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Effect of Patient's Family Engagement in Nursing Care on Nurses' Perception and Patients' Clinical Outcome at Neurological Intensive Care Unit

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Abstract

Background: Family engagement means active partnerships between health care providers' families. Family engagement in ICU takes different forms depending on the needs of critically ill patients. IT can improve patients' clinical outcomes. **Aim:** Evaluate effect of patient's family engagement in nursing care on nurse's perception and patients' clinical outcome at Neurological Intensive Care Unit. **Subjects and Method:** Design: A quasi-experimental study was used at the Neurological Intensive Care Unit of Tanta University Hospital. **Subjects:** A convenience sample of all nurses working in previously setting and 60 adult critically ill patients in ICU. **Tools:** Three tools were developed by the researcher as follow. **Tool (I):** Patient's socio-demographic characteristics, and patients' clinical data. **Tool (II):** Nurses perception about family engagement. **Tool (III):** Clinical Outcome Measurement of Critically Ill Patient. **Results:** The family engagement protocol show an improvement in clinical patient condition which in study group there were significant differences regarding level of consciousness, physiological parameters monitoring and Richmond Agitation-Sedation Scale (RASS) with p level=0.012 respectively. The most of critical care nurses (72.5%) have high level of knowledge after family engagement protocol implementation. **Conclusions:** Application of protocol of family engagement had significance effectiveness on improvement of clinical outcome among critically ill patients. The nurses made an encouraging and positive outlook on the involvement of family. **Recommendations:** Create policies, protocols, and procedure for family engagement in ICUs, assessment tool to assess family readiness to be actively contributing to their patients' care and the aspects of care they can be engaged in should be available.

Keywords: Critically ill patients, Family engagement, Intensive Care Unit, Nurse's perception.

Introduction:

Critical illness and intensive care have a profound and traumatic impact on the health and well-being of patients and their loved ones. According to earlier studies, many critically ill patients in the intensive care unit (ICU) are kept apart from their family by pervasive, stringent visitation regulations, which may have a detrimental effect on their care and ability to recover (**Hayes, Harding, Blackwood, & Latour, 2024**). Admission of a patient to the ICU can be traumatic for both the patient and their family, and this stress may be heightened if the illness is severe, chronic, life-limiting, life-threatening, or involves resuscitation or death (**Schwartz et al., 2022**).

Due to their admission to the intensive care unit, critically ill patients need special attention and needs to be met. One of the basic needs of patients and families during hospitalization ICU is the presence of a family member beside the patient. Family participation in patient care is accepted in public wards, but unfortunately in ICUs due to the structure and restriction of visits in these wards, this issue faces

many challenges (**Ludmir & Netzer, 2019**).

An active collaboration between medical staff, patients, and their families is known as family engagement, and it can enhance patient safety and quality of treatment as well as individual health and wellness. The necessity of family involvement, especially in decision-making, is emphasized in the most recent family-centered care (FCC) guidelines. However, there is little evidence to support active family participation, where family members assist with direct patient care, to the best of our knowledge, no evaluation of active family involvement strategies has been carried out, despite the fact that involving families in the provision of care is encouraged across ICU populations and practice contexts (**Alexanian, Fraser, Smith, & Kitto, 2024**).

According to a research study conducted in Copenhagen in 2023 across 28 intensive care units, about one-third of the participating ICUs had a strategy for patient and family involvement. Approximately half of the ICUs engaged patients and families in the research process,

while only four ICUs reported engagement at the organizational level (**Oxenbøll Collet, Albertsen, & Egerod, 2024**).

Furthermore, an Alexandria University study demonstrated that the use of structured auditory and tactile stimulation by trained family members improved the level of consciousness in comatose patients with traumatic brain injury, reduced the incidence of physiological adverse events, and shortened the length of stay in the intensive care unit (**Ahmed, Attia, Mansour, & Megahed, 2023**). In a current review of family involvement interventions in adult ICUs, family engagement is described on a field moving from passive (eg, physical presence at the bedside and receiving and needs met) to more active activities (eg, sharing and getting information, involvement in decision-making, and making contributions to the care of the patient). The relevance of decision-making support in the intensive care unit, family presence, and communication with families are all supported by empirical data. (**Kaslow et al., 2022**).

The assertive and supportive roles of family members are especially crucial when patients are critically ill, as many patients are unable to make decisions or communicate on their own and have limited support.

As a result, patient-centered care should also be family-centered (**Doherty, Feder, Heyman, & Akgün, 2024**).

Offering appropriate care and support to family members and encouraging them to actively participate in the patient's care, can help them better address the patient's various needs and preferences (**Alam, Hannon, & Zimmermann, 2020**).

An important component of patient- and family-centered care that nurses can apply is involving the family in the patient's daily care. When suitable, family members can assist by giving massages, helping with full-body bathing, providing eye and oral care, and grooming the patient's hair. They may also take part in washing the patient's hair or face, as well as assist with procedures such as suctioning, enteral feeding, monitoring central venous pressure, and performing limb exercises (**Krajnc & Bercan, 2020**).

By supporting family involvement in patient care, the nurse fosters a sense of respect, support, and partnership between families and healthcare providers. Research has also shown that involving family members in care enhances emotional closeness, promotes patient safety and a sense of security, and helps maintain the patient's dignity (**Joo, Jang, & Kwon, 2024**). While the advantages

of family involvement generally surpass the disadvantages, there are challenges related to family participation during physician rounds. Potential risks include confusion from misunderstandings of the discussions, breaches of privacy and confidentiality, and difficulty addressing sensitive medical issues like inadequate home care, medical errors, or poor prognosis in front of family members (**Exposito, & Mara  n, 2021**).

Critical nurses are essential to ICU family care because they stay in close proximity to patients' families during their stay, offering them support, comfort, and information while also facilitating their presence and communication with the ICU staff. It is essential to determine what encourages and hinders nurses from interacting with ICU families. There are facilitators at the organizational, unit, and nursing culture levels as well as at the family adaption level. Systemic obstacles, moral dilemmas, family misery, and family exclusion are disruptors (**Dijkstra et al., 2023**).

Although ICU nurses are primarily responsible for facilitating families' daily contact with the ICU. In addition to their direct care responsibilities, critical care nurses also teach and assist family members

with various nursing procedures, such as enteral feeding, naso-oropharyngeal suctioning, measuring central venous pressure, and providing bed baths (**Cypress, Gharzeddin, Ransom, Villarente, & Pitman, 2024**).

Prior recognition and intervention studies to explore these family engagements in patient care concepts have been reported, but limited data exist about the scope and variability of family engagement and visitation policies and practices across the developing country (**Abdi et al., 2024**). Nurses in Egyptian intensive care units lack a clear understanding of the best practices for family engagement while taking patient safety into account because there are no explicit laws or regulations pertaining to the involvement of the family of critically ill patients in treatment. Critically ill patients receive round-the-clock care from the intensive care unit staff. This study will be carried out to increase planned family presence in the intensive care unit in order to improve clinical outcome among critically ill patients, as nurses' perceptions and attitudes on family engagement may have an impact on the implementation of the family involvement plan.

Subjects and Method

Research design:

A quasi- experimental design was utilized to conduct this study.

Setting:

The study was conducted at Neurological Intensive Care Unit at Tanta Main University Hospital affiliated to Ministry of Higher Education and Scientific Research. It was prepared with 2 wards each ward equipped with 8 beds; the total number of beds was 16.

Subjects:

All nurses employed in the aforementioned context as well as 60 adult patients from the previously described setting were selected. They will be split up into two equal groups, each of which will have thirty patients: Study group included thirty patients who received care from nurses and their families made up the study group. The control group included thirty patients who were just cared after by nursing staff. The sample was chosen based on the following criteria:

Inclusion criteria: Patients aged between 21 and 60 years. Both sexes. First class family member (Mother, father, sister, brother, and wife).

Tools of the study:

Three tools were utilized to collect patient data, which include the following:

Tool (I): Structural patient's Clinical Assessment Tool

It was consisted of two parts : **Part (A): Demographic characteristics of patients:** which included patient' code, age, sex.

Part (B): Patients' clinical data: - It included: current diagnosis, date of admission, previous admission to ICU, chief complaint and past medical and surgical history (**Gates, 2020**).

Tool (II): Nurses perception about family engagement

It was established by researcher after reviewing the up-to-date based on literature (**Hetland, Hickman, Mcandrew & Daly, 2017**), it consisted of two parts:

Part (A): Nurses' demographic characteristics: The demographic traits of the nurses encompassed their age, gender, relationship status, years of experience, and level of education.

Part (B) Nurses' perception about family engagement: This part was created by the investigator to evaluate how nurses view family involvement and to gather their responses. It included 20 items, such as:

Family engagement in care is supported, family involvement in the planning and delivery of care, family members can easily access the ICU whenever they wish, Restrictions on visiting hours and days, the presence of family members may increase the

risk of infection (Abd El Wareth, & Elcokany, 2019).

Scoring system:

All items included in the nurses' perception were measured using a five-point Likert scale as follows: 1- Strongly Disagree, 2- Disagree, 3- Neutral, 4- Agree, 5 - Strongly agree.

All of the Likert scale items were summed and were described as follow:

-Total score <60% was considered negative feedback.

-Total score $\geq 60\%$ was considered positive feedback.

Tool (III): Clinical Outcome Measurement of Critically Ill Patient:

It was comprised of three parts:

Part (A): Assessment of level of consciousness of patients by Glasgow coma scale:

The Glasgow Coma Scale (GCS) was developed by Bryan Jennett et al., (1974), adopted by Cook (2021); Teasdale et al. (2014), Glasgow Coma Scale (GCS) reflects the patient's overall level of consciousness, consists of three domains: Eye opening: scored from 1 to 4, verbal response: from 1 to 5, and motor response: from 1 to 6. These individual scores are summed to form a total GCS score ranging from 3 to 15.

Part (B): Physiological Parameters Monitoring.

This section was developed by the researcher after an extensive review of the related literature (Brennan, Whittingham, Sinha, & Teasdale, 2024), and it was included: Heart rate, rhythm, respiratory rate, CVP, systolic blood pressure, diastolic blood pressure, mean arterial pressure and SPO2.

Part (C): The level of agitation was assessed using the Richmond Agitation-Sedation Scale (RASS), which was developed by Sessler (2002) and later adopted by Namigar et al. (2017); Vasilevskis et al. (2016). The RASS is used to assess arousal levels and guide sedation therapy.

Scoring system:

The RASS is a 10-point scale ranging from -5 to +4.

- Levels of sedation from -1 to -5 (drowsy, light sedation, moderate sedation, deep sedation, unarousable).

- Levels of agitation from +1 to +4 (restless, agitated, very agitated, and combative).

-RASS level 0 is "alert and calm."

Method:

1. **An Official Permission** was obtained from the responsible authorities at the Faculty of Nursing, Tanta University to the director of the Neurological Intensive Care Unit

emergency hospital in Tanta University Hospital.

2. Ethical and legal consideration:

- a. Approval of Scientific Research Ethics Committee of the Faculty of Nursing under code number (127/11/22), and by the Ethics Committee of the Faculty of Medicine under code number (36103/11/22).
- b. Nature of the study didn't cause any harm or pain to the entire subjects.
- c. Informed consent was obtained from a family member after explaining the purpose of the study and the right to withdraw at any time. Consent was also obtained from nurses working in the Neurological Intensive Care Unit.
- d- Confidentiality and anonymity were preserved by assigning code numbers in place of names, and patients' privacy was respected throughout the data collection process.

3. Tool Development: Study Tools (I) and (II) were developed by the researcher following a review of relevant literature, while Tool (III), parts (A) and (C), were adapted from existing sources.

4. Tool validity: content validity of the developed tools was evaluated for clarity and applicability by seven experts in critical care nursing and biostatistics to ensure their accuracy,

and necessary modifications were made accordingly.

5. A pilot study: A pilot study was performed on 10% of the patients and nurses to assess the possibility and applicability of tools, as well as to identify any potential challenges might arise through data collection. Based on the findings, necessary modifications were made.

6. Reliability of the tool: was done on developed tools by Cronbach's alpha test

- Reliability of Glasco coma scale for conscious level assessment and RASS for sedation level assessment score was 0.96”95% confidence intervals (CI 0.92 - 1.0)”

-The reliability of the developed Tool III, Part (B), was assessed using Cronbach's alpha: is 0.878, indicating a high level of internal consistency.

7. Duration of study: Data was gathered over an eight-month timeframe, spanning from August 2023 to March 2024.

-The present research was conducted in four stages: evaluation, strategy development, execution, and assessment, as detailed below.

1. Assessment phase: the researcher assesses patients in both control and study group by using Tool (I) and Tool (III) on the first day of admission.

Nurses' assessment: The assessment of nurses in the ICU was conducted by the researcher using Tool (II) to evaluate their family involvement perceptions in patient care within the ICU.

2-Planning stage: Developing the material for involving families in patient treatment in the ICU: The researcher will create the material rooted in an analysis of existing literature (Carew, Redley, & Bloomer, 2024) to align with the specific objectives mentioned above. An illustrated, structured booklet will be created to support this content.

-Before beginning of this protocol and family entered to ICU, the informed consent included explanations regarding voluntary participation, by using a power-point presentation and a simple booklet and about which demonstrate brief data about what is ICU, its shape, devices, the ICU equipment, methods of the infection control, the mechanism of any probable complaint, how to participate with nursing care procedures for patient.

-In the intervention group, the first class member Family (father, mother, wife, sister, brother) based on after The strongest and most emotional relationship with the patient will be chosen.

-Before entering into the unit, the researcher communicated to the family members that it was essential for them to adhere to the unit's regulations and to respect the privacy of other patients, ensuring they did not interfere with the nursing care while visiting their relative. To avoid overcrowding in the ICU, family members were allowed to enter the unit in rotation, with prior approval from the charge nurse. For ethical reasons, other visitors adhered to the standard visiting policy. Additionally, families of patients who were not eligible for the study were given the opportunity to visit their loved ones at a separate time, ensuring the environment remained controlled.

3. Implementation phase: The implementation phase involved the planned presence of a chosen family member who met the inclusion criteria, with their participation occurring from the first day of ICU admission for duration of 3 days. The selected family members were allowed to visit the ICU twice daily (at 10 a.m. in the morning and 3 p.m. during the evening shift), each visit lasting 15 minutes. After coordinating with the nurse in charge, they were permitted to enter the ICU to provide emotional support to their loved ones, including physical contact during

specific critical procedures such activities include suctioning, assessing central venous pressure, and engaging in fundamental care responsibilities such as changing dressings, cleansing the face, styling hair, cleaning teeth, providing oral and enteral nutrition, along with supporting the patient throughout procedures and assessments. Moreover, family members were given the chance to engage with the nursing team, inquire about the patient's health status, and acquire additional knowledge to enhance their understanding and assurance in their involvement.

4. Evaluation phase: Was done with tool I, II for both control and study group in first, second and third day to compare between the two studied groups.

-Nurses perception was evaluated before and at the end of the study by using tool II.

Results

Table (1) illustrates how the patients involved in the study are distributed according to their demographic characteristics. It was observed that more than two-fifths (43.33%) of the patients in the control group, compared to nearly one-third (33.33%) in the study group, were in the age range of 30-50 years. The mean age for the control group was 41.83 ± 8.313

years, while for the study group, it was 41.47 ± 8.733 years. Additionally, nearly two-thirds (63.33%) of the control group were male, compared to just over half (53.33%) in the study group respectively.

Table (2) shows how the patients involved in the study are categorized according to their clinical data. Regarding the current diagnosis, it was discovered that over one-third (36.67%) of individuals in the control group experienced a hemorrhagic stroke, while 33.34% of those in the study group were similarly affected. Regarding past medical history, the most common comorbid condition was neurological diseases, affecting 26.67% of patients in the control group and 30.00% in the study group. The results also indicated that 43.33% of patients in the control group and 53.33% in the study group had no past surgical history respectively.

Table (3) illustrates how the patients are categorized in the Neurological Intensive Care Unit according to their consciousness levels. It was revealed that there were no significant differences in control group as regards eye opening, motor response and verbal response. On the other hand, in the study group there were significant

differences regarding to eye opening at the 3rd day, motor response at the 2nd day and verbal response at the 2nd and 3rd day with P level less than 0.05 respectively.

Table (4) presents the mean scores of physiological parameters. It was originated that there were significant changes in the physiological parameters between the study and control groups throughout the study period, with a p-value of less than 0.05.

Table (5) displays how the patients in the study were categorized based on their scores on the Richmond Agitation-Sedation Scale (RASS) during the different phases of the research. The findings revealed that over seventy percent (70.00%) of the control group were unarousable upon admission, while by the third day, nearly one-third (33.3%) had reached deep sedation. In contrast, over half (60.00%) of the study group were unarousable upon admission, but by the third day, nearly one-quarter (23.33%) of the patients had become alert and calm. Additionally, significant differences were observed between two groups regarding their RASS scores on the third day, with a p-value of 0.012*.

Table (6) Distribution of the studied nurses regarding their socio-demographic characteristics. The results revealed that nearly half

(42%) of the nurses were aged between 21 and 30 years, with a mean age of 35.10 ± 8.752 years. Regarding gender, 60% of the nurses were female. In relation to marital status, nearly half (47.5%) of the nurses were married. Concerning education, about half (50%) of the nurses held a nursing bachelor's degree, while less than half (27.5%) had a nursing technician diploma. Regarding their years of experience in the neurological care unit, approximately one-third (32%) of the nurses in the study group had worked in the neurological intensive care unit for 5-10 years, with a mean $\pm$ SD of years of experience of 11.84 ± 8.34 years.

Table (7) displays distribution of the studied nurses regarding their knowledge about family engagement in nursing care pre and post implementation. In relation to the family engagement protocol following a three-day intervention, The findings revealed notable statistical differences in the nurses' understanding pertaining to the concept of family, the significance of involving family in the ICU for both patients and nursing staff, along with the fundamentals, dimensions, levels, and obstacles related to family participation in the ICU, with a p-value of 0.000 after the family

engagement protocol was implemented.

Table (8) Distribution of the studied nurses regarding their total knowledge level about family engagement in nursing care pre and post implementation. The results revealed that a minority (5%) of the nurses had a high level of knowledge prior to the implementation of the family engagement protocol, compared to nearly three-quarters (72.5%) of nurses accomplishing a high level of knowledge after implementation of the protocols.

Table (9) Distribution of the studied nurses regarding their perception level about family engagement in nursing care pre and post implementation. The results indicated that 10% of the nurses had a positive perception prior to the family engagement protocol, whereas 92% of the nurses had a positive perception after its implementation, with a p-value of 0.005.

Table (1): Illustrates how the patients involved in the study are distributed according to their demographic characteristics.

Characteristics	The studied patients (n=60)				χ^2 P
	Control group (n=30)		Study group (n=30)		
	No	%	No	%	
Age (in years)					1.341 0.720
(21-<30)	4	13.33	4	13.33	
(30-<40)	7	23.33	10	33.33	
(40-<50)	13	43.33	9	30.00	
(50-60)	6	20.00	7	23.33	
Range	(25-56)		(22-53)		t=0.028
Mean $\pm$ SD	41.83 $\pm$ 8.313		41.47 $\pm$ 8.733		P=0.868
Gender					
Male	19	63.33	16	53.33	FE
Female	11	36.67	14	46.67	0.601

Table (2): Shows how the patients involved in the study are categorized according to their clinical data

Clinical data	The studied patients (n=60)				χ^2 P
	Control group (n=30)		Study group (n=30)		
	No	%	No	%	
Current diagnosis					9.408 0.152
Hemorrhage stroke	11	36.67	9	30.00	
Ischemic stroke	10	33.34	11	36.66	
Gullian baree syndrom	3	10.00	3	10.00	
Mythenia gravies	3	10.00	4	13.33	
Seziure	3	10.00	3	10.00	
Previous hospitalization					FE 0.792
Yes	11	36.67	13	43.33	
No	19	63.33	17	56.67	
Past medical history					3.368 0.849
None	7	23.33	8	26.67	
Respiratorydiseases	2	6.67	2	6.67	
Heart diseases	4	13.33	4	13.33	
Renal diseases	1	3.33	1	3.33	
Hepatic failure	2	6.67	0	0.00	
Neurological diseases	8	26.67	9	30.00	
Diabetic	4	13.33	3	10.00	
Cancer	2	6.67	3	10.00	
Past surgical history					0.670 0.880
None	13	43.33	16	53.33	
Heart surgery	3	10.00	2	6.67	
Vascular surgery	6	20.00	5	16.67	
Abdominal surgery	8	26.67	7	23.33	

Table (3): Illustrates how the patients are categorized in the Neurological Intensive Care Unit according to their consciousness levels

Total consciousness level	The studied patients (n=60)																							
	Control group (n=30)												Study group (n=30)											
	1 st day				2 nd day				3 rd day				1 st day				2 nd day				3 rd day			
	Pre		Post		Pre		Post		Pre		Post		Pre		Post		Pre		Post		Pre		Post	
	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
Unconscious	25	83.3	25	83.3	25	83.3	21	70.0	21	70.0	20	66.7	26	86.7	26	86.7	28	93.3	10	33.3	10	33.3	1	3.33
Semiconscious	5	16.7	5	16.7	5	16.7	9	30.0	9	30.0	10	33.3	4	13.3	4	13.3	2	6.7	20	66.7	20	66.7	23	76.67
Full conscious	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	6	20.00
χ^2 , P	FE , 1.00				FE , 0.360				FE , 1.00				FE , 1.00				FE , 0.000*				17.074 , 0.000*			
Range Mean ± SD	(3-9) 6.13±2.129		(3-9) 6.17±2.151		(3-9) 6.10±2.187		(3-10) 6.47±2.403		(3-11) 6.57±2.515		(3-11) 6.67±2.604		(4-9) 6.77±1.406		(4-9) 6.90±1.296		(4-9) 7.07±1.015		(6-11) 8.83±1.234		(6-11) 8.83±1.416		(7-14) 11.07±1.574	
t , P	0.004 , 0.952				0.382 , 0.539				0.023 , 0.880				0.146 , 0.704				36.678 , 0.000*				33.371 , 0.000*			

(3-8) unconscious

(9-12) semiconscious

(13-15) full conscious

FE: Fisher' Exact test

* Significant at level P<0.05

Table (4): Mean scores of physiological parameters monitoring of the studied patients.

Physiological Parameters Monitoring	The Studied Patients (n=60)	Range Mean $\pm$ SD								
		1 st day		T P	2 nd day		t p	3 rd Day		T P
		Pre	Post		Pre	Post		Pre	Post	
Heart rate (B/m)	Control group	(56-144) 86.20 $\pm$ 29.972	(56-144) 86.27 $\pm$ 29.914	0.00 0.993	(56-144) 86.87 $\pm$ 29.752	(56-144) 87.07 $\pm$ 30.157	0.001 0.979	(56-140) 86.53 $\pm$ 28.863	(56-140) 85.27 $\pm$ 27.983	0.030 0.864
	Study group	(78-140) 99.03 $\pm$ 20.200	(76-125) 92.57 $\pm$ 16.068	1.883 0.175	(70-136) 93.40 $\pm$ 17.789	(60-120) 88.60 $\pm$ 12.683	1.448 0.234	(76-100) 89.23 $\pm$ 7.691	(60-100) 82.50 $\pm$ 10.843	7.697 0.007*
Respiratory rate (C/m)	Control group	(10-80) 19.87 $\pm$ 13.214	(10-80) 19.87 $\pm$ 13.214	0.00 1.00	(10-36) 18.20 $\pm$ 7.053	(10-36) 18.40 $\pm$ 7.054	0.012 0.913	(10-34) 18.33 $\pm$ 6.890	(10-34) 18.47 $\pm$ 6.658	0.006 0.940
	Study group	(14-26) 19.13 $\pm$ 3.665	(14-26) 18.87 $\pm$ 3.037	0.094 0.760	(14-24) 18.33 $\pm$ 2.454	(14-21) 17.70 $\pm$ 1.822	1.288 0.261	(14-20) 17.03 $\pm$ 1.691	(12-22) 15.63 $\pm$ 2.141	7.897 0.006*
Blood pressure (mmHg) Systolic pressure	Control group	(90-190) 126.40 $\pm$ 36.15 4	(90-190) 126.40 $\pm$ 36.15 4	0.00 1.00	(90-190) 126.27 $\pm$ 34.69 6	(90-190) 127.10 $\pm$ 34.39 2	0.009 0.926	(90-190) 126.97 $\pm$ 34.22 7	(90-190) 126.93 $\pm$ 34.59 6	0.00 0.997
	Study group	(110-180) 141.17 $\pm$ 23.62 4	(120-180) 134.90 $\pm$ 22.04 5	0.743 0.392	(110-180) 135.87 $\pm$ 18.63 8	(110-170) 130.83 $\pm$ 13.83 9	1.410 0.240	(110-165) 128.00 $\pm$ 11.11 1	(100-150) 112.67 $\pm$ 13.62 9	22.812 0.000*
Diastolic pressure	Control group	(60-160) 78.97 $\pm$ 22.304	(60-100) 76.90 $\pm$ 16.340	0.168 0.684	(60-100) 77.03 $\pm$ 16.323	(60-100) 77.30 $\pm$ 16.337	0.004 0.950	(60-100) 76.93 $\pm$ 14.605	(60-100) 76.67 $\pm$ 14.826	0.005 0.944
	Study group	(60-90) 79.67 $\pm$ 12.172	(60-90) 78.83 $\pm$ 11.940	0.072 0.790	(65-95) 79.17 $\pm$ 9.567	(65-95) 74.00 $\pm$ 7.701	5.309 0.025*	(60-95) 71.67 $\pm$ 8.938	(60-80) 66.50 $\pm$ 8.110	5.498 0.022*

* Significant at level P<0.05

Continue Table (4): Mean scores of physiological parameters monitoring of the studied patients.

Physiological Parameters Monitoring	The Studied Patients (n=60)	Range Mean $\pm$ SD								
		1 st day		T P	2 nd day		t p	3 rd Day		T P
		Pre	Post		Pre	Post		Pre	Post	
MAP	Control group	(75-155) 102.68 $\pm$ 27.48 0	(75-145) 101.65 $\pm$ 25.82 2	0.023 0.881	(75-145) 101.65 $\pm$ 25.07 5	(75-145) 102.20 $\pm$ 24.89 9	0.007 0.932	(78-145) 101.95 $\pm$ 23.52 3	(77-145) 101.80 $\pm$ 23.85 6	0.001 0.981
	Study group	(36-130) 108.61 $\pm$ 18.75 4	(36-125) 106.86 $\pm$ 17.80 5	0.137 0.712	(87.5-130) 107.51 $\pm$ 10.05 2	(90-120) 102.41 $\pm$ 7.146	5.130 0.027*	(90-112.5) 99.83 $\pm$ 5.906	(80-105) 89.58 $\pm$ 7.164	36.559 0.000*
SPO ₂	Control group	(76-96) 83.27 $\pm$ 5.065	(76-98) 85.60 $\pm$ 7.005	2.186 0.145	(76-96) 84.27 $\pm$ 5.199	(76-97) 87.00 $\pm$ 6.390	3.303 0.074	(76-96) 85.53 $\pm$ 5.393	(76-100) 88.13 $\pm$ 7.886	2.222 0.141
	Study group	(80-98) 83.93 $\pm$ 5.099	(76-98) 84.33 $\pm$ 7.019	0.064 0.802	(76-96) 84.17 $\pm$ 5.253	(76-97) 91.50 $\pm$ 6.902	21.445 0.000*	(76-97) 88.70 $\pm$ 5.961	(76-100) 95.20 $\pm$ 6.692	15.782 0.000*
Central venous pressure (mmhg)	Control group	(6-26) 13.87 $\pm$ 7.036	(6-26) 13.73 $\pm$ 7.090	0.005 0.942	(6-26) 14.00 $\pm$ 7.017	(6-26) 13.60 $\pm$ 6.886	0.050 0.824	(6-28) 13.87 $\pm$ 7.094	(6-28) 13.73 $\pm$ 7.148	0.005 0.942
	Study group	(6-22) 14.40 $\pm$ 5.456	(6-20) 14.13 $\pm$ 5.151	0.038 0.846	(6-20) 13.47 $\pm$ 4.74	(8-20) 12.43 $\pm$ 3.812	0.866 0.356	(7-16) 11.47 $\pm$ 2.417	(6-14) 10.53 $\pm$ 2.27	2.376 0.129

Table (5): Distribution of the studied patients regarding Richmond Agitation-Sedation Scale (RASS).

Total RASS Level	The studied patients (n=60)																					
	Control group (n=30)											Study group (n=30)										
	1 st day		2 nd day		3 rd day		1 st day		2 nd day		3 rd day		1 st day		2 nd day		3 rd day		1 st day		2 nd day	
	Pre		Post		Pre		Post		Pre		Post		Pre		Post		Pre		Post		Pre	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Alert and calm	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	7	23.33
Drowsy	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	3.33	0	0.00	0	0.00	0	0.00	3	10.00	7	23.33
Light sedation	0	0.00	0	0.00	0	0.00	1	3.33	2	6.67	3	10.00	0	0.00	0	0.00	2	6.67	2	6.67	11	36.67
Moderate sedation	2	6.67	2	6.67	1	3.33	3	10.00	4	13.33	2	6.67	1	3.33	2	6.67	3	10.00	15	50.00	7	23.33
Deep sedation	7	23.33	7	23.33	7	23.33	12	40.00	10	33.33	10	33.33	11	36.67	10	33.33	17	56.67	9	30.00	4	13.33
Unarousable	21	70.00	21	70.00	22	73.33	14	46.67	14	46.67	14	46.67	18	60.00	18	60.00	8	26.67	1	3.33	1	3.33
χ^2 , P	0.00 , 1.00		5.557 , 0.135		2.267 , 0.687		0.387 , 0.824		21.592 , 0.000*		14.591 , 0.012*											
Range	(8-10)		(8-10)		(8-10)		(7-10)		(7-10)		(6-10)		(8-10)		(8-10)		(7-10)		(6-10)		(6-10)	
Mean $\pm$ SD	9.63 $\pm$ 0.615		9.63 $\pm$ 0.615		9.70 $\pm$ 0.535		9.30 $\pm$ 0.794		9.20 $\pm$ 0.925		9.10 $\pm$ 1.125		9.57 $\pm$ 0.568		9.53 $\pm$ 0.629		9.03 $\pm$ 0.809		8.10 $\pm$ 0.96		7.37 $\pm$ 1.098	
t, P	0.00 , 1.00		5.233 , 0.026		0.141 , 0.708		0.046 , 0.830		16.596 , 0.000*		4.652 , 0.035*											

(3-8) Severe

(9-12) Moderate

(13-15) Mild

* Significant at level P<0.

Table (6): Distribution of the studied nurses regarding their socio-demographic characteristics

Characteristics	The studied nurses (n=40)	
	No	%
Age (in years)		
(21-<30)	17	42.5
(30-<40)	11	27.5
(40-<50)	7	17.5
(50-60)	5	12.5
Range	(24-56)	
Mean $\pm$ SD	35.10$\pm$8.752	
Gender		
Male	16	40.0
Female	24	60.0
Marital status		
Single	15	37.5
Married	19	47.5
Divorced	2	5.0
Widow	4	10.0
Level of education		
Diplom	5	12.5
Institute of nursing	11	27.5
Bachelor of nursing	20	50.0
Post studies	4	10.0
Work experience (in years)		
(<5)	8	20.0
(5-<10)	13	32.5
(10-<15)	9	22.5
(15-<20)	3	7.5
($\geq$ 20)	7	17.5
Range	(0.5-30)	
Mean $\pm$ SD	11.84$\pm$8.34	

Table (7): Distribution of the studied nurses regarding their knowledge about family engagement in nursing care pre and post implementation

Items	The studied nurses (n=40)								FE P-value
	Pre				Post				
	Incorrect		Correct		Incorrect		Correct		
	No	%	No	%	No	%	No	%	
Definition of family engagement in ICU	35	87.5	5	12.5	7	17.5	33	82.5	0.000*
Importance of family engagement in ICU for patients	35	87.5	5	12.5	7	17.5	33	82.5	0.000*
Importance of family engagement in ICU for nurses	34	85.0	6	15.0	5	12.5	35	87.5	0.000*
Importance of family engagement in ICU for family	34	85.0	6	15.0	5	12.5	35	87.5	0.000*
Principles of family engagement in ICU	35	87.5	5	12.5	3	7.5	37	92.5	0.000*
Level of family engagement in ICU	36	90.0	4	10.0	7	17.5	33	82.5	0.000*
Criteria of family member engaged in patient care	29	72.5	11	27.5	3	7.5	37	92.5	0.000*
Aspect of family engagement in ICU	33	82.5	7	17.5	7	17.5	33	82.5	0.000*
Barriers of family engagement related to ICU	32	80.0	8	20.0	9	22.5	31	77.5	0.000*
Barriers of family engagement related to nurses	29	72.5	11	27.5	6	15.0	34	85.0	0.000*
Barriers of family engagement related to patients	31	77.5	9	22.5	13	32.5	27	67.5	0.000*

FE: Fisher' Exact test

* Significant at level $P < 0.05$ **Table (8): Distribution of the studied nurses regarding their total knowledge level about family engagement in nursing care pre and post implementation.**

Total Knowledge Level	The studied nurses (n=40)				χ^2 P
	Pre		Post		
	No	%	No	%	
Low	36	90.0	1	2.5	101.51 0.000*
Moderate	2	5.0	10	25.0	
High	2	5.0	29	72.5	
Range	(0-6)		(6-11)		t=56.91
Mean ± SD	1.90±1.614		9.20±1.265		P=0.000*

<60% Low

(60-80) % Moderate

>80% High

* Significant at level $P < 0.05$

Table (9): Distribution of the studied nurses regarding their perception level about family engagement in nursing care pre and post implementation

Total perception level	The studied nurses (n=40)				χ^2 P
	Pre		Post		
	No	%	No	%	
Negative attitude	36	90.0	3	7.5	FE 0.000*
Positive attitude	4	10.0	37	92.5	
Range	(34-59)		(64-80)		t=62.63
Mean ± SD	46.00±5.634		73.03±3.886		P=0.000

* Significant at level $P < 0.05$

Discussion

Regarding age, it was observed that more than two-fifth of the patients in the control group, compared to nearly one-third in the study group, were in 30-50 years old, with mean ages of 41.83 ± 8.313 and 41.47 ± 8.733 years, respectively. It may be contributed that age in a non-modifiable risk factor for chronic diseases. This observation aligns with the research conducted by **Al Mamun, Sheikh, Rahman, Wadud, & Iffat (2023)**, who investigated the role of intraventricular hemorrhage extension as a strong predictor of mortality in hemorrhagic stroke. They found that approximately half of the patients in their study were aged between 40 and 50 years.

Concerning gender, it was noted that two third of the control group consisted of males, whereas slightly more than half of the individuals in the study group were male. This could be linked to the reality that men face a greater

risk of experiencing a stroke than women, possibly due to elements like occupational stress, tobacco use, and various lifestyle decisions. This finding is consistent with the study by **Rexrode, Madsen, Carcel, Lichtman, and Miller (2022)**, which explored the impact of sex on stroke, revealing that two-thirds of their studied groups were male. Similarly, the result agreed with the research by **Elsaid, El-Seidy, Bahnasy, and Belal (2024)**, who studied posterior circulation strokes and found that the largest proportion of participants were male.

Concerning medical diagnosis, the findings indicated that most individuals in both the control and experimental group were identified as having either a hemorrhagic or ischemic infarction. This may be indicated that patients in neuro-intensive care units may have distinct characteristics as sensory stimuli exposure can increase the risk

of sensory deprivation, requiring additional care and support from close family members. This helps create a supportive and familiar environment that promotes the patient's peace and comfort. This result was agreed with **Qaryouti and Greene (2023)**, this finding is supported by a study that examined neurocritical care aspects of ischemic stroke management, which described that the majority of the studied group were diagnosed with stroke. This agrees with the current results, highlighting the prevalence of both hemorrhagic and ischemic stroke among critically ill patients in intensive care settings.

Concerning medical history, it was noted that neurological disorders ranked as the prevalent additional health issue among individuals in both the experimental and control cohorts. This could be attributed to the considerable impact hypertension has on the configuration of cerebral blood vessels, which elevates the likelihood of stroke occurrence. This finding was corroborated by **Turana and colleagues in 2021**, who examined the relationship between hypertension and stroke in Asia, highlighting that hypertension was frequently identified as the primary factor leading to stroke.

Concerning the level of consciousness, the results of this study discovered no significant differences within the control group in terms of eye

opening, motor response, and verbal response throughout the study period. In contrast, significant improvements were observed in the study group: specifically, eye opening showed a significant difference on the third day, motor response on the second day, and verbal response on both the second and third days.

These findings were agreed with **Mohammadi and Yeganeh (2019)**, who investigated the effects of familiar voices on the level of consciousness among comatose patients; they reported that patients who were exposed to familiar voices and received care from familiar individuals showed noticeable improvements in consciousness levels. This improvement may be attributed to the brain's neuroplasticity its ability to form new neural connections and bypass damaged areas which is stimulated by repeated environmental input. Emotional and affective stimulation especially from family members can activate the reticular activating system, leading to the increased release of norepinephrine, which enhances arousal and consciousness.

These findings are further supported by studies from **Cheng et al. (2018)**; **Zhu et al. (2019)**, who observed statistically significant improvements in the level of consciousness in patients receiving family-centered auditory and tactile

stimulation. Improvements were noted as early as the first day and continued through the third day of the intervention. Similarly, **Sedghi and Ghaljeh (2020)** emphasized the direct impact of family involvement in sensory stimulation, as demonstrated by the significant differences in consciousness levels between intervention and control groups.

Concerning physiological parameters, the current study exposed fluctuations in the improvement and stability of respiratory rate, heart rate, systolic and diastolic blood pressure, mean arterial pressure, SpO₂, and central venous pressure among patients in the intervention group, compared to those in the control group over the course of 3 days. The stability of these physiological parameters within normal ranges may be attributed to the balancing effects of family-engaged sensory stimulation on both the sympathetic and parasympathetic nervous systems. From the researcher's perspective, interactions between conscious patients and their family members reduce sympathetic nervous system activity, decrease stress, and, as a result, may lead to positive hemodynamic changes. This was in line with **Yekefallah, Aghae, Azimian, Heidari, and Hasandoost (2018)**, who studied the effect of hand tactile stimulation on the vital signs of brain injury patients, reported a

positive impact, specifically noting a decrease in heart rate and blood pressure in patients with brain trauma.

More ever this finding agrees with **Sosnowski, et al. (2023)**, the research examining the influence of the ABCDE/ABCDEF combination on delirium, functional results, and life quality for severely ill individuals indicated that the adoption of the ABCDEF combination resulted in notable enhancements in the clinical results of the patients.

Regarding mean score of heart rate, the present research revealed an enhancement in the average heart rate measurement for the experimental group in contrast to the control group on day three. Our results suggest that this enhancement might be associated with the treatments administered.

This result is also in line with the findings of **Goldfarb, Bibas, and Burns (2020)**, whose study on patient and family engagement in care within the cardiac intensive care unit reported a significant improvement in the mean heart rate scores of patients in the intervention group. Their findings further support the positive impact of family involvement on physiological and neurological outcomes in critically ill patients.

Concerning systolic, diastolic, and mean arterial pressure, the current study showed that systolic, diastolic and mean arterial pressure decreased

statistically significantly in study group. This finding was agreed with **Park and Giap (2020)** who conducted study about patient and family engagement as a potential approach for improving patient safety. This finding aligns with the results of **Park and Giap (2020)**, who explored patient and family engagement as a strategy to enhance patient safety, reporting improvements in physiological outcomes associated with increased family involvement. Similarly, the results are consistent with the study by **Nagm Eldean, Khalaf, and Bakri (2024)**, who examined the effects of implementing the ICU liberation bundle on outcomes for critically ill patients. They found that the mean values of hemodynamic parameters showed significant improvement within six days of hospital stay, reinforcing the positive influence of structured interventions and family-centered care on patient stability.

Regarding O2 saturation, present study showed a significant decrease in the mean O2 saturation levels among the control group, while patients in the study group showed a significant improvement. This result aligns with the research conducted by **Yousefi, Naderi, and Daryabeigi in 2015**, explored how sensory input from family could influence arterial oxygen levels in patients facing severe health issues. Their research revealed that the

levels of SpO2 were notably elevated in agitated patients on mechanical ventilation who experienced touch massage in comparison to those who did not receive such treatment in the control group.

On the other hand, this finding disagrees with **Uysal and Vaizoğlu (2023)**, who studied the effect of video calls with family members on physiological parameters of critically ill patients in the intensive care unit, they reported that while video calls influenced Pulse rate (PR), respiratory rate (RR), and Glasgow Coma Scale (GCS) ratings did not have a meaningful impact on blood pressure (BP) and oxygen saturation (SpO2).

Concerning Richmond Agitation-Sedation Scale (RASS), the current study showed that the percentage of calm and alert patient increased among the study group nearly to quarter of patient versus only small percentage in control group at 3th day post intervention. This finding is consistent with **Devlin, Skrobik, and Gélinas (2018)**, who studied clinical practice guidelines for the prevention and management of pain, agitation/sedation, delirium, immobility, and sleep disruption in adult ICU patients, found that the majority of patients in both groups were unarousable according to the RASS score.

This finding also agrees with **Reznik and Daiello (2020)**, who studied fluctuations of consciousness after stroke and their association with the confusion assessment method for the intensive care unit, reported that they the majority of patients in both groups were unarousable according to the RASS score by the end of the study period.

Regarding the age of the studied nurses, the results showed that nearly half of them were between 21 and 30 years old, with a mean age of 35.10 ± 8.75 years.

This finding may be attributed that the majority of the studied nurses were newly graduated. This result is consistent with **Helwan et al. (2019)**, who, in their study titled “assess nursing performance during implementation of care bundle for critically ill patients,” found that the mean age of the nurses was 29.32 ± 6.77 years, with ages ranging mostly between 20 and 35 years.

Regarding the gender of the nurses observed in the study, it was clear that most of them were women. This observation aligns with the findings of **Erbay Dalli et al. (2023)**, who studied “practices of the ABCDEF care bundle in intensive care units as reported by nurses,” which also revealed that most of the participating nurses were female.

In terms of the academic qualifications of the nurses

examined, the present research indicated that over fifty percent possessed a bachelor degree. This may be attributed to the increasing enrollment in faculties of nursing in recent years, possibly influenced by the growing emphasis on implementing family engagement protocols in ICUs. This finding is supported by **Bozkurt, Duzkaya, and Oren (2021)**, who conducted a study about “opinions of intensive care nurses about family-centered care in turkey,” and found that the majority of nurses surveyed held a bachelor’s degree.

