nurses had six years of experience .Most of the nurses had six years of experience at Neonatal Intensive Care Unit , which can increase their knowledge in dealing with CPAP.[21]

Finally , the current study has been able to shed some light on the knowledge and practice of nurses toward neonates on CPAP

.In this respect , the nurse should have complete and accurate knowledge and skills about CPAP by updating their knowledge , attending in -service training programs and reading books related to respiratory diseases and CPAP to improve their quality of nursing care for those critically ill neonates.

The study conclude that there was a significant improvement in total level of nurses' knowledge and practice regarding nursing care of neonate receiving Continues Positive Airway Pressure immediately and after one month from educational guideline program implementation .there was a positive correlation between the total knowledge score of nurses and their total practice regarding CPAP .

The study recommended that

1. Manual log book about care of neonates and CPAP should be available to nurses at NICU as a reference .
2. In -service training program should be conducted periodically and regularly for teaching nurses working in Neonatal Intensive Care Unit care of neonatal reciving CPAP.
3. A system for accreditation and certification should be developed to motivate nurses' participation in the educational programs which should be conducted.

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Effect of In-service Training Program on Obstetric Nurses' Knowledge, Attitudes and Practices Regarding Painless Labor

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Abstract: Painless labor is the most trend topic among pregnant women nowadays. Inadequate knowledge, negative attitudes, and lack of training among obstetric nurses' were major obstacles in implementing effective painless labor. **Aim of the study:** Determine the impact of in-service training program on obstetric nurses' knowledge, attitudes and practices regarding painless labor in addition to identify the perceived obstacles related to painless labor among the studied nurses. **Subjects and Method:** A quasi-experimental research design was used. **Setting:** This study was carried out at labor units Tanta University and El-Menshawy General Hospitals. **Subjects:** All nurses (60) who are working at the previously mentioned settings were included. **Four tools were used: Tool (I): Obstetric nurses' knowledge questionnaire regarding painless labor, Tool (II): Obstetric nurses' attitudes regarding painless labor,Tool (III): Nurses' practices observational checklist toward painless labor and Tool (IV): Obstacles that prevent the use of painless labor methods among obstetric nurses. Results:** obstetric nurses' level of knowledge, attitudes and practices post implementing the in-service training program regarding painless labor was highly improved than pre implementation. Also, the main obstacles that hinder the use of painless labor were; hospital policy in the health care system, difficult of method application among nurses, and unusefulness of painless labor methods related to patient obstacles .**Conclusion:** Application of the in-service training program achieved significant improvement in obstetric nurses' knowledge, attitudes and practices related to painless labor. **Recommendations:** Reapplication of the in-service program in other geographical areas in Egypt regarding painless labor.

Keywords: In-service Training Program, Obstetric nurses, Painless labor.

Introduction

Childbirth is associated with the most severe pain a woman will ever experience throughout her life. Women described labor pain with terms such as distressing, overwhelming, traumatic, horrible or unbearable during the first stage of labor and even worse during the second stage. [(1-3)] Labor pain may result from the myometrial ischemia during uterine contractions in addition to cervical, vaginal, and perineal stretching particularly throughout the second stage of labor. [(4)] It is usually felt in the lumbar, sacral, pelvic, and abdominal areas. [(5)]

Severe pain negatively affects the process of labor. It may result in premature bearing down in the first stage of labor against an un-dilated or partially dilated cervix leading to tears and subsequent postpartum hemorrhage. [(6)] In addition to, maternal fear, stress, anxiety, nausea, increased sympathetic response and hyperventilation which may lead to uncoordinated uterine action. [(7-9)] Therefore,

effective management of labor pain is an important issue for better maternal and neonatal outcome. [7]

Painless labor is the most trending topic among pregnant women nowadays. [3] There is a wide spectrum of painless labor methods including non-pharmacological and pharmacological methods. [10,11] Non-pharmacological options available for pain relief in labor include continuous social support, homeopathy, hydrotherapy, hypnosis, music therapy, transcutaneous electrical nerve stimulator (TENS), breathing and relaxation techniques, massage, hot and cold water therapy bags, acupressure, acupuncture and aromatherapy. [5,12-15] The pharmacological analgesia for labor pain include nonopioids (ketamine and acetaminophen), opioids (nalbuphine, pethidine, diamorphine, meperidine and fentanyl), inhalational and regional analgesia for labor (epidural analgesia, combined spinal-epidural, and peripheral nerve blocks). [4, 16-19] Yet, the presence of skilled birth attendants is a crucial for applying these management options. [12]

Obstetric nurses spend a significant portion of their time with in labor women and have a vital role in the decision-making process regarding the management of labor pain. [20] They have a critical role in assessing in labor women's perception of pain; documenting the pain; offering and providing different non-pharmacological and pharmacological options for pain management; evaluating the maternal and fetal response to treatment, including desired and adverse effects; assessing the women's satisfaction with that options; modifying the plane of care as needed; and documenting each of these aspects of labor pain management. [21, 22] Moreover, nurses can also advocate for integrating labor pain management in the hospitals policy as an essential human right for all women during labor.

Significance of the study

Egypt is ranked first globally in the number of cesarean section (CS) deliveries which make up 75-80% of deliveries, in comparison to an average of 25-30% worldwide as reported by the Egyptian Ministry of Health.[24] Applying painless labor methods can help in reducing the increased rates of CS with its associated complications. [25,26]

Inadequate knowledge, negative attitudes, lack of trained personnel for effectively managing labor pain and absence of painless labor protocols were reported as major obstacles in the implementation of effective labor pain management. [27] So, providing obstetric nurses with the up to date labor pain management evidence based knowledge and practices will contribute to improve their attitudes toward painless labor methods. Which represent the aim of our study.

Aim of the study

The aim of this study is to

1. Determine the impact of in-service training program on obstetric nurses' knowledge, attitudes and practices regarding painless labor.

2. Identify the perceived obstacles related to painless labor among the studied nurses.

Research hypothesis

The in-service training program is expected to improve obstetric nurses' knowledge, attitudes and practices regarding painless labor.

Operational Definition

Painless labor: Refers to using pain relieve methods during labor as non-pharmacological and pharmacological methods to help women cope with labor pain or relieve it.

I. Subjects and Method

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

Setting: This study was carried out at labor

units of obstetrics departments of:

1. Tanta University Hospital (Ministry of Higher Education).
2. El-Menshawy General Hospital (Ministry of Health and Population).

Subjects

- All nurses (60) who were working at the previously mentioned study settings were included in the current study.

Tools of data collection

To achieve the aim of this study, four tools were used as follows:

Tool (I): Obstetric nurses' knowledge questionnaire regarding painless labor: It was developed by the researchers after reviewing the related recent literatures. It compromised the following two parts:

Part (1): Socio demographic characteristics of nurses: This part collected the nurses' basic data included; age, current marital status, residence, educational qualification, place of work, years of experience and previous attendance of a training program and/or workshop regarding painless labor.

Part(2): Obstetric nurses' knowledge regarding painless labor: It was used to assess nurses' knowledge regarding labor pain which includes; causes, effects on the mother and fetus, site, onset, and methods used to assess it. Also, it was used to assess nurses knowledge regarding; definition of painless labor, importance of relieving labor pain, and methods of painless labor, both non-pharmacological and pharmacological methods including; types, appropriate time of use, advantages and disadvantages of both methods. In addition, it was used to assess nurses knowledge regarding; contraindications of painless labor methods, maternal and fetal side effects of painless labor methods, and effect of painless labor methods on labor process.

The scoring system for obstetric nurses' knowledge regarding painless labor was categorized as follows:

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

The total knowledge scores was calculated as follow

- High level of knowledge 80-100%.
- Moderate level of knowledge 60 -<80%.
- Low level of knowledge <60%.

Tool (II): Obstetric nurses' attitudes regarding painless labor.

This tool was adapted from **Hasan et al (2016)[28], McCauley et al (2017) [29], Mousa et al (2018) [30] and Delwatta et al (2019) [31].** It was used to assess nurses' attitudes regarding painless labor (non-pharmacological and pharmacological methods). It consisted of 19 statements (positive and negative) such as; pain relief during labor is necessary, painless labor methods help women perform much better during labor, using some methods during labor reduces the intensity of pain, and the use of painless labor methods can affect the progress of labor.

The scoring system of obstetric nurses' attitudes regarding painless labor was as follows:

Each statement was rated by using 3 point Likert scale, where:

─ Each positive statement scored as (2) if nurses' response was agree, (1) if it was uncertain and zero if it was disagree.

─ Each negative statement scored as (2) if nurses' response was disagree, (1) if it was uncertain and zero if it was agree.

The total attitudes score of obstetric nurses' was calculated as follows:

- Positive attitudes ≥ 60% of the total score.

- Negative attitudes < 60% of the total score.

Tool (III): Nurses' practices observational checklist toward painless labor. This tool was developed by the researchers and adapted from **Ohaeri B et al (2019) [32]**, **Solomon E et al (2021)[12]** to assess obstetric nurses' practices steps regarding painless labor which consisted of **;** prepare the necessary equipment, environment, and the woman. As well as taking complete history of the woman, assessment of pain level, assessment of the physiological and behavioral responses to labor pain, ask woman to choose pain relive method from the available options (acupressure points, massage, deep breathing exercise, changing positions, and continuous support, intravenous or intramuscular pethidine or morphine, spinal analgesia, and epidural analgesia). In addition to assess effectiveness of chosen method and post procedure tasks.

The scoring system for obstetric nurses' practices toward painless labor was as follows:

- Done correctly and completely was scored (2).
- Done correctly but incompletely was scored (1).
- Done incorrectly or not done was scored (0).

The total practices scores of obstetric nurses' were summed up and converted into percent score as follows

Satisfactory practice: ≥ 80%

- Unsatisfactory practice: < 80%.

Tool (IV): Obstacles that prevent the use of painless labor methods among obstetric nurses: It was developed by the researchers to assess obstacles that prevent the use of painless labor methods. They were divided to the obstacles ; in the health care system, nurses, and the patient obstacles which hinder the use of painless labor.

- **Method**

1. Administrative approval: An official letter clarifying the purpose of the study was obtained from the Faculty of Nursing and was submitted to the responsible authorities of the selected study settings to obtain their approval and cooperation for conducting the study.

2. Ethical and legal considerations: The approval of ethical committee was obtained with a code number (272-6-2023).After explaining the purpose of the study nurse's informed consent was obtained to participate in the study. The nature of the study did not cause any harm or pain for the entire sample. Also, confidentiality and privacy were ascertained regarding the data collected and each subject was free to withdraw from the study at any time.

3. Tools development: They were developed by the researchers after reviewing the recent related literatures. They were translated into Arabic language and tested for content and construct validity by 5 experts in the field of Maternal and Neonatal Nursing. The test revealed that it was 0.91, 0.93, 0.95 and 0.97 respectively. While, the reliability of the translated Arabic tools was tested using Cronbach's alpha test, which was 0.882, 0.885, 0.887 and 0.889 respectively.

4. Pilot Study: After the development of the tools, a pilot study was conducted on 10% of the total sample (6 obstetric nurses) from the previously mentioned settings to ascertain the clarity, feasibility and applicability of the developed tools. The pilot study was conducted before the actual data collection. There were no major changes in the tools, so the data obtained from the pilot study were included.

5. Field work: Data collection was conducted through **4 phases:** assessment, planning, implementation, and evaluation as follows:

– **Assessment phase (Pre-test):** After explaining the purpose of the study by the researches before the application of in-service training program**,** the obstetric nurses were assessed using **Tool (I**) **part (1)** to collect their socio-demographic characteristics, **part (2)** to assess their knowledge regarding painless labor. Also, **Tool II** was used to assess obstetric nurses' attitudes regarding painless labor. Then **Tool III** was used to assess nurses' practices regarding painless labor. Finally, **Tool (IV**) was used to assess obstacles that prevent the use of painless labor methods among obstetric nurses.

– **Planning phase:** An appropriate in-service training program was prepared by the researchers based on the assessment phase after assessing nurses' knowledge, attitudes and practices regarding painless labor. The purpose of the study were explained for nurses and obtained their consent to participate. Planning phase included two parts: theoretical part which entailed knowledge regarding painless labor and practical part related to steps of nurses' practices regarding painless labor observational checklist. Also this phase included preparation of the in-service training program content; an Arabic educational booklet was developed by the researchers used as a guide for nurses regarding painless labor.

- As well as, different methods of teaching were prepared to conduct the in-service training program which included; lectures, group discussion, posters, power point, demonstration and re-demonstration and video scenarios presentation.

– **Implementation phase**

- To implement the content of the in-service training program, 4 sessions (2 sessions for theoretical part and 2 sessions for practical part) were implemented at the previously mentioned study settings. The data was collected over a period of 6 months from the beginning of November 2022 to the end April 2023.

- The total numbers of nurses (60 nurses) were divided into 10 groups. Each group included 6 nurses and the in-service training program sessions were conducted over 4 days per week at morning and afternoon shifts.

- The duration of each session ranged from 30 to 45 minutes including periods of discussion. The sessions were as follow:

- **The first theoretical session:** At the beginning an orientation to the significance and the purpose of the study were clarified. This session included providing nurses with knowledge about causes of labor pain, effects of labor pain on the mother and fetus, site, onset, methods used to assess labor pain, definition of painless labor, and importance of relieving labor pain and methods of painless labor**.**
- **The second theoretical session:** It gave feedback for the previous session and provide knowledge about both non-pharmacological and pharmacological methods including; types, appropriate time of use, advantages and disadvantages of both methods, contraindi-cations of painless labor methods, maternal and fetal side effects of painless labor methods, and the effect of painless labor methods on labor process.
- **The third practical session:** Nurses were trained regarding the procedure of pain management which includes performing; pre procedure tasks, taking complete history of woman, assessment of pain level, and assessment of the physiological and behavioral responses of woman to labor pain.
- **The fourth practical session:** During this session, first the nurses re-demonstrated the practical skills from the previous session. Second, nurses were trained about providing

practical skills regarding available pain relive options to the woman including; acupressure points, massage, deep breathing exercise, changing positions, and continuous support. In addition to assisting doctor with pharmacological, methods of painless labor as; intravenous or intramuscular pethidine or morphine, spinal analgesia, and epidural analgesia.

Also, nurses were trained how to assess effectiveness of the chosen method through assessing labor pain intensity as well as performing post procedure tasks**.**

- **Phase IV: Evaluation phase (Post-test):** Obstetric nurses' knowledge, attitudes and practices were assessed immediately post and one month later after the in-service training program application by using; **Tool (I) part (2), Tool (II) and Tool (III)**.

6. 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). For quantitative data, the range, mean and standard deviation were calculated. For qualitative data, which describe a categorical set of data by frequency, percentage or proportion of each category, comparison between two groups and more was done using Chi-square test (χ^2). For comparison between related more than two means of non-parametric data (pre, immediate post and one month post educational training program), Friedman Test (χ^2 value) was calculated. Correlation between variables was evaluated using Pearson's correlation coefficient (r).

I. Results

Table (1): shows that the age of the studied nurses ranged from 21-59 years old with a mean of 27.58±4.58 and (56.7%) of them were divorced. Regarding the educational qualifications, (53.3%) of the studied nurses had Nursing Technician Diploma with years of experience ranged from 1-15 years. However, the entire sample didn't attend any training program or workshop about painless labor.

Table (2): Reveals that there were high statistical significant differences in the mean frequency of the total knowledge responses of the studied nurses related to all items about painless labor throughout the program intervention where ($p<0.001$). It was observed that pre-program (51.7%) of the studied nurses gave incorrect answers or had no knowledge about all items of painless labor. But immediately post-program, these results significantly improved to be correct and complete answers among (86.7%) of them and slightly decreased one month later among (81.7%) of them.

Figure (1): Illustrates that the total knowledge score of the studied nurses was low among (95.0%) of them preprogram which significantly improved to be high among (93.3%) of them immediately post-program and slightly decreased to (83.3%) one month later.

Figure (2): Clarifies that 65.0% of the studied nurses had a positive attitude toward painless labor before program application increased to 98.3% immediately post-program and slightly decreased to (93.3%) one month later with a highly statistically significant difference where ($p=<0.0001*$).

Table (3): Demonstrates that there were high statistical significant differences in the mean frequency of the total practice responses of the studied nurses related to all items about painless labor throughout the program intervention where ($p<0.0001*$). It was observed that pre-program (65.0%) of the studied nurses done incorrectly or not done all items of painless labor. But immediately post-

program, these results significantly improved to be done correctly and completely among (86.7%) of them and slightly decreased one month later among (76.7%) of them.

Figure (3): Reveals that there was highly statistically improvement in the total practices scores of the studied nurses toward painless labor after implementing the program. All of the studied nurses 100% had unsatisfactory practices preprogram application that is improved to be satisfactory among 95% of them immediately post program and slightly decreased to 70% one month later.

Table (4): Demonstrates that there was a statistical significant positive correlation between the studied nurses' overall score of knowledge with their total attitude toward painless labor immediately and one month post-program application (r= 0.604 p= 0.0001* and r= 0.310 p= 0.016*respectively). The table also reveals the significant positive correlation between the studied nurses' overall score of knowledge with their total practice toward painless labor before, immediately and one month post-program application (r= 0.419 p= 0.001* , r= 0.415 p= 0.001*and r= 0.444 p= 0.0001*respectively).

Figure (4): Illustrates that hospital policy, insufficient staff members and shortage of time represents the main obstacles related to health care system as perceived by (85.0%, 73.3% and 63.4% respectively) of the studied nurses. Additionally (60.0% and 55.0% respectively) of the studied nurses reported that difficulties of applying painless labor and lack of knowledge about it are considered the obstacles from their side. Concerning the obstacles related to mothers, (88.4%, 86.6% and 71.7% respectively) of the studied nurses mentioned that women's beliefs about pain and their thoughts that painless labor methods will be not useful for them as well as women's unwillingness are the most noticed obstacles.

Table (1): Socio-demographic characteristics of the studied nurses (n=60).

Socio-demographic characteristics.	The studied nurses (n=60)	
	N	%
Age : (years)		
Range	21-59	
Mean±SD	27.58±4.58	
Current marital status:		
Married	24	40.0
Divorced	34	56.7
Single	2	3.3
Place of residence:		
Rural	22	36.7
Urban	38	63.3
Educational qualification:		
Nursing Technician Diploma	32	53.3
Nursing Technical Institute	20	33.3
Bachelor of Nursing	8	13.3
Place of work:		
Tanta University Hospitals	38	63.3
El-Menshawy General Hospital	22	36.7
Years of experience:		
<5	15	25.0
5-10	8	13.3
10-15	37	61.7
Range	1-15	
Mean±SD	14.42±3.78	
Attendance of a training program and/or workshop about painless labor:		
No	60	100

Table (2): Knowledge of the studied nurses regarding painless labor pre and post in-service training program (n=60).

Knowledge items about painless labor	Responses of the studied nurses pre and post in-service training program (n=60)																		χ^2 test	P value
	Pre						Immediate post						One month post							
	Incorrect or don't know		Correct and incomplete answer		Correct and complete answer		Incorrect or don't know		Correct and incomplete answer		Correct and complete answer		Incorrect or don't know		Correct and incomplete answer		Correct and complete answer			
	N	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%		
- Causes of L. pain.	4	6.7	45	75.0	11	18.3	1	1.7	2	3.3	57	95.0	3	5.0	5	8.3	52	86.7	100.100	0.0001*
- Effects of L. pain on mother	19	31.7	39	65.0	2	3.3	1	1.7	7	11.7	52	86.7	2	3.3	26	43.3	32	53.3	93.678	0.0001*
- Effects of L. pain on fetus.	56	93.3	0	0	4	6.7	57	95.0	0	0	3	5.0	40	66.7	12	20.0	8	13.3	30.369	0.0001*
- Site of L. pain.	5	8.3	0	0	55	91.7	3	5.0	0	0	57	95.0	5	8.3	0	0	55	91.7	0.663	0.718
- Onset of L. pain.	43	71.7	0	0	17	28.3	9	15.0	0	0	51	85.0	12	20.0	1	1.7	47	78.3	53.236	0.0001*
- Methods used to assess labor pain	34	56.7	23	38.3	3	5.0	1	1.7	7	11.7	52	86.7	3	5.0	13	21.7	44	73.3	105.048	0.0001*
- Definition of painless labor.	41	68.3	3	5.0	16	26.7	3	5.0	0	0	57	95.0	8	13.3	0	0	52	86.7	79.208	0.0001*
- Importance of relieving L. pain	7	11.7	44	73.3	9	15.0	2	3.3	2	3.3	56	93.3	2	3.3	7	11.7	51	85.0	98.596	0.0001*
- Methods of painless labor.	20	33.3	21	35.0	19	31.7	2	3.3	1	1.7	57	95.0	5	8.3	5	8.3	50	83.3	65.032	0.0001*
- Non-pharmacological methods of painless labor.																				
- Types.	22	36.7	36	60.0	2	3.3	1	1.7	4	6.7	55	91.7	1	1.7	6	10.0	53	88.3	127.881	0.0001*
- Appropriate time of use	52	86.7	1	1.7	7	11.7	13	21.7	0	0	47	78.3	2	3.3	0	0	58	96.7	102.410	0.0001*
- Advantages	36	60.0	19	31.7	5	8.3	1	1.7	4	6.7	55	91.7	1	1.7	11	18.3	48	80.0	115.137	0.0001*
- Disadvantages	36	60.0	20	33.3	4	6.7	1	1.7	3	5.0	56	93.3	1	1.7	11	18.3	48	80.0	120.794	0.0001*
- Pharmacological methods of painless labor																				
- Types.	13	21.7	47	78.3	0	0	1	1.7	3	5.0	56	93.3	1	1.7	6	10.0	53	88.3	138.574	0.0001*
- Appropriate time of use	53	88.3	0	0	7	11.7	12	20.0	0	0	48	80.0	7	11.7	1	1.7	52	86.7	89.868	0.0001*
- Advantages	24	40.0	32	53.3	4	6.7	1	1.7	1	1.7	57	96.6	1	1.7	4	6.7	55	91.7	134.447	0.0001*

- Disadvantages	34	56.7	24	40.0	2	3.3	1	1.7	2	3.3	57	95.0	2	3.3	4	6.7	54	90.0	137.514	0.0001*
- Contraindications of painless labor methods.	34	56.7	22	36.7	4	6.7	1	1.7	3	5.0	56	93.3	2	3.3	2	3.3	56	93.3	131.978	0.0001*

Table (2): Continue.

Knowledge items about painless labor	**Responses of the studied nurses pre and post in-service training program (n=60)**																		**χ^2 test**	**P value**
	Pre						**Immediate post**						**One month post**							
	Incorrect or don't know		**Correct and incomplete answer**		**Correct and complete answer**		**Incorrect or don't know**		**Correct and incomplete answer**		**Correct and complete answer**		**Incorrect or don't know**		**Correct and incomplete answer**		**Correct and complete answer**			
	n	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**		
- Maternal side effects of painless labor methods.	34	56.7	23	38.3	3	5.0	1	1.7	2	3.3	57	95.0	1	1.7	2	3.3	57	95.0	143.013	0.0001*
- Fetal side effects of painless labor methods.	38	63.3	20	33.3	2	3.3	1	1.7	1	1.7	58	96.7	2	3.3	1	1.7	57	95.0	150.509	0.0001*
- Effect of painless labor methods on labor process.	48	80.0	11	18.3	1	1.7	14	23.3	4	6.7	42	70.0	7	11.7	7	11.7	46	76.7	87.010	0.0001*
Total knowledge response (Mean frequency)	**31**	**51.7**	**21**	**35.0**	**8**	**13.3**	**6**	**10.0**	**2**	**3.3**	**52**	**86.7**	**5**	**8.3**	**6**	**10.0**	**49**	**81.7**	**81.586**	**0.0001***

***Statistically significant (P<0.05)**

L. pain= Labor pain

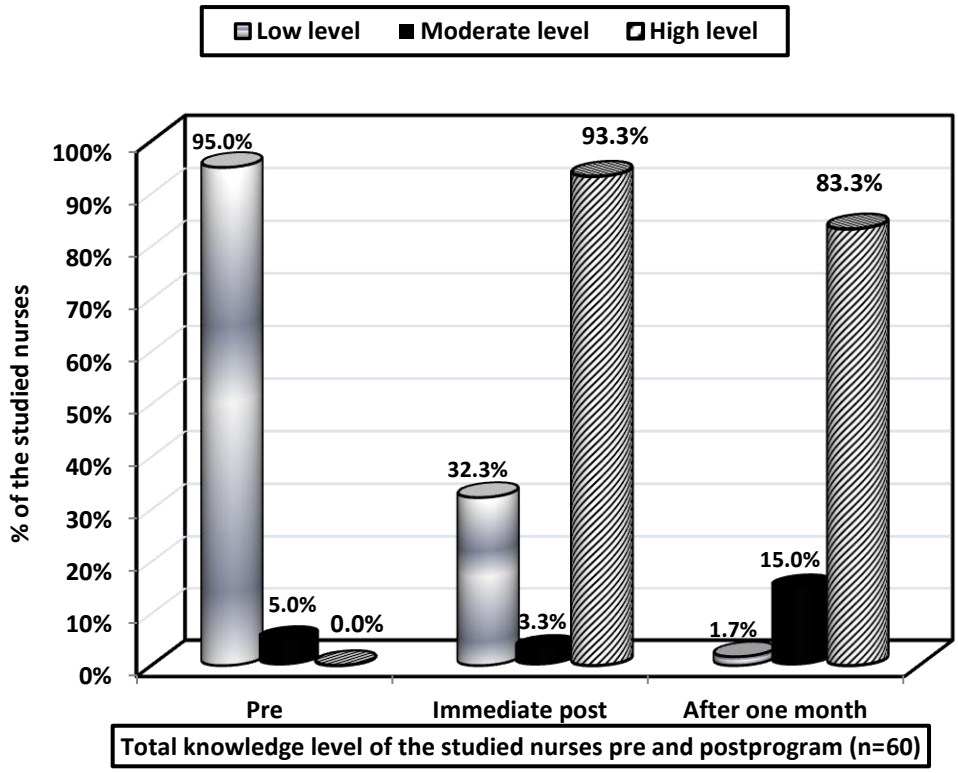

Figure (1): Total knowledge scores' level of the studied nurses regarding painless labor pre and post in-service training program (n=60).

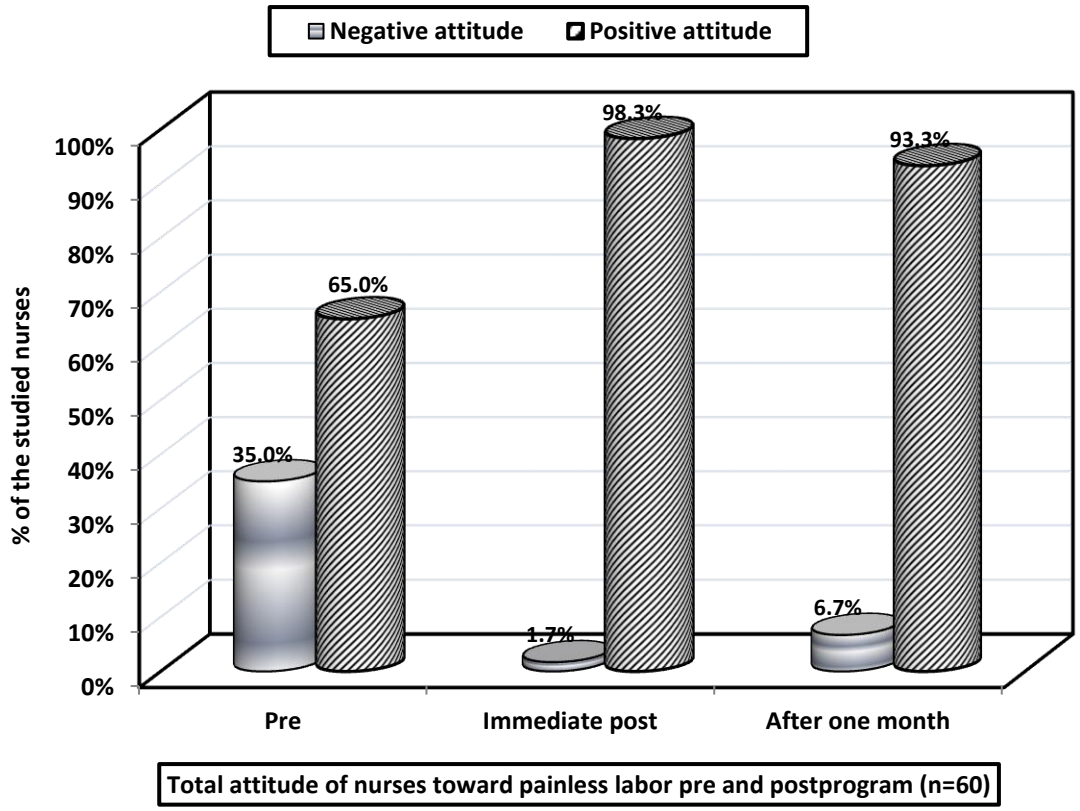

Figure (2): Total attitude of the studied nurses toward painless labor pre and post in-service training program (n=60).

Table (3): Practices of the studied nurses toward painless labor pre and post in-service training program (n=60).

Practice items toward painless labor	Responses of the studied nurses' practice steps pre and post in-service training program (n=60)																		χ^2 test	P value
	Pre						Immediate post						One month post							
	Done incorrectly or not done		Done correctly but incompletely		Done correctly and completely		Done incorrectly or not done		Done correctly but incompletely		Done correctly and completely		Done incorrectly or not done		Done correctly but incompletely		Done correctly and Completely			
	n	%	n	%	n	%	N	%	n	%	n	%	n	%	n	%	n	%		
1-Prepare the necessary equipment.	13	21.7	34	56.7	13	21.7	2	3.3	13	21.7	45	75.0	2	3.3	18	30.0	40	66.7	43.486	0.0001*
2-Prepare the environment.	39	65.0	13	21.7	8	13.3	2	3.3	5	8.3	53	88.3	3	5.0	7	11.7	50	83.3	98.967	0.0001*
3-Prepare the woman.	46	76.7	9	15.0	5	8.3	4	6.7	2	3.3	54	90.0	6	10.0	4	6.7	50	83.3	106.095	0.0001*
4-Prepare the nurse.	17	28.3	12	20.0	31	51.7	2	3.3	3	5.0	55	91.7	4	6.7	7	11.7	49	81.7	29.783	0.0001*
5-Take complete history of the woman	38	63.3	18	30.0	4	6.7	4	6.7	15	25.0	41	68.3	4	6.7	17	28.3	39	65.0	81.469	0.0001*
6- Asses the mother's perception of pain.	47	78.3	6	10.0	7	11.7	4	6.7	13	21.7	43	71.7	3	5.0	16	26.7	41	68.3	101.614	0.0001*
7- Assess level of pain.	47	78.3	6	10.0	7	11.7	4	6.7	13	21.7	43	71.7	3	5.0	16	26.7	41	68.3	101.614	0.0001*
8- Assess the physiological responses to L. pain.	41	68.3	13	21.7	6	10.0	3	5.0	2	3.3	55	91.7	3	5.0	9	15.0	48	80.0	107.857	0.0001*
9- Assess the behavioral responses to L. pain.	42	70.0	10	16.7	8	13.3	2	3.3	2	3.3	56	93.3	2	3.3	9	15.0	49	81.7	110.693	0.0001*
10- Ask woman to choose pain relive method from the available options as; acupressure points and epidural analgesia.	43	71.7	9	15.0	8	13.3	2	3.3	2	3.3	56	93.3	1	1.7	6	10.0	53	86.3	116.343	0.0001*
11- Assess the effectiveness of the chosen method.	48	80.0	7	11.7	5	8.3	2	3.3	2	3.3	56	93.3	3	5.0	4	6.7	53	88.3	124.179	0.0001*
12- Perform post procedure tasks.	42	70.0	9	15.0	9	15.0	2	3.3	2	3.3	56	93.3	3	5.0	4	6.7	53	88.3	106.829	0.0001*
Total practice responses (Mean frequency)	**39**	**65.0**	**11**	**18.3**	**10**	**16.7**	**3**	**5.0**	**5**	**8.3**	**52**	**86.7**	**6**	**10.0**	**8**	**13.3**	**46**	**76.7**	**88.717**	**0.0001***

***Statistically significant (P<0.05)**

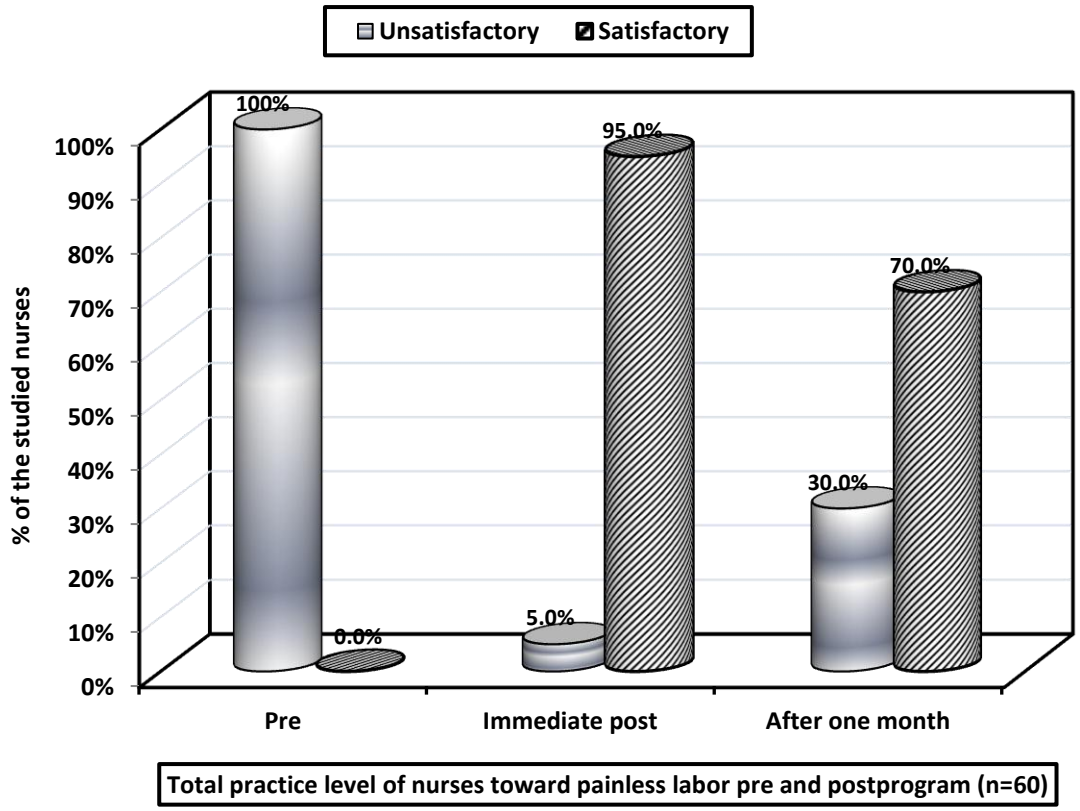

Figure (3): Total practices scores' level of the studied nurses toward painless labor pre and post in-service training program (n=60).

Table (4): Correlation between total knowledge scores, total attitude scores and practice scores among the studied nurses toward painless labor pre and post in-service training program (n=60).

Variables	Total knowledge scores of the studied nurses pre and post in-service training program (n=60)					
	Pre		Immediate post		One month post	
	r	P	r	P	r	P
Total attitude scores	0.213	0.103	0.604	0.0001*	0.310	0.016*
Total practice scores	0.419	0.001*	0.415	0.001*	0.444	0.0001*

***Statistically significant (P<0.05)**
r=Correlation Coefficient

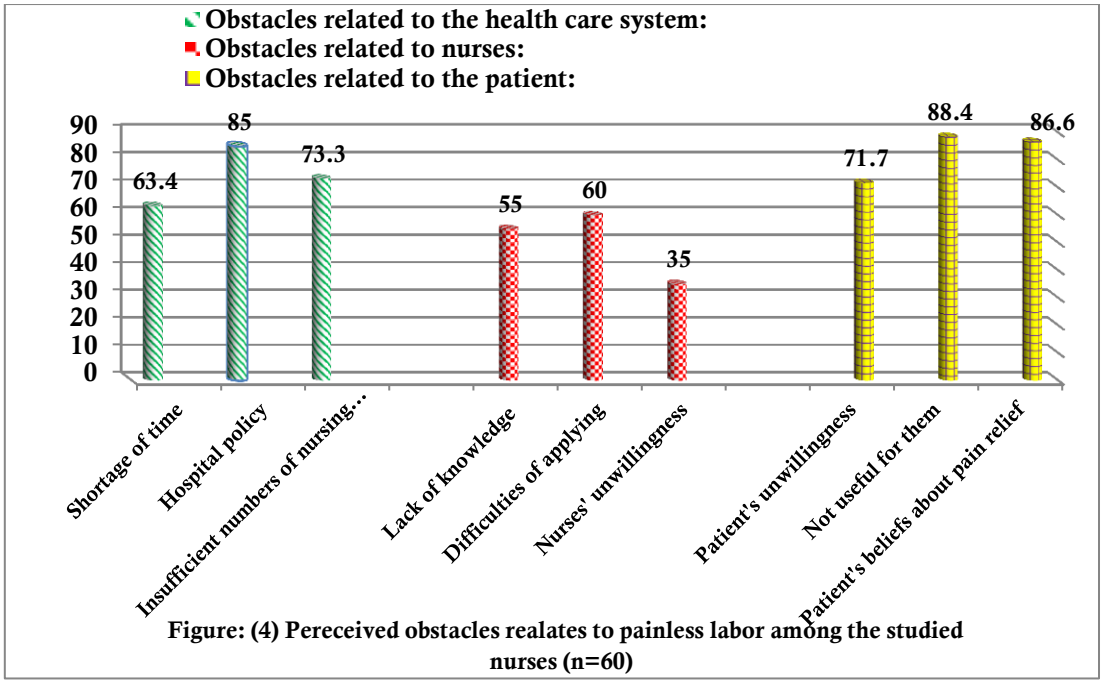

Figure: (4) Pereceived obstacles realates to painless labor among the studied nurses (n=60)

Figure (4): Perceived obstacles related to painless labor among the studied nurses (n=60).

Discussion

Painless labor is currently one of the milestones of current obstetric care and one of the emerging topics in the international health scenario, beyond women's expectations, a care that affects their health without harm and with better birth outcome and maternal wellbeing. [33, 34] The present study aimed to determine the effect of an in-service training program among obstetric nurses regarding painless labor in labor units. The results revealed improvement in nurses' knowledge, practice and positive attitude regarding painless labor. This result support study hypothesis "Nurses' knowledge, attitude and practices regarding painless labor may improve after in-service training program". The results of the present study revealed that; the age of the studied nurses ranged from 21-59 years old, with a mean of 27.58±4.58 and more than half of them were divorced. Also, more than half of them had Nursing Technician Diploma with years of experience ranged from 1-15 years, and all studied nurses had no previous training courses regarding painless labor.

Early information and knowledge about painless labor can empower women to make informed decisions towards pain management and be prepared for the labor process. This in turn, will reduces their fear and anxiety, promote an easy labor process, increase women's satisfaction with childbirth experience as well as leads to better birth outcome. Hence, nurses employed in prenatal health care setting need to have accurate and up-to-date knowledge regarding painless labor. [33,35,36] **In relation to the total score of knowledge regarding painless labor among the studied nurses** in the present study, none of the studied nurses had high total score of knowledge regarding painless labor before implementation of the in-service training program. **Endalew N et al., (2020)** [16] conducted a cross sectional study to explore final year midwifery students' knowledge and attitudes towards pain relief during labor, almost more than half of the students were not aware of painless labor. Other researchers add that provision of painless labor methods remains infrequent due to lack of knowledge which is considered to be the main obstacles that prevent women from using these methods especially in developing countries. [12, 37]

While, the total score of knowledge in the present study was significantly improved among the majority of them immediately after the sessions and more than four-fifths of them one month after implementation of the in-service training program, with a highly statistically significant difference regarding knowledge about painless labor pre- and post-program. This may be due to effect of the in-service training program. This finding is in line with **Hasan R et al.,(2020)** [38] who mentioned that there is a significant positive correlation between pretest and posttest after the implementation of education program for nurse- midwives regarding knowledge about non-pharmacological management for labor pain. Also, **Rabello R. (2018)** [39] whose study was to incorporate a structured teaching program to educate nurses regarding pain control strategies during labor and to assess its effectiveness, revealed that a majority of the nurses in her study had inadequate knowledge in the pre-test phase but gained a significant amount of knowledge post-test.