Concerning the years of expertise within the neurological care unit, it was noted that nearly one-third of the participants in the study had spent between 5 to 10 years in the neurological intensive care unit. This finding aligned with **Berchtenbreiter, Innes, Watterson, Nickson& Wong, (2024)** who studied Intensive care unit nurses’ perceptions of debriefing after critical incidents reported that more than half of studied nurses have 5-10 years of experiences at intensive care unit .this study is contraindicated with **Helwan et al. (2019)** who found that nearly one quarter had more than 10years of clinical experience. Also, the present study revealed that all of the studied nurses did not receive any training sessions about family engagement in ICU may be due to

nurses' disability to attend training courses because of work over load.

The current results revealed that only a minority of the studied nurses had a high level of knowledge before the implementation of the family engagement protocol. In contrast, nearly three-quarters of the nurses demonstrated a high level of knowledge following the implementation. This indicates a marked improvement in knowledge levels as a result of the protocol intervention.

The current result is in accordance with **Liang et al. (2016)**, who demonstrated in their study "The ABCDEF Bundle: A Survey of Nurses' Knowledge and Attitudes in the Intensive Care Units" that the majority of the participating nurses reported being aware of the bundle. Their findings support the idea that structured educational interventions, such as protocol implementation, can significantly enhance nurses' knowledge and awareness in critical care settings.

Regarding nurses' perception of family engagement in nursing care before and after implementation of the protocol, the results highlighted the majority of the nurses that were examined had an optimistic view after the implementation. From the researcher's perspective, nurses demonstrated a favorable attitude toward family presence, expressing that

families could help calm patients through conversation and that many believed sedated patients could still hear their loved ones. Although most nurses acknowledged only minimal family involvement in direct care tasks, they recognized the psychological and spiritual support provided by families as valuable to patients. Specifically, this study showed that nurses viewed family involvement as a source of emotional reassurance and comfort for critically ill patients.

This finding similar with **Juba, Olumide, and Azeez (2024)**, who conducted a study on the influence of family involvement on the quality of care for aged adults. They reported that ICU nurses had a positive attitude toward family participation in routine care, including tasks such as oral care, body massage, lotion application, and assistance with bed-bathing, highlighting the beneficial role of families in supporting both emotional and physical aspects of care.

In contrast, **McConnell and Moroney (2015)** reported that many nurses identified negative aspects of family engagement in ICU care. Concerns included increased infection risk, restricted workspace, heightened stress among healthcare staff, and added workload. The literature also reflects that family presence can be a source of stress for care teams, and some staff may resist family participation,

particularly during more invasive procedures or critical interventions.

Additionally, restricted hospital visitation policies were identified by nurses as a significant barrier to family involvement. This was supported in the study by **Erbay et al. (2023)**, which study Practices of the ABCDEF Care Bundle in Intensive Care Units as Reported by Nurses. Their findings suggest that while nurses recognize the value of family involvement, institutional policies—especially those limiting visitation—can hinder meaningful participation. Nonetheless, nurses showed awareness of the importance of minimizing interruptions during allowed visiting hours to support family-patient interaction.

Conclusions

Application of protocol of family engagement had significance effectiveness on improvement of clinical outcome among critically ill patients.

The nurses made encouraging and positive outlook on the involvement of family.

Recommendations

Create policies, protocols, and procedure for family engagement in ICUs, assessment tool to assess family readiness to be actively contributing to their patients' care and the aspects of care they can be engaged in should be available.

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Effect of Implementing Carotid Massage versus Ice Bag Maneuver on Clinical Outcomes for Children with Supraventricular Tachycardia

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Abstract:

Background: Supraventricular tachycardia is an emergency condition in children that requires a professional management, as it may lead to serious complications such as hemodynamic compromise resulting in syncope, shock, or even congestive heart failure and death. **Aime of the present study was to** evaluate the effect of implementing carotid massage versus ice bag maneuver on clinical outcomes for children with supraventricular tachycardia. **Subjects and method:** A purposive sampling of 60 children with stable supraventricular tachycardia divided into two equal groups; carotid massage and ice bag maneuver group. **Setting:** Pediatric medical department including pediatric emergency and cardiac intensive care units of Tanta University Main Hospital. **Two tools were used:** Tool (I) Supraventricular tachycardia assessment of children. Tool (II): Assessment of children's clinical outcomes. **Results:** Statistically significant differences were found in the mean scores regarding children's heart rate within the two groups before, immediate and 15 minutes after the intervention. Also, it was found that the return of children's heart rhythm to normal, immediately after implementing each maneuver, was higher in carotid massage group compared to children in ice bag group. **Conclusion:** Despite the opportunity for improvement exists with both maneuvers (carotid massage and ice bag maneuver), however the carotid massage has achieved a higher success rate of SVT conversion to normal heart rhythm than the ice bag maneuver. So, carotid massage is considered more effective in reducing the need for treatment escalation for children with stable SVT. **Recommendation:** Carotid massage and ice bag maneuver should be integrated in the urgent management of stable SVT in children, with providing training to pediatric cardiac intensive care unit nurses and children's caregivers as well.

Keywords: Carotid Massage, Children, Clinical Outcomes, Ice Bag Maneuver, Supraventricular Tachycardia.

Introduction:

Supraventricular tachycardia is a medical condition that refers to any tachycardia originating above the ventricles which involves atrial tissue or atrioventricular nodal tissue **(Brubaker et al., 2018) (Karmegeraj et al., 2018)**. This type of heart rhythm disturbance occurs commonly in children with a normal heart structure and rarely associated with cardiac anomalies. Tachycardia is defined as a heart rate above the average value determined according to the patient's age. The heart rate during supraventricular tachycardia may reach 200-300 bpm in infants and 180-250 bpm in older children **(Bibas et al., 2016)**.

The most common types of supraventricular tachycardia in children are based on the electrical pathway which is taken from the atria, which include: Firstly, atrioventricular nodal reentrant tachycardia, as there is dual atrioventricular nodal inputs with two limbs of the reentrant circuit near the AV node. Secondly, common type is atrioventricular reentrant tachycardia, which characterized by the existence of accessory pathway which pass through the atrioventricular septum and thus provide for a larger re-entry circuit **(Desai & Hajouli, 2023) (Hafeez et al., 2023)**. Atrioventricular re-entrant tachycardia is the most commonly observed type of SVT in pediatric patients generally, and in newborns and

infants specifically. On the other side, the atrioventricular nodal re-entrant tachycardia is the most common in older children and adolescents **(Kittnar, 2023) (Quattrocelli et al., 2018)**.

The incidence of supraventricular tachycardia is approximately 1 in 250-1000 children in the United States and is a serious health burden in Canada, California and internationally. Manifestations of supraventricular tachycardia may be asymptomatic or may include such symptoms as chest pain, palpitations, shortness of breath, sweating, feeling faint, and rarely, unconsciousness **(Victoria & Larry, 2015) (Desai & Hajouli, 2023)**.

The main diagnostic method for supraventricular tachycardia is recording of a channel electrocardiogram (ECG). As in particular, a narrow QRS complex tachycardia is typically seen on the ECG, the ECG during an attack offers numerous crucial clues for differentiating between SVT and other conditions. A baseline echocardiography is also advised to rule out structural heart disease, especially in children with signs of congestive heart failure **(Bibas et al., 2016)**. Besides, assessing the hemodynamic status, to detect any complications and to initiate the appropriate therapeutic intervention. Also, tests for thyroid function, electrolytes, and blood counts

are recommended to identify any risk factors for SVT (**Page et al., 2016**).

Treatment of stable supraventricular tachycardia can be achieved by non-pharmacological measures as vagal maneuvers beside pharmacological measures such as adenosine and calcium channel blockers. Indeed, vagus nerve supplies parasympathetic motor fibers to the myocardium which is responsible for bradycardia response at the level of the atrioventricular AV node which can be stimulated through different techniques called vagal maneuvers. These maneuvers can prolong refractoriness of the nodal tissue and disrupt the re-entry circuit. On the other hand, unstable cases of SVT may require cardioversion, catheter ablation or even a Pacemaker (**Rohit & Kasinadhuni, 2020**).

Multiple types of vagal maneuvers have been used for management of SVT, such as bearing down, Valsalva maneuver, modified Valsalva maneuver, gagging reflex, carotid sinus massage and diving reflex (**Smith et al., 2015**) (**Sohinki & Obel, 2014**). Cold stimulus to the face technique (diving reflex), involves emerging a child's face in ice-cold water or it can be achieved through ice bag maneuver that includes placing an ice bag or a washcloth soaked in ice water on child's face, it should last about 15 seconds to create a physiological vagal response similar to a person being submerged in cold water.

As, the ice bag maneuver works through stimulation of thermoregulatory sensors in the skin by initiating afferent impulses from the trigeminal nerve (cranial nerve V), the predominant sensory nerve of the face leading to increased vagal tone resulting in a bradycardia response by the slowing of AV nodal conduction and prolonged myocardial refractoriness thus the reversion of SVT can occur (**Godek & Freeman, 2022**).

Carotid sinus massage: the technique is performed with the child's neck in an extended position, the head turned away from the side being massaged. Only one side should be massaged at a time. Pressure is applied underneath the angle of the jaw in a gentle circular motion for about 5-10 seconds that in turn stimulates the vagus nerve, as the carotid sinus induces changes in arterial blood pressure and heart rate by means of its baroreceptors, nerve endings of sensory neurons that extend along the first segment of the internal carotid artery, just above the carotid bifurcation. Baroreceptors are stimulated by the stretching of the blood vessel wall by applying gentle massage that increases the firing rate of the nerve fibers, thus inhibiting the sympathetic nervous system and stimulating the parasympathetic nervous system through a centrally acting mechanism resulting in a decrease in blood pressure

and heart rate (**Andani & Khan, 2023**) (**Godek & Freeman, 2022**).

Critical care nurse plays an important role in managing such cases by obtaining a detailed history that includes past and present history, present signs and symptoms, time of onset, prior episodes, and current medications. Also, the nurse conducts a physical examination including vital signs (respiratory rate, blood pressure, temperature, and heart rate) and electrocardiogram monitoring to help assessing hemodynamic stability. In addition, the nurse implements interventions to control SVT through applying vagal maneuvers and administering ordered medications (**Hafeez & Armstrong 2023**) (**Karpas, 2006**).

Significance of the study

Supraventricular tachycardia is an emergency condition in children that may lead to serious complications as tachycardia-induced cardiomyopathy (**Kafalı & Ergül, 2022**). Also, congestive heart failure may occur in half of affected infants because of their high heart rates (**Bibas et al., 2016**). However, some children with cardiac comorbidities may not be able to tolerate the underlying rapid ventricular rate, which may lead to hemodynamic instability, exacerbated congestive heart failure, angina, or even sudden death (**Borquez & Williams, 2021**) (**Page et al., 2016**). The mortality rate in SVTs is

low (1% in those with concomitant heart disease, 0.25% if the heart is structurally normal) (**Allen et al., 2013**). Therefore, the importance of emergent management of these cases, that can be managed by non-pharmacological vagal maneuvers which are considered safe and effective in terminating SVT in 20%-40% of children (**Kafalı & Ergül, 2022**).

Aim of the study

Evaluate the effect of implementing carotid massage versus ice bag maneuver on clinical outcomes for children with supraventricular tachycardia.

Research hypotheses:

- 1-Implementing carotid massage is expected to relieve supraventricular tachycardia in children.
- 2-Implementing ice bag maneuver is expected to relieve supraventricular tachycardia in children.
- 3-Carotid massage is expected to be more effective in relieving supraventricular tachycardia in children than ice bag maneuver.

Operational definition:

Clinical outcomes: Refer to hemodynamic parameters of children as heart rate, time to return to normal rhythm, respiratory rate, blood pressure and oxygen saturation and heart rhythm detected by electrocardiogram.

Subjects and Method:

Research design:

A quasi-experimental research design

was used in the present study.

Setting:

The study was conducted at the pediatric medical department (pediatric emergency and cardiac intensive care units) of Tanta University Main Hospital affiliated to Ministry of Higher Education and Scientific Research.

Subjects:

Purposive sampling of 60 children with supraventricular tachycardia was collected from the above previously mentioned settings and who fulfilled the inclusion criteria. The sample was selected and divided randomly, by using systematic random sampling method, into two equal groups:

1- Carotid massage group: It consisted of thirty children who received carotid massage with routine hospital intervention.

2- Ice bag group: It included thirty children who received the ice bag maneuver with routine hospital intervention.

Inclusion criteria include children with stable supraventricular tachycardia, ranged from 1 to 12 years from both sexes and are willing and their parents to participate in the study.

Exclusion criteria include children with unstable supraventricular tachycardia. Children with psychiatric disorders. Exclusion criteria for carotid massage include carotid bruit/stenosis, cerebral vascular accident in the last

three months, ventricular tachycardia, ventricular fibrillation, or myocardial infarction in the past three month.

Tools of data collection: Two tools were used to collect the data:æ

Tool I: Supraventricular tachycardia assessment of children: This tool was developed by the researcher after reviewing the related literatures (Younis et al., 2024) (Patti & Ashurst, 2023) (Karpas, 2006) and it included the following three parts:

Part (1): Children sociodemographic characteristics as child's age, sex, birth order and residence.

Part (2): Children's clinical data including onset of attack, past and present history, family history, risk factors, previous attacks of supraventricular tachycardia, previous techniques used to alleviate tachycardia and anti-arrhythmic medications.

Part (3): Supraventricular tachycardia associated manifestations: It was used to assess supraventricular tachycardia associated manifestations as nausea, dyspnea, palpitation, poor feeding, chest discomfort, fatigue, syncope, and dizziness.

Tool (II): Assessment of children clinical outcomes: This tool was developed by the researcher based on review of recent relevant literature (Hafeez & Armstrong, 2023) and it consisted of four parts as the following:

Part (1): Hemodynamic parameters

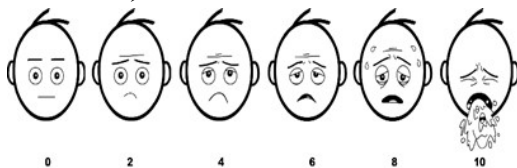
assessment: This part was used by the researcher to assess vital signs such as heart rate, respiration, blood pressure, oxygen saturation, as well as time to return to normal rhythm.

Part (2): Electrocardiogram (ECG)

monitoring: This was used to assess type of arrhythmia and heart rhythm before and after the intervention (Patti & Ashurst, 2023). Normal ECG rhythm was scored as 1 and abnormal ECG rhythm was scored as zero.

Part (3): Baxter Animated Faces

Scale of nausea: It is a pictorial nausea scale developed by (Baxter et al., 2011) and composed of 6 faces (Figure 3), with assigned scores ranging from 0 to 10, with a score difference of 2 between each adjacent faces (Yurdakul et al., 2021) (Naz et al., 2023). These faces show children who feel no nausea at all (0), a little nauseated (2), more nauseated (4), moderately nauseated (6), severely nauseated (8) or have the most possible nausea to feel (10). It has been validated in postsurgical patients, oncology patients and patients in the emergency department by (Watcha et al., 2018).



Part (4): Respiratory rate, accessory muscle use and decreased breath sounds Scale for dyspnea: This scale was modified by the researcher after reviewing related literatures

(Boeschoten et al., 2020) (Arnold et al., 2011) to assess severity of dyspnea in children. The scale consists of three items (respiratory rate, accessory muscle use and oxygen saturation), each item takes score from zero to three according to the condition of the child. The total score ranged from 0 – 9 and the scoring system was as the following:

0 = No dyspnea

1 - 3 = Mild dyspnea

4 – 6 = Moderate dyspnea

7 – 9 = Severe dyspnea

Method

The study was accomplished through the following steps:

1-Administrative process:

An official permission to conduct the study was obtained from Faculty of Nursing Tanta University to the directors of the pediatric medical department (pediatric emergency and cardiac intensive care units) of Tanta University Main Hospital after explaining the aim of the study to obtain their approval and cooperation to conduct the study.

2-Ethical and legal considerations:

- a) Ethical and legal approval was obtained from Faculty of Nursing Scientific Research Ethical Committee (Code No. 381- 2/2024) and a trial registry by Pan African Clinical Trial Registry at <https://pactr.samrc.ac.za/>

(Registration No. PACTR202405504971616).

- b) Children's privacy and confidentiality were taken into consideration.
- c) Informed consent was taken from the parents of children to participate in the study after explaining the aim of the study and their right to withdraw from the study at any time without providing a reason and without affecting the care provided to their children.
- d) The nature of the study would not cause any harm or pain to the entire subjects.

3- Tools development:

Two tools were developed by the researcher for data collection: **Tool I:** Supraventricular tachycardia assessment of children that included three parts, and **Tool (II):** Assessment of children clinical outcomes, which was composed of four parts.

- 4- Content validity:** The study tools were presented to a jury of five experts in the area of pediatrics to check content validity, clarity, comprehensibility, applicability and ease of tool implementation.

- 5- Reliability statistics** of the developed tools were tested through internal consistency: Cronbach's Alpha for tool I was 0.906, for tool II was 0.878 and for the sheet in total was 0.881 for 28 items.

- 6- A pilot study** was carried out on 10% of the sample (six children) to test

the tool for its clarity, applicability, feasibility, and the necessary modifications were done. Pilot sample was included in the total sample of the study.

Phases of the study: The study was conducted through four phases:

1- Assessment phase: The researcher was present through the morning and afternoon shifts for 5 days per week (Saturday, Sunday, Monday, Tuesday and Wednesday) to collect the data.

Once the child arrived at the department, the child and his/her parent were interviewed by the researcher, before any intervention, to explain the purpose of the study and gain their participation consent. The researcher collected child's full history from the parent, including sociodemographic data, clinical data and the associated manifestations of supraventricular tachycardia as included in Tool I.

In addition to assessing children's hemodynamic status, severity of nausea and dyspnea with recording the ECG findings as reported by the attending pediatric cardiologist (Tool II).

2- Planning Phase: The researcher first met the pediatric emergency and pediatric cardiac intensive care unit nurses and resident doctors to explain the purpose of the study to gain their cooperation. Objectives of vagal maneuvers (carotid sinus massage or ice bag maneuver) were established. The researcher prepared herself about the

maneuvers of the study via receiving training by the attending pediatric cardiologist at the pediatric cardiac intensive care unit for one month.

The preparation of unit's beds, ECG and monitor devices was checked. The atmosphere of surrounding environment was ensured to be quiet, reassuring and not terrible for children. Equipment needed to perform the maneuvers were prepared including (monitor device – clean gloves – hand watch – alcohol 70% – documentation sheet). In addition to a stethoscope for the carotid massage maneuver, also an ice bag and towel for the ice bag maneuver.

3- Implementation Phase: After detecting the type of arrhythmia and stability of hemodynamic parameters, the researcher ensured the children met the inclusion criteria. The researcher applied the vagal maneuvers as follows:
-The researcher connected the child with a monitor device.

-Carotid massage group:

-The child was placed on a supine position with the neck in an extended position, the head turned away from the side being massaged. The stethoscope was used to auscultate the carotid sinus (underneath the angle of the jaw with the upper level of thyroid cartilage) to exclude the presence of bruits.

-Massage was applied over carotid sinus in a gentle circular motion, by using the finger pads of the index and middle fingers, for about 5-10 seconds. Only

one side was massaged at a time. If unsuccessful, the massage was repeated up to 3 attempts for each side with time interval of one minute in between (Ceylan et al., 2019).

-Ice bag group:

The child was placed on supine or semi-fowler position. The ice bag was applied on the face, using an underlying clean cloth towel, covering most of child's face as possible for about 15 seconds. If unresponsive, the maneuver was repeated for another 15 seconds with a time interval of one minute in between, up to 3 attempts (Ceylan et al., 2019).

4- Evaluation Phase: The researcher reassessed and recorded the clinical outcomes immediately, and 15 minutes after the intervention (tool I &II) in the term of:

-Hemodynamic parameters (heart rate, respiration, and blood pressure and oxygen saturation).

-ECG findings and the time to return to normal heart rhythm.

-Associated manifestations that appeared on the child.

-Severity of nausea and dyspnea.

This phase took about 5 minutes.

The data was collected over a period of ten months, from the beginning of May 2024 to the end of February 2025.

Statistical analysis:

The collected data was organized, tabulated and statistically analyzed using SPSS software statistical

computer package version 26. For quantitative data, the range, mean and standard deviation were calculated. For qualitative data, comparison was done using Chi-square test (χ^2). For comparison between means of two variables in a group, paired samples t-test was used. For comparison between means for variables during three periods of intervention in a group, or for more than two variables, the F-value of analysis of variance (ANOVA) was calculated.

Correlation between variables was evaluated using Pearson and Spearman's correlation coefficient r . A significance was adopted at $P < 0.05$ for interpretation of results of tests of significance (*). Also, a high significance was adopted at $P < 0.01$ for interpretation of results of tests of significance (**) (Gerstman B., 2019).

Results:

Figure (1) illustrates distribution of studied children regarding their age in years. It was evident that more than half of children 53.33% and 56.67% were between 6 -12 years old, with the mean age was 6.40 ± 1.031 and 6.43 ± 1.023 years, respectively in carotid massage and ice bag maneuver groups.

Figure (2) clarifies distribution of the studied children regarding their birth order and gender. It shows that about 46.67% and 36.67% were at the second birth order in carotid massage and ice

bag maneuver group respectively. In relation to gender, it was noticed that 53.33% of carotid massage group were females, while 56.67% of ice bag maneuver group were males.

Table (1) shows distribution of the studied children regarding their clinical data, past medical and family history. Regards the onset of current supraventricular tachycardia attack, it was clear that nearly two thirds of studied children 60% and 66.67% started the current attack during the last 24 hours, with a mean of 1.47 ± 0.629 and 1.60 ± 1.037 days respectively in carotid massage and ice bag maneuver group. Also, it was found that the commonly used anti-arrhythmic medications were amiodarone 40% and 20% and betacor 26.67% and 30% for children in carotid massage and ice bag maneuver groups, respectively.

By monitoring the type of arrhythmia using electrocardiogram (ECG), it was clear that more than half (60% and 53.33%) of children in carotid massage and ice bag maneuver groups respectively, have atrioventricular reentrant tachycardia (AVRT) type of arrhythmia.

Considering the presence of previous SVT attack, it was found that 53.33% and 60% of children have a previous attack, with the mean age of onset 31.81 ± 3.269 and 51.83 ± 4.671 months in carotid massage and ice bag maneuver groups, respectively.

Additionally, the date of the previous attack was between 15 to 30 days with percentage of 40% in both groups similarly. Regarding the vagal maneuvers used previously to alleviate tachycardia, carotid massage was the most commonly used one for 46.67% and 60% of the studied children in carotid massage and ice bag maneuver groups, respectively.

In relation to children's family history, it was evident that the majority 93.33% and 90% of children in carotid massage and ice bag maneuver groups, respectively have a negative history for presence of SVT in their families. While the presence of family history for other chronic diseases, hypertension was obviously present in 43.33% and 50% of children's families in carotid massage and ice bag maneuver groups, respectively.

Table (2) illustrates the percentage distribution of supraventricular tachycardia associated manifestations among the studied children in both groups throughout the periods of implementation. As regard to cardiac and respiratory manifestations, palpitation was the most frequently detected manifestation in 93.33%, 40% and 40% of children in carotid massage group before, immediate and 15 minutes after the intervention respectively, while in ice bag maneuver group it was 80%, 53.33% and 53.33%

before, immediate and 15 minutes after the intervention, respectively.

On the other side, the most commonly found gastrointestinal manifestation was nausea in more than one third of children in carotid massage group and nearly half of children in ice bag maneuver group throughout the three periods of the implementation. The main cerebral manifestation that was observed among studied children was fatigue 60%, 60% and 40% in carotid massage group, compared to 80%, 80% and 60% in ice bag maneuver group before, immediate and 15 minutes after the intervention, respectively.

Table (3) presents the mean scores of hemodynamic parameters of the studied children among the two groups throughout the periods of implementation. The mean scores of children's heart rate within carotid massage group were 240.83 ± 56.658 , 189.13 ± 69.361 and 175.07 ± 84.007 before, immediate and 15 minutes after the intervention respectively, compared to 251.63 ± 46.436 , 195.47 ± 66.810 and 179.63 ± 80.713 before, immediate and 15 minutes after the intervention in ice bag maneuver group respectively. There was a statistically significant difference within the two groups throughout the three periods of the study, with no significant differences between the two groups.

Regarding systolic blood pressure, the mean scores were 97.63 ± 8.062 ,

98.03±7.876 and 98.07±8.428 before, immediate and 15 minutes after the intervention, respectively for carotid massage group, while they were 104.30±22.695, 103.87±21.924 and 103.77±22.402 before, immediate and 15 minutes after the intervention respectively for ice bag maneuver group. Also, the mean scores of diastolic blood pressure were 65.83±7.101, 66.67±6.850 and 65.53±7.619 before, immediate and 15 minutes after the intervention for carotid massage group, while they were 69.80±16.061, 70.00±15.161 and 69.97±14.910 before, immediate and 15 minutes after the intervention for ice bag maneuver group.

In relation to respiratory rate, the mean scores were 34.73±1.543, 33.27±1.693 and 31.33±1.315 throughout the three periods of the study respectively for carotid massage group, compared to 36.07±10.891, 33.60±9.888 and 31.27±9.903 for ice bag maneuver group respectively. Concerning oxygen saturation, the mean scores were 94.90±3.220, 95.43±3.451 and 96.40±3.212 for carotid massage group, respectively throughout the three periods of the study, compared to 93.27±6.264, 94.57±4.446 and 95.27±4.556, respectively for ice bag maneuver group, with no significant difference between the two groups in terms of blood pressure, respiratory rate and oxygen saturation.

Table (4) shows distribution of the studied children's time of return to normal heart rhythm among the two groups throughout the three periods of implementation. It was found that the heart rhythm returned to normal in 46.67% of children in carotid massage group, compared to 40% of children in ice bag group immediately after implementation of the two maneuvers. Although the rate of response of children in carotid massage group was higher, there was no statistically significant difference between the two groups ($p=0.795$). As regard to time of return to normal heart rhythm, the range of time was 35-50 seconds with mean of 42.50±6.455 in carotid massage group, compared to 10-35 seconds with mean of 22.50±11.902 in ice bag maneuver group, with a statistically significant difference between the two groups ($p=0.025$).

Table (5) illustrates the distribution of the studied children's levels of nausea throughout the periods of implementation. This table indicates that 26.67% of children within carotid massage group suffered from the most possible nausea to feel before applying the maneuver, then the percentage decreased to 20% immediately and 15 minutes after the intervention. Compared to 40% of children in the ice bag group who suffered from the most possible nausea to feel before the maneuver, the percentage decreased to

6.67% immediately and 15 minutes after applying the maneuver.

No statistically significant difference was observed among carotid massage group throughout the periods of the intervention. However, a statistically significant difference was observed among ice bag maneuver group throughout the periods of the intervention as $P= 0.000$.

Table (6) clarifies the percentage distribution of the studied children's levels of dyspnea throughout periods of implementation. As regard to carotid massage group, the percentages of children who suffered from mild dyspnea were 33.33%, 13.33% and 6.67% before, immediate and 15 minutes after the intervention, respectively. While in the ice bag maneuver group 33.33%, 33.33% and 20.00% of children suffered from moderate dyspnea before, immediately and 15 minutes after the intervention, respectively with a statistically significant difference $P= 0.035$.

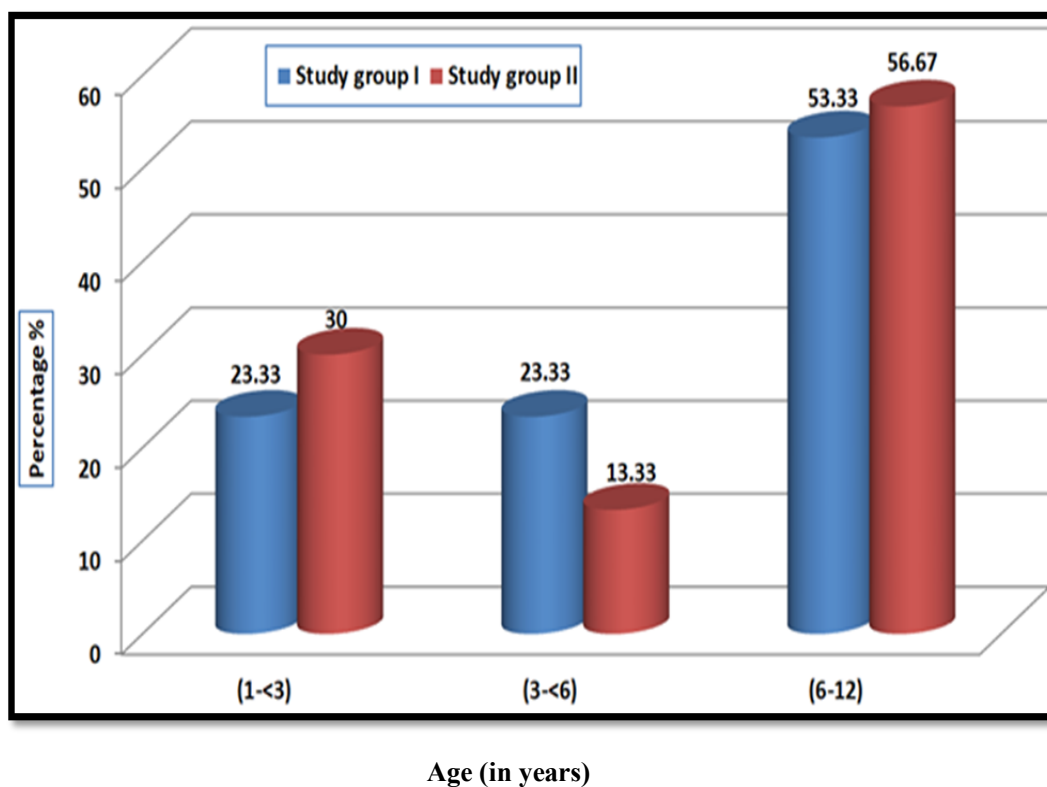


Figure (1) Studied children's age in years.

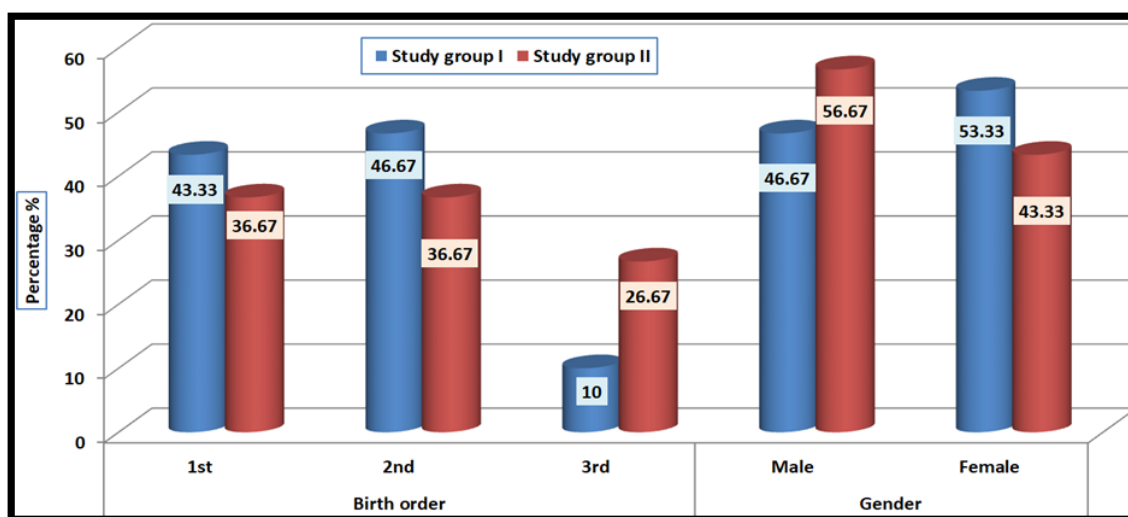


Figure (2): Studied children's birth order and gender.

Table (1): Percentage distribution of the studied children regarding their clinical data, past medical and family history.

Clinical data	The studied children (n=60)			
	Carotid massage group (n=30)		Ice bag group (n=30)	
	No	%	No	%
Onset of current supraventricular tachycardia (SVT) attack (in days)				
- Last 24 hours	18	60.00	20	66.67
- >1–3 days	12	40.00	8	26.67
- >3–6 days	0	0.00	2	6.67
Range	(1-3)		(1-5)	
Mean ± SD	1.47±0.629		1.60±1.037	
Current anti-arrhythmic medications				
- Adenosine	0	0.00	2	6.67
- Amiodarone	12	40.00	6	20.00
- Betacor	8	26.67	9	30.00
- Inderal and lasix	4	13.33	8	26.67
Type of arrhythmia by ECG				
- Atrioventricular reentrant tachycardia (AVRT)	18	60.00	16	53.33
- Atrioventricular nodal reentrant tachycardia (AVNRT)	12	40.00	14	46.67
Past medical history				
History of congenital heart disease				
- Atrial septal defect	1	3.33	1	3.33
- Congenitally corrected transportation of great arteries	1	3.33	0	0.00
- Ebstein anomaly	0	0.00	1	3.33
History of heart surgery				
- Glenn shunt	1	3.33	0	0.00
- Mitral and tricuspid valves replacement	2	6.67	0	0.00
History of previous SVT attack				
- No	14	46.67	12	40.00
- Yes	16	53.33	18	60.00
Age of onset (in months)				
Range	(1-108)		(1-132)	
Mean ± SD	31.81±3.269		51.83±4.671	
Date of previous attack of supraventricular tachycardia (in days)				
- <7	2	6.67	2	6.67
- 7-<15	2	6.67	4	13.33
- 15-<30	0	0.00	0	0.00
- ≥30	12	40.00	12	40.00
Range	(2-365)		(5-365)	
Mean ± SD	99.50±2.890		88.33±1.229	

Previous vagal maneuvers used to alleviate tachycardia				
- Valsalva maneuver	1	3.33	3	10.00
- Carotid massage	14	46.67	18	60.00
- Ice bag maneuver	4	13.33	4	13.33
Family history				
Presence of SVT				
- No	28	93.33	27	90.00
- Yes	2	6.67	3	10.00
Presence of cardiac diseases				
- Congenital	0	00.00	0	00.00
- Acquired	3	10.00	3	10.00
Presence of other chronic diseases				
- Hypertension	13	43.33	15	50.00
- Diabetes mellitus	12	40.00	10	33.33
- Bronchial asthma	3	10.00	1	3.33
- Hypothyroidism	2	6.67	1	3.33
- Liver cirrhosis	2	6.67	1	3.33

More than one answer was chosen.

Table (2): Percentage distribution of supraventricular tachycardia associated manifestations among the studied children in both groups throughout the periods of implementation.

# Manifestations	The studied children (n=60)													
	Carotid massage group (n=30)						χ^2 P	Ice bag group (n=30)						χ^2 P
	Before		Immediate		After 15 min			Before		Immediate		After 15 min		
	No	%	No	%	No	%		No	%	No	%	No	%	
1. Cardiac and respiratory manifestations														
- Dyspnea	8	26.67	6	20.00	6	20.00	0.244	14	46.67	10	33.33	8	26.67	0.010
- Palpitation	28	93.33	12	40.00	12	40.00		24	80.00	16	53.33	16	53.33	
- Chest discomfort	4	13.33	4	13.33	2	6.67		8	26.67	8	26.67	8	26.67	
2. Gastrointestinal manifestations														
- Nausea	14	46.67	14	46.67	10	33.33	0.127	16	53.33	16	53.33	14	46.67	1.475
- Vomiting	10	33.33	8	26.67	6	20.00	0.722	10	33.33	4	13.33	2	6.67	0.961
- Poor feeding	2	6.67	2	6.67	2	6.67		4	13.33	4	13.33	4	13.33	
3. Cerebral manifestations														
- Fatigue	18	60.00	18	60.00	12	40.00	0.249	24	80.00	24	80.00	18	60.00	0.933
- Dizziness	4	13.33	4	13.33	4	13.33	0.933	8	26.67	8	26.67	6	20.00	0.988
4. Other														
- Fever	2	6.67	2	6.67	1	3.33	0.251 0.953	2	6.67	2	6.67	2	6.67	1.475 0.961
- Sleepy	1	3.33	1	3.33	1	3.33		0	0.00	0	0.00	0	0.00	
- Crying, headache and blurred vision	0	0.00	0	0.00	0	0.00		3	10.00	3	10.00	2	6.67	

More than one answer was chosen

Table (3): Mean scores of hemodynamic parameters of the studied children among the two groups throughout the periods of implementation.

Hemodynamic parameters	The studied children (n=60)							
	Range							F P
	Mean ± SD							
	Carotid massage group (n=30)			F P	Ice bag group (n=30)			
Before	Immediate	After 15 min	Before		Immediate	After 15 min		
1. Heart rate	(150-300) 240.83±56.658	(100-280) 189.13±69.361	(87-286) 175.07±84.007	7.16 0.001*	(165-297) 251.63±46.436	(90-290) 195.47±66.810	(73-288) 179.63±80.713	9.809 0.000*
Gp I Vs Gp II t, P	0.808 , 0.423	0.360 , 0.720	0.215 , 0.831					
2. Blood pressure								
▪ Systolic	(89-112) 97.63±8.062	(89-110) 98.03±7.876	(89-110) 98.07±8.428	0.03 0.974	(87-190) 104.30±22.695	(88-185) 103.87±21.924	(86-188) 103.77±22.402	0.005 0.995
Gp I Vs Gp II t, P	1.516 , 0.135	1.371 , 0.176	1.304 , 0.197					
▪ Diastolic	(53-80) 65.83±7.101	(54-78) 66.67±6.850	(50-80) 65.53±7.619	0.20 0.819	(50-130) 69.80±16.061	(56-128) 70.00±15.161	(50-127) 69.97±14.910	0.001 0.999
Gp I Vs Gp II t, P	1.237 , 0.221	1.097 , 0.277	1.450 , 0.152					
3. Respiration rate	(19-63) 34.73±1.543	(20-62) 33.27±1.693	(18-64) 31.33±1.315	0.70 0.501	(19-56) 36.07±10.891	(18-56) 33.60±9.888	(18-55) 31.27±9.903	1.649 0.198
Gp I Vs Gp II t, P	0.460 , 0.647	0.125 , 0.901	0.024 , 0.981					
4. O ₂ saturation	(85-99) 94.90±3.220	(84-99) 95.43±3.451	(86-99) 96.40±3.212	1.60 0.209	(77-99) 93.27±6.264	(83-99) 94.57±4.446	(82-99) 95.27±4.556	1.162 0.318
Gp I Vs Gp II t, P	1.270 , 0.209	0.843 , 0.402	1.114 , 0.270					

Gp I: Group I: Carotid massage group.

* Statistically significance at level P<0.05

Gp II: Group II: Ice bag group.

Table (4): Percentage distribution of the studied children's time of return to normal heart rhythm among the two groups throughout the three periods of implementation.

Return to normal heart rhythm	The studied children (n=60)													
	Carotid massage group (n=30)						χ^2 P	Ice bag group (n=30)						χ^2 P
	Before		Immediate		After 15 min			Before		Immediate		After 15 min		
	No	%	No	%	No	%		No	%	No	%	No	%	
Yes	0	0.00	14	46.67	14	46.67	28.68 0.000*	0	0.00	12	40.00	12	40.00	23.62 0.000*
No	30	100.00	16	53.33	16	53.33		30	100.00	18	60.00	18	60.00	
Gp I Vs Gp II χ^2 P	-		FE 0.795		FE 0.795									
Time of return to normal heart rhythm (in seconds) No (%) Range Mean $\pm$ SD							4 (13.33%) (35-50) 42.50 $\pm$ 6.455			4 (13.33%) (10-35) 22.50 $\pm$ 11.902			t=8.727 P=0.025*	
Time of return to normal heart rhythm (in minutes) No (%) Range Mean $\pm$ SD							10 (33.33%) (1-10) 3.80 $\pm$ 2.700			8 (26.67%) (2-10) 5.25 $\pm$ 2.964			t=1.176 P=0.294	

Gp I: Group I: Carotid massage group.* Statistically significance at level $P < 0.05$ **Gp II: Group II: Ice bag group.**

Table (5): Percentage distribution of the studied children's levels of nausea throughout the periods of implementation.

Nausea	The studied children (n=60)													
	Carotid massage group (n=30)						χ^2 P	Ice bag group (n=30)						χ^2 P
	Before		Immediate		After 15 min			Before		Immediate		After 15 min		
	No	%	No	%	No	%		No	%	No	%	No	%	
- None	14	46.67	14	46.67	18	60.00	2.88 0.942	14	46.67	14	46.67	16	53.33	34.36 0.000*
- Little nauseated	2	6.67	4	13.33	2	6.67		0	0.00	2	6.67	6	20.00	
- More nauseated	0	0.00	0	0.00	0	0.00		0	0.00	0	0.00	2	6.67	
- Moderately nauseated	4	13.33	4	13.33	2	6.67		4	13.33	10	33.33	2	6.67	
- Severely nauseated	2	6.67	2	6.67	2	6.67		0	0.00	2	6.67	2	6.67	
- Most possible nausea to feel	8	26.67	6	20.00	6	20.00		12	40.00	2	6.67	2	6.67	
Range	(0-10)		(0-10)		(0-10)		F=0.466	(0-10)		(0-10)		(0-10)		F=3.205
Mean ± SD	4.13±4.424		3.60±4.149		3.07±4.258		P=0.629	4.80±4.745		3.33±3.536		2.27±3.226		P=0.045*
Gp I Vs Gp II														
χ^2	6.351		5.429		7.076									
P	0.174		0.246		0.215									

Gp I: Group I: Carotid massage group.

* Statistically significance at level P<0.05

Gp II: Group II: Ice bag group.

Table (6): Percentage distribution of the studied children's levels of dyspnea throughout periods of implementation.

Dyspnea	The studied children (n=60)													
	Carotid massage group (n=30)						χ^2 P	Ice bag group (n=30)						χ^2 P
	Before		Immediate		After 15 min			Before		Immediate		After 15 min		
	No	%	No	%	No	%		No	%	No	%	No	%	
- None (0)	14	46.67	20	66.67	22	73.33	8.28 0.082	14	46.67	20	66.67	20	66.67	13.58 0.035*
- Mild dyspnea (1-3)	10	33.33	4	13.33	2	6.67		4	13.33	0	0.00	4	13.33	
- Moderate dyspnea (4-6)	6	20.00	6	20.00	6	20.00		10	33.33	10	33.33	6	20.00	
- Severe dyspnea (7-9)	0	0.00	0	0.00	0	0.00		2	6.67	0	0.00	0	0.00	
Range	(0-5)		(0-5)		(0-5)		F=0.67	(0-8)		(0-6)		(0-6)		F=1.58
Mean ± SD	1.47±0.925		1.07±0.874		0.93±0.760		P=0.513	2.47±2.776		1.73±2.504		1.33±2.187		P=0.211
Gp I Vs Gp II														
χ^2	6.440		5.556		0.775									
P	0.092		0.038*		0.679									

Gp I: Group I: Carotid massage group.

* Statistically significance at level P<0.05

Gp II: Group II: Ice bag group.

Discussion:

The most common type of arrhythmias in children is supraventricular tachycardia (SVT), which is divided into two most common subtypes in children: Atrioventricular nodal re-entrant tachycardia and atrioventricular re-entrant tachycardia (**Abbasi et al., 2023**). It is an emergency condition in children as it may lead to serious complications such as hemodynamic compromise resulting in syncope, shock, or even congestive heart failure and death (**Kafalı & Ergül, 2022**). Therefore, the importance of emergent management of such cases, that can be managed by non-pharmacological measures called vagal maneuvers which are considered safe and effective in terminating SVT (**Ceylan et al., 2019**).

The results of the current study revealed that the incidence of supraventricular tachycardia in pediatrics peaks at 6 years. This is coming in same direction with (**Yap et al., 2022**) (**Borquez & Williams, 2021**) who reported that the incidence of SVT peaks during the first year of life and then again at the age of 6 to 9 years.

Considering the presence of previous SVT attack, it was found that more than half of children have a previous SVT attack. This result is in line with (**Bah et al., 2023**) (**Moore et al., 2022**) who stated that SVT is a recurrent disorder under certain conditions. Regarding the vagal maneuvers used previously to alleviate tachycardia, carotid massage was the most

commonly used technique in nearly half of children and this comes in track with (**Hindy A., 2022**) who reported that the carotid sinus massage was one of the commonly used vagal maneuvers for converting supraventricular tachycardia to sinus rhythm.

In addition, the results of the present study found that the commonly used anti-arrhythmic medication was amiodarone, that comes in line with (**Nizami et al., 2024**) (**Hill et al., 2019**) who reported that amiodarone is commonly used as a maintenance prophylaxis therapy and has achieved meaningful arrhythmia control in 78% of pediatric patients with recurrent SVT. This may be attributed to the mechanism of action of this drug, as amiodarone decreases the automaticity of sinoatrial (SA) node and the atrioventricular (AV) node conduction velocity. This action occurs by blocking potassium ion channels (prolonging repolarization), blocking sodium ion channels, and antagonizing alpha- and beta-adrenergic receptors (**Taylor & Watts, 2024**).

In relation to children's family history, it was noticed that the majority of studied children have a negative family history for the presence of SVT, respectively in carotid massage and ice bag groups. This result may be due to the limited sample size at the current study, as this result disagrees with (**Adam & Prince, 2021**) who stated that SVT is highly related to

genetic abnormalities and requires genetic testing, in their study titled (Genetic Arrhythmia Syndromes).

Regarding supraventricular tachycardia associated manifestations, the result of the current study found that palpitation and dyspnea were the frequently detected cardiac and respiratory manifestations respectively in carotid massage and ice bag groups, that agrees with the result of **(Nizami et al., 2024) (Yetkin et al., 2020)** who reported that palpitation is the most noticeable manifestation of SVT in children and dyspnea may accompany palpitation. Palpitation and dyspnea occur as a result of altered cardiac output by the effect of rapid filling and emptying of the heart **(Levine G., 2021)**. It is worth mentioning in the current study that palpitation was better responded to carotid massage maneuver as it decreased from 93.33% before the implementation, to 40% after the implementation. While for dyspnea it was better responded to ice bag maneuver as it decreased from 46.67% before the implementation, to 26.67% after the implementation with a statistically significant difference.

On the other side, the most commonly found gastrointestinal manifestations were nausea and vomiting that come on track with **(Jeon et al., 2019)** who revealed that abdominal pain and vomiting are common gastrointestinal manifestations of SVT presented in children. Also, this result is consistent with the study of **(Uysal et al.,**

2023) who mentioned that nausea is one of the common symptoms that accompany SVT in children, while this finding is in contrast with **(Yetkin et al., 2020)** who mentioned that nausea is rare during episodes of SVT attack. However, nausea occurs secondary to disturbed blood supply to digestive system, as the arrhythmia negatively affects the cardiac output **(Levine G., 2021)**. It is worth mentioning that a statistically significant difference was observed among ice bag maneuver group throughout the periods of the intervention, while no statistically significant difference was observed among carotid massage group.

The main cerebral manifestation observed among studied children was fatigue, which was also reported by other studies of **(Abbasi et al., 2023)**, **(Borquez & Williams, 2021)** and **(Quattrocelli et al., 2018)**, who found that fatigue was from the commonly detected manifestations among children with SVT. The results of the current study revealed that nausea is better decreased by implementing carotid massage, compared to vomiting which was better relieved by ice bag maneuver.

Regarding the return to normal heart rhythm and the hemodynamic parameters throughout periods of intervention, it was observed that children in carotid massage group returned to normal heart rhythm immediately after the intervention, which was significantly better than those in the ice bag group with a statistically

significant differences in the heart rate within the two groups throughout the three periods of the study. This result is consistent with European Society of Cardiology (ESC) guidelines for the management of supraventricular tachycardia 2019, stated that Valsalva maneuver and carotid massage had a high success rate of SVT conversion reaching 54% (Costache et al., 2023) (Katritsis et al., 2020). On the other hand, the review of (Nizami et al., 2024) stated that the ice bag maneuver has achieved a lower success rate of the studied cases compared to the Valsalva maneuver. This may be attributed to the effect of applying carotid massage maneuver and its action on the vagus nerve to slow heart rate, as carotid sinus baroreceptor has a crucial role in the control of blood pressure and heart rate through the afferent signals that travel from carotid baroreceptors to the cardiovascular control center in midbrain via the glossopharyngeal nerve. Then, the efferent signals transmit via parasympathetic and sympathetic nerves to the heart and blood vessels. This response brings appropriate changes to maintain heart rate and blood pressure in normal physiological limits, which is known as carotid sinus baroreflex (Andani & Khan, 2020). However, this result does not match with (Abbasi et al., 2023) who found that the carotid massage had a lower success rate for SVT conversion compared with ice bag maneuver, but this difference appears as

(Abbasi et al., 2023) cited this result from an old study that was conducted on adults by (Wen et al., 1998).

Conclusion

Based on the results of the current study, it can be concluded that despite the opportunity for improvement exists with both maneuvers that applied in the current study, which were carotid massage and ice bag maneuver, however the carotid massage has achieved a higher success rate of SVT conversion to normal heart rhythm than the ice bag maneuver. So, carotid massage is considered more effective in terminating SVT attacks and in reducing the need for treatment escalation for children with stable SVT.

Recommendations:

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

For clinical practice:

- Carotid massage and ice bag maneuver should be integrated in the urgent management of children with stable SVT in pediatric emergency and cardiac intensive care units.
- Training should be provided to pediatric critical care nurses and children's caregivers on the application of carotid massage and ice bag maneuver.

For further nursing research studies:

- Future research studies that focus on studying the risk of developing

psychological difficulties in children suffering from supraventricular tachycardia compared to healthy peers.

- Replication of the study using a larger probability sample from different geographical areas, to attain more generalization of the results.

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Abstract

Background: Pain, stiffness, functional limitations are most common features associated with knee osteoarthritis (OA) can lead to challenges in performing activities of daily living (ADLs) and sleep quality. **Aim:** assess sleep quality and daily living for elderly patients diagnosed with knee osteoarthritis. **Design:** was used cross-sectional descriptive study. **Setting:** The study was conducted in the Orthopedic Outpatient Clinic of El-Fayoum General Hospital at Elfayoum City. **Sample:** A purposive sample was used; they were 72 Elderly patients 60 years old and over. **Tool:** Two tools were used to gather the data. Tool I: A self-administered questionnaire or structured interview for assessing socio-demographic data of patients, past & present medical history and knowledge. Second tool consists of 3parts (Pittsburgh Sleep Quality Index, Visual Analog Pain Scale, Knee Injury and Osteoarthritis Outcome Score. **Results:** The study results showed 50.0% were 70 years and more, 61.1% who bad sleeper, 25.3% experiencing always pain, 47.3% had sleep latency, 58.3% had short sleep period and statistically significant correlation among total knowledge, sleep quality and Koos. **Conclusion:** findings of the current study indicate approximately three-quarter of the studied patients had bad score of total score regarding KOOS and patients already had difficult in performing daily activities. **Recommendations:** The study recommended further research to rehabilitate elderly patients to self-manage their condition through creates effective health educational programs.

Keywords: Elderly, Osteoarthritis, Pain, Sleep.

Introduction

Osteoarthritis (OA) is the most prevalent degenerative disorder impacting elderly patients, marked by features such as cartilage breakdown or functional impairment in one or more joints, chronic pain leading to physical limitations; poor sleep quality, interference with daily activities, and psychological issues. The knee is typically the first joint to be affected, followed by the joints of the lumbar spine and hands. This condition may arise from both modifiable and non-modifiable risk factors, including advancing age, gender, obesity, and excessive strain on certain ligaments and joints **(Ali et al., 2022)**.

A person's physical health can be significantly impacted by knee osteoarthritis (OA) and affects various aspects of joint tissues and general well-being, greatly affecting everyday activities and mobility. Persistent pain, physical restrictions, and feelings of depression can hinder a person's ability to participate in social, community, and work-related activities **(Wojcieszek et al., 2022)**.

Insomnia and inadequate sleep quality are frequently linked with chronic pain disorders, including knee osteoarthritis. A notable proportion of individuals suffering from knee osteoarthritis, were around 60%, report experiencing pain at night. In elderly patients, about 80% express difficulties with both falling asleep and staying asleep, which are typical symptoms of insomnia in those

with osteoarthritis **(Pham et al., 2024)**. Over 264 million people of all ages worldwide experience depression. This condition can affect individuals from various backgrounds throughout their lives, but it is particularly pronounced among older adults **(Kumar et al., 2023)**.

Sleep disturbances are major comorbidity of KOA, with a prevalence rate of more than 70% and an emerging target for intervention and increasing quality of life. Pain-catastrophizing may exacerbate poor sleep, particularly short-term and/or fragmented sleep, which is believed to increase pain sensitivity in osteoarthritis. Pre-sleep anxiety is linked to poor sleep quality and is prevalent in both chronic pain and insomnia **(Dai et al., 2020; Riemann et al., 2022)**.

Functional limitations related to knee OA that might make it difficult to complete daily living activities (ADLs), such as bathing, dressing, and household chores. Elders with knee OA may be able to bend their knees or maintaining balance, affecting their ability to self-manage these duties. This dependency on others or assistive devices can decrease their overall quality of life and increase the burden on caregivers **(Khalil et al., 2024)**.

Elderly knee OA requires a multidisciplinary approach for effective therapy. It involves specialized exercises that improve joint strength and flexibility, methods for alleviating

pain like drugs or injections, mobility devices like walkers or canes, and home environment adjustments to increase accessibility and safety. Elderly people's general well-being can be enhanced and the effects of knee OA on daily activities can be lessened by addressing these concerns thoroughly (Östlind et al., 2022).

Health education encourages self-management techniques to help people live well with osteoarthritis. In order cope with daily symptoms and preserve function in spite of joint discomfort, nurses can help senior patients set realistic goals. This method promotes increased independence and a feeling of control over their health by offering helpful advice on how to carry out everyday tasks with the least amount of pain. By using these techniques, patients can enhance their resilience and build a positive attitude, both of which are vital to controlling their illness over many years (Mihalko et al., 2024). **Significance of the study:**

Healthcare systems are heavily burdened by knee OA, led to in substantial expenditures. Whatever the reason for obtaining care for unrelated diseases, research has shown that people with OA are more likely to be hospitalized. With 28% of these costs and 3% of all disease-related expenses, OA is a major contributor to healthcare expenses associated with musculoskeletal disorders (Kiadaliri & Englund, 2021).

Approximately eighty-five percent of people over 75 in Egypt have some form of osteoarthritis, with a prevalence of KOA of 8.5% in the population. Forty percent of people with the disease struggle with everyday tasks to the extent that they interfere with their social or job responsibilities. Additionally, about 29.5% of elderly females suffer from knee osteoarthritis due to the postmenopausal osteoporosis is part of age-related changes among females (Magni et al., 2021).

Since they are crucial to the evaluation and treatment of senior patients with knee osteoarthritis, geriatric health nurses should pay closer attention to these patients' issues. According to Hassan et al. (2023), this highlights the necessity of creating an efficient educational program to assist senior citizens with knee osteoarthritis in managing their condition on their own (Hassan et al., 2023).

Aim of the Study:

The aim of this study was to assess sleep quality and daily living for elderly patients diagnosed with knee osteoarthritis, through

1. Assessing elderly patients' knowledge regarding knee osteoarthritis.
2. Appraising sleep quality for elderly patients diagnosed with knee osteoarthritis.
3. Assessing studied patients diagnosed with knee osteoarthritis outcomes (stiffness, pain severity, physical

disability, sports and recreational activity difficulty).

Research Questions

1. What is knowledge degree associated with knee osteoarthritis?
2. What is pain severity associated with knee osteoarthritis?
3. What is the sleep quality of studied patients diagnosed with knee osteoarthritis?
4. What is knee osteoarthritis outcomes (stiffness, pain intensity, physical dysfunction, sports and recreational activity difficult.

Subjects and Methods:

I. Technical Item:

Research design:

The study used cross-sectional descriptive research design.

Setting:

The search was carried out at Orthopedic Outpatient Clinic of Fayoum General Hospital at Fayoum City, Egypt. The Hospital composed of 14 clinics in first floor, Orthopedic Outpatient Clinic was included two rooms and four nurses and six doctors. The working in this clinic is 6 days per week from Saturday to Thursday from 9 am until 2 pm.

Type of Sample:

Data for this study was gathered during a three-month period (June 2024 to August 2024) & using a purposive sample. 115 older people with knee osteoarthritis included in the sample who were present at the study location during the study period made up the

sample size **Yamane (1967)**. A 95 confidence level and $p = 0.5$ are assumed.

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

n = sample size

N = population size is 115

e = 0, 05 is the level of precision.

$$n = \frac{115}{1 + 115 (0.05)^2}$$

$$n = 72$$

The actual size of sample was 72 elderly patients suffer from knee osteoarthritis through academic year 2022 – 2023.

Inclusion criteria:-

- The study was involved elderly patients who diagnosed with knee osteoarthritis.
- Patient age 60 years and older.
- The patients don't receive corticosteroid injection or past had stroke or other illness led to lower extremity dysfunction, knee replacement, administer sleep medication.
- The patients consented to participate in the trial and were able to answer questions adequately.

Data collection tools:

The researcher created an organized interviewing questionnaire.

Contained six parts:

Part I- Demographic data of studied patients diagnosed with knee osteoarthritis (OA) such as; age, sex, level of education, marital status, occupation before retirement, monthly

income, place of living and number of family members.

Part II- Past and present medical history of studied patients diagnosed with knee osteoarthritis (OA) such as: medical history of older individuals with osteoarthritis of the knee, including comorbidities (history of chronic diseases), family history, osteoarthritis duration, symptoms, treatment plan, and body mass index (BMI). Body mass index (BMI) is calculated using the following formulas from **Castillo et al., (2012)** to show the degree of obesity:

- Underweight: less than 18
- Normal BMI: from 18 to 24.9
- Overweight: from 25 to 29.9
- Obese : from 30 to 34.9
- morbid obese : from 35 and more

Part III- knowledge of Studied Patients The primary reason of osteoarthritis, risk factors, symptoms, complications, treatment, non-pharmacological intervention, and prevention were all evaluated in the questionnaire.

System of scoring:

The answers have been divided into 2 categories: incorrect and correct. Each incorrect answer received one point, while the right answer received two. The questionnaire consisted of seven questions, the total patients' knowledge scores (14 scores) were categorized as follows:

- Unsatisfactory knowledge less than 50%

Satisfactory knowledge more than or equal 50%

Part IV- Pittsburgh Sleep Quality Index) PSQI):-

The developers of the tool were **Buysse et al. (1989)**. A form of self-report was used to measure the amount and quality of sleep. The original version was designed to evaluate sleep reports over a month; the scale showed the frequency of sleep disturbances and whether or not they happened during the preceding month. Data about subjective sleep quality sleep latency, duration, efficacy, disruption, daytime dysfunction, and use of sleep medication.

System of scoring:

The scores of the seven components are gathered after each component's score falls between 0 and 3. A high total score, which ranges from 0 to 21, shows poor sleep quality greater than or equivalent to 5. (5 to 21) and less than five indicates good sleep quality.

Part V- The Visual Analog Pain Scale (VAS):-

Hayes and Patterson applied the pain rating scale for the first time in 1921, and **Delgado et al. (2018)** developed it. Validated severity of pain scale was based on self-reported assessments of symptoms and was administered using a composite line A 10-cm with the two ends of the scale—"no pain" at the left end (0 cm) and "worst pain" at the right..

System of scoring: Calculated by the distance between the patient's recorded number and the zero point along a 10-cm length of pain intensity.

Part VI- Knee Injury and Osteoarthritis Outcome Score (KOOS):

This was a trustworthy and legitimate instrument. The origin of it was (Roos et al., 1998). Five patient-relevant outcomes consisted of pain, symptoms, activities of daily living (ADL), sport and pleasure function, and quality of life. It was designed to evaluate the results of the patients.

System of scoring:

Symptoms (7 items), stiffness (2 items), pain (9 items), ADL function (17 items), sport and recreation function (5 items), and quality of life (4 items) are the five patient-relevant features of the KOOS that are assessed independently. Every item on the Likert scale had five different answers, ranging from 0 (no problems) to 4 (severe problems). The sum of the five values is determined for each item.

Validity:

Three-person expert panel Review of community health nursing Face and content validity are tested using the data gathering tools field. The tools' accuracy, comprehension, relevance, phrases, length, framework, and overall appearance were all to be assessed by the experts for the comments, adjustments were made.

Reliability:

In order to estimate Cronbach's Alpha, the research instruments were examined for internal consistency using the pilot study reliability. The findings involved 0.745 for knowledge and 0.78 for the Pittsburgh Sleep Quality Index (PSQI). Also, the Knee Injury and Osteoarthritis Outcome Score (KOOS) was 0.82 and the Visual Analog Pain Scale (VAS) was 0.89.

Ethical consideration:

Before beginning, the suggested study was officially approved by Helwan University's Faculty of Nursing's Scientific Research Ethics Committee. In order to gain the trust and confidence of the nurses involved in the study, the researcher showed the goal of the investigation. Also, the study setting encourages effective learning, and the nurses gave their consent to take part.

II. Operational Item:

Pilot Study:

To evaluate the tools' usefulness, comprehensibility, and effectiveness, a Trial study work was carried out on % of the study patients (7). And was excluded from the total sample. No significant changes were discovered. The pilot's reliability was really high.

Field work:

Helwan University's Dean of the Faculty of Nursing offered an official letter of consent for the study, which was addressed to the management of the Orthopedic Out-patient Clinic at Fayoum General Hospital in Fayoum City. highlighting the study's goal of

obtaining consent after building an atmosphere of trust

-At the start, the researcher announced her- self and describes the goal of study them to get their consent and cooperation. Each subject interviewed individually by the researcher.

-From June 2023 to September 2023, data was gathered twice a week (Monday through Wednesday) from 9 a.m. to 12 p.m. until the required sample was obtained.

-Elderly patients were interviewed, subjects gave their oral consent, and the study's purpose was explained. Each tool took around 20 minutes, and the researcher saw patients twice a week.

-The researcher took about 3 patients every day, which amounts to about six patients per week, or 24 patients per month, for a total of 72 patients.

Administrative item:

After description of the study goal and purposes, an informed consent was gained from the Dean of college of Nursing, Helwan University of higher education and manager of Elfayoum General Hospital ordering for collaboration and agreement to perform the research work.

IV. Statistical analysis:

After complete gathering the necessary data, evaluated using statistical Bundle for the Societal Discipline (SPSS), version 24 for examination. The P value was set at 0.05. Descriptive statistics analyses as numbers, ratio, mean $\pm$ standard deviation ($\pm$ SD), were used

to illustrate the grades. Suitable inferential statistics such as —Fll test or tll test was used as well. Chai-square test (x)2 was taken for appraisal between qualitative variables. Spear mean association measures the strong point and the track of association between two graded variables. Regression analysis was hand-me-down after measuring for normal distribution, familiarity, and homoscedasticity and examination of variance for the complete regression models were finished.

Significance of findings:

-When P above 0.05, it is statistically insignificant difference.

-When P less than 0.05, it is statistically significant difference.

-Highly significant at p-value less than 0.01.

Results:

Table (1): Reveals that, demographic characteristics of studied patients who suffered from knee osteoarthritis. About 50.0% were 70 years and more, 74.01+ 6.043 is mean age $\pm$ SD. While sexes 63.9% of them were female, but education level 27.8% read and write, 25% had secondary education. Also marital statuses 38.9% were widow. Regarding to occupation before retirement 27.8 % of them employee also 27.8% of them Manual work. 38.9% their income enough and residence in urban. Regarding number of family members 30.6% of them no one.

Table (2): shows, 91.7% of these patients had comorbidities, with hypertension (47.2%), diabetes mellitus (55.6%), cardiac diseases (52.8%), obesity (50.0%). The duration of osteoarthritis was 41.7% for more than five years. Common symptoms included pain (25.0%), joint stiffness (11.1%), physical limitation (13.9%), redness and inflammation (25.0%). Regarding treatment, 30.6% followed a drug regimen.

Figure (1): reveals that, the total knowledge of patients regarding osteoarthritis of knee. Total knowledge of 70.6% of patients were unsatisfactory (less than 50%), but 29.4% had satisfactory total knowledge related to osteoarthritis ($\geq 50\%$).

Table (3): Shows that, patients' pain severity by using the Visual Analog Scale (VAS), represented 62.5% who suffered from moderate pain, while 30 % suffered from severe pain.

Table (4): shows that, 47.3% of the elderly patients in the current study went to bed every day between 8 and less than 10 am, according to the Pittsburgh Sleep Quality Index. Every night, 50.0% of them take you one to three hours to fall asleep. Additionally, 52.7% of them woke up between 5 and 7 am. However, 47.3% of older adults have a sleep latency of 30 to 60 minutes each day, and 58.3% of them get less than 6 hours of true sleep at night.

Table (5) demonstrates the number of both good and bad sleepers based on

PSQI. According to the results, 61.1% of people had poor sleep quality. (PSQI ≥ 5 scores)

Table (6): reveals that, the prevalence of swelling, always joint noises (grinding or clicking), and knee catching or hanging significantly (27.8, 27.8% and 19.4%), respectively. Additionally, the ability to straighten and bend the knee fully improved markedly, with "always" responses 25.0% and 27.8, respectively. And severity of joint stiffness after sitting, lying, or resting about 27.8%.

Figure (2): clarifies that; 7.0% of the elderly patients reported absence of knee pain, 25.3% of the elderly patients reported continuously feeling knee pain (always).

Table (7): Illustrates that, elderly patients who reported severe and extreme knees pain during different movements such as (twisting/pivoting, during in bed, sitting or lying, and standing straight), (25.0%, 28%, 30.6%, 36.1%, 27.8% and 30.6%) respectively.

Table (8): shows that, 75.0% of severe knee pain experienced during ascending or descending stairs, moving from sitting, standing and lowering to the ground or carrying something.

Table (9): shows that, High-impact exercises like squatting, racing, leaping, turning or pivoting on an injured knee, and kneeling cause 72.2% of people to have significant knee discomfort.

Table (10): The results indicate significant correlations between the

KOOS score and these elements. The relation between knowledge is positive ($r = 0.452$, $p = 0.001^{**}$). There is a significant negative correlation between pain and $p < 0.001^{**}$ ($r = -0.634$).

Table (1): Frequency Distribution of Demographic Data among patients diagnosed with knee osteoarthritis (n=72)

Demographic Data			No	%
Age	60 < 65 years		24	33.3
	65 < 70 years		12	16.7
	≥ 70 years		36	50.0
Mean ± SD		74.01+ 6.043		
sex	Male		26	36.1
	Female		46	63.9
level of Education	No read and write		10	13.9
	Read and write		20	27.8
	Primary education		12	16.7
	Secondary education		18	25.0
	University education		12	16.7
Marital Status	Single		12	16.7
	Married		14	19.4
	Divorced		18	25.0
	Widow		28	38.9
Occupation	Employee		20	27.8
	Manual work		20	27.8
	Farmer		8	11.1
	Not work		24	33.3
Monthly income	Enough and saved		20	27.8
	Enough		28	38.9
	Not enough		24	33.3
Residence	Rural		28	38.9
	Urban		44	71.1
Number of family members	≤ 2member		20	27.8
	3 – 4 members		18	25.0
	> 4 members		12	16.7
	No one		22	30.6

Table (1): Past and present medical history of study patients diagnosed with osteoarthritis of knee (n=72).

Items		(n=72)	
		N	%
Comorbidities		66	91.7
Hypertension disease		34	47.2
Diabetes mellitus		40	55.6
Cardiac diseases		38	52.8
Obesity		36	50.0
Renal diseases		30	41.7
Family history	Yes	32	44.4
	No	40	55.6
Duration of osteoarthritis	< 3 years	24	33.3
	3 to 5 years	18	25.0
	> 5 years	30	41.7
Signs and symptoms of the disease that you have	Pain	18	25.0
	Joint stiffness	8	11.1
	Physical limitation	10	13.9
	Redness and inflammation	18	25.0
	crackling sound	8	11.1
	all of the above	10	13.9
Treatment regimen that you follow	Drug treatment	22	30.6
	Physical therapy	14	19.4
	Making compresses	20	27.8
	All of above	16	22.2
Body mass index (BMI)	Underweight < 18	7	19.4
	Normal weight ≥18 - 24.9	6	16.6
	Over weight ≥ 25 – 29.9	13	36.0
	Obese 30 -<25	36	50.0
	Morbid obese ≥ 35	10	27.7

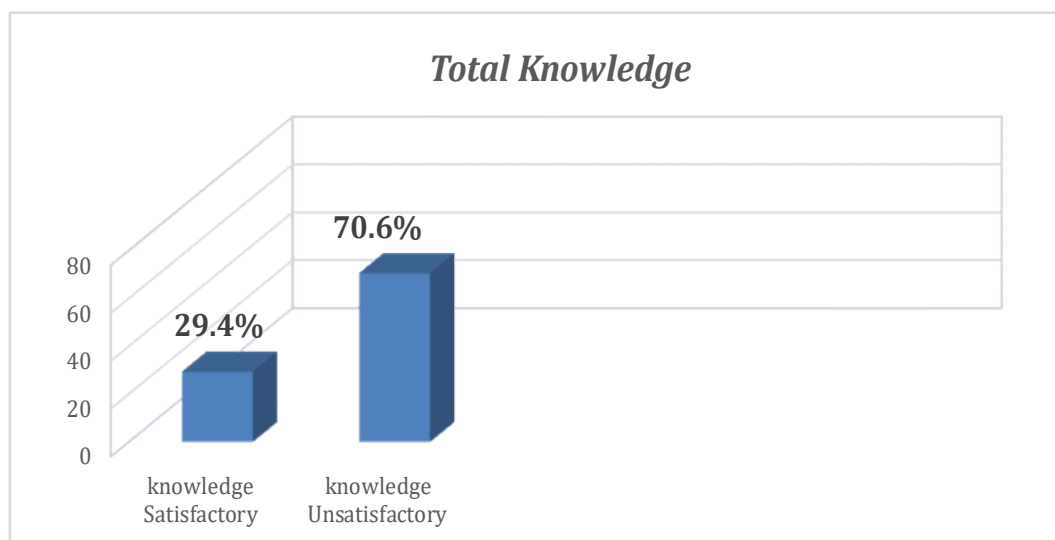


Figure (1): Frequency Distribution of Elderly patient's score of Total knowledge related to osteoarthritis (n=72)

Table (3): Frequency Distribution of patient's severity of the pain (n= 72)

severity of Pain	(n=72)	
Median (IQR)	6 (2-8)	
Range	1 – 10	
	N	%
Mild	5	6.9
Moderate	45	62.5
Severe	22	30.6

Table (4): Frequency Distribution of the Elderly Patients with knee osteoarthritis (n=72).

Components	No.	%
1-during Past month, one typically goes to bed		
8-10 pm	34	47.3
11-12 am	25	34.7
≥ 1 am	13	18.0
Time taken to fall a sleep each night :		
10-12 minutes'	32	44.4
1-3 hours	36	50.0
more than one hours	4	5.6
Time gotten up in the morning		
5-7 am	38	52.7
7-<10 am	26	36.2
≥10 am	8	11.1
Hours of truly sleep at night		
Short < 6 hours/day	42	58.3
Normal 7-8 hours/day	23	31.9
.Long ≥ 9 hours	7	9.8
5- Sleep latency		
Less than 30 min	31	44.3
30-<60 min	34	47.3
≥ 60 min	6	8.4

Table (5): Sleep Quality Total Score of Elderly Patients with Knee Osteoarthritis (n=72)

Sleep Quality	No	%	P
Good Sleep Quality (PSQI < 5 scores)	28	38.9	0.00**
Bad SleepQuality (PSQI ≥ 5 scores)	44	61.1	0.00**
PSQI Global Scores Median (min-max)	12.0 (6-17)		

** p≤0.01 (high significant)

Table (6): Frequency Distribution of Elderly Patient's KOOS Symptoms (n=72)

Symptoms	N	%
Severity of stiffness in the morning		
Always	23	31.8
Often	19	24.2
Sometimes	11	14.0
Rarely	14	19.4
Never	7	9.6
Degree of swelling in your knee		
Never	12	16.7
Always	20	27.8
Often	16	22.2
Sometimes	10	13.9
Rarely	14	19.4
Never	12	16.7
Presence of grinding, hearing clicking, or any other type of noise during knee movement		
Always	20	27.8
Often	16	22.2
Sometimes	10	13.9
Rarely	16	22.2
Never	10	13.9
knee catching or hanging up when moving		
Always	20	27.8
Often	14	19.4
Sometimes	14	19.4
Rarely	10	13.9
Never	14	19.4
Capacity of preforming fully knee straighten		
Always	21	28.0
Often	13	19.0
Sometimes	14	19.4
Rarely	16	22.2
Never	14	19.4
Ability of preforming fully knee bending		
Always	18	25.0
Often	16	22.2
Sometimes	16	22.2
Rarely	10	16.7
Never	10	13.9
Severity of knee joint stiffness after first getting up in the morning		
Extreme	20	27.8
Severe	16	22.2
Moderate	12	16.7
Mild	16	22.2
None	8	11.1
Severity of knee joint stiffness after sitting, lying, or resting later in the daytime		
Extreme	20	27.8
Severe	16	22.2
Moderate	12	16.7
Mild	16	22.2
None	8	11.1

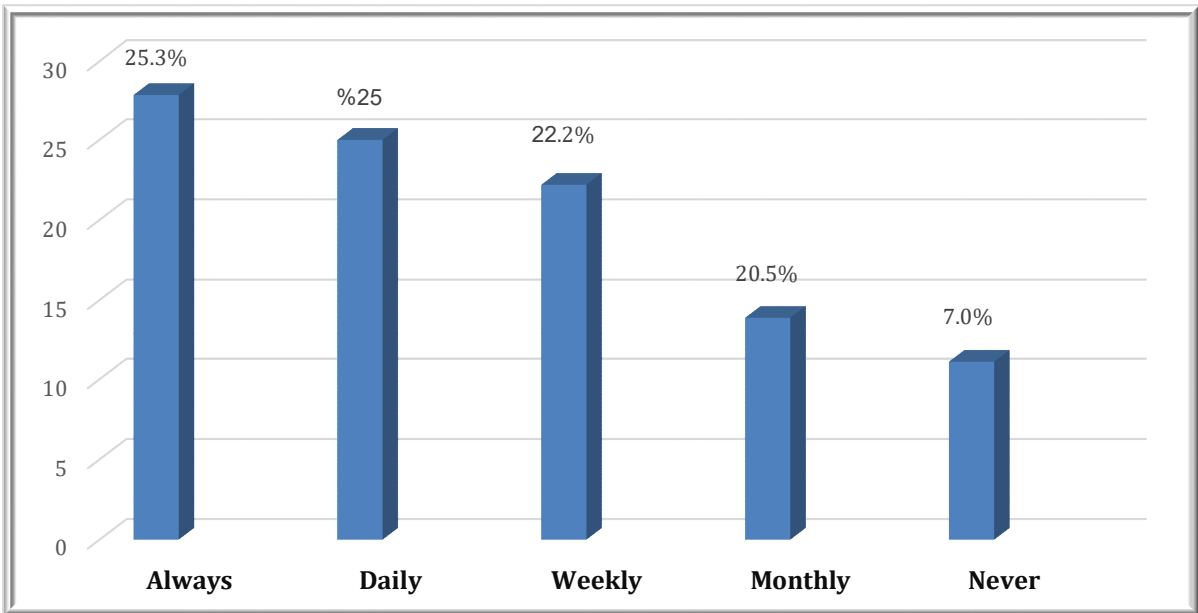


Figure (2): Distribution of Elderly Patients According to Reported Pain Frequency (n-72)

Table (7): Frequency Distribution of Elderly patient's regarding Degree of Pain during Knee Movement by Using KOOS (n=72).

Degree of pain during knee movements	(n=72)	
	N	%
Twisting/pivoting on your knee		
Extreme	18	25.0
Severe	16	22.2
Moderate	14	19.4
Mild	14	19.4
None	10	13.9
Straightening knee fully		
Extreme	21	28.0
Severe	11	16.0
Moderate	18	25.0
Mild	12	16.7
None	10	13.9
Bending knee fully		
Extreme	22	30.6
Severe	14	19.4
Moderate	6	8.3
Mild	12	16.7
None	18	25.0
Walking on flat surface		
Extreme	26	36.1
Severe	14	19.4
Moderate	12	16.7
Mild	12	16.7
None	8	11.1
Going up or down stairs		
Extreme	20	27.8
Severe	16	22.2
Moderate	10	13.9
Mild	16	22.2
None	10	13.9
At night while in bed		
Extreme	18	25.2
Severe	16	22.2
Moderate	12	13.9
Mild	16	22.2
None	12	16.7
Sitting or lying		
Extreme	20	27.8
Severe	16	22.2
Moderate	12	16.7
Mild	8	11.1
None	16	22.2
Standing upright		
Extreme	22	30.6
Severe	16	22.2
Moderate	14	19.4
Mild	8	11.1
None	12	16.7

Table (8): Frequency Distribution of Elderly Patients with Knee Osteoarthritis According to their Degree of Difficulty during daily living (n=72)

Daily Living		(n=72)	
		N	%
Daily Living Subscale Score	Not experienced Difficulty	18	25.0
	experienced Difficulty	54	75.0

Table (9): Frequency distribution of elderly Patients According to their Difficulty in Sport and Recreation Activities (n=72)

Sports and Recreation		(n=72)	
		N	%
Sports and Recreation Subscale score	Not experienced Difficulty	20	27.8
	experienced Difficulty	52	72.2

Table (10): Correlation between Total KOOS score and Knowledge, sleep quality, and pain for Elderly Patients with Knee Osteoarthritis (n= 72)

Item	KOOS Score	
	R	P-value
Knowledge	0.452	0.001**
Sleep quality	0.569	<0.001**
Pain	-0.634	<0.001**

Discussion:

Osteoarthritis (OA) is a progressive degenerative joint disease that significantly impacts the quality of life, functional mobility, and sleep patterns of elderly individuals. Knee OA, in particular, is associated with chronic pain, joint stiffness, and sleep disturbances, leading to decreased physical activity and a reduced ability to perform daily tasks. Furthermore, poor sleep quality has been directly linked to

increased pain sensitivity and functional decline in OA patients, making sleep management a crucial component of osteoarthritis care (Jastreboff et al., 2024).

Regarding studied patients' demographic data, study findings indicate that about half of the participants were aged 70 years or older. From the researcher's point of view, this could be due to the fact that osteoarthritis (OA) is a degenerative joint disease that

primarily affects the elderly, particularly those above 70 years. The aging process contributes to cartilage wear and tear, leading to increased prevalence with age. This finding is consistent with a study by **Hunter et al. (2020)** entitled "Epidemiology of osteoarthritis," conducted in the United States, which reported that the prevalence of symptomatic knee OA approximately doubled among women (67%) and tripled among men (33%) aged 70 years and older over a 22-year period.

Regarding gender distribution, more than half of elderly patients were female. From the researcher's opinion, this may be caused by the fact that women are at a higher risk of developing OA, especially after menopause, due to endocrinal changes that affect joint health, functions and cartilage integrity. This result is in agreement with a research work by **Haq et al. (2023)** entitled "Hand Osteoarthritis in Elderly Women with Primary Knee Osteoarthritis," conducted in the UK, which found that 70% of women above 60 years of age had a higher prevalence of hand OA, suggesting a gender predisposition.

Regarding education level, the majority of studied patients had low educational attainment, with a significant proportion being able to read and write (more than one quarter). From the researcher's perspective, this could be related to the fact that OA is more prevalent among elderly populations who had limited access to higher education in

earlier decades. Additionally, lower education levels may contribute to poor health literacy.

The research finding is supported by a study by **Kim et al. (2021)** entitled "Effects of education, income, and occupation on prevalence and symptoms of knee osteoarthritis," conducted in South Korea, which found that 32% of participants with lower education levels were significantly more likely to have higher prevalence and symptom severity of knee OA.

Regarding marital status, less than half of studied patients more than one third were widowed. From the researcher's point of interpretation, this may be explained by the fact that OA primarily affects older individuals, and widowhood is more common in elderly populations, especially among women due to their longer life expectancy. This outcome is in line with a study by **Ayres et al., (2025)** conducted in the US in a study entitled "A brief patient-centred multidisciplinary educational program for knee osteoarthritis," which found that social support, including marital status, plays a significant role in managing OA symptoms and improving patient outcomes. Health care services may have a more substantial impact on OA outcomes.

Regarding occupation, less than half of participants were unemployed, while others engaged in manual labor or farming. From the researcher's point of view, this could be due to the physical demands of these occupations,

which may contribute to joint overuse and increased OA risk. Additionally, unemployment in elderly populations may be linked to functional limitations caused by OA. This finding is consistent with a study by **Kim et al. (2021)** conducted in South Korea, which highlighted that 45% of participants in non-managerial occupations and the unemployed group experienced higher prevalence and symptom severity of knee OA.

Regarding monthly income, more than one third of participants reported having either "enough" income. From the researcher's point of view, financial constraints can impact healthcare access, leading to delayed diagnosis and inadequate management of OA. This study finding is in the similar line with a study by **Lee et al. (2021)** entitled "Effects of education, income, and occupation on prevalence and symptoms of knee osteoarthritis," which reported that lower income levels (36%) were associated with higher incidence and symptom seriousness of knee OA.

Regarding past and present history of studied patients, the majority of studied patients had comorbidities bad more than half of then suffered from diabetes mellitus, while half of them were obese. From the researcher's point of opinion, the higher prevalence of comorbidities considered part of age-related degeneration and the progressive nature of osteoarthritis (OA). Elderly patients with OA often present with multiple chronic conditions, such as

hypertension, diabetes, and cardiovascular diseases, due to shared risk factors like systemic inflammation, obesity.

This finding is consistent with a research work by **Swain et al. (2020)** conducted in India, entitled "Osteoarthritis and comorbidities: a systematic review and meta-analysis," which reported that OA patients have a significantly higher risk of developing cardiovascular diseases (48%), diabetes (37%), and renal impairments (30%).

Regarding family history to OA, study presented, less than half had family history of OA, and less than half of them the duration of osteoarthritis more than five years. the study with the same line the **Peat et al (2020)** the study accomplished in USA about "Knee pain and osteoarthritis in older adults: a review of community burden and current use of primary health care". Who described that, near to half of elderly patients had family members with OA and the duration of osteoarthritis more than five years.

Concerning patient's total knowledge related to knee osteoarthritis before and after the treatment, The current study findings revealed, elderly patients' total knowledge related to knee osteoarthritis, the present study revealed that, more than two third of the study sample had unsatisfactory knowledge regarding knee osteoarthritis. From the researcher inspection hat, most of the patients there had no available chances to attend workshops or raise awareness

about the disease, their lack of knowledge can lead to worsen of illness. The study is in agreement with **Ingvarsson et al (2020)** the study performed in Pakistan about “Assessment of primary hip osteoarthritis: comparison of radiographic methods using colon radiographs”. Found that, two third of study sample unsatisfactory knowledge regarding knee osteoarthritis.

Regarding severity of pain in studied patients, the present study shown that , most of them complain moderate to severe pain, the study agreement by **Ali et al (2022)** the study conducted in El-Fayoum City, Egypt about “assessment of sleep quality in elderly patients diagnosed with osteoarthritis at Orthopedic outpatient Clinic”. Found that, majority of elderly complain worse pain. From the researcher point of view, the pain is the main cause to poor sleep quality and physical dysfunction.

Regarding studied patients’ sleep quality, the current study results demonstrated Sleep onset latency less than 30-60 minutes were less than half of participants. This result is in similar contract with this study accomplished by **Ali et al (2022)**. Found that near to half of the study sample the sleep latency less than 30 -60 minutes.

Regarding total scores of sleep quality of elderly patients with knee osteoarthritis, showed that, patients who "Good sleepers" approximately one third and two-third who "bad sleepers". From the

researcher’s point of view, the knee pain had significant impact on sleep quality, so suggests that the structured health education program played a crucial role in enhancing sleep quality. The intervention likely introduced participants to effective sleep hygiene practices, relaxation techniques, and strategies for managing pain-related sleep disturbances, all of which contributed to more restorative sleep patterns.

The research finding is consistent with a study by **Luik et al. (2021)** entitled "Cognitive behavioural sleep interventions for older adults with chronic pain: a meta-analysis," which reported that enhanced sleep quality (38%), sleep efficiency (25%).

Also, agreement by **Rangasamy et al (2021)** entitled "Assessment of Sleep Quality in Patients with Osteoarthritis" included 150 patients with osteoarthritis in India, found that near to two third experiencing sleep disturbances.