Other researchers have investigated the role of intervention programs used within the field of obstetrics. **Abu Hadaf T et al., (2019)[40]** assessed the perception of the graduates of the professional diploma in midwifery educational program regarding the effect of the program on graduates' knowledge, attitudes, and practices (KAP), and found that the participants' level of knowledge increased after completing the program . Also, **Abd El-Razek A(2017)[41] ,**evaluated the effect of instructional intervention program on obstetrics nurses information and perceptions relating to TENS throughout labor, and found that it was effective and significantly improved nurses' information relating to TENS. **Mahmoud H (2020) [42]** also found that the educational program was effective in improving nurses' knowledge regarding pain intervention in post-program than before in premature infant. Moreover, **Büyük E (2020) [43]** whose study aimed to find the effect of video‑assisted training given to midwifery and nursing students about pain and its management in newborns on the knowledge level of students, found that students' knowledge increased after the training .Furthermore, other studies were consistent with the current study, which reported that pain education program was effective in improving nurses' pain knowledge. [44-46]

Regarding the studied nurses' attitudes towards painless labor, nearly two-thirds of them had a positive attitude toward painless labor before program application, The present finding agree with **Ogboli-Nwasor E et al., (2011) [47] and Kannan B** and **Rengasamy C (2017) [48] findings.** On contrast, **Melesse A et al., (2022) [37]** and **Solomon E et al., (2021) [12]** indicated that provision of painless labor methods remains infrequent due to poor attitudes among health care providers which are considered to be the main obstacles that prevent women from using pain management methods especially in developing countries. Also, **Endalew N et al., (2020) [16]**, mentioned that most participants in there study have shown negative attitude towards labor analgesia before the program, then the attitude was significantly improved to the majority of them immediately post-program and slightly decreased to more than four-fifths one month later with a highly statistically significant difference. This findings is supported by **Abu Hadaf Tet al., (2019) [40]** findings. They found that the graduates of the professional diploma in midwifery educational program s' attitudes become more positive towards caring for clients after completing education program and all items about the perception of the attitude were statistically significant. Also, **Abd El-Razek A (2017) [41] ,** found that the instructional intervention program for obstetrics nurses was effective and significantly improved nurses' attitudes relating to TENS. These results are also congruent with two other studies that concluded that educational programs are effective means of improving nurses' attitudes. [49,50] Other studies, reported that a pain education program was effective in improving nurses' pain attitudes toward pain management. [44-46]

Nowadays, painless labor methods are widely spread in obstetric field and it becomes a corner stone in management of labor pain which are done by trained obstetrician or delegated to the nurses by primary care providers. Therefore, these painless labor methods are one of the primary responsibilities of the maternity

nurses in the current obstetric practice. [51] **Concerning total score of practices regarding painless labor among the studied nurses,** none of them had satisfactory practices before implementation of the in-service training program, then the total practices score was significantly improved among the majority of them immediately after the sessions and nearly three-quarters of them one month after implementation of the program. This result agrees with **Hasan R et al.,(2020)** [51] findings. They concluded that the educational program can be considered as an effective mean for improvement of the nurses-midwives' practices about the importance pain management. Also, **Bo S et al.,(2020)** [52]explored the value of mind map in assisting midwife-led labor in pain management and found that it can significantly enhance patients' self-efficacy, reduce cesarean delivery, reduce pain, and improve the quality of life. Moreover, **Abu Hadaf T et al., (2019)** [40] found that the most of the graduates of the professional diploma in midwifery educational program s' practices level was higher after completing education program. **Higgins A et al., (2016)** [53] also suggested that prenatal mental health education module was effective in improving the self-reported skills of student midwives towards women with health issues. Furthermore, **Rabello R (2018)** [39] revealed that a majority of the nurses in her study employed poor practices in the pre-test phase but adopted better practices post-test. **Mahmoud H (2020)** [42] found that the educational program was also effective in improving nurses' practices regarding pain intervention in post-program than before in premature infant.

Concerning the correlation between the studied nurses' total score of knowledge with their total score of attitude toward painless labor and the total practices score regarding painless labor , there was a strong positive correlation between them before**,** immediate and one month after implementation of the in-service training program. These findings are consistent with **Abu Hadaf Tet al., (2019)** [40] , and **Suchitra J and Lakshmi Devi N(2007)**[54], studies which concluded that education has a positive effect on the maintenance of knowledge, attitude and practices in all the categories of employees. These results also agree with **Reis Met al., (2013)** [55], findings .They illustrated there are positive relation between knowledge, attitudes and practices among university students in Portugal regarding to contraceptive and transmitted infection.

In relation to **the perceived obstacles related to the application of painless labor among the studied nurses**, the reported barriers were categorized into three; health care system-related, nurse-related and mother-centered barriers. In the health care system-related barriers; hospital policy were perceived as the main obstacles by more than four-fifths of the studied nurses ,followed by insufficient staff members and shortage of time among nearly three – quarters and two-thirds of the studied nurses, respectively. These results agree with **Ponnusamy R et al., (2018)** [56] who found that obstetricians felt that non availability of anesthesiologist as their main barrier which was similar to **Wassihun B et al.,(2022)** [14]**.** Similar finding were found in other studies.[57,58] Insufficient staff and shortage of time among maternity care providers causes excessive workload and increased

client turnover invariably place a lot of stress on the few practicing nurses and midwives, leading to staff burnout and impaired work efficiency . [(59)] **Also, Almushait M, & Abdel Ghani R. (2014)[(60)]** found that regulatory issues, and lack of time were recorded as the highest barriers among health-care providers regarding non-pharmacological pain relief during labor.

Regarding nurse-related barriers in the current study; two –thirds and more than half of the studied nurses reported that difficulties of applying painless labor methods and lack of knowledge about it are considered the obstacles from their side. While, in the barriers related to mothers; the majority of the studied nurses mentioned that women's beliefs about pain and their thoughts that painless labor methods will be not useful for them, as well as women's unwillingness mentioned by less than three-quarters of them are the most noticed barriers. These findings agree with **Almushait M & Abdel Ghani R. (2014) [(60)]** findings. Moreover**, Mousa O et al.(2018) [(30)]**add that there is an urgent need to identify the barriers against and raise the awareness among the community and health professionals of the need to use pain-relief methods as part of improving the quality of care during labor. Despite the encouragement of public humanization policies, the technocratic model is still present in obstetric care during childbirth. The humanization of obstetric care requires changes in attitudes and care paradigms, in order to guarantee respect and the right to quality care. [(61)]

Conclusion

Application of the in-service training program achieved significant improvement in obstetric nurses' knowledge and practices related to painless labor as well as it had a positive effect on their attitude. The study also reveals that the major barriers for applying painless labor from nurses' perspective are the hospital policy, insufficient nursing staff, lack of knowledge and difficult of applying it among nurses as well as parous women's believes that pain management methods had no benefits for them.

Recommendations: distribution of the educational booklet for all nurses as well as other health care providers in the obstetric department in order to enhance the awareness about benefits of painless labor. In addition to replication of the program in other geographical areas in Egypt to enhance awareness about of painless labor. Integrating the concept of painless labor in nursing curriculum and hospital policy. The study also suggested equipping obstetric departments with simple illustrated posters covering various non-pharmacological and pharmacological methods of painless labor and distributing them on parous women to gain their attention and co-operation.

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Effect of Virtual Reality- Based Rehabilitation Program Versus Booklet-Based Education on Self-Care Practices and Prevention of Complications among Women after Mastectomy

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Abstract

Background: Breast cancer is a common malignancy among women worldwide. With an estimated 2.1 million new cases being diagnosed each year and accounting for 24.2% of all cancer diagnoses among women, it is the most frequent disease in women. Virtual reality-based rehabilitation (VRBR) is a relatively new method that might make it easier to simulate doing functional tasks than conventional rehabilitation. **The aim of the study** was to compare the effect of Virtual Reality- based rehabilitation program versus booklet-based education on self-care practices and prevention of complications among women after modified radical mastectomy. **Design:** A quasi-experimental (Case-Control) research design was used to carry out this study. **Setting:** The study was conducted at Damanhour oncology center in El-Beheira governorate. **Sample:** A convenient sample of 100 female patients was included in the study. **Tools of data collection:** Three tools were used for data collection Tool I: Socio-Demographic characteristics and Health Profile Structured Interview questionnaire. Tool II: Self-care practices of modified radical mastectomy structured interview schedule. Tool III: Early post modified radical mastectomy complications checklist. **Result:** Virtual reality group has higher mean scores than the booklet group in relation to all the studied dimensions as well as the total score of the self-care practices. The differences are statistically significant in all studied items (P= 0.000), except for some items such as follow-up (P=0.305), pain management (P=0.051), skin care (P=0.722) and proper nutrition (P=0.794). **Conclusion:** According to the findings of the current study it can be concluded that virtual reality-based rehabilitation program is more effective than booklet-based rehabilitation program in improving self-care practices and prevention of complications among women after mastectomy. **Recommendation:** The application of virtual reality-based rehabilitation programs after mastectomy should be incorporated into the daily care of post-mastectomy women in oncology centers and hospitals.

Keywords: Breast cancer, Virtual Reality (VR), Self-care practices, prevention of complications, modified radical mastectomy, and rehabilitation program.

Introduction

Breast cancer is a common malignancy among women worldwide. With an estimated 2.1 million new cases being diagnosed each year and accounting for 24.2% of all cancer diagnoses among women, it is the most common disease in women. It affects 1 in 4 women worldwide and is a factor in 15% of fatalities. The incidence of breast cancer is increasing in the developing world due to increased life expectancy, increased urbanization and adoption of western lifestyles [1, 2].

Breast cancer is a term used to describe malignancies that develop from breast tissue, most frequently from the lobules that feed the milk ducts with milk or the inner lining of the milk ducts. Ductal carcinomas are cancers that begin in ducts, whereas lobular carcinomas are cancers that begin in lobules[3].

A higher risk of breast cancer is linked to a number of factors. These elements don't always lead to breast cancer. Some are indicators of other risk factors that are still unknown or suspected. Sex, age, absence of pregnancy or nursing, and increased hormone levels have been identified as the main risk factors. A high-fat diet, alcohol consumption, obesity, and environmental variables like smoking, radiation, and endocrine disruptors are additional risk factors. Despite the minimal radiation exposure from mammography, the cumulative effect can lead to cancer [4].

The interdisciplinary method used today to treat breast cancer includes surgery, radiation, hormone therapy, and chemotherapy. Breast cancer treatment largely involves surgery. It is the fundamental technique to employ for disease local control. The procedure most frequently used to treat breast cancer was the Halsted radical mastectomy for many years. Halsted's radical mastectomy entails both excision of both pectoralis muscles and removal of the breast along with axillary lymph nodes. Due to the high likelihood of morbidity without a survival advantage, it is no longer advised. The modified radical mastectomy performed on Patey is now more well-known. The whole breast tissue, together with a sizable portion of the skin, the axillary lymph nodes, and the pectoralis major muscle, must be removed [3].

The quality of life of patients may be impacted by a variety of problems following a modified radical mastectomy, including seroma formation, wound infection, skin flap necrosis, lymph edoema, haemorrhage, hematoma formation, paresthesia, and muscle paralysis. Additionally, even in the absence of preexisting shoulder issues, many breast cancer patients who had surgical excision experience postoperative shoulder pain and decreased range of motion [5-6]. So, physical therapy activities included in post-operative rehabilitation programs are useful in reversing these alterations. Additionally, educating patients on self-care practices is essential for avoiding post-operative problems [7-8].

Virtual Reality Based Rehabilitation (VRBR) is a relatively new method that might make it easier to imitate practicing functional tasks than traditional rehabilitation. When compared to traditional rehabilitation, VRBR aims to imitate real-world activities, which might offer more engaging challenges. It consists of methods that let people explore with their senses using informatics technologies [9].

Patients can conduct real-time tasks, anticipate and respond to objects or events in

a range of secure 3-dimensional environments using virtual reality, an advanced computer-human interface. Virtual reality (VR) is described operationally as a type of digital technology where users can interact with virtual objects using artificially produced sensory experiences (such as visual, aural, tactile, and olfactory inputs). VR therapy is more engaging than traditional therapy because it gives users the chance to enhance repetitive tasks and boost visual and audio feedback [(10)]. Additionally, the use of virtual reality encourages more workout repetitions and fosters motor learning by providing quick feedback on tasks that are accomplished and are connected to real-world activities [(9)].

As a member of the multidisciplinary team, nursing staff bring a variety of abilities to the table. Because they interact with patients more frequently than any other member of the medical staff, they play a crucial role in the physical and psychological treatment of breast cancer patients [(11)]. Helping breast cancer patients who have surgery get back to their normal lives is the main objective of nursing care [(12)]. Community health nurses provide a continuum of care for breast cancer patients, beginning with the promotion of health and awareness and continuing with specialist and expert work in settings that provide services to them, such as health centers, hospitals, and homes [(13)]. They also have a significant impact on patients' lives by offering high-quality treatment, information, and psychosocial support throughout the post-operative period [(14)].

Significance of the study

Breast cancer is a significant health concern in Egypt, with an estimated incidence rate of 48.7 cases per 100,000 women in 2020, according to the Global Cancer Observatory [(15)]. After mastectomy, a significant number of women develop complications that can affect their function and quality of life. Prevention of these complications will help relieve the suffering and improve patients' quality of life [(16)]. Different studies showed that a post-mastectomy rehabilitation program is necessary to control early postoperative complications and increase women's awareness about the importance of self-care practices and adherence to follow the schedule of checkups. Moreover, it helps to decrease complications and emotional disturbances and enhance self-care practice. Furthermore, experiencing a VR encounter through multisensory interactive methods like seeing and hearing offers a novel, immediate, and distinctive setting that can increase people's excitement and improve their ability to perform tasks.

Aim of the study

The aim of this study was to compare the effect of virtual reality- based rehabilitation program versus booklet-based education on self-care practices and prevention of complications among women after modified radical mastectomy.

Research hypotheses

H1: post mastectomy women who involved in virtual reality based program exhibit improvement in self-care practice than those in booklet-based education

H2: post mastectomy women who involved in virtual reality based program experience less complications than those in booklet-based education.

Operational definitions

- In this study early postoperative mastectomy complications refer to seroma formation, lymphedema, wound infection, parasthesia, hematoma, hemorrhage, flap necrosis, deep vein thrombosis and anxiety

among geriatric patients undergoing mastectomy.

- Mastectomy in the study refers to the modified radical type which is the removal of the breast tissue and an axillary lymph node dissection; the pectoralis major and minor muscles remain intact.

Subjects and method

Research design: A quasi-experimental (Case-Control) research design was used to carry out this study.

Setting: The study was conducted at Damanhour oncology center in El-Beheira governorate.

Subjects: The study subjects were the female patients with breast cancer who were undergoing a modified radical mastectomy in the previously mentioned setting. Selection of the subjects was based on the following criteria:

- No previous history for breast cancer,
- No previous injury, or surgery in the affected upper limb,
- No previous chemotherapy or radiotherapy before the surgery,
- Willing to participate in the study and able to communicate.

Sample size: The World Health Organization and the Centers for Disease Control and Prevention in Atlanta, Georgia, USA, version 2002, developed Epi-Info 7, a statistical programme 25, which was used to determine the sample size and power analysis. The criteria used for sample size calculation were as follows: Total population of 256 women per year, confidence limit of 95%, margin of error of 5%, and population proportion of 50%. The sample size based on the previously mentioned criteria was 100 patients.

Patients were selected conveniently and randomly assigned to one of the two groups (50 women in each one). The study group (VR group) who received virtual reality based rehabilitation program and the control group (booklet group) who received the hospital conventional educational booklet.

Tools: Three tools were used for data collection.

Tool (I): Structured Interview Questionnaire: This tool was developed by the researcher based on relevant literature to collect the required data, it included two parts:

Part I: Socio-demographic characteristics: it included data about the patients such as age, marital status, place of residence, educational level, working status, and family income.

Part II: **Health profile:** it included data such as the family history of breast cancer, onset of breast cancer's diagnosis, manifestations, compliance with the prescribed medications, and presence of chronic disease.

Tool (II): Self-Care Practices of Modified Radical Mastectomy Structured Interview Schedule.

This tool was developed by **El Garhy S. et al., (2021)** [16] and it was adapted by the researcher to evaluate the female patients post mastectomy self-care practices. It was used to assess patient's maintenance of self-care practices to prevent early post-operative mastectomy complications. These practices include pain management; wound care, prevention of wound infection, managing fatigue, managing nausea and vomiting, prevention of lymphedema, follow up, anxiety and stress management, prevention of DVT, arm exercises and proper nutrition. The total number of questions was 81 questions. All items were scored using a 5-point Likert scale in terms of frequency as the following: 5 for often, 4 for always, 3 for sometimes, 2 for rarely and 1 for never. Score of all items

were summed together and total score was ranged between 81 and 405.

Tool (III): Early Post Modified Radical Mastectomy Complications Checklist:

This tool was developed by **Awan et al., (2011)** [17] to monitor the presence or absence of early post-operative modified radical mastectomy complications such as (Seroma formation, lymphedema, Paresthesia, Hematoma).

Methods

I- Administrative process

- An official letter was issued from the Faculty of Nursing, Damanhour University to the director of the Damanhur Oncology Centre to facilitate the implementation of the study.
- A meeting was held with the director of the selected facility to obtain his approval after clarifying the purpose of the study, setting the time for the beginning of the study, and gaining his cooperation and support during data collection.
- **Development of study tools**
  - The study tool I was developed by the researchers after an extensive review of the relevant and recent literature. While, tool II and III were adapted by the researchers [16,17].
  - The content validity of the study tools was tested by a jury of five experts in the fields of community health nursing and medical surgical nursing and their opinions and suggestions were taken into consideration.
  - Reliability of the study tools II and III was tested for internal consistency using Cronbach's alpha test. The reliability result for tool II, (self-care practices of modified radical mastectomy structured interview schedule) was r=0.93 and tool III reliability (early post modified radical mastectomy complications checklist) was r= 0.97.

II- Pilot study

To evaluate the applicability, clarity, and viability of the study instruments and those that weren't included in the study subject, a pilot study was conducted on 10 female patients (representing 10% of the sample) who had been diagnosed with breast cancer and were having mastectomy surgery. Accordingly, the necessary adjustments were made.

III- Field work

The program was accomplished in a period of 10 months (from the beginning of March 2022 to the end of December 2022.), and included the following phases:

a) Assessment phase

- The researchers explained the aim of the study and its pathway to all study participants.
- Initial assessment of both groups using study tools (I), and (III) was carried out to assess patients' socio-demographic characteristics and health profile and to exclude the presence of any of the complications before implementation of the program.

b) Planning phase

- The program objectives were determined according to the recent relevant literature and the obtained results from the initial assessment.
- The Plan of the training was formulated.
- The dates of the sessions were planned and scheduled with patients.
- Appropriate equipment and educational materials were prepared:
- Hospital routinely used educational booklet for women undergoing modified radical mastectomy.

- Vision VR TM itek TM.
- Cell phone.

Figure I): Vision VR TM itek TM

c) Implementation phase

This phase included the execution of the program plan.

- The female patients assigned to the control group received the routine oncology center care provided for all patients with modified radical mastectomy (booklet method). The researcher met the patients during the follow up appointments in the outpatient clinic in order to maintain relationship with patients and assess presence of any complication.
- The program was implemented for VR group through six individual sessions with the patients. Three sessions were conducted in inpatient department at female surgical ward and three sessions were conducted in the outpatient clinic after discharge. The researcher met the patients during the follow up appointments in the outpatient clinic. **Training was conducted over the following sessions**

➢ **First session (in the day of inpatient admission)**: It took about 30 minutes. This session was including the following:

- Provide information about breast cancer such as definition, risk factors, sings & symptoms, diagnosis, and treatment.
- Showing VR videos about the importance of post mastectomy exercises, how to develop a successful exercise routine, how to perform the first operational day exercises and deep breathing exercise and how to manage anxiety and stress.

-Re-demonstrate of exercises by using VR games.

➢ **Second session (zero day of operation):** it took about 30 minutes. It started during the evening shift to the beginning of night shift of the same day of the surgery (7-9 pm) to give a chance for the patient to tolerate pain, regain her ability to communicate and follow the given instructions. This session was including the following:

- Revision of the instructions given in the previous session about deep breathing exercise, and the 1st postoperative day exercise as rang of motion or muscle strength exercises.
- Showing VR videos about pain management, positioning after mastectomy management of nausea and vomiting, prevention of deep vein thrombosis (DVT) and warning signs and symptoms that require seeking medical advice.

➢ **Third session (in the morning of the first post-operative day).** It was focused on:

- Revision of the instructions given in previous session.
- Re-demonstrate of exercises by using VR games.
- Showing VR videos about arm and shoulder exercises which begin with these easy exercises and then move on to the more advanced exercises once feel stronger. By the end of this stage, patients should have full movement of the affected arm and shoulder. It's including: wand

exercise, winging it, snow angels, posture, wall climbing, and side bends and instructed the patients to repeat these exercises 5 or 10 times a day for at least 20-minute period of time and continue during the first 6 weeks after surgery

- **Fourth session :** This session was focused on the following:
  - Revision of the instructions given in previous session.
  - Showing VR videos about proper nutrition and wound care and prevention of wound infection
  - Re-demonstrate of exercises by using VR games.
- **Fifth session:** This session was focused on the following:
  - Revision of the instructions given in previous session.
  - Showing VR videos about personal hygiene, proper skin care, and how to manage fatigue.
  - Re-demonstrate of exercises by using VR games.
- **Sixth session:** This session was focused on the following:
  - Revision of the instructions given in previous session.
  - Showing VR videos about early post-operative mastectomy complications (Lymphedema, Hematoma, Paresthesia, and Seroma): how to detect and how to prevent.
  - Re-demonstrate of exercises by using VR games.

d) Evaluation Phase

After 14 days from the operation date, the researcher interviewed the female patients in the VR and booklet groups and reviewed their charts to evaluate the occurrence of early post-operative mastectomy complications by using the study tool (III) (early post modified radical mastectomy complications checklist). Also, patients in both groups were evaluated regarding their adherence to self-care practices after mastectomy by using the study tool (II) (self-care practices of modified radical mastectomy structured interview schedule).

Ethical considerations

- The Damanhour University nursing faculty's ethics committee granted permission for the study to be carried out.
- Informed written consents were obtained from the women patients in the previously mentioned setting after a brief explanation of the purpose and nature of the research.
- Women's privacy was maintained all the time during all sessions, especially in the outpatient clinic.
- Confidentiality and anonymity of individual responses were guaranteed by a statement in the cover letter and using code numbers instead of names.

Descriptive statistics

1. The qualitative data are described and summarized using count and percentage.
2. The arithmetic mean and standard deviation (Mean SD) are used to describe normally distributed quantitative data as measurements of central tendency and dispersion.

Analytical statistics

1. Chi test (χ^2): used to assess the relationship between two qualitative variables or to identify variations between two or more proportions.
2. Student t-test of significance: used to determine whether the means of two distinct groups are statistically different from one another.

Results

Table I shows that 40.0% of the VR group and 36.0% of the booklet group ranged from 50 to less than 60 years ,with the mean and standard deviation of the patient's age being 58.8±3.45.2. In relation to marital status, 54.0% of the VR group was married, compared to 70.0% of the booklet group. While 36.0% of the study group and 22.0% of the booklet group were widows. Only 2.0% of the VR group and booklet group were single. In relation to education, 26.0% of the VR group and the same in the booklet group were illiterate, read, and wrote. With respect to the place of residence 78.0% of the VR group, compared to 70.0% of the booklet group, lived in rural areas. In addition, 8.0% of the VR group, compared to 16.0% of the booklet group, was currently working. Lastly, 42.0% of the VR group, compared to 46.0% of the booklet group, reported sufficient monthly income.

Table II portrays that, most subjects in VR and booklet groups (72.0% and 62.0 %, respectively) had no family history for breast cancer, and 44.0% of the VR group and 50.0% of the booklet group were diagnosed with breast cancer for less than two months. With regard to manifestations of breast cancer, the change in shape and size of the breast was the main manifestation reported by 56.0% of the VR group compared to 64.0% of the booklet group. As regards to compliance with the prescribed medications, 70.0% of the patients in the VR group and 60.0% of those in the booklet group were taking prescribed medications regularly.

Figure 1 illustrates that, only 20.0% of VR group and 30.0% of the booklet group were free from chronic diseases. Diabetes mellitus and heart disease were the most reported diseases among the total subjects. Diabetes was reported by 30.0% of the VR group and 26.0% of the booklet group. Additionally, heart diseases were reported by 30.0% of the VR group and 28.0% of the booklet group. On the other hand, only 6.0% of subjects in both groups reported having respiratory diseases and arthritis.

Table III shows that lymphedema occurred in only 6.0% of the VR group compared to 26.0% in the booklet group. Regarding hematoma, it was the most common complication among booklet group (50.0%) compared to only 10.0% in the VR group. As regards Seroma, it occurred more among the booklet group (46.0%) compared to 24.0% among the VR group. Additionally, paresthesia occurred more among the booklet group (24.0%) compared to 16.0% among the VR group. Moreover, the table displays statistically significant differences between both groups in the occurrence of lymphedema, hematoma, and seroma (P= 0.006, P= 0.000, and P= 0.021 respectively).

Table IV shows comparing mean score of self-care practice in both groups. It appears from the table that the VR group has higher mean scores than the Booklet group in relation to all the studied dimensions as well as the total score of the self-care practices. The differences are statistically significant in all studied items (P= 0.000), except for some items such as follow-up (P=0.305), pain management (P=0.051), skin care (P=0.722) and proper nutrition (P=0.794).

Table V shows the relation between VR groups means score of self-care practices and presence of complications after implementation of the rehabilitation program. The table reveals that self-care practices mean score is higher among female patients who had no complications (355.57±8.406) than those who had complications (349.67± 8.505). Moreover, the table demonstrates no statistically significant relationship between self-care practice and presence of complications (t= 1.331, P = 0.191).

Table I: Distribution of the studied female patients in both groups according to their socio-demographic characteristics.

Items	Group type				Total (n=100)		Test of significant χ^2
	VR group (n=50)		Booklet group (n=50)				
	No	%	No	%	No	%	
Age (in years)							
- 40-	14	28.0	15	30.0	29	29	
- 50-	20	40.0	18	36.0	38	38	X= 0.412
- 60-	10	20.0	12	24.0	22	22	P= 0.937
- ≥70	6	12.0	5	10.0	11	11	
Mean ± SD	58.25±3.736		59.5±2.179		58.87±3.457		
Marital status							
- Single	1	2.0	1	2.0	2	2.0	
- Married	27	54.0	35	70.0	62	62.0	X=2.864
- Divorced	4	8.0	3	6.0	7	7.0	P=0.412
- Widowed	18	36.0	11	22.0	29	29.0	
Levels of education							
- Illiterate and Read and write	13	26.0	13	26.0	26	26.0	
- Basic education	22	44.0	25	50.0	47	47.0	X=0.905
- Secondary and technical	11	22.0	10	20.0	21	21.0	P=0.824
education	4	8.0	2	4.0	6	6.0	
- University education							
Place of residence							
- Urban	11	22.0	15	30.0	26	26.0	X=0.8310
- Rural	39	78.0	35	70.0	74	74.0	P=0.361
Current work							
- Working	4	8.0	8	16.0	12	12.0	X=1.515
- Not working	46	92.0	42	84.0	88	88.0	P=0.218
Income sufficiency							
- Sufficient	21	42.0	23	46.0	44	44.0	X=0.162
- Insufficient	29	58.0	27	54.0	56	56.0	P=0.687

X^2= Chi Square test * Significant $P \leq 0.05$

Table II: Distribution of the studied female patients in both groups according to their health profile.

Items	Group type				Total (n=100)	
	VR group (n=50)		Booklet group (n=50)			
	No	%	No	%	No	%
Family History of cancer						
- Yes	14	28.0	19	38.0	33	33.0
- No	36	72.0	31	62.0	67	67.0
Onset of breast cancer's diagnosis						
- Less than 2 months	22	44.0	25	50.0	47	47.0
- 2-4 months	14	28.0	17	34.0	31	31.0
- 4-6 months	9	18.0	4	8.0	13	13.0
- More than 6 months	5	10.0	4	8.0	9	9.0
Manifestations#						
- Change shape/size of breast	28	56.0	32	64.0	60	60.0
- Abnormal nipple discharge	10	20.0	5	10.0	15	15.0
- Change texture of breast	3	6.0	7	14.0	10	10.0
- Swelling of lymph nods	7	14.0	5	10.0	12	12.0
- Pain	9	18.0	11	22.0	20	20.0
Compliance with the prescribed medications						
- Yes	35	70.0	30	60.0	65	65.0
- No	15	30.0	20	40.0	35	35.0

Responses are NOT mutually exclusive.

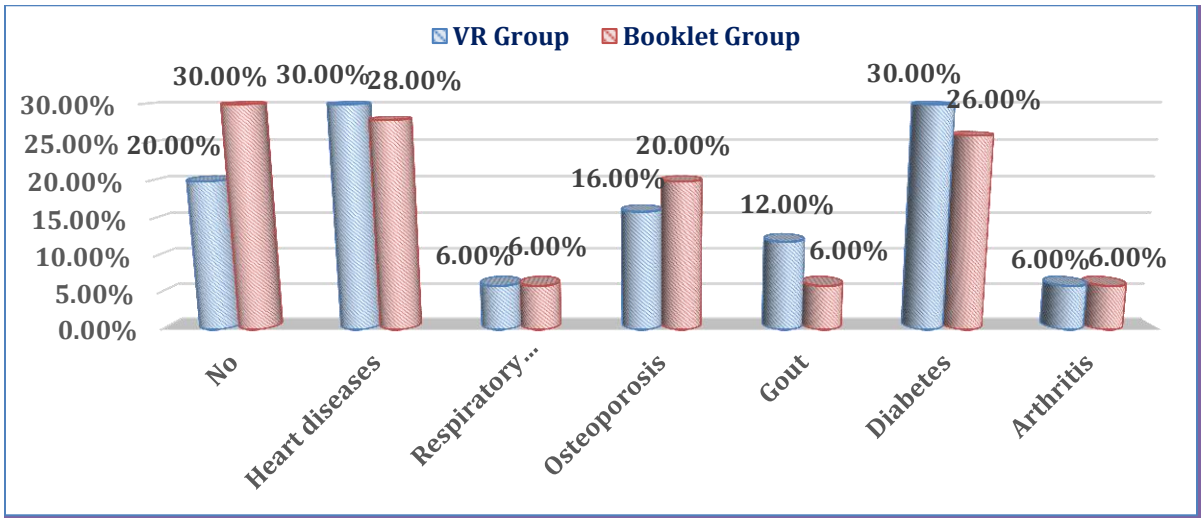

Figure 1: Distribution of the studied female patients in both groups according to presence of chronic diseases.

Table III: Distribution of the studied female patients in both groups according to presence of post mastectomy complications.

Items	Group type				Total (n=100)		Test of significance
	VR group (n=50)		Booklet group (n=50)				
	No	%	No	%	No	%	
Lymphedema							
- No	47	94.0	37	74.0	84	84.0	X^2 = 7.4405
- Yes	3	6.0	13	26.0	16	16.0	P= 0.006*
Hematoma							
- No	45	90.0	25	50.0	70	70.0	X^2 = 19.047
- Yes	5	10.0	25	50.0	30	30.0	P= 0.000*
Paresthesia							
- No	42	84.0	38	76.0	80	80.0	X^2 = 0.999
- Yes	8	16.0	12	24.0	20	20.0	P= 0.317
Seroma							
- No	38	76.0	27	54.0	65	65.0	X^2 = 5.318
- Yes	12	24.0	23	46.0	35	35.0	P= 0.021*

X2: Chi square test **t**= student t test * Significant p at ≤0.05

Table IV: Comparing mean score of self-care practice in both groups

Items	Group type		Test of significance
	VR group (n=50)	Booklet group (n=50)	
	Mean ±SD	Mean ±SD	
Pain management	28.15±1.88	28.75±1.75	t = 1.6518 P= 0.051
Wound care	31.55±1.887	29.50±2.28	t = 4.8979 P= 0.000*
Prevention of wound infection	30.27±1.882	23.91±1.18	t = 20.2455 P= 0.000*
Managing fatigue	14.87±1.817	12.68± 2.25	t = 5.354 P= 0.000*
Managing nausea and vomiting	19.30±0.661	17.32±3.78	t = 3.6485 P= 0.004*
Prevention of lymphedema	42.75±2.845	34.75±4.68	t = 10.333 P= 0.000*
Follow up	51.45±3.716	50.15±8.11	t = 1.030 P= 0.305
Anxiety and stress management	20.61 ±0.829	16.87 ±3.19	t = 8.023 P= 0.000*
Prevention of DVT	25.80±1.224	21.98±5.91	t = 4.475 P= 0.000*
Proper nutrition	17.65±2.070	17.83±4.42	t = 0.2608 P= 0.794
Arm exercises	27.70±1.220	21.78±5.91	t = 4.465 P= 0.020*
Skin care	19.20± 2.066	19.43± 4.08	t = 0.355 P= 0.722
Total self-care practices	301.15±20.874	273.13±41.63	t = 4.2501 P= 0.000*

t= student t test * Significant P ≤0.05

Table V: Relation between VR groups means score of self-care practices and presence of complications after implementation of the rehabilitation program.

Items	Self-Care Mean Score (Mean ± SD)	Test of significance
Presence of complications		
- Yes	349.67± 8.505	t= 1.331
- No	355.57± 8.406	P= 0.191

t = Student t test * Significant p at ≤0.05

Discussion

The second greatest cause of death for women worldwide and one of the most often diagnosed malignancies is breast cancer. There is an urgent need to incorporate the most recent developments in breast cancer treatment that can increase patient survival and quality of life due to the high prevalence of severe physical and psychological symptoms, functional deficits, and adverse effects in patients with breast cancer both during and after treatment **Weiderpass et al (2020)** [18]. Using VR technology for rehabilitation is a novel approach to postoperative breast cancer rehabilitation. In this regard, the primary goal of the current study was to examine the impact of rehabilitation programs based in virtual reality and booklet-based education on post-mastectomy women's self-care behaviors and the avoidance of problems.

Regarding the demographic characteristics of the studied women, the majority were between the ages of 40 and 60 in both groups (VR group and booklet group), This finding is justified by increases breast cancer incidence of women over 40 years due to changes in reproductive patterns, menopausal hormone use, the rising prevalence of obesity and genetic damage (mutations) in the body at this age **Weiderpass et al (2020)** [18]. These findings are in line with **Tsuchiya et al. (2017)** [19] **and Hunter et al. (2009)** [20]**,** who showed that less than half of the studied patients were in the age group between 40 and 50 years. This finding is also consistent with **Saleh et al. (2018)** [20]**,** who, in their study "Upper limb cancer related to breast cancer therapy: incidence, risk factors, diagnostic techniques, risk reduction, and optimal management," conducted in Egypt, reported the same median age. Additionally, this result was consistent with a study on the "Effect of educational program regarding therapeutic exercises for women undergoing mastectomy," [22] which noted that the majority of the analyzed samples were women between the ages of 40 and 55.

Concerning marital status, the present study revealed that the majority of the studied group was married; this result is in line with **Zhang X. et al. (2023)** [23], who reported that most breast cancer women were married.

Concerning the educational level, the findings of the present study revealed that 44% of the VR group and half of the booklet group had basic education. This finding disagreed with a study conducted by **Beiki et al. (2012)** [24] about "Women with the greatest educational level had a significantly greater incidence of breast cancer compared to those with lesser education, according to a study titled "Breast cancer incidence and case fatality among 4.7 million women in relation to social and ethnic background.".

Moreover, concerning residence, the findings of the present study revealed that the majority of the studied women in both groups lived in rural areas. This finding is consistent with **Sayed et al. (2018)** [25], They carried out a study in Egypt on the "Informational Needs of Newly Diagnosed Breast Cancer Women" and discovered that 76% of their participant women resided in cities.

Regarding the occupation of the studied women, the results of the current study showed that the majority of the studied women in both the VR-based education group and the booklet-based education group were not working. This result might be due to an increased percentage of unemployment, and most of the participants lived in rural areas. This result was supported by the study done by **Mohammed et al. (2021)** [26] about "effect of booklet-based education versus mobile-based education on women's arm lymphedema and their knowledge and practices regarding post mastectomy exercise", which revealed that more than two-thirds of the participant women (68.8%) were housewives.

The study's findings showed that the VR group outperformed the Booklet group in terms of mean scores for the majority of the aspects that were examined as well as the overall score for self-care practices. Self-care practices such as managing vomiting and nausea, caring for wounds, preventing wound infections, performing arm exercises and preventing lymphedema differ significantly between the VR group and the Booklet group. These results agreed with **Mohammed et al. (2021)** [26] who found that mobile education was more effective in improving post-mastectomy practices regarding exercise than those who received booklet-based education.

Moreover, these results are consistent with **Buche et al. (2021)** [27]**,** who confirmed that no matter whether immersive or participatory VR is used, it is different from traditional methods and can be provided to the patients engaged. Patients' perceptions of time shift, they experience titer-induced well-being improvements, anxiety levels drop, and they become more focused on the virtual experience, which is separated from the stressful surroundings and unpleasant stimuli.

Furthermore, valuable studies have been conducted on the effects of VR, and our results are in agreement with those of previous review studies, showing the positive effects of VR exercise therapy. **Qian et al**. **2020** [28] showed that the positive effect of VR-based exercise therapy on health outcomes was greater than 60%. Moreover, **Asadzadeh et al. (2021)** [29] illustrated that virtual reality-based exercise therapy is effective in improvement of rehabilitation outcomes.

The current study showed that the VR-based education group after implementation of the rehabilitation program had a lower incidence of lymphedema and hematoma than the booklet-based education group, and there are statistically significant differences between the two groups. This may be due to the effect of VR, which led to good adherence to self-care practices such as exercises and arm care. These results came in line with **Gautam et al. (2011)** [30]**,** who reported that the intervention group met the instructions better than the control group during the next evaluation and after eight weeks, which helped prevent the appearance of lymphedema in the study group. Also,

consistent with these findings are **Baumann et al. (2018)** [31]**,** who reported that there was a possible preventive effect of physical exercise on the appearance of lymphedema. Also, **Salime et al. (2022)** [32]**,** revealed that, after implementing a health education intervention, there was a significant improvement and increase in all of the studied women's knowledge about arm lymphedema post-mastectomy and prevention strategies. Contrary to current findings by **Paskett et al. (2021)** [33], which found no difference in the incidence of lymphedema in breast cancer patients randomized to a physiotherapy intervention with educational materials.

Regarding the association between the women's mean self-care practice score and the existence of problems following the implementation of the VR program (the study group), the current study finds no evidence of a meaningful link between these variables. However, the findings showed that women with no difficulties following mastectomy are more likely to engage in high self-care behaviors. This is supported by **Gamee et al. (2019)** [34] who noted a significant inverse relationship between exercise performance, post- and follow-up recommendations for preventing arm lymphedema, and upper extremity functional index restriction. This indicates that the patient experiences less functional restrictions or disabilities when she complies with instructions, including exercise performance and other self-managements.

Conclusion

Based on the results of the current study , it can be stated that avirtual reality –based rehabilitation program is superior to abooklet-based rehabilitation program in terms of helping women improve their self-care habits and prevent difficulties following mastectomy

Recommendations: In light of this study's findings, the following recommendations are suggested:

- Application of virtual reality based rehabilitation program after mastectomy should be emphasized and encouraged in oncology centers and hospitals.
- Application of comprehensive health education programs for women following mastectomy should be adopted to maintain good adherence to self-care practices to prevent complications.

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Effect of Oxytocin versus Oketani Massage on Breastfeeding Predictors among Primipara Women

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Abstract

Background: Breast massage is a simple, affordable, and effective technique for implementation after childbirth and adoption as the mainstay to improve breastfeeding success. This study aimed to examine the effect of oxytocin versus Oketani massage on breastfeeding predictors among primipara women. **Method:** A quasi-experimental design (nonequivalent control group pretest/posttest) was utilized. A convenience sample of 108 primipara women was selected and was divided into three groups (36 primipara women in each group control, oxytocin, and Oketani massage). **Setting:** This study was conducted at Minia University Hospital for Maternity and Child. Minia governorate, Egypt. Four tools were used: the structured interview questionnaire schedule, the LATCH Assessment tool, the Infant Breastfeeding Assessment Tool, and the Breastfeeding Self-Efficacy Scale Short Form. **Results**: There was no significant difference between the control group and the study groups in terms of mean breastfeeding support, success, and self-efficacy at pre- test ($p > 0.05$). However, at six hours and on discharge after the intervention, there were highly statistically significant differences between the control group and study after intervention in mean breastfeeding support and success Also, on discharge and at 1 week after intervention, high statistical significance (p 0.001) was found in the differences in mean Breastfeeding Self-Efficacy between the control group and the study groups. **Conclusion**: Breastfeeding support, success, and self-efficacy scores were significantly higher among the study groups than control group ($p<0.001$). **Recommendation:** Raise awareness among maternity nurses about Oxytocin and Oketani massages to be implemented into practice.

Keywords: Oxytocin, Oketani Massage, Breastfeeding Predictors, Primipara Women

Introduction

Breastfeeding is one of the most effective methods for ensuring a child's health and survival. The world health organization (WHO) recommended that solid foods be added to nursing starting at six months of age and continuing for at least another two years. Nursing should begin within an hour of delivery and should be done exclusively for the first six months of life. Worldwide, fewer than half of infants younger than six months are exclusively breastfed. In contrast to WHO recommendations, the Academy of Breastfeeding Medicine, the American Academy of Pediatrics, the United Nations Children's Fund, The Brazilian Ministry of Health, and the Indonesian Doctors Association with the same recommendation. **(1,2)**

Early breastfeeding has been shown to have numerous benefits. And its benefits are provided not only to the children and health of women but also to the society and total family. Immediate and early initiation of breastfeeding as a primary nutrient source for a child is considered essential child care. It is crucial for healthy development and growth factors. Also, it is the best food, sterile, safe, contains antibodies enzymes, and hormones, that serve as defenses against risk factors for chronic disease, guard against

allergies, promote cognitive and sensory development, improve a child's immune response to bacteria and viruses, lower rates of obesity and diabetes and raise the rate of intelligence. Additionally, it reduces the risk of sudden child death syndrome. [1-, 6]

Breastfeeding provides numerous benefits for women to increase uterine blood flow and decrease the risk of developing breast, ovarian, cervical, and uterine cancer, and use as a method of contraception. [7, 8]

Nursing success occurs when the milk passes successfully from the mother's breast to the child's mouth. Its success depends on a number of variables, including the child's desire and the recommended eight to twelve times of nursing daily. Hearing the swallowing sound of the child, the mother's breast softening with wet diapers, and an increase or decrease in weight within normal ranges are all signs of successful breastfeeding. [9]

The method of birth is one of the most crucial elements impacting the success of breastfeeding and its self-efficacy. Cesarean sections delay the start of breastfeeding; result in an early and extended separation of the mother and her child, postoperative pain, a loss of skin-to-skin contact, and a greater demand on the side of the mother for nursing support. Therefore, some mothers need more help breastfeeding, especially in the first few hours and days after giving birth. Hence, Cesarean sections hinder the onset and maintenance of effective breastfeeding and have an impact on the mother's sense of independence and self-worth. Additionally, mothers who undergo cesarean sections feel less secure in their ability to breastfeed. [10, 11, 12, 13, 14, 15]

Massage therapy is one of the standard nursing interventions for midwives and women's health that are listed in the Nursing Interventions Classification. Worldwide, breast massage is a nursing practice used to treat issues with nursing mothers. In order to alleviate breastfeeding difficulties, many breast massage techniques may be performed. Oketani, Oxytocin breast massage, Marmet technique, warm compresses, breast care, back massages, and suggestive provision are a few of these techniques that can increase the production of breast milk. However, because healthcare services lack the knowledge to properly apply these techniques, nurses hardly ever introduce them. [16- 19]

Oxytocin and Prolactin are two hormones that affect the ability to produce and use milk. Reduced child suction also decreases stimulation of prolactin and oxytocin hormones. The prolactin hormone was boosted via massage techniques, among other things. Many cultures around the world have employed massage techniques for health and treatment. After childbirth, oxytocin massage can be used to stimulate prolactin and oxytocin hormones among mothers. A massage that stimulates oxytocin and prolactin hormones after childbirth is known as an oxytocin massage. Increased levels of the oxytocin hormone from this massage may help to soothe the women and trigger the release of milk. the researchers used oxytocin massage techniques for breastfeeding to give cutaneous stimulation that was anticipated to boost women’s comfort and stimulate oxytocin release, which would increase milk production. [17, 18, 20, 21]

Sotomi Oketani from Japan originally promoted the unusual breast treatment known as Oketani massage, which has now been adopted by several nations, including Bangladesh, Korea, and Japan. Oketani massage is an easy, cost-effective, efficient method and will soften the breasts and increase the elasticity of the areola and nipples, making it simpler for the infant to feed. Because of the focus on the alveoli and the flow of milk becomes smoother. According to Sotomi, nursing can strengthen the link between a woman and her infant and promote the infant's healthy physical

and mental development. Oketani massage can assist nursing women in overcoming obstacles to successful breastfeeding, finding comfort and pain relief postpartum and the postpartum mother's body relaxes. [22]

Significance

Goal 3 of the Sustainable Development Goals (SDGs) for the period of 2015–2030 aims to ensure a healthy life and enhance wellness for all people of all ages by 2030. It is hoped to eradicate infant and under-five mortality by having all nations work to bring down the infant mortality rate to at least 12 per 1,000 live births and the toddler mortality rate to 25 per 1,000 live births. A remarkable 53% of child deaths were related to malnutrition. The most beneficial food for children is breast milk, which has the ideal vitamin balance, is easily digestible, and guards them against disease. [23]

According to the Egypt Demographic and Health Survey (EDHS, 2014), breastfeeding exclusively during the earliest stages of infancy is frequent but not prevalent in Egypt. 71% of infants younger than two months old exclusively took breast milk. The percentage of older infants who are exclusively breastfed, however, rapidly declines. Only 13% of infants were exclusively breastfed by the age of 4-5 months. [24]

Mothers are more likely to successfully breastfeed their children postpartum throughout the hospitalization, if they initiate breastfeeding soon after giving birth, master breastfeeding skills, and have strong breastfeeding support, successful breastfeeding, and breastfeeding self-efficacy.[25, 26] **Cattaneo & Arendt (2023)** reported that the support of breastfeeding, preservation, and preferment is a national health essential and a collective work; assortment and cooperation are primary for success. [27]

Failure to breastfeed is typically brought on by the newborn's difficulty sucking, breast deformities, cesarean section delivery, the mother's lack of breastfeeding information, and no prior breastfeeding experience. These failures frequently lead to the mother ceasing to breastfeed and beginning to provide formula milk in place of breast milk. There are different studies, that examined breastfeeding predictors on women such as socio-demographic and psychological factors, attitudes, breastfeeding, family support, and social support help to increase breastfeeding self-efficacy, and the factor which has the strongest effect on the predictors of breastfeeding was determined to be the mother's perception of breastfeeding self-efficacy. [28, 29]

From clinical experience, it was observed that the primipara women who delivered by cesarean sections delay the initiation of breastfeeding and need more support to begin and keep breastfeeding. So, the current study had a genuine interest to examine the effect of oxytocin versus Oketani massage on breastfeeding predictors among primipara women, and that will be the basis for the contribution of the study to health education, nurse practice, and research concerning Oxytocin and Oketani Massage provided by women's health and midwifery nurses during postpartum for primipara women.

Aim of the study

The aim of the current study was to examine the effect of Oxytocin versus Oketani massages on breastfeeding predictors among primipara women

Research hypotheses

H.1. Primipara women who receive Oxytocin massage will have higher scores of breastfeeding predictors than those who do not receive it.

H.2. Primipara women who receive Oketani massage will have higher scores of breastfeeding predictors than those who do not receive it.

H.3. There is a difference in breastfeeding predictors between primipara women who receive Oxytocin massage and those who receive Oketani massage.

Operational definition

In this study, breastfeeding predictors refer to women's need for breastfeeding support, successful breastfeeding, and breastfeeding Self-Efficacy. These predictors will be measured using the LATCH Assessment score, Infant Breastfeeding Assessment Tool (IBFAT), and the Breastfeeding Self-Efficacy Scale-Short Form (BSES-SF).

Subjects and Method

Research design

A quasi-experimental design (nonequivalent control group pretest/posttest) was utilized in this research. is a design where the participants in the intervention groups are studied before and after the manipulation. The subjects in this design are split into intervention and control groups. All subjects got the baseline measurements for the dependent variables. Following that, the intervention group's participants only received breast massage. After that, the post-test was measured on all subjects to measure how much the dependent variables had changed. **(LoBiondo-Wood & Haber, 2018).** [30]

Setting

This study was conducted at Minia university hospital for Maternity and Child. This setting is considered one of the important medical and specialized hospitals in North Upper Egypt and it provides free health services for women and children during life stages. This setting includes antepartum, intrapartum, and postpartum care for low-risk and high-risk pregnant women. The postnatal unit on the second floor included six rooms divided into three rooms for vaginal deliveries and three rooms for cesarean section. Each room contains six beds. It conducted approximately (5580) deliveries annually according to its local statistics for the year 2022 (Obstetrics and Gynecological Hospital, Minia University statistics, 2022).

Subjects

A convenience sample of 108 primipara women, was distributed into three groups (36 women in the control group, 36 women in the oxytocin massage group, and 36 women in the Oketani massage group), and was recruited according to the following inclusion criteria: age between 18 and 35 years, singleton pregnancy, term gestation (>37–40 weeks), women willing to breastfeed, the woman delivered by cesarean section, the birth of a mature and healthy neonate weighing equal or more than 2,5 Kg and accepted to participate in the study. The exclusion criteria included women with pre-existing medical conditions such as breast tumors and inverted nipples. The birth neonate has a cleft lip and cleft palate and admitted to the neonatal intensive care unit was also excluded from the study.

Sample size calculation

The sample size can be computed using the following method based on data from the literature (**Mahdizadeh-Shahri et al., 2021**) [22], a level of significance of 5%, and a power of study of 80%:

$$n = \frac{2(Z\alpha/2 + Z\beta)^2 \times p\,(1-p)}{(d)^2}$$

where, p = pooled proportion obtained from previous study; d = expected difference in proportion of events; $Z_{\alpha/2}$ =1.96 (for 5% level of significance) and Z_{β} = 0.84 (for 80% power of study). Therefore,

$$n = \frac{2(1.96 + 0.84)^2 \times 0.891\,(1-0.891)}{(0.208)^2} = 35.2$$

The needed sample size is 36 in each group as result, giving a total sample of 108 primipara women.

Tools of data collection

Data was collected through four tools:

Tool 1: **Structured Interview Questionnaire Schedule:** This tool was developed by the researchers after reviewing the related literature **(Mahdizadeh-Shahri et al., 2021; Barirah et al., 2017)** [22, 31] and included two parts: **Part A. Demographic characteristics of the primipara**

women: such as (age، education, residence, occupation, telephone number……. etc)**;** and **Part B. The current Obstetric history of the primipara women:** such as (gravida, gestational age, antenatal follow-up visits number, time of initiation of breastfeeding, and frequency of breastfeeding on the first day.

Tool II. The LATCH Assessment Tool: It was adopted by (**Jensen et al, 1994**) [32] to assess primipara women's need for breastfeeding support, it is numbered from zero to ten, and getting a score of less than ten offers the women's need for more support during breastfeeding. The letters of the acronym LATCH appoint separate areas of assessment: L (Latch) for how well the infant latches onto the breast; A (Audible swallowing) refers the amount of audible swallowing noted while nursing the neonate; T (Type of nipple) for the women's nipple type; C (Comfort) for the women's level of comfort regarding the breast and nipple; and H (Hold) indicates to whether or not the women need help in positioning the child. The system assigns a numerical score, 0, 1, or 2, to five key statements. LATCH score of poor (0 to 3), moderate (4 to 7), and good (8 to 10).

Tool III. Infant Breastfeeding Assessment Tool (IBFAT): It was adopted from **(Matthews, 1988)** [33] to assess the infant state and contains four scored items: (1) infant readiness to feed/reusability, (2) rooting, (3) fixing (the time needed to latch to the breast), and (4) the sucking pattern. Each item is scored on a scale of 0–3, with minimum and maximum scores of 0 to 12, respectively. A score of 10–12 refers to completely successful breastfeeding, a score of 7–9 indicates relatively successful breastfeeding and a score of 0–6 suggests unsuccessful breastfeeding.

Tool IV. The Breastfeeding Self-Efficacy Scale-Short Form (BSES-SF): It was adopted by **(Dennis et al., 2011)** [34] to measure breastfeeding confidence. The original scale contained 33 statements, while the short form scale contains 14 statements that are scored on a 5-point Likert scale ranging from very confident (score 5) to never confident (score 1). The minimum on this scale is 14 and the maximum possible score is 70.

Validity

Five academic nursing professionals in the fields of women's health & midwifery nursing assessed and validated the structured interview questionnaire schedule, a tool created by the researchers, for its content validity. The validity of the tool's contents was checked for completeness, relevancy, and clarity. The suggested modifications were made as a result.

Reliability

The Cronbach's alpha coefficient test was used to assess the reliability of the suggested instruments. Cronbach's alpha of 0.89 for the structured interview questionnaire schedule indicated a strong, positive correlation between the tool's elements. Whereas the Test-retest reliability, validity LATCH, IBFAT, and BSES-SF was 0.95 (**Amini et al., 2019; Altuntas et al., 2014).** [35, 36]

Ethical Considerations

Approval granted from the Research Ethics Committee at the Faculty of Nursing- Minia University granted the study ethical permission (Code: REC202313). Primipara women who met the inclusion criteria were informed about the aim, procedure, benefits, and nature of the study. After explaining the study's nature and aim to each woman, their formal agreement- by giving written consent- was obtained before the study began. Each primipara woman was made aware that participation in the study was entirely voluntary and that they had the freedom to discontinue at any moment. For the course of the study, anonymity, safety, privacy, and confidentiality were guaranteed.

Pilot study:

A total of 11 primipara women were recruited for the pilot study to investigate data collection tools for their feasibility, objectivity, content validity, clarity of the questions, and correction of any discrepancies found in these tools. The pilot study indicated that the tools are clear and no modifications or changes were done to the tools. The sample that participated in the pilot study was excluded from the actual study.

Procedure

Data were collected within five months from the beginning of January 2023 to the end of May 2023. The researchers attended the predetermined setting four days a week from 9:00 am to 1:00 pm. The study was conducted through four steps: preparation, interviewing & assessment, implementation, and evaluation.

Preparation. Official permission was obtained from the university and administrative personnel at Minia university hospital. Also, it included the construction and preparation of different data collection tools. One of the researchers received a certificate from (The National Institute of Nutrition, Cairo & Faculty of Nursing, Cairo University, Egypt) for applying oxytocin massage and Oketani massage.

Interviewing and assessment: The researchers met the primipara woman who had inclusion criteria and explained the nature, aim of the study, its importance, and its benefits. After that, the researcher welcomes them to share in the study. Written consent was gained from each primipara woman. the samples were distributed into three groups the first 36 women in the control group, the second 36 women in the oxytocin massage group, and the last 36 women in the Oketani massage group. After enrollment, the researchers were holding an interview with each primipara woman individually during the first hour after cesarean section to obtain data related to demographic characteristics and the current obstetrical history through using the structured interviewing questionnaire schedule. The questions were asked in Arabic and the responses were documented by researchers. In addition, the primipara woman was asked about the need for breastfeeding support, the rate of successful breastfeeding, and breastfeeding self-efficacy by using The LATCH assessment tool, Infant Breastfeeding Assessment Tool (IBFAT), and The Breastfeeding Self-Efficacy Scale-Short Form (BSES-SF) to obtain the baseline assessment (pre-test) breastfeeding predictors for three groups and it was documented by the researchers. All primipara women in the three groups who were subjected to interviews and assessments underwent these processes. This interview and assessment took roughly 25 to 30 minutes to complete for each one.

Implementation: Primipara women in the control group received postpartum breast care according to the hospital protocol of care. For the oxytocin massage group, in addition to postpartum breast care according to the hospital protocol of care, the researcher applied the oxytocin massage to the primipara women and it was applied through the first six hours when primipara women had the ability to sit. Also, it was done at 12 hrs after birth and on discharge. During the massage, the researchers kept privacy and ask primipara women to sit in a sitting position, exposed the of top their dress, and backup forward. After that, set her arms on the billow put in front of her and set her head on her arms. Therefore, both breasts were discovered and set free. The researchers applied oxytocin massage up and down both breasts also sides of the vertebrae between the bones of the scapula with small circular friction movements. The researchers applied the friction movements with a clenched fist with the thumb curved outward and finally, the researcher applied the friction movements for 3 min (Figure,1).

For the Oketani massage group, in addition to postpartum breast care according to the hospital

protocol of care, the researcher applied the Oketani massage to the primipara women through the first six hours when primipara women had the ability to sit. Also, it was done at 12 hrs after birth and on discharge. The massage was performed very gently and rhythmically on the right and left breasts within 8 several manual steps. From one to seven refers to (the course of treatment) & Step eight refers to (milking or expressing). One minute was spent on a series of tasks and statements, which were repeated for 15 to 20 minutes. Pushing and pulling away included manipulations in stages one, two, and three were carried out gently and painlessly on primipara women in order to separate the hard section of the breast from the fascia of the pectoralis. Four to six steps were required to drag the entire breast downward and to either side with two thumbs and two hands. At four Steps; the total breast was pushed down towards the umbilicus. Five to six steps were done to disconnect the hard base parts of the breast. In addition to, the breast was circulated clockwise in the first seven steps with an expansion of its base. In the eighth step, expression was done in four different ways for the outside surface, lower part, inside of the breast, and inside of the upper periphery of the right breast and inside, lower part, outside surface, and inside of the upper periphery of the left breast. (Figure, 2). The researcher also trained the women's relatives to apply oxytocin or Oketani massage to the primipara women at home. At the end of the session, a pamphlet was distributed containing the importance and how to apply oxytocin or Oketani massage to all primipara women who participated in the research whether the control, oxytocin, or Oketani massage group. This pamphlet is a guideline to facilitate the application of massage at home. Also, the researcher communicated with primipara women by phone to follow up on their application for the massage.

Evaluation: The researchers assessed breastfeeding predictors at three points in time for evaluation. The first time, the researchers assessed and recorded breastfeeding success and needs for support during breastfeeding for three groups as baseline; 2nd time after the 1st six hours after birth and the third time on discharge through an observation sheet. As well as Breastfeeding Self Efficacy Scale (BSES) was measured on discharge and after one week when primipara women came to the hospital for follow-up to cesarean section. This was done for the control, oxytocin massage group, and Oketani massage group for 10-15 minutes with each woman.

Figure (1) Oxytocin massage

The effect of oxytocin massage on the postpartum mother on breastmilk production in Surakarta Indonesia. **(37)**

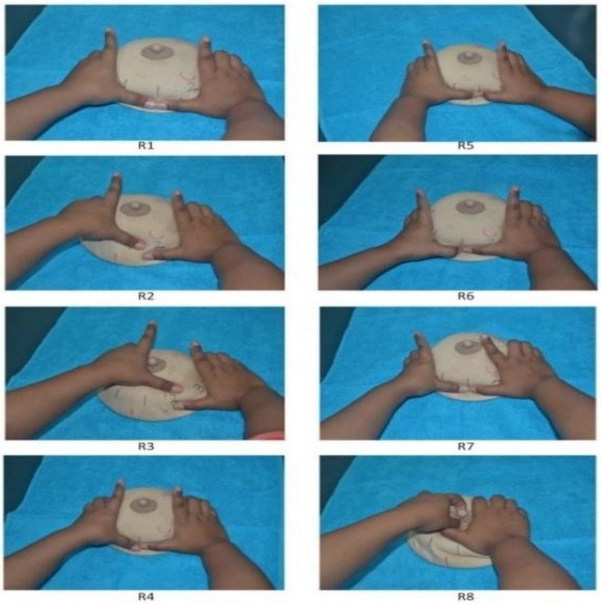

Figure (2) Oketani massage on RT breast

Difficulties in breastfeeding: Easy solution by Oketani breast massage. Bangladesh Medical Research Council Bulletin, 45(3), 149-154. **(38)**

Statistical analysis

Data were coded and entered using the statistical package for the Social Sciences (SPSS) version 28 (IBM Corp., Armonk, NY, USA). Inferential statistics were used; Comparisons between groups were done using analysis of variance (ANOVA) with multiple comparisons post hoc tests. For comparing categorical data, Chi-square ($\chi 2$) test was performed. P-values were regarded as significant when they were less than 0.05 and highly significant when they were less than 0.001.

Results

The results of the current study are presented in three main sections: I. Demographic characteristics; II. The current obstetric history; III. Breastfeeding predictors (the primipara women's need for breastfeeding support, breastfeeding success, and breastfeeding self-efficacy).

I.Demographic characteristics. This part includes age, residence, level of education, and occupation

Table (1) showed that the age range was 18– 26 years; the mean age of the primipara women in the control, oxytocin, and Oketani group was 20.44±1.69, 20.44±1.48, and 21.05±2.12years respectively. More than half of the primipara women in the control group and oxytocin group were living in rural areas and less than half of the primipara women in the Oketani group were living in urban areas 52.8%, 55.6% & 52.8% respectively. Level of education revealed that 47.2% of the control and 30.6% of the Oxytocin group had preparatory education, compared to 22.2 % in the Oketani group had secondary or higher education. In addition, regarding to occupation more than half of (52.8%) the primipara women in the control group were working. While in the oxytocin and Oketani group (50% & 58.3%) respectively were housewives. There was no statistically significant difference between the three groups regarding demographic characteristics.

II. The Current Obstetric History: This part includes gravidity**,** antenatal follow-up visit number, gestational age (GA), Time of initiation of breastfeeding, and frequency of breastfeeding at 1st day. Table (2) showed that the mean gravidity of the primipara women in the control, Oxytocin, and Oketani group was 1.05±0.23, 1.02±0.67and 1.05±0.23 respectively. In addition to the mean antenatal follow-up visits number of the primipara women in the three groups was 5.94± 0.79, 6.03±0.84, and 5.83±0.81 visits respectively. Also, the mean gestational age of the primipara women in the control, Oxytocin, and Oketani groups were 38.83±0.84, 38.94±0.89, and 39.11±0.82 weeks respectively. There was no statistically significant difference between the three groups in terms of gravidity, antenatal follow-up visits number, and gestational age p=0.815, 0.599, and 0.384 respectively. Regarding the mean of the time of initiation of breastfeeding for the primipara women in the

control, oxytocin, and Oketani group was 3.00±1.17, 3.44±1.21and 3.86±1.10 hours respectively. Concerning the mean frequency of breastfeeding on 1st day of the primipara women in the control, oxytocin and Oketani groups were 4.08±1.32, 7.67±1.24, and 5.52±1.082 respectively. There was a highly statistically significant difference between the three groups in terms of the time of first breastfeeding initiation and frequency of breastfeeding on 1st day p=0.009 and 0.000 respectively.

III. Breastfeeding predictors. This part includes the women's need for breastfeeding support, breastfeeding success, and breastfeeding self-efficacy.

As shown in Table (3), One way ANOVA revealed a highly statistically significant difference in the mean scores of the need for breastfeeding support among the three groups throughout six hours later (F = 11.966 and p <0.001), and on discharge (F = 53.214 and p <0.001). Regarding the mean scores of successful breastfeeding, there was a highly statistically significant difference in the mean scores of successful breastfeeding among the three groups throughout six hours later (F = 12.615 and p <0.001), and on discharge (F = 79.778 and p <0.001). In addition to, Breastfeeding Self-Efficacy, there was a highly statistically significant difference in the mean scores of Breastfeeding Self-Efficacy (BSES) among the three groups on discharge (F = 14.025 and p <0.001), and 1 week later (F = 21.432 and p <0.001).

Figure (3) illustrated that primipara women in the intervention groups, according to the LATCH, needed less support compared to the primipara women in the control group. Also, Figure (4) noted that the mean scores for all dimensions of breastfeeding success, including readiness to feed, rooting, fixing (latching on), and sucking, in the breastfeeding primipara women in the intervention groups were significantly higher than those of the primipara women in the control group. And Figure (5) showed that the breastfeeding self-efficacy of the primipara women in the intervention groups according to the BSES was significantly higher than those in the control group.

Table 1. Comparison of the demographic characteristics of the sample in three groups (N=108).

Variables	Control group n=36		Oxytocin group n=36		Oketani group n=36		Chi-Square	
	Freq	%	Freq	%	Freq	%	X^2	P value
Age (Years)								
18 -	13	36.1	14	38.8	3	8.3	13.967	0.452
21 -	11	30.6	14	38.8	19	52.9		
24 – 26	12	33.3	8	22.3	14	38.8		
Age (Mean ±SD)	20.44±1.69		20.44±1.48		21.05±2.12			
Residence								
Rural	19	52.8	20	55.6	17	47.2	0.519	0.771
Urban	17	47.2	16	44.4	19	52.8		
Level of Education								
Read and write	3	8.4	5	13.9	7	19.4	11.106	0.196
Primary education	8	22.2	8	22.2	6	16.8		
Preparatory education	17	47.2	11	30.6	7	19.4		
Secondary education	4	11.1	9	25.0	8	22.2		
Higher education	4	11.1	3	8.3	8	22.2		
Occupation								
Housewife	17	47.2	18	50.0	21	58.3	0.964	0.617
Working	19	52.8	18	50.0	15	41.7		

*Significant at p <0.05

Table 2. Comparison between three groups regarding the current obstetric history (N=108)

Variables	Control group n=36	Oxytocin group n=36	Oketani group n=36	ANOVA test	
	Mean ±SD	Mean ±SD	Mean ±SD	F	P value
Gravidity	1.05±0.23	1.02±0.67	1.05±0.23	0.205	0.815
Antenatal follow-up visits number	5.94± 0.79	6.03±0.84	5.83±0.81	0.515	0.599
GA (wks)	38.83±0.84	38.94±0.89	39.11±0.82	0.967	0.384
Time of initiation of breastfeeding	3.00±1.17	3.44±1.21	3.86±1.10	4.965	0.009**
Frequency of breastfeeding on 1st day	4.08±1.32	7.67±1.24	5.52±1.082	78.897	0.000**

**Highly significant at p <0.01 Abbreviation :SD = (Standard Deviation)

Table 3. Comparison between three groups according to the mother's need for breast-feeding support, breast-feeding success, and breast-feeding self-efficacy (N=108).

Variables	Control group n=36	Oxytocin group n=36	Oketani group n=36	ANOVA test	
	Mean ±SD	Mean ±SD	Mean ±SD	F	P value
Need for Breastfeeding Support (LATCH)					
Pretest	4.69±0.98	4.58±1.27	4.67±1.41	0.079	0.924
6 hours later	5.08±0.81	6.19±1.55	4.94±1.09	11.966	<0.001**
On discharge	5.33±1.10	8.14±0.80	7.06±1.49	53.214	<0.001**
Breastfeeding Success Score (IBFAT)					
Pretest	5.33±0.99	5.61±1.25	5.36±1.29	0.602	0.549
6 hours later	6.56±0.94	7.97±1.63	6.83±1.13	12.615	<0.001**
On discharge	7.89±0.92	11.14±0.80	10.06±1.49	79.778	<0.001**
Breastfeeding self-efficacy					
Pretest	29.53±7.61	29.31±6.11	29.44±4.86	0.011	0.989
On discharge	52.61±7.53	60.75±6.27	59.03±6.75	14.025	<0.001**
1 week later	51.75±7.20	60.22±5.72	59.75±5.44	21.432	<0.001**

**Highly significant at p <0.01

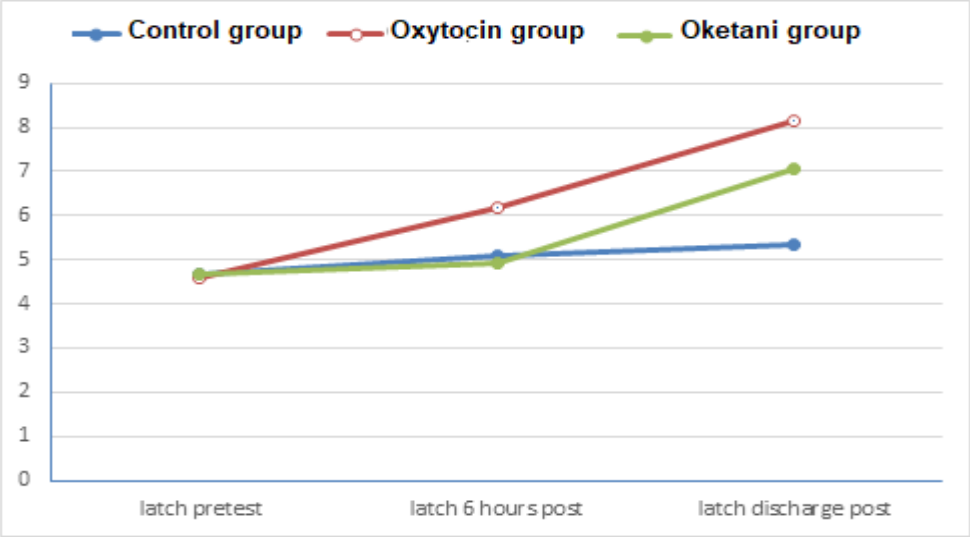

Figure (3) LATCH assessment score

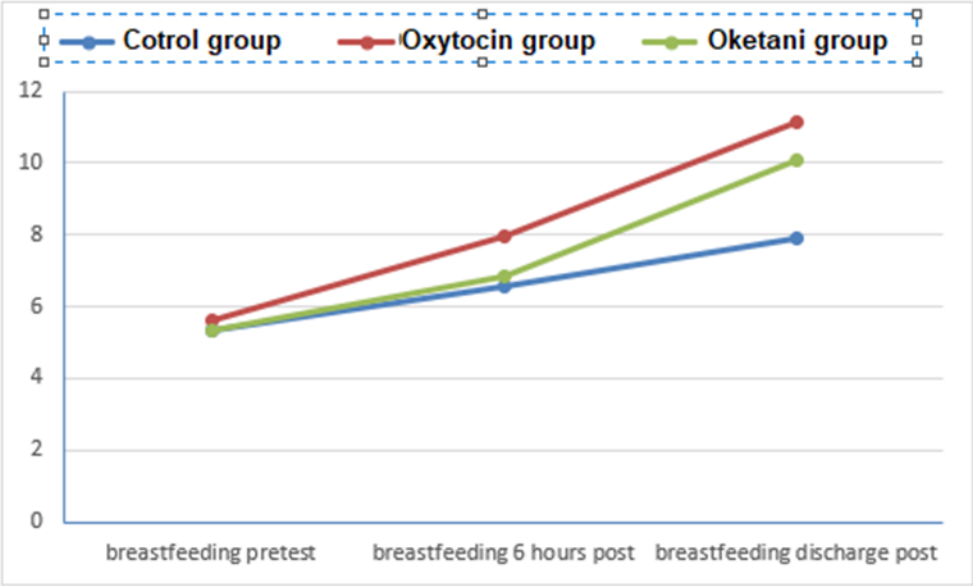

Figure (4) Infant Breastfeeding Assessment score (IBFAT)

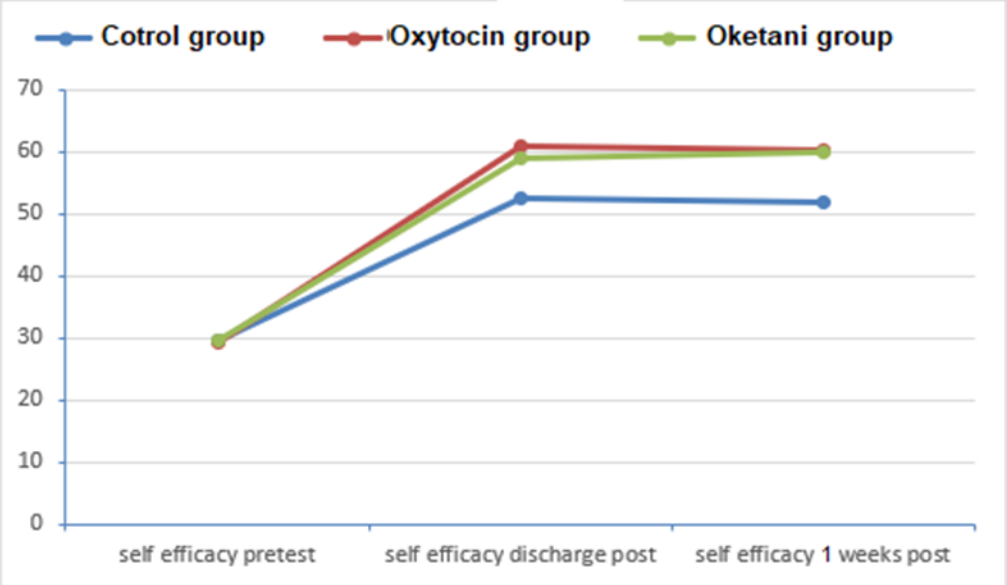

Figure (5) Breast Feeding Self Efficacy score (BSES)

Table 4. Post hoc pair-wise comparison in significant items

Variables	Control group VS Oxytocin group	Control group VS Oketani group	Oxytocin group VS Oketani group
LATCH assessment score			
6 hours later	< 0.001**	1.000	< 0.001**
On discharge	< 0.001**	< 0.001**	< 0.001**
Breastfeeding success score (IBFAT)			
6 hours later	< 0.001**	1.000	0.001**
On discharge	< 0.001**	< 0.001**	< 0.001**
Breastfeeding self-efficacy (BSES)			
On discharge	< 0.001**	< 0.001**	0.870
1 week later	< 0.001**	< 0.001**	1.000

**Highly significant at p <0.01

Discussion

Breastfeeding is a worldwide practice for primipara women after birth. It is known that breastfeeding predictors are among the strongest shapes of breastfeeding success that a woman can experience. Different methods are generally applied to promote breastfeeding predictors. [22, 39,40, 41] the present study tested three hypotheses: H.1. Primipara women who receive Oxytocin massage will have higher scores of breastfeeding predictors than those who do not receive it, H.2. Primipara women who receive Oketani massage will have higher scores of breastfeeding predictors than those who do not receive it.; and H.3. There is a difference in breastfeeding predictors between primipara women who receive Oxytocin massage and those who receive Oketani massage.

The findings of the current study showed that before applying the intervention there was no significant difference between the control group and the Oxytocin massage group concerning breastfeeding predictors. In contrast, after the intervention has been applied, statistically significant differences emerged between the Oxytocin massage group and the control group, favoring Oxytocin massage group all predictors of breastfeeding; thus, the first hypothesis was supported. The results of the first hypothesis emphasize that Oxytocin massage is a successful method of increasing breastfeeding predictors. This may be due to the fact that Oxytocin massage is more successful in causing the pituitary gland to release prolactin and oxytocin at the beginning of breastfeeding. The Oxytocin massage technique affects autonomous nervous and hypodermic tissue; which in turn can calm these tissues and improve breastfeeding success by facilitating blood flow in the ductal system. Another interpretation of this finding is that Oxytocin massage can help primipara women calm down and relax which in turn brings them a deep feeling of comfort. These relaxation feelings enhance their feeding of their children successfully with less support; increase their positive attitudes such as bonding and breastfeeding self-efficacy.

In agreement with the current study findings, **Idris & Asrina (2020**) [42] conducted a study that aimed to determine how Indonesian

mothers responded to breastfeeding when their husbands offer them Oxytocin massage. They found that mothers who had their oxytocin massaged by their husbands had less need for breastfeeding support, increased the rate of breastfeeding success and improved breastfeeding self-efficacy. Also, the current findings match the findings of **Barirah et al., (2017)** [(31)] who reported that applying both Marmet and Oxytocin massage techniques have an impact on postpartum women who underwent cesarean sections' overall colostrum production and improved breastfeeding successfully.

The findings of our study showed that before applying the intervention, there was no significant difference between the control group and the Oketani massage group concerning breastfeeding predictors. In contrast, after the intervention has been applied, statistically significant emerged between Oketani massage group and the control group, favoring the Oketani, on all predictors of breastfeeding; thus, the second hypothesis was supported.

A possible interpretation for this finding is that Oketani massage increases breast softness, and increases the elasticity of nipples and areolas to make them so manageable that the child can suck them easily and consequently increase breastfeeding success. It can help reduce stress, decrease the need for breastfeeding support, enhance the immune system, and improve women's overall health and relaxation. Additionally, it has been demonstrated that massage can aid in boosting oxytocin production naturally. Generally, these findings advocate Oketani massage as a valuable technique that could be used to reduce the need for breastfeeding support and increase breastfeeding success and self-efficacy **Cattaneo & Arendt (2023)** [(27)]

These results are in the same line with the data in an experimental study carried out by **Mahdizadeh-Shahri et al., (2021)** [(22)] in which they reported that women who received Oktani massage reduced their need for breastfeeding support, increased their breastfeeding success, and improved their breastfeeding self-efficacy than the control group.

These findings are in line with those by **Jamzuri et al., (2019)** [(43)] who found that Oketani massage increased mothers' mean levels of oxytocin hormone as well as enhanced sucking speed, consequently, advanced breastfeeding success.

Furthermore, these results are supported **Tasnim et al., (2019)** [(38)] findings that, after receiving Oketani massage, most of the mothers grew confident and the majority of mothers expressed good feelings.

Also, this finding was matched with the data in a **Chan Man et al.'s (2016)** [(44)] longitudinal study to assess the effect of a self-efficacy-based educational program on maternal breastfeeding self-efficacy, breastfeeding duration, and exclusive breastfeeding rates, in which they revealed that the intervention group demonstrated significantly higher breastfeeding self-efficacy at 1 week and overall better breastfeeding at 8 weeks than the control group.

The current results also showed a statistically significant mean difference ($p < 0.001$) between the oxytocin massage group and the Oketani massage group, favoring the oxytocin massage group, in terms of a decrease in breastfeeding support, and a rise in the rate of breastfeeding success. In contrast, there was no statistically significant difference between the two groups in terms of self-efficacy This

reflects that our study partially supports the 3rd hypothesis: This finding may be due to the fact that our study sample was young primipara women who had undergone cesarean section and who had lower levels of prior experience in breastfeeding, and thus they may not correctly judge their breastfeeding self-efficacy.

Conclusion:

This study concluded that: the primipara women in the intervention groups needed less breastfeeding support and had higher breastfeeding success and self-efficacy breastfeeding than those in the control group.

Recommendation

This study recommended that:

- Oxytocin and Oketani massage should be applied as an intervention to enhance breastfeeding in primipara women with cesarean sections.
- The health care providers should provide education to postpartum women related to Oxytocin and Oketani massage.
- A protocol should be implemented in every maternity unit with knowledge about the benefits of Oxytocin and Oketani massage to improve breastfeeding successfully.
- Further research:
- Oxytocin and Oketani massage should be applied on primipara women delivered by vaginal birth.
- Replicate the present study by using a large sample from different regions of the country.