Regarding knee pain frequency showed that; about one-quarter of the elderly patients reported always feeling knee pain. This result in the same line with **Osman et al (2024)**, included 80 patients diagnosed with knee osteoarthritis in Egypt, assessed osteoarthritis outcomes and found one-quarter of patients experienced high intensity of pain at all time.

Regarding patients’ symptoms related to OA, one-third of the studied patients had severe knee inflexibility after awakening in the

sunrise and after sitting, lying, or resting later. Those results in the line with **Chen et al.(2019)**, in a quasi-experimental study of 171 Chinese reported, 40.3% has severe knee stiffness

Regarding pain severity during knee movement, one third of studied patients who reported severe and extreme knee during (twisting/pivoting, full knee straightening, walking on a flat surface, experiencing pain in their knees at night while in bed, sitting or lying, and standing upright).at the same line with those study **Osman et al (2024)**, found about one third of patients sever difficulties during movements

Regarding the degree of difficulty in acting sporting and entertaining activities, three-quarter of patients who reported difficulty in squatting, running, twisting on knees. In the same line with those of **Patel et al.(2022)**,who in a 12-week evidence-based program, to assess outcomes, noticed that majority of patient bad scores for knee function in daily function.

Regarding the association between total KOOS grade and knowledge, sleep quality, and pain .for elderly patients with knee osteoarthritis. The findings of the present study indicated a significant relationship between these variables and the KOOS score. This study result is consistent with a study by **Simick Behera et al., (2024)** entitled “How does osteoarthritis education influence knowledge, beliefs, and behaviour in people with knee and

hip osteoarthritis” which found that patients with chronic sleep disturbances experienced worsened pain symptoms, leading to decreased functional mobility and lower KOOS scores.

Conclusion

Based on the consequences and outcomes of the study, the current research work settled that,

About three-quarter of the elderly patients had unacceptable knowledge about osteoarthritis. Nearly two-third of knee osteoarthritis elderly patients had poor sleep quality ($PSQI \geq 5$) regarding to subjective sleep quality, sleep latency, sleeping period, sleep efficiency, daytime dysfunction and use of sleep medication. Significant relationships between these variables and the KOOS score. Knowledge has a positive correlation. Pain has a significant negative correlation, severe pain leading to worsen KOOS and knee dysfunction. Also knee OA has significant impact on all aspects of daily living

Recommendations:

Constructed on the results of this research study the next advices are derived and suggested:

- Increase public awareness and knowledge about Osteoarthritis pain and complications of osteoarthritis through directed program to persons in community
- 2. Periodic assessment for elderly patients with osteoarthritis
- More studies measuring more health outcomes for long-term follow-up and larger samples are suggested for

knee osteoarthritis elderly patients to generalize the findings

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Effect of Pre procedure Education on Anxiety and Quality of Life on Patients Undergoing Upper Gastrointestinal Endoscopy

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Abstract

Background: Upper gastrointestinal (GI) endoscopy is a gold standard procedure for detecting upper gastrointestinal disorders which may cause anxiety to patients. This results in people skipping endoscopies, delaying diagnosis and treatment, and ultimately worsening their quality of life. **Aim:** To evaluate the effect of pre procedure education on anxiety and quality of life on patients undergoing upper gastrointestinal endoscopy. **Design:** Quasi experimental research design was utilized. **Setting:** The study was carried out in endoscopy unit at Fayoum University hospital, Egypt. **Subjects:** A purposive sample of 60 adult patients whose undergoing upper gastrointestinal endoscopic examinations who selected and assigned into two equal groups. **Tools for data collection:** Sociodemographic and Medical Data Questionnaire, Beck Anxiety Inventory Scale, and Short Form-36 Health Survey Questionnaire. **Results:** There was statistically significant improvement in total quality of life score for upper gastrointestinal endoscopy and alleviated in anxiety level in study group compared with control group ($P < 0.05$). There was negative statistically correlation between anxiety level and quality of life among study group after pre-endoscopy preparation. **Conclusion:** Pre-procedure education for patients undergoing upper gastrointestinal endoscopy help for reducing the anxiety level and improving total quality of life of the patients **Recommendation:** The pre-endoscopy preparation program should be implemented as a routine nursing care for patients undergoing upper gastrointestinal endoscopy.

Keywords: Education, Anxiety, Quality of Life, Upper Gastrointestinal Endoscopy.

Introduction:

Gastrointestinal (GI) endoscopy is one of the most common invasive procedures in the clinical practice for both diagnostic and therapeutic interventions to assess and treat various gastrointestinal (GI) disorders. There are two types of endoscopies: upper and lower. The esophagus, stomach, duodenum, and jejunum are all examined with an upper GI endoscopy (**Mohamed et al., 2022**).

Upper gastrointestinal endoscopy, also known as esophagogastroduodenoscopy (EGD), is recommended for patients who exhibit alarm features or relevant physical examination findings, such as unexplained weight loss, recurrent vomiting, inflammatory bowel disease, gastrointestinal bleeding, anemia, and family history of upper gastrointestinal malignancy or inflammatory bowel disease.

Through direct inspection of the esophageal, gastric, and duodenal mucosa, upper endoscopy facilitates tissue sampling for histopathologic diagnosis and lesion detection in Peptic ulcer disease, stomach outlet obstruction, *Helicobacter pylori* infection, and celiac disease (**Cangemi et al., 2025**).

Upper gastrointestinal tract (UGIT) symptoms are commonly reported in clinical settings, are a common reason for patients to seek medical attention and productivity loss (**Abdelrazek et al., 2024**).

Upper gastrointestinal endoscopy is an invasive procedure that can cause pain, nausea, and discomfort. These

side effects can cause anxiety, fear, and worry, which can significantly reduce patient participation (**Liu et al., 2025**).

GI problems are the main health issue facing the community, and improving quality of life is a key therapeutic objective when GI patients receive the right treatment to alleviate their symptoms. People with

gastrointestinal (GI) problems have a lower health-related quality of life than compared to those without such symptoms. A negative impact on an individual's physical, psychological and social functioning has been demonstrated (**Bovenschen et al., 2004**).

Educating the patient before to an upper gastrointestinal endoscopy may help them feel less anxious and to tolerate the process better. In order to ensure the high-quality and safety of the upper gastrointestinal endoscopy treatment, it is critical to ascertain the patient's degree of anxiety and the best ways to lower it while also improving the patient's understanding of the procedure (**Anwar et al., 2018**).

Significance of the study

Upper gastrointestinal endoscopy is used as a first-line method in diagnosing and treating digestive system diseases and gastrointestinal symptoms which are the most prevalent complaints and cause morbidity and mortality worldwide (**Kulkarni et al., 2024**).

There are an estimated 20 million upper endoscopy procedures performed each year in the United States (**Dermeyer et al., 2025**). An

estimated 15 million endoscopic operations are performed annually on average in Egypt, with upper gastrointestinal endoscopies accounting for 55% of these procedures (Mohamed et al., 2024). According to statistical records of Fayoum University hospital, there were 3500 endoscopies carried out yearly. Upper GI endoscopy constitutes about 75% of these procedures in 2024.

Most endoscopic patients experience anxiety that may range from minor to severe, and it might interfere with the procedure, delaying the diagnosis of the illness. According to studies, 8% of patients withdraw from the procedure due to fear and refusal to cooperate. Therefore, pre-endoscopy patient education should alleviate anxiety leads to patient more relaxed, well tolerance procedure; improve adherence and overall quality of life. (Kaur & Williams, 2022).

No previous studies done at Fayoum University Hospital to evaluate the effect of pre procedure education on anxiety, and quality of life on patients - undergoing upper gastrointestinal endoscopy, for this reason, the study - was conducted.

Aim of the Study:

The aim of the study was to evaluate - effect of pre procedure education on anxiety and quality of life on patients - undergoing upper gastrointestinal endoscopy.

Research hypothesis:

H₁: Patients level of anxiety will be - improved post implementation of the - pre procedure education.

H₂: Patient quality of life of will be improved post implementation of the pre procedure education.

Materials and Methods:

Research design:

Quasi experimental research design was utilized to conduct this study. This design used to evaluate the effects of an intervention in the absence of randomization to groups (Miller, 2020).

Setting:

The study was carried out at Fayoum University Hospital in endemic outpatient clinic and gastroscopy unit.

Subjects:

A purposive sample of 60 adult patients undergoing upper gastrointestinal endoscopic examination was selected for fulfilling the stated criteria. The sample divided into two equal groups; the study group (n=30) who received the pre procedure education on endoscopic procedure and control group (n=30) who received routine care.

Inclusion criteria:

Definitive diagnostic endoscopic patient from both genders.

Ages >18 years.

- Mentally alert and able to communicate freely.

- Agree to participate in this study.

Exclusion criteria:

- Patients who were sedated or confused.

- Patients who already exposed previously to gastroscopy.

- Patients who had end stage of liver.

- Patients who had speech disorder.

- Patients who were posted for emergency upper gastroscopy.

Tools for Data Collection:

Data were collected using the following forms:

Tool I: Sociodemographic and medical data questionnaire: This tool was designed by the researcher to collect patient data in relation to the following:

A. Sociodemographic data such as age, gender, marital status, level of education, occupation, residence area and family income.

B. Medical data: such as indications of endoscopy, present diagnosis, causes of hospitalization, associated disease, medications and family history.

Tool II: Beck Anxiety Inventory

Scale: It used to assess anxiety level and adapted from **(Beck et al., 1988)**.

It consists of 21 items; each item is rated on a 4-point scale, ranging from 0 (Not at all) - 3 (Severely). The total score is calculated by finding the sum of the 21 items such as: a) Low level of anxiety (0 – 21); b) Moderate level of anxiety (22 – 35) and c) Severe level of anxiety (36 and above).

Tool III: Short Form-36 Health Survey Questionnaire (SF-36 QOL):

It used to assess quality of life and adapted from **(Link et al., 2010)**. The SF-36 questionnaire consists of eight scales covering two summary measures: physical and mental health. The physical health measure includes; four scales of physical functioning (10 items), role-physical (4 items), bodily pain (2 items), and general health (5 items). The mental health measure is composed of vitality (4 items), social functioning (2 items), role-emotional

(3 items), and mental health (5 items). The SF-36 offers a choice of recall format at a standard (4 weeks) or acute (1 week) time frame. Likert scales and yes/no options are used to assess function and well-being on this 36-item questionnaire. These scales further represent two distinct higher-ordered clusters due to physical and mental health variance, can range from 0 (worst health) to 100 (best health). Higher scores indicate better health status.

Validity and reliability:

Content validity was conducted to determine whether the tool covers the aim by a jury of five experts, one professor, and three assistant Professor of Medical Surgical Nursing at the faculties of nursing (Damietta & Helwan) universities and professor of Endemic Medicine at the Faculty of Medicine, Fayoum university, to review tools for clarity, relevance, comprehensiveness and applicability. Modifications of tools were done.

Testing reliability: To assure the tools were reliable before data collection of the study by using Alpha Cronbach Test. The tools used for its reliability using test-retest reliability and proved to be strongly reliable at (0.87; 0.89) for Tool II and III.

Pilot study:

The pilot study was done on 10% of the sample (6 patients) to evaluate clarity of questions, visibility, applicability, content validity, assess the ability of the tools to achieve the study objectives, and determine the time needed to complete the study tools. Subjects who shared in pilot

study were excluded from the main study sample.

Field Work:

- An approval was obtained from Fayoum University Supreme Committee for Scientific Research Ethics and approval was obtain from the hospital director to carry out the study after explained of the purpose of the study.
- Data collection for this study was carried out from October 2023 to February 2024.
- The study was conducted in four phases namely: assessment, planning, implementation and evaluation.
- Assessment phase: A baseline assessment was carried out by the researcher for all the study subjects in the study and control groups by using sociodemographic and medical data, beck anxiety inventory scale, and short form-36 health survey questionnaire. This assessment was collected prior to conducting the pre procedure education
- Planning phase: This phase was formulated based on the study subjects' assessment. Pre procedure education was given by the researcher through face-to-face communication with study groups in the form of a colored booklet that takes about one month for development. They were designed by the researcher in the Arabic language.
- The pre procedure education was planned according to two sessions; each session was taken for 30-40 minutes to study groups within two days /week. The teaching methods included a colored booklet that had been distributed to study groups and videos about endoscopy with discussion and answer any questions for the patient.
- Implementation phase: The researcher started the interview with each patient individually using the data collection tools. Study group who received pre procedure education and hospital routine care In this phase, the information about preparation for UGI endoscopy was given for study group patients only through an oral instruction as a method of teaching with booklet. The researcher interviewed the patients for 3 sessions; the first session for patient contact was provided to the patient approximately 1 week before the procedure when the patient came to the endoscopy unit to make an appointment for the procedure and took from 30 to 45 included the information about the upper gastrointestinal endoscopy procedure including definition, indications, contraindication, complications, preparations for the procedure, position of the patient during the upper endoscopy, steps of the procedure. Second session was started on the day of performing the procedure and took about 30-40 minutes. This session included the following: The patient learned to demonstrate the deep breathing exercise independently, relaxation techniques, discharge instructions, warning signs and requiring immediate care. The control group who received the routine hospital nursing care as prescribed by the medical team.

- Evaluation Phase: Each patient of the study and control group was evaluated three times; the first evaluation is in the baseline assessment. The second evaluation was done on the day of endoscopy for both study and control groups were assessed for their anxiety level. While third evaluation through day of follow up for both study and control groups within 15-20 minutes to estimate the effect of the pre-endoscopy education programs on quality of life.

Ethical considerations:

Ethical research approval was obtained from Fayoum University Supreme Committee for Scientific Research Ethics before initiating the study work. The purpose of the study was explained to the patients and oral consent was obtained from them to participate in the study. Patients were given the possibility to withdraw from the study at any time without explaining the purpose and they were assured that anonymity and confidentiality of information was protected. Ethics, values, and beliefs were respected.

Statistical Design:

- Each data assessment sheet was coded and scored manually prior to computerized data entry.
- Descriptive statistics (frequency, percentage, mean and standard deviation) were performed for quantitative and qualitative variables.
- Pearson's correlation coefficient (r) and tests of significance (paired and unpaired t-test and chi-square) were applied.
- P values were considered significant if less than 0.05

- The above-mentioned statistical techniques were obtained by using Statistical Package of Social Science (SPSS) software version 22 in windows 7 (SPSS Inc., Chicago, IL, USA).

Results:

Table (1): shows that, the mean age of the study and control groups was (40.8 ± 17.6 , 38.3 ± 14.9), The majority (63.3%, 60%) of studied patients were females.

As regards to marital status, more than two quarters (60%, 63.3%) of studied patients were married and (50%, 46.7%) of them were illiterate education. In relation to occupation (53.3%, 56.7%) of studied patients were not working and (90%, 73.3%) of them were rural area. Considering monthly income, (83.3%, 76.7%) of them were insufficient income respectively.

Also, this table shows that there was no statistically significant difference between study group and control group as regards different demographic characteristics such as age, gender, marital status, education level, occupation, residence and income level with p-value >0.05 .

Figure (1): illustrates that, there is a statistically significant decrease in anxiety score among study group and improve in anxiety level after the intervention, as pre intervention majority of cases show higher percentage of severe anxiety (50%) which change to higher percentage of low degree of anxiety after the intervention (86.7%).

Table (2): Indicates that there was no statistically significance difference in

quality of life domains before the intervention between study and control groups with $p\text{-value} > 0.05$.

Table (3): shows that there was statistically significant difference between mean scores of the physical domain regarding general health, physical functioning and bodily pain (61.5, 72.3 and 75.6) respectively in study group compared to (54.02, 62 and 60.4) respectively in control group. There was a statistically significant difference between the mean scores of total QOL of both groups post intervention ($p\text{-value} 0.03$).

Table (4): illustrates that, there was a statistically significant negative correlation between Anxiety score and quality of life score post intervention which indicated increase in anxiety score will be associated with decrease in quality of life score either with $p = 0.008$.

Table (1): Sociodemographic characteristics for study and control groups (N=60)

Variables	Study group (n=30)		Control group (n=30)		t-test	p-value
Age (years)						
Mean ±SD	40.8±17.6		38.3±14.9		0.58	0.56
Range	19-60		19-55			
Gender	No.	%	No.	%	X ² test	p-value
Male	11	36.7%	12	40%	0.07	0.99
Female	19	63.3%	18	60%		
Marital status						
Single	10	33.3%	10	33.3%	3.02	0.38
Widow	2	6.7%	0	0%		
Married	18	60%	19	63.3%		
Divorced	0	0%	1	3.3%		
Educational level						
Illiterate	15	50%	14	46.7%	2.2	0.52
University	6	20%	4	13.3%		
Basic education	8	26.7%	12	40%		
Post graduate	1	3.3%	0	0%		
Occupation						
Employed	14	46.7%	13	43.3%	0.06	0.99
Unemployed	16	53.3%	17	56.7%		
Residence						
Urban	3	10%	8	26.7%	2.7	0.18
Rural	27	90%	22	73.3%		
Family Income						
Sufficient	5	16.7%	7	23.3%	0.41	0.74
Insufficient	25	83.3%	23	76.7%		

*statistical significant p-value >0.05

Figure (1): Percentage distribution of Beck Anxiety Inventory (BAI) scale Pre and post intervention in study group.

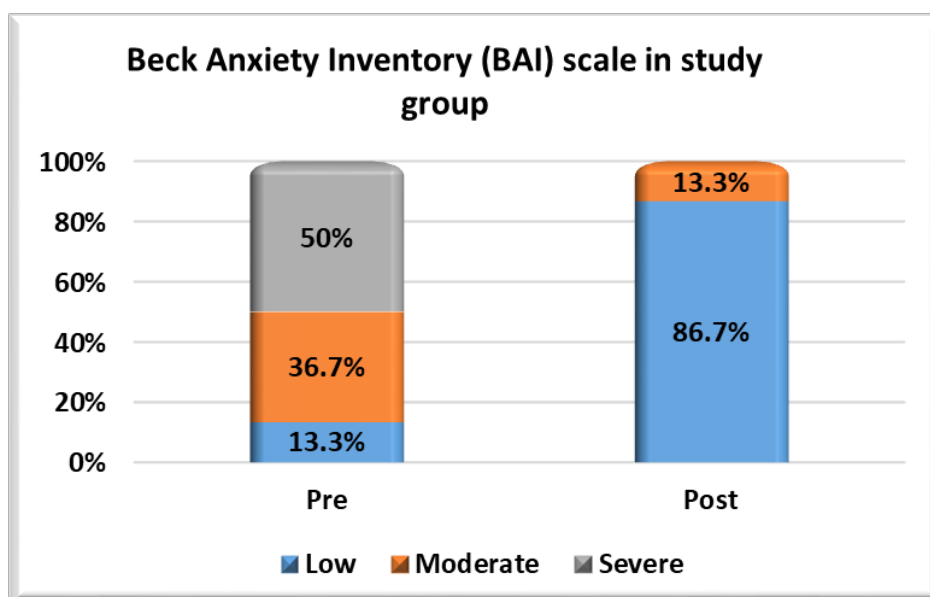


Table (2): Mean score of the SF36 Quality of life scale pre-intervention among both groups (N=60).

Pre- intervention	Study group (n=30)	Control group (n=30)	U-test	p-value
	Mean ±SD	Mean ±SD		
Physical health				
General health	21.5±9.1	20.9±7.8	-0.27	0.78
Physical functioning (PF)	24.8±25.8	37.3±26.4	-1.8	0.07
Role- physical (RF)	16.7±37.9	20±40.7	-0.31	0.74
Bodily pain (BP)	18.7±18.7	21.7±13.3	-1.1	0.25
Mental health				
Vitality (VT)	18.2±12.2	17.2±12.01	-0.31	0.75
Social functioning (SF)	25.4±19.6	23.7±11.9	-0.12	0.90
Role- emotional (RE)	17.8±37.9	16.7±37.9	0.11	0.19
Mental health (MH)	26.4±16.9	20.9±11.8	-1.2	0.22
Total scores				
Total Physical health	20.4±16.5	25.01±14.4	-0.16	0.25
Total Mental health	21.9±14.9	19.6±13.1	0.64	0.57
Total quality of life score	21.2±14.1	22.3±10.8	-0.36	0.72

Table (3): Comparison of the Quality of life (QOL) scale post-intervention in both groups (N: 60).

post- intervention	Study group (n=30)	Control group (n=30)	T-test	p-value
	Mean ±SD	Mean ±SD		
Physical health				
General health	61.5±14.2	54.02±14.01	0.68	0.04*
Physical functioning (PF)	72.3±19.7	62±19.7	4.2	0.01*
Role- physical (RF)	80±40.7	59.7±50.4	1.9	0.09
Bodily pain (BP)	75.6±15.2	60.4±17.6	0.51	0.001*
Mental health				
Vitality (VT)	69.1±20.3	58.6±18.6	0.89	0.04*
Social functioning (SF)	72.08±17.9	66.3±16.1	-0.49	0.19
Role- emotional (RE)	75±43.1	63.3±49.01	0.98	0.33
Mental health (MH)	72.5±19.8	65.8±17.1	1.4	0.17
Total scores				
Total Physical health	73.1±16.7	60.8±16.9	2.8	0.006*
Total Mental health	72.2±20.6	67.02±18.7	1.01	0.31
Total quality of life score	72.7±17.2	63.8±14.6	2.1	0.03*

Table (4): Correlation between quality of life and Beck Anxiety Inventory scale among studied subjects pre and post intervention (N: 60).

Variables	QOL score			
	Pre		Post	
	r	p-value	r	p-value
Age	-0.12	0.37	-0.15	0.25
BAI score pre	0.04	0.73	0.08	0.53
BAI score post	-0.05	0.66	-0.34	0.008*

Discussion:

Upper gastrointestinal endoscopy is the gold standard medical procedure for diagnosing disorders of the esophagus, stomach and upper duodenum, enabling direct examination of mucosal surfaces, imaging, video recording, diagnostic biopsies of unclear lesions and treatment approaches. It was evident that patients who are scheduled for endoscopic procedures suffer from anxiety due to a lack of information about the procedure or worse outcomes as fear of diagnosis or mortality (**Helba et al., 2024**).

Endoscopy patient education is a cornerstone of effective healthcare, which can help patients improve their awareness, manage their treatment and avoid unexpected consequences and hospital re-admissions while preserving or improving their quality of life (**Elgmal et al., (2025)**).

The study's findings regarding the sociodemographic characteristics of the subjects showed that the mean age of the patients in the study and control groups was (40.8 ± 17.6 , 38.3 ± 14.9) respectively. This finding is supported by **Abdelrazek et al., (2024)** who stated that the mean age was 41.77 ± 15.74 years.

In relation to gender and marital status, current study illustrated that women represented more than half of the patients in both the study and control groups (63.3%, 60%) respectively and less than two thirds of them were married. This result is corroborated by **Mohamed et al.,**

(2022) who stated that female gender took the highest percentage in the study among studied patients. Also, this finding is consistent with **Yadav et al., (2023)** who mentioned that almost two thirds of the study subjects were married.

Concerning educational level, the current study found that the study group was nearly half illiterate, while the control group was less than half illiterate. This finding has been verified by **Sabry & Abouda (2021)** who reported that less than half of the studied patients who undergoing upper GI endoscopy were illiterate.

However, those findings were contradicted with **Dubois et al., (2020)** who reported that less than half of the studied patient had high educational level.

As regard residence, the current study's findings showed that both patient groups lived in rural areas. This outcome is corroborated by **Emam et al., (2024)** who reported that less than three quarters of study subjects were rural.

Regarding monthly income, the findings of the study showed that the most patients of the study and control groups was insufficient (83.3%, 76.7%) respectively. This result is supported by **Anwar et al., (2018)** who mentioned significantly fewer than two-thirds of the patients in the study considered their income as being low.

Concerning medical diagnosis, it is found that, more than half of the study group and less than half of the control groups not diagnosed and have the endoscopic examination for

diagnosis (56.7%, 46.7%) respectively, and the findings of the study show that H pylori and gastritis in the study group and control group were (23.3%, 30%) respectively.

Also (**Sewilam et al., 2024**) who reported that medical history of greatest number of patients under study had diagnosed with helicobacter pylori infection that impaired patients' quality of Life, and (**Adjei & Adjei, 2025**) who found that the prevalence of H. pylori infection to be 81.7%, and gastritis 31.8% in the subjects of the study. The low socioeconomic status and inadequate sanitation and hygiene habits of the research area's residents could be the causes. The gastrointestinal tract infection caused by H. pylori is one of the most common infections in the world. It is the main cause of chronic gastritis and a major risk factor for both peptic ulcer disease and stomach cancer.

As regard associated disease, the result of the present study revealed that majority of study group and less than three quarters of control group have no associated disease. This finding is supported by **Behrouzian et al., (2017)** who stated that less than two thirds and less than three quarters of patients in the study group and control group have no history of any disease respectively.

As regards level of anxiety among study group, the findings of this study disclosed that more than third of the study group had moderate anxiety before pre procedure

education program. This finding is in the same line with **Alam and Elashri, (2020)** who demonstrated that all studied subjects had severe anxiety before nursing intervention.

Concerning post intervention Anxiety level, the current study demonstrated that, there was statistically significant improvement in anxiety level with higher percentage of mild degree among study group after pre procedure education with $p=0.001$.

The current study cleared that, there was a statistically significant lower score of anxiety in the study group when compared to the control group after implementation of pre procedure education. This finding is supported by **Elgmal et al., (2025)** who stated that there was a highly statistically significant reduction in the study group compared to control group post intervention.

In the same line with **Shradha & ManoRanjini, (2022)** who stated that compared to the control group of patients who had GI endoscopy, pre-procedural education was successful in reducing the anxiety levels of patients in the study group. Education interventions were linked to a decrease in anxiety levels after they were implemented because they helped patients better understanding how to reduce their fear of the unknown. By providing them with information about the procedure, the goal of the examination, and potential risks, these interventions may have reduced anxiety levels and prevented the patient's overall psychological condition.

Regarding pre- intervention Quality of Life score, the results of the current study demonstrated that there is no statistically significant difference between study group and control group as regards total quality of life level before the intervention, as both groups show poor quality of life level. The finding is in accordance with **Jang et al., (2022)** who reported that QOL integrates physical, emotional, and spiritual wellbeing and anxiety is a factor that deteriorate QOL. Patients with functional gastrointestinal disorders (FGIDs) were a significantly lower QOL than the general population.

Regarding post intervention Quality of Life score, the present study revealed improvement in total QOL parameters of both groups post intervention. There was a statistically significant difference between the mean scores of total QOL of both groups post intervention ($p= 0.03$).

Paralleling the findings of **Helba et al. (2024)**, who said that the nursing instructions lead to improvement of knowledge and clinical outcomes for patient undergoing upper endoscopy procedure.

Regarding correlation between quality of life and level of anxiety among studied subjects, this study finding illustrates that there is a statistically significant negative correlation between anxiety score and quality of life score post intervention which indicated increase in anxiety score will be associated with decrease in quality of life score. This finding is

supported by **Tepox, (2024)** who reported that high levels of pre-procedural anxiety during diagnostic endoscopies cause sedation problems and elevated autonomic arousal in patients, which may result in cardiorespiratory adverse events and troublesome cannulation because of sedation intolerance. In turn, this cannulation difficulty may raise the risk of bleeding, or perforation.

Conclusion:

Based on the findings of the current study, it can be concluded that the pre procedure education is very important concern and effective for alleviating anxiety and improving quality of life for patient undergoing upper gastrointestinal endoscopy.

Recommendations: The following suggestions are made in light of the current study's findings:

Recommendation for patients:

- Implementation of education program about UGI endoscopic procedure plan for patients and families.
- Educational Program should be implemented as a routine nursing care for patients undergoing upper endoscopy procedure

Recommendation for further research:

- Replication of the study using a bigger probability sample from various regions in order to get findings that are more broadly applicable.
- Provide posters and simple Arabic booklet about GI endoscopy procedure should be available for patient.

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Effect of Designed Educational Program on Nurses' Performance regarding Prevention of Aspiration Pneumonia for Patients with Stroke

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Abstract

Background: Nurses are pivotal in the management of patients with stroke, particularly in the prevention of aspiration pneumonia, a common and serious complication resulting from dysphagia. The knowledge and performance of nursing staff are crucial for optimizing patient outcomes in these vulnerable patients. **Aim:** This study aimed to evaluate the effect of a designed educational program on nurses' performance regarding prevention of aspiration pneumonia for patients with stroke. **Methods:** A quasi-experimental design was employed at Stroke Unit of Beni-Suef University Hospital, engaging a cohort of 40 nurses. **Data collection** involved a self-administered questionnaire, a knowledge assessment, and an observational checklist, administered before and after the targeted educational program. **Results:** Initial assessments revealed that nurses exhibited inadequate clinical performance related to aspiration pneumonia management. However, following the implementation of the educational program, there was a marked improvement in both knowledge and practice with p value (0.004, 0.005 respectively). **Conclusion & Recommendations:** The results underscore the profound impact that designed educational initiatives can have on augmenting nurses' knowledge and performance in preventing aspiration pneumonia among stroke patients. Healthcare institutions are encouraged to establish continuous education and training programs centered on stroke care and aspiration pneumonia prevention, thereby ensuring high-quality care for at-risk patients.

Keywords: Aspiration Pneumonia, Dysphagia, Educational Program, Nurses, Performance, Stroke.

Introduction

Stroke occurs approximately every five minutes and is characterized by the disruption of cerebral blood flow due to either vascular occlusion or hemorrhage, leading to ischemic or hemorrhagic stroke, respectively. This interruption results in neuronal injury, permanent brain damage, long-term disability, or mortality. Ischemic strokes—caused by emboli or thrombotic occlusion of cerebral arteries—constitute most stroke cases. Conversely, hemorrhagic strokes result from vascular rupture or leakage, causing intracranial bleeding and increased intracranial pressure that further damages brain tissue (**Centers for Disease Control and Prevention CDC, 2024**).

A significant post-stroke complication is aspiration pneumonia—an acute pulmonary infection resulting from the inhalation of oropharyngeal or gastric contents, often due to impaired swallowing mechanisms. This condition is notably prevalent in stroke patients and is exacerbated by advanced age, gender, dysarthria, denture use, and cerebral atrophy. The occurrence of post-stroke pneumonia is associated with increased morbidity and mortality, despite medical advancements (**Getie et al., 2024**).

Dysphagia, a frequent neurological manifestation in stroke patients, significantly heightens the risk of aspiration and subsequent pneumonia due to impaired cough reflexes and reduced immune function. Dysphagia is defined as difficulty in transporting food or liquid from the oral cavity to the stomach and may present as odynophagia (pain during swallowing) or globus sensation (a persistent feeling of a lump in the throat) (**Dziewas et al., 2021**).

Stroke-associated pneumonia (SAP), typically occurring within the first seven days post-stroke, has a reported incidence ranging from 6.7% to 37.98%. It represents a critical determinant of post-stroke mortality, largely due to the high prevalence of dysphagia in this patient population. Neurological injury from stroke can impair the motor functions responsible for safe swallowing. Additionally, factors such as reduced consciousness, improper patient positioning (e.g., supine posture), and diminished muscular strength associated with aging contribute to increased aspiration risk (**Guo et al., 2022; Lidetu et al., 2023**).

The diagnostic criteria for aspiration pneumonia in stroke patients include the presence of at least three of the following: febrile state ($>38^{\circ}\text{C}$),

productive cough with purulent sputum, abnormal respiratory examination (e.g., tachypnea >22 breaths/min, tachycardia, crackles, bronchial breath sounds), chest radiographic abnormalities, hypoxemia on arterial blood gas analysis, leukocytosis, and clinical indicators of aspiration as confirmed by swallowing assessments (**Sluis et al., 2024**).

Proactive identification of aspiration risk is a cornerstone of effective prevention strategies. Nurses, as frontline providers, are instrumental in recognizing early signs of aspiration and implementing timely interventions. Their continuous monitoring and clinical judgment are vital in mitigating the onset of aspiration-related complications (**Urden, et al., 2022**).

Evidence-based preventive measures include thorough swallowing assessments, adherence to rigorous oral hygiene protocols, safe practices for feeding and enteral nutrition, and appropriate patient positioning. Notably, postural modifications—such as reclining the patient—may leverage gravity to aid bolus movement, thereby reducing aspiration risk. Research highlights that specific head and neck positions can significantly influence swallowing efficacy and should be

incorporated into clinical protocols (**Liu, et al., 2022**).

Nurses play an essential role in multidisciplinary stroke care, particularly in monitoring secondary complications.

Without standardized, evidence-informed guidelines, stroke patients face a greater likelihood of clinical deterioration, hospital readmission, and extended hospital stays. Given the complex rehabilitation needs of stroke survivors, it is imperative to equip nurses with specialized training. However, current literature indicates a limited availability of structured educational programs specifically designed to enhance nursing competencies in stroke management and aspiration pneumonia prevention (**Zhao, et al., 2024**).

Aim of the study:

This study aimed to evaluate the effect of a designed educational program on nurses' performance regarding prevention of aspiration pneumonia for patients with stroke.

Research Hypotheses

The present study hypothesizes that the implementation of a designed educational program will lead to significant improvements in nurses' mean score of knowledge and clinical practice related to the prevention of aspiration pneumonia among patients with stroke.

Subjects and Methods

Research Design

A quasi-experimental design (pretest and posttest) was utilized to achieve the aim of the current study.

Setting

The study was conducted at Stroke Unit of Beni-Suef University Hospital. It is located on the 4th floor; 1st room containing 8 beds intensive care unit and 2nd room contains 8 beds for intermediate care.

Subjects

Convenience sampling of all available nurses (40 nurses) were working at the previous setting and caring for stroke patients. They were both genders and willing to participate in the study.

Data Collection Tools

Tool I: Nurses' Self-Administered Knowledge Questionnaire

This tool was adapted from Aitken et al. (2023) and Morton (2023) and comprised two main sections.

Part I: Collected Demographic data of Participating Nurses, including age, gender, educational background, years of experience, and prior participation in relevant training programs.

Part II: Assessed nurses' knowledge related to aspiration pneumonia prevention among stroke patients. The questionnaire covered key domains such as the

definition, types, and complications of stroke; and the etiology, risk factors, diagnostic criteria, complications, and preventive strategies for aspiration pneumonia.

Scoring System:

Each correct response was scored as 1, and incorrect responses were scored as 0. The questionnaire consisted of 38 items. The total scoring system of nurses' knowledge was based on statistical review as the following: A score of $\geq 90\%$ (i.e., ≥ 34.2 points) was categorized as satisfactory level of knowledge, while a score of $< 90\%$ was deemed unsatisfactory.

Tool II: Nurses' Observational Checklist

Adapted from Renton et al. (2019); Perry et al. (2020); and Wilkins (2022), this tool assessed the practical skills of nurses in four key domains: oral hygiene, oropharyngeal suctioning, enteral feeding, and adherence to nursing precautions aimed at minimizing aspiration risk.

Scoring System:

The total scoring system of nurses' practices was based on statistical review as the following: A score of $\geq 90\%$ (≥ 68.4 points) was considered competent practice; scores below this threshold were classified as incompetent practice.

Tool Validity and Reliability

The content validity of the data collection instruments was reviewed and confirmed by a panel of five experts in medical-surgical and critical care nursing, who assessed the tools for clarity, relevance, and comprehensiveness.

Reliability was evaluated using Cronbach's alpha, yielding acceptable internal consistency:

Knowledge questionnaire: $\alpha = 0.71$

Practice checklist: $\alpha = 0.79$

Pilot Study

A pilot study involving four nurses (excluded from the final sample) was conducted to evaluate the feasibility, clarity, and applicability of the instruments. The results confirmed that the tools were user-friendly, relevant, and appropriate for the target population.

Data Collection Procedure

The study was conducted over three months (November 2024 – February 2025) and followed a structured three-phase design. Prior to implementation, official approvals were obtained from the medical and nursing administration at Beni-Suef University. Informed consent was secured from all participating nurses after a full explanation of the study's purpose. Data collection occurred during alternating morning and afternoon shifts, at least three days per week.

Phase One: Baseline Assessment and Program Design

A comprehensive needs assessment was conducted using the study tools to identify baseline knowledge and performance levels. The research team conducted indirect observations of nurses while caring for post-stroke patients, ensuring realistic and unbiased assessments. Nurses then completed the self-administered questionnaire, which took approximately 20–30 minutes.

Findings from this phase informed the development of a competency-based educational program, tailored to address the specific knowledge deficits and practice gaps identified. The curriculum design was also supported by a review of recent, evidence-based literature.

Phase Two: Educational Program Implementation

The intervention consisted of a structured, interactive educational program delivered in six sessions:

- Two sessions focused on theoretical content
- Three sessions emphasized practical skills
- One final session provided a summary and reinforcement of key concepts

Each session lasted 30–45 minutes and included a review of prior content, stated objectives, and interactive discussion based on

participant feedback. Researchers conducted 2–3 sessions per day.

An Arabic-language educational booklet was distributed to enhance understanding and retention. The booklet addressed stroke pathophysiology, dysphagia, aspiration pneumonia, and relevant nursing interventions, including oral care, suctioning, enteral feeding, and aspiration precautions.

A total of 40 nurses participated, divided into eight subgroups of 4–6 members. Training sessions were held within the nursing department in collaboration with the head nurse and conducted during regular working hours to accommodate staff schedules.

Instructional Methods:
Multiple educational techniques were employed to maximize engagement and learning, including:
-Illustrated booklets and audiovisual materials (photos, videos, PowerPoint slides)
-Mini-lectures and small-group discussions
-Demonstrations and return demonstrations
-Role-playing scenarios
Motivational strategies such as verbal praise and positive reinforcement were used to sustain participant motivation throughout the program.

Phase Three: Post-Intervention Evaluation

Immediately following program completion, nurses were re-evaluated using the same knowledge and practice tools employed in the pre-intervention phase. This allowed for direct comparison and assessment of program effectiveness. The analysis focused on identifying improvements in knowledge acquisition and clinical practice competence in relation to aspiration pneumonia prevention in stroke patients.

Statistical Analysis

The data collected were analyzed using IBM SPSS software version 26.0. Following data entry, a thorough examination and verification were undertaken to ensure accuracy. Descriptive statistics including means (M), standard deviations (SD), and frequencies/percentages were computed to summarize demographic data and pre- and post-test results. Paired t-tests were conducted to compare pretest and posttest results for knowledge, clinical performance, and reality shock. Statistical significance was determined at the 5% ($p < 0.05$).

Ethical Considerations:

Ethical approval for the study was secured from the Ethics Committee of the Faculty of Nursing at Beni-Suef

University and Beni-Suef University Hospital prior to the commencement of data collection (ApprovalNo:FNBSURECP/2811202412). Written informed consent was obtained from all participants, confirming their voluntary participation in the study. Rigorous ethical protocols were adhered to throughout the research process to safeguard participant confidentiality. The participating nurses were fully informed of their right to withdraw from the study at any point without any repercussions. All personal data collected were treated as confidential and accessible exclusively to the research team. The protection of participants' privacy and the maintenance of anonymity were prioritized as fundamental ethical principles throughout the study.

Result

Table 1: Demographic characteristics of Nurses

-Age and gender: All nurses (100%) were predominantly young (mean age 27.1 ± 5.7 years), with 77.5% aged 20–30. Females slightly outnumbered males (55% vs. 45%)

-Education: Most nurses held diploma-level training (67.5% had a technical nursing institute certificate), only 25% had a bachelor's degree and 2.5% higher degrees.

-Experience: Nearly half (47.5%) had <3 years of stroke-unit experience; 30% had ≥ 5 years.

-Prior training: Very few had prior relevant training – only 3 nurses (7.5%) had attended an aspiration-pneumonia prevention course.

Table 2. Comparison between nurses' level of knowledge regarding Prevention of Aspiration Pneumonia for Patients with Stroke pre and immediately post-implementation of the educational program

-Dysphagia and aspiration pneumonia knowledge: nurses' knowledge regarding dysphagia rose from 20% pre-program to 72.5% post-program ($p=0.001$), similarly aspiration-pneumonia knowledge improved from 25% to 75% ($p=0.003$).

-Basic knowledge about stroke increased from 30% to 67.5%, and knowledge of prevention rose from 32.5% to 85%. However, these changes did not reach statistical significance ($p=0.436$ and $p=0.479$, respectively).

-Overall knowledge jumped markedly from 22.5% before the program to 87.5% after. This overall increase was highly significant ($p=0.004$).

Table 3. Total Mean knowledge scores pre and post educational program

-Subscale scores: Mean scores improved significantly in every knowledge domain. All these within-subject comparisons were highly significant ($p \leq 0.001$).

-Total score: The overall mean knowledge score rose from 21.57 ± 10.82 pre-program to 35.55 ± 2.84 post-program ($p < 0.001$).

Table 4. Comparison between nurses' level of practice regarding Prevention of Aspiration Pneumonia for Patients with Stroke pre and immediately post-implementation of the educational program

-Nurse proficiency improved in all practice areas, though statistical significance varied. The percentage with oropharyngeal suction practice rose from 15% to 70% ($p = 0.003$). Similarly, practices related to preventive precautions increased from 20% to 82.5% ($p = 0.001$). These gains were statistically significant.

-Oral care practice increased from 20% to 75% and **enteral feeding** from 25% to 90%. Although these absolute improvements were large, they did not reach significance in this sample ($p = 0.495$ and $p = 0.700$, respectively).

Total practice rose from 20% pre-program to 85% post-program. This overall increase was highly significant ($p < 0.001$).

Table 5. Comparison between mean practice score differences between pre, and post implementation of educational program

Mean practice scores increased significantly across all domains. For **oral care**, the mean scores increased from 14.60 ± 5.47 to 21.80 ± 1.74 . **Oro-pharyngeal suction** improved from 12.35 ± 4.25 to 17.83 ± 1.45 **enteral feeding** went from 11.15 ± 4.10 to 16.05 ± 2.04 and **precaution** score from 13.00 ± 4.40 to 17.73 ± 0.96 after program implementation. All p-values were ≤ 0.001 , indicating robust improvements.

-The total practice score significantly increased from 51.13 ± 17.33 pre educational program to 73.40 ± 3.96 post educational program ($t = 9.379$, $p < 0.001$).

Figure 3. Comparison between total satisfactory level of knowledge and practice pre- and immediately post-implementation of the educational program. Figure 3 highlights that both cognitive and skill outcomes improved dramatically. Before the program, only ~22.5% of nurses had satisfactory overall knowledge and ~20% had competent practice; after the program implementation, these

proportions rose to ~87.5% and ~85%, respectively.