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Effect of Evidence-Based Guidelines on Nurses' Knowledge and Practice Regarding Management of Post Lumbar Puncture Headache in Children with Meningitis

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Abstract:

Background: Meningitis is a major cause of morbidity and mortality around the world. It is diagnosed via lumbar puncture that its most consequence in children is headache, so evidence-based practice guidelines offer direction for headache management. **The study's aim** was analyzing the effect of evidence-based guidelines on nurses' knowledge and practice regarding management of post lumbar puncture headache. **Research design:** A quasi experimental design. **Setting:** Pediatric Intensive Care Unit at Benha Fever Hospital. **Study sample** was a convenient sample consisted of all nurses worked in selected setting (40). **Tools of data collection** included **Tool (I)** A structured Interviewing Questionnaire Sheet that consisted of; **Part (1):** Personal characteristics of nurses. **Part (2):** Nurses' knowledge regarding post lumbar puncture headache**. Tool (II):** Lumbar puncture observational checklist. **The results** revealed that there was highly statistical significance difference between nurses' total level of knowledge and practice regarding post lumbar puncture headache in the studied nurses pre compared to post guidelines. It is **concluded** that evidence-based practice guidelines significantly improved nurses' knowledge and practices regarding management of post lumbar puncture headache in children. **Recommendation** is designing a standard for nursing practice regarding management of post lumbar puncture headache in children.

Key words

Evidence Based Practice, Guidelines, Post Lumbar Puncture Headache and Meningitis

Introduction

Meningitis is a severe inflammatory infection that affects the membranes that surround the brain and spinal cord, known as the meninges. Around the world, meningitis continues to be a leading cause of mortality and morbidity. Meningitis represents one of the top four causes of neurological disability adjusted life years (DALYs) worldwide. [1]

Meningitis is a condition caused by an infection in the meninges that might be fungal, bacterial, viral, or parasitic. The most frequent causes of meningitis are bacteria and viruses, however bacterial meningitis is typically severe and widespread. The etiological agents must be accurately and quickly identified to begin public health initiatives and proper management**.** [2]

A positive cerebrospinal fluid (CSF) culture, which is often obtained via lumbar puncture (LP), is the gold standard for the diagnosis of bacterial meningitis. Cerebrospinal fluid analysis is the only completely reliable diagnostic technique. Lumbar puncture should only be done after a thorough neurologic examination**.** [3]

Seizures, bulging fontanel, fever and aberrant consciousness raise the clinical suspicion of meningitis, but the early signs in neonates are often subtle. According to American and British recommendations, performing LP is advised in cases of possible sepsis and meningitis in

newborns and infants. In any illness that could be related to bacteremia, a strong suggestion for CSF collection to rule out meningitis must be made. [4]

Lumbar puncture is a lumbar spine invasive procedure used for diagnostic or therapeutic purposes. It is a method for drawing or sampling cerebrospinal fluid. And it is frequently used to get information regarding cerebrospinal fluid. [5]

The procedure entails inserting a needle into the lumbar sac's subarachnoid space, which is located safely below the spinal cord. It is utilized typically for diagnostic purposes in order to rule out illnesses including bacterial meningitis and idiopathic intracranial hypertension. It can also be utilized therapeutically, such as in the treatment of intracranial pressure issues. The most common reason for an LP in children is to diagnose a central nervous system (CNS) infection such as meningitis or meninge-encephalitis**.** [6]

Lumbar puncture is contraindicated in children who may have an intracranial mass or other signs of unstable hemodynamics and increased intracranial pressure. If necessary, proper CT scanning should be performed prior to LP to determine its safety. [7]

The most frequent post-lumbar puncture complication is post-Lumbar Puncture Headache (PLPH). The failure of the Dural puncture site to close properly is hypothesized to produce PLPH, leading to CSF leaking and cerebral hypovolemia. This pulls on parts of the brain that are sensitive to pain, causing a headache. Age, gender, body mass index and needle (gauge, point shape, orientation, bevel direction and core withdrawal) and operator skill level are all associated with the prevalence of PLPH. [8]

Post lumbar puncture headache is a type of position-dependent headache that is commonly accompanied by nausea, vomiting, dizziness, tinnitus, and visual abnormalities. The PLPH manifests or significantly worsens when in the upright posture, whereas in the supine posture, it disappears or improves. [9] & [10]

Children frequently experience anxiety and stress because of lumbar puncture. The nurse must educate children as well as their parents about lumbar puncture guidelines before, during, and after the procedures in order to minimize children's suffering and potential post-lumbar puncture consequences. [11]

Nurses should inform children and their parents about the lumbar puncture procedure prior to the procedure. To proceed, informed approval must be given. Instruct children to clear their bowels and bladders. Nurses should do a thorough neurological examination on children, take vital signs, prepare necessary equipment, review laboratory test results. [12]

During LP procedure, to prevent nerve damage, any children's movement should be avoided. Reassurance may be helpful and if necessary, offer the prescribed sedative, and. Children usually lie in a lateral position, with their backs close to the edge of the bed, their knees drawn as tight as possible towards their chest, and their chin flexed onto their chest. [13]

Following LP, nurses should evaluate children for any problems, recommend lying down for four hours, measure children's vital signs, encourage children to increase fluid intake if not contraindicated and check for leakage or bleeding at the puncture site. [14]

Evidence Based Practice (EBP) refers to the application of interventions and techniques whose efficacy has been verified by research. The ultimate objectives of evidence-based nursing practice are to advance high-quality treatment that is informed by research as well as cost-effective results for patients, healthcare professionals and health care system. [15]

Nurses have a critical role in ensuring Evidence Based Nursing Guidelines (EBNGs) in care provided for children who yield to LP and, in the prevention, management of complications which begins with sustaining the highest quality of care, maintaining the hemodynamic state, and managing complications. [16]

Significance of the study:

The most frequent complication in children after LP is headache, with some publications reporting an incidence of 10%–30%. [17] While others claim that it can happen in 70% of cases. [18] The variable incidence of (PLPH) is determined by several factors, including needle orientation and gauge, operator skills, and the existence of risk factors, such as PLPH history. According to some publications, the incidence of headache after diagnostic LP approaches 36%. [10] Because of the less traumatic needles used during anesthesia. [19]

Despite these high rates of occurrence, there is lack of evidence-based recommendations for the prevention and management of PLPHs in children. The aim of the current research was to develop evidence-based practice guidelines for prevention and management of PLPHs among pediatric meningitis patients.

Aim of the study

Analyzing the effect of evidence-based guidelines on nurses' knowledge and practice regarding management of post lumbar puncture headache in children with meningitis.

Research Hypotheses:

Evidence based practice guidelines are expected to improve nurses' knowledge and practice regarding post lumbar puncture headache.

Subjects and method

Research design: A quasi-experimental design with pre / post-intervention was utilized to conduct the study.

Research settings:

The study was conducted in Pediatric Intensive Care Unit at Benha Fever Hospital in Benha City, which affiliated to Egyptian Ministry of Health and Population, it contained 10 beds and allocated in 3rd floor.

Sample:

The sample of study was a convenient sample consisting of all nurses worked in selected setting (40 nurses) who provided care for children with meningitis undergoing lumbar puncture.

Tools of data collection:

Two tools were utilized to collect the data. These tools include the following:

Tool (I): A structured Interviewing Questionnaire Sheet. It was developed by the researchers and included two parts:

Part (1): Personal characteristics of nurses.

Including data related to nurses' characteristics such as Age, gender, educational level, years of experience and attending training courses regarding lumbar puncture.

Part (II): Nurses' knowledge regarding post lumbar puncture headache.

The researchers designed it depending on recent and relevant literatures [20, 21] to assess nurses' knowledge and it consisted of 22 multiple choice questions, classified in to three sub parts:

A-Nurses' knowledge regarding meningitis in children. It included (8) questions such as; Causes, risk factors, definition, signs and symptoms, diagnosis, complications, preventive measures, and nursing management for children with meningitis.

B-Nurses' knowledge regarding lumbar puncture in children. It included (8) questions such as: Definition of lumbar puncture, definition of cerebrospinal fluid, indications and contraindications of lumbar puncture, common complications of lumbar puncture, nursing care before, during and after lumbar puncture procedure.

C- Nurses' knowledge regarding post lumbar puncture headache in children. It included (6) questions such as: Definition, causes, characteristics of headache, contributing factors, prevention, and management of post lumbar puncture headache.

Scoring system of nurses' knowledge.

The studied nurses' knowledge was analyzed through answer using a model, and outcomes were evaluated as complete correct answer was given (2) scores, incomplete correct answer was given (1) score and (0) for do not know answers. According to the studied nurses' answers, the following divisions describe their overall level of knowledge; Good ≥80% was ranged from (35 - 44) points, Average :60 - <80% was fluctuated from (26 to less than 35) points, Poor: <60% was ranged from (0 to less than 26) points.

Tool (2): Lumbar puncture observational checklist.

An observational checklist was developed based on related literature [22- 23,24,25] to observe nurses practice before, during, and post LP procedure. It contained (23) steps of evidence-based nurses' practices that classified as before (5 steps), during (10 steps), and after lumbar puncture procedure in children (8 steps).

Scoring system of nurses' evidence-based practices.

Nurses' evidence-based practices evaluated and graded as (1) for done step, and zero for not done step. The total nurses' practice considered to be a competent level when total nurses' practice was ≥85% with score ranged from (19-23) points and, incompetent level when total practice was <85% with score ranged from (0- < 19) points.

Tools validity and reliability

Validity

To evaluate face and content validity of the study tools, the researchers submitted it to a jury of three experts in the field of Pediatric Nursing from Benha university. The study tools have been modified in accordance with the panel's evaluation of the sentences' clarity, appropriateness of content and sequence of items.

Reliability

Considering reliability, internal consistency of each tool's component was applied by the researchers by using Cronbach′s coefficient alpha. It was 0.887 for nurses' knowledge regarding meningitis, 0.906 for nurses' knowledge regarding lumbar puncture, 0.893 for nurses' knowledge regarding management of post lumbar puncture headache, and for all nurses' knowledge assessment sheet items was 0.960. The reliability of lumbar puncture observational checklist was 0.96.

Ethical considerations

Before beginning the study, the Scientific Research Ethics Committee of the Faculty of Nursing, Benha University provided its ethical permission. Prior to collecting data, an informed consent was obtained from the studied nurses. The nature of the study and its expected findings were stated for the studied nurses in clear and simple clarification. Nurses were guaranteed that all information gathered was handled in confidence, kept anonymous, and used only for research. Also, they informed that they had the ability to discontinue participation at any time.

Administrative Design:

A formal approval was given to the administrator of the fever hospital and the head of the PICU by the dean of the nursing faculty at Benha University. To ensure that the study would be conducted with little resistance, its nature, significance, and predicted results were clearly explained.

Pilot study

To assess the applicability and validity of the study tools and the time needed to complete the questionnaire, a pilot study was conducted over a two-week period on 10% of the total sample (4 nurses). The study sample included the pilot subjects because no significant changes were made to the study.

Field work:

Four phases were carried out over a six-month period, commencing at the beginning of August 2022, and ending at the end of January2023, to achieve the study's objective. These phases include the following.

a) Assessment Phase

The studied nurses were interviewed to gather baseline data during assessment phase. The researchers were available two days per week (Sunday and Tuesday) on the morning shift. The purpose of the study was explained by the researchers to all participating nurses. The researchers warmly welcomed and received formal consent from the studied nurse after providing an overview about the objective, duration, and activities of the study. The researchers interviewed each nurse and provided a questionnaire sheet for completing it to assess nurses' knowledge and it lasted fifteen minutes. Each nurse was evaluated individually during their actual practice of procedures to assess their practice regarding management of post lumbar puncture headache in children at PICU in fever hospital and it took 30 minutes. This phase lasted about 4 weeks.

b) Evidence-based practice guidelines construction:

Evidence based practice is defined as the process of directing the provision of holistic childcare by utilizing validated evidence, judgment, and nursing skill. **[26]** Evidence based practice guidelines designed based on relevant and current evidence, after searching on textbooks, Systematic Reviews, Cochrane collaboration, Medline, CINAHL, Embase, PubMed, regarding evidence-based practices about post lumbar puncture headache management in children with meningitis. Guidelines developed in simple Arabic language.

General objectives:

The aim of evidence-based practice guidelines was to enhance the studied nurses' knowledge, and practice regarding management of post lumbar puncture headache in children with meningitis.

The following suggestions are offered for the prevention and treatment of post lumbar puncture headache, considering the evidence currently available. It consisted of 17 recommendations.

1- It is recommended based on (level -Ⅲ evidence), to perform brain imaging and complete neurological assessment before lumber puncture especially in cases of aberrant intracranial pressure due to heightened CSF pressure, seizures and impaired in consciousness. **[27]**

2- Check laboratory tests regarding coagulation and platelet count in recent blood analysis before lumbar puncture. **[23,27]**

3- It is recommended based on (level -Ⅲ evidence), to check for intake of anti-coagulant medications because lumber puncture contraindicated as anticoagulant drugs increase risk of procedure, but if it is one antiplatelet drug, lumbar puncture may be performed due to decreasing in potential risks of the procedure. **[23,27]**

4- Check for infection in lumbar puncture site for relative contraindication of procedure. **[24, 27]**

5- It is recommended to check for child characteristics such as younger age and history of headache as they considered as risk factors of post lumbar puncture headache. **[24,25, 27]**

6- The recommended position of the child is the lateral decubitus position with fully flexed at the waist and neck, due to the fact of more severe headache was attributed to the sitting position. **[22,23,28, 27]**

7− Utilize smaller size (19-27) of spinal needles (higher gauge) for performing lumbar punctures in children as it prevents PLPHs, when clinically applicable. **[22, 25,27]**

8- It is recommended to consider child weight and body characteristics, when choosing the appropriate needle size. [23,27]

9- The usage of pencil point needles in children undergoing lumbar puncture is strongly recommended, since it reduces the risk of PLPHs. [21,22]

10- The use of a lumbar puncture needle with a bevel orientation parallel to the long access is recommended to reduce the frequency of PLPHs [22, 25]

11- The maximum number of times a lumber puncture should be performed during the procedure is four because it increases incidence of back pain. [27]

12- It is recommended to permit passive withdrawal of CSF because there is a relation between doing so and a reduction in headache frequency. [27]

13- Collecting up to 30 mL of CSF from children is safe and well-tolerated. [27]

14- It is recommended for allowing children to move about freely after procedure, [23,27] instead of prolonged bed rest to prevent post lumbar puncture headache [22,25].

15- Using oral and intravenous hydration to shorten the duration of PLPHs is recommended. [23,25]

16- It is recommended to use epidural injections of saline fluid for promoting closure of the dural perforation. [22,25]

17- The use of an epidural blood patch in the treatment of pediatric PLPHs is recommended. [25]

c) Evidence based practice guidelines implementation:

Regarding evidence-based practice sessions implementation, 10 groups were created from the nurses under study., each group consisted of 4 nurses, according to their readiness, the evidence-based recommendations were distributed as follows; (1) session was needed for the theoretical portion, and (2) sessions for practical part. They lasted around 45 minutes, at morning shift two days each week. Theoretical portion: included knowledge regarding meningitis and lumbar puncture in children. Practical part concerned with the application of nurses' skills regarding management of post lumbar puncture headache in children with meningitis; the first session included nursing care provided before and during lumbar puncture procedure for prevention of headache, the second session included nursing management of post lumbar puncture headache.

Application of evidence-based practice. The evidence-based practice approach is applied with a questioning attitude towards clinical care. Evidence-based practice starts with a clinical query and search for the data supporting the provided care. [29] The process of evidence-based practice can be described by several steps as the following:

Step 0: Fostering a spirit of inquiry. A spirit of inquiry must be fostered in order to implement evidence-based practice. Continuous curiosity is encouraged as clinical inquiry becomes a routine aspect of practice.

Step 1: Formulating a clinical inquiry in PICOT structure.

(P)Patient population of interest, (I)Intervention or area of interest, (C)Comparison group or intervention,

(O)Outcome, and (T)Time.

Step 2: Search for the best evidence. The PICOT framework focuses on finding appropriate evidence for solving the clinical question. Finding publications to inform practice on the desired topic is made possible by database searches utilizing key words or phrases.

Step 3: Critically appraise the evidence. At this step, the articles that were found through the search are systematically evaluated. Results

from the study are examined for validity, reliability as well as applicability. A review of the available data is done to see if there is enough evidence for the current practice or if a change of practice is advised.

Step 4: Integrate the evidence with clinical expertise and patient preferences and values. Clinical expertise, and patient assessment data are considered along with the research evidence, as well as patient preferences and values.

Step 5: Evaluate the outcomes of evidence-based practice change.

Findings are analyzed after implementing evidence-based practice changes to determine the intervention impact.

Step 6: Disseminate the outcomes. It was important to communicate any lessons acquired to others. [30] Modified lectures, brainstorming sessions, demonstrations, re-demonstrations, and group discussions were among the several instructional techniques employed. To ensure that nurses fully understood the material, appropriate teaching tools were used, such as handouts, audio-visual aids, role playing, and real equipment to achieve the objectives and contents of the educational guidelines. This phase started from October 2022 to the middle of January 2023.

d) Evaluation phase:

Using pretest tools, the researchers evaluated the impact of evidence-based guidelines on the studied nurses' practices and knowledge regarding management of post lumbar puncture headache immediately after implementation, this phase lasted for two weeks.

Statistical analysis

Using an electronic computer and the SPSS version 20 statistical tool, the accumulated data were arranged, tabulated, and analyzed. For the data, descriptive statistics were computed in the following formats: frequency and distribution for qualitative data, mean and standard deviation for quantitative data. Moreover, the chi square test was used in analytical statistics to compare categorical data between groups (X2 value). Pearson's correlation coefficient test was also applied

Results

Table (1): Illustrates that, 47.5% of the studied nurses age is about 30 <40 and the mean age is 34.825±8.995 year. While more than three quarters of them (82.5%) are female. Regarding educational level, half of nurses (50.0 %) have technical nursing institute and less than half (47.5%) of nurses having 5 < 10 years of experience. It also shows that less than two thirds (62.5%) did not attend training courses related to lumbar puncture.

Fig. (1): Demonstrates that less than two thirds of the studied nurses (62.0%) pre-guidelines have poor level of knowledge regarding meningitis. While the majority (93.0%) have a good level of knowledge in post guidelines. Therefore, there are highly statistical significance difference (P<0.000) between nurses' total level of knowledge regarding meningitis pre compared to post guidelines.

Fig. (2): Clarifies that 70.0% of the studied nurses at pre-guidelines have poor level of knowledge regarding lumbar puncture. While the majority (96.0%) have a good level of knowledge in post guidelines. Therefore, there are highly statistical significance difference (P<0.000) between nurses' total level of knowledge regarding lumbar pre as compared to post guidelines implementation.

Fig. (3): Illustrates that nearly two thirds of the studied nurses (67.0%) pre-guidelines have poor level of knowledge regarding post lumbar puncture headache. While the majority (94.0%) have a good level of knowledge post guidelines implementation. Therefore, there was highly statistical significance difference (P<0.000) between nurses' total level of

knowledge regarding post lumbar puncture headache pre compared to post guidelines.

Table (2): Demonstrates that mean knowledge about meningitis is 2.250± 4.632 in studied nurses pre guidelines, while mean knowledge is 2.945± 4.121in post guidelines. It also shows that, mean knowledge about post lumbar puncture headache in children is 1.887±0.899 in pre guidelines, while mean knowledge is 2.125±0.745 in post guidelines. Moreover, there is a highly statistically significant difference (p <0.001) at post guidelines.

Fig. (4): Shows that, more than three quarters of the studied nurses (82.5.0%) pre-guidelines have poor level of knowledge regarding meningitis, lumbar puncture and post lumbar puncture headache in children. While the majority (89.0%) have a good level of knowledge in post guidelines. Therefore, there are highly statistical significance difference (P<0.000) between nurses' total level of knowledge regarding meningitis, lumbar puncture and post lumbar puncture headache in children pre compared to post guidelines.

Table (3): Demonstrates that, mean practice of the studied nurses before procedure is 2.800±0.242 pre guidelines, while mean practice is 5.150±0.276 in post guidelines. It also shows that, mean practice post procedure is 2.650±0.2083 in pre guidelines, while mean practice is 6.300±0.3880 in post guidelines. Moreover, there was a highly statistically significant difference (p <0.001) at post guidelines.

Fig. (5): Shows that, (93.0%) of the studied nurses at pre-guidelines have incompetent total level of practice regarding management of post lumbar puncture headache in children. While the majority (87.5%) have a competent total level of practice post guidelines. Therefore, there are highly statistical significance difference (P<0.000) between nurses' total level of practice regarding management of post lumbar puncture headache pre compared to post guidelines.

Table (4): Demonstrates that, there is a positive correlation between the studied nurse's total knowledge score and total practice pre / post evidence-based guidelines (P<0.001)

Table (1): Distribution of the studied nurses according to their personal characteristics (n=40)

Items	The studied nurses n=40	
	N	%
Age/years		
19 < 30	12	30.0
30 <40	19	**47.5**
40 ≤ 50	9	22.5
Mean± SD	**34.825±8.995**	
Gender		
Male	7	17.5
Female	33	**82.5**
Educational level		
Bachelor	7	17.5
Technical nursing institute	20	**50.0**
Diploma	13	32.5
Years of experience		
< 5	14	35.0
5 < 10	19	**47.5**
≥ 10	7	17.5
Mean± SD	**6.450±3.4932**	
Attended training courses related to lumbar puncture		
Yes	15	37.5
No	25	**62.5**

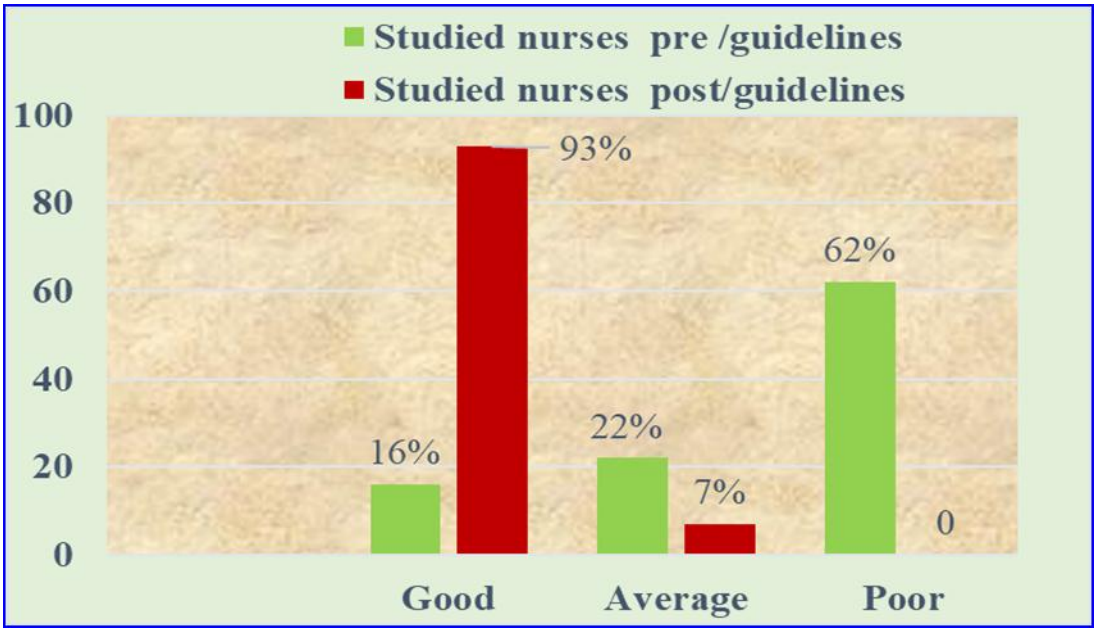

Figure (1): Distribution of the studied nurses according to their total level of knowledge regarding meningitis in children pre/ post evidence-based guidelines (n=40)

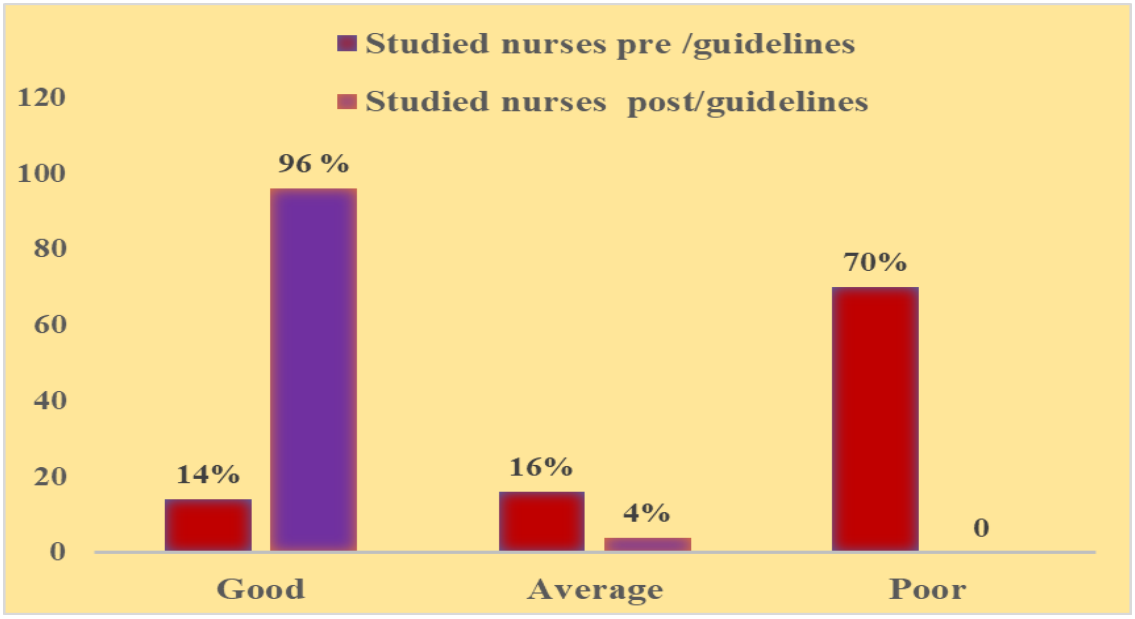

Figure (2): Distribution of the studied nurses according to their total level of knowledge regarding lumbar puncture in children pre/ post evidence-based guidelines (n=40)

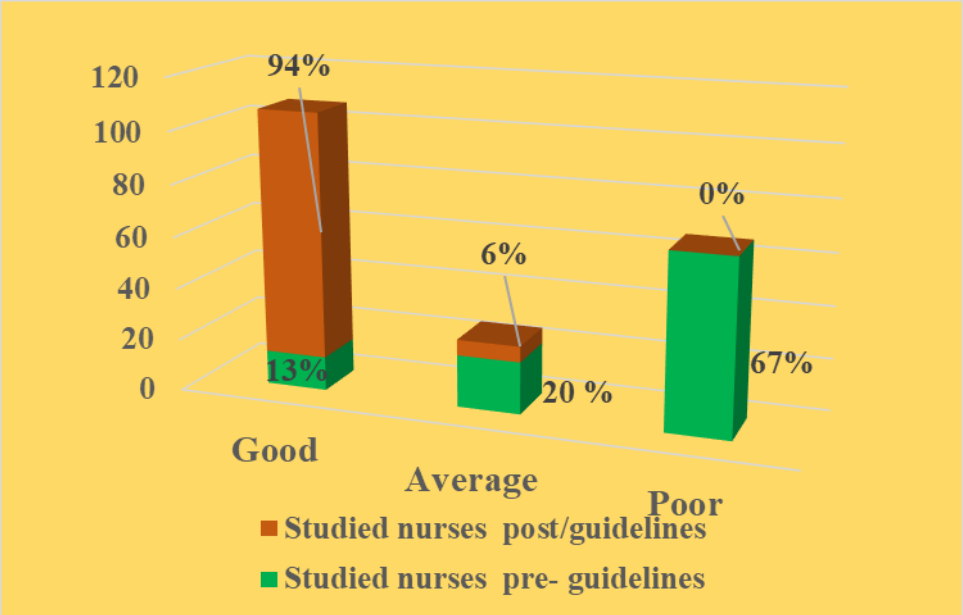

Figure (3): Distribution of the studied nurses according to their total level of knowledge regarding post lumbar puncture headache in children pre/ post evidence-based guidelines (n=40)

Table (2): Comparison of the studied nurses' knowledge related meningitis, lumbar puncture and post lumbar puncture headache in children (n=40)

Items	The studied nurses (n=40)		Independent T- test	P
	Pre /guidelines	Post /guidelines		
	Mean ±SD	Mean ±SD		
Meningitis	2.250± 4.632	2.945± 4.121	3.045	0.000
Lumbar puncture	1.075±0.882	1.631±0.500	2.682	0.000
Post lumbar puncture headache in children	1.887±0.899	2.125±0.745	3.393	0.000

Highly statistically significant at P value <0.001**

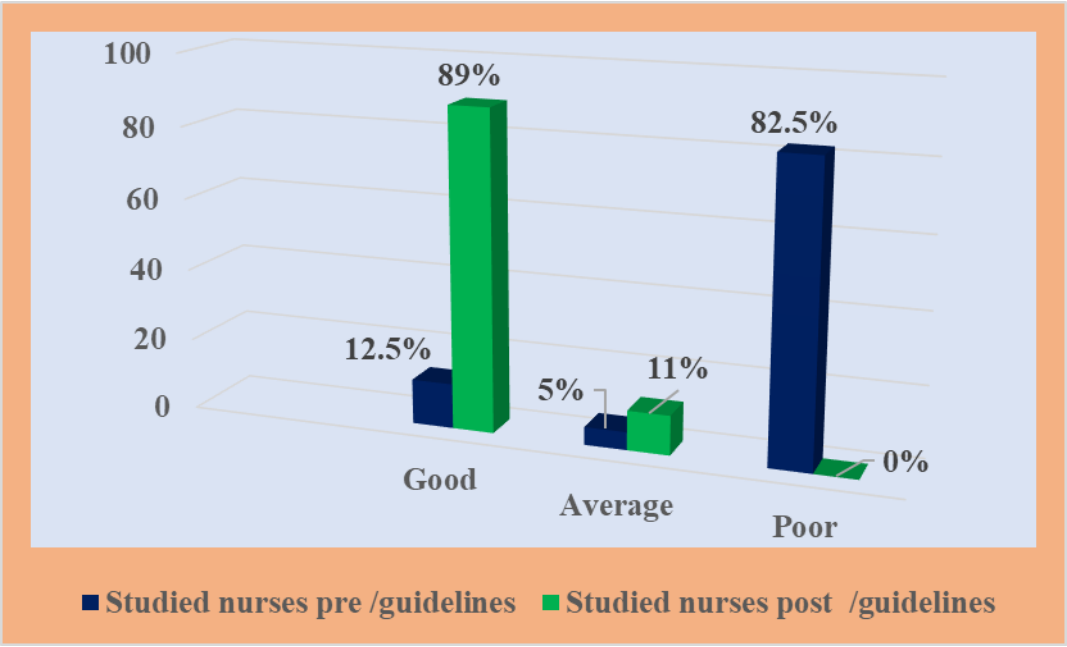

Figure (4): Distribution of the studied nurses according to their total level of knowledge regarding meningitis, lumbar puncture and post lumbar puncture headache in children (n=40)

Table (3): Distribution of the studied nurses according to their practice before, during and after lumbar puncture in children pre/ post evidence-based guidelines (n=40)

Items of procedure	The studied nurses (n=40)		Independent T- test	P value
	Pre /guidelines	Post /guidelines		
	Mean ± SD	Mean ± SD		
Before	2.800±0.242	5.150±0.276	4.246	0.000**
During	4.800±0.3034	6.85±0.549	8.562	0.000**
After	2.650±0.2083	6.300±0.3880	7.354	0.000**

Highly statistically significant at P value <0.000**

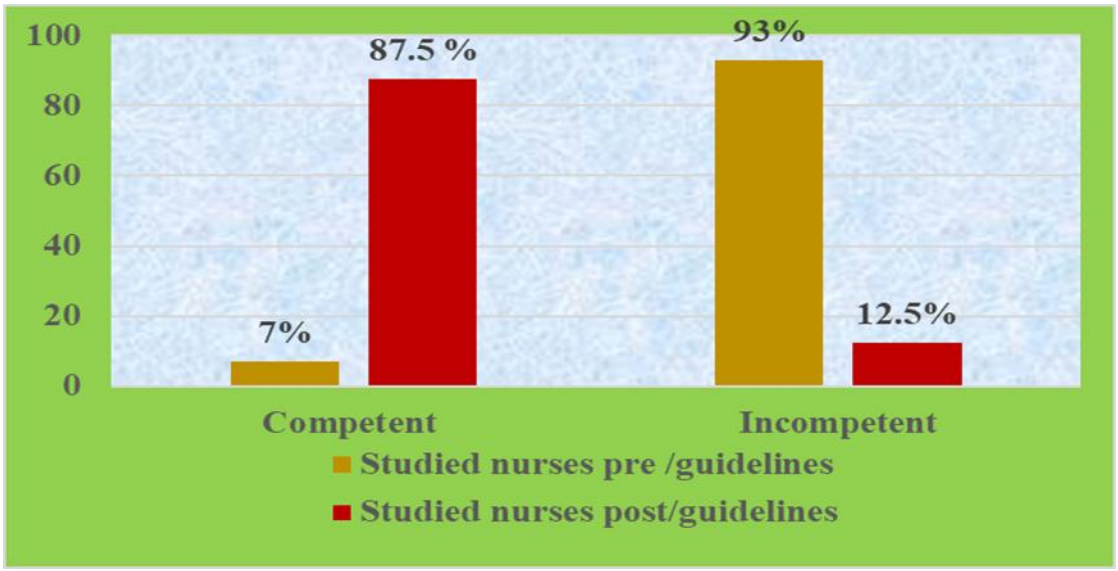

Figure (5): Distribution of the studied nurses according to their total level of practice regarding management of post lumbar puncture headache in children pre/ post evidence-based guidelines (n=40)

Table (4): - Correlation between total knowledge score and total practice of nurses through evidence-based guidelines (n=40)

Variables	Total practice			
	The studied nurses n= (40)			
	Pre / evidence-based guidelines		Post / evidence-based guidelines	
	R	P	R	P
Total knowledge score	0.199	0.000*	0.285	0.000*

Discussion

Children having meningitis have a harder time surviving and avoiding harm. A lumbar puncture is a minimally invasive, painless diagnostic procedure that involves taking cerebrospinal fluid samples for analysis and estimating the fluid's pressure. To offer children high-quality care, nurses need to be knowledgeable, talented, and capable. Aside from that, every child wants to get care from skilled nurses who will treat them with respect, safety, and comfort. [31]

Post lumbar puncture headache (PLPH) is the most frequent complication of the lumbar puncture procedure. It can be prevented by applying evidence-based recommendations to provide optimal care for children undergoing lumbar puncture procedures. So, nurses require specific training concerning the application of Evidence Based Nursing Guidelines to provide care for children and reduce their expected complications**.** [32] This study aimed to analyze the effect of evidence-based guidelines on nurses' knowledge and practices regarding management of post lumbar puncture headache in children with meningitis.

According to characteristics of nurses under the study, the current study Illustrated that, less than half of nurses age was about 30 <40 and the mean age was 34.825±8.995 year. While more than three quarters of them were female. Moreover, half of nurses had technical nursing institute, less than half of nurses had 5 < 10 years of experience in the nursing field, and less than two thirds did not attend training courses related to lumbar puncture.

This result was correspondent to **Abdelmowla et al., (2017)** who noticed that the majority of nurses were between 25 to 45 years while the same study showed that the majority of sample was females and having more than 10 years of experience.[33]

Additionally, this result was in the same line with **Mohammed et al., (2019)** who illustrated that the nursing technical institute graduated more than two fifths of the nurses[34].

Similarly, the current study was in agreement with **Jissir and Hassan (2019)** who indicated that over half of participants were women, over a third had nursing institute, over a fifth had ages 20 to 29, and more than half had worked for one to nine years. [35]

Regarding the total level of knowledge regarding meningitis in children pre/ post evidence-based guidelines, the present study results demonstrated that less than two thirds of the nurses' pre-guidelines had poor level of knowledge regarding meningitis. While the majority had a good level of knowledge of post guidelines. According to the researchers, these findings may be related to a lack of sufficient educational opportunities in the institutions, and improvements may be attributable to the efficiency of the guidelines.

The study results were consistent with **Hussien et al, (2021)** who found that, most study participants reported insufficient levels of knowledge concerning meningitis before program implementation while two thirds of them had insufficient level of knowledge about meningitis post program implementation [36]. Also, this result comes in accordance with (**Oladele et al., 2020**) who noticed that most of nurses under the study had poor knowledge about meningitis before training program with a statistically significance difference between pre and post program. [37]

The results of this study illustrated that there was highly statistical significance difference between nurses' knowledge regarding meningitis pre compared to post guidelines (P<0.00). From researcher' point of view, it might be connected to how knowledge was conveyed throughout educational instruction. The learning process was also improved by the assistance provided when applying. Thus, this improvement illustrates the value of the educational instructions on nurses' acquiring knowledge. These results were in harmony with **Mohammed, et al., (2019)** who presented a significant difference in acute meningitis knowledge between the total mean score of nurses' knowledge before and after the instruction program with (P< 0.001). [34]

Concerning total level of nurses' knowledge about lumbar puncture in children pre/ post evidence-based guidelines, the present study results clarified that, more than two thirds of the studied nurses at pre-guidelines had poor level of knowledge

regarding lumbar puncture. While the majority had a good knowledge level in post guidelines. Therefore, there was highly statistical significance difference between nurses' total level of knowledge regarding lumbar puncture in the study group pre compared to post guidelines (P<0.000).

From researcher' perspective, it could be interpreted that the nursing guidelines' impact on improving nurses' levels of knowledge and the lack of educational and training programs, seminars, and workshops are significant factors in the nurses' lack of knowledge.

This finding was consistent with **Abdelmowla et al., (2017)** who found Difference in nurses' knowledge of lumbar puncture before and after applying the nursing instructions booklet that is extremely statistically significant. After using the nursing instructions pamphlet, all nurses in the neurosurgery department caring for patients receiving lumbar punctures had a satisfactory level of knowledge in their fields. While more than three quarters of them had insufficient knowledge prior to applying the nursing instructions pamphlet. [33]

Regarding the total level of knowledge regarding post lumbar puncture headache in children pre/ post evidence-based guidelines, the current study results Illustrates that, nearly two thirds of the studied nurses pre-guidelines had poor level of knowledge regarding post lumbar puncture headache. While the majority had a good level of knowledge in post guidelines. From researcher' viewpoint, it can be explained as dissemination of information on evidence-based guidelines was done so simply. Additionally, the use of appropriate media for clarification and the assistance provided when applying the guidelines improved the learning process. As a result, this improvement demonstrates the efficacy of evidence-based guidelines in enhancing nurses' knowledge acquisition.

This finding was in agreement with **Niemantsverdriet et al., (2020)** who stated that after application of educational intervention, the majority of participated nurses had correct information concerning lumbar puncture headache as compared to pre-educational intervention. [5]

Also, there were highly statistical significance difference between nurses' total level of knowledge regarding post lumbar puncture headache pre compared to post guidelines (P<0.000). This result was consistent with This finding was agreed with **Dunaway., et al, (2021)**, who reported that there was statistical significance difference between nurses' total level of knowledge pre compared to post intervention. [28]

Regarding Comparison of the studied nurses' knowledge related meningitis, lumbar puncture, and post lumbar puncture headache in children pre/ post evidence-based guidelines, the result of the current study demonstrated that, mean knowledge about meningitis was 2.250± 4.632 pre guidelines, while mean knowledge was 2.945± 4.121in post guidelines. It also showed that, mean knowledge about post lumbar puncture headache in children was 1.887±0.899 in pre guidelines, while mean knowledge was 2.125±0.745 in post guidelines.

Moreover, there was a highly statistically significant difference between nurses' knowledge regarding meningitis, lumbar puncture, and post lumbar puncture headache in children pre compared to post guidelines (p <0.001). From the researcher's point of view, it could be related to the fact that knowledge about evidence-based guidelines was delivered in a straight forward manner. In addition, the use of appropriate media for clarification enhanced the educational process. As a result, this improvement demonstrates the efficacy of evidence-based guidelines in enhancing nurses' knowledge acquisition.

The finding of this study was in agreement with **Mahmoud and Abd-ElSadik (2019),** who state

that the total mean score of nurses' knowledge regarding meningitis, lumber puncture and post lumbar puncture complication improved after receiving clinical pathway-related health education [41]

According to studied nurses' total level of knowledge regarding meningitis, lumbar puncture, and post lumbar puncture headache in children pre/ post evidence-based guidelines, the current study results showed that, more than three quarters of the studied nurses pre-guidelines had poor level of knowledge regarding meningitis, lumbar puncture and post lumbar puncture headache in children. While the majority had a good level of knowledge in post guidelines.

This finding was consistent with **Kafl, (2019),** who discovered that after implementing the training program, the majority of the evaluated sample had a thorough comprehension of meningitis. [38] Similarly with **Hamad et al., (2022**) who reported that on the post-test and follow-ups test, nurses who had received the nursing intervention had more knowledge about lumbar puncture than they did on the pretest. [39].

In addition, there were highly statistical significance difference between nurses' total level of knowledge regarding meningitis, lumbar puncture and post lumbar puncture headache in children pre compared to post guidelines (P<0.000). This finding was coherent with **Temsah et al. (2021)** who discovered a statistically significant variation in post-educational meningitis knowledge; lumbar puncture and post lumbar puncture headache and self-reported intended practice. [40]

According to the studied nurses' practice before, during and after lumbar puncture in children pre/ post evidence-based guidelines, the results of the present study indicated that, mean practice before procedure was 2.800±0.242 pre guidelines, while mean practice was 5.150±0.276 in post guidelines. It also shows that, mean practice post procedure was 2.650±0.2083 in pre guidelines, while mean practice was 6.300±0.3880 in post guidelines. Moreover, there was a highly statistically significant difference at post guidelines (p <0.001).

Regarding to researchers, this may be connected to the effectiveness of evidence-based guidelines for promoting the level of nurses' practices, involving providing the nurses under study with ongoing explanations, reinforcement, and feedback, as well as continuous demonstration and re-demonstration.

This finding was in friendship with **Hamad et al., (2022**) They discovered that while all of the nurses under study performed poorly on the pre-test about lumbar puncture, they all performed satisfactorily on the post-test and the follow-up test, respectively. [39] Similarly, **Jissir & Hassan (2019)** illustrated that after the program implementation, skills of the studied nurses had improved statistically when compared to pre-test**.** [35]

Also, there were highly statistical significance difference between nurses' practice before, during and after lumbar puncture in children pre compared to post evidence-based guidelines (P<0.000). From researcher' perspective, these findings highlight the value of practical training done on the job for nurses to develop their skills. The finding was in accordance with **Temsah et al., (2021)**, whose self-reported planned practice and post-educational knowledge showed a statistically significant difference[40].

According to the studied nurses' total level of practice about management of post lumbar puncture headache in children pre/ post evidence-based guidelines, the result of the existing study Showed that, the majority of the studied nurses at pre-guidelines had incompetent total level of practice regarding management of post lumbar puncture headache in children. While the majority

had competent total level of practice in the study group post guidelines.

From the point of view of the researchers, this is because nurses learned knowledge and skills from the instructional materials, post-test errors were less common among them. This may be demonstrated by the impact of nursing evidence-based guidelines on nurses' practice (effective children preparation and care prior to, during, and following lumbar puncture), which resulted in prompt relief of headache following lumbar puncture.

These results agreed with **Abdelwahab Abdallah Srour& Alsayed Ahmed, (2023)** who found that, most of the nurses under study improved their level of competence after the program's implementation, followed by a phase of follow-up testing, but only one third did so before the program's implementation.[42] Similarly, with **Abdelmowla et al., (2017)** who reported that following the use of the nursing instruction leaflet, the majority of nurses had a sufficient level of practice. [33]

Also, there were highly statistical significance difference between nurses' total level of practice regarding management of post lumbar puncture headache pre compared to post guidelines (P0.000>). This result was consistent with **Jissir & Hassan (2019)** observation that nursing skills improved statistically significantly between the pre- and post-test after the programs were implemented. [35]**.** Similarly, **Rusch et al., (2014)** who reported that statistical significance difference between nurses' total practice regarding management of post lumbar puncture headache in the study group pre compared to post evidence-based practice recommendations.[25] By investigating the correlation between nurses' total knowledge score and total practice using evidence-based guidelines, it was stated that, there is a positive correlation between nurse's total knowledge score and total practice pre / post evidence-based guidelines. From the researchers' point of view This may be attributed to the high level of knowledge exhibited in nurses' practices; knowledgeable nurses provide more precise care.

This finding agreed with **Abdelmowla et al., (2017)** who identified a positive relationship between nurse knowledge and practice **[33]**also, this result was in the same line with **Abdelwahab Abdallah Srour& Alsayed Ahmed, (2023)** They revealed that the nurses under study had a strong, statistically significant positive correlation with their overall knowledge and practices regarding the care of patients having meningitis during the preceding, post, and three months follow up. [42] Similarly, **Hamad et al., (2022**) found that there was a highly statistically significant positive correlation between total knowledge and total practice. [39]

Conclusion:

On the basis of the present study's results, it can be noticed that evidence-based practice guidelines significantly improved nurses' knowledge and practices regarding management of post lumbar puncture headache in children.

Recommendations:

- Design a standard for nursing practice regarding management of post lumbar puncture headache in children.
- Conducting continuous education about management post lumbar puncture complications in children.
- Further studies regarding the effect of EBP on the clinical outcome of children undergoing lumbar puncture.

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Effectiveness of Topical Glycerin Magnesium Sulfate Application Versus Cold Application on Patients with Peripheral Intravenous Catheters induced Thrombophlebitis

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Abstract: Peripheral intravenous catheters (PIVCs) are a widespread practice and considered the most common invasive procedure for hospitalized patients. Thrombophlebitis or Phlebitis is a common complication linked with the use of peripheral intravenous catheters. Nurses play an essential role in the prevention and treatment of thrombophlebitis. ***Aim:*** The study aimed to evaluate topical glycerin magnesium sulfate application versus cold application on patients with peripheral intravenous catheter-induced thrombophlebitis. ***Design***: Quasi experimental research design had been utilized. ***Settings***:The study was carried out in medical units at Mansoura University Hospital. ***Subjects***: A purposive sampling technique was used. The study sample consisted of 60 adult patients, the sample was assigned to two experimental groups, 30 in each group (topical glycerin magnesium sulfate application- group I and cold application -group II). ***Tools of data collection***: Data were collected using tool I: A structured interview questionnaire and tool II: Visual infusion phlebitis (VIP) scale. ***Results:*** It revealed that there was a highly significant difference in VIP scale score between the studied patients in topical glycerin magnesium sulphate group and cold application group after each intervention (P= 0.000). Likewise, there is a significant difference in mean score of VIP in two experimental groups after comparison baseline within 36, 48 hours after intervention ($P < 0.05$) while mean ±SD score of VIP in group I, was 1.93± 0.583 & 1.52±0.861 respectively and group II, was 2.26±0.583 & 1.83±0.694 respectively. ***Conclusion:*** Application of glycerin magnesium sulfate & cold application were effective in reducing severity of phlebitis. Also, the study demonstrated that using a dressing with glycerin magnesium sulfate is more effective than applying cold compresses in managing thrombophlebitis. ***Recommendation***: It was recommended to monitor cannula site regularly, early detection of cannula-induced phlebitis. Using glycerin magnesium sulfate application and cold application to reduce severity of peripheral intravenous catheters induced thrombophlebitis in hospitalized patients.

Keywords: Cold application, Glycerin magnesium sulfate, Peripheral intravenous catheters, Thrombophlebitis.

Introduction

Peripheral intravenous catheters (PIVCs) are among the most frequently used vascular access devices worldwide, with their insertion being one of the most common practices for hospital nurses. PIVCs are indicated for short-term use, usually around a week, for the administration of intravenous therapy [(1)].

Peripheral line placement, is the insertion of an indwelling single-lumen plastic conduit across the skin into a peripheral vein [(2,3).] Size of the cannula is chosen based on the duration and type of infused therapy [(4,5)], and among the uses of PIVCs such as parenteral nutrition, fluid therapy, blood transfusion, and blood sample for diagnostic studies [(4).]

There are several complications associated with peripheral intravenous catheters that are classified into local or systemic; Local complications including thrombophlebitis, extravasation, infiltration, and infections can occur, Systemic complications include pulmonary edema, air, and catheter embolism. The most common complication is thrombophlebitis [6,7]. The Infusion Nurses Society (INS) indicates that the accepted phlebitis rate should be 5% or less (8). Presently, incidence of phlebitis change in various settings from 3.7% to 67.24% [9,10].

Thrombophlebitis or Phlebitis is a widespread complication associated with the use of peripheral intravenous catheters [4,11]. Phlebitis is defined as an acute inflammation of the blood vessels wall, with irritation of the venous endothelium in the section cannulated by the catheter. [9]. That is characterized by pain, edema, erythema along the vein, heat, and fever. PIVC‑related phlebitis may develop due to four causes: chemical, mechanical, bacterial, and post infusion [10].

Nurses play an essential role in prevention and treatment of thrombophlebitis. Nurses are responsible for prevention and interventions strategies such as insertion, monitoring and assessing peripheral venous catheter (PVC) site for early identification of phlebitis to minimize the severity of complications [12]. Different interventions are available for thrombophlebitis, which consists of removal of IV line and restarting it in another site, applying a cold compress to decrease blood flow and increase platelet aggregation [13]. Magnesium sulphate is a natural exfoliant and has anti- inflammatory properties. Topical application of magnesium sulphate enhances a process called reverse osmosis which absorbs excessive water and reduces edema. The cooling effect of applying cold compress to the phlebitis is very beneficial, causing a numbing sensation and relives pain. Those are the two interventions mainly used [14].

Significance of the study

Thrombophlebitis occurs in 20–70% of peripheral intravenous treatment patients according to 20-year studies(5). The prevention of phlebitis is important in hospital setup. The nurses have more responsibility to prevent and reduce incidence of phlebitis. The cooling effect of applying ice to the phlebitis is very beneficial in addition, magnesium sulfate is a natural exfoliant and has anti-inflammatory properties. Nurses should prevent and reduce thrombophlebitis complications(10,15).

Judgment in deciding on the treatment modality or selecting the optimal intervention for managing phlebitis remains a topic of ongoing controversy for the practicing nurse. Consequently, this study aims to address this issue and provide clarity on the matter.

Study aim

The study aimed to evaluate the effectiveness of topical glycerin magnesium sulphate application versus cold application among patients with peripheral intravenous catheter-induced thrombophlebitis.

Research Hypothesis

H1: There will be a significant reduction in the severity of phlebitis between pre- and post-intervention among patients in experimental group I (Glycerin Magnesium Sulfate Application).

H2: There will be a significant reduction in the severity of phlebitis between pre- and post-intervention among patients in experimental group II (Cold Application).

H3: There will be a significant difference between two experimental groups I and II in severity of phlebitis post-intervention.

Subjects and method

Study Design

Quasi Experimental (pre-post) test research design had been conducted.

Setting:

The study was carried out in medical units at Mansoura University Hospital.

Sample

Purposive sampling technique was used. The study sample consisted of 60 adults patients, admitted in medical units at Mansoura University Hospital who developed thrombophlebitis as a result of the peripheral intravenous catheter (PIC) during hospitalization. Estimation of sample size was performed using open Epi (https://www.cdc.gov/epiinfo/index.html)to calculate sample size of two groups. Mean difference module was used, this module calculates sample size by comparing two means. Estimation based on previously reported improvement in severity of phlebitis (14), 30 patients in each group were needed to achieve 80% statistical power, alpha error level 5% (95% significance). The sample was assigned to two experimental groups, 30 in each group (30 in glycerin magnesium sulphate application - group I, 30 in cold application – group II). The patients were selected according to the following criteria,

Inclusion criteria included: Patients who are.

- Between the age group from 18 to 60 years.
- Developed thrombophlebitis due to intravenous therapy in upper limbs.
- Willing to participate in this study.
- Available during the study period

Exclusion Criteria: Patients who are

- Poor skin condition.
- Receiving chemotherapy.
- Peripheral vascular diseases.
- Have a pre -existing skin condition (dermatitis, eczema)

Data collection tools

Tool I: **A structured interviewing questionnaire.**

This tool was developed by researchers after a review of relevant literature (1,2) to assess demographic data and factors associated with occurrence of phlebitis and divided into two parts.

Part I: Demographic characteristics

It included (gender, age, marital status, educational level, and occupation).

Part II: Factors associated with occurrence of phlebitis.

It included (size of cannula, insertion site, number of punctures during the IV cannulation, purpose of IV cannulation, and duration of cannulation).

Tool II: Visual infusion phlebitis (VIP) scale

It is a standardized tool developed by Andrew Jackson (1998)[16] to assess the severity of phlebitis before and after intervention. The scoring system was done based on the stages and clinical appearance of phlebitis; score ranged from 0 (no signs of phlebitis) to 5 (advanced stage thrombophlebitis)

Score	Stages of phlebitis	Observation
0	No signs of phlebitis	IV site appears healthy
1	Possible first sign of phlebitis	One of the following signs is evident: • Slight pain near IV site OR • Slight redness near IV site

2	Early stage of phlebitis	TWO of the following are evident: • Pain at IV site • Redness • Swelling
3	Medium stage of phlebitis	ALL of the following signs are evident: • Pain along path of cannula • Redness around site • Swelling
4	Advanced stage of phlebitis	ALL of the following signs are evident and extensive: • Pain along path of cannula • Redness around site • Swelling • Palpable venous cord
5	Advanced stage of thrombophlebitis	ALL of the following signs are evident and extensive: • Pain along path of cannula • Redness around site • Swelling • Palpable venous cord • Pyrexia

Ethical consideration

Approval from the director of Mansoura university hospital and ethical approval (Ref.No.P.0464) from the Institutional Review Board of the Faculty of Nursing, Mansoura University were obtained to collect the necessary data after explanation of the aim and nature of the study. All participants in the study were informed that participating in the research was voluntary and written informed consent was obtained. Confidentiality and privacy of information from health care professionals were maintained at all times.

Validity and Reliability

The questionnaire was finalized with the help of the five experts in medical- surgical nursing for testing content validity of the tools, therefore the necessary changes were done. Reliability for tool I testing was done using Cronbach's alpha (Alpha = 0.78). The reliability of the VIP score was checked by using Kappa's Co-relation Coefficient, was 0.83 [(16)].

A pilot study

A pilot study was carried out on 6 patients with thrombophlebitis to check and ensure clarity and applicability of the tools.

Data collection

1. The data collection for the study was done after obtaining permission from the institutional ethical committee at the Faculty of Nursing, Mansoura University.
2. The researchers introduced themselves to the patients and explained the purpose of the study.
3. Patients who met the inclusion criteria were selected, and informed consent was obtained. patients were assigned randomly

to two groups (glycerin magnesium sulphate - group I and cold application – group II).

4. From April 2023 to the end of June 2023, data were collected throughout a three-month period. Two days a week, researchers were present in the settings stated above.
5. Initial assessment was done to assess demographic data and factors associated with occurrence of phlebitis using tool I.
6. Previously inserted cannula was removed, and phlebitis was assessed using the tool II; VIP scale (pretest).
7. Regarding posttest, in glycerin magnesium sulphate (group I) after the initial assessment, normal saline was used to clean area and a dressing with glycerin magnesium sulphate soaked on a sterile gauze was applied by the researchers over the site of phlebitis for 10 minutes (3 times/ day) for two consecutive days.
8. While in the cold application (group II) after the pre-test, a gauze was soaked in cold water of a temperature <15°C taken from the refrigerator immediately before the dressing and applied at the phlebitis site for a duration of 20 min, (3 times/ day) for two consecutive days.
9. Post test was done for both groups every 12, 24, 36, 48 hours after the intervention using tool II.

Statistical analysis

The frequency and percentage distribution were used to analyze the demographic variables, factors associated with occurrence of phlebitis and the severity of thrombophlebitis among patients. Mean and standard deviation were used to assess the effectiveness of glycerin magnesium sulphate versus cold application on both groups, using chi square test. Friedman Test for comparing the effectiveness of glycerin magnesium sulphate & cold application on severity of phlebitis in each group. Independent t-test for comparing the two experimental groups before intervention, after 12 hrs, after 24 hrs, after 36 hrs, and after 48 hrs respectively.

Results

Table (1): Frequency and percentage distribution of demographic variables of the studied groups no=60:

Showed the age of studied patients in two groups ranged from 49≥ 60 years old with mean age 46.20 in group 1 and 46.93 in group II. Female were controlling in the studied sample (63.3in group I &53.3in group II). Regarding marital status (73.3 & 66.7 respectively) were married in both experimental groups and (33.3% & 30.0% respectively) in both groups were had secondary education. Regarding occupation, 36.7% of the group I was employee & housewife while 33.3 % of the group II was housewife. There was no significant difference of demographic data among both groups.

Table (2): Factors associated with occurrence of phlebitis (n = 60).

Showed that size of inserted cannulas was 18 and 20 gauge with the percentage of 36.7% in group I, while 40 % of group II inserted cannula size was 18 gauge. Pointing to the insertion site 43.3% of cannula was inserted in Median vein in group I, and 53.3 % of group II was inserted in Cephalic vein. Considering purpose of IV cannula was 50% & 56.7% for infusion in group I & group II respectively. 76.7% & 70.0% of studied patients in group I & group II respectively were cannulated from the first time. Concerning to duration of cannula, it lasted for 24-48 hrs in both groups with percentage of 43.3% and 40.0% in group I and group II

respectively. Cannula related factors show no significance difference between both groups.

Table (3): Signs & Symptoms of phlebitis in the studied patients pre- intervention (n = 60).

Illustrated that the studied patients in group I & group II experienced presence of pain along the cannulated vein with the percentage of (63.3% & 56.7 %) respectively, while 36.7% and 43.3 % had pain in site of cannula insertion in both groups correspondingly. Erythema was observed in 66.7% in group I and 46.7% in group II. Swelling was observed in 43.3% and 26.7% in group I and group II respectively. Considering presence of induration, it was 26.7% in group I and 23.3% in group II. Regarding presence of palpable venous cord, it was observed in 16.7% of patients in group I and 26.7% in group II. Pyrexia was observed in 3.3% of group I and 6.7 % of group II.

Table (4): Baseline severity of phlebitis according to VIP score of the studied patients pre-intervention (n = 60).

Revealed baseline severity of phlebitis according to VIP score pre- intervention while the medium stage/ moderate phlebitis as scored by "3" was noticed in 50.0% & 43.3% of the studied patients among group I &II respectively. Referring to early/mild stage as scored by "2" noticed in 30.0% of group I & 46.7% group II. Advanced or severe thrombophlebitis as scored by "4" observed in them 6.7% & 3.3 % of group I and group II respectively with no significant difference between two groups.

Table (5): Comparison of the effectiveness of glycerin magnesium sulfate and cold application on severity of phlebitis with comparison to baseline score.

Illustrated that there is a highly significant difference in VIP score between the studied patients in glycerin magnesium sulphate group I and cold application group II after each intervention ($P = 0.000$). The mean score of VIP was reduced post- intervention in both groups. Consequently, it was concluded that both applications were helpful in reducing severity of phlebitis. Likewise, there is a significant difference in mean score of VIP in two experimental groups after comparison baseline within 36, 48 hours after intervention ($P < 0.05$) while mean ±SD score of VIP in group I, was 1.93± 0.583 & 1.52±0.861 respectively and group II, was 2.26±0.583 & 1.83±0.694 respectively. But it noticed that there is a more decline in mean score of VIP in group I, as compared with group II, so magnesium sulphate with glycerin was more effective than cold application.

Table (1): Frequency and percentage distribution of demographic variables of the studied groups no=60:

Items	Group I (Glycerin Magnesium Sulfate Application)		Group II (Cold Application)		Total		X2 (P)
	No=30	%	No=30	%	No=60	%	
Age (in years)							
18>29	3	10.0	4	13.3	7	11.7	1.115
29>39	7	23.3	4	13.3	11	18.3	(0.773)
39>49	8	26.7	8	26.7	16	26.7	
49≥60	12	40	14	46.7	26	43.3	
Mean ± SD	46.200 ±1.174		46.933 ± 1.170				
Gender							0.617
Male	11	36.7	14	46.7	25	41.7	(0.432)
Female	19	63.3	16	53.3	35	58.3	
Marital status							
Married	22	73.3	20	66.7	42	70.0	1.706
Widowed	4	13.3	5	16.7	9	15.0	(0.636)
Divorced	1	3.3	0	0.0	1	1.7	
Single	3	10.0	5	16.7	8	13.3	
Level of Education							
Illiterate	1	3.3	3	10.0	4	6.7	
Read& write	7	23.3	6	20.0	13	21.7	2.945
Basic education	10	33.3	7	23.3	17	28.3	(0.567)
Secondary	10	33.3	9	30.0	19	31.7	
University & above	2	6.7	5	16.7	7	11.7	
Occupation							2.129
Employee	11	36.7	7	23.3	18	30.0	(0.546)
Manual work	5	16.7	8	26.7	13	21.7	
Housewife	11	36.7	10	33.3	21	35.0	
No work	3	10.0	5	16.7	8	13.3	

X2 test Pearson Chi-Square *non-significant p > 0.05*

Table (2): Factors associated with occurrence of phlebitis (n = 60).

Items	Group I (Glycerin Magnesium Sulfate Application)		Group II (Cold Application)		Total		X2 test (P)
	No=30	%	No=30	%	No=60	%	
Size of Cannula							
16 gauge	1	3.3	1	3.3	2	3.3	3.304
18 gauge	11	36.7	13	43.3	24	40.0	(0.347)
20 gauge	11	36.7	14	46.7	25	41.7	
22 gauge	7	23.3	2	6.7	9	15.0	
Insertion site							
Cephalic	12	40.0	16	53.3	28	46.7	2.163
Basaltic	3	10.0	1	3.3	4	6.7	(0.539)
Median	13	43.3	10	33.3	23	38.3	
Metacarpal	2	6.7	3	10.0	5	8.3	
Purpose of IV cannula							
Infusion	15	50.0	17	56.7	32	53.4	1.968
Medication Administration	11	36.7	12	40.0	23	38.3	(0.374)
Blood transfusion	4	13.3	1	3.3	5	8.3	
Number of punctures							
First time	23	76.7	21	70.0	44	73.3	1.691
Second time	6	20.0	9	30.0	15	25.0	(0.429)
Third time	1	3.3	0	0.0	1	1.7	
Duration of cannula							
Less 24 hrs	7	23.3	9	30.0	16	26.7	
24-48 hrs	13	43.3	8	26.7	23	38.3	1.812
48-72 hrs	8	26.7	12	40.0	18	30.0	(0.612)
More than 72 hrs	2	6.7	1	3.3	3	5.0	

X2 test Pearson Chi-Square *non-significant p > 0.05*

Table (3): Signs & symptoms of phlebitis in the studied patients pre- intervention (n = 60).

Signs & Symptoms of phlebitis	Group I (Glycerin Magnesium Sulfate Application)		Group II (Cold Application)		X2 test	P- Value
	No=30	%	No=30	%		
Presence of pain						
Insertion site of cannula	11	36.7	13	43.3	0.278	0.598
Along the cannulated vein	19	63.3	17	56.7		
Presence of Erythema	20	66.7	14	46.7	2.443	0.118
Presence of Swelling	13	43.3	8	26.7	1.832	0.176
Presence of Induration	8	26.7	7	23.3	0.089	0.766
Presence of Palpable Venous Cord	5	16.7	8	26.7	0.884	0.347
Pyrexia	1	3.3	2	6.7	0.351	0.554

X2 test Pearson Chi-Square *non-significant p > 0.05*

Table (4): Baseline severity of phlebitis according to VIP score of the studied patients pre-intervention (n = 60).

Severity of Phlebitis according to VIP Score:	Group I (Glycerin Magnesium Sulfate Application)		Group II (Cold Application)		X2 test	P- Value
	No=30	%	No=30	%		
0 ---No Phlebitis.	0	0.0	0	0.0		
1--- Possible first sign/very mild.	4	13.3	2	6.7		
2--- Early stage/Mild.	9	30.0	14	46.7		
3--- Medium stage/Moderate.	15	50.0	13	43.3	2.230	0.526
4 ---Advanced phlebitis/severe.	2	6.7	1	3.3		
5--- Advanced Thrombophlebitis/Very severe.	0	0.0	0	0.0		

X2 test Pearson Chi-Square *non-significant p > 0.05*

Table (5): Comparison of the effectiveness of glycerin magnesium sulfate and cold application on severity of phlebitis with comparison to baseline score (n = 60).

Duration difference	Group I (Glycerin Magnesium Sulfate) No=30		Group II (Cold Application) No=30		Test of significant (independent sample t test)	(P^2) value
	Mean ± SD	Mean Rank	Mean ± SD	Mean Rank		
Baseline Score pre- Intervention)	2.50± 0.820	3.77	2.43± 0.678	3.35	0.343	0.733
After 12 hrs	2.40± 0.813	3.57	2.36± 0.668	3.20	0.173	0.863
After 24 hrs	2.20± 0.714	3.17	2.30± 0.651	3.07	-0.567	0.573
After 36 hrs	1.93± 0.583	2.63	2.26± 0.583	2.98	-2.213	0.031*
After 48 hrs	1.52± 0.861	1.87	1.83± 0.694	2.23	-2.475	0.016*
Friedman test (p)1	59.718 (0.000)**		29.890 (0.000)**			

Friedman test (p) [1]: Comparing the effectiveness of glycerin magnesium sulphate & cold application on severity of phlebitis in each group.

Independent t-test (p) [2]: Comparing the two experimental group before intervention, after 12 hrs, after 24 hrs , after 36 hrs, and after 48 hrs respectively.

** Statistically significant p≤ 0.05* *** Highly statistically significant p≤ 0.01*

Discussion

Intravenous therapy is prescribed for various medical purposes. A considerable proportion of hospitalized patients undergo peripheral venous cannulation as a routine procedure to facilitate swift and precise medication delivery. Nonetheless, this intravenous cannulation may lead to unwanted consequences, with phlebitis being the most common among them. Phlebitis can arise from mechanical, chemical, or infectious factors [(17)].

The study was carried out to assess the effectiveness of topical glycerin magnesium sulphate versus cold application on thrombophlebitis among patients with peripheral intravenous cannula. Nearly half of studied patients were in the age group ranged from 49≥ 60years old and female were prevalent representing more than half of the studied sample and more than two third were married where secondary education representing nearly one third of studied sample. From researchers' point of view these findings may be due to association between chronic diseases and age, especially medical diseases and this age group explain the marital status of studied patients. These findings are similar to a study conducted in Kerala by Neethu and Pillai (2020) who found that half of his studied sample were in the age group 50-60 years where female were more prevalent, and nearly two third of studied sample were married while one third of the sample had secondary education [(18)].

Regarding to insertion site of cannula, the current study noticed that the main site for cannula insertion was Median vein which represents above forty of sample in Glycerin magnesium sulfate application group I & above half was inserted in cephalic vein in cold application group II. Considering size of cannula nearly three quarter of studied patients in group I, were cannulated by 18–20-gauge cannula and nearly half of studied sample in group II, were cannulated by 20-gauge cannulas.

Researchers point of view regarding site of cannula insertion in cephalic and median vein attributed to the characteristics of these veins as they most frequently accessed vein which naturally explains the size of inserted cannula to be 18–20-gauge This was in the same line with a study done by Jayabharathi (2015) who investigated "The effect of glycerin magnesium sulphate application versus cold application on thrombophlebitis among patients received intravenous therapy " who reported that nearly above one third of group I and above half of group II cannulated at Cephalic vein [(19)]. Similarly, a study conducted in Dharan, Nepal by Amuda (2019) found that half of the sample were cannulated with 20 gauge [(20)]. While the finding is incompatible with a study by Rukhsana , Rahman, , Tamang, and Kochhar (2016) who studied "effectiveness of Magnesium Sulphate with Glycerin Dressing versus Heparinoid Ointment Application on Management of Phlebitis among Patients" which

showed that Metacarpal vein is the most preferred site of cannulation in his two experimental groups [21].

Concerning duration of cannula, just about half of the sample in group I, developed phlebitis after 24 to 48 hrs., and forty of sample in group II developed phlebitis after 48 to 72 hrs. This may attributed to type and amount of administered medication or infusion given to patients. This result is confirmed by study conducted by Varghese and Moly (2018) who investigated "effectiveness of magnesium sulfate with glycerine versus cold compress on patients with peripheral intravenous cannula induced phlebitis who found that phlebitis developed in half of sample after 2 days, and forty of sample developed phlebitis < 2 days and one tenth only from 3-5 days [22].

On the other hand the current study results is conflicting with the results by Urbanetto, Peixoto, and May (2016) who reported that the occurrence of phlebitis increases after IV cannula left in place more than72 hrs [23].

Regarding the effectiveness of glycerin magnesium sulphate & cold application on thrombophlebitis. The result revealed that there is a significant difference in mean score of VIP among the patients in glycerin magnesium sulphate group I & cold application group II after each intervention. The mean score of VIP was reduced post-intervention in two groups. Consequently, it was fulfilled that both the applications were helpful in reducing severity of thrombophlebitis.

This can be attributed to the fact that Magnesium sulfate is known for its anti-inflammatory properties. When applied topically, it can help reduce inflammation and swelling in the affected veins, which is a hallmark of phlebitis. Glycerin, often used as a vehicle for drug delivery, can enhance the penetration of magnesium sulfate through the skin. This allows the medication to reach the inflamed veins more effectively, potentially speeding up the healing process.so, combining magnesium sulfate with glycerin may create a synergistic effect, where the two substances work together to provide a more potent anti-inflammatory action, further aiding in reducing phlebitis symptoms and pointing to cold compresses, typically made by applying ice or a cold pack to the affected area, are widely used for reducing inflammation and pain in various medical conditions, including phlebitis.

The application of cold constricts blood vessels, which can help reduce blood flow to the inflamed veins. This constriction decreases the swelling and inflammation in the affected area. Cold compresses can also provide relief from pain and discomfort by numbing the area and slowing down nerve conduction, which may help ease the sensation of pain associated with phlebitis.

This result is consistent with the study by Varghese and Moly (2018) where results showed that both magnesium sulfate with glycerin & cold compress were found to be effective in reducing level of phlebitis. The difference in post-intervention VIP scores between two groups was found to be significant [22].

Another similar study conducted in Coimbatore by Arthi and Tamilselvi (2019) to evaluate "effectiveness of

magnesium sulphate with glycerin versus ice pack application on phlebitis among patients with peripheral intravenous cannula induced phlebitis" demonstrated that there was a significance differences in mean score of phlebitis between pre-test & post-test among patients with peripheral intravenous catheters induced phlebitis who received magnesium sulphate with glycerin application & ice pack application. Hence it is fulfilled that the magnesium sulphate with glycerin & ice pack application significantly reduces phlebitis [(14)].

Similarly, the study conducted in New Delhi by Rukhsana, Rahman, Tamang, and Kochhar (2016) showed significant difference in mean score of VIP among the patients in glycerin magnesium sulphate group I & cold application group II after each intervention. Therefore, this indicates that cold application& glycerin magnesium sulfate were useful in reducing phlebitis [(21)]. Another similar study conducted by Jayabharathi (2015) in Perambalur, which found the difference between pre & post score were significant in two groups, and there is a significant reduction on level of thrombophlebitis after glycerin magnesium sulphate & cold application [(19)].

Concerning the comparison of the effectiveness of glycerin magnesium sulphate and cold application on thrombophlebitis. The current study revealed that there is a significant difference in mean score of VIP in two experimental groups after comparison baseline within 36, 48 hours after intervention. But it noticed that there is a more decline in mean score of VIP in experimental group I, as compared with experimental group II. This can be explained by the fact that the combination of magnesium sulfate and glycerin may work synergistically to provide a more potent and targeted anti-inflammatory effect on the inflamed veins.

On the other hand, while cold compresses can help reduce inflammation and pain, they primarily act by constricting blood vessels and may not have the same focused anti-inflammatory action as the specific medication. Magnesium sulfate with glycerin, when applied topically, can potentially penetrate deeper into the affected tissues, reaching the inflamed veins more effectively. This deeper penetration allows for a more direct and concentrated delivery of the anti-inflammatory properties of magnesium sulfate, leading to a more pronounced reduction in inflammation.

Cold compresses provide temporary relief by numbing the area and reducing blood flow, but their effects may wear off once the cold application is removed. In contrast, magnesium sulfate with glycerin could have a longer-lasting impact due to its sustained anti-inflammatory action, even after the application has been discontinued. So, magnesium sulfate with glycerin was more effective than cold application in reducing the level of phlebitis, likely due to its targeted anti-inflammatory properties, potential for deeper penetration, and sustained effects.

This result of the study is being confirmed by the study carried out in Coimbatore by Arthi and Tamilselvi (2019) who reported that there was a significant difference in the effect of magnesium sulphate with glycerin and

ice pack application in day 2 and 3. Also stated that magnesium sulphate with glycerin application was effective in reducing the level of phlebitis in the experimental group I than who receive ice pack application in the experimental group II [(14)].

Another similar study conducted in Kerla by Varghese and Moly (2018) found that the mean VIP scores post-intervention of magnesium sulfate with glycerin was less than the mean VIP score of cold compress. The study fulfilled that magnesium sulfate with glycerin was more effective than cold compress for treatment phlebitis [(22)]. Similarly, a study carried out by Jayabharathim (2015) in Perambalur, showed the glycerin magnesium sulphate application will be effective than the cold application on reduction of thrombophlebitis between participants received IV therapy [(19)].

On the other hand, this finding conflicts with a study carried out in New Delhi by Rukhsana, Rahman, Tamang, and Kochhar (2016) reported that there is no significant difference between cold application and glycerin magnesium sulfate application in relieving phlebitis. This indicates that both the treatments were effective in relieving phlebitis (21). Also the finding is incoherent with the findings from a study carried out in India by Yadavet al. (2016) who stated that cold compress was more effective as compared with glycerin and alovera [(24)].

Conclusion

The findings of the current study concluded that both glycerin magnesium sulfate and cold application were effective in reducing the severity of thrombophlebitis among patients received intravenous therapy, but among them the mean VIP score is reduced in glycerin magnesium sulphate group as compared with cold application group so magnesium sulphate with glycerin was more effective than cold application.

Recommendations

- Using glycerin magnesium sulphate application and cold application to reduce severity of peripheral intravenous catheters induced thrombophlebitis in hospitalized patients.
- Regular monitoring of the cannula site, early detection of cannula-induced phlebitis, and timely management are crucial for treatment and the avoidance of subsequent complications.
- Nurses must possess the necessary knowledge and abilities to manage cannula-induced phlebitis and prevent its complications.
- Additional research might be done utilizing a larger sample and different types of items.

Conflict of interest

The authors announce that they have no conflict of interest.

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Effect of mothers' empowerment guildelines about caring for children with cast on their knowledge and children selected outcomes

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Abstract

Casts are used to keep the bones and soft tissues lined up and protected while they are healing. A cast wraps completely around the arm or leg and is custom-made for the patient. It can only be taken off with a specialized cast saw. Casts also protect wounds after surgery while it heals. The hard, immobile part of most custom made casts is made from plaster or fiberglass**. Aim of the study:** evaluate the effect of mothers' empowerment guidelines about caring for children with cast on their knowledge and children selected outcomes. **Research Design:** Pre-posttest quasi-experimental research design will be used to fulfill the current study's goal. **Setting:** The current study was conducted at the orthopedic surgical unit and pediatric orthopedic outpatient clinic at Cairo University Specialized Pediatric Hospital (CUSPH). **Participants:** A purposive sample of 60 mothers whose children with cast, divided equally to study and control groups. **Data collection tools:** Structured Interview Questionnaire, Mother's Knowledge & Practices Assessment Sheet, and Post Cardiac Catheterization Assessment Record were used. **Results:** There was a significant statistical difference in the total mean scores for children's outcomes between both groups, as well as, in the mean scores for mothers' knowledge and practice between before and after empowerment guidelines implementation. **Conclusion:** there was a significant increase in knowledge and reported practice in caring for children with cast following empowerment guidelines. Moreover, children of mothers who received empowerment guidance had better cast's outcomes. **Recommendation:** Extensive prospective randomized studies required to enhance outcomes.

Keywords: Empowerment Guidelines, and Children Selected Cast Outcomes

Introduction

Musculoskeletal disorders (MSDs) are major disorders that affect the pediatric population, providing valuable insights into their diagnosis, treatment, clinical and radiologic outcomes, and prognosis predictors. Approximately 33% of childhood medical problems were related to the musculoskeletal system. They range from those that arise suddenly and are short-lived, such as fractures, to lifelong conditions associated with ongoing functioning limitations and disability. Musculoskeletal disorders are the leading contributor to disability worldwide [(1)]. As lifestyles have an impact on musculoskeletal health, studies show that more children and young people are developing MSDs, and doing so earlier in life[(2)].

Musculoskeletal disorders are injuries and conditions that influence the human body's musculoskeletal system, which contains the bones, muscles, tendons, ligaments, nerves, and discs. The muscles, joints, and bones of children are affected by a wide range of illnesses. These conditions may be as result of hereditary factors, trauma, inflammation, or infection[(3)]. Musculoskeletal disorders can be categorized as traumatic damage,

congenital defects, acquired defects, infections of the bones and joints, bone and soft tissue tumors, and disorders of the joints [4].

Children are different from adults as they are developing physically, socially, and psychologically. Due to physiology and biomechanics of growth, children and young people show a unique set of age-related problems. Children show a unique set of age related symptoms. Delays in diagnosis may lead to long term disability or mortality [5].

The improvement of a child's health-related quality of life is the ultimate goal of treatment for children with orthopedic issues. Options for treatment depend on the child's age, the type and degree of MSDS. Children can be treated without surgery, and the most frequent corrections involve the use of a splint, cast, traction, and braces to speed up healing. Drugs are administered to treat pain and stop infections. In order to retain bone fragments in place and allow for alignment and healing, surgical treatment techniques may be necessary [6].

Casts are used to keep the soft tissues and bones aligned and safe while they mend. A cast is manufactured specifically for the patient and completely encircles the arm or leg. It can only be removed using an expert cast saw. Casts can help to keep surgical wounds safe while they heal. Most bespoke casts are produced with plaster or fiberglass for the hard, immovable portion [7].

Cast immobilization can cause complications ranging from minor skin rashes to major iatrogenic nerve palsy, compartment syndrome, skin loss, and contracture [8]. Cast may cause a number of issues. Some of these complications, including soiling and moisture, can be found during a physical examination, while others might be more challenging to identify. A cast that smells bad could indicate a wound infection. With pediatric patients, localization of pressure sores may not be achieved [9].

In children, cast immobilization can result in pressure ulcers, especially around bone prominences and cast edges with inadequate padding, as well as dermatological issues including damp casts that can promote maceration skin breakdown and infection. Other cast-related complications include severe discomfort, skin irritation, ischemia, and necrosis [10].

Clinical pediatrics frequently expresses the desire to empower parents. Parental empowerment increases parental involvement in day-to-day care and decision-making, reduces symptoms in children, improves informational requirements and skills, and fosters more altruistic and pro-social conduct. Finding the correct balance between medical and community resources, as well as paying attention to parents' cognitive and emotional needs, can all help to foster parent' empowerment[11].