Table 6. Correlation between nurses' knowledge and practice regarding prevention of aspiration pneumonia and demographic data

Nurses' educational level showed strong positive correlations with performance. For example, pre-program knowledge score correlated with education ($r=0.500$, $p=0.001$) and post-program knowledge ($r=0.407$, $p=0.009$). Similarly, post-program practice was higher among better-educated nurses ($r=0.502$, $p=0.001$). These findings imply that nurses with higher formal qualifications tended to achieve higher knowledge and practice scores.

Table 7. Correlations between nurses' total level of knowledge and total level of practices through two phases of the study Shows that; there was positive and significant statistical correlation between total knowledge and practice scores of studied nurses pre and post educational program implementation with p value=(0.003&0.000,respectively)

Part I: Demographic characteristics of the study nurses.**Table (1): Percentage distribution of the studied nurses' characteristics (n=40).**

Items	N	%
Age group		
20<30 years	31	77.5%
30<40 years	6	15%
≥ 40 years	3	7.5%
Mean ±SD=27.125±5.72		
Gender		
Male.	18	45%
Female.	22	55%
Educational level		
Diploma.	2	5%
Technical institute.	27	67.5%
Bachelor.	10	25%
Higher degrees.	1	2.5%
Years of experience in stroke Unit		
Less than 3 years.	19	47.5%
3 less than 5years.	9	22.5%
≥5.	12	30%
Mean ±SD= 1.8250±0.87376		
Attendance training courses regarding the Prevention of Aspiration Pneumonia		
Yes	3	7.5%
No	37	92.5%

Part II: Nurses' Knowledge Regarding the Prevention of Aspiration Pneumonia for Patients with Stroke Pre and Immediately Post -Implementation of the Educational Program.

Table (2): Comparison between nurses' level of knowledge regarding Prevention of Aspiration Pneumonia for Patients with Stroke pre and immediately post-implementation of the educational program (n=40).

Item	Level of knowledge				Chi-square	P value
	Pre-program		Immediately Post			
	N	%	N	%		
First: Nurses' basic knowledge about stroke	12	30%	27	67.5%	15.212	0.436
Second: knowledge regarding dysphagia (definition, causes, diagnosis, prevention and nursing care).	8	20%	29	72.5%	33.598	0.001
Third: knowledge regarding aspiration pneumonia (definition-diagnosis, causes, complication and prevention)	10	25%	30	75%	93.499	0.003
Fourth: knowledge regarding prevention of aspiration pneumonia for stroke patients.	13	32.5%	34	85%	17.6647	0.479
Total level of knowledge	9	22.5%	35	87.5%	139.170	0.004

Significant at p value ≤ 0.05

Table 3. Comparison between mean knowledge score differences between pre, and post implementation of educational program.

Item	Knowledge			
	Pre	Post		
	Mean $\pm$ SD	Mean $\pm$ SD	T test	P value
Basic knowledge about stroke	2.275 $\pm$ 2.24	4.500 $\pm$ 0.82	-6.801	0.000**
Knowledge regarding dysphagia	4.225 $\pm$ 2.57	7.550 $\pm$ 0.88	-8.499	0.000**
Aspiration pneumonia	9.725 $\pm$ 5.72	15.775 $\pm$ 1.86	-7.078	0.000**
Prevention of aspiration pneumonia for stroke patients.	5.250 $\pm$ 2.57	7.725 $\pm$ 0.72	-6.621	0.000**
Total	21.57 $\pm$ 10.82	35.550 $\pm$ 2.84	-8.76	0.000**
T Paired samples t-test, ** Statistically significant at p $\leq$ 0.001				

Part III: Nurses' Level of Practice regarding Prevention of Aspiration Pneumonia for Patients with Stroke pre and immediately post implementation of the educational program (n= 40)

Table (4): Comparison between nurses' level of practice regarding Prevention of Aspiration Pneumonia for Patients with Stroke pre and immediately post-implementation of the educational program (N=40).

Item	Level of practice				X2 test	P value
	Pre-program		Immediately Post			
	N	%	N	%		
1- oral care	8	20%	30	75%	51.450	0.495
2-oro-pharygneal suction.	6	15%	28	70%	84.126	0.003
3-enteral feeding	10	25%	36	90%	49.046	0.700
4-precaution for prevention of aspiration pneumonia	8	20%	33	82.5	88.00	0.001
Total level of practice	8	20%	34	85%	360.556	00.005

Significant at p value ≤ 0.05

Table 5. Comparison between mean practice score differences between pre, and post implementation of educational program.

Item	Practice		T test	P value
	Pre	Post		
	Mean $\pm$ SD	Mean $\pm$ SD		
Oral care	14.6 $\pm$ 5.47	21.8 $\pm$ 1.74	-8.692	0.000**
Oro-pharyngeal suction	12.35 $\pm$ 4.25	17.83 $\pm$ 1.45	-9.238	0.001**
Enteral feeding	11.15 $\pm$ 4.10	16.05 $\pm$ 2.04	-7.904	0.000**
Precaution	13.0 $\pm$ 4.397	17.73 $\pm$.96	-7.519	0.000**
Total	51.13 $\pm$ 17.328	73.4 $\pm$ 3.96	-9.379	0.000**
T Paired samples t-test, ** Statistically significant at p ≤ 0.001				

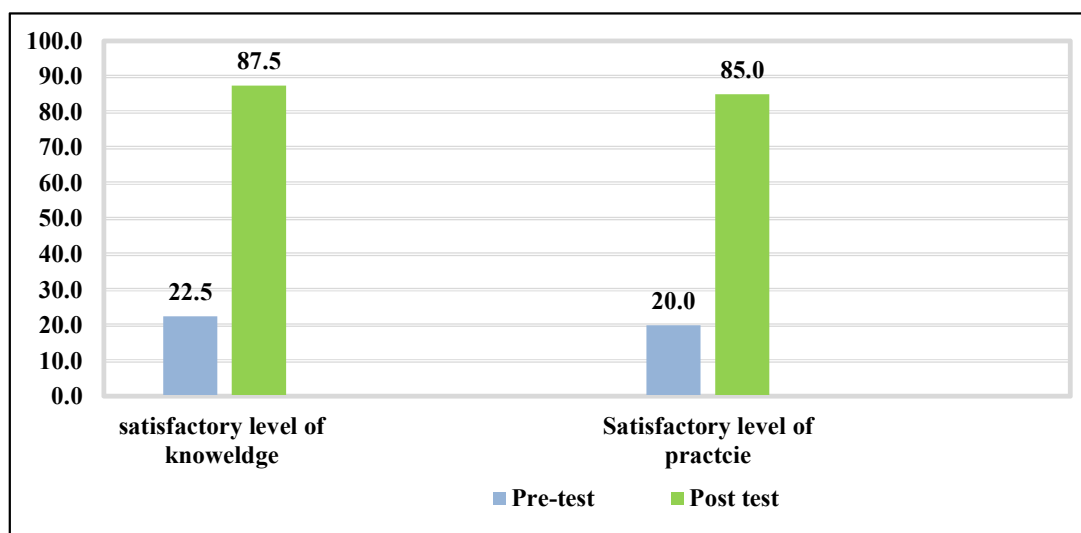


Figure (3): Comparison between total satisfactory level of knowledge and practice pre- and immediately post-implementation of the educational program n=40

Part IV: Correlations between study variables.

Table (6): Correlation between nurses' knowledge and practice regarding prevention of aspiration pneumonia and demographic data (n=40).

Items	Knowledge				Practice			
	Pre		Immediately post		Pre		Immediately post	
	r	P	r	P	r	P	r	P
Age	.063	.700	.098	.547	.072	.657	.101	.535
Gender	.182	.262	.052	.750	.164	.310	.205	.205
Educational level	.500**	.001	.407**	.009	.374*	.017	.502**	.001
Years of experience	.013	.934	.033	.842	.006	.971	.039	.812
Previous training course	.246	.126	.046	.779	.053	.743	.168	.299

r Pearson Correlation

Statistically significant at $P \leq 0.005$

Table (7): Correlations between nurses' total level of knowledge and total level of practices through two phases of the study (n=40).

Periods	Variables		
		r	P
Pre –program	Knowledge &Practice	0.457*	.003*
Post –program	Knowledge &Practice	.658	.000**

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

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

Discussion

This study aimed to evaluate the effectiveness of a structured educational program on enhancing nurses' knowledge and clinical performance in preventing aspiration pneumonia among patients with stroke. The discussion is structured into four primary areas: demographic characteristics of the study sample, knowledge levels, clinical practice performance, and the correlation between knowledge and practice.

1. Demographic Characteristics of the Studied Nurses

The study included 40 nurses, with the majority (over two-thirds) aged between 20 and 30 years. This demographic distribution aligns with findings from **Ismail et al. (2022)**, who also reported a predominance of younger nurses in similar educational interventions. The high representation of newly graduated

nurses may be attributed to the demanding nature of intensive care unit (ICU) work, which tends to be assigned to younger personnel due to their physical endurance and recent training. Additionally, most participants were graduates of technical nursing institutes.

In terms of gender, slightly more than half of the nurses were female. This result is consistent with **Abd El-Hamid et al. (2021)**, reflecting the ongoing gender distribution trends within the nursing profession. Regarding educational qualifications, approximately two-thirds of the participants held diplomas from technical institutes, a finding differing from **Ismail et al. (2022)**, who reported a majority with nursing diplomas. This discrepancy may be influenced by institutional policies at Beni-Suef University Hospital, where graduates from local

technical institutes are often appointed directly and restricted from working in other healthcare sectors.

Most of the nurses had fewer than five years of experience in stroke care, which is in agreement with **Abd-Alla et al. (2016)**. This could be due to high staff turnover in critical care environments, as well as the recruitment of recently graduated nurses to manage staffing shortages. The vast majority of participants had not attended prior training programs on aspiration pneumonia prevention, highlighting a critical gap in ongoing professional development. This lack of training underscores the necessity of structured educational interventions and reflects similar findings by **Ebraheim et al. (2024)**, who identified insufficient access to training on cerebrovascular care among nursing staff.

2. Nurses' Knowledge Before and After Program Implementation

The study demonstrated significant improvements in nurses' knowledge following the educational intervention. Prior to the program, fewer than one-third of the participants exhibited satisfactory knowledge related to stroke and aspiration pneumonia prevention. This percentage rose to over two-thirds immediately after program completion.

These findings support those of **Abd-Alla et al. (2016)** and **Ebraheim et al. (2024)**, both of whom documented similar gains in knowledge post-intervention. The improvement is likely due to the appropriateness of the educational content, the use of engaging and accessible teaching strategies, and the availability of an Arabic-language educational booklet that reinforced learning.

Knowledge gains were particularly notable in areas related to dysphagia and aspiration pneumonia, with the proportion of nurses demonstrating satisfactory knowledge increasing from less than one-third to approximately two-thirds. These results are in alignment with **Behairy et al. (2022)**, who also reported significant improvements in post-intervention knowledge of dysphagia and associated complications.

3. Clinical Practice Performance

Significant improvements were also observed in nurses' clinical practice post-program. prior to the intervention, fewer than one-quarter of participants demonstrated competent practice in essential procedures such as oral care and aspiration prevention. Post-intervention, this percentage increased to more than two-thirds,

indicating marked improvement in clinical competency.

These results are consistent with those reported by **Seedat and Penn (2016)**, as well as **Behairy et al. (2022)**, both of whom highlighted the effectiveness of educational programs in improving nurses' procedural competencies.

A substantial improvement was also noted in enteral feeding practices, where performance improved from one-quarter to over two-thirds post-intervention. This suggests that hands-on training, particularly through demonstration and re-demonstration, was effective in translating knowledge into practice. Moreover, the lack of previous training and procedural guidelines may have contributed to the pronounced learning gains.

Overall, the study revealed a statistically significant enhancement in total clinical practice performance corroborating the findings of **Abd-Alla et al. (2016)**, who similarly reported improved practice scores following educational interventions.

4. Correlation Between Knowledge and Practice

Post-intervention analysis revealed a statistically significant positive correlation between knowledge acquisition and clinical practice performance. This finding aligns with Syahrin et al. (2022), who also

identified a direct association between increased nursing knowledge and improved clinical application.

The results of this study support the initial hypothesis that structured, simulation-based educational programs are effective in enhancing both the knowledge and clinical practice of nurses in aspiration pneumonia prevention.

Conclusion

The implementation of a structured educational program had a significant positive impact on nurses' performance—both in terms of knowledge and clinical practice—regarding the prevention of aspiration pneumonia among stroke patients. The findings affirm the study hypothesis and demonstrate that targeted educational interventions are effective in bridging knowledge-practice gaps in critical care nursing.

Recommendations

-Expansion and Scaling: Reapplication of the study on a larger and more diverse sample is recommended to validate and generalize the findings.

-Institutional Integration: Hospitals, particularly those with stroke units, should integrate similar educational programs into their continuing professional development strategies.

-Development of Resources:

Establishment of procedural manuals and readily accessible educational materials in the local language could further support sustainable learning and improve care outcomes.

-Regular Training: Periodic refresher courses and simulation-based workshops should be implemented to ensure sustained competency among nursing staff.

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The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Author Contribution

The author expresses gratitude to GS for their contributions to the research study, and data collection. NM. conducted the literature review, WK performed statistical analysis, AS helped design the study, contributed to data acquisition, and all authors approved the final version, agreeing to be accountable for all aspects of the work.

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Mothers' Perceptions of Potential Threats Associated with Epilepsy in their Children

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Abstract

Background: Mothers are often the primary caregivers who closely monitor their children with epilepsy and manage seizures and its related complications. They often experience multiple threats that affected their children's health and ability to function normally. **Aim:** the present study aim was to assess mothers' perceptions of potential threats associated with epilepsy in their children. **Research design:** A descriptive research design was utilized. **Subjects:** Purposive sampling of 120 mothers of children complaining of epilepsy was included. **Setting:** the study was conducted at Neurological Outpatient Clinic at Tanta Main University Hospital. **Tools:** Two tools were utilized. **Tool (I)** Epilepsy Knowledge Questionnaire. **Tool (II)** Mothers Perception of Epilepsy Threats. **Results:** slightly more than half of the mothers (55%) had moderate level of total knowledge regarding epilepsy. It was evident that, most of the mothers (88.3%) had negative perception toward physical threats followed by social threats 75% and psychological threats 70%. **Conclusion:** Based on the results of the present study, it can be concluded that, the majority of the studied mothers had negative perception regarding physical threats. Nearly three quarters of the mothers had negative attitude toward psychological and social threats. **Recommendation:** Educational instructions must be designed for mothers to raise their awareness about childhood epilepsy.

Key words: Children, Epilepsy, Mothers, Perception & Threats.

Introduction

Epilepsy is one of the most common disorders of the nervous system. It is a progressive and complex disease with unpredictable and debilitating nature. It is a brain condition that causes a child to have seizures. Epilepsy leads to neuro-biological, cognitive, psychological and social consequences in children, and can have a major impact on their development (Falco, 2020).

International League Against Epilepsy (ILAE) 2018 suggests that, epilepsy is a neurological disease that can be defined by the recurrence of at least two unprovoked seizures more than 24 hours apart, one unprovoked seizure and a probability of further seizures similar to the general recurrence risk after two unprovoked seizures, or diagnosis of an epilepsy syndrome (Fisher, Cross, & French, et al., 2021).

Epilepsy causes repeated seizures, which are sudden burst of rhythmic discharges of electrical activity in the brain that causes an alteration in sensation, behavior, or consciousness (Pearl, 2020). Epilepsy is the commonest neurological disorder affecting 11 million children worldwide. One of 150 children has epilepsy during the first 10 years of their life. The incidence is 149 / 100.000 among low to middle income countries, and

43.4 / 100.00 in developed countries (Truls, Morten, & Ragnhild, et al., 2025). Prevalence of childhood epilepsy in Egypt was 123 /1000 per year with higher prevalence among children less than 12 years than adolescents (Farghaly, Abd Elhamed,& Hassan, et al., 2021). More than half of affected children (59.4%) had idiopathic epilepsy (Kisk, Hosny, & Bodry, et al., 2024).

The causes of epilepsy in childhood vary. It may be unknown (67.6%), congenital (20%), trauma (4.7%), infection (4%), stroke (1.5%), tumors (1.5%), and degenerative (0.7%) (Mond, Duke, & Vince, 2020). Epilepsy can be categorized depending on level of consciousness. Complex seizure occurs when there is a change in consciousness, and simple seizure occurs when there is no change in consciousness (Falco, 2020).

Management of epilepsy requires integration and cooperation among health care team to improve child's prognosis. The goal of epilepsy treatment is to control, stop, or reduce seizures (Striano,& Minassian, 2020).

Epilepsy affects children in various ways, going beyond the physical health challenges to influence their emotional and social development. Many children with epilepsy live in

constant fear of when the next seizure will occur, leading to reduced children's confidence in engaging in daily activities (Soltanifar, Salimi, & Norbakhsh, et al., 2018).

Mothers are mostly the primary caregivers of children with epilepsy (Tavares, Anderson, & Ferro, et al., 2021). They perceive a number of threats that may be physically due to seizures-related injuries, socially including stigma, bullying, and isolation of their children. In addition to educational threats such as learning disabilities, or reduced academic performance. Psychological threats also perceived by mothers like anxiety, depression, and fear (Benson, Lambert, & Gallagher, et al., 2022).

Pediatric nurses have key role in educating mothers to manage their children's illness. Core dimensions of their role toward mothers of children with epilepsy includes performing comprehensive assessment to tailor child's care plan, engage mothers in their child's care, and provide them with necessary knowledge to enhance their perception of the disease process (Hockenberry, & Wilson, 2023).

Pediatric nurses should also, assess how mothers' perceived threats that encounter epilepsy. By building trust

and maintain open communication, nurses can encourage mothers to express their fears, and concerns about epilepsy, caregiving behaviors, and the child's overall wellbeing (Higgins, Downes, & Varley, et al., 2019; Pfafflin, Schmitz, & May, 2022).

Significance of the study:

Epilepsy is unpredictable, chronic, and debilitating childhood morbidities world-wide. It is often associated with significant developmental, physical, psychological, and social health implications. It is a disorder that affects not only the child but also their mothers (Horaib, Alshamsi, & Zabeeri, et al., 2021).

Nurses play a critical role in supporting mothers of epileptic children. By understanding mothers' perception of epilepsy threats, nurses can tailor education, emotional support, and care strategies to reduce their stress, improve child's safety, and enhance quality of life (Higgins et al., 2019). Therefore, this study was carried out to assess mothers' perception of epilepsy threats to their children.

Aim of the study was to:

The present study aim was to assess Mothers' perceptions of potential threats associated with epilepsy in their children.

Research Question:

What are the most common epilepsy threats perceived by mothers of children with epilepsy?

Subjects and Method:**Research Design**

A descriptive research design was utilized in the current study.

Setting

The present study was conducted at Neurological Outpatient Clinic of Tanta Main University Hospital, confined to the Ministry of Higher Education and Scientific Research.

Subjects

Purposive sampling of 120 mothers accompanied their children with epilepsy, and actively involved in their care were included in the study.

Tools for data collection

Two tools were utilized to collect data in this study:

Tool (I): Epilepsy Knowledge Questionnaire:

It was developed by the researcher and it consisted of two parts:

Part (1): Mothers' socio-demographic characteristics such as: age, educational level, residence, job, marital status, consanguinity, income, number of family members.

Part (2): Mothers' knowledge about epilepsy and epileptic seizures: It was developed by the researcher after reviewing the related literatures (Hockenberry et al., 2023; Nevin, Wakefield, &

Schilstra, et al., 2020; Morrison, Glick & Yin, 2019; Fisher et al., 2021): It included the following sub-items:

- A. Knowledge related to child's history of epilepsy as causes, and age at first seizure attack, duration, and frequency of epileptic seizure
- B. Knowledge about epilepsy and epileptic seizures as meaning, causes, manifestation, complication, and treatment of epilepsy. It also, included knowledge about triggers, and duration of epileptic seizures, signs and symptoms of aura, and safety measures during seizure.

The questionnaire sheet was scored from 0-2 grades, in which correct and complete answer take score two, correct and incomplete answer take one, while wrong or not known answers had zero score.

Mothers' knowledge was calculated and classified into:

- High level of knowledge from 75% - 100%.
- Moderate level of knowledge from 50 to < 75 %.
- Low level of knowledge from zero to < 50%.

Tool (II): Mothers' attitude toward Epilepsy Threats:

It was developed by the researcher after reviewing of recent and related literatures (Rani, Mphil, & Thomas, 2019; Shore, Austin,& Dunn, 2023; Pack, Morrell,&

Marcus, 2021). It was used to assess mothers' perception of epilepsy threats. It included physical threats as sleep deprivation and injuries, psychological threats as anxiety and depression, and social threats as stigma and discrimination.

Scoring system for mothers' perception was scored as follows:

Agree = 2, Neutral=1 & Disagree=0

The scores of these items were summed up and converted into percentage.

Mothers' attitude was calculated and classified into:

- **Negative** attitude $\geq 80\%$.
- **Positive** attitude $< 80\%$.

Method:

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, Tanta University and the responsible authorities of Tanta Main University Hospital.

2-Ethical considerations:

- a. Ethical approval code No. was 234/4/2023. It was obtained from the Faculty of Nursing Scientific Research Ethical Committee.
- b. Nature of the study didn't cause any harm or pain to the participated mothers.

c. Informed consent was obtained from mothers of children with epilepsy prior to data collection.

d. Confidentiality of information was maintained.

3-Tools Development: Two tools were developed by the researcher to collect the needed data.

4-Content validity: A jury of five experts in Pediatric Nursing checked the content validity and clarity of the questionnaire.

5-Pilot study: A pilot study was carried out on 12 mothers resampling 10 % of the sample. It was conducted to test clarity, applicability, feasibility of the tools and the necessary modifications were done. Pilot study was included in the study sample.

6-Reliability of tools: To test reliability of the tools cronbach's alpha test was done. It was 0.842 for tool (I), and 0.87 for tool (II) that indicated high reliability.

Mothers were interviewed individually at the Neurological Outpatient Clinic. Data was collected within 3 months.

Statistical analysis:

Statistical analysis using SPSS software was done. For quantitative data, Numbers and percentage were used. Mean and standard deviation was calculated.

Results:

Table (1) illustrates socio-demographic characteristics of the studied mothers. It was observed that, 40% of the studied mothers, aged between $30 < 40$ years old, with mean $\pm$ SD 33.616 ± 8.22 years. It was evident that, 38.3% of the mothers had secondary education and nearly equal percentage (26.7%) of them had primary and university education.

It was found that, about two thirds (61.7%) of the studied mothers lived in rural areas, and 63.3% of them weren't a working mothers. More than half of the studied mothers (53.3%) had 5-6 members in their family with mean $\pm$ SD 5.016 ± 1.333 .

Table (2) explains percentage distribution of the studied mothers' knowledge about child's epilepsy. It was clear that, more than two-thirds of the mothers (70%) reported that their children had epileptic seizures at any time of the day, and 60% of the seizures occurred once weekly. Most of the mothers (85%) mentioned that their children experienced generalized seizures and 43.3% had aura. Less than half of the mothers (46.1%) mentioned visual disturbances as a symptom of aura followed by hearing sounds 30.8% and 23.1% for feeling intense fear or joy.

Figure (1) explains mothers' knowledge about causes of epilepsy in their children. It was found that, nearly half of the studied mothers (48.3%) mentioned genetic causes, followed by 26.7% for infections of the nervous system and a minority of them (8.3%) didn't know the cause of epilepsy in their children.

Mothers' knowledge about duration of children's epileptic seizures was illustrated in **figure (2)**. It was revealed that, 43.3% of the mothers reported that the attack of seizure had lasted from 2-3 minutes, more than one-quarter (28.3%) their seizure attack lasted from 3-4 minutes and 11.7% had seizure attack for 1-2 minutes.

Regarding seizure triggering factors, it was noticed that, 40% of the mothers mentioned that their children exposed to seizure attack after missing treatment dose, 35% had seizure attack during watching T.V. and other screens, while excitement was the triggering factor in 11.7% of the studied children as illustrated in **figure (3)**.

Figure (4) presents mothers' knowledge about age of first seizure attack in their children. It was clear that, 50% of the children their first seizure attack had occurred before the first two years of life while more than one third of them (35%) reported first seizure attack during 2-

4 years of life and a minor percentage (6.7%) had first seizure attack at 6-8 years.

Total knowledge scores of the studied mothers regarding epilepsy and epileptic seizures were displayed in **table (3)**. It was observed that, more than one-third of the studied mothers (36.7%) had high level of knowledge about epilepsy and epileptic seizures while 55 % of them had moderate knowledge with Mean $\pm$ SD 13.033 $\pm$ 2.79.

Table (4) illustrates mothers' perception of epilepsy threats. Regarding physical threats, it was observed that, the majority of the studied mothers (90.8%) experienced sleep problems. An equal percentage of the mothers (95.9%) had reported stress and anxiety affected children's physical health, and children had difficulties in meeting their own health needs.

Concerning psychological threats, it was clear that, all the studied mothers (100%) and 97.5% mentioned that their children experienced sadness or depression and feeling worried as psychological threats respectively. Few percentages of the studied mothers (12.5%) had mentioned seeking psychological counseling or therapy for psychological threats to children. As regards social threats, most of the studied mothers (81.7%, 85.8%)

faced stigma or negative reactions, and had difficulties in accessing community or government support services. Nearly three quarters of the mothers (74.2%) had mentioned that epilepsy of children affected the ability to achieve their career goals and 58.3% of them reported that children's epilepsy had affected family relationship.

Table (5) explains mothers' total perception regarding epilepsy threats. It was evident that, most of the mothers (88.3%) had negative perception toward physical threats followed by social threats 75% and psychological threats 70%.

Table (1): Mothers' Socio-Demographic Characteristics (No. =120).

Socio-demographic characteristics	No. =12)	
	No.	%
Age in years:		
< 20	2	1.7
20<30	38	31.7
30<40	48	40.0
≥ 40	32	26.6
Mean ± SD	33.616 ± 8.22	
Educational level		
Illiterate	10	8.3
Primary education	32	26.7
Secondary education	46	38.3
University education	32	26.7
Residence		
Rural	74	61.7
Urban	46	38.3
Job		
Not working	76	63.3
Working	44	36.7
Number of family members		
3 - 4	44	36.7
5 - 6	64	53.3
7 - 8	12	10.0
Mean ± SD	5.016 ± 1.333	

Table (2): Mothers' Knowledge regarding Children's Epilepsy (No. =120).

Mothers' knowledge about child's epilepsy	No. =120	
	No.	%
Timing of epileptic seizures		
Morning	36	30.0
Any time of the day	84	70.0
Frequency of seizure		
Daily	48	40.0
Once weekly	72	60.0
Health problems associated with epilepsy		
Behavior disorders	40	33.3
Memory impairment	18	15.0
Attention deficit	10	8.3
All the above problems	52	43.4
Type of seizure		
Partial seizure	18	15.0
Generalized seizure	102	85.0
Presence of aura		
Yes	52	43.3
No	68	56.7
Symptoms of aura		
Visual disturbances	24	46.1
Feeling intense fear or joy	12	23.1
Hearing sounds such as buzzing	16	30.8

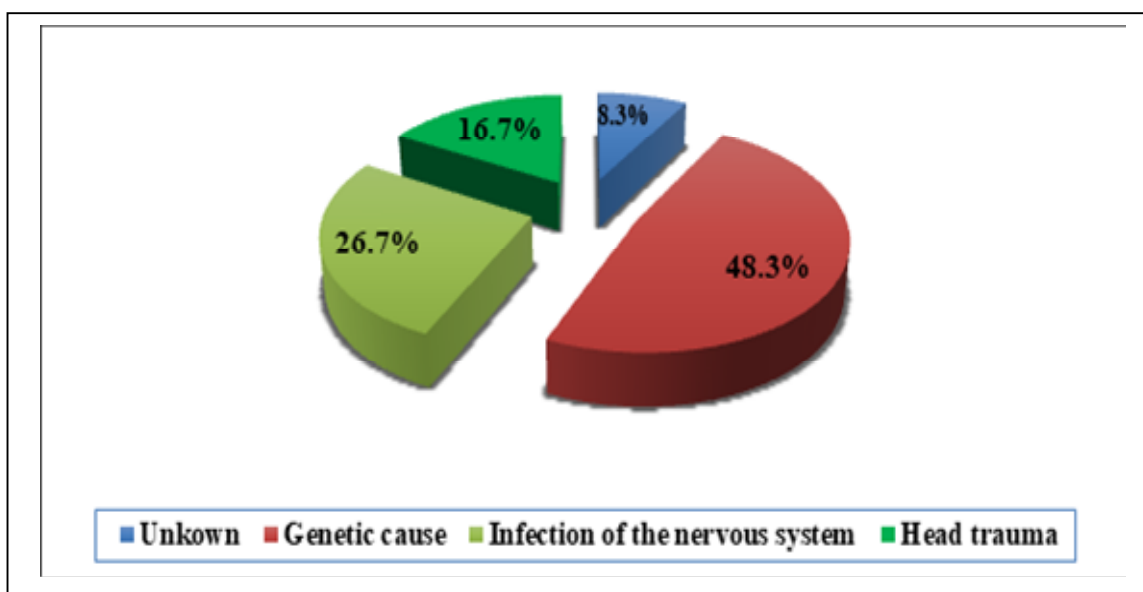


Figure (1): Mothers' Knowledge about Causes of Epilepsy in their Children.

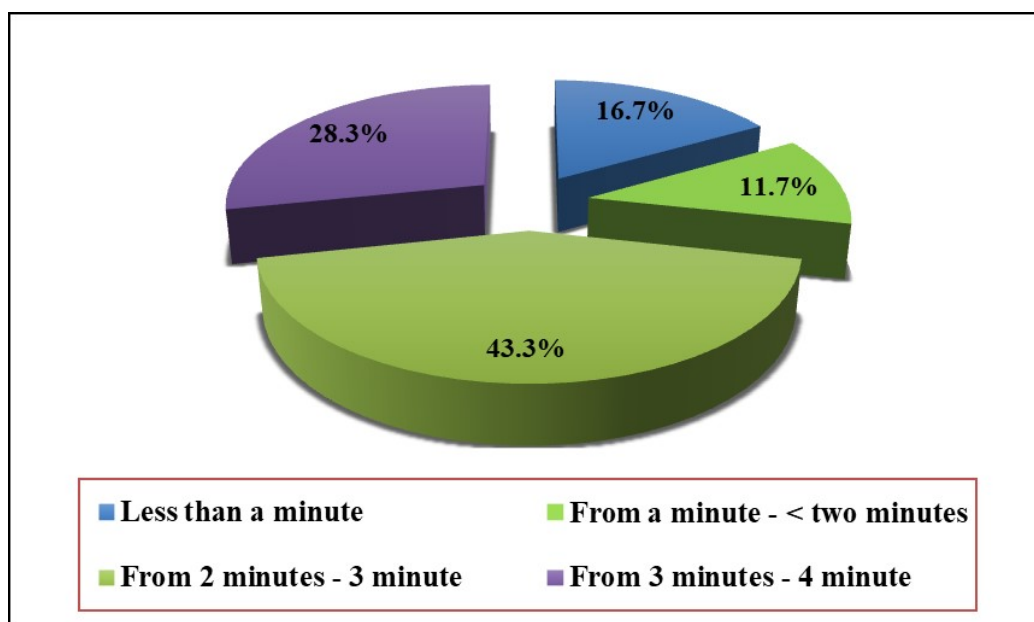


Figure (2) Duration of Epileptic Seizures as Mentioned by Mothers / Minutes

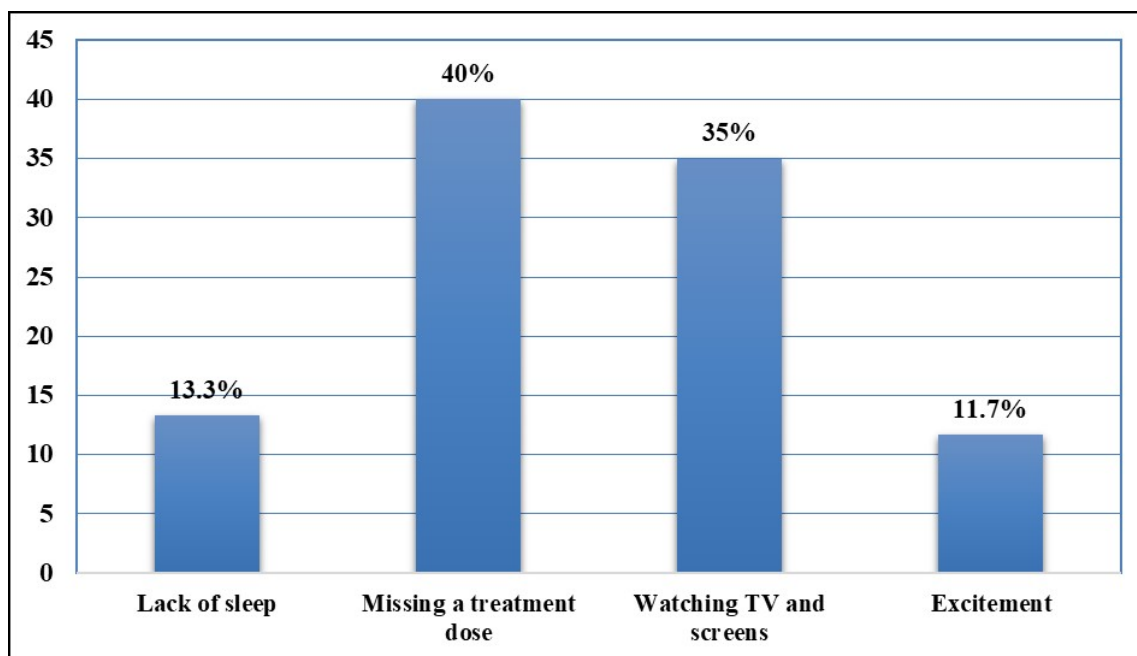


Figure (3) Mothers' Knowledge regarding Seizures Triggering Factors

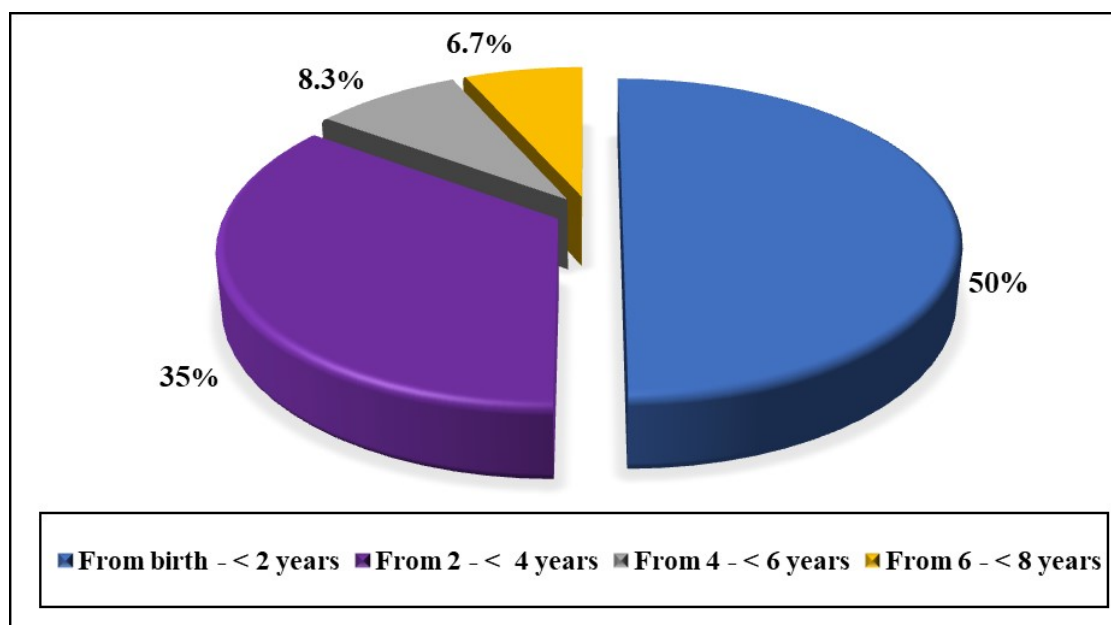


Figure (4) Mothers' Knowledge regarding Age of First Seizures Attack/Years

Table (3): Mothers Total Knowledge Regarding Epilepsy and Epileptic Seizures. (n=120)

Mothers' total level of knowledge.	No.	%
Low level	10	8.3
Moderate level	66	55.0
High level	44	36.7
Mean $\pm$ SD	13.033 $\pm$ 2.79	

Table (4): Mothers' Perception of Epilepsy Threats (n=120).

Mothers' perception of epilepsy threats.	Agree		Neutral		Disagree	
	No	%	No	%	No	%
Physical Threats						
Suffering from severe exhaustion.	102	85.0	5	4.1	13	10.9
Experiencing sleep problems.	109	90.8	3	2.6	8	6.6
Stress and anxiety affected physical health.	115	95.9	5	4.1	0	0.0
Suffering from injuries.	76	63.3	0	0.0	44	36.7
Difficulties meeting their own health needs.	115	95.9	0	0.0	5	4.1
Psychological Threats						
Feeling worried.	117	97.5	3	2.5	0	0.0
Feelings of sadness or depression.	120	100	0	0.0	0	0.0
Feeling lonely or isolated.	90	75.0	0	0.0	30	25.0
Feeling guilty.	77	64.2	0	0.0	43	35.8
Seeking psychological counseling or therapy.	15	12.5	0	0.0	105	87.5
Social Threats						
Facing stigma or negative reactions.	98	81.7	0	0.0	22	18.3
Epilepsy affected family relationships.	70	58.3	0	0.0	50	41.7
Epilepsy affected ability to achieve career goals.	89	74.2	0	0.0	31	25.8
Difficulties to access community services.	103	85.8	0	0.0	17	14.2

Table (5): Mothers' Total Perception Regarding Epilepsy Threats. (n=120)

Mothers' total level of perception	Negative		Positive	
	No	%	No	%
Physical threats	106	88.3	14	11.7
Psychological threats	84	70.0	36	30.0
Social threats	90	75.0	30	25.0
Mean ± SD	26.67±11.37			

Discussion

Epilepsy is a chronic neurological disorder, characterized by recurrent unprovoked seizures (**Beghi, 2020**). It starts in childhood in 60% of cases and most of the clinically significant aspects of the disease occur during childhood (**Truls, et al., 2025**).

Epilepsy can significantly disrupt children and family life owing to its chronic course, need for regular medications use, adverse effects, and its associated stigma with social constraints. (**Hansen, Szaflarski, Bebin, & Szaflarski, 2018**).

Mothers' role is crucial in the management of children with epilepsy before, during, and after the seizures. Mothers of epileptic children may perceive many threats, and fears about their children. So, it is important for pediatric nurses to assess these threats in order to alleviate it (**Tavares et al, 2021**).

In relation to the studied mothers' knowledge about causes epilepsy, half

of the studied mothers mentioned genetic predisposition as a cause of epilepsy in children, while more than one-quarter of them mentioned infections of the nervous system. From researcher point of view, this results may be due to about two-thirds of the studied mothers were from rural areas where consanguineous marriage was common.

A study done by **Farghaly et al., (2021)** about "Prevalence of childhood and adolescence epilepsy in Upper Egypt" weren't in harmony with the current results as they found epilepsy was idiopathic in two-thirds of children in their study.

Regarding type of seizure, the current study ruled out that, most of the mothers mentioned that their children had generalized seizure. This was in agreement with **Farghaly et al., (2021)** who stated that, generalized seizures were more frequent in childhood. On contrary, **Pokharel,**

Poude,& Sami Lama, et al., (2020) who carried out a study to “assess burden and its predictors among caregivers of patients with epilepsy” weren’t congruent with this finding and found that, more than half of the children had focal onset of seizures.

Concerning presence of aura before seizure attack, the present study showed that, more than half of the studied children didn’t experience aura before seizure attack. This may be justified by the majority of the studied children had generalized seizures, and auras are more common in focal seizures. **Shahin,& Hussien (2021)** in their study about “knowledge, attitude, practice, and self-efficacy of caregivers of children with epilepsy” were in the same line, and ruled out that, most of their studied children didn’t have aura before seizures.

It was clear that, half of the studied children their first seizure attack occurred before the first two years of life. This may be attributed to decreased seizure threshold of the immature brain among young children. This finding was consistent with **Farghaly et al., (2021)** who found that, most of seizures occurred during infancy and early childhood.

In relation to the studied mothers’ knowledge about epilepsy and epileptic seizures, it was clear that, more than half of the studied mothers

gave correct and complete answers related to meaning of epilepsy. This could be justified by; many of the studied children had epilepsy at a younger age which made mothers familiar with its meaning.

In congruence with the current results, **Nagan, Caffarelli & Donatelli, et al., (2017)** conducted a study to assess “parental knowledge and misconceptions about epilepsy” and reported that, about two-thirds of the parents of children with epilepsy had sufficient knowledge about definition and nature of epilepsy and its seizures.

Regarding causes and treatment of epilepsy, about one-quarter of the studied mothers gave correct and complete answers about causes and few percentages knew treatment of epilepsy. This may be attributed to low educational level of the studied mothers. A study performed by **Hamaad & Alseraty (2019)** about “Impacts of seizure care simulation intervention on mothers’ of epileptic children efficiency, believes, anxiety and seizure care” was in the same line with the current results. They ruled out that, only few percentages of the studied mothers gave correct answers about causes of epilepsy in their study. Also, a study conducted by **Shahin et al., (2021)** were in harmony with the current findings as they found marked decrease in

mothers' knowledge of epilepsy especially regarding medical treatment.

Regarding mothers' total knowledge about epilepsy and epileptic seizures; it was observed that, about one-third of the studied mothers had high level of knowledge related to epilepsy and epileptic seizures. This could be attributed to mothers' low educational level, whereas more than one quarter of them had primary education. Also, about two-thirds of the studied mothers lived in rural areas that make access to health services is not easy. All these factors may precipitate to low knowledge level.

This finding was consistent with **Turan, Sefika,& Yangoz (2022)** in their study entitled "effect of educational interventions on level of epilepsy knowledge in children with epilepsy and their parent", and a study conducted by **Akbas,& Kartal(2022)** addressed "knowledge, attitudes, and behaviors of parents regarding epilepsy" who proved that, the parents in their studies had poor knowledge.