The nurse is tasked with involving the parents in the child's healthcare, particularly while the child is through a hospital procedure. She is regarded as a specialist professional. From hospitalization until release, nursing care is very thorough and includes directing, communicating safety, and letting patients and family express their emotions, concerns, and suffering [12].

Nurses assist parents in caring for their children through educating the parents. The goal of parent' education is to increase parents' health literacy and understanding while also fostering healthy relationships, life skills, and behavior changes that will help parents improve the health of their families. To assist parents in learning and comprehending the "what, why, how, and when" of necessary care, parent' education practices should draw on evidence-based learning theories [(13)].

Orthopedic nursing focuses on preventing and treating MSDs. An orthopedic nurse's role also includes teaching families and children on the prevention, symptoms, and treatments of musculoskeletal diseases [(14)].When a child with musculoskeletal diseases is immobilized, nurses are crucial to the patient's care. The general objectives of care for an immobile child and family are ensuring that they don't suffer any physical harm or psychological issues, and that they have enough nutrition, fluids, Infection control and surveillance. Other objectives include involving the child in divisional activities that are appropriate and providing the child and family with sufficient support and instruction [(3)]. One of the most challenging aspects of caring for child with cast is keeping the cast clean and dry and maintaining healthy skin integrity. Caring for the child in cast at home can be very stressful, therefore it is essential that nurses provide the appropriate support and discharge education. The care of the child include positioning, skin care, cast care, pain relief, child activities, follow up and warning signs of a problem with child's cast[(15)].Nurses play a major role in prevention of cast complications, as she is the one who early recognize the signs of cast complications and apply all measures to prevent complications of cast[(16)].

Significance of the study

Worldwide, the burden of MSDs increased significantly and MSDs being the second cause of the years lived with disability worldwide [(17)].Dermatologic complications have been reported in up to 1.4% of pediatric casts. Awareness of complications is important for timely recognition and reduced morbidity in this pediatric population [(10)].

In Egypt, musculoskeletal system anomalies were the most common types of congenital anomalies [(18)].Another study concluded that, musculoskeletal system anomalies were the most common in 48% of cases [(19)].

A study found that the incidence of cast-related skin complications was 8.9 per 1000 casts and the study recommended applying effective intervention to reduce cast complication[(9)]. Complications of casts have contributed a burden of non-emergent children seen in emergency departments. The study concluded that, equally as important as applying a cast is the detailed child' education on how children and children's family can maintain this cast [(8)].

Based on the medical records of the statistical affairs department in Cairo University Specialized Pediatric Hospital (CUSPH)[(20)], the total number of children admitted to the orthopedic pediatric surgery department "in the year 2015 to 2016" was 1185.Through empirical experience in surgical unit at CUSPH, the research investigator observed thatchildren with MSDs

dramatically increased and they were at high risk for occurrence of complications due to lack of instructions for those children and their families.

In Egypt, there are scarce studies conducted and focused on teaching the parents of children with cast. Hence, the current study is undertaken to evaluate the effect of mothers' empowerment guidelines about caring for children with cast on their knowledge and children selected outcomes. Hopefully the results will set a standard care that can be followed to improve the knowledge of these mothers and achieve better outcomes for their children. The results of the current study will help in reducing the incidence of cast complications among children with MSDs. As well as providing guidance and recommendations that should be reflected in pediatric nursing education and providing evidence based data that can develop nursing practice and research in the field of pediatric surgery nursing.

Operational Definition

Children' selected outcomes

In the current study, child's selected outcomes are the established criteria against which the success of implementing the empowerment guidelines is measured which is judged by child's vital signs, intensity of child's pain, status of the cast, skin integrity, occurrence of complications of immobilization, occurrence of potential injuries, child's nutrition as well as movement.

Aim of the study

The aim of the current study was to evaluate the effect of mothers' empowerment guidelines about caring for children with cast on their knowledge and children selected outcomes.

Research Hypotheses

The current study tested the following research hypotheses:

1. Mothers' level of knowledge related to care of their children with cast is expected to be improved after receiving empowerment guidelines.
2. Children outcomes are expected to be improved after empowerment of mothers' knowledge related to caring of their children's with cast.

Methods

Research Design

One pre- posttest group quasi experimental research design was utilized to achieve the aim of the current study.

Setting

The study conducted at the pediatric orthopedic surgical unit which is located at the fourth floor in Cairo University Specialized Pediatric Hospital (CUSPH). The unit capacity was 12 beds. The study also conducted in the pediatric orthopedic outpatient clinic, in the second floor at CUSPH. The hospital received children from all over Egypt. The orthopedic surgical unit and pediatric orthopedic outpatient clinic received cases of children affected with various orthopedic disorders either congenital or acquired at a great rate due to the scarcity of this specialty in the other hospitals.

Subjects

A purposive sample of 60 mothers and their children with cast participated in the study. The first 30 mothers received empowerment guidelines (study group). The second 30 mothers didn't receive the empowerment guidelines (control group). The number

of participants calculated based on the following formula. The mothers no is calculated according to children's total number per year. According to informal report of manager of pediatric orthopedic surgical unit, It was about 40 -70 children admitted to pediatric orthopedic surgical unit.

Inclusion criteria

-Mothers' of children who aged from 3 to less than 6 years (preschool child).

-Both gender of children.

-Children with different types of casts.

Exclusion Criteria

-Children with any congenital anomalies such as gastrointestinal, genitourinary, and central nervous system as well as congenital heart defects.

Data collection tools

The required data collected by the following tools, which were developed by the research investigators after extensive review of related literatures.

1-**Tool I: Structured Interview Questioner**

It assessed Sociodemographic data of the studied mothers and their children with cast. It included 14 items and divided into two parts:

Part 1: It involved 5 questions related to the personal data of the mothers such as age, level of education, occupation, and place of residence.

Part 2: It included 9 questions concerned with data about the child's personal characteristics as age, gender, and child rank in the family. It also involves child's past and present medical history questions related to cast (such as causes, type and site of cast).

2- Tool II: Mothers' Knowledge Assessment Questionnaire (Pre/Post Test):-

It divided into two parts to assess mothers' knowledge about cast and cast care.

Part 1: Mothers' knowledge regarding cast, it had 7 questions such as cast's definition, functions, indications, observations, complications, treatment, and care after implementation.

Part 2: Mother's reported practices regarding cast care included 43 questions regarding the mobility, bathing, elimination, feeding, fluids intake, accident prevention, follow-up, assessment of cast site (edema, injuries, and capillary refill), and treatment.

Scoring system:

Mothers' Knowledge and Reported Practices Assessment Questionnaire (Pre/Post Test). After the conversion of total scores of each part of the same Questionnaire**,** scores were 100 points**.** Fifty points were related to mothers' knowledge about cast, and a further 50 were related to the mother's reported practice in caring for children with cast. Each complete answer was given 2 points, an incomplete answer was given 1 point, and an incorrect or no answer was given 0 points. The total score was converted to 100% (100 points) and categorized as follows: A score of less than 60% (less than 60 points) is considered unsatisfactory, and a score of 60% or more (60 points) is considered satisfactory.

3- Tool III: Post Cast Child's Outcomes Assessment Record:

It assessed the children's outcomes. It divided into three parts.

Part 1: Assessment of Children's Intensity of Pain: It was performed using Faces Pain Rating Scale (FPRS), developed by Wong and Baker (1983), contented 6 faces. It was a pain scale to

assess pain intensity in children. Each face is rated by number to determine the pain intensity (0-10). The scores ranged from 0 (no hurt/pain) to 10 (hurts worst/worst pain). The higher the total scores (10), the more pain the child was experiencing. The scale had high test-retest reliability and content validity. In addition, the scale had high reliability with a Cronbach's alpha coefficient of 0.70, as tested by Drendel, Kelly, and Ali (2011). The scale was available online without copyright restrictions. It is available online at: www.health.gov.au.

Part 2: it had 15 questions to evaluate cast condition and cast complications, child's skin in affected limb, pulse in effected limb, child's movement, and complications of immobilization and potential injuries.

Part 3: it consisted of 9 questions regarding rash, redness, edema, warm limb, cold dry skin, anoxia, vomiting, low fluids intake, diarrhea, and constipation.

Mothers' empowerment guidelines:

It developed by the researchers. It had information about cast and cast care for mothers to provide accurate care for their children and had better outcomes and limit occurrence of complications. It contained information regarding definition, aim, duration, cause of cast, information about care of child with cast such as pain relief, cast care, skin care, enhancing activities, elimination, fluids intake and nutrition. In addition to, it had information about cast complications and immobilization and how to prevent these complications and what should the mother do if they happened. The guidelines booklet included figures and pictures to facilitate and enhance understanding of this information.

Validity and Reliability

The tools were reviewed by three experts in pediatric surgery nursing, and pediatric orthopedic surgery to test the content and face validity of the tools. Modifications of tools were done according to the experts' judgment. The tools were examined for content coverage, clarity, relevance, applicability, wording, length, format, and overall appearance. Reliability of tools performed to confirm its consistency using Cronbach's alpha. It equaled 0.72.

Pilot study

A pilot study was conducted on six mothers who had children with cast and their children to clarify the tool's contents and determine the time required to fill the tools. As a result, minor changes have been made, such as changing the wording of some districts. Based on the pilot study results, mothers of children participating in the pilot study were included in the study.

Procedure

The study tools were developed by the researches after extensive review of the literature. After taking the approval of the Research Ethics Committee of Faculty of Nursing, Cairo University. Official permissions obtained from the director of CUSPH and from the heads of pediatric orthopedic surgical unit and pediatric orthopedic surgery out-patient clinic. The researchers introduced themselves to the mothers of children who fulfill the inclusion criteria. In the first visit, a written formal consent attained after explanation of the aim, the nature of the study and mothers rights.

After the mothers accepted to participate in the study, the researchers met each mother alone at special quiet room in the surgical department in waiting area to keep their privacy to fill the study's tools. The researchers fall the structured interview questionnaire (tool I). Children's data obtained from mother and completed from the medical records on individual bases, then the mothers were given the **Mothers' Knowledge Assessment Questionnaire (tool II)** as pretest questionnaire regarding knowledge about cast and its related care. It took about 30-45 minutes for each mother. Then, **Post Cast Child's Outcomes Assessment Record** (Tool III) filled at the same room by researchers as the 1st time. It took about 20-30 mins.

In the 2nd day the researchers utilized mothers' empowerment guidelines Arabic booklet to empower mothers about cast and cast care. It had information about cast and cast care for mothers to help them to provide accurate care for their children, improve their outcomes and limit occurrence of cast complications. It contained information regarding definition, aim, duration, cause of cast, information about care of child with cast such as pain relief, cast care, skin care, enhancing activities, elimination, fluids intake and nutrition. In addition, it had information about cast complications and immobilization and how to prevent these complications and what should the mother do if they happened. The researcher used mothers' empowerment guidelines Arabic booklet and re-demonstration of practices on a doll, educational videos and pictures also utilized and distributed to each mother who participated in study group. This session was taking 30-45 minutes for each mother.

During follow up schedule, the 1st visit was 7 days of cast. The researchers were given the **Mothers' Knowledge Assessment Questionnaire (tool II)** to mother in quite room at waiting area of pediatric orthopedic outpatient clinic as posttest questionnaire regarding knowledge about cast and its related care. It took about 30-45 minutes for each mother. Then, **Post Cast Child's Outcomes Assessment Record** (Tool III) filled at pediatric orthopedic outpatient clinic by researchers as the 2nd time. It took about 20-30 mints.

The control group left for hospital routine of care. The researcher provided mothers' empowerment guidelines Arabic booklet, educational videos and pictures also utilized and distributed to each mother who participated in the control group. The control group collected after the completion of the study sample collection.

Statistical analysis

The collected data coded, categorized, tabulated, and analyzed using the Statistical Package for Social Science (SPSS) program version 21. Descriptive data expressed as mean and standard deviation. Qualitative data expressed as frequency and percentage. Chi- square used to detect the relation between mothers' knowledge based on their selected personal variables. Comparison of means performed using Paired sample t-test. Correlation among variables would be done using Pearson Correlation coefficient. Level of significance set at $P < 0.05$, 0.001

would be used as the cut of value for statistical significance.

Ethical Considerations

An approval obtained from the Research Ethics Committee in the Faculty of Nursing, Cairo University. A written informed consent attained from children' mothers by the researchers after complete description of the purpose and nature of the study in order to obtain their acceptance as well as, to gain their cooperation. Children and their mothers informed that participation in the study was voluntary; mothers had the right to withdraw from the study at any time without giving any reason and without any effect on the care of their children. Confidentiality assured to children and their mothers

Results

Table (1) showed that 40% of the mothers in both groups were 25-30 years old. Furthermore, regarding the mother's educational level, half (50%) of the mothers in the study group were illiterate, whereas 36.7% of mothers in the control group had basic education. Finally, regarding maternal occupation, most mothers in the study group (87.7%) and control group (73.4%) were working mothers.

Figure (1) illustrates that the highest percentage of mothers live in rural areas in n the study and control groups (60%, and 76.7%, respectively).

Table (2) clarified that more than two-fifths (43.3%) of the children in The study and control groups were between the ages of 4 and 5 years. Furthermore, in the study group, more than half of the children (53.3%) were male, and more than two-fifths (46.7%) were female, while the control group had the highest percentage of males (60%) and 40.0% of females.

Table (3) found statistically significant differences between mothers' mean knowledge before and after receiving cast's definition, function, time, complications, treatment, and care ($p<0, 05$).

Table (4) illustrated that There were statistically significant differences were detected between the total mean score of mothers' practices before and after receiving empowerment guidelines regarding bathing, feeding, activity, and follow up ($p < 0.05$).

Table (5) indicated that there was statistically significant difference detected between mothers' knowledge and practices before and after receiving empowerment guidelines ($p < 0.05$).

Table (6) indicated that 63.3 %of mothers had insufficient knowledge and practices compared to 36.7 % with sufficient knowledge and practices.

The Table (7) showed statistically significant differences between children's outcomes in both groups regarding many items.

Table (8) revealed that there was a highly statistically significant positive correlation between mothers' knowledge and practices before receiving empowerment guidelines r=0.640, p=0.000 and their level of education as well as there was a highly statistically significant positive correlation between mothers' knowledge and practices after receiving empowerment guidelines r=0.507, p=0.000 and their level of education.

It is evident from Table (9) that there was a highly statistically significant positive correlation between mothers'

knowledge and practices after getting empowerment guidelines and their place of residence. As well as there was a statistically significant positive correlation between mothers' knowledge and practices before receiving empowerment guidelines and working status

Table (1) Percentage Distribution of Mothers' Personal Data in study and control groups.

Mothers' Personal Data	Study (n=30)		Control (n=30)		X^2	P
	N	%	N	%		
Mothers 'age/years:-					23.067	0.574
< 20	2	6.7	1	3.3		
20 to less than 25	5	16.7	10	33.4		
25 to less than 30	12	40	12	40		
30 to less than 35	6	20	4	13.3		
35 to less than 40	4	13.3	2	6.7		
40 and more	1	3.3	1	3.3		
Mother's level of education:-					33.579	0.117
Not read or write	15	50	7	23.4		
Read and write	1	3.3	1	3.3		
Basic education	7	23.4	11	36.7		
Secondary school	4	13.3	7	23.4		
University education	3	10	4	13.3		
Mothers 'occupation:-					16.133	0.24
Working outside home	26	86.7	24	73.4		
Housewife	4	13.3	6	26.6		

* Significant at p < 0.05

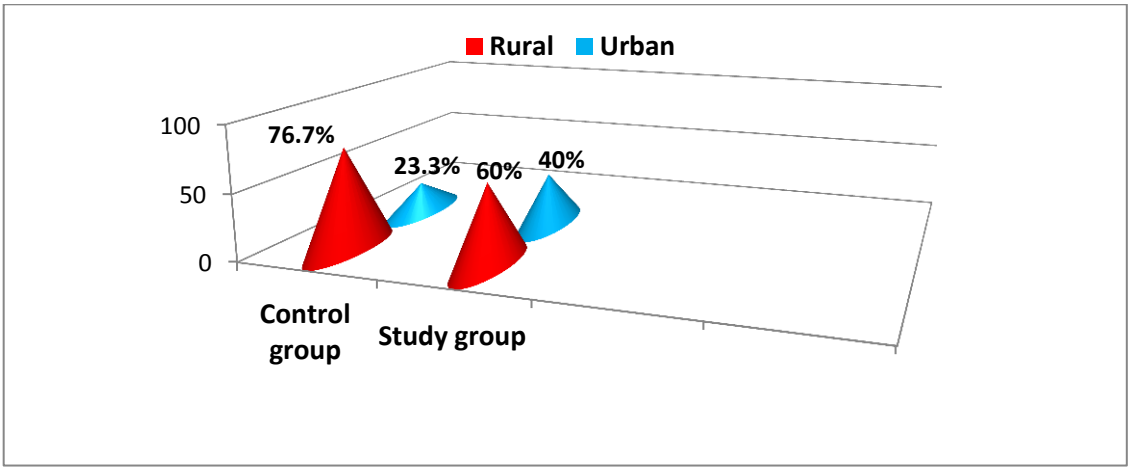

Figure (1) Mothers' Place of Residence in both groups.

Table (2) Percentage distribution of children's characteristics in both Groups.

Child's characteristics	Study(n=30)		Control(n=30)		X^2	P
	N	%	N	%		
Child's age/years:-					2.589	0.629
3- <4 yrs.	11	36.7	12	40.0		
4- < 5 yrs.	13	43.3	13	43.3		
5- 6 yrs.	6	20.0	5	16.7		
Mean ±SD	1.81 ±1.61		1.91 ± 1.64			
Gender:-					0.089	0.765
Male	16	53.3	18	60.0		
Female	14	46.7	12	40.0		
Child's rank in the family:-					14.694	0.100
First	12	40.0	12	40.0		
Second	5	16.7	11	36.7		
Third	6	20.0	5	16.7		
More than third	7	23.3	2	6.6		

Table (3) Comparison between Total Mean Scores of Mothers' Knowledge Before and After Receiving Empowerment Guidelines in the Study Group (n=30).

Items	Before Empowerment Guidelines At 1st day of cast	After Empowerment Guidelines After 1st week at follow up	t-test	P value
	Mean ± SD	Mean ± SD		
CAST definition (10 marks)	2.3±2.1	6.3+1.2	0. 73	0.001*
CAST functions (10 marks)	2.3±1.7	5.2±1.2	0.61	0.02*
CAST indications (5 marks)	1.3±0.3	3.3±1.2	1. 55	0.062
CAST observations (10 marks)	3.3±1.4	7.2±1.2	0.88	0.02*
CAST complications (5 marks)	0.3±1.1	2.3±1.2	0. 9	0.01*
CAST treatment (5 marks)	0.7±1.7	3.2±0.4	0.56	0.002*
CAST care after implementation (5 marks)	1.3±1.1	4.3±0.2	0. 93	0.001*

* Statistical significant at $P \leq 0.05$

Table (4) Comparison between Total Mean Scores of Mothers' Reported Practices Before and After Receiving Empowerment Guidelines in the Study Group (n=30).

Items	Before Empowerment Guidelines At 1st day of cast	After Empowerment Guidelines After 1st week at follow up	t-test	P value
	Mean ± SD	Mean ± SD		
Mobility (10 marks)	1.3±1.1	6.3+1.2	0. 93	0.001*
Assessment of cast site (edema, injuries, and capillary refill). (10 marks)	2.3±1.2	7.5±1.2	0.88	0.01*
Elimination. (5 marks)	0.3±0.9	2.5±1.2	0.73	0.02*
Bathing (5 marks)	1.3±0.3	3.2±1.1	0.51	0.000*
Feeding (5 marks)	1.3±0.3	3.3±0.2	0. 55	0.02*
Fluid intake (5 marks)	1.7+1.2	2.9±1.1	0.81	0.02*
Accidents prevention (5 marks)	1.3±1.1	2.3±1.2	1. 9	0.61
Follow-up (5 marks)	0.7±0.5	3.2±0.4	0.36	0.002*
Treatment (5 marks)	1.3±1.1	2.2±1.2	0. 9	0.53

* Statistical significant at P ≤ 0.05

Table (5) Comparison between Mother's Knowledge &Practices Assessment Scores Before and After Receiving Empowerment Guidelines in the Study Group (n=30).

Knowledge & Practices Assessment scores	Before Empowerment Guidelines At 1st day of cast		After Empowerment Guidelines After 1st week at follow up		X^2	P value
	No	%	No	%		
Satisfactory	8	26.7	16	53.4	0.29	0.04*
	60.3±2.1		**67.3±3.2**			
Unsatisfactory	22	73.3	14	46.6	0.33	0.03*
	34.3±1.7		**47.2±1.2**			

* Statistical significant at P ≤ 0.05

Table (6) Mother's Knowledge & Practices Assessment Scores in Control Group (n=30).

Knowledge & Practices Assessment scores	No Receiving Empowerment Guidelines		X^2
	No	%	
Satisfactory	11	36.7	7.19
	60.3±4.1		
Unsatisfactory	19	63.3	6.43
	41.3±1.7		

* Statistical significant at $P \leq 0.05$

Table (7) Percentage Distribution of children' outcomes in the Study and Control Group After One Week at Follow up.

Items	Study (n=30)		Control (n=30)		X^2	P
	N	%	N	%		
Anoxia:					0.207	0.001*
Present	11	36.7	25	83.3		
Not present	19	63.3	5	16.7		
Vomiting:					0.429	0.02*
Present	4	13.3	15	50.0		
Not present	26	86.7	15	50.0		
low fluids intake:					2.239	0.302
Present	3	10.0	4	13.3		
Not present	27	90.0	26	86.7		
Diarrhea:					1.824	0.317
Present	7	23.3	9	30.0		
Not present	23	76.7	21	70.0		
Constipation:					0.429	0.000*
Present	9	30.0	24	13.3		
Not present	21	70.0	6	86.7		
Skin discoloration:					0.429	0.001*
Present	7	23.3	12	30.0		
Not present	23	76.7	18	70.0		
Weak pulse in casted limb:					2.143	0.000*
Present	2	6.6	15	50.0		
Not present	28	93.4	15	50.0		
Child's ability to move:					3.159	0.690
Present	13	43.3	10	33.3		
Not present	17	56.7	20	66.7		
Skin surrounding cast characteristics: (More than one answer)					0.315	0.000*
Discolored	0	0.0	0	0.0		
Dry	2	6.7	12	40.0		

Cold	0	0.0	4	13.3		
Warm	2	6.7	12	40.0		
Presence of hematoma	1	3.3	5	3.3		
Bleeding	1	3.3	4	13.3		
Redness	1	3.3	1	3.3		
Edema	1	3.3	5	16.6		
Rash	0	0.0	4	13.3		
None of the above	26	86.7	11	36.7		
Presence of pain:						
Present	9	30.0	18	60.0	0.203	0.001*
Absent	21	70.0	12	40.0		

* Statistical significant at P < 0.001

Table (8) Correlation between Mothers' Level of Education and their Total Mean Score of Knowledge and Practices in the Study Group.

Mean ± SD	No read& write (n=15)	Read &write (n=1)	Basic school (n=7)	secondary school (n=4)	University education (n=3)	r P
Before Empowerment Guidelines	11.2±0.4	13.5±0.5	17.50±0.547	12.8±0.3	22.0±0.0	0.640 0.000**
After Empowerment Guidelines	24.2±1.	26.3±1.9	31.3±0.8	36.0±2.3	37.8±1.6	0.507 0.000**

* Correlation is significant at P≤ 0.05, two-tailed.

Table (9) Correlation between Mothers' Place of Residence, Occupation, and their Total mean Score of Knowledge and Practices in the Study Group (n=30).

Items Mean±SD	*Place of Residence*		R P	*Occupation*		r P
	Rural (n=18)	Urban (n=12)		Working (n=26)	Housewives (n=4)	
Before Empowerment Guidelines	22.02±4.4	26.5±6.4	r= 0.476 P= 0.000**	29.6±5.34	25.4±1.6	r= 0.311 P= 0.028*
After Empowerment Guidelines	34.9±1.9	36.09±2.1	r= 0.417 P= 0.003**	34.9±1.9	31.6±1.5	r= 0.360 P= 0.010*

* Correlation is significant at P≤ 0.05, two-tailed.

Discussion

The result of the current study revealed that two fifth of the mothers in both groups were 25-30 years old. These results agreed with Abd Alkhair, Mohamed, Mohamed & Elbarabary, (2020) [(21)] who found that less than two thirds of mothers in the study and control group' age ranged from 20 to less than 30 years old, the mean age of them was 26.8±5.9.

Regarding the mother's educational level, the current study revealed that, half of the mothers in the study group were illiterate, whereas more than one third of mothers in the control group had basic education. This result in accordance with Dingemann, Sonne, Ure, Bohnhorst, Kaisenberg, & Pirr, (2019) [(22)] who concluded that low maternal education is associated with a reduced uptake of screenings, adverse outcomes, and higher incidence of postoperative complications for their children. Moreover mothers' level of education could be a contributing factor that affecting mothers knowledge and practice for their children with cast.

It is evident from the current study that most mothers in the study group and control group were found to work outside the home. This result in agreement with Said, Ahmed, Mahmoud, & Ahmed, (2021) [(23)] who indicated that more than one-third and more than half of the studied mothers were working and these study and concluded that Mothers'work had a negative effect on the psychological wellbeing of their children. Also Desai, (2020) [(24)] concluded that maternal working is particularly important and influential children well-being and effect children's outcomes.

Based on the result of the current study, the highest percentage of mothers lived in rural areas in both groups. These findings in accordance with a study carried out by Abd Alkhair, et al (2020)[(21)] who showed that two thirds of mothers in the study group and more than half of mothers in the control group were come from rural areas. In Egypt musculoskeletal anomalies were the second common congenital anomalies and the majority of children were from rural areas (ElAwady, AlGameel, Ragab, & Hassan, 2021) [(25)].

The current study results indicated that the highest percentages of children in both groups aged 4 to 5 years. On the same line with this finding of a study done by Koskimies-Virta, Helenius, Pakkasjärvi, & Nietosvaara, (2020)[(26)] who studied hospital care and surgical treatment of children with congenital upper limb defects and concluded that most surgery for orthopedic congenital anomalies is done ideally in the first years of life and almost before school age.

The present study results clarified that the highest percentage of children were male. This result was in the same line with Shrestha & Shrestha (2020)[(27)] who reported The musculoskeletal system represents the third most common system involved in major congenital malformations and a higher rate in males than females In addition other study by Tan, et al (2018)[(4)] who also supported that musculoskeletal problem was significantly higher in males than females.

Clearly the current study emphasized that a significant statistical difference between mothers' mean

knowledge before and after receiving empowerment guidelines about cast's definition, function, time, complications, treatment, and care. This result matched with the result of Rahgoi, Sojoodi, Khoshknab, Rahgozar & Shahshahani (2019)[28] who showed that family-centered empowerment programs emphasize that family has an effective role on the motivation, psychological, knowledge, attitudes and perceived threat of the members and its primary goal is to empower family system that can lead to health promotion.

Regarding mothers practice the current study revealed that there were statistically significant differences were detected between the total mean score of mothers' practices before and after receiving empowerment guidelines regarding bathing, feeding, activity, and follow up. This finding goes with the opinion of Noipoung, Prasopkittikun, & Nookong (2019)[29] who concluded that that the empowerment program for mothers helps improving perceived self-efficacy in child care and increasing satisfaction towards nursing services and recommended that, the implementation of the program in routinely nursing services should be promoted to further improve the quality of care in orthopedic pediatric patients.

There was statistically significant difference was detected between mothers' knowledge and practices before and after receiving empowerment guidelines. This result is supported in Ashcraft, etal (2019)[11] that reported parent empowerment may enhance parent involvement in daily care and care decisions, improve child symptoms, enhance informational needs and skills, and increase advocacy and altruistic behaviors. In the same line Khalafallha & Bahnsawy (2020)[30] who concluded that the mothers who received nursing instructions had a higher overall mean score of knowledge and practices. As well as the infants of the mothers who received the nursing instructions there were fewer complications of casting and better outcomes.

Therefore, from the researcher’s point of view the empowerment education program in this study enabled the mothers to acquire accurate knowledge and practice about cast care which improved mother’s self-confidence by increasing their participation in caring their children and, eventually, prevention of cast complications.

The study results indicated that there were statistically significant differences between children's outcomes in both groups. These results are consistent with kearney, thompson, zychowicz, shaw & keyes (2022)[31] in their study about the role of patient and parent education in pediatric cast complications who found the role of parent education in pediatric cast complications and found that the complication rate declined and recommended that continuous access to clinic-specific cast instructions demonstrates decreased cast complications in pediatric populations, and this approach to patient education can be easily utilized across all medical specialties.

Therefore, the empowerment education program in the present study enabled the mothers to be in a better position to reflect on their children’s care, to set appropriate goals, and make decisions.

So, the current findings supported the study hypothesis.

In light of the findings of the present study regarding the correlation between mothers' level of education and mothers' knowledge and practices before and after receiving empowerment guidelines the results illustrated that of there was a highly statistically significant positive correlation between mothers' knowledge and practices and their educational level. This result is in agreement with Abd Alkhair, et al. (2020)[21], who found that there were statistical significant correlations between mothers' level of education and improve postoperative outcomes and decrease complication.

The study results reported that there was a statistically significant positive correlation between mothers' knowledge and practices before receiving empowerment guidelines and working status. In light of the findings Kocher, Ciarlo, Feroe, Dichtel & Traver (2022)[32] in their study found that The children with working parents demonstrated significantly higher discrepancy scores than children with a parent at home, signifying a greater impact of spica casting on the family based on Feetham Family Functioning Survey (FFFS) discrepancy score.

Conclusion

The results of the present study demonstrated that mothers who received empowerment guidelines experienced a significant increase in their level of knowledge, and their mean knowledge scores about cast itself and practices related to caring for children with casts were higher than others in the control group. The current study additionally discovered that, compared to children in the control group, children of mothers who received empowerment guidelines experienced less post-cast complications. They also had higher mean scores for outcomes. In comparison with the control group, children in the study group had normal vital signs, fewer complaints of pain, cast-related limb problems that were better controlled, and shorter hospital stays**.**

Recommendations

- Informing mothers about cast itself and how to care for children with casts through health education seminars should be performed.
- Mothers who cared for children with casts in hospitals should have access to receive a simple Arabic illustrated booklet explaining the cast and its care.
- A longitudinal research is required to monitor the long-term effects and late cast complications.
- Use the most recent trend of telenursing to follow mothers who have children with cast.
- Comprehensive cast randomized trials are required to develop suggestions for improving post-cast outcomes among children with cast.

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Effect of Nutritional Intervention Program for Mothers on Health Parameters of Infant with Phenylketonuria

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Abstract

Background: **Phenylketonuria** is a rare inborn inherited disorder of metabolism disease due to an autosomal recessive trait. The prevalence in Egypt is one case per 7,500. When PKU untreated or delayed treatment, can lead to severe mental retardation, seizures and tremors, impaired growth and development. The present study was aimed to evaluate the effect of implementing nutritional intervention program for mothers on health parameters of their infants with phenylketonuria. **Research design**: A quasi-experimental research design was used. **Setting**: The study was conducted at pediatric outpatient clinic inherited and metabolic diseases of Tanta University Hospital. **Subjects:** A convenience sampling of 50 mothers having infants with PKU who attended the previously mentioned setting. **Two tools** were used to collect the required data: **Constructed interview questionnaire sheet**: to assess mothers' knowledge towards their infants suffering from Phenylketonuria. It consisted of **three parts**: Socio-demographic characteristics of mothers, infants, and mothers' knowledge regarding phenylketonuria, **mothers' practices sheet**: to assess mothers' practices regarding to infants' feeding. **Observational chick list** to assess outcomes of infants. **Result**: revealed that there were highly statistically significant differences between the pre-test and post-test of nutritional intervention program implementation for infants with Phenylketonuria. **Conclusion:** the present study was revealed that a significant improvement of mothers' knowledge and practice regarding phenylketonuria immediate and after one-month of program implementation, nutritional intervention program was effective on their infants' development and health parameters as increase weight . **Recommendations**: In-service training program should be conducted periodically and regularly in health care services for mothers with infants had phenylketonuria.

Key words: Health parameters-Infant- Mothers- Nutritional intervention program-Phenylketonuria.

Introduction

Phenylketonuria (PKU) is a rare inborn inherited disorder of metabolism disease due to an autosomal recessive trait in which an infant born without the ability to properly breakdown of an amino acid called phenylalanine mutation affects both males and females.(1)Babies with PKU are missing an enzyme called phenylalanine hydroxylase, which leads to an increase in its level and is harmful to the central nervous system, causing irreversible brain damage if untreated, intellectual disability, and in severe cases, it may lead to death.(2,3)

Most common clinical manifestations of PKU do not appear after birth but may be delayed by age three to six months in the form of small head size (microcephaly), stunted or slow growth, vomiting, lighter skin, hair, and eyes, delayed mental and social skills, hyperactivity-jerking movements of arms or legs, seizures, skin rash, a musty odor in urine, breath or skin that result from the excess level of phenylalanine in the body.(4)

Management of infants with PKU depends upon early diagnosis with a simple blood test in the New born Screening program, which is included in the hypothyroidism program from three to the end of seven days from birth by measuring phenylalanine (phe) level in blood spots in a filter paper.(5) Cornerstone of PKU management is low in phe, practically when infant is growing, diet must be strictly followed and outcome is expected to be improved.(6)

Nutritional interventions for infant are very important to prevent delayed growth and health problems. The major aim of the nutritional interventions is to strengthen using of guidelines, starting with nutritional assessment including; anthropometric measurements, laboratory investigations, feeding patterns, amount of infant formula, and variety of complementary foods provided. Each infant is unique in detecting nutrient requirements such as the amount of food ingested and stored, growth rates, and physical activity levels.[7,8]

Pediatric nurse is a key provider of services internationally nurses play an integral role in caring for infants with PKU in improving health outcomes of them to maintain good health status. The general principles of nursing care for these affected infants included; clinical nursing practices in the good assessment of nutritional status, early management, mother education, and follow-up.[9]

Pediatric nurse plays a crucial role in applying the recent guidelines and talent for applying the general principles of management in medical health care. In addition to maintaining safe nurses must be aware of recent nutritional intervention guidelines for infants with special nutritional disorders as phenylketonuria to make appropriate nursing decisions making.[10]

Significance of the study

The Prevalence of PKU varies worldwide. It is estimated that approximately 350 cases per million live birth about four cases per 100,000 individuals in the USA.[11] while in Egypt incidence rate was one case per 7,500 live birth.[12]The high incidence was recorded in Turkey which is one case in 2600 live births.[13]

Infants and young children are the future of the country, the healthy growth and development of them is the paramount importance for them to develop full physically and mental potentials development. Growth is the best global indicator of physical well-being and is one of a number of international goal like the World Health Organization assembly global target for 2025.[14] When pku untreated or delayed treatment, can lead to severe mental retardation or reduced IQ, seizures and tremors, difficulties in psychological and behavioral issues, social difficulties, impaired growth and development**.** [2,3]

Aim of the study

The study was aimed to evaluate the effect of implementing nutritional intervention program for mothers on health parameters of their infants with phenylketonuria.

Research Hypothesis

Implementing nutritional intervention program for mothers of their infants with phenylketonuria is expected to improve mothers' knowledge and practice about phenylketonuria and improve infants' physical growth as increase weight

Subjects and method

Research design: a quasi-experimental research design was used in the present study

Setting: The research was done at Pediatric outpatient clinic Inherited and metabolic diseases of Tanta University Hospital which is affiliated to Ministry of Higher Education and Scientific Research.

Subjects:

- Convenience sampling of fifty mothers and their infants were collected from the previously mentioned settings. aged ranged from 4 to 12 months within a period of six months, both sexes and Free from any congenital anomalies.

Tools of collecting data:

Tool (I): Mothers **Knowledge about phenylketonuria structure interview schedule.** It was developed by the researcher after reviewing literatures[5,15]It was consisted of three parts: .**Part (1) M**others' socio-demographics, as age, education, residence, occupation, family size,

b- Infants characteristics as**:** age, sex , birth order, medical history about phenylketonuria, routine laboratory investigations.

Part (II):- Mothers' knowledge about phenylketonuria such as definition, causes, manifestations, complication, prevention, infants' feeding patterns, infants' weaning, dietary management and food exchange list for phenylketonuria.

Scoring system of mothers' knowledge

-Correct and complete answer was scored (2).

-Correct and incomplete answer was scored (1).

- Incorrect answer or didn't know was scored (0).

Total scoring system of mothers' knowledge was c as the following:

-From 65 % and more was considered high level of knowledge.

-From 50% to less than 65 % was considered moderate level of knowledge

-Less than 50% was considered low level of knowledge

Tool (I) Part(3):Mothers' Practice regarding infants' feeding

It was adapted / by the researcher to assess **mothers'** practice about phenylketonuria care for infants with It was used three times before, immediately and one month after implementation of nutritional intervention program as the following:

It was consists of (10 marks) about number of meals, snacks, infants' feeding pattern, given their infants fruits and juice, vegetables soups, sugar , jam and honey, estimate proteins in potatoes and cheeps, in rice and cereals, given meat, fish , chicken and given milk , milk products as yogurt.

Tool II: Nutritional Assessment Sheet: It was developed and used by the researcher to assess the effect of nutritional intervention program for mothers on health parameters of their infants with phenylketonuria after two months. . It was included:

1- **Anthropometric measurements** of infants which included: weight, length, mid-arm, head, based on World Health Organization (2010) standards of growth chart according to infants' age and sex. [16]

2- Laboratory investigations were done at the clinic as; phenylalanine, tyrosine, and phe/ tyrosine ratio.

3- **Daily dietary intake**: for 24 hours recall method to estimate daily caloric intake as carbohydrate, protein, fats, vitamins, minerals per day by asking mothers about food consumed for at least 24 hours, in portion size mild obtained of three meals (breakfast, lunch, dinner and between meals

M**ethod**

The study was accomplished through the following steps:

1- **Administrative process:** An official permission for data collection was obtained from the Dean of the Faculty of Nursing, and the directors of pediatric outpatient clinic Inherited and Metabolic Diseases of Tanta University Hospital

2- **Ethical and legal considerations**: Ethical approval to conduct the study was taken from scientific research ethical committee at the Faculty of Nursing.

-Nature of the study didn't cause any harm or pain to the entire sample. -Confidentiality and privacy regarding the data collection were taken into consideration.

3- Tools Development: Two tools were used for data collection**.**

4-Content validity: Modifications were carried out accordingly; the nominal validity of the questionnaire was calculated on the basis of expert opinion and was 99.1%.

5- Reliability of tools

Test of reliability using Cranach's alpha was 0.947 that indicates high reliability of the tools used for data collection in the current study.

6- Pilot study

A pilot study was carried out on (10%) of the studied mothers and their infants to test the tool for its clarity, applicability and feasibility. Pilot study was excluded from the total sample of the study

7- Interview schedule was translated into Arabic language by the researcher (**Tool I** and **Tool II**).

8-Phases of the study

The present research was conducted at four phases of implementing educational nutritional program including assessment, planning, implementation and evaluation.

1) Assessment phase

-The researcher conducted meeting with mothers, who participated in the research in order to explain the aim of the research, collect data about mothers and their infants to assess mothers' knowledge and practice about care provided to infants with PKU before implementing nutritional intervention program **(Tool I and II)**.

2) Planning phase

Based on the results of a requirements analysis and a study of relevant literature, a training curriculum for mothers was developed. which included the following:

a- Setting specific objectives of the educational program.

b-Preparation of the content of educational program.

c- Different methods and materials for nutritional intervention program were used including interactive lectures, power point presentations, pictures, books and posters

3) Implementation phase

-The researcher interviewed with the available mothers at pediatric outpatient clinic inherited and metabolic diseases and the aim of research was explained and their approval was obtained to participate in the research prior to data collection.

-The mother performance level was assessed related to care of infants with PKU (pre- interventions implementation) by using mothers structured interviewing sheet and by using observational checklist as following the first tool was

administered to all mothers at Pediatric Outpatient Clinic Inherited and Metabolic Diseases (**Tool I**).

- The second tool was used to assessing the nutritional assessment of an infants with phenylketonuria. It was developed and used by researcher to assess effect of implementing nutritional intervention program for mothers on health parameters of their infants with phenylketonuria after two months (**Tool II**).

-There are five anthropometric measurements used to asses nutritional status as weight, length, head, upper mid arm circumference, and body mass index. Each one was measured according to standard and compared with normal standard of corresponding Egyptian for age and sex .

- Daily dietary intake to estimate caloric intake by using 24- hour recall method. It was applied by the researcher through an interview with studied mothers at the time of interview and each follow up assessment.

- All mothers on the morning sifts were observed, mothers participated.

I**mplementation nutritional intervention program includes**

Preparation of good media for teaching as different methods of teaching were used including; interactive lectures, power point presentations, pictures, and posters were demonstrated to facilitate mothers' understanding.

- Preparation of content which was covered reasons behind implementation of sessions.

-Intervention of nutritional program was carried out for mothers through conduction of successive sessions according to actual needs assessment of studied mothers.

-Education nutritional program was conducted in six sessions, two/per week. Time of each session was about 30-45 minutes including periods of discussion according to mothers' progress, Mothers were divided into small groups and each group has consisted of five mothers.

- **Assessment phase**
- Interview was conducted to collect baseline data about studied mothers and their infants with phenylketonuria.
- Setting objectives of intervention educational nutritional program about phenylketonuria.
- General objectives were set ; determine effect of intervention educational nutritional program on health parameters of infants with phenylketonuria .
- **Planning phase**
- Researcher planned questionnaires sheet after review of literature built on assessment of mothers' knowledge obtained from structured questionnaire sheet (Tool 1).
- A booklet was designed and included a teaching module. It contained definition, risk factors, causes clinical manifestations, diagnosis and management , complication , prevention of phenylketonuria, type of infants' feeding, food exchanges list according to color, micronutrients.
- **Implementation Phase**
- Intervention nutritional program was carried out through conduction of successive sessions according to actual needs assessment of studied mothers.
- **Sessions covered the following topics:**

First session: Focused on definition, causes, and manifestations of phenylketonuria.

Second session: Related to management of phenylketonuria and signs of an increased level of phenylalanine in blood as vomiting, skin rashes, and hyperactivity.

Third session: Focused on importance, principles of weaning. vitamins, minerals as vegetables, fruits, water, fluids and micronutrients as vitamin D, calcium, and iron should be given to their infants.

Fourth session: Focused on infants' feeding patterns such as importance and principles of breast feeding, artificial feeding by using special formula free from phenylalanine.

Fifth session: Focused on infants' feeding in weaning by using food exchange list based on the metabolic standard of food color.

Sixth session: Focused on a schedule of blood samples in a filter paper and appropriate time intake as after two hours given of free formula and follow up schedule.

4) Evaluation phase

Mothers were observed by the researcher for the care provided to infants with PKU pre-and post-program. The mothers were evaluated before, immediately and one month after implementation of nutritional intervention program to assess their knowledge and practice about care of infants with PKU by using (**Tool I and II)**.

Statistical analysis:

Collected data were organized, tabulated, and statistically analysed using SPSS software version 23, SPSS Inc. Chicago, IL, USA). For quantitative data, mean and standard deviation were calculated. For qualitative data, which describes a categorical set of data by frequency, percentage of each category, comparison were done using Chi-square test (χ^2). P value of ANOVA test was calculated. Correlation between variables was evaluated using Pearson's correlation coefficient (r). Significance was adopted at $p < 0.05$.[17]

Results

Table (1) It reveals that, nearly two fifth (38%) of mothers graduated from secondary school and more than one quarter (28%) graduated from high education. Regarding their age most (70%) of mothers were age ranged from 20 to less than 30 years , with Mean ± SD (26.520 ± 5.087). Concerning mothers' occupation, it obvious that most (72%) of them housewife, it shows more than two third (68%) of them had consanguinity between two parents.

Table (2) Shows percentage distribution of infants' regarding their socio-demographic characteristics and medical history. Nearly half (48%) of infants aged from six months mean age (6.360 ± , 0.802), it notice that , more than half (56%) of them are females but only more than two fifth (44%) of them are males. In addition, two third (66%) of infants diagnosis of PKU from 15 day to less than one month of age. Concerning past family history, it notice that more than one fifth (22%) of them had past family history of PKU. Also, more than two fifth (45.4%) from had consanguinity with their brothers or sisters. Moreover, half (50%) of infants had mild, while, more than one third (38%) had moderate.

Table (3) Demonstrates percentage distribution of mothers' regarding total scores of knowledge about phenylketonuria. It shows total score of mothers' knowledge regarding phenylketonuria, (72%) of mothers had low level of knowledge before. While, it is proved that most (86% , 82%) of them had high knowledge immediate and after one month of nutritional intervention program implementation respectively. There was statistically significant difference between before, immediate and after one month of nutritional intervention

program implementation at X2 =71.660**, P<0.001*,<0001*, 0.764 respectively.

Figure(1) Illustrate the mean score of total mothers' knowledge improved from (21.50 ± 10.10) before to (57.12 ± 10.23) immediate, and (55.50 ±11.24) after one month of nutritional intervention program with significant improvement between before , immediate , and after one month of program implementation X2 =70.670*, P<0.001*,<0.001*,0.484 respectively.

Figure(2) Shows percentage distribution mothers' practices regarding to their infants' feeding. It reveals that most (78%) of mothers had poor unsatisfactory regarding total practices of their infants' feeding before .while, most (90% and 86%) of them had good satisfactory immediately and after one month respectively. There was significant improvement between before , immediate , and after one month of nutritional intervention program implementation at X^2 = 64.235, P 0.001*,0.001*,0.764 respectively.

Table (4) Explains percentage distribution of mothers' practice regarding to their infants' feeding. It obvious that, most (90%, 86%, 92%)of mothers had unsatisfactory feeding' practices regarding given meals, snacks between meals and infants' feeding pattern before respectively. While, most (86% , 70%, 86%) of them had satisfactory immediately and after one month of program implementation. Furthermore, it obvious that all (100%) of mothers had poor unsatisfactory feeding practice regarding estimate protein in potatoes before. Compared to most (90% ,80%) of them had good satisfactory immediately and after one month. There was significant improvement between before , immediate , and after one month of nutritional intervention program implementation at P =0.001*.

Table (5) Shows percentage distribution of infants regarding to their anthropometric measurements. It notice that, half (50%) of infants had underweight (<90%) before. But two third (60%) of them had normal weight (90%-110%) immediate. While, most (80%) of them had normal weight after two months. There was statistically significant difference between before, immediate and after two months of nutritional intervention program implementation for weight according to infants' age at X^2 =15.909*, P <0.001*.Concerning, body mass index it obvious that (60%) of infants had normal 90-110%) before. But nearly two third (64%) of them had normal range (90%-110%) immediate. Also, most (80%) of them had normal range (90%- 110%) after two months. There was statistically significant difference between before, immediate and after two months of nutritional intervention program implementation for body mass index according to infants' age at X^2 =9.333* , P <0.009*.

Table (6) Shows percentage distribution of infants regarding to their laboratory investigations. It shows that, regarding phenylalanine and tyrosine ratio in a filter paper two third (66.0%) before and immediate most (88.0%) within normal after two months. Regarding tyrosine in a filter paper , it clarifies that nearly two third (64%) normally before and immediate compared to all (100%) normally after two months. There was statistically significant difference between before, immediate and after two months of program implementation at P = 0.001*.

Table (7) Shows percentage distribution of infants regarding to their feeding, food

exchange colors and micronutrients. It shows that all (100%) of infants had given free phe formula before feeding and meals before and after two months. Regarding given vegetables soups as main meals . It clear that only 20% of infants had vegetables soups before. While, all (100%) of them had vegetables soups immediate and after two months. There was statistically significant difference between before, immediate and after two months of program implementation at X^2= 80.0*, P<0.001*.

Table (8) Shows percentage distribution of infants regarding to their daily dietary intake of feeding ,vitamins and minerals . It notice that most (80%) of infants had adequate DRAs of protein and fluids before and all (100%) of them immediate. And only 30% of them had adequate DRAs of vegetables and fruits before respectively. Also reported that all (100%) of infants had not given fats before (20%) of them had adequate immediate. While, most (70%) of them had adequate DRAs of fats after two months. There was statistically significant difference between before, immediate and after two months of nutritional intervention program implementation at X^2= 138.50*, P <0.001*. Unfortunately, regarding to DRAs of carbohydrate. It notice that nearly two fifth (38%) before and (60%) immediate and most (80%) after two months of infants had adequate DRAs of carbohydrate. There was statistically significant difference between before, immediate and after two months of nutritional intervention program implementation at X^2= 91.00*, P <0.001.

Table (9) Shows correlation between total scores of mothers' knowledge and their reported practices regarding phenylketonuria through the program phases. There was positive statically significant correlation coefficient between total score of mothers' knowledge and their reported practices regarding phenylketonuria before, immediate and after one month of nutritional intervention program implementation at P 0.041*, 0.010*, <0.001* respectively.

Table(1):Percentage distribution of mothers' regarding to their socio-demographic characteristics.

Mothers' socio-demographic characteristics (n=50)	No.	%
Age / years		
20 –< 30	35	70.0
30 –<40	11	22.0
≥ 40	4	8.0
Mean ± SD.	26.520 ± 5.087	
Educational		
Illiterates or read and write	7	14.0
Preparatory school	10	20.0
Secondary school	19	38.0
High education	14	28.0
Occupation		
Worked	14	28.0
Housewives	36	72.0
Residence		
Urban	15	30.0
Rural	35	70.0
Mean ± SD.	6.36 ± 0.802	
Consanguinity		
- Yes	34	68.0
- No	16	32.0
Number of other child with phenylketonuria		
Yes	7	14.0
No	43	86.0

Table (2): Percentage distribution of infants' regarding to their socio-demographic characteristics and medical history.

Infants' socio- demographic characteristics	(n=50)	
	No.	%
Age of infants / month		
5<6	6	12.0
6<7	24	48.0
7<8	116	32.0
8<9	4	8.0
Mean ± SD.	6.360 ± .802	
Sex		
Male	22	44.0
Female	28	56.0
Birth order		
First	17	34.0
Second	14	28.0
Third	17	34.0
Fourth	2	4.0
Diagnose of phenylketonuria		
First two weeks of birth	12	24.0
From15 days to less than one month of age	33	66.0
From one to three months of age	1	2.0
After three months of age	4	8.0
Consanguinity relation with infants (n=11)		
Brother or sister	5	45.4
Uncle or aunt of mother	2	18.2
Uncle or aunt	4	36.4
Type of infants' phenylketonuria		
Classical	6	12.0
Moderate	19	38.0
Mild	25	50.0

Table (3):Percentage distribution of mothers' regarding total scores of knowledge about phenylketonuria.

Total scores of mothers' knowledge about phenylketonuria	Before (n=50)		Immediately(n=50)		After one month (n=50)		X^2	p	p_1	p_2	p_3
	No.	%	No.	%	No.	%					
Low	36	72.0	4	8.0	4	8.0	71.660*	<0.001*	<0.001*	<0.001*	0.764
Moderate	10	20.0	3	6.0	5	10.0					
High	4	8.0	43	86.0	41	82.0					
Total score	(0 – 66)						70.670*	<0.001*	<0.001*	<0.001*	0.484
Mean ± SD.	21.50 ± 10.10		57.12 ± 10.23		55.50 ± 11.24						

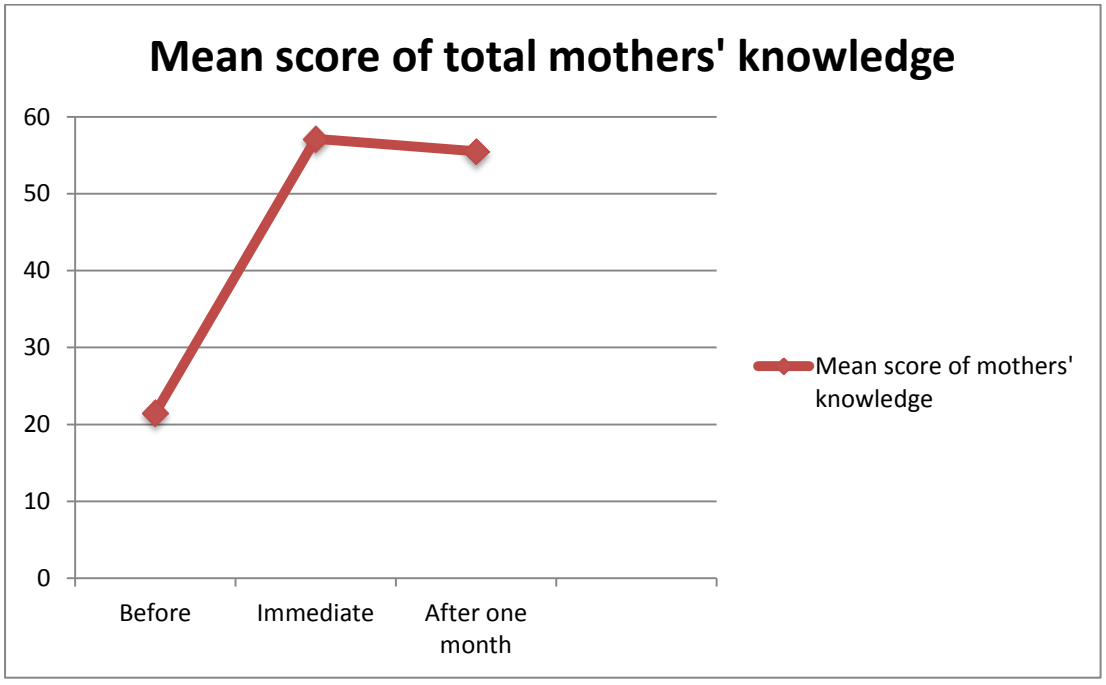

Figure (1): Mean score of total mothers' knowledge

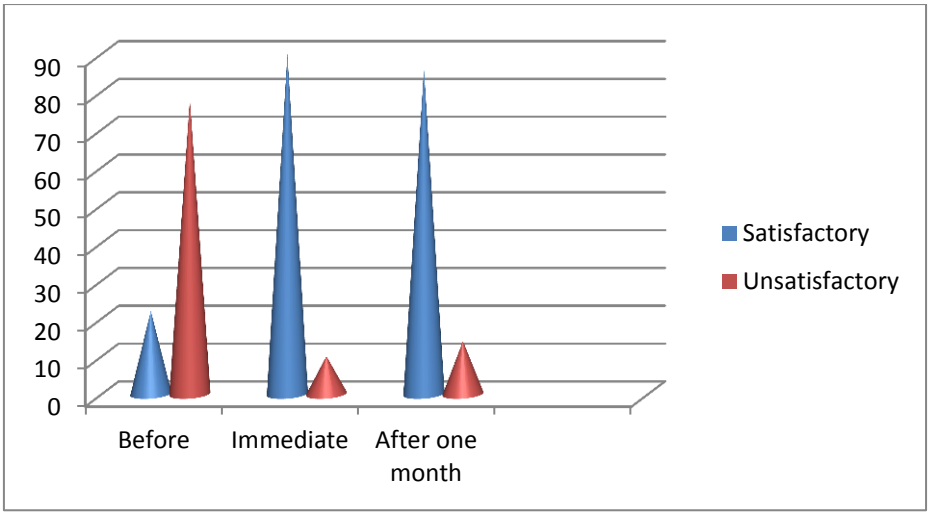

Figure (2) : Total mothers' practices regarding to their infants' feeding.

Table (4):Percentage distribution of mothers' practice regarding to their infants' feeding

Mothers' practice regarding infants' feeding.		Before (n = 50) No	%	Immediately (n = 50) No		After one month(n = 50) No	%	X2 (1)	P1	X2 (2)	P2	X2 (3)	P3
Given meals /day	Satisfactory	5	10	43	86	40	80	57.845	0.001*	49.487	0.001*	0.642	0.424
	Unsatisfactory	45	90	7	14	10	20						
given snacks /day	Satisfactory	7	14	35	70	35	70	32.182	0.001*	32.182	0.001*	0.0	1.0
	Unsatisfactory	43	86	15	30	15	30						
Type of infants' feeding pattern	Satisfactory	4	8	43	86	43	86	61.059	0.001*	61.059	0.001*	0.0	1.0
	Unsatisfactory	46	92	7	14	7	14						
Given fruits, juice	Satisfactory	19	38	35	70	35	70	10.308	0.001*	10.308	0.001*	0.0	1.0
	Unsatisfactory	31	62	15	30	15	30						
Given vegetables	Satisfactory	10	20	43	86	40	80	43.718	0.001*	36.001	0.001*	0.642	0.424
	Unsatisfactory	40	80	7	14	10	20						
Estimate proteins in potatoes	Satisfactory	0	0	45	90	44	88	81.823	0.001*	78.569	0.001*	0.102	0.749
	Unsatisfactory	50	100	5	10	6	12						
Give infants meat, fish, chicken	Satisfactory	10	20	36	72	35	70	27.213	0.001*	25.251	0.001*	0.052	0.826
	Unsatisfactory	40	80	14	28	15	30						
Give infants milk, products as; yogurt	Satisfactory	9	18	45	90	43	86	52.168	0.001*	46.312	0.001*	0.379	0.538
	Unsatisfactory	41	82	5	10	7	14						
	Unsatisfactory	41	82	5	10	7	14						

Table (5):Percentage distribution of infants regarding to their anthropometric measurements.

Infants' anthropometric measurements	Before (n=50)		Immediate (n=50)		After two months (n=50)						
	no	%	no	%	No	%	X2	P	P1	P2	P3
Weight											
Normal 90-110%	25	50	30	60	40	80	15.909*	<0.001*	0.453	0.024*	0.134
Below normal <90%	25	50	20	40	10	20					
length											
Normal 90-110%	25	50	32	64	40	80	15.364*	<0.001*	0.294	0.024*	0.230
Below normal <90%	25	50	18	36	10	20					
Head circumference											
Normal 90-110%	35	70	38	76	44	88	7.875*	0.019*	0.653	0.177	0.368
Below normal <90%	15	30	12	24	6	12					
Mid arm circumference											
Normal 90-110%	20	40	25	50	40	80	25.00*	<0.001*	0.453	0.003*	0.024*
Below normal <90%	30	60	25	50	10	20					
Weight for length= Body Mass Index											
Normal 90-110%	30	60	32	64	40	80	9.333*	0.009*	0.764	0.134	0.230
Below normal <90%	20	40	18	36	10	20					

χ^2: Chi square for Friedman test, Sig. bet. periods *: Statistically significant at $p \leq 0.05$

Table (6):Percentage distribution of infants regarding to their laboratory investigations.

laboratory investigation	Before (n = 50) No	%	Immediately (n = 50) No	%	After two months (n = 50) No	%	X2 (1)	P1	X2 (2)	P2	X2 (3)	P3
Phenylalanine in a filter paper mg\dl Within normal	17	34	17	34	44	88	0.0	1.0	30.641	0.001*	30.641	0.001*
Above normal	33	66	33	66	6	12						
Tyrosine in a filter paper mg\dl Within normal	32	64	32	64	50	100	0.0	1.0	21.951	0.001*	21.951	0.001*
Below normal	18	36	18	36	0	0						
Phenylalanine \\Tyrosine Ratio Within normal	14	28	14	28	44	88	0.0	1.0	36.948	0.001*	36.948	0.001*
Above normal	36	72	36	72	6	12						

χ^2: Chi square for Friedman test, Sig. bet. periods *: Statistically significant at $p \leq 0.05$

Table (7): Percentage distribution of infants regarding their feeding, food exchange color and micronutrients

Infants' food exchange color and micronutrients	Before (n = 50)		Immediate (n = 50)		After two months (n = 50)		X2 (1)	P	P1	P2	P3
	No	%	No	%	No	%					
Given free phe formula before feeding, meals	44	88	50	100	50	100	12.00*	0.002*	0.368	0.368	1.000
Given fresh fruits, and juice at least twice daily	19	38	30	60	44	88	36.171*	<0.001*	0.016*	<0.001*	0.051
Given vegetables soups as main meals	10	20	50	100	50	100	80.0*	<0.001*	<0.001*	<0.001*	1.000
Given sugar, jam and honey	6	12	40	80	45	90	75.244*	<0.001*	<0.001*	<0.001*	0.549
Estimate proteins in Potatoes, cheeps in infants' food	0	0	29	58	44	88	79.699*	<0.001*	<0.001*	<0.001*	0.040*
Estimate protein in rice , cereals in infants' food	5	10	25	50	38	76	74.961*	<0.001*	<0.001*	<0.001*	0.134
Give infants meat, fish, chicken and eggs	15	30	10	20	5	10	19.042*	<0.001*	<0.001*	0.011*	0.294
Give infants milk and milk products as; yogurt and cheese	19	38	15	30	7	14	18.557*	<0.001*	<0.001*	0.099	0.051
Give infants artificial juices	15	30	10	20	4	8	10.706*	0.005*	0.453	0.099	0.368
Given infants Calcium	0	0	10	20	26	52	36.857*	<0.001*	0.134	<0.001*	0.016*
Given infants vitamin D	22	44	30	60	47	94	39.120*	<0.001*	0.230	<0.001*	0.011*
Given infants Iron	0	0	5	10	20	40	26.0*	<0.001*	0.453	0.003*	0.024*

χ^2: Chi square for Friedman test, Sig. bet. periods *: Statistically significant at $p \leq 0.05$

Table (8): Percentage distribution of infants regarding to their daily dietary intake.

Infants' daily dietary intake.	Before (n = 50) No	%	Immediate (n = 50) No	%	After two months (n = 50) No	%	X2	P	P1	P2	P3
Protein : Adequate **RDAs**	30	60	50	100	40	80	23.077*	<0.001*	0.003*	0.134	0.134
Less than **RDAs**	20	40	0	0	10	20					
Carbohydrate: Adequate **RDAs**	19	38	30	60	40	80	17.892*	<0.001*	0.099	0.002*	0.134
Less than **RDAs**	31	62	20	40	10	20					
Fats :Adequate **RDAs**	0	0	10	20	35	70	54.167*	<0.001*	0.134	<0.001*	<0.001*
Less than **RDAs**	50	100	40	80	15	30					
Fruits: Adequate	15	30	42	84	35	70	40.621*	<0.001*	<0.001*	0.003*	0.294
Less than **RDAs**	35	70	8	16	15	30					
Vegetables: Adequate	15	30	40	80	42	84	43.806*	<0.001*	<0.001*	<0.001*	0.764
Less than **RDAs**	35	70	10	20	8	16					
Calcium: Adequate	0	0	10	20	26	52	39.692*	<0.001*	0.134	<0.001*	0.016*
Less than **RDAs**	50	100	40	80	24	48					
Vitamin D : Adequate	22	44	30	60	47	94	20.720*	<0.001*	0.011*	0.764	0.024*
Less than **RDAs**	28	56	20	40	3	6					
Iron: Adequate **RDAs**	0	0	5	10	20	40	72.298*	<0.001*	<0.001*	<0.001*	0.011*
Less than **RDAs**	50	100	45	90	40	80					

χ^2: Chi square for Friedman test, Sig. bet. periods *: Statistically significant at $p \leq 0.05$

Table(9): Correlation between total scores of mothers' knowledge and their reported practices regarding phenylketonuria.

Correlation	Mothers' practices (n=50)					
Mother's knowledge	Before		immediately		After one month	
	r_s	p	r_s	p	r_s	P
	0.290*	0.041*	0.361*	0.010*	0.571*	<0.001*

**. Correlation is highly significant at the 0.01 level.

Discussion

Phenylketonuria is an autosomal recessive inheritance, consanguinity among carrier couples is risk factors that causing inborn error of phenylalanine metabolic phenylketonuria is mainly caused by decline of phenylalanine hydroxylase, enzyme that catalyse hydroxylation of phenylalanine to tyrosine.[1]This disease if untreated or undiagnosed, neurotoxic effect of high phenylalanine may due to impaired cognitive development and irreversible brain damage. In addition, which is a life threating condition and may lead to death in severe cases.[1-3]

Mothers play a vital role to deal with their infants disabilities and to gain infants' nutritional needs.[10]The problem rose due to lack of mothers' knowledge about PKU and infants' feeding pattern. Paediatric nurses could share mothers to care for their infants by giving suitable guidance and reinforcement. In addition, nurses should be assess daily dietary intake and decrease of phenylalanine.[9] Nutritional intervention programs play an integrate role in speeding and updating the mothers' knowledge, beside improving practice of mothers about infants' feeding requirements.[14]

In relation to consanguinity, the present study notice that more two third of mothers and their infants with PKU were had relative consanguineous **(Table 1)**; This could be due to the scientific facts that PKU is a genetic disorder and common in relative marriage between parents .This result was agreement with **Ford et al., (2018)**[18] who stated that more half of mothers and their infants with PKU having consanguineous relationship.

Regarding infants' socio-demographic characteristics, the present study shows more half of infants were female (**Table 2**);This finding was agreement with **Fouad et Abd El-Moneem (2016)**[19] **and jurecki et al., (2017)**[20] who were find that half of PKU infants included in their studies were female. In contrast **Teruya et al.,** (2021)[21]who record that more half of infants with PKU were male. In addition, the present study mentioned that half of infants moderate type of PKU and more than two third of them diagnosed of PKU from 15 days to less than one month (**Table 2**).This result in the same direction with **Teruya et al., (2021)**[21] who found that more half of sample diagnosed and early treatment of PKU within three months.

Concerning mothers' knowledge about phenylketonuria before program, the present results revealed that; the majority of mothers had low level of knowledge and minority of them had moderate level of knowledge before nutritional intervention program **Table (3);** these findings may be contributed to many factors as absence of in-services educational program at hospital from health care provider that influence mother knowledge, lack of information about PKU, mothers didn't attend nutritional intervention program and lack of health education in health care setting. These findings was in consistent with **El-Sayed et al., (2020)**[22] who was reported that more half of mothers had poor knowledge level, compared to low percentage of them had good knowledge level.

However, average knowledge constituted one third of them, that; contributed to mothers got knowledge particularly from physicians, and media. Also, **Abd El-kodoos et al., (2012)**[23]who were similar to the present findings who mentioned that most mothers and their infants with PKU had varies sources of information

about PKU as; health care staff, the internet, support groups, and organizations related to this condition**.**

Furthermore, total scores of mothers' knowledge regarding PKU the present study reported that; the mean score before nutritional intervention program implementation were improved immediately after program intervention and continues its progress after one month with statistical significant difference between before, immediate and after one month of nutritional intervention program implementation **(Figure 1)**;This may be attributed to mothers had emotional support and more than one quarter from high school and nearly two fifth of them graduated from secondary school and mothers gain information about PKU after implementing nutritional intervention program.

This results agreement with study **Abd-Elkodoos et al., (2018)**[24] who reported that there was highly statistically significance differences between the total score knowledge about phenylketonuria, pre, post and follow up 2 months of nutritional intervention program implementation among caregivers' which contributed to enormous responsibilities in providing care managing but the only barrier to develop any interventional program is educational level which the majority of mothers had low educational school level.

In respect of mothers' practices regarding infants' feeding pattern, the present finding showed most of mothers had poor unsatisfactory practice regarding infants' feeding pattern before. Compared to most of them had good satisfactory practice immediate and after one month of nutritional intervention program implementation **(Figure 2)**; This may attributed to mothers didn't aware about infants' feeding, they had low level of knowledge before and increase their knowledge after program implementation. Moreover, knowledge is the pre-requisite to practice and practice facilitate retention of knowledge had an effect on their practice. So, improved mothers' practice about infants' feeding pattern immediate and after implementing nutritional intervention program .

These findings in the same direction with **Fouad et Abd El-Moneem (2016)**[19]who showed that, after implementation nutritional intervention program given to mothers , a highly statistically significant improvement correct knowledge scores post-test from one quarter is unsatisfactory, to nearest all enrolled in study are satisfactory practice. In addition**, Asfour (2013)**[25] continuing the previous study who was reported that mothers' practice scores and feeding pattern for their infants were much lower when scores were extremely low, and adding that nutritional knowledge is an essential component in dietary compliance and mothers' practice.

Regarding anthropometric measurements of infants, the present study showed that half of infants had underweight (<90%) before, two third of them were normal weight (90%- 110%) immediate, while, most of them were normal weight two months after nutritional intervention program implementation **(Table 5)**; These finding may be contributed to infants' born to a woman who has phenylketonuria that is not controlled with a special diet is at high risk for serious problems, this can cause low birth weight, length and growth retardation, nutritional intervention program implementation for mothers help to improve infants' growth and development. These findings agreement with **Zaghamir et**

al.,(2022)[26] who mentioned that after nutritional intervention program implementation on mothers' knowledge and practice and infants' feeding pattern and their growth. So, positive linear correlations between mothers' knowledge and their practice, and infants' development. This result confirms positive relation between them.

In contrast to the current study, **Tiele et al., (2019)**[27]who observed that the majority of new born experienced general health issues, including delayed growth as decreased weight and length. In addition, **Alena (2017)**[28] validated this conclusion by reporting that, from birth through adulthood, German infants with phenylketonuria were noticeably shorter than healthy infants. Furthermore, in this respect **Ahmad et al., (2022)**[29] They reported that; the nutritional status of the participants less than one quarter of the study sample were low length or extremely short. Also, with regards nearly half of infants were overweight.

As regard lab investigation, present study mentioned, **(Table 6)** There was statistically significant difference between phenylalanine and tyrosine ratio in a filter paper. Also, tyrosine in a filter paper improved in all infants immediate and after two months of program implementation.

Nutritional intervention programs for mothers play an important role in enhancing and updating knowledge beside improving care given to infants, and literature reports indicate that nutritional interventions program yield a long improvement in intake dietary but only a short-term improvement metabolic control.[30]

The present finding reveals that, there was statically significant correlation coefficient between total score of mothers' knowledge and their reported practices regarding phenylketonuria before, immediate and after one month of nutritional interventions program implementation (**Table 9)** This finding the fact that increasing level of knowledge followed by increasing in practice, and increased dietary compliance for their infants with PKU. Also, the effect of nutritional intervention programs is to increase their knowledge about infants' feeding pattern.

The present findings were harmony with **Witalis et al., (2017)** [31] who reported that total caregiver knowledge scores significantly increased following educational intervention. Additionally, highly statistically significant positive correlation was discovered between total knowledge and total practice scores. The present findings were consistent with these findings. However, knowledge level improved, the amount of their practice improved. Moreover, **Mac Donald et al., (2016)**[32] are in agreement with the current results who showed a good link between mothers' practices and educational programs concerning optimal PKU management and mothers' practice.

The results of the present study show that, relation between mothers' knowledge about phenylketonuria and health parameters of infant's with PKU, following nutritional intervention program implementation. This outcome might be the consequence of an nutritional intervention programs that increased the mothers' knowledge scores and enhanced their practice since it was designed and carried out in accordance with their prior assessments of the infants' health parameters and nutritional needs. Support the necessity of on-going a nutritional intervention program to keep mothers' knowledge toward their phenylketonuria

affected infants' growth , and general health.

Conclusion

A significant improvement was observed level of mothers' knowledge regarding phenylketonuria immediate and after one-month of nutritional intervention program implementation in comparison to that in pre-program. Also, the nutritional program was effective on their infants' health parameters as; increase weight.

Recommendations

1- Health education of nutritional intervention training program should be conducted periodically and regularly in health care services for mothers with infants had phenylketonuria. and designing an education hand out about phenylketonuria and its management plan.

2 – Started with continue early detection and successful new born screening programs to early diagnose and proper management of infants with phenylketonuria to guard against cognitive impairment and growing infants and children of generally healthy.

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Effect of Topical Cryotherapy on Clinical Outcomes of Patients with Breast Cancer Related Lymphedema

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Abstract

Background: Breast cancer-related lymphedema is a prevalent complication of breast cancer treatment. It has a significant negative impact on patients 'physical and psychological well-being and overall quality of life. Cryotherapy gained universal acceptance for its therapeutic effects on controlling various forms of edema when used in conjunction with conservative treatments for patients with lymphedema. **Aim of the study** was to evaluate the effect of topical cryotherapy on the clinical outcomes of patients with breast cancer-related lymphedema. **Subjects and methods:** A quasi-experimental research design was utilized to carry out this study. A purposive sample of 84 adult women who had breast cancer-related lymphedema was divided into two equal groups. **Tools**: Four tools were used to collect data, as follows: Tool I: Patients' demographic characteristics and health-related data; Tool II: Manual circumference measurement, Tool III: Lymphedema tracking tool; and Tool IV: Numerical Rating Scale (NRS). **Results**: The present study showed that there were statistically significant differences between the control and study groups regarding total mean scores of lymphedema-related symptoms and pain scores post-intervention ($P < 0.05$). Moreover, there was a significant improvement in the total mean scores of the patients' arm circumferences in the study group after intervention; wrist measurement improved from 18.15 (1.97) to 16.98 (1.27), forearm from 27.26 (2.84) to 25.49 (2.11), and upper arm from 38.2 (3.36) to 36.17 (2.66). **Conclusion**: The study results indicated that cryotherapy is an effective complementary modality for the treatment of breast cancer-related lymphedema. **Recommendations:** It is recommended to include cryotherapy in physical therapy protocols for lymphedema rehabilitation, develop educational programs and guidelines for safe application in clinical settings, and evaluate long-term effects.

Key words: Topical Cryotherapy, Clinical Outcomes, Breast Cancer-Related Lymphedema

Introduction:

Breast cancer is the most common type of cancer among women and the main cause of cancer-related deaths worldwide. According to the American Cancer Society (ACS) annual report for 2022–2024, more than 4 million women suffered from invasive breast cancer, with an estimated 287,850 new cases detected among women, and 43,250 of them will die in the United States alone in 2023. Precariously, about one in eight women is suspected to have breast cancer in her life-time, and 1 in 39 of them will die. So early detection and timely treatment are life-saving. (1)

Aggressive treatment therapies used for early eradication of breast cancer (e.g., chemotherapy, radiotherapy, hormonal therapy, and surgery) regretfully have many

morbid complications. One of the most serious sequelae of cancer treatment is breast cancer-related lymphedema (BCRL) of the upper extremity, [2,3] that is frequently caused by axillary lymph node dissection or radiation therapy, which are responsible for 10–20% of the risk of developing lymphedema. [4,5] It was estimated that 3-5 million women had BCRL in the US, with 10 million affected worldwide, and approximately one in every three patients was at risk for developing BRCL post mastectomy. [6]

Lymphedema is a group of pathologic disorders that are characterized by an excessive local buildup of protein-rich lymph fluid that may result from disruption or blockage of lymphatic drainage after axillary lymph node dissection, axillary radiation, infection, scarring from wound healing, and compression of the lymphatic by tumors. Eventually, an abnormal swelling in the upper extremity nearby and distal to the treatment site is foreseen and ultimately progresses to BCRL. [3, 7]

Breast cancer-related lymphedema (BCRL) has two forms: early-onset and late-onset lymphedema. Early-onset lymphoedema develops up to 2 months after surgery and is usually temporary. Late-onset lymphedema progresses at any time, usually after 6 months of initial treatment. Lymphedema can develop in four defined stages. Stage (0) is characterized by subclinical swelling that is not visible on clinical examination despite impaired lymph flow. Stage (I) is presented by pitting edema that is considered reversible. In stage II, the edema evolves and becomes brawny, fibrotic, non-pitting, and irreversible. Advanced lymphedema (stage III) develops rarely after breast cancer treatments and is differentiated by cartilaginous hardening, papillomatous outgrowths, and skin hyperkeratosis. [8,9]

Women with BCRL were confronted not only with physical difficulties (i.e., inflammation, pain, edema, arm tightness and heaviness, impaired upper-extremity mobility, function, and overall daily living activities), but also with psychological distress and altered health-related quality of life, in addition to social and economic burdens. [10] In this regard, the National Comprehensive Cancer Network (NCCN) guidelines call for early screening, prevention, education, and intervention for women at risk of developing BCRL. The goal of secondary prevention is to control arm swelling and manage BCRL symptoms. [3, 11]

Going with this context, the oncology nurses who are responsible for caring for the patients with breast cancer should be familiar with the magnitude of this complication and related treatment modalities, assessing patients who are at risk by frequent limb measurement, planning for conservative and alternative treatments, implementing actions, and educating the patients to follow self-care regimens that control symptoms and prevent exacerbation of lymphedema. [12]

Oncology Nursing Society Treatment Guidelines for BCRL include resistive exercises, manual lymphatic drainage, compression pumps, and complete decongestive therapy. [6] Noteworthy, recent evidence-based studies recommended the application of alternative and complementary therapy for its therapeutic benefits and confirmed that many patients prefer it as a non-pharmacological treatment

for controlling BCRL. Nowadays, cryotherapy is the most effective type of complementary therapy and has received much attention in recent research as an unconventional treatment for BCRL. [7, 13, 14] Cryotherapy is a canonical term often used to describe therapeutic procedures involving the application of cold temperatures by ice, cold water, or cold air on an affected part of the body. This treatment modality is recently used; however, its uses date back for centuries to the ancient Greeks and Hippocrates. The principal purposes of cryotherapy are the withdrawal of heat by reducing core and tissue temperatures and the alteration of blood flow associated with slowing sensory nerve conduction. Ultimately, the resulting downstream effects of cold therapy are reducing perception of pain, getting an analgesic benefit, hastening inflammation, and controlling edema. [15, 16, 17]

Furthermore, topical cryotherapy produces cooling to a depth of about 2-4 cm of the skin, ensuing an initial local vasoconstriction that can persist beyond the time of skin temperature normalization and reduces the normal post-ischemic hyperemic response. Skin cooling also causes systemic vasoconstriction, which, together with local vasoconstriction, can decrease interstitial fluid filtration and promote post-capillary fluid reabsorption. These enhanced processes tend to reduce interstitial fluid volume, giving rise to the almost universal acceptance of cryotherapy as a modality for the control of various forms of edema. [18] Therefore, it is reasonable to think that cryotherapy might have a positive effect on the treatment of lymphedema. [14]

Unfortunately, there is little evidence-based research supporting the application of cryotherapy for breast cancer-related lymphedema, and there are controversial reports regarding its therapeutic effects. Consequently, the current study is intended to evaluate the effect of topical cryotherapy on the clinical outcomes of patients with BCRL as evidence-based nursing research that will support the future use of this modality in clinical practice.

Significance of the study

Nowadays, breast cancer is a significant health problem and is considered the main cause of morbidity and mortality worldwide. However, recent treatment technology has improved patients' survival rates. Unfortunately, some of these technologies have negative consequences, and BCRL is one of them. Breast cancer-related lymphedema has physical, psychological, social, and economic burdens on affected patients. In this respect, BCRL gains the attention of clinical communities and research to explore solutions. Recent studies recommended the application of cryotherapy and confirmed its therapeutic effects on controlling symptoms of lymphedema. In the clinical setting, it was observed that cold therapy is a safer, easier-to-apply, less expensive treatment modality to be used in conjunction with conservative treatments for patients with BCRL. Therefore, we tried to evaluate the effect of topical cryotherapy on BCRL.

The aim of the study

To evaluate the effect of topical cryotherapy on the clinical outcomes of patients with breast cancer-related lymphedema.

Research hypothesis

H1: Patients who receive topical cryotherapy would exhibit a significant improvement in lymphedema size compared to patients who do not receive topical cryotherapy.

H2: Patients who receive topical cryotherapy would exhibit a significant improvement in lymphedema-related symptoms compared to patients who do not receive cryotherapy.

H3: Patients who receive cryotherapy would express lower pain intensity compared to patients who do not receive cryotherapy.

Operational definitions

- Cryotherapy is a treatment modality that involves the application of cold temperatures using a skin cooling agent, "moist or dry," on the lymphedema site for a length of time for therapeutic purposes.