The current results were in harmony with **El-Amin, El-Sadig & Mohamed (2021)** who carried out a study about "knowledge, attitudes, and practices of caregivers of children with epilepsy in Sudan" and revealed that, caregivers had deficiency in knowledge level and required

periodic educational programs about epilepsy.

Regarding mothers' perception of epilepsy threats, It was clear that, the majority of mothers feared from epilepsy stigma, complications, leaving children alone after mothers' death, and fear of the unknown. From researcher point of view, this may be due to chronic nature of epilepsy, and its associated stigma.

In the same line a study of **Verna & Minu (2021)** entitled "A study to assess the effectiveness of video assisted teaching program on knowledge regarding seizure among mothers of under five children" reported that, majority of the studied mothers had many epilepsy threats.

This result also, was in agreement with the study carried out by **Sheijani, Chehrzad, & Reza, et al., (2020)** whose study was "evaluate effect of creating opportunities for empowerment program on parents of children with epilepsy", and their findings indicated that, the majority of the studied mothers had many epilepsy threats.

Conclusion and Recommendations:

Conclusion

Based on the results of the present study, it can be concluded that, the majority of the studied mothers had negative perception towards physical, social and psychological threats facing their children with epilepsy.

Recommendations

The following recommendations are suggested:

1. Regular & continuous educational programs should be conducted to enhance mothers' knowledge and practice regarding care of their children with seizure.
2. Manual booklet and brochures about epilepsy and seizure management in a simple Arabic language must be available at Neurological Outpatient Clinic.
3. Psycho-social support and counseling services for mothers to address emotional stress, fears, and misconceptions related to epilepsy.
4. Community awareness programs should be tailored to suit cultural beliefs and values of the mothers, especially in communities where epilepsy is stigmatized.
5. Further researches should be conducted on a larger sample of children from different ages to achieve generalizability.

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Relationship between Body Mass Index and Menstrual pattern among Female Nursing Students

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Abstract

Background: Adolescence is a stage of maturation and a time of social, psychological, emotional, and physical transformation. Menstruation, is a physical expression of the intricate endocrine system and the ultimate indication of femininity. Being overweight, obese, or underweight can result in irregular ovulation. **Aim:** To evaluate the relationship between BMI and menstrual pattern among female nursing students at El Fayoum University. **Design:** A Comparative Descriptive Study design was used. **Setting:** The study was carried out at Faculty of Nursing El Fayoum University, Egypt. **Sample:** Two Groups of nursing students (n=200) (100 obese students and 100 non-obese students). **Tools:** Four tools were used for data collection. **Tool I:** A Structured interviewing questionnaire: Included (A) Socio demographic data. (B) Food habits of female students. (C) Menstrual assessment **Tool II:** Premenstrual symptoms assessment. **Tool III:** Assessment of intensity of menstrual pain. **Tool (IV):** BMI Assessment Sheet. **Results:** The findings of present study revealed that there was highly statistically significant negative correlation between BMI and pain intensity during menstrual cycle among the studied none obese female nursing students. While, there was highly statistically significant positive correlation between BMI and pain intensity during menstrual cycle among the studied obese female nursing students. **Conclusion:** According to the study's findings, high and low BMI have a negative effect on the menstrual cycle. Lifestyle changes and dietary guidance could help with menstrual issues. **Recommendation:** The study suggests implementing an educational program for adolescent's females to promote their awareness about the role that lifestyle and dietary factors have in reducing the symptoms of menstrual distress.

Keywords: Menstrual pattern– Body mass index -Adolescent female students.

Introduction:

The menstrual cycle is a physiological alteration that occurs during woman's reproductive age. It involves modifications to the structure, function of the endometrium and reproductive hormones production. It is calculated starting on the first day of one menstruation and ending on the first day of the next. Normal cycle lasts between 21 to 35 days on average and in teenagers, it can last up to 45 days **(Desmawati, D., Berliani, H., & Utama, B. I. 2024)**. Adolescence is the developmental stage that lasts from puberty until early adulthood. Its quick growth is one of its defining characteristics. There is a tight relationship between nutrition and the teenage transition because eating habits and behaviors are influenced by a variety of factors, such as body image, mass media, social pressure, parental modeling, food availability, food preferences, cost, and convenience. **(Daly., O'Sullivan & Kearney 2022)**.

Every woman's menstruation is a significant event in her life since it signifies the passage from girlhood to womanhood. It is a normal and necessary aspect of the reproductive cycle and represents the capacity for conception and childbearing as well as the possibility of fertility. A woman's general health and well-being are also thought to be significantly influenced by

it. Menstrual health and well-being maintenance is also complicated and impacted by a number of psychological, physiological, social, and economic issues. Menstrual flow ranges from 30 to 80 milliliters per cycle, with the first three cycles seeing the most bleeding. Any departure from the typical features of the menstrual cycle could be a sign of hormone imbalances or other menstrual cycle-affecting factors **(De Silva & Tyson, 2024)**.

The regularity of the menstrual cycle is influenced by a number of factors, including body mass index (BMI), physical activity, nutritional condition, daily sleeping hours, exposure to smoking, and psychological issues. College students lead extremely stressful lives, and because of their poor eating habits and sedentary lifestyles, they are more prone to several menstruation irregularities **(Verma et al., 2020)**.

Excessive fat accumulation brought on by a long-term imbalance between energy intake and expenditure is known as obesity. It negatively impacts the human body, especially the health of the reproductive system. Obese women in particular frequently experience menstrual disorders and are disrupted by the pituitary-ovarian-hypothalamic axis. Women with high body fat will have an impact on the estrogen hormone production, in addition to the ovaries,

adipose tissue also produces estrogen, which causes it to be abnormally high. The menstrual cycle may be disturbed as a result of this imbalanced hormones production. **(Czlapka-Matyasik et al., 2025).**

A popular anthropometric tool for estimating an individual's underweight or overweight status in adults and adolescents is the body mass index (BMI). It shows the individual's current state of health. The WHO states that a BMI of less than 18.5 indicates underweight, between 18.5 and 24.9 indicates normal weight, between 25.0 and 29.9 indicates overweight, and greater than 30.0 indicates obesity **(Sarita& Jitendra K, 2019).**

The menstrual cycle is associated with body mass index (BMI). This is because a woman's menstrual cycle can be influenced by her BMI through the hormone estrogen. The ovaries, placenta, adrenal glands, and adipose tissue all produce estrogen. It is well known that eating too many calories and gaining a lot of weight can raise blood estrogen levels. It has increased androgens in addition to a significant increase in body fat. It is well known that granulosa cells and adipose tissue will aromatize androgens into estrogen. Negative feedback on GnRH secretion will be triggered by elevated blood estrogen levels **(Desmawati et al., 2024).** Menstrual irregularities are a prevalent

problem that affects women all over the world. They impact 75% of teenage girls and are becoming more and more important causes of gynecological visits. Approximately 87% of female students in Egypt experience irregular periods. Frequently, menstruation irregularities affect university students' everyday lives. But this problem frequently gets little attention, especially in underdeveloped nations. **(Nicola Ghatas et al, 2024).**

Among these irregularities include premenstrual syndrome (PMS), dysmenorrhea, menorrhagia, hypomenorrhea, polymenorrhea, oligomenorrhea, amenorrhea, and other substantial alterations in the interval, duration, or amount of menstrual flow in comparison to the normal menstrual cycle **(Attia et al., 2023).**

Accordingly, dietary practices can induce on a number of menstrual abnormalities and considered one of the potential influences on women's general health. A healthy diet, which includes eating breakfast every day and avoiding junk food, is associated with better menstrual health. However, poor eating habits, such as consuming fast food, may raise the chance of menstruation problems **(Taheri et al., 2020).**

Centered around communities Health, nurse's involvement in encouraging teenagers to have healthy lives is vital. A nurse should therefore understand the

significance of health-promoting practices including stress reduction, physical exercise, good sleep hygiene, eating a balanced diet, and preserving positive relationships. The community's health will be influenced by nursing schools, however, as they can offer a suitable environment for teaching teenagers healthy behaviors. Vital signs checks are also frequently performed by nurses as part of a standard physical examination. As part of the Review of Systems, the American College of Obstetricians and Gynecologists (ACOG) published a committee opinion item recommending that the length of the menstrual cycle and the menstrual pattern be evaluated (**Abdel-Baset Taha et al., 2023**).

Significance of the study:

Adolescence is viewed in Egypt as a neglected time. However, it is a crucial transitional stage between childhood and adulthood, during which one grows, changes, and acquires the ability to procreate (**Bahari et al., 2021**). A 2019 survey called "100 million health" found that 39.8% of Egyptian adults (defined as those with a BMI of 30 kg/m²) were obese, screening 49.7 million adults aged 18 and over. Adult females in Egypt were more likely than adult males to be obese (49.5%) compared to 29.5% of adult males (**Aboulghate et al., 2021**). Menstrual abnormalities are the primary cause of gynecological appointments, affecting 75% of teenage girls.

Menstrual cycles are impacted by a number of hormonal changes that many undergraduate students experience as adolescents (**Odongo et al., 2023**). Understanding how obesity, or BMI, affects a woman's menstrual cycle is crucial for nursing students. However, there are a few nursing research in Egypt that attempt to evaluate how BMI affects menstruation issues. Therefore, the proposed study will aid in evaluating the connection between menstruation pattern and BMI.

Aim of study:

This study aimed to evaluate the relationship between BMI and menstrual pattern among female nursing students at El Fayoum University. **This aim will be achieved through:**

- 1- Estimating BMI among female nursing students.
- 2- Assessing menstrual pattern of female nursing students.
- 3- Evaluating the effect of BMI (Overweight) on menstrual pattern in female nursing students.
- 4-Assessing prevalence of obesity among females university students at faculty of nursing.

Research questions:

- 1-What is the prevalence of obesity among female nursing students?
- 2- What is the impact of obesity on menstrual pattern among female nursing students?

Subjects and Methods:**Research design:**

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

Setting:

The study was conducted at the faculty of Nursing – El Fayoum university, Egypt.

Type of Sample: A purposive sample selected by body mass index was used in this study.

Sample size:

A total of 200 nursing students with the studied criteria were selected. The total sample divided into two equal groups; 100 obese female students and 100 non obese female students.

Inclusion criteria:

Female nursing Students at age of adolescence.

Exclusion criteria:

Female nursing students who were married.

Being on treatment for menstrual problem.

Have primary amenorrhoea.

Have undergone pelvic surgery.

Have any chronic disease.

Refuse participation in the study.

Female nursing students their age more than 20 years.

Tools of Data Collection:

Four tools were used for data collection in the present which developed by the researcher and revised by the experts to confirm its validity:

Tool I: Structured Interviewing Questionnaire:

It developed based on the review of currently related literature and used by the researcher to collect the data needed on the subjects of the study It comprised of three parts:

a. Part 1: Socio-demographic characteristics of female nursing students: It was used to assess; age, residence, grade of education, work beside study, mother educational level, and family income level.

b. Part 2: Food habits of female nursing students: It was used to assess; regularity of meal times, eating breakfast daily, having fast food, entertainment and soft drinks, the way of cooking food, following a specific diet.

c. Part 3: Menstrual history of female nursing students: It was used to assess age of menarche, regularity of the cycle, duration of menstruation, amount of menstrual bleeding, interval of cycle and the form and color of menstrual blood, any interruption occur in menstrual cycle and its period and knowledge of the adolescent girl regarding general reasons that lead to irregular menstrual cycle. Time and site of dysmenorrheal pain.

Tool II: Severity of premenstrual symptoms assessment:

This tool was adapted from (Elnagar & Awed, 2015), modified by the researcher

and consisted of 26 items and included three major symptoms:

Part I: Physical symptoms included 16 items.

Part II: Psychological symptoms included 6 items.

Part III: Behavioral symptoms included 4 items.

Scoring system for PMS severity:

Each item was scored on a 4-point Likert scale (0 = None, 1 = Mild, 2 = Moderate, 3 = Severe).

Degree of PMS

Mild Up to 47 points

Moderate 48- 72 points

Severe More than 73-96 points

Tool (III): Menstrual pain intensity assessment: By using Visual analog scale. This tool adopted from (Abou-Dakin, 2012). It used to examine the degree of pain occur during menstrual period and included ten points, each point is scored on a scale of 0 indicate (no pain), from 1: 3 (mild pain), 4:6 (moderate pain) and from 7:10 indicate (severe pain)

Tool (IV): BMI assessment sheet:

The BMI is Weight in kilograms divided by Height in meters squared (Weight (Kg)/Height (m)²).

-lower than 18.5 is considered as underweight

-Between 18.5 to 24.9 as normal weight

-25.0 to 29.9 as overweight

-Higher than 30.0 as obese.

Tools Validity:

The validity of the tools was ascertained by professors of subject area and three experts (juries) in the field of obstetric nursing, who reviewed each tool for content and internal validity. Also, they were asked to judge on items for relevance, completeness and clarity. Modification was done based on the comments.

Tools Reliability:

Regarding to the reliability, the researcher used Cronbach's Alpha test to tent the internal reliability.

Pilot Study:

A pilot study was conducted on a sample of 10% of the cases, which equal (20) girl's students from the studied sample (10 obese girls and 10 non obese girls) to evaluate clarity of the data collection tools. The sample of Pilot study was excluded from the studied sample. There were modifications in the time of all tools to save participants time.

Ethical approval:

An official permission to conduct the proposed study was obtained from the Scientific Research Ethics Committee of the Faculty of Nursing, El-Fayoum University. (20- 8- 2023). The study involved female nursing students who were informed about its purpose and objectives, obtained written consent, and had the option to withdraw at any point. Confidentiality was maintained throughout; ensuring female nursing students rights were protected.

Field of work:

-Data collection took place over three months, starting in early October 2023 and concluding at the end of December 2023. The researcher was attended to the faculty of nursing Fayoum university two days / week (Sunday and Thursday from 12pm: 2 pm) for the previous mentioned setting, attendance was, according to time table prepared by researcher to match what's suitable for student girls of the studied sample, all studied samples were selected according to inclusion criteria until the predetermined number of the studied sample is obtained.

-Data collection was carried out through: Interviewing and assessment meetings.

Interviewing and Assessment.

-In this meetings the researcher met adolescent girls' students and the purpose and nature of the study were explained and socio demographic and data of menstrual cycle among female nursing students (tool number I, II) were filled after taking the informed consent of the nursing students to participate in the study.

-After distributing the tools to studied sample at the suitable setting for girls' students (classes of the faculty), they were informed of how the questionnaires were to be filled in. The data collected was self-reported by the students.

-Then the researcher filled part (3) of questionnaire that includes (Weight,

Height, BMI and Classification of student according to BMI).

Statistical design:

The data which were obtained reviewed, prepared for computer entry, coded, analyzed and tabulated for some important results. The statistical package for social science (IBM SPSS – version (20). Appropriate statistical technique and testes of significance were used. In analysis and data collection.

-The chi - square test was used to compare quantitative items between groups.

-T-test was used to compare qualitative variable.

Degrees of significance of results were considered as follows:

- P-value > 0.05 Not significant (NS)

- P-value $\leq$ 0.05 Significant (S)

- P-value $\leq$ 0.01 Highly Significant (HS).

Administrative design:

Necessary official approval to conduct the study was obtained from the Dean of Faculty of Nursing - El Fayoum University for explanation of the nature and purpose of the study for the female nursing student before obtaining their written consent. All data were collected by the research.

Results:

Table (1): Shows socio demographic characteristics of students and illustrated that the mean age of the non-obese group was 19.16 ± 0.58 years, while mean age in

the obese group was 19.07 ± 0.60 years. (69.0% and 66.0%) of the obese and non-obese groups reside in rural areas, respectively. Also, (68.0% and 59.0%) of the obese and non-obese groups, respectively have insufficient income. there were no statistically significant differences between the two groups regarding all their socio demographic characteristic at ($p > 0.05$) and test results not valid.

Table (2): Shows the menstrual pattern of the student girls, illustrated that nearly two thirds of the obese group (65.0%) and more than three quarters of the non-obese students (76.0%) experienced menarche at the age range from 10 -16 years old. nearly half of the obese students (46.0%) reported having irregular menstrual cycle. While, the majority of the non-obese group (84.0%) have regular menstrual cycle, more than one quarter of the obese students (26.0%) have cycle length >35 days while about half of the non- obese students (52.0%) have cycle length 25-30 days, more than half of the obese students (56.0%) and about four fifth of the non-obese students (80.0%) reported have a duration of menstrual period between 3-7 days. However, about two fifth of the obese group (40.0%) reported more than 7days as a duration of menstrual period, more than two fifth of the obese group (48.0%) reported a heavy amount of menstrual blood while more than half of the non-obese students

(58.0%) reported moderate amount of menstrual blood and all the subjects of both groups (100.0%) reported suffering from abdominal and back pain during the menstrual period.

Table (3) and figure (1): Shows the severity of PMS of the studied students and illustrated that, more than half (52.0%) of the obese group have experienced moderate PMS. While, the majority of the non-obese group had reported mild PMS and showed highly statistically significant differences between the non-obese and obese groups ($X^2=47.09$, $p < 0.01$).

Figure (1): This figure reveals that, about three fifth of the obese group (60.0%) reported suffering from severe pain during their menstrual period while about half of the non-obese group (54.0%) reported suffering from moderate pain during menstrual period. However, (10.0%) of the obese students reported suffering from very severe pain during their menstrual period and (18.0%) of the non-obese group reported experience severe pain during their menstrual period.

Figure (3): Shows that about two fifth of the female university students at faculty of nursing have moderate pain during menstrual cycle. Also, near to two fifth of them have severe pain. While, less than one fifth of them have mild pain. Although about 5% of them experience very severe pain.

Figure (4): Displays that, more than half of the obese groups (58.0%) were overweight and (34.0%) were obese while about four fifth of the non-obese group have normal weight (80.0%) and (20.0%) were underweight.

Figure (5): Illustrates that about two fifth 40% of the female university students at faculty of nursing have normal weight and 10% were under weight. While, more than one fifth (29%) of them were overweight. Also, near to one fifth 17% of them were obese and 4% were extremely obese.

Table (4) Shows that, there was highly statistically significant relation between pain intensity during menstrual cycle among the studied obese female nursing students and their eating habits as eating meals on time regularly every day, eating daily breakfast before going to university, eating fast food, eating entertainment during the day, drinking soft drinks between meals, method of cooking food in home and following a specific diet at ($P = < 0.01$).

Table (5): Illustrates that, there was highly statistically significant relation between pain intensity during menstrual cycle among the studied obese female nursing students and their menstrual cycle regularity, menstrual cycle (days), duration of menstrual blood flow (days), amount of menstruation, sleeping during period, eating certain foods during period and history from interruption in

menstrual period at ($P = < 0.01$). Also, there was statistically significant relation with age of menarche, the form of menstrual bleeding, feeling during period at ($P = < 0.05$).

Table (6): Indicates that, there was highly statistically significant negative correlation between body mass index and pain intensity during menstrual cycle among the studied none obese female nursing students at ($P = < 0.01$). While, there was highly statistically significant positive correlation between body mass index and pain intensity during menstrual cycle among the studied obese female nursing students at ($P = < 0.01$).

Table (1): Socio demographic characteristics of the female nursing students in obese and non-obese groups

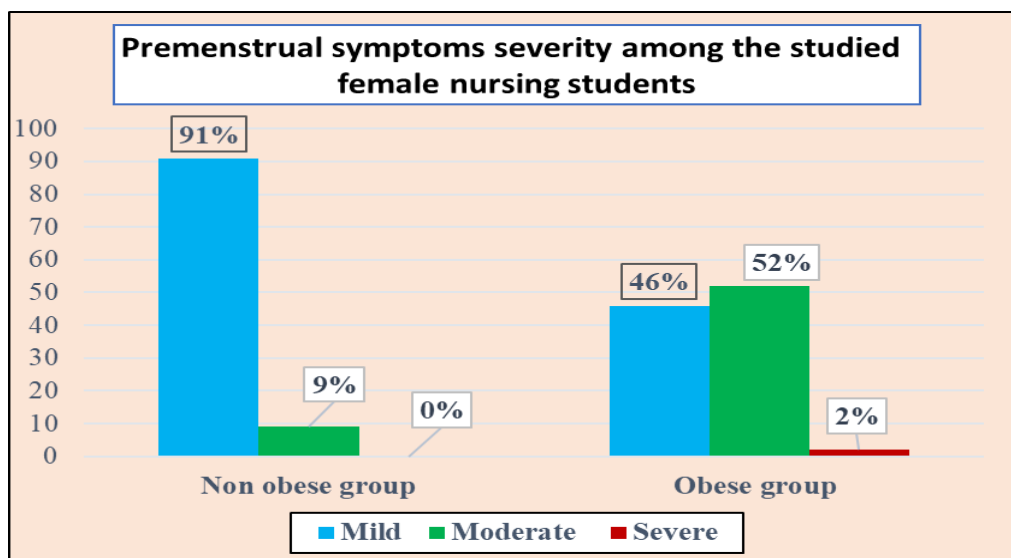
Socio demographic characteristics	Non obese group (n=100)		Obese group (n=100)		X ²	P-Value
	No.	%	No.	%		
Age					1.341	0.511
18 years	10	10.0	15	15.0		
19 years	64	64.0	63	63.0		
20 years	26	26.0	22	22.0		
Mean ± S.D	19.16±0.58		19.07±0.60		t=1.071	0.286
Grade					1.299	0.254
First	60	60.0	52	52.0		
Second	40	40.0	48	48.0		
Place of residence					0.205	0.651
Rural area	66	66.0	69	69.0		
Urban area	34	34.0	31	31.0		
Mother's education level					2.510	0.474
Illiterate	4	4.0	9	9.0		
Basic education	10	10.0	12	12.0		
Secondary education	64	64.0	57	57.0		
High education	22	22.0	22	22.0		
Working besides studying					0.101	0.750
Yes	26	26.0	28	28.0		
No	74	74.0	72	72.0		
Family Income Level					1.747	0.186
Sufficient	41	41.0	32	32.0		
Insufficient	59	59.0	68	68.0		

Table (2): Menstrual cycle data of the female nursing students. (n= 200)

Menstrual cycle data	Non obese group (n=100)		Obese group (n=100)		x ²	p-value
	no.	%	no.	%		
Age of menarche (years)					6.887	0.032*
<10 years	6	6.0	18	18.0		
10-16 years	76	76.0	65	65.0		
> 16 years	18	18.0	17	17.0		
Menstrual cycle regularity					21.03	0.000**
Yes	84	84.0	54	54.0		
No	16	16.0	46	46.0		
Menstrual cycle (days)					15.16	0.004**
<21	8	8.0	12	12.0		
21<25	22	22.0	21	21.0		
25<30	52	52.0	32	32.0		
30<35	10	10.0	9	9.0		
>35	8	8.0	26	26.0		
Duration of menstrual blood flow (days)					14.52	0.001**
<3	4	4.0	4	4.0		
3-7	80	80.0	56	56.0		
>7	16	16.0	40	40.0		
Number of sanitary pads do you use during period					25.16	0.000**
<8 pads	23	23.0	23	23.0		
8-10 pads	51	51.0	20	20.0		
11-12 pads	18	18.0	38	38.0		
>12 pads	8	8.0	19	19.0		
Amount of menstruation					37.19	0.000**
Scanty	7	7.0000	0	0.0		
Small	24	24.0	13	13.0		
Moderate	58	58.0	39	39.0		
Soaked/ heavy	11	11.0	48	48.0		
The bleeding of the menstrual period is in a form					44,44	0.000**
Liquid	90	90.0	20	20.0		
Coagulated	10	10.0	78	78.0		
Large blood clots	0	0.0	2	2.0		
The color of menstrual blood					4.082	0.121
Dark red	100	100.0	96	96.0		
Light red	0	0.0	4	4.0		
*Complain of any of troubles during period					26.41	0.003**
Pain in the abdomen and back	100	100.0	100	100.0		
Tendency to vomit	26	26.0	27	27.0		
Feeling cold	36	36.0	44	44.0		
Feeling tired and exhausted	82	82.0	87	87.0		

Table (3): Distribution of the studied female nursing students according to their premenstrual symptoms' severity. (n=200).

Levels of premenstrual symptoms' severity	Non obese group (n=100)		Obese group (n=100)		χ^2	P-value
	No.	%	No.	%		
Mild	91	91.0	46	46.0	47.09	0.000**
Moderate	9	9.0	52	52.0		
Severe	0	0.0	2	2.0		

**Figure (1): Percentage distribution of the studied female nursing students according to premenstrual symptoms' severity (n=200).**

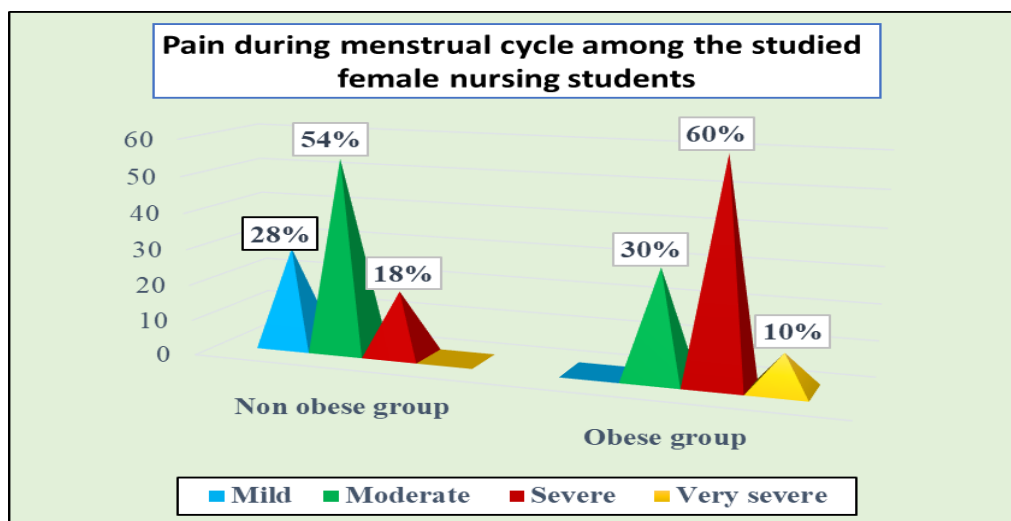


Figure (2): Percentage distribution of the studied female nursing students according to pain intensity during menstrual cycle (n=200) (100 obese students and 100 non-obese students)

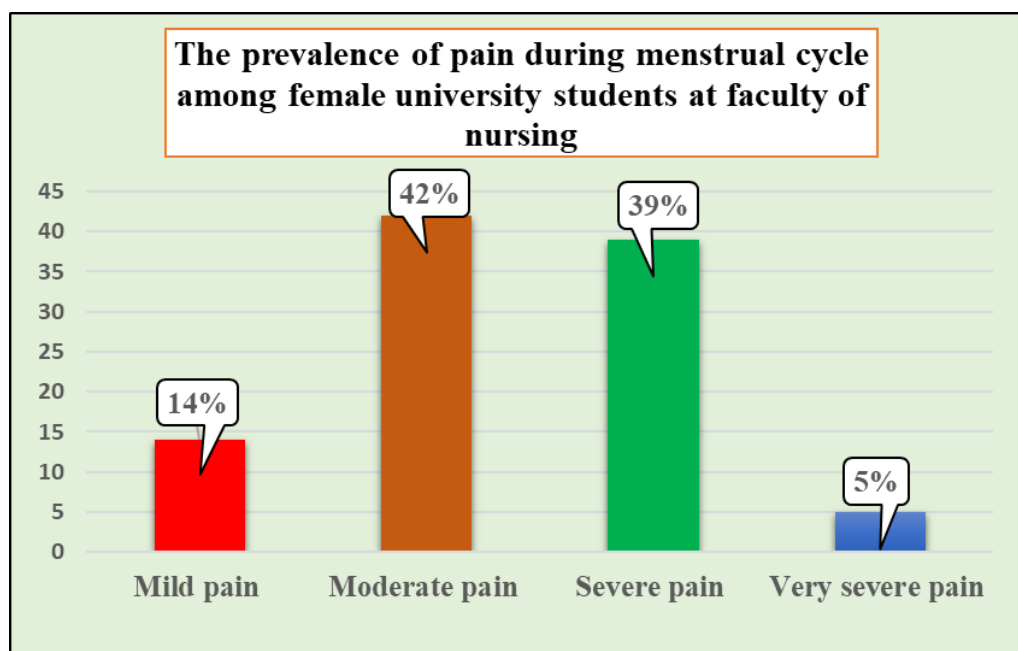


Figure (3): The prevalence of pain intensity during menstrual cycle among female university students at faculty of nursing (n=200).

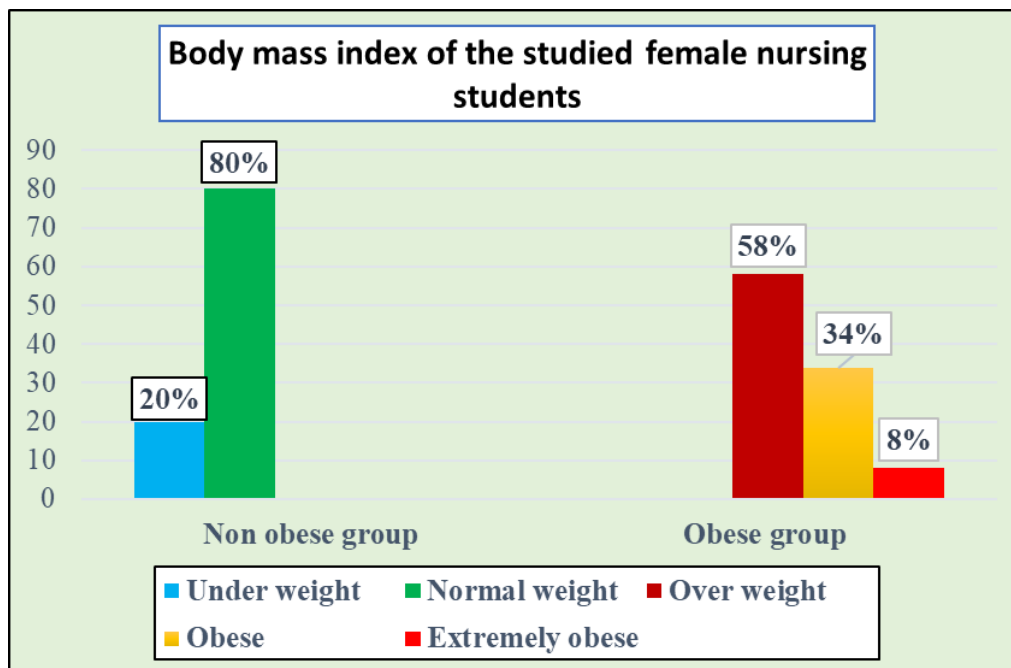


Figure (4): Percentage distribution of the studied female nursing students according to their body mass index (n=200).

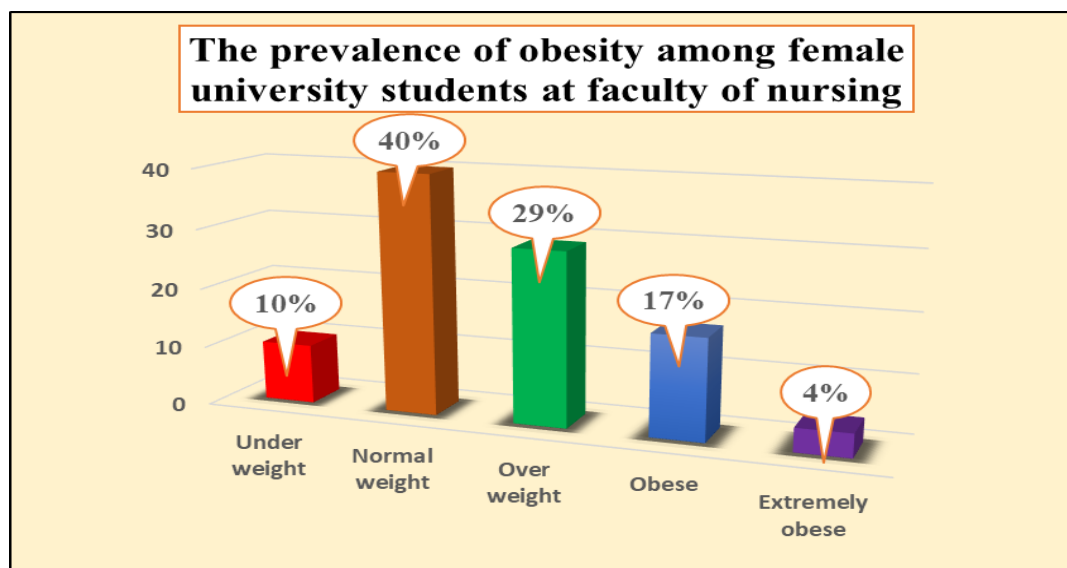


Figure (5): The prevalence of obesity among female university students at faculty of nursing.

Table (4): Relation between food habits of the studied obese female nursing students and their pain intensity during menstrual cycle (n=100).

Food habits		Pain Intensity during menstrual cycle						X ²	P- Value
		Moderate pain (n=30)		Severe pain (n=60)		Very severe pain (n=10)			
		No.	%	No.	%	No.	%		
Eating meals on time regularly every day	Yes	8	26.7	0	0.0	0	0.0	90.77	0.000**
	No	1	3.3	59	98.3	10	100.0		
	Sometimes	21	70.0	1	1.7	0	0.0		
Eating daily breakfast before going to university	Yes	12	40.0	0	0.0	0	0.0	76.65	0.000**
	No	0	0.0	53	88.3	10	100.0		
	Sometimes	18	60.0	7	11.7	0	0.0		
Eating fast food	Yes	0	0.0	48	80.0	10	100.0	67.44	0.000**
	No	12	40.0	0	0.0	0	0.0		
	Sometimes	18	60.0	12	20.0	0	0.0		
Eating entertainment during the day	Yes	0	0.0	44	73.3	10	100.0	54.02	0.000**
	No	2	6.7	0	0.0	0	0.0		
	Sometimes	28	93.3	16	26.7	0	0.0		
Drinking soft drinks between meals	Yes	0	0.0	46	76.7	10	100.0	71.85	0.000**
	No	18	60.0	0	0.0	0	0.0		
	Sometimes	12	40.0	14	23.3	0	0.0		
Method of cooking food in home	Foundry	29	96.7	33	55.0	0	0.0	51.36	0.000**
	Forged	1	3.3	13	21.7	10	100.0		
	Boiled	0	0.0	14	23.3	0	0.0		
Following a specific diet (Healthy diet)	Yes	8	26.7	0	0.0	0	0.0	62.02	0.000**
	No	9	30.0	60	100.0	10	100.0		
	Sometimes	13	43.3	0	0.0	0	0.0		

X²= Chi-square test. No statistically significant at $p > 0.05$. * Statistically significant at $p < 0.05$. **: Highly statistically significant at $p < 0.01$

Table (5): Relation between menstrual cycle data of the studied obese female nursing students and their pain intensity during menstrual cycle (n=100).

Menstrual cycle data		Pain Intensity during menstrual cycle						X ²	P-Value
		Moderate pain (n=30)		Severe pain (n=60)		Very severe pain (n=10)			
		No.	%	No.	%	No.	%		
Age of menarche (years)	<10 years	5	16.7	12	20.0	1	10.0	10.42	0.034*
	10-16 years	23	76.7	38	63.3	4	40.0		
	> 16 years	2	6.6	10	16.7	5	50.0		
Menstrual cycle regularity	Yes	30	100.0	24	40.0	0	0.0	42.02	0.000**
	No	0	0.0	36	60.0	10	100.0		
Menstrual cycle (days)	<21	9	30.0	2	3.3	0	0.0	104.28	0.000**
	21<25	21	70.0	1	1.7	0	0.0		
	25<30	0	0.0	32	53.3	0	0.0		
	30<35	0	0.0	7	11.7	2	20.0		
	>35	0	0.0	18	30.0	8	80.0		
Duration of menstrual blood flow (days)	<3	4	13.3	0	0.0	0	0.0	36.28	0.000**
	3-7	26	86.7	28	46.7	2	20.0		
	>7	0	0.0	32	53.3	8	80.0		
Amount of menstruation	Small	13	43.3	0	0.0	0	0.0	54.73	0.000**
	Moderate	17	56.7	18	30.0	4	40.0		
	Soaked/ heavy	0	0.0	42	70.0	6	60.0		
The form of menstrual bleeding	Liquid	10	33.3	9	15.0	1	10.0	10.39	0.034*
	Coagulated	2	6.7	0	0.0	0	0.0		
	Large blood clots	18	60.0	51	85.0	9	90.0		
Sleeping during period	Normal	20	66.7	2	3.3	2	20.0	44.07	0.000**
	Insomnia	10	33.3	58	96.7	8	80.0		
Feeling during period	Normal	6	20.0	0	0.0	0	0.0	16.31	0.012*
	Makes you disgusted	8	26.7	17	28.3	3	30.0		
	Lack of confidence	1	3.3	8	13.3	1	10.0		
	Nervous	15	50.0	35	58.4	6	60.0		
Eat certain foods during period	Yes	22	73.3	20	33.3	4	40.0	13.04	0.001**
	No	8	26.7	40	66.7	6	60.0		
History from interruption in menstrual period	Yes	2	6.7	42	70.0	9	90.0	38.31	0.000**
	No	28	93.3	18	30.0	1	10.0		

X²= Chi-square test. No statistically significant at p > 0.05. * Statistically significant at p < 0.05. **: Highly statistically significant at p < 0.01

Table (6): Correlation between body mass index and pain intensity during menstrual cycle among the studied female nursing students. (n=200).

Group	Variables	Pain intensity during menstrual cycle
Non obese group	Body mass index	r = -0.437- P = 0.000**
Obese group	Body mass index	r = 0.567 P = 0.000**

r= Spearman correlation coefficient test. P= p-value. (-) =Negative correlation.

**Highly statistically significant at $p < 0.01$.

Discussion:

The onset of menstruation is one of the most significant changes that occur during adolescence. It is a regular rhythmic phase that happens once a month and is a typical physiological phenomenon that lasts from menarche to menopause. Adolescent girls frequently experience menstrual abnormalities because they are strongly related to the processes that female pubertal development involves. One crucial measure of a woman's endocrine and reproductive health is her menstrual cycle (Joseph et al., 2025). Furthermore, it seems that normal ovulation depends on keeping a normal BMI. Deviations from this norm, whether due to an inadequate or excessive amount of body fat, affect ovarian function and result in menstruation issues (Purba., Arto & Saragih 2023).

Thus our comparative descriptive research study was carried out to evaluate the relationship between BMI and menstrual pattern among female nursing students at El Fayoum University. This aim was achieved through the present study findings which revealed a significant relation between BMI and the menstrual pattern among those adolescent girls after assessment of dietary habits, weight, height and BMI and evaluation of menstrual pattern of student girls (age of menarche, regularity and interval of menstrual cycle, duration of menses, amount of menstrual blood, PMS and menstrual pain intensity).

The current study revealed that the mean age of the obese group and the non-obese group was 19.07 ± 0.60 years, near to three quarters of the obese and non-obese groups reside in rural areas, respectively. Also, more than half of the obese and non-

obese groups have insufficient income.

These findings were reinforced by an Egyptian study by **Ghazawy et al., (2022)** who carried out a study titled Obesity/Overweight among University students. Minia, Egypt, was in line with our study findings and reported that; the mean age of the studied group was (19.89 ± 1.47) and more than half of participants reside in rural areas.

From the researcher's point of view, these studies findings are not surprising as urban environment favor un healthy lifestyles (junk foods, physical inactivity, delayed sleeping time and fatty meals and soft drinks) that significantly affect body mass index specially among university students.

Concerning the menstrual pattern of the female students, the present study findings showed that more than three fifth of the obese group and more than three quarters of the non-obese students experienced menarche at the age range from 10 - 16 years old. More than two fifth of the obese students reported having irregular menstrual cycle. While, the majority of the non-obese group have regular menstrual cycle, more than one quarter of the obese students have cycle length >35 days

while about half of the non- obese students have cycle length 25-30 days, more than half of the obese students and about four fifth of the non-obese students reported have a duration of menstrual period between 3-7 days. About two fifth of the obese group reported more than 7days as a duration of menstrual period, about half of the obese students reported a heavy amount of menstrual blood. **On the researcher's point of view**, excessive blood loss has been linked to ovulatory abnormalities, which are more prevalent in obese women, and may be related to underlying hormonal irregularities, such as hyperandrogenemia, which is how the prior results were explained.

Likewise, **(Elgendy et al., 2024)** who explored Menstrual Abnormalities and its Relation to Body Mass Index among Adolescent Girls, proved that; The majority of the cases were overweight and obese. Among the cases group, the most frequent menstrual abnormalities were heavy flow (more than one fifth of the subjects), variable cycle length flow (more than one fifth of the subjects), extended cycle length (about one quarter of the subjects) (oligo menorrhea), and lengthy flow days (about one quarter of the subjects).

As regards the knowledge about general causes of irregular menstruation, the findings of the present study indicated that the majority of two groups don't know the health factors that lead to irregular menstruation especially the weight. **We conclude that** there was a lack of knowledge about the relation between BMI and regular menstrual cycle among female nursing students. Thus fostering open discussions, promoting education, and encouraging timely medical consultations, we can reduce the stigma around menstruation and ensure that all women can manage their health confidently. Correspondingly, **(Ahmad et al., 2025)** found that just one fifth of the study sample had a high awareness of menstrual abnormalities and their causes, compared to two fifths of the study sample who had a low awareness and also two fifths of the study sample who had a moderate awareness.

Investigating the severity of premenstrual symptoms, the present study clarified that; about half of the obese group have experienced moderate PMS. While, the majority of the non-obese group had reported mild PMS and showed highly statistically significant differences

between the non-obese and obese groups.

In this respect, **(Azadi et al., 2025)** who conducted a study titled Exploring the Factors Influencing Premenstrual Syndrome and Its Severity, indicated that more than two fifths of the individuals had a BMI higher than 25 kg/m². The risk of premenstrual syndrome was significantly positively correlated with BMI. Contrary, **(Kharb et al., 2022)** who evaluated Correlation of Body mass index with premenstrual syndrome and age at menarche in medical students, highlighted that although half of the study group had PMS, only more than one fifth of them had a high BMI, and there was a weak relationship between PMS and BMI values.

Considering the severity of pain during menstrual period, the present study revealed that; about three fifth of the obese group reported suffering from severe pain during their menstrual period while, about half of the non-obese group reported suffering from moderate pain during menstrual period, the majority of the obese and non-obese students experienced pain before menstrual period in lower back and lower abdomen. More than three fifth of the obese group and near to half of

the non-obese group felt pain with the first period (menarche).

Likewise, (Aktaş et al., 2023) who evaluated the relationships between primary dysmenorrhea with body mass index and nutritional habits in young women, proved that almost half of the sample individuals had primary dysmenorrhea. Menstrual pain was 7.16 ± 1.95 on average. In addition, young women who were overweight or obese by body mass index had higher frequency of primary dysmenorrhea than those who were underweight or normal. Women who were overweight/obese according to body mass index compared to those who were underweight and normal.

On the other hand, (Donayeva et al., 2023) who performed a study titled The relation between primary dysmenorrhea in adolescents and body mass index, indicated that the underweight teenage group (8.7 ± 0.8) had a statistically higher visual analogue scale of dysmenorrhea than the normal-weight (6.5 ± 0.5) and overweight (6.3 ± 0.6) adolescent groups.

Findings of the present study concluded that; there was highly statistically significant relation between pain intensity during menstrual cycle among the studied groups (obese and non-obese) and

their eating habits as regularity of meal times, having fast food, soft drinks. **From the researcher's point of view**, this may be due to the hormonal changes during the menstrual cycle have a significant impact on eating habits. An awareness of these changes can help women control their food intake and maintain normal weight. Reinforced such findings (Wahyuni et al., 2024) who performed a study titled Diet and Menstrual Disorders in Women of Fertile Age. also explained that the frequency of junk food consumption and menstrual cycle abnormalities were significantly correlated.

Regarding the menstrual cycle data, findings of the present study clarified that; there was highly statistically significant relation between pain intensity during menstrual cycle among the studied groups (obese and non-obese students) and their menstrual cycle regularity, menstrual cycle (days), duration of menstrual blood flow (days), amount of menstruation, sleeping during period, eating certain foods during period and history from interruption in menstrual period. Also, there was statistically significant relation with age of menarche, the form of

menstrual bleeding, feeling during period.

The previous results are similar to **(Duman et al., 2022)** who assessed Risk factors for primary dysmenorrhea and the effect of complementary and alternative treatment methods: Sample from Corum, Turkey discovered that there were statistically significant correlations between the incidence of dysmenorrhea, the history of menorrhagia, and the history of early menstruation.

Concerning BMI, results of the present study showed that; there was highly statistically significant relation between pain intensity during menstrual cycle among the studied obese female nursing students and body mass index. **From the perspective of the researcher**, high body fat mass is influenced by excess adipose tissue and an elevated BMI. The synthesis of progesterone and estrogen is affected by this. An increase in estrogen and progesterone will result in high prostaglandin levels, which in turn will promote ischemia and more uterine contractions, ultimately leading to dysmenorrhea during menstruation.

These results match the findings of the study by, **(Donayeva et al., 2023)**. Highlighted that primary dysmenorrhea was significantly

impacted by BMI differences; both the obese and underweight groups experienced higher pain intensity and a lower pressure pain threshold compared to the normal weight and overweight groups.

Conclusion:

Based on the research and research questions, the study concluded that there is There was highly statistically significant negative correlation between body mass index and pain intensity during menstrual cycle among the studied none obese female nursing students. On the other hand, there was highly statistically significant positive correlation between body mass index and pain intensity during menstrual cycle among the studied obese female nursing students.

Recommendations:

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

1. Ongoing training and professional development for healthcare professionals regarding the most recent recommendations, findings, and best practices for treating menstrual health and irregularities.
2. Incorporate knowledge addressing menstruation and abnormalities into the nursing curriculum.

- Undergraduate based programs must be reconstructed to improve student's knowledge about factors contributing to overweight and its complications, the importance of following a healthy lifestyle habits as possible such as healthy eating habits, exercise.

Further research:

- Explore the obstacles that female students have while trying to obtain menstrual health and gynecological care, and suggest ways to increase utilization.
- Additional research on obesity and the nurse's role in preventing it are suggested for a sizable sample.
- Investigate how irregular menstruation affects women's health and academic achievement.

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Effect of Awareness Program regarding Inclusion System on School Children's Performance and Social Adaptation

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Abstract

Background: The inclusion system is designed to ensure that all students, regardless of diversity, abilities, and needs, have equal access to quality learning opportunities. Implementing an inclusion system in schools improves children's school performance and social adaptation. **Aim:** This study aimed to evaluate the effect of an awareness program regarding the inclusion system on school children's performance and social adaptation.

Research design: A quasi-experimental research design was used in this study. **Sample:** A purposive sample comprised of 150 students. **Setting:** Hafez Ibrahim Experimental School in Helwan city, Cairo, Egypt. **Tools:** Four tools were used, Tool I: School Children Inclusion Assessment Questionnaire consisted of three parts, Part 1: Characteristics of school children, Part 2: School children's knowledge regarding the inclusion system, Part 3: School children's reported practices; Tool II: Attitude of School Children; Tool III: School Performance of Children & Tool IV: An observation Checklist for Children's Social Adaptation. **Results:** Tenth of school children had good knowledge regarding the inclusion system pre-implementation of the awareness program, which increased significantly to most of them post-implementation. More than two-fifths of them had satisfactory reported practices before the awareness program, which improved to most of them after its implementation. Also, less than a quarter of them exhibited a positive attitude before the awareness program, rising to the majority of them post-program. Less than one-quarter of the studied children had good school performance pre-awareness program, which improved to more than three-quarters of them post-awareness program. Additionally, most of the studied children had an inadequate social adaptation pre-program, and improved to three-quarters of them had an adequate social adaptation post-program. **Conclusion:** School children's knowledge level, reported practices, attitude, school performance, and social adaptation regarding the inclusion system improved significantly after implementation of the awareness program. **Recommendations:** Conduct further research with larger samples and in other settings for generalization.

Key words: Awareness Program, Inclusion System, School Children, Performance, Social Adaptation.

Introduction

Inclusion systems in primary education integrate children with Special Educational Needs (SEN) into mainstream classrooms. Research shows that school children positively impact school achievement and social adaptation, fostering better social skills, peer relationships, and a sense of belonging among children with SEN (Turner et al., 2024).

Inclusion is a process of systemic reform that includes adjustments to educational content, teaching methods, approaches, structures, and strategies to remove barriers. In education, inclusion refers to methods that make all students who are susceptible to exclusionary pressures more involved in the curricula, cultures, and communities of their local schools.

Providing all children of the appropriate age range with an equitable and participatory learning experience and the environment that best suits their needs and preferences is the goal of inclusion (Gale et al., 2022).

The inclusion process involves children with disabilities, cognitive and mental characteristics, representatives of ethnic minorities, persons held in penitentiary institutions, marginal strata of society, migrant workers, foreign students, people in difficult life situations, gifted individuals, persons with various intellectual and physical disabilities,

and others (Rapp & Corral-Granados, 2021).

Children with special educational needs are diverse, with conflicting theories about inclusion's effects on school achievement, socio-emotional development and overall well-being. This uncertainty affects special educators and policymakers in decision-making about special education provision (Dalgard et al., 2022).

School Children, usually between the ages of 5 and 12, are in a critical developmental stage where they gain the fundamental school, social, and emotional abilities that will influence their future education and personal development. Children's cognitive development accelerates at this time, allowing them to acquire the foundational literacy, numeracy, and problem-solving abilities that underpin their education. Their social and emotional growth is equally crucial since schoolchildren learn how to communicate with their peers, form friendships, and handle group dynamics (Erol et al., 2025).

Since schoolchildren are inherently inquisitive and creative, now is the perfect time to cultivate a love of learning through dynamic and captivating teaching strategies. However, Children may struggle with things like adjusting to regimented settings, controlling their emotions, or handling expectations from school. To

overcome these obstacles and succeed, they need the assistance of educators, parents, and school health specialists. Primary schools are essential in helping children develop resilience, self-assurance, and a feeling of responsibility by offering a supportive and inclusive atmosphere. This helps them succeed in subsequent educational and life phases **(Klemp et al., 2025)**.

Children with disabilities are diverse and face various challenges due to their environment. There are schoolchildren in every community who are born with or develop special disabilities that affect their vision, mobility, talk, self-care, or make friends. However, their ability to function, participate in society and lead a fulfilling life depends on their inclusion and accommodation **(Churchill et al., 2024)**.

Schoolchildren's social adaptation programs are organized efforts to improve their school performance by cultivating critical social and emotional competencies. These programs seek to establish a nurturing environment in which kids can cultivate the interpersonal skills, emotional control, and resilience that are essential for success in the classroom **(Mohzana, 2024)**. These programs help children navigate social dynamics, reduce stress, and improve concentration. Research shows that participation improves school performance by managing peer relationships, working cooperatively,

and connecting with teachers. These programs also address learning obstacles, including social anxiety or behavioral difficulties **(Zheng et al., 2024)**.

Social justice and human rights issues have changed in tandem with schoolchildren's shifting attitudes towards disabilities, which has increased inclusive education practices globally and changed the focus to include children with disabilities in inclusive classrooms **(Norwich, 2025)**.

Nurses significantly contribute to improving schoolchildren's school performance by implementing social adaptation plans. These programs, often led by nurses in coordination with teachers and counselors, focus on addressing schoolchildren's social, emotional, and behavioral needs, all of which directly influence their school success. School health nurses help create a more welcoming and supportive learning environment by identifying and assisting students who may face challenges with peer interactions, emotional regulation, or social integration **(Mosia et al., 2025)**.

These programs teach children vital skills like empathy, communication, and conflict resolution via exercises in mindfulness, role-playing, and group discussions. Children who struggle with issues like anxiety, bullying, or low self-esteem, all of which can impede school progress, get tailored care from

nurses. Social adaptation programs help schoolchildren focus better in class, participate more actively, and develop positive relationships with instructors and peers by promoting a sense of belonging and emotional well-being (Wu, 2025).

Significance

The United Nations International Children's Emergency Fund (UNICEF) and Global Burden of Diseases (GBD) study offered comprehensive estimates of disability prevalence among children and adolescents worldwide, UNICEF reported that 28.9 million child aged 0–4 years (4.3%), 207.4 million children aged 5–17 years (12.5%) and a total of 236.4 million children aged 0–17 years (10.1%) are living with moderate-to-severe disabilities. In comparison, GBD 2019 predicted that mild-to-severe disabilities affect 49.8 million (7.5%) children under the age of five, 241.5 million (12.6%) children between the ages of five and nineteen, and 291.3 million (11.3%) children under the age of twenty. More than half of the disabled children in both datasets were from South Asia and Sub-Saharan Africa (Olusanya et al., 2022).

The global prevalence of school children with special needs varies. It is estimated by UNICEF that 49% of disabled children in underdeveloped nations have never gone to school (UNESCO, 2020).

International initiatives to improve educational opportunities for children with special needs have been spurred by Sustainable Development Goal 4 and the United Nations Convention on the Rights of Persons with Disabilities. To achieve these goals, regulations are needed to meet the needs of children with disabilities and close the gap that currently exists between children with and without disabilities (Zakaria, 2023).

The researchers view that this study provides empirical evidence on how awareness programs regarding inclusion systems can enhance both the school performance and social adaptation of school children. It supports the broader goal of creating inclusive educational environments that benefit all students to achieve child rights, reduce discrimination, and prepare children to thrive in a diverse world.

Aim of the study:

This study aimed to evaluate the effect of an awareness program regarding the inclusion system on school children's performance and social adaptation through:

- Assess school children's knowledge, attitudes, and reported practices regarding the inclusion system.
- Designing and implementing an awareness program about the inclusion system for school children in light of their actual needs and assessment.

- Evaluate the effect of school children's awareness program about the inclusion system on their performance and social adaptation

Research Hypothesis:

H₁: An awareness program regarding the inclusion system is expected to improve school children's knowledge, attitudes, reported practices, and school performance.

H₂: After implementing an awareness program about the inclusion system, school children are more socially adapted in school.

Subject and Methods**Research design:**

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

Setting:

This study was conducted at Hafez Ibrahim Experimental School in the Helwan district of Cairo Governorate, Egypt. This school has four floors and contains 22 classrooms, each one accommodating approximately 50 to 55 school children of boys and girls.

Sampling:

Type of sample: A purposive sample was used in this study, through selecting classes that include children with disabilities at each stage, then applying the program to all school children in the selected classes.

Inclusion criteria:

Children are able to communicate, free from psychological problems that

interfere with interaction. Children's age ranged between 6-12 years.

Sample size: It included 150 children in the school year 2024/2025, from the selected classes, 11 children from them had disabilities.

Tools of data collection

The researchers designed it in simple Arabic after reviewing relevant literature **Spandagou, 2025; Zakaria, 2023; Elwakil, 2024**. Data for this study was collected by using the following tools:

Tool 1: School Children Inclusion Assessment Questionnaire

It consisted of three parts as follows:

Part 1: Characteristics data of school children included age, gender, parents' education and occupation, crowding index, home type, and whether the child suffered from disability.

Part 2: School children's knowledge regarding the inclusion system (pre & posttest): It consisted of 21 multiple choice questions about the meaning of the inclusion system, aim, classifications, types, factors leading to the success of the inclusion system, advantages, disadvantages and effects of the inclusion system on children and their school performance and criteria for selecting an integrated child.

Scoring system

A correct and complete answer scored 2 points, 1 point for a correct and not complete answer, and zero point for a wrong or no answer. The total

knowledge score equals 42 points regarding the inclusion system, divided into three levels as follows (**Wittwer et al., 2024**):

- Poor knowledge < 50% (< 21 score).
- Average knowledge 50% to < 75% (21- < 31.5 score)
- Good knowledge $\geq 75\%$ (≥ 31.5 scores).

Part 3: School children's reported practices (pre & posttest).

It was used to assess school children's practices regarding interactions with their classmates in the school environment. It consisted of 4 sub-items:

- A. School children's reported practices regarding dealing with a disabled classmates**, it included 8 statements as, dealing with a classmate who has a disability, helping a classmate with a disability generally, in the classroom, helping classmates with disability in learning, participating in school activities that include students with disability, participate classmates with disability in activities outside the class, if you deal with your classmates having disability in the same way you deal with the rest of classmates, training on how to deal with classmates with disability, support and interact positively with disabled classmates when they needed.
- B. School Children's reported practices regarding interacting with classmates:** It is 5 statements involved playing or talking regularly with my

classmates, finding it easy to communicates with them in class, treating my classmates kindly and respecting their feelings, ask for help from my classmates or teacher when I need, and starting conversations with new classmates and welcome them.

- C. School children's reported practices regarding school environment adaptation** contained 5 statements as go to school every day with feel comfortable attending, follow school rules and regulations, understand and follow teachers' instructions correctly, participate in classroom and extracurricular activities such as games and trips, and feel that teachers treat me fairly and to interact with them respectfully.

- D. School children's reported practices regarding their self-confidence and interactions:** It involved 5 statements as act confidently when I'm in a new group of children, I express my thoughts and feelings in front of others, stay calm and respectful when facing uncomfortable situations, I act as a part of the school community and report bullying or ask for help when I'm being bothered.

Scoring system of school children's reported practices

It included 23 statements; each reported practice was assigned 1 point for the child's report of being done and zero point for not done. The total scores of school children's reported practices

were 23 points classified into two levels as (Zakaria, 2023):

- Unsatisfactory reported practices < 60% (< 14 points)
- Satisfactory reported practices $\geq$ 60% ($\geq$ 14-23 points)

Tool II: Attitude of School Children (pre & posttest):

It was used to assess school children's attitude toward inclusion system in school, it contained 19 statements as feeling comfortable studying with classmates with special needs, believe that inclusion helps all school children learn better, believe that having children with special needs in class may slow down the progress of other students, believe that all school children deserve equal educational opportunities, regardless of their abilities, children with a disability generally should be educated in regular class, and some children with disabilities face an obstacle to achieving school improvement in schools.

Scoring system

Children's responses were scored on the Likert scale, where 2 points for always, 1 point for sometimes, and zero point for never. Reverse coding was useful for inappropriate. The total attitude scores of children were 38 points about the inclusion system, classified into two levels as (Abu Khadeja et al., 2024):

- Positive attitude $\geq$ 50 % ($\geq$ 19 points).
- Negative attitude < 50 % (< 19 points).

Tool III: School Performance of Children (pre & posttest)

It was used to assess children's performance in school by asking the child questions and confirming the data from the school supervisor. It contained 10 statements as child achieve good grades in class, easily understand the information presented in lessons, participate in class discussions, complete homework regularly, interested in learning and developing my skills, can solve school problems, ask teachers for help when needed, able to concentrate and pay attention in class, respond positively to the course material, and performance continually improves throughout the semester.

Scoring system

The children's performance at school was measured using a 5-point Likert scale; children were asked to grade their school performance on a scale, and confirmed by the school supervisor. It was rated from 1- 5, (1) Never, (2) Rarely, (3) sometimes, (4) often, and (5) always; the total score ranged from 10-50, lower scores represented low school performance, while higher scores displayed rising school performance.

- Weak performance < 50% (< 25 score).
- Fair performance 50% to < 75% (25- 37 score)
- Good performance $\geq$ 75 % ($\geq$ 38 scores).

Tool IV: An observation Checklist for Children's Social Adaptation (pre & posttest)

It was designed and used by researchers to evaluate children's social adaptation in school through observation. It consisted of 15 statements as a child interacting with peers, a child speaks freely with his classmates, a child participates in group activities without isolation, a child asks for help from his classmates when needed, a child participates in playing and eating.

Scoring system

It included 15 items; each item was scored by the researchers on a three-point Likert scale, "always, sometimes, and never" and scored 3, 2, and 1, respectively. The score is summed up and converted into a percentage score. The total score of school children, 15-45 points about social adaptation, is classified into two levels as follows (Elwakil, 2024):

- Inadequate social adaptation < 60% (15 - < 27 points).
- Adequate social adaptation $\geq$ 60% ($\geq$ 27 - 45 points).

Validity:

A panel of five experts, two from community health nursing, two from pediatric nursing and one from psychiatric nursing in Faculties of Nursing revised the tool to ensure clarity, relevance, comprehensiveness, understanding, and applicability, thereby measuring its content validity.

Reliability:

Cronbach's alpha was calculated between the two scores using SPSS computer package. It was 0.87, which indicates that knowledge questions were reliable in detecting the objectives of the study. Then, Cronbach's alpha was calculated between the two scores. It was 0.83 for reported practice questions, 0.89 for attitude questions, and 0.84 for social adaptation, which indicates that they were reliable in detecting the objectives of the study.

Ethical Considerations:

An official permission to conduct the proposed study was obtained from the Scientific Research Ethical Committee in the Faculty of Nursing, Helwan University- No. (41) On 19/5/2024. Participation in this study was voluntary, and subjects were given complete information about the study and their role before signing the informed consent from their parents. The ethical considerations included explaining the purpose and nature of the study, stating the possibility to withdraw at any time, and ensuring the confidentiality of the information. Also, demonstrated ethics, values, culture, and beliefs were respected.

Pilot study:

A pilot test was conducted on 10 % of the total study sample (15 child), to assess the feasibility of the study, including the clarity and objectivity of the tools. Those subjects were included

in the actual research because there were no modifications in the tools.

Field work:

After obtaining approval to conduct the study, samples were collected during the school day, specifically two days a week on Tuesday and Wednesday from 8 am to 12 pm. After establishing a trusting relationship, school children were interviewed by the researchers during the assessment phase to explain the study's purpose. The tools took 20-30 minutes to be filled out and the researchers collected the data through the previously mentioned tools. Data was collected during the school year 2024/2025, taking 6 months from the beginning of October 2024 to the end of March 2025.

School children's awareness program about the inclusion system was conducted according to the following phases:

Preparatory phase: The researchers reviewed the current advanced national and international related literature, reviewing aspects of the inclusion system in schools using available books, periodicals, articles and magazines, then designed and prepared tools for data collection and the awareness program.

Assessment phase: Using the previous tools to assess school children's knowledge, reported practices, and attitudes regarding the inclusion system. Also, children's school performance

and social adaptation were assessed. The researchers first introduced themselves and explained the study's purpose briefly to the school children. Every child was met individually, and informed consent for participation was obtained from them and their parents. The school children were assured that the information obtained would be treated confidentially and used only for the study purpose.

Planning phase: Based on the assessment phase, the researchers designed the awareness program sessions' contents according to the school children's needs. Awareness program sessions were developed after reviewing related literature. Detected needs and requirements were clarified and discussed in the form of a booklet. The booklet consisted of knowledge about the inclusion system, such as the meaning, defining children with disabilities, and how to deal with children with disabilities. Teaching methods used as lectures, open discussion, brainstorming, and role playing about inclusion system management were frequently applied during sessions. Media used in the study as PowerPoint, pictures, and videos.

Implementation phase:

After developing the awareness program contents, the researchers divided children into 6 groups, and each group consisted of 25 children. The

program was divided into 4 sessions implemented in one month. Based on the result of the pre-test questionnaire, each session needs 30-45 minutes and a meeting with the school children, two days per week. The program involved the first session, including a pretest and knowledge about the inclusion system, 2nd session covered school children's practices, 3rd session comprised children's attitudes regarding disability and the inclusion system, and 4th session covered school performance and social adaptations. At the end of each session, children give feedback about the session and are informed about the content of the next session and the time.

Awareness Program Booklet:

A booklet included all the contents of the program. It was designed and given to children as an educational reference during and after the implementation of the program. Contents of booklet include (meaning of inclusion system, the process of educational integration in primary schools, objectives of the inclusion system, types of inclusion system, criteria for selecting a merger applicant, positives of the merger process, who are the children integration system applies, and students' attitudes toward children with disabilities, school performance and social adaptation among school children.

Evaluation phase: This phase aimed to

evaluate the effect of the awareness program for school children regarding the inclusion system on their performance and social adaptation. It was done one month after the implementation program, by using the same tools.

III. Administrative design:

The Dean of Helwan University's Faculty of Nursing submitted an official letter to the official directorate of education, the director of Helwan Educational Administration, and the school director, outlining the purpose of the study and requesting permission to visit the school and carry out the research. The study, the date, and the time of data collection had been provided to the school manager.

IV) Statistical design

SPSS version 20 was used for analysis once the data were coded and converted into a computer-friendly format. Graphics were created using Excel. The mean and standard deviation were used to display quantitative data, whereas frequency distribution tables, numbers, and percentages were used to display qualitative data. Depending on the predicted value of a cell, the chi-square test, Fisher's exact test, or the likelihood test was used to examine the data. For all significant tests, the significance level was set at a P value <0.05.

Results

Table (1): Illustrates that 64% of the children were 8-10 years old, and 54%

of them were females. Slightly less than half of children (48%) have middle-educated fathers, and 54% of them have middle-educated mothers. Regarding their fathers' occupation, 70% of their fathers were workers. In addition, 7.3 % of children suffered from disability.

Tables (2): Demonstrates that the studied children's knowledge level increased from 10.0% pre-program to 87.3% post-program, and the difference was highly statistically significant ($P < 0.001$).

Figure (1): Shows that 87 % of studied children had a negative attitude pre-awareness program. While 80 % of them had a positive attitude post-awareness program.

Figure (2): Shows that 41.7% of the studied children had satisfactory reported practices pre-awareness program. While 86% of them had satisfactory reported practices post-awareness program.

Figure (3): 20.0 % of studied children had good school performance pre-program implementation, which improved to 76.0 % of them had good performance post-program. While 49.0 % of studied children had weak school performance pre-program implementation, which decreased to 5.0 % post-program, where the P value was 0.000 and the paired t test = 27.33.

Figure (4): Shows that 83 % of studied children had an inadequate social

adaptation level before implementation of the program. While 75 % of the studied children had adequate social adaptation post program implementation.

Table (3): Shows that there were statistically significant differences between the school children's characteristics data and their total score of knowledge post program about the inclusion system, $p > 0.05$ for each item, except for mother education, which showed no significant difference between different educational levels.

Table (4): Reveals that there were statistically significant differences between the studied children's characteristics data and the level of total score of reported practices post awareness program about the inclusion system ($p > 0.05$ for each item) except for father education, which showed no significant difference between different educational levels.

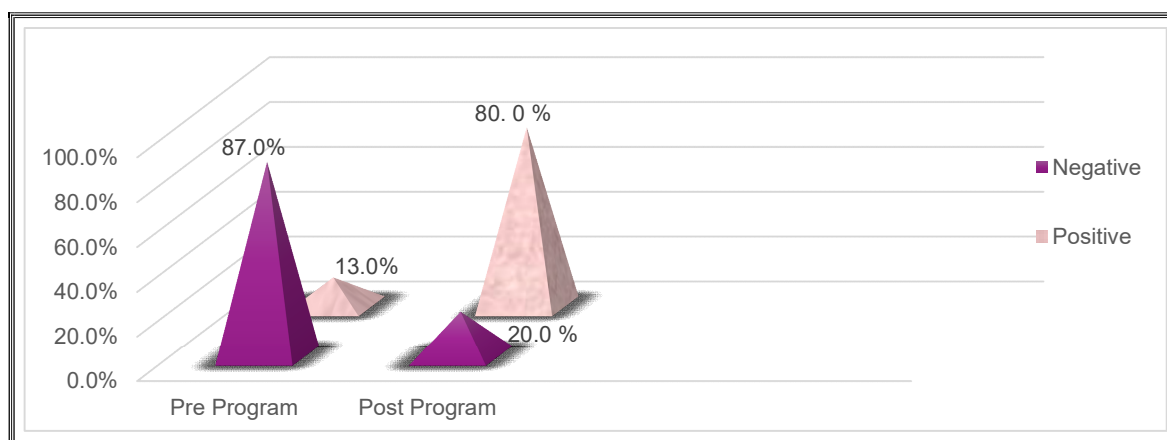
Table 5: Demonstrates the efficacy of the awareness program for the improvement of the correlation between the knowledge level score of children post-program and their practices, as well as, attitude of children post-program and their practices. The correlation significance increased from a non-significant correlation ($p = 0.06, 0.07$) pre-program to a highly significant correlation post-program ($P < 0.0001$).

Table (1): Distribution of the Studied Children's Characteristics Data (n=150).

Characteristics Data		No.	%
Age	8-10 years	96	64.0
	11-13 years	54	36.0
Mean $\pm$ SD		9.2 $\pm$ 0.8 years	
Gender	Male	69	46
	Female	81	54
Father's Education	Not read & write	6	4
	Basic education	39	26
	Middle education	72	48
	University education	33	22
Mother's Educational	Not read & write	15	10
	Basic education	21	14
	Middle education	81	54
	University education	33	22
Father's Occupation	Employee	39	26
	Farmer	6	4
	Worker	105	70
Mother Occupation	Employee	24	16
	Housewives	111	74
	Workers	15	10
Crowding Index	1-2	48	32
	> 2	102	68
Home Type	Family house	69	46
	Separate apartment	81	54
Child Suffered from Disability	Yes	11	7.3
	No	139	92.7

Table 2: Distribution of the Studied Children's Level of Knowledge about Inclusion System Pre- and Post-Awareness Program (n=150).

Knowledge	Pre-Awareness Program		Post-Awareness Program		χ^2	P- Value
	No.	%	No.	%		
Poor Knowledge Level	9	6	4	2.7	181.5	<0.0001
Average Knowledge Level	126	84	15	10		
Good Knowledge Level	15	10	131	87.3		



**** $\chi^2=30.7$ **P value=0.000**

Figure (1): Percentage Distribution of Attitude among Studied Children regarding Inclusion System Pre and Post Applying Awareness Program (n=150).

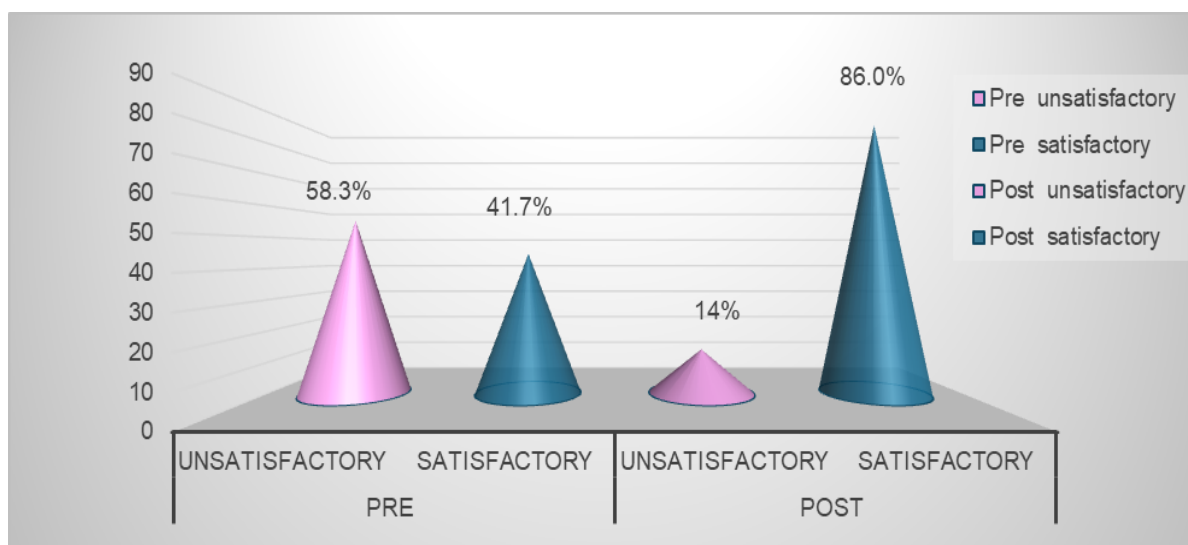
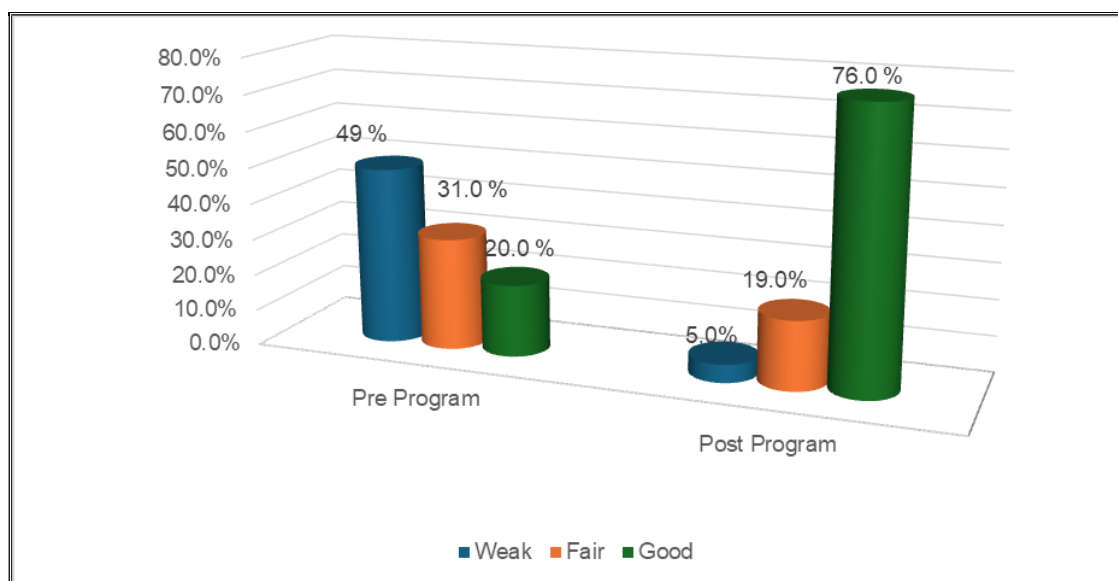
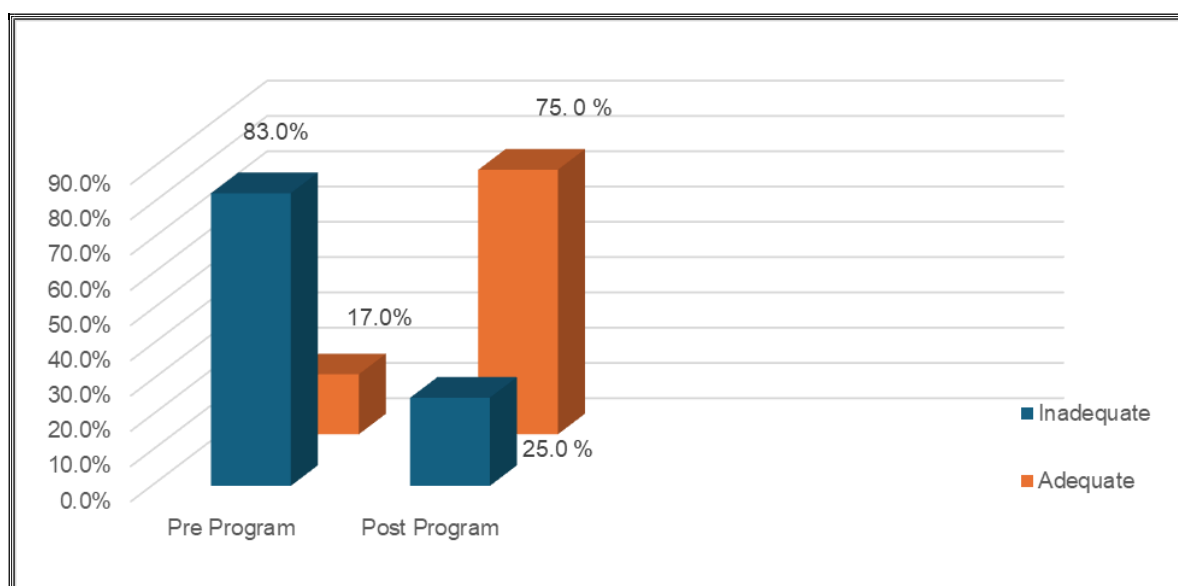


Figure (2): Percentage Distribution of the Studied Children's Total Reported Practices Levels Pre and Post Awareness Program (n=150).



**** $\chi^2=27.33$ **P value=0.000**

Figure (3): Percentage Distribution of Studied Children's School Performance Pre and Post Applying Program (n=150).



**** $\chi^2=30.7$ **P value=0.000**

Figure (4): Percentage Distribution of Children's Social Adaptation Pre and Post Applying Program (n=150).

Table 3: Relation between Studied Children's Characteristics and their Knowledge Post Awareness Program (n=150)

Characteristics data		Total Knowledge (Post)						X ²	P value
		Poor = 4		Average=15		Good = 131			
		No.	%	No.	%	No.	%		
Age:									
8-10 years	96	0	0	3	20.0	93	71.0	2.7	0.003
11-13 years	54	4	100.0	12	80.0	38	29.0		
Gender:								1.1	0.005
Male	69	1	25.0	6	40.0	62	47.3		
Female	81	3	75.0	9	60.0	69	52.7		
Father education								5.1	0.001
Not read & write	6	1	25.0	1	6.7	4	3.1		
Basic education.	39	0	0	4	26.7	35	26.7		
Middle education	72	2	50.0	6	40.0	64	48.9		
University & above	33	1	25.0	4	26.6	28	21.3		
Mother education								13.4	<0.03*
No read & write.	15	2	50.0	2	13.3	11	8.4		
Basic education.	21	0	0	4	26.7	17	13.0		
Middle education	81	1	25.0	4	26.7	76	58.0		
University & above	33	1	25.0	5	33.3	27	20.6		
Home type:								0.33	0.002
Family house	69	3	75.0	5	33.3	61	46.6		
Separate apartment	81	1	25.0	10	66.7	70	53.4		
Father occupation:								2.3	0.001
Employee	39	0	0	4	26.7	35	26.7		
Vocational Business	6	0	0	1	6.7	5	3.8		
Farming	105	4	100.0	11	73.4	94	71.8		
Mother's occupation:								2.9	0.57
Employee	24	0	0	2	13.3	22	16.8		
Housewives	111	4	100.0	12	80.0	95	72.5		
Workers	15	0	0	1	6.7	14	10.7		

Table 4: Relation between Characteristics Data and Reported Practices of Studied children Post Awareness Program (n=150).

Characteristics data		Post Awareness Program Total Reported Practices				X ²	P-value
		Unsatisfactory (9)		Satisfactory (141)			
		N0.	%	N0.	%		
Age:							
8-10 years	96	6	66.7	90	63.8	0.19	0.000
11-13 years	54	3	33.3	51	36.2		
Gender:							
Male	69	9	100.0	60	42.6	2.5	0.002
Female	81	0	0.00	81	57.4		
Father Education:							
No read & write.	6	1	11.1	5	3.5	1.8	0.60
Basic education.	39	6	66.7	33	23.4		
Secondary education	72	0	0.00	72	51.1		
University & above	33	2	22.2	31	22.0		
Mother Education							
No read & write.	15	6	66.7	9	6.4	2.3	0.001
Basic education.	21	3	33.3	18	12.8		
Secondary education	81	0	0.00	81	57.4		
University & above	33	0	0.00	33	23.4		
Crowding Index:							
1-2/room	48	7	77.8	41	29.1	0.01	0.005
> 2/room	102	2	22.2	100	70.9		
Home Type:							
Family house	69	8	88.9	61	43.2	1.5	0.000
Separate apartment	81	1	11.1	80	56.7		
Father Occupation:							
Employee	39	6	66.7	33	23.4	0.73	0.001
Farmer	6	2	22.2	4	2.8		
Worker	105	1	11.1	104	73.8		
Occupation:							
Employee	24	5	55.6	19	13.5	4.3	0.000
Housewives	111	4	44.4	107	75.9		
Workers	15	0	0.00	15	10.6		

Table 5: Pearson Correlation between Children's Knowledge Level, Attitude, and Their Score of Reported Practices about Inclusion System (n= 150).

Variables	Reported Practices of Children			
	Pre-program		Post program	
Knowledge Level of Children	r	P	r	P
	-0.11	0.06	-0.23	< 0.0001
Attitude of Children	-0.13	0.07	-0.22	< 0.0001

Discussion

In an inclusive education system, all students are permitted to attend the same class. It is an environment free from disability-based divisions among children. When they come to learning, all children are on an equal basis. The concept of inclusive education involves bringing children of various backgrounds together in the same classroom. There are various schools in the educational system for children with varying ability levels (**Stavrou & Kafa, 2024**).

Teachers, parents and school administrators can learn about the advantages and difficulties of inclusive education through an awareness program that focuses on how the inclusion system affects students' performance and social adaptation. By demonstrating how inclusion fosters empathy, communication abilities, and peer

relationships among all children, it highlights the significance of social adaptation (**Spandagou, 2025**). The present study revealed that more than two-thirds of the studied children were aged 8-10 years, and more than half of them were females. The majority of their parents had middle-level education, most of them were workers, and a minority of studied children suffered from disability.

Regarding the effectiveness of the program on studied children's knowledge, the present study revealed that a minority of them had good knowledge pre-awareness program, which improved to the majority of them post-program, which emphasized the research hypothesis I. This finding was in the same line with **Carrington et al., (2020)** who conducted a published study at Vietnam entitled "What Universal Design for Learning

Principles, Guidelines, and Checkpoints are Evident in Educators' Descriptions of their Practice When Supporting Students on Inclusion System?" in Southeast Asia in Vietnam" revealed that, tenth of students had good knowledge pre learning principles guidelines, it improved and become most of them had good knowledge post Guidelines. From the researchers' point of view, the awareness program likely provided clear, structured, and relevant content tailored to the participants' needs, making it easier to understand and retain key concepts.

Regarding the effectiveness of the program on studied children's reported practices, the study findings revealed that less than half of the studied children had satisfactory reported practices pre-program, which improved to a majority of them had satisfactory reported practices post-program, which emphasized the research hypothesis I. This finding was similar with **Thelma, (2025)** who conducted published study at Zambia under title" The Effect of Social Well-Being on Student's School Achievements: A Case of Selected Higher Learning Institutions in Lusaka District, Zambia " shows that there was half of students had satisfactory reported practices pre-

program and become most of them had satisfactory reported practices post program. From the researchers' point of view, before the program, children may not know the correct practices or may not have understood their importance, leading to unsatisfactory behavior despite good intentions.

Concerning the effectiveness of the program on studied children's attitude, the majority of the studied children had a negative attitude pre-program, which enhanced and became less than a quarter post-awareness program, which emphasized the research hypothesis I. This finding was similar with **Omachi et al., (2025)** who conducted published study at Indonesia and Argentina, under title" The Impact of School-Based Mental Health Interventions on School Resilience through a Comparative Study of Secondary Schools in Indonesia and Argentina" shows that, most of the studied students had negative attitudes pre-interventions which improved and become quarter post apply health interventions. From the researchers' point of view, attitude plays a crucial role in the success of inclusion systems, as a negative perception can hinder social integration and acceptance of peers with diverse abilities. Also, this may

be related to the positive impact of the intervention on children's perceptions. This shift suggests that the program was effective not only in increasing knowledge but also in transforming attitudes, which is critical for fostering an inclusive environment.

In relation to the effectiveness of the program on studied children's school performance, the study found that less than a quarter of studied children had good school performance pre-program, which improved to more than three-quarters of them had good total performance post-program. While, less half of studied children had weak school performance pre-program which decreased to less than tenth of them post-program and this finding was similar with **Balga & Dolz, (2023)** who conducted published study at Malaysia and Argentina, under title "Disability Awareness Seminar and Workshop: Assessing Teachers' Degree of Willingness in Providing Learning Support for Students with Special Needs", who found that, tenth of studied children had good total performance pre applied program, which improved and become more two thirds of them had good total performance post applied program. From the researchers' point of view, the awareness program can

significantly enhance the school performance of children by providing supportive learning environments and enhancing better understanding and acceptance by peers, and enhanced motivation and confidence among the children themselves.

Regarding the effectiveness of the program on studied children's social adaptation revealed that the majority of the studied children had inadequate social adaptation pre-awareness program, which improved to three-quarters of them had adequate social adaptation post-program, which emphasized the research hypothesis II. This finding was similar with **Dalgaard et al., (2022)** who conducted published study at Canada, under title "The effects of inclusion on school achievement, socio-emotional development and wellbeing of children with special educational needs", who found that, more two-thirds of the children had inadequate social adaptation pre apply program which improved and become more than three-quarters had adequate social adaptation post apply program. From the researchers' point of view, this improvement underscores the program's effectiveness in enhancing children's social skills and their ability to interact and integrate

within diverse peer groups. Children who gain a better understanding of social norms, communication skills, conflict resolution, and emotional regulation contribute to improving social adaptation.

The present study clarified that there was a statistically significant relation between the school children's characteristics data and their total score of knowledge and reported practices post awareness program about the inclusion system, $p > 0.05$. Both fathers' and mothers' education levels were strongly associated with children's knowledge. From the researchers' point of view, parental education, particularly maternal education, has been shown to significantly impact children's learning outcomes and contribute to a more supportive learning environment. This underscores the importance of considering parental education when designing and implementing educational interventions. This finding was supported by **Karoly & Gonzalez (2011)**, who conducted a published study in Britain under the title "Early Care and Education for Children in Immigrant Families" who reported that there was a

significant and direct relation between knowledge, reported practices of children, and their characteristics data.