- Clinical outcomes of breast cancer-related lymphedema represent the following: lymphedema size and volume change by intervention, which was measured by tool II; BCRL related symptoms, including swelling, arm heaviness, tingling, tenderness, tissue firmness, and level of pain, that were measured by tools III and IV.

Subjects and methods

Research design:

A quasi-experimental research design with a two-group pretest-posttest methodology without randomization allocation was used to investigate the effects of topical cryotherapy.

Settings of the study

The current study was conducted at the inpatient surgical wards along with the outpatient clinics of the Oncology Center affiliated with Egypt's Mansoura University Hospitals. The Oncology Center consisted of two female surgical wards, each ward consisted of five rooms: two big rooms and three small rooms. The big rooms consisted of six beds, and the small rooms consisted of three beds. The Oncology center was founded in 1994, aiming to provide integrated preventive, management, educational, and research services in all oncology disciplines (i.e., Breast, Bone marrow, Blood, and GIT) for Delta and Channel Governorates, with a census of approximately a million people.

Subjects

A purposive sample of 84 conscious adult women was recruited from the aforementioned setting to fulfil the aim of the current study based on the following:

Sample size calculation: The power analysis was done using Open Epi Software (Open Epi.com) to calculate sample size; an anticipated alpha error was 1% (confidence 99%), β error was 5%, and study power was 95%. Upon careful consideration, cooling breast skin leads to a decrease in F4.0 from 3.54 ± 0.72 N to 2.79 ± 0.81 N (**Mayrovitz & Yzer, 2017)**. To account for expected drop-outs, an additional 10 percent were added, so the minimum number of subjects required by considering dropouts for adequate statistical power to test the study model was 84 patients, which were divided into two equal groups.

The total study sample was assigned into two equal groups: a study group consisting of 42 adult women who received the routine hospital's care along with the designed cryotherapy sessions at the affected arm, and a control group consisting of 42 adult women who received the routine hospital's care only.

Participants' inclusion criteria: Adult women aged 18–60 years who had a confirmed diagnosis of either arm lymphedema post-mastectomy (stage 0–1) and were referred for lymphedema treatments, were not engaged in routine

hospital care or any intervention, were able to communicate verbally, and exhibited their willingness to participate in the study.

Participants' exclusion criteria: Women diagnosed with irreversible BCRL (stages II–III), had a local infection, and had a past history of peripheral vascular diseases, connective tissue disorders, and diabetic neuropathy.

Tools for data collection

Four tools were used to collect the significant data for the study.

Tool I: Patients Demographic Characteristics and Health-Related Data Questionnaire

This tool was developed by the researchers after reviewing recent published literature relevant to the study. [10, 19, 20] It was filled only once (pre-intervention) by the researchers and involved two main parts, as follows:

Part-1: Demographic characteristics of the study participants were included: age, level of education, occupation, and residence.

Part-2: Health-relevant data of the study participants was comprised of the following: weight (wt), height (Ht), body mass index (BMI), type and site of operation, post-operative treatment, time of lymphedema development, stages of lymphedema, and routine therapy used.

Tool II: Manual Circumference Measurement

Arm circumferential measurement is a measuring tool used clinically to assess arm size changes, the presence of excess lymph (edema), and the subsequent changes due to either time or treatment. [21] Arm circumference was measured in centimeters (cm) by a calibrated tape measure that was pulled with a constant tension at different points of the arm (wrist, forearm, and upper arm). The inter-limb circumference difference was calculated by taking a number of measurements from the affected arm and comparing them with the other non-affected arm to estimate baseline measurements for comparison pre- and post-intervention.

Tool III: Lymphedema Tracking Tool

The researchers developed this tool after reviewing recent published literature. [18, 22, 23] to assess symptoms of lymphedema such as swelling, arm heaviness, tingling, tenderness, and tissue firmness to compare levels of improvement before and after intervention. The participants were instructed to rate their responses about BCRL-related symptoms using either yes or no questions using a 2-point score (i.e., 0 = No, and 1 = Yes).

Tool IV: Numerical Rating Scale (NRS)

The NRS was developed by Downie et al. (1978). The purpose of this scale is to assess pain intensity in acute and chronic conditions. This scale consists of an 11-point rating scale (0 to 10), with 0 denoting "no pain" and 10 "the worst possible pain ". The participants were asked to select the single number that best described their pain intensity. [24] The NRS was transformed into a five-point ordinal scale interpreted as follows; "no pain = 0; mild pain = 1-4; moderate pain = 5–7; severe pain = 8 >10; very severe pain = 10. [25]

Validity and reliability of the study tools

Validity: the study tools were tested for content validity by a panel of five experts in the fields of surgical oncology, medical-surgical nursing, critical- care nursing, community-health nursing, and medical biostatisticians. The professional jury reviewed the content of the tools to ensure their inclusiveness, relevancy, simplicity, and applicability. All suggested modifications were calculated and found to be five mistakes in the Arabic translation, which were adjusted, and the final format of the tools was prepared. Reliability: The

proposed study tools were tested by Cronbach's Coefficient Alpha to measure the internal consistency of tool II (α = 0.75) and tool III (α = 0.87) based on the Strainer study, which reflects that the tools are acceptable and reliable when Cronbach's Alpha =0.70 [26]. For tool V, the test-retest reliability (r = 0.95) according to the study done by [27]

Pilot study

Before starting the data collection phase, 10% of the target sample size (eight patients) were interviewed to assess the clarity and applicability of the stated tools and make any necessary modifications before conducting the main study, as well as to estimate the required time needed for completing the questionnaire. Participants included in the pilot study were excluded from the target sample size.

Field Work

Data collection was sustained for 4 months, from the beginning of December 2022 to the end of March 2023. Fieldwork is accomplished through five phases, which are consecutively commenced in order to achieve the aim of the current study.

1. **Preparatory/ development phase**:

The current phase covers the process of stating research problems, formulating hypothesizes, designing the research instruments, and completing administrative preparation for data collection. After the researchers were acquainted with the actual dimension and magnitude of the problem, the study tools were designed. The study tools (I, III) were developed by the researchers after reviewing the relevant literature and used to collect the data for the study, except (II, IV), which were standardized tools used without changing their content. Then the final English version of the tool was translated into Arabic and tested for content validity and reliability. The final Arabic version of the tool was subjected to a pilot study for possible improvement and settled for data collection. Ultimately, written approval to conduct the study was assembled from the pertinent authorities prior to commencing the data collection.

2. **Assessment phase (Pre-test):**

The study procedure was coordinated with health care providers, including nursing staff, after a clear explanation of the aim and nature of the study. Patients who fulfilled the previously mentioned study criteria and attended the study settings during the period of data collection were selected and assigned equally to the study and control groups. Both groups were matched as closely as possible concerning demographic and health related data to secure the homogeneity of the study participants. As a part of the standard pre-intervention assessment (pre-test), before applying topical cryotherapy sessions, each patient of both groups was interviewed individually so as to collect baseline data using all the study tools after explaining the nature and purpose of the study, and obtaining their consent. The time taken to fill out the questionnaire was around 20–30 minutes, as follows:

- The participants demographic data (age, sex, etc.) was obtained from their health records. The health-related data were evaluated as follows: anthropometric measurement (Wt, Ht, BMI) and stage of lymphedema were estimated by the researcher in collaboration with health care providers, and the data concerning type and site of operation, post-operative treatment,

time of lymphedema development, and routine therapy used were collected from patients (Tool I).

- Arm circumference for both groups was measured by a calibrated tape measure that was pulled with a constant tension at the wrist, 10 cm below the elbow, and 15 cm above the elbow on both the affected and non-affected sides based on the recent guidelines [21]. The affected arm size was calculated by subtracting the non-affected side from the affected side before the intervention. After intervention, the comparison of arm measurements was performed only on the lymphedema target site (tool II). Measurements were taken at the selected lymphedematous target site on the arm as well as on the contralateral arm at an anatomically similar site for both groups.
- Subjective complaints of BCRL were evaluated by asking patients about associated symptoms of the affected arm, such as swelling, arm heaviness, tingling, tenderness, and tissue firmness, using Tool III. The participants were asked to rate their level of BCRLs' pain using Tool IV.

3. Planning phase

The current phase was focused on designing the cryotherapy sessions schedule for the participants, which included; date and name of patients, method of skin cooling, application times per day, length of time for each session, procedure steps, and assigned caregiver, which were prepared according to patients' health status, needs, and comfort level based on the data retrieved from the assessment phase.

4. Implementation phase (procedure)

Topical cryotherapy (dry form) was added only for the study group using reusable gel ice packs with straps, which are gel-based. The gel content of the pack provides better cooling power than frozen water, which can be refreezed and used more than once, and the straps secure it in place as much as needed. Moreover, it is manufactured wrapped in cotton cloth, which reduces patient discomfort from direct exposure to cold. The proposed cryotherapy sessions were conducted over six consecutive sessions, three times per day, three days per week, for two weeks, according to standard protocol and recommendations from recent research. [13, 14, 18] Topical skin cooling steps were performed as follows:

- At the beginning of the first session, the researcher introduced herself and explained the objectives of the proposed session and the steps of the procedure for the target woman.
- Wash the skin of the affected arm with normal saline and dry it to avoid infection.
- Apply oil or cream to moisturize the skin before skin cooling.
- A reusable gel ice pack was applied to the affected arm and secured by a strap starting from the hand, wrist, forearm, and shoulder in a distal to proximal direction at each point, which emulates the direction of lymphatic fluid transport and drainage.
- Apply cryotherapy agents for 15-20 minutes, 2-3 times per day, the ideal time for achieving therapeutic effect and avoiding adverse effects from longer exposure according to standard protocol. Each session took approximately 30 to 45 minutes.
- The patient's response to cryotherapy was evaluated, such as discomfort, tolerance, and skin problems, and the

session time was adjusted according to patient tolerance.

- The researcher executed one session per day, and patients or their carers repeated the procedure two times per day after ensuring that they were able to carry out the procedure. Consequently, each patient received regular telephone calls to confirm the adequate application of the intervention.

5. Evaluation phase (post-test)

At the final step of data collection after cryotherapy sessions, the researcher evaluated the effect of cryotherapy on the clinical outcomes of patients with BCRL. All outcome measurements were undertaken prior to the intervention and at the end of six intervention sessions for a follow-up period of two months, passing through the study tools (II–IV) as follows:

- The first phase of evaluation (post-test 1) was conducted after two weeks at the end of the intervention for both groups.
- The second phase of evaluation (post-test 2) was conducted after four weeks for both groups.
- The third phase (follow-up/ post-test3) was conducted after 8 weeks of intervention for both groups.
- Both study and control groups received routine hospital care according to Oncology center protocol as follows; anti-inflammatory drugs, anti-edematous therapies, and resistance exercise. After data collection was accomplished, the researcher provided the control group with cryotherapy guidelines to be involved in their routine care, striving to achieve justice in receiving the same care for both groups.

Ethical Considerations

The Ethical Committee for Scientific Research of Faculty Nursing, Mansoura University, Egypt, approved the study (IRP: ref. no. P.0331). Official approval to carry out the study was obtained from the Mansoura University Hospital authorities before conducting the current study after describing the nature and objective of the study. Informed consent (verbal and written) was obtained from the participants after illustrating the study's aim, advantages, and risks. Voluntary participation, withdrawal from the study at any time, and the patients' rights to refuse to participate in the study without adverse effects on their care were assured. Privacy was absolutely ascertained, data confidentiality was secured by coding the data, and the researchers confirmed that the data would be used only for research purposes.

Statistical analysis

The collected data were coded and entered into the statistical package for social sciences (SPSS) version 20. Qualitative data was presented as percentages. Quantitative data were described as mean/SD, as appropriate. The study data were tested for normality by the Kolmogorov-Smirnov test. For normally distributed variables, RM-ANOVA for the comparison of more than two related groups was used to indicate an actual difference between mean scores. While an independent T test was used to indicate the difference between the mean scores of the two different groups. Chi-square, Monte-Carlo, and Fisher exact were utilized for comparison between two nominal variables. All tests were performed at a level of significance where (P-value

equal to or less than 0.05 was considered to be statistically significant.

Results

Table (1): Baseline characteristics of the studied groups : This table reveals that the mean age of control and study groups were 40.33(3.26) and 42.23(2.53) respectively. Regarding educational level 40.5% and 47.6 % of control and study groups were illiterate respectively and 88.1%, 95.2 % of control and study groups were housewives respectively. Concerning residence 71.4% and 66.7% of control and study groups were lived in rural area respectively. The mean body mass index of control and study groups were 34.35(4.86) and 34.81(4.45) respectively. There were no statistically significance differences of baseline characteristics between control and study groups.

Figure (1): Types of postoperative treatment in control and study group : Presents that 50 % and 61.9% of patients were received hormonal therapy post-operative in control and study groups respectively. While 45.2 % and 28.6 %were received chemotherapy post-operative in control and study groups respectively.

Figure (2): Comparison between control and study groups related to time of lymphedema developed postoperative: This figure shows that 33.3 % and 31% of patients, lymphedema was developed after one year postoperative in control and study groups respectively. While 26.2 % and 31% of them lymphedema developed after 4 to 6 weeks postoperative in control and study groups respectively. There was no significantly difference related to the time of lymphedema developed between the control and study groups (p=0,900).

Figure (3): Comparison of lymphedema stages between control and study groups pre-intervention: This figure clarifies that 61.9 % and 69% of patients were in stage 1 of lymphedema in the control and study groups, respectively. While 38.1% and 31% of them were in stage 0 of lymphedema in the control and study groups, respectively. There was no statistical significance between the control and study groups (P = 0.491) related to lymphedema stages pre intervention.

Table (2): Comparison between affected and unaffected arm measurements in the control and study groups pre-intervention: This table reveals that there were statistically significant differences between the affected and unaffected arms in the control group and study group before intervention.

Table (3): Comparison of the lymphedema signs between the control and study groups before, after 2 weeks, after 1 month, and after 2 months of intervention: This table portrays the distribution of patients according to signs of lymphedema in the control and study groups. It was noticed, there was a significant decrease in hotness and localized swelling as signs of lymphedema after two weeks in the study group. While all of the lymphedema signs decreased after one month in the study group and disappeared after two months. There were statistical differences between the control and study groups related to signs of lymphedema after one month and after two months of intervention.

Table (4) Affected arm measurement in the control and study groups before, after 2 weeks, after 1 month, and after 2

months of intervention: This table reveals that there were no statistically significant differences in different arm measurements (wrist, forearm, and upper arm) at baseline between the control and study groups (p = 0.542, 0.700, and 0.567, respectively). There were statistically significant differences in different arm measurements (wrist, forearm, and upper arm) related to time within subjects (p = 0.000*). Also, there were statistical differences between the control and study groups after two weeks, after one month, and after two months related to previous items.

Figure (4): Comparison of tissue firmness pre, after 2 weeks, after 1 month, and after 2 months between the control and study groups: This figure portrays that 61.9 % and 71.4% of patients suffered from tissue firmness in the control and study groups, respectively, pre-intervention. There was no statistical significance (P = 0.355) between the control and study groups pre-intervention. While after 2 months, 33.3% and 7.1% of them suffered from tissue firmness in the control and study groups, respectively. There were statistically significant differences between the control and study groups after 2 weeks, after 1 month, and after 2 months (p =0.048, 0.013, and 0.003), respectively.

Table (5): Comparison of pain scores in control and study groups before, after 2 weeks, after one month, and after 2 months of intervention: This table reveals that there were no statistically significant differences in pain score (p = 0.683) at baseline between the control and study groups. There were statistically significant differences in pain score (p = 0.000*) related to time within subjects. Also, there were statistical differences between the control and study groups after two weeks, after 1month, and after two months related to the previous item.

Figure (5): Pain level in the control and study groups before, after 2 weeks, after one month, and after 2 months of intervention: This figure illustrates that 76.2% and 69% of patients suffered from moderate pain in the control and study groups, respectively, pre-intervention. It was noticed that the level and severity of pain decreased in the study group compared with the control group after 2 months of intervention, where 28.6% and 61.9% had no pain in the control and study groups, respectively.

Table (1) Baseline characteristics of the studied groups (N = 84)

Items	**Control (n=42) N (%)**	**Study (n=42) N (%)**	**P value**
Age			
18<30	2(4.8)	2 (4.8)	0.757[a]
30<40	11(26.2)	7(16.7)	
40<50	13(31)	13 (31)	
50 and more	16 (38.1)	20 (47.6)	
□ **(SD)**	40.33(3.26)	42.23(2.53)	
Educational level			
Illiterate	17 (40.5)	20 (47.6)	0.718[a]
Read and write	9 (21.4)	10 (23.8)	
Secondary	11 (26.2)	10 (23.8)	
University	5(11.9)	2 (4.8)	
Occupation			
Housewife	37 (88.1)	40 (95.2)	0.236[b]
Administrative work	5 (11.9)	2 (4.8)	
Residence			
Urban	12 (28.6)	14 (33.3)	0.637[c]
Rural	30 (71.4)	28 (66.7)	
Weight □ (SD)	91.12(13.57)	92.9 (12.3)	0.529 [d]
Height □ (SD)	162.81(4.33)	163.36 (4.28)	0.562[d]
Body mass index (BMI) □ (SD)	34.35 (4.86)	34.81 (4.45)	0.657[d]

a: Monte Carlo **b**: Fisher's Exact **c**: chi square **d**: Independent T test

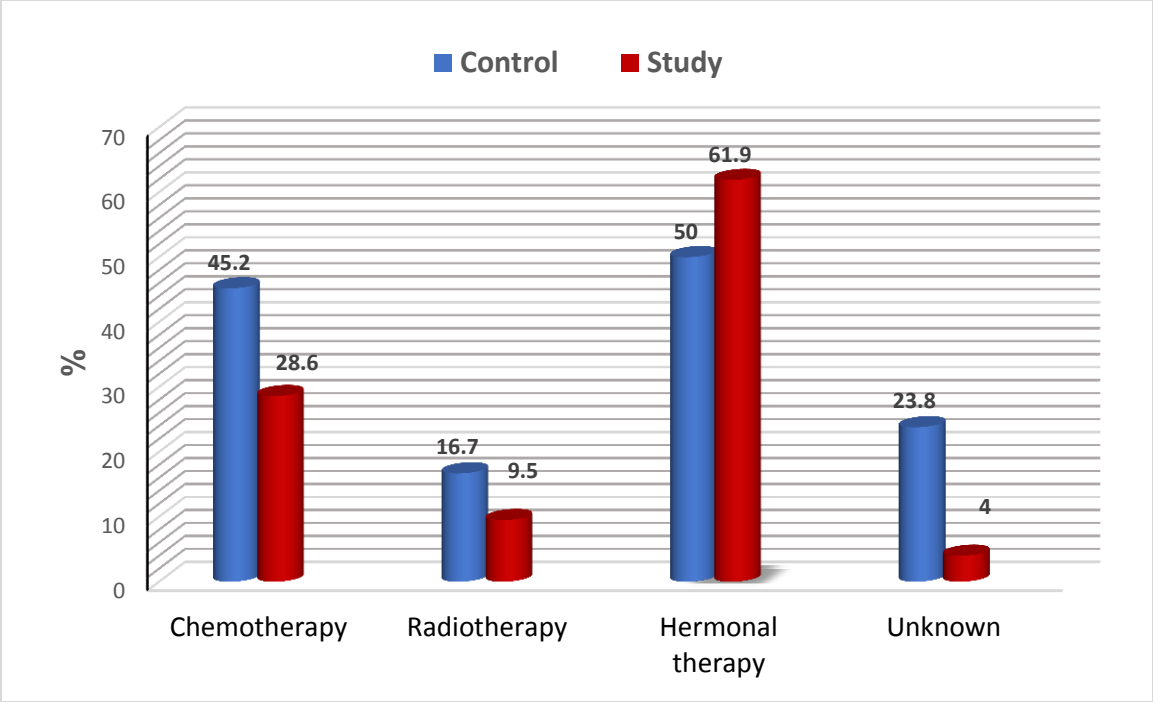

Figure 1: Types of postoperative treatment in control and study group (n=84)

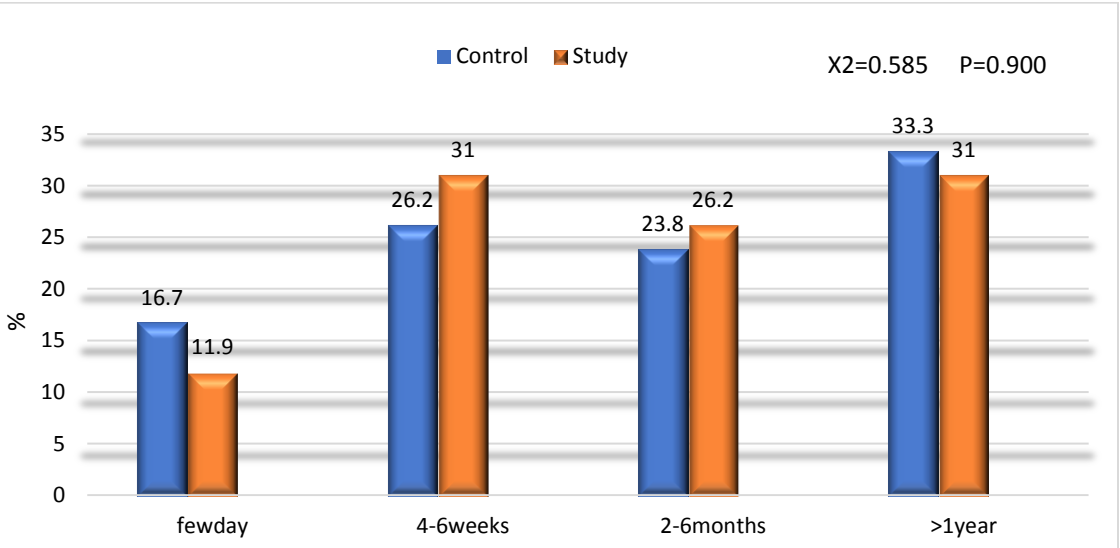

Figure 2 :Comparsion between control and study groups related to time of lymphedema developed postoperative (n=84)

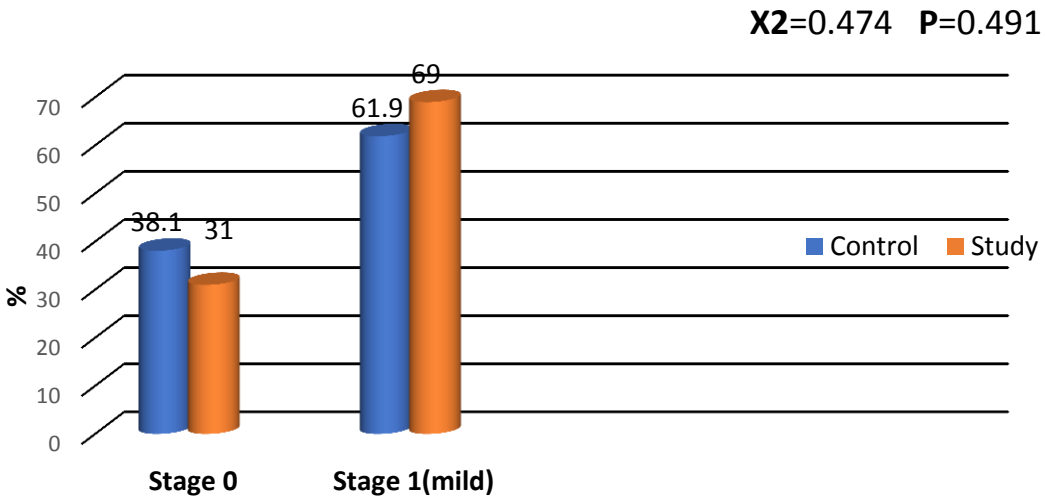

Figure 3 : **comparsion of lymphedema stages between control and study group pre intervention (84)**

Table (2) Comparison between affected and unaffected arm measurements in control and study group before intervention (N = 84)

Arm measurement	Groups			
	Control (N=42)		Study (N=42)	
	Unaffected	Affected	Unaffected	Affected
Wrist	□ (SD)		□ (SD)	
	17.12(1.22)	18.31(1.87)	17.11(1.28)	18.15(1.97)
	T=3.375 **P =0.001***		T=2.870 **P =0.005***	
Forearm	26.11(1.8)	27.51(2.68)	25.92(1.86)	27.26(2.84)
	T=2.860 **P =0.006***		T=2.631 **P =0.01***	
Upper arm	36.22(2.84)	38.62(2.62)	36.24(2.98)	38.2(3.36)
	T=3.373 **P =0.001***		T=2.992 **P =0.004***	

T: Independent T test P (significance)

Table (3) Comparison of the lymphedema signs between control and study group before, after 2weeks, after one month and after 2 months of intervention (N = 84)

Items	**Control group**	**Study group**	**Test of significance**	
	N (%)	**N (%)**	FE	P
Pre-intervention				
Redness	12 (28.6)	9 (21.4)	.571	0.615
hotness	20 (47.6)	22(52.4)	.190	0.827
Edema (all arm)	31 (73.8)	31 (73.8)	0.00	1.000
Swelling (localized)	13 (31)	7 (16.7)	2.363	0.200
Tenderness	34 (81)	38 (90.5)	1.556	0.350
Numbness	37 (88.1)	38 (90.5)	0.124	1.000
Tingling	27 (64.3)	29 (69)	0.214	0.817
After 2 weeks				
Redness	12 (28.6)	6 (14.3)	2.545	0.183
hotness	20 (47.6)	0	26.250	0.000*
Edema (all arm)	31 (73.8)	31 (73.8)	0.000	1.000
Swelling (localized)	13 (31)	4 (9.5)	5.974	0.028*
Tenderness	34 (81)	27 (64.3)	2.934	0.141
Numbness	37 (88.1)	10(23.8)	0.819	0.548
Tingling	27 (64.3)	23(54.8)	0.791	0.505
After one month				
Redness	6(14.3)	0	6.462	0.026*
hotness	20(47.6)	6 (14.3)	10.918	0.002*
Edema (all arm)	24 (57.14)	14 (33.3)	4.805	0.048*
Swelling (localized)	11 (26.2)	2 (4.8)	7.372	0.013*
Tenderness	13 (31)	5(11.9)	4.525	0.033*
Numbness	16 (38.1)	2 (4.8)	13.859	0.000*
Tingling	19 (45.2)	9 (21.4)	5.357	0.036*
After 2 months				
Redness	0	0	NA	
hotness	14 (33,3)	0	16.8	0.000*
Edema (all arm)	16 (38.1)	4(9.5)	9.450	0.004*
Swelling (localized)	10 (23.8)	1 (2.4)	8.473	0.007*
Tenderness	9 (21.4)	0	10.080	0.002*
Numbness	10 (23.8)	0	11.351	0.001*
Tingling	10 (23.8)	2(4.8)	6.222	0.026*

FE: Fisher's Exact Test **NA:** *Not applicable* ***P*: (significance)***

Table (4): Affected arm measurement in control and study group before, after 2weeks, after one month and after 2 months of intervention (N = 84)

Items	Time				P^a -value	
	Pre- test	**After two weeks**	**After one month**	**After 2 months**	Within subjects	Between subjects
	□ **(SD)**	□ **(SD)**	□ **(SD)**	□ **(SD)**		
Wrist cm						
Control group	18.31(1.87)	18.30 (1.93)	18.1(1.79)	17.71(1.78)		
Study group	18.15 (1.97)	18.05(2)	17.03(1.3)	16.98(1.27)	**0.000***	**0.009***
P^b	0.542	0.018*	0.003*	0.033*		
Forearm cm						
Control group	27.51(2.68)	27.12(2.82)	27.2(2.56)	26.75(2.56)		
Study group	27.26(2.84)	26.45(1.87)	26.06(2.19)	25.49(2.11)	**0.000***	**0.030***
P^b	0.700	0.001*	0.032*	0.016*		
Upper arm cm						
Control group	38.62(2.62)	38.61(3.05)	38.21(2.65)	37.42(2.89)		
Study group	38.2(3.36)	37.68(2.42)	36.94(2.66)	36.17(2.66)	**0.000***	**0.064**
P^b	0.567	0.031*	0.031*	0.042*		

P^a: Repeated measure ANOVA **P^b:** Independent T test P*; significance

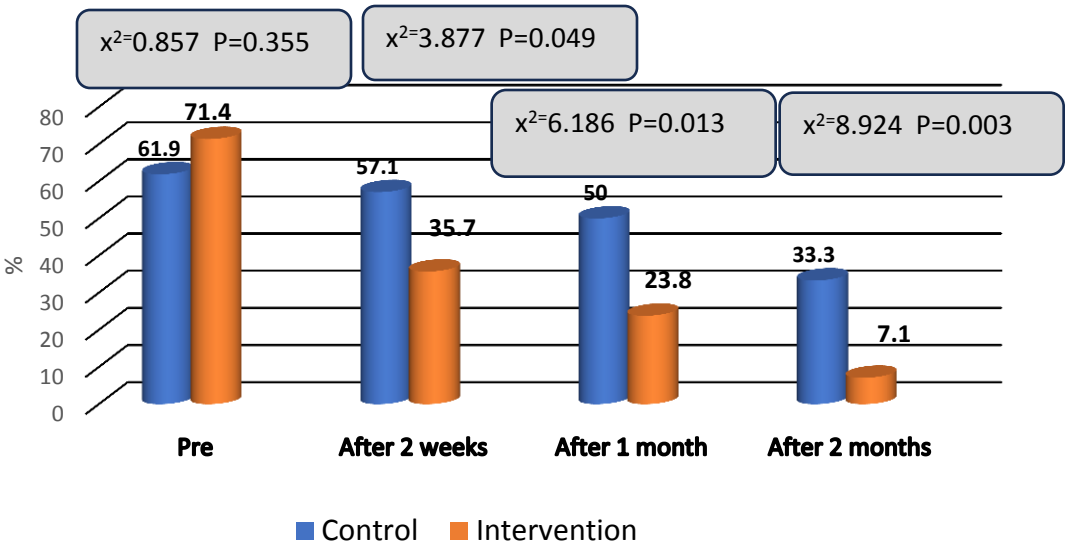

Figure 4 :Comparison of tissue firmness pre , after 2 weeks ,after 1 month ,and after 2 months between control and study group

Table (5): Comparison of pain scores in control and study groups before, after 2weeks, after one month and after 2 months of intervention (N = 84)

Items	Time				P^a -value	
	Pre- test	**After two weeks**	**After one month**	**After 2 months**	Within subjects	Between subjects
	□ **(SD)**	□ **(SD)**	□ **(SD)**	□ **(SD)**		
Pain score						
Control group	6.93(1.22)	6.93(1.18)	5.2(1.69)	2.82(2.54)	**0.000***	**0.000***
Study group	6.8(1.54)	5.12(1.65)	3.3(1.37)	0.76(1.14)		
P^b	0.683	0.000*	0.000*	0.000*		

P^a: Repeated measure ANOVA **P^b:** Independent T test P*; significance

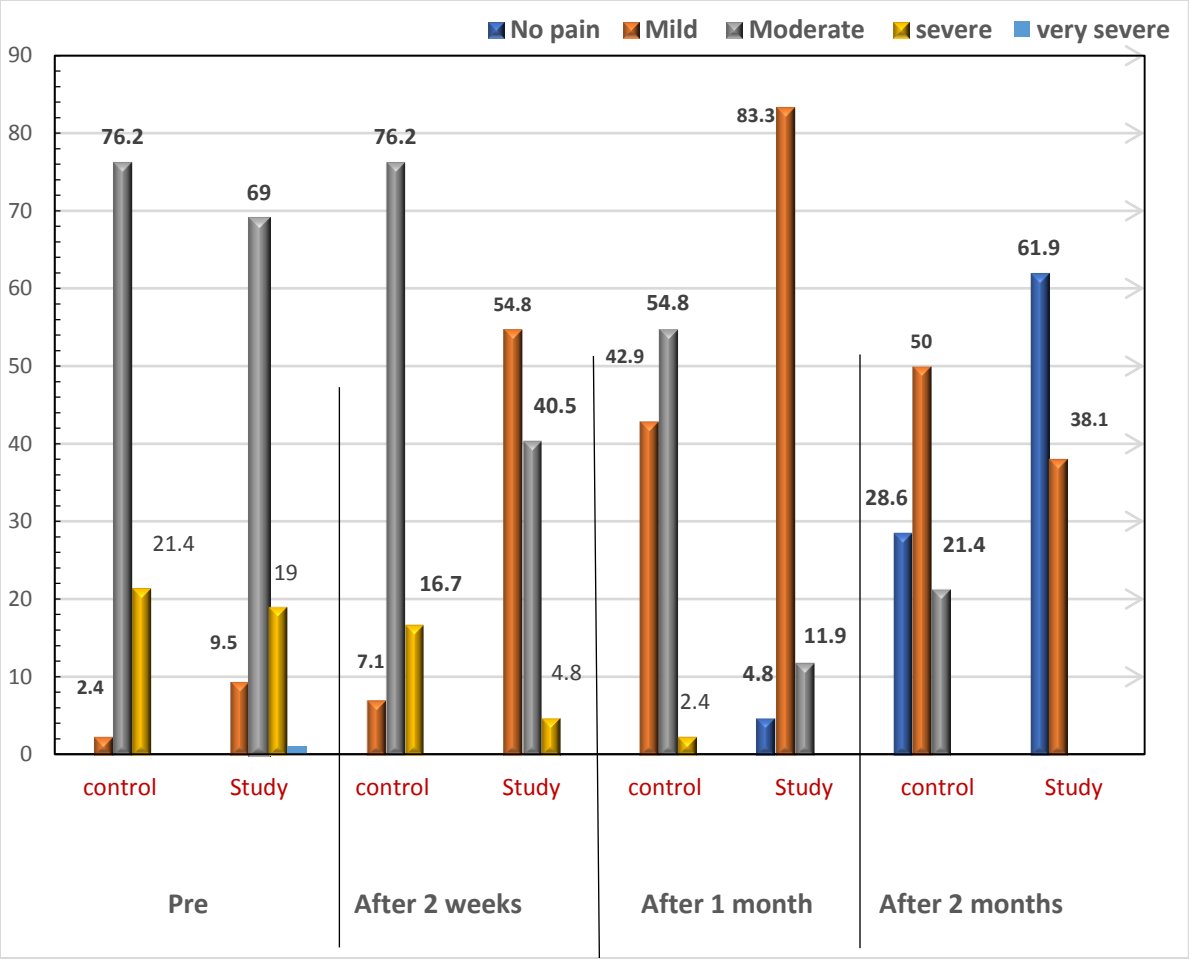

Figure (5): Pain level in control and study group before, after 2weeks, after one month and after 2 months of intervention

Discussion

Breast cancer-related lymphedema is a prevalent complication of breast cancer treatment and manifests as upper limb swelling. [28] It is a chronic condition that may lead to lifelong impairment of the affected upper extremity. [29] It has a significant negative impact on physiologic and psychological well-being. Moreover, greater restrictions on activity lead to poor quality of life (QOL) and make patients more prone to cellulitis. Lymphedema is incurable and progressive. [30]

Furthermore, persistent lymph stasis creates a condition of chronic inflammation that contributes to fibrosis and fatty deposition in the subcutis of the affected limb. Therefore, more attention should be paid to the management of BCRL in order to improve the patient's clinical outcomes and health-related quality of life. Topical cryotherapy is used as a new physical modality for the treatment of BCRL in order to decrease pain, inflammation, and edema. [31, 32] So, the current study investigated the effect of topical cryotherapy on the clinical outcomes of patients with breast cancer-related lymphedema.

Regarding demographic and medical data, the present study revealed that there was no statistically significant difference between the two groups regarding all items of baseline characteristics. This data emphasizes the strength of the study in eliminating the assignment bias of participants to groups by randomization.

Regarding the types of treatment received after mastectomy, the current study indicated that 50 % and 61.9% of patients received hormonal therapy postoperatively in the control and intervention groups, respectively. These findings are in agreement with **Refaat Elmaadawy et al., (2022)** [33] who found that 55% of women received hormonal therapy after mastectomy. These findings related to endocrine therapies are the main treatment strategies for the clinical management of hormone-dependent breast cancer, improve prognosis and decrease the risk of recurrence in patients with positive human epidermal growth factor receptor 2 (HER2) **(Alataki & Dowsett, 2022)**. [34]

In reference to the development of lymphedema, the present study revealed that, lymphedema developed in 33.3 % and 31% of patients after one year postoperatively in the control and intervention groups, respectively. These findings were consistent with **McDuff et al., (2019)** [35] who reported that, the risk of lymphedema peaked between 12–30 months postoperatively; however, the time course varied depending on the treatment received.

Regarding arm measurement, the present study showed that there were statistical differences between the control and study groups regarding different arm measurements after two weeks, after one month, and after two months post-intervention. These findings were supported by **Askary& Elshazly, (2022)** [14] who demonstrated that there was a significant decrease in thickness and circumferential limb difference at the wrist, below the elbow, and above the elbow in

intervention group compared with control group. In contrast, these findings disagree with **Hemmati, Rojhani-Shirazi, Zakeri, Akrami, & Salehi Dehno, (2022)** [36] who revealed that, changes in limb circumference at the end of the treatment were not significantly different at any measured point among the studied groups. From the researcher's point of view, this may be related to the measurement method used in the study, and aside from topical cryotherapy, combined therapies are required to produce a significant change in arm measurement.

In relation to signs of lymphedema, the current study revealed that there were statistical differences between the control and study groups regarding signs of lymphedema in terms of hotness and localized swelling after 2 weeks, after one month, and after 2 months of intervention, where most of the lymphedema signs disappeared after 2 months in the intervention group compared with the control group. These findings agree with **Askary& Elshazly, (2022)** [14] who reported that, skin cooling initially leads to local vasoconstriction, leading to decreasing redness, hotness, and edema. In addition to **Jan, (2019)** [37] who revealed that local cooling decreases interstitial fluid volume, inflammation, and fibrosis.

Concerning tissue firmness, the current study revealed a statistically significant difference between the control and intervention groups, and there was a significant improvement in the intervention group. These findings are in harmony with **Mayrovitz & Yzer, (2017)** [18] who demonstrated that topical surface cooling of lymphedematous and fibrotic regions led to a reduction in tissue hardness as judged by reduced local indentation forces.

As regards pain scores, the present study demonstrated statistically significant differences in pain score levels between the control and intervention groups, and there was a decrease in the mean pain score level at different times due to intervention. This agrees with **Mayrovitz& Yzer, (2017)** [18] who stated that skin cooling of the upper limb softens lymphedematous and fibrotic tissue by about 24% to 28%. This tissue softening leads to decreased pressure on the underlying nerve ending and decreased input to the sensory nerves that interrupt the pain cycle.

Conclusion

According to the findings of the current study, it can be concluded that topical cryotherapy is an effective complementary modality for the treatment of breast cancer-related lymphedema by improving the clinical outcomes of the affected patients. It was evident that cold therapy had led to significant improvements in lymphedema size, associated symptoms, and pain intensity scores.

Recommendations

- Including cryotherapy in physical therapy protocols for lymphedema rehabilitation.
- Developing an educational programs and guidelines for safe application of cryotherapy in clinical settings
- Developing educational programs for patients and nurses to enhance their

knowledge about topical cryotherapy as a modality for lymphedema management
- Perioperative education of patients regarding risk-reduction strategies as well as signs and symptoms of lymphedema
- Rigorous clinical trials are needed to address the effect of early detection and rehabilitation of lymphedema after breast cancer treatment.
- Randomized controlled trials with a larger sample size can be conducted to assess the long-term effects of topical cryotherapy on patients with BCRL.

Limitation of the study

The current study has some limitations. Firstly, the follow-up for patients was limited to two months, and the long-term effects needed 3-6 months follow up. Secondly, the study was carried out at one cancer center; so its findings cannot be generalized. Finally, there was a scarcity of evidence-based research on cryotherapy.

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Conflicts of interest

The authors declare that there was no conflict of interest regarding the study.

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