Concerning correlation between children's knowledge level, attitude and practices post awareness program, the present study showed significant correlation between children's score knowledge level, attitude and reported practices and this finding was supported with **Kart & Kart (2021)**, who published study at Mbare Musika and Mutoko, Zimbabwe under title "Academic and Social Effects of Inclusion on Students without Disabilities: A Review of the Literature", who reported that there was significant correlation observed between students' knowledge and practices. From the researchers' point of view, this might be related to that the inclusion of teachers creates curriculum adaptations to support every child's school performance, physical, emotional, behavioral, and social adaptation in the best way possible. Children achieve this by first identifying their strengths and special needs.

Conclusion

Based on the results of the present study and the research hypothesis, the following conclusion includes:

An awareness program about the inclusion system significantly improved children's educational experience. Pre-program, only a minority of children had good knowledge, with less than half of them exhibiting satisfactory practices and positive attitudes towards inclusion and adequate social adaptation. Post awareness program, most children achieved good knowledge, positive attitude, and satisfactory practices. The program also significantly enhanced school performance for children. Social adaptation improved substantially, with three-quarters of children demonstrating adequate social skills. These findings highlight the effectiveness of awareness programs in improving the correlation between knowledge level scores, practices, and attitudes of children post-program than pre-program.

Recommendations

Based on the findings of the present study:

- Implement an ongoing awareness program about the inclusion system and social adaptation among school children with the distribution of informative booklets and the display

of posters within schools to reinforce key messages and promote sustained understanding and positive attitudes.

- Apply further research in large samples and other settings for generalization.

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Effectiveness of Training Program about Skin Self-examination on Knowledge, Practices, and Attitudes of Outdoor Campus Security Personnel

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Abstract

Background: Outdoor workers are a high-risk group for certain types of skin cancer due to their routine and unavoidable sun exposure as part of their job responsibilities. Practicing effective skin self-examination (SSE) is essential for early detection and management of skin cancer. This study aimed to assess the effect of a training program about SSE on knowledge, self-reported practices, and attitudes of outdoor campus security personnel. **Method:** A quasi-experimental design was used, involving all 156 outdoor security personnel at Mansoura University Campus. Data were collected before and one month after a training program using four tools: two structured questionnaires covering the socio-demographic & general characteristics of the security personnel, skin health history and sun exposure, and knowledge about SSE; a self-reported SSE practice scale; and an attitude scale. **Results:** Median scores increased significantly after the training program: knowledge (7 to 31), self-reported SSE practices (0 to 44), and attitudes (20 to 32) ($P \leq 0.001$). Significant positive correlations were found in the pre-test between knowledge and both practices and attitudes scores ($P < 0.001$), and between practices and attitudes scores in both the pre-test ($P < 0.001$) and post-test ($P = 0.018$). **Conclusions:** Implementing the SSE training program for outdoor campus security personnel positively improves their knowledge, attitude, and self-reported practice. **Recommendations:** Incorporating periodic SSE training into occupational health and safety programs for outdoor campus security personnel can sustain knowledge, practices, and attitudes, potentially reducing future skin cancer incidence.

Keywords: Skin cancer- Skin cancer screening- Skin self-examination- Outdoor workers

Introduction

Global climate change is among the most significant environmental challenges of the 21st century, with the potential to influence human health both directly and indirectly. Although widely acknowledged as a critical global issue now and in the future, the effects of climate change on human well-being, including occupational health and safety, have been relatively overlooked. Earlier studies have indicated that climate change may lead to ozone layer depletion and affect the amount of ultraviolet radiation (UVR) that reaches the Earth's surface (**Flouris et al., 2018; Moda, Filho, & Minhas, 2019**).

Prolonged unprotected exposure to the sun has been found to cause skin damage and a range of skin disorders. Short-term exposure to UVR can lead to immediate effects on the skin, such as sunburn and tanning. Over time, continued UV exposure can result in chronic conditions, including hyperpigmentation (such as solar lentigines, freckles, and melasma), premature skin aging (like telangiectasia and elastosis), and the development of non-melanoma and potentially melanoma skin cancers. Additionally, UVR has been linked to various eye conditions, including photokeratitis, pinguecula,

pterygium, cataracts, and possibly eye tumors (**Almuqati, Alamri, & Almuqati, 2019; El-Shafei & Said, 2023**).

Outdoor workers face a heightened risk of excessive exposure to UVR and its associated harmful effects. In this context, outdoor workers are defined as individuals who spend at least three hours per day working outside, typically between 9 a.m. and 3 p.m., on most days of the week. These workers often experience UVR exposure levels that exceed recommended safety limits, frequently without sufficient sun protection. Campus safety and security staff, who are responsible for managing traffic flow on campus during sunlit hours, are considered part of this vulnerable group (**Ngo & Rivera, 2022**).

Exposure to sunlight in the workplace has been strongly associated with an increased risk of developing non-melanoma skin cancers and may also be linked to melanoma. Over half of all cancer cases and nearly two-thirds of deaths caused by cancer take place in low- and middle-income countries. Projections suggest that by 2025, cancer incidence in developing nations will rise to 45% (**Mehri et al., 2024**).

Skin cancer constitutes an escalating burden on both public health and

economic resources. Research indicates that both the direct and indirect expenses associated with its treatment place considerable pressure on healthcare systems. As a result, initiatives that support early detection of skin cancer possess the capability to reduce costs and enhance health outcomes significantly **(Baghani et al., 2024)**.

In general, Skin self-examination (SSE) is a method aimed at encouraging the early identification of melanoma. A comprehensive SSE consists of a careful and systematic review of the entire body to spot any suspicious lesions based on recognized guidelines, commonly employing a mirror or assistance from another individual to examine areas that are hard to see. Early melanoma detection through SSE in individuals at high risk can potentially decrease both mortality and illness related to melanoma, thereby lessening the impact on patients and the healthcare system **(Niu & Heckman, 2022)**.

Skin self-examination (SSE) plays a vital role in the early detection and management of skin cancers. It is a recommended early screening practice endorsed by organizations including the American Cancer Society, the Cancer Council Australia, and the Skin Cancer Foundation **(Göl & Erkin, 2018)**.

Health awareness and preventive care are gaining greater significance within the healthcare system. Community health nurses play a crucial role by providing direct care, educating individuals and the public about the importance of preventive services such as health screenings, and advocating for overall health improvements. With ongoing healthcare reforms and a rising number of people affected by chronic illnesses, the role of nurses has expanded to include a stronger focus on raising community awareness and preventing disease **(Tushe & Karagjozi, 2025)**.

Primary prevention, according to the International Agency for Research on Cancer, encompasses any measures taken to lower the risk of cancer development in humans. Central strategies for population-wide prevention involve creating and delivering targeted health education and training programs. Educational interventions are one of several approaches aimed at reducing workers' exposure to UVR and have proven effective in enhancing their knowledge and promoting sun-protective behaviors **(Fazel et al., 2023; Symanzik & John, 2022)**.

Significance of the study

Skin cancer is considered one of the most widespread types of cancer worldwide, representing a substantial concern for public health. In 2020 alone, approximately 1.5 million new cases of skin cancer were reported worldwide, including 325,000 cases of malignant melanoma (Muxunov et al., 2024).

One of the most crucial known facts about skin cancer is that it can be prevented and effectively managed if detected early. The goal of disease screening is to shorten the interval between the point when a disease is detectable without symptoms and when it is clinically diagnosed, allowing for earlier initiation of treatment (Rowell et al., 2017).

Through the implementation of educational interventions, the community health nurse can help lower morbidity and mortality rates while also enhancing access to healthcare services. In the light of what has been mentioned before, the present study assesses the effect of training program on promoting skin self-examination among outdoor workers.

Aim of the study

The study aimed to assess the effects of a training program about skin self-examination on the knowledge, self-reported practices, and attitudes of campus security personnel.

Study Hypothesis

1. Campus security personnel who received a skin self-examination training program exhibit improved mean knowledge scores post-test compared to their mean score pre-test.
2. Campus security personnel who received a skin self-examination training program exhibit improved mean scores of self-reported practice post-test compared to their mean score pre-test.
3. Campus security personnel who received a skin self-examination training program exhibit improved mean attitude score post-test compared to their mean score pre-test.

Subjects and method

Study design

A quasi-experimental design (One-Group Pretest-Posttest Design) was employed in the study.

Study setting

The study was conducted in outdoor spaces of the Mansoura University Campus, including the large courtyards, sports fields, parking lots, and pathways. These areas demand constant monitoring by security personnel and expose the personnel to varying levels of sunlight throughout the day.

Participants

The study included outdoor campus security personnel aged 18 years and above, belonging to both sexes, and able to understand written Arabic. Additionally, those who spent a significant portion of their work outdoors monitoring the entry and exit points, traffic and parking management, and patrolling and surveillance gave consent to participate in the study.

Conversely, those campus security personnel who were unable to understand written Arabic, primarily worked indoors, and refused to give or sign the informed consent form were excluded.

Sample size calculation

The total number of campus security personnel at Mansoura University is about 186 persons on duty. After excluding the night shift security personnel, who are about 30. Thus, the target population is the remaining 156 security personnel (response rate = 86.7%).

Study tools

Tool (I): A structured self-administered questionnaire was developed by the researcher after reviewing related literature and consists of two parts:

Part (1): Socio-demographic & general characteristics of the security personnel, including age, sex, marital status, educational level,

years of experience, residence, and monthly income, family history of skin cancer, and sources of skin safety information.

Part (2): Skin health history and sun exposure. It included questions about the history of blistering sunburn, the number of freckles and moles, and Fitzpatrick skin type. The researchers classified workers' skin types using the Fitzpatrick Skin Type Scale (**Fitzpatrick, 1988**). According to the scale, the skin is divided into six categories based on its sensitivity to sunburn, with the risk of developing skin cancer decreasing progressively from skin type 1 to skin type 6. Specifically, skin types 1 and 2 are considered at high risk, types 3 and 4 at moderate risk, and types 5 and 6 at low risk. The assessment of sun protection behaviors included questions about practices such as seeking shade, wearing sunglasses, using hats or caps, wearing long-sleeved clothing or trousers, and applying high-factor sunscreen (sun protection factor).

Tool (II): Knowledge about SSE. It was a structured self-administered questionnaire developed by researchers and contained 9 questions about the definition, importance, and steps of conducting SSE, skin abnormal markings & signs, and the ABCDE “Asymmetry, Border, Color, Diameter, Evolving”

rule. Additionally, questions about the time to perform SSE, and the tools & materials that can be used during SSE. The questions were structured as multiple-choice, allowing for more than one correct answer. The total score for each question was based on the number of correct responses selected. Each correct answer received a score of 1, while incorrect answers were scored as 0. The total score ranges from 0 to 36. Scores < 21.6 are classified as poor knowledge, scores from $21.6 < 28.8$ are classified as fair knowledge, and scores ≥ 28.8 and more classified as good knowledge.

Tool III: Self-reported practice about SSE. It was a self-rating scale developed by the researchers and contained 19 questions about preparation for SSE, body parts that should be examined during SSE, and the ABCDE rule. Answers to these questions were based on a four-point Likert scale (3=Always, 2=Often, 1=Sometimes, 0=Never). The total score for self-care practices was obtained from the sum of responses and ranged from 0-57 points, with higher scores ≥ 42.75 indicating satisfactory self-care practices.

Part IV: The Skin Self-Examination Attitude Scale (SSEAS), developed by **Djaja et al. (2014)**, assesses attitudes towards SSE by measuring outcome expectations and planning

for future SSE. The scale consists of 8 items; each rated on a five-point Likert scale ranging from strongly disagree to strongly agree. Scores on the SSEAS can range from 0 to 32, with 0 representing a low level of attitude toward SSE and 32 indicating a high level.

Ethical consideration

Written initial approval was obtained from the research ethics committee of the Faculty of Nursing, Mansoura University (Reference No P.0634). An official letter clarifying the purpose of the study was obtained from the Dean of the Faculty of Nursing, Mansoura University, and submitted to the head of the campus security department for permission to carry out the study. The researchers met with the manager and explained the purpose and procedures of the study, asking them to facilitate participant recruitment, scheduling of training sessions, and ensure that the study did not disrupt regular security operations. Each security personnel was provided with a written informed consent form after being informed about the study's purpose and procedures. They were assured that their participation involved no physical, social, or psychological risks and that they could withdraw from the study at any time during data collection without any penalty.

To maintain confidentiality and anonymity, each participant was assigned a unique code number used only for data analysis. No incentives or rewards were offered to participants for completing the questionnaire.

Validity and reliability

Following a comprehensive literature review to guarantee validity, the researchers developed the questionnaires. These were then evaluated by a panel of five academic experts, three professors in community health nursing and two in public health and preventive medicine, to evaluate content validity. According to the panel's feedback concerning the appropriateness of the material and the clarity of the phrases, only minor revisions were made to the self-administered questionnaire. After that, a translator with expertise in medical texts and research translated the questionnaire into Arabic. Subsequently, the Arabic version was back translated into English to ensure accuracy, and the translation was examined in comparison with the original text by the same team. Any minor discrepancies detected between the original and back-translated versions were resolved through group consensus.

Pilot study

A pilot study was carried out on 16 security personnel (10% of the sample) to evaluate the clarity and completeness of the tools and to estimate the time needed to complete the questionnaire. The results showed that no refinements and modifications were needed, so the subject was included in the actual sample. On average, it took 15-20 minutes to complete the structured questionnaire.

The reliability analysis was done by Cronbach's Alpha coefficient test. Cronbach's Alpha coefficient of the knowledge instrument was 0.853, for self-reported SSE practices was 0.859, and for the SSE attitude scale was 0.80.

Fieldwork

The fieldwork was carried out in 6 months, starting from the beginning of October 2024 to the end of March 2025. The study was carried out through four phases:

Phase I: Assessment phase: Data collection for the study took place over one month, beginning in early October 2024. The researchers visited the study setting three days a week, from 9 AM to 2 PM, throughout the designated period. During these visits, the researcher met with the campus security personnel at their on-site locations, explained the study's purpose and

procedures, and introduced the data collection tools. The security personnel then completed the self-administered questionnaires, self-rating scale, and attitude scale as part of a pre-test assessment of their baseline knowledge, attitudes, and self-reported SSE practices.

Phase II: Planning phase: The researchers developed and prepared the training program contents and learning materials based on the knowledge gaps that were found in the baseline data, reviewing relevant literature, and utilizing the American Cancer Society's recommended training manual, which included SSE videos and other accessible educational resources. The program content was then reviewed by six experts, three in community health nursing, two in public health and preventive medicine, and one from the dermatology department. The final version of the program was developed based on the feedback and recommendations from these experts. It consisted of both theoretical and practical sessions to be implemented over four weeks. Focusing on ensuring that the security personnel understand the key concepts and can confidently perform SSE. The goal of the training program was to educate them on the importance of regular

SSE for the early detection of skin cancer.

Phase III: Implementation phase:

This phase took three months, starting from the end of November 2024 to the end of February 2025. The researchers implemented a four-week training program in the security staff break rooms. It was carried out through four sessions (one/per week), three theoretical sessions with a duration ranging from 30-45 minutes for each session, and one practical session with a duration ranging from 25-35 minutes. The study participants were divided into 26 subgroups, with 6 security personnel in each subgroup. The researchers attended the study setting for 3 days/ week, starting from 9 AM to 2 PM, and interviewed three subgroups daily until the end of the predetermined period. Each subgroup was interviewed separately during their break time.

The first theoretical session included an orientation about the training program's goal and objectives, with an introduction to skin cancer. The second theoretical session included information about the importance of SSE and understanding skin changes. The third theoretical session focused on sun protection and preventive behaviors, including minimizing environmental UV

exposure, using protective clothing, wearing wide-brimmed hats, protecting the eyes, and applying sunscreen. The fourth session was practical, involving a demonstration and re-demonstration of the steps and methods of SSE. Each session began with a review and feedback on the previous session and an overview of the new session's aim and objectives. At the end of each session, the researchers briefed the security personnel on the objectives of the upcoming session, answered questions, and facilitated a discussion period. Further details of the group training program are provided in Table 1.

During the training sessions, the researchers used different teaching and learning methods and materials, including interactive lectures, group discussion, brainstorming, demonstration, re-demonstration, poster, and PowerPoint presentation. The researchers also gave pictures, brochures, mirrors, and training videos to each participant. The posters and pictures displayed information on the steps for SSE, the risks of skin cancer, and the importance of early detection. The brochure detailed how often SSE should be conducted, who should perform it, and included information on the ABCDE rule. Additionally, a video on SSE was shown to all

participants and shared via a brief message sent to their mobile phones. These materials were created based on a guide developed by Friedman, Rigel, and Kopf (1985).

The posters and pictures provided information about the steps for performing SSE, the risks associated with skin cancer, and the importance of early detection. The brochure outlined who should perform SSE, how it should be done, and the recommended frequency, while also including information about the ABCDE rule. Additionally, a video demonstrating SSE was presented to all participants and subsequently shared with them via a short message on their mobile phones. These materials were developed following the guidelines established by **Friedman, Rigel, and Kopf (1985)**. The informative posters were put in staff break rooms, the university security administration building, and entrances and exits of campus grounds as a reinforcement for the training program. Following the training, hats were distributed to the security personnel. Additionally, a WhatsApp group was established for the study participants to ensure effective follow-up and reduce dropout rates.

Phase IV: Evaluation phase: This phase was carried out after a month-long follow-up. The researchers

asked the participants to complete the same questionnaire about knowledge, attitude, and SSE self-reported practices used in the pre-test to evaluate the effect of the training program by comparing the difference between pre- and post-test scores.

Table 1: The training program was as follows.

Session	Subject	Time duration (minutes)
1 st	Introduction Welcome and introduction: Brief overview of the program and its objectives. Icebreaker activity: Engage participants by asking about their current knowledge or practices regarding skin checks. Understanding skin cancer -Types of skin cancer (basal cell carcinoma, squamous cell carcinoma, melanoma). -Risk factors for skin cancer include prolonged sun exposure, fair skin, and family history. -Importance of early detection in improving survival rates.	30-45
2 nd	Importance of skin self-examination -How regular self-examinations can lead to early detection. -The frequency of self-examinations Identifying skin changes -The ABCDEs of melanoma: asymmetry, border, color, diameter, evolving. -Other warning signs: non-healing sores, changes in texture, and new growths.	30-45
3 rd	Sun protection and prevention -UV protection: discuss the importance of wearing sunscreen, protective clothing, and seeking shade. -Behavioral changes: encourage adopting sun-safe behaviors, such as avoiding peak sun hours.	30-45
4 th	Demonstration of skin self-examination -Instructor-led demonstration: the researchers demonstrate a complete skin self-examination using a volunteer. -Use of mirrors: demonstrate how to use a full-length mirror and a handheld mirror for checking hard-to-see areas. -Checking moles and spots: show participants how to apply the ABCDE criteria in practice.	25-35

Data analysis

The analysis was conducted using SPSS (Statistical Package for the Social Sciences) version 26.0. Descriptive statistics, such as frequencies and percentages, were employed to present the data. For continuous variables, the arithmetic mean $\pm$ standard deviation was utilized, while percentages were used for categorical variables. The comparison between two paired groups for quantitative variables involved the use of the Wilcoxon signed rank test for non-normally distributed data and expressed in median (Min-Max). The McNemar test was used for the comparison of categorical variables. Spearman correlation was used to assess the correlation between knowledge, practice, and attitude. The significance level of $P < 0.05$ was considered statistically significant.

Results

Table 2 shows that 82.1% of the security personnel were between 30 to less than 40 years old, with the mean age and SD for them 37.65(10.69) years. It was found that 81.4%, 94.2%, and 84.6% of them were males, married, and living in rural areas, respectively. Regarding their income, 53.8% had enough income. About educational level, 79.5% of them had secondary education. Furthermore, the mean

years of experience was 4.71(3.38) years.

Table 3 portrays that 1.28 % of the security personnel had a family history of skin cancer. They also had skin problems such as unusual moles, thin hair, freckles, and sunburn with 7.1%, 22.4%, 9.6%, and 21.8%, respectively. Additionally, 50.3%, 96.2% of them spent midday (11 AM-3 PM) outdoors and had few moles from 0 to 50. Regarding their skin color and type, 59% had bronzed skin, and 54.5% reported that their skin rarely burns and tans profusely to a dark brown. Concerning protective measures used during sun exposure, 84% reported staying in the shade.

Figure 1 illustrates that the source of information related to SSE was primarily the internet (19.9%), followed by family and TV (9.6%). Meanwhile, 60.4% have no information regarding SSE.

Table 4 reveals that in the post-test, there was a statistically significant increase in the median scores of the security personnel's knowledge regarding various aspects of SSE. This increase pertains to the definition and importance of SSE; skin abnormalities and signs found during SSE; tools and materials for SSE; time to perform SSE; the ABCDE rules; and the steps of SSE ($P < 0.001$).

Table 5 shows that in the post-test, there was a statistically significant increase in the median scores of the security personnel's self-reported practices of SSE. This increase pertains to preparation for SSE, body areas examined during SSE, and the ABCDE rule ($P < 0.001$).

Table 6 clarifies that regarding attitudes, 15.4% of security personnel were confident that they could examine their skin even if they had not done so in the past few months during the pre-test, which increased to 82.7% in the post-test. Additionally, 14.7% and 35.3% of participants reported that they could regularly examine their skin without assistance and that they regularly checked their skin to take care of their health in the pre-test, respectively, both increasing to 92.9% in the post-test.

Table 7 indicates that there were statistically significant differences between the pre-test and post-test in the total score levels of knowledge, self-reported practices, and attitudes regarding SSE among the security personnel. It was found that 94.2% of them had a poor total knowledge score level in the pre-test, while 79.5% had a good level in the post-test. In addition, 98.1% of them

showed an unsatisfactory level of total self-reported practices in the pre-test, compared to 61.5% who showed a satisfactory level in the post-test. As for total attitudes, 35.3 % of them had high total attitude scores in the pre-test, while 100% had high attitude scores in the post-test.

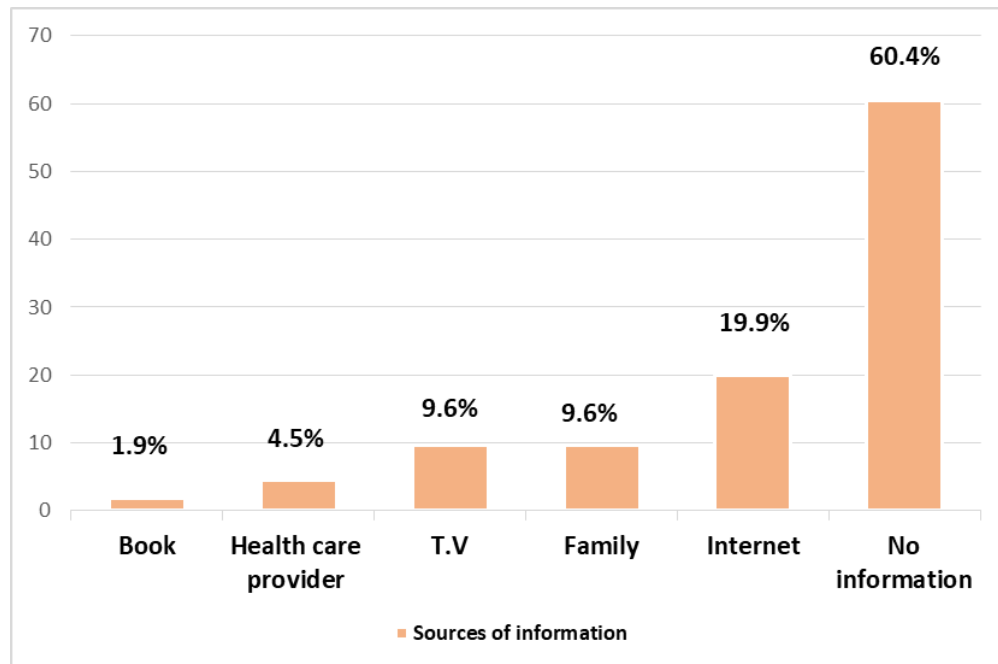
Table 8 shows that there were statistically significant positive correlations between the total knowledge score and total self-reported practices scores as well as between the total knowledge score and total attitudes score in both pre-test ($P < 0.001$) and post-test ($P = 0.027$ & 0.014), respectively. Moreover, statistically significant positive correlations were found between the total self-reported practices score and the total attitudes score in both the pre-test ($P < 0.001$) and post-test ($P = 0.031$).

Table 2. Security personnel's socio-demographic and general characteristics

Item	N (156)	%
Age		
20 > 30	3	1.9
30 > 40	128	82.1
40 > 50	20	12.8
50 and more	5	3.2
Mean (SD)	37.65(10.69)	
Sex		
Male	127	81.4
Female	29	18.6
Current marital status		
Married	147	94.2
Single	7	4.5
Widow	2	1.3
Residence		
Rural	132	84.6
Urban	24	15.4
Income		
Enough	84	53.8
Not enough	72	46.2
Qualifications		
Illiterate	1	0.6
Primary	1	.0.6
Preparatory	1	0.6
Secondary	124	79.5
University	29	18.6
Years of work experience		
> 5	2	1.3
5 >10	29	18.6
10 >15	112	71.8
15 and more	13	8.3
Mean (SD)	4.71(3.38)	

Table 3. Security personnel's skin health history and sun exposure

Item	N (156)	%
Previous skin diseases	22	14.1
Family history of skin cancer	2	1.28
Skin problems		
Thin hair	35	22.4
Sun burn	34	21.8
Freckles	15	9.6
Unusual mole	11	7.1
Time spent outdoors		
Early morning (before 11 AM) and/or late afternoon or evening (after 3 PM)"	53	34
Midday (11 AM - 3 PM)	80	50.3
All day	23	14.7
Mole Numbers		
Few (up to 50)	150	96.2
Moderate (51-100)	6	3.8
Skin color		
Bronzed	92	59
Light	44	28.2
Very light	13	8.3
Dark	7	4.5
Skin type		
Type I: Always burns, never tans, highly sensitive to UV exposure	4	2.6
Type II: Burns easily and tans minimally	31	19.9
Type III: Burns moderately and tans gradually to a light brown	22	14.1
Type IV: Burns minimally and always tans to a moderately brown color	7	4.5
Type V: Rarely burns, tans profusely to a dark brown	85	54.5
Type VI: Never burns, deeply pigmented, least sensitive to UV exposure	7	4.5
Protective measures during sun exposure		
Staying in the shadow	131	84
Sunglasses	25	16
Hat or Scarf	24	15.4
Clothing over	17	10.9
Sunscreen	13	8.3



*More than answered used

Figure (1): Security personnel's sources of information regarding skin self-examination (n=156)

Table (4). Comparison of the security personnel's score level of knowledge regarding skin self-examination before and one month after the training program (N=156)

Knowledge score level	Pre-test		Post-test		Test of significance	P value *
	N	%	N	%		
Definition of skin self-examination						
Poor	149	95.5	13	8.3	X ² =134.001	<0.001
Good	7	4.5	143	91.7		
Median (Min-Max)	1(0-2)		2(1-2)		Z=4.525	<0.001
Importance of skin self-examination						
Poor	130	83.3	5	3.2	X ² =133	<0.001
Fair	8	5.1	13	8.3		
Good	18	11.6	138	88.5		
Median (Min-Max)	1(0-5)		5(1-5)		Z=10.661	<0.001
Skin abnormalities and signs found during skin self-examination						
Poor	148	94.8	6	3.8	X ² =145	<0.001
Fair	4	2.6	24	15.4		
Good	4	2.6	126	80.8		
Median (Min-Max)	3(0-7)		6(3-7)		Z=10.898	<0.001
Tools and materials for skin self-examination						
Poor	154	98.8	11	7.1	X ² =144	<0.001
Fair	1	0.6	28	17.9		
Good	1	0.6	117	75		
Median (Min-Max)	0(0-4)		4(1-5)		Z=10.922	<0.001
Time to perform skin self-examination						
Poor	145	92.9	33	21.2	X ² =110.009	<0.001
Good	11	7.1	123	78.8		
Median (Min-Max)	0(0-2)		2(0-2)		Z=10.103	<0.001
ABCD rule						
Poor	149	95.5	8	5.1	Z=11.195	<0.001
Fair	0	0	21	13.5		
Good	7	4.5	127	81.4		
Madian (Min-Max)	0(0-5)		5(1-5)		Z=10.742	<0.001
Steps of performing skin self-examination						
Poor	129	82.7	7	4.5	X ² =136	<0.001
Fair	15	9.6	35	22.4		
Good	12	7.7	114	73.1		
Median (Min-Max)	1(0-10)		9(3-10)		Z=10.646	<0.001

 X^2 = McNemar's test

Z = Wilcoxon Signed Rank Test

* Significant (p< 0.05)

Table (5). Comparison of the security personnel's self-reported practice score level regarding skin self-examination before and one month after the training program (N=156)

Practice score level	Pre-test		Post-test		Test of significance	P value*
	N	%	N	%		
Preparation for skin self-examination						
Unsatisfactory	118	75.6	29	18.6	X ² = 78.222	<0.001
Satisfactory	38	24.4	127	81.4		
Median (Min-Max)	0(0-12)		10(7-12)		Z=10.105	<0.001
Body areas examined during skin self-examination						
Unsatisfactory	144	92.3	53	34	X ² = 83.505	<0.001
Satisfactory	12	7.7	103	66		
Median (Min-Max)	0(0-30)		24(18-30)		Z=10.634	<0.001
ABCDE rule						
Unsatisfactory	155	99.4	124	79.5	X ² = 29.032	<0.001
Satisfactory	1	0.6	32	20.5		
Median (Min-Max)	0(0-15)		10(5-15)		Z=10.816	<0.001

 X^2 = McNemar's test Z = Wilcoxon Signed Rank Test* Significant ($p < 0.05$)

Table (6). Comparison of security personnel's attitude regarding skin self-examination before and one month after the training program (N=156)

Items	Pre-test					Post-test				
	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
	N (%)	N(%)	N(%)	N(%)	N(%)	N(%)	N(%)	N(%)	N(%)	N(%)
It is important to check my skin for skin cancer even if I have no symptoms	2(1.3)	1(0.6)	1(0.6)	9(5.8)	143(91.7)	0	0	1(0.6)	11(7.1)	144(92.3)
Checking my skin regularly is a priority for me	0	6(3.8)	11(7.1)	11(7.1)	128(82.1)	0	2(1.3)	12(7.7)	12(7.7)	130(83.3)
I think I could find something suspicious on my skin if it was there	24(15.4)	5(3.2)	6(3.2)	22(14.1)	99(63.5)	2(1.3)	2(1.3)	8(5.1)	28(17.9)	116(74.4)
If I saw something suspicious on my skin, I'd go to the doctor straight away	2(1.3)	0	0	10(6.4)	144(92.3)	0	0	0	11(7.1)	145(92.9)
I am confident in a doctor's ability to diagnose skin cancer	2(1.3)	3(1.9)	5(3.2)	17(10.9)	129(82.7)	0	0	0	20(12.8)	136(87.2)
I am confident that I can take up examining my own skin again even if I have not looked at my skin in the past few months	86(55.1)	9(5.8)	14(9)	23(14.7)	24(15.4)	0	0	0	27(17.3)	129(82.7)
I am able to keep examining my own skin regularly, even if I have no one to help me	87(55.8)	9(5.8)	14(9)	23(14.7)	23(14.7)	0	0	1(0.6)	10(6.4)	145(92.9)
If I regularly examine my skin, then I am helping to look after my own health	82(52.6)	2(1.3)	2(1.3)	15(9.6)	55(35.3)	0	0	0	11(7.1)	145(92.9)

Table (7). Comparison of security personnel's total score levels of knowledge, self-reported practice, and attitude regarding skin self-examination before and one month after the training program (N=156)

Variables	Pre-test		Post-test		Test of significance	P value*
	N	%	N	%		
Total knowledge score level						
Poor	147	94.2	0	0	Z=11.433	<0.001
Fair	9	5.8	32	20.5		
Good	0	0	124	79.5		
Median (Min-Max)	7(0-26)		31(23-36)		Z=10.839	<0.001
Total practice score level						
Unsatisfactory	153	98.1	60	38.5	X ² =89.095	<0.001
Satisfactory	3	1.9	96	61.5		
Median (Min-Max)	0(0-53)		44(33-55)		Z=10.796	<0.001
Total Attitude score level						
Low	101	64.7	0	0	X ² =108.079	<0.001
High	55	35.3	156	100		
Median (Min-Max)	20(8-32)		32(24-32)		Z=10.616	<0.001
X ² = McNemar's Test		Z = Wilcoxon Signed Rank Test		* Significant (p< 0.05)		

X²= McNemar's Test

Z = Wilcoxon Signed Rank Test

* Significant (p< 0.05)

Table (8). Correlation between knowledge, self-reported practice, and attitude scores before and one month after the training program (N=156)

Items	Test time	R	p
Knowledge and self-reported practice	Pre-test	0.672	<0.001*
	Post-test	0.177	0.027*
Knowledge and attitude	Pre-test	0.466	<0.001*
	Post-test	0.196	0.014*
Self-reported practice and attitude	Pre-test	0.460	<0.001*
	Post-test	0.172	0.031*

r=Spearman correlation * Significant (p< 0.05)

Discussion

Exposure to ultraviolet (UV) radiation is the primary preventable cause of skin cancer. Skin cancer constitutes a major global health concern, with incidence rates increasing faster than those of any other cancer type. Outdoor workers, as an occupational group, are particularly at high risk for developing skin cancer (**Troya Martín et al., 2023**). Research shows that performing SSE is advantageous for individuals at high risk. Consequently, creating effective target group-oriented interventions aimed at promoting SSE practices among outdoor workers in their workplace is of particular relevance (**Coroiu et al., 2020**). Training programs can play a pivotal role in equipping individuals with the information and skills necessary to drive meaningful behavioral changes. Thus, this study aimed to assess how the knowledge, practices, and attitudes of the outdoor campus security personnel regarding SSE were affected by this educational intervention. Regarding socio-demographic characteristics, it is noted that the age of the majority of the outdoor campus security personnel falls between 30 and 40 years old, and the majority of them are male. This age group and gender have significant criteria that increase

susceptibility to skin cancer in Egypt. According to the study of **El-Khalawany et al. (2024)** on skin tumor characteristics at a large tertiary center in Egypt, the age group between 19- 59 years had the highest prevalence of skin tumors, with malignant tumors occurring more frequently in males. Furthermore, the present study found that most security personnel live in rural areas and have between 10 and 15 years of work experience. This is in agreement with **Wu, et al. (2022)**, who investigated outdoor activities and sunburn in urban and rural families. They reported that people living in rural areas experience higher rates of melanoma incidence and mortality compared to those in urban settings, which may be attributed to greater exposure to UVR, whether from occupational or other sources. Additionally, **Wittlich et al. (2023)**, in their GENESIS-UV study examining UVR exposure across 250 occupations, found that extended work experience as an outdoor worker is directly linked to greater cumulative UV exposure, thereby raising the risk of skin damage and skin cancer.

Concerning the security personnel's skin health history and sun exposure, the findings demonstrated that half of them work outdoors during peak UV hours (midday from 11 AM to 3

PM) when the sun's rays are most intense. This comes in line with **Mohsin & Ali (2022)**, who examined the impact of UVR on outdoor workers and found that longer working hours increase UV exposure, making the duration of time spent at work a significant factor in UVR exposure.

The relationship between skin color and skin cancer is well recognized: individuals with less melanin in their skin have a higher risk of developing skin cancer. Melanin plays a crucial protective role, as it not only absorbs UV radiation but also acts as an antioxidant and neutralizes free radicals. It is well documented that people with darker skin tones experience a lower incidence of skin cancer compared to those with lighter skin (**Garbe et al., 2024; LaBerge et al., 2020**). By skin color, the results of the study reveal that more than one-fourth of security personnel have light skin color. Moreover, less than one-fourth of them identified themselves as skin type I or II (most susceptible to sunburn). This result was consistent with research by **Peters et al. (2016)** on sun protection practices among outdoor workers during both work and leisure time. Similarly, **Troya Martín et al. (2023)** reported comparable results regarding skin type reactivity (I–III) based on the

Fitzpatrick classification in their study assessing the risk of occupational skin cancer among outdoor workers.

The findings also showed that an informal source from the internet was the main source of knowledge for security personnel concerning skin safety and SSE. This highlights a significant gap in formal education and training on this topic. This reliance on the internet suggests that structured, credible resources on skin safety and SSE may be either inaccessible or insufficiently promoted to this group. This finding underscores the need for targeted educational interventions, such as structured training programs or easily accessible, authoritative resources, to provide security personnel with reliable, evidence-based knowledge.

The findings demonstrated that the study's hypothesis was accepted. This indicates that following the training program, the security personnel's knowledge, self-reported practices, and attitudes regarding SSE have improved.

After one month of receiving our training program, the security personnel's knowledge of SSE has increased. There were significant changes between the pre-test and post-test in their level of knowledge of the definition and importance of

SSE; skin abnormalities and signs found during SSE; tools and materials for SSE; time to perform SSE; the ABCDE rules; and the steps of SSE. The median for all domains of knowledge increased. This can be attributed to the comprehensive and multifaceted instructional approach employed by the researchers. The use of interactive lectures, group discussions, and brainstorming sessions facilitated active engagement and reinforced learning through varied educational techniques.

Supplementary materials, such as posters, pictures, and brochures, provided visual aids, enhancing participants' understanding and recall of SSE steps. The inclusion of visual tools and hands-on resources, tailored to meet different learning styles, likely made the content more relatable and memorable. By integrating diverse methods and materials, the program effectively bridged knowledge gaps and promoted skill acquisition, contributing to the observed improvement in the security personnel's SSE knowledge.

This result is in line with the findings of **Erkin & Aygün (2020)** from their study on the impact of an educational intervention on nursing students' knowledge and attitudes toward SSE and skin cancer risks.

They observed significant improvements between pre-test and post-test scores among participants, particularly in their understanding of how frequently SSE should be done, how to properly use a wall and hand mirror during SSE, and the reasons participants gave for not performing SSE. Another study by **Kudubes (2024)** examined the impact of sun protection education on nursing students' knowledge levels. The study showed that receiving this education significantly increased their knowledge about skin cancer and sun protection by a factor of 0.874 ($\beta = 0.874$), with the results being statistically significant ($p < 0.001$).

According to our results, the median of self-reported practices regarding SSE showed a sharp rise in the post-test following the training program. Significant improvements were observed between the pre-test and post-test in self-reported practices related to preparation for SSE, the body areas examined, and application of the ABCDE rule. The median for all domains of self-reported practices increased. Additionally, regarding security personnel's attitudes toward SSE, 35.3% had high attitude scores in the pre-test, which increased to 100% in the post-test. This notable increase in both self-reported practice and

attitudes scores can be attributed to the program's comprehensive and engaging design, which combined interactive and visual educational methods with practical reinforcement strategies. The use of demonstrations and re-demonstrations actively engaged participants and reinforced learning. Supplemental materials, such as mirrors and training videos, provided clear, accessible guidance on SSE steps, frequency, the ABCDE rule for early detection, and the importance of regular self-monitoring. Distributing hats and placing informative posters in key locations served as consistent visual reminders, promoting practice adherence in the participants' work environment. Furthermore, sending the 5-minute training video to participants' mobile phones reinforced the training content, enhancing both accessibility and retention.

This finding is compatible with a study by **Rowell et al. (2017)** on the evaluation of an SSE program. It demonstrated that watching the DVD had a larger and more immediate impact on skin-checking behavior and diagnosis of skin cancer. Another study by **Niu and Heckman (2022)** explored digital educational approaches for teaching SSE. The results demonstrated that

participants in the high interactivity and customization group were more effective at correctly identifying abnormal skin lesions and exhibited a stronger intention to perform SSE compared to those in the low interactivity group. Moreover, a study by **Yeşilyurt, & Altunkürek (2024)** on the impact of skin cancer education and SSE. It was found that the rate of performing SSE after training was statistically significant and high in our study. In the pre-test, 20% of parents in the intervention group gave their children SSE, but this percentage climbed to 59.2% in the post-test. Consistent with our results, **Kamyab et al. (2023)** conducted a study on the impact of a series of theory-based educational interventions grounded in the health belief model to promote skin cancer prevention behaviors. They found that three months after the intervention, the experimental group showed significant improvements in knowledge (from 6.22 ± 1.52 to 12.26 ± 1.55), attitude (from 25.51 ± 5.48 to 52.36 ± 5.82), subjective norms (from 20.21 ± 5.20 to 43.32 ± 5.11), perceived behavioral control (from 17.64 ± 4.87 to 40.46 ± 4.58), behavioral intention (from 27.40 ± 5.33 to 61.46 ± 5.68), and skin cancer preventive behaviors (from 5.13 ± 1.35 to 12.84 ± 1.30), with these changes being statistically

significant (paired t-test, $p < 0.05$). In contrast, the control group showed no significant changes.

In this study, correlation analysis was conducted to explore how participants' knowledge, self-reported practices, and attitudes toward SSE were interrelated before and after the training program. A significant positive correlation was observed in the pre-test between the total knowledge score and both the self-reported practices and attitudes scores, suggesting that the security personnel with higher baseline knowledge about SSE were more likely to engage in recommended practices and hold favorable attitudes toward SSE. This implies that knowledge may serve as a foundational component influencing both behavioral and attitudinal readiness. Furthermore, the sustained positive correlation between practices and attitudes scores in both the pre- and post-test indicates a reinforcing relationship, where improved attitudes likely supported better adherence to SSE practices, and vice versa. The persistence of this association after the training program highlights the potential for the training program not only to enhance knowledge but also to foster a positive feedback loop between attitude and practice. This finding aligns with the study by

Baghani et al. (2024), which evaluated knowledge, attitude, and practice related to skin cancer. Their results showed a positive correlation between knowledge, attitude, and practice concerning skin cancer among medical students and general practitioners.

This study highlights the vital importance of educational interventions in enhancing skin cancer prevention among outdoor campus security personnel, a population particularly vulnerable to sun exposure. The significant improvements observed in participants' knowledge, self-reported SSE practices, and attitudes following the training program demonstrate its effectiveness in fostering early detection behaviors. These findings highlight the critical role of structured health education in promoting preventive practices and empowering individuals to take charge of their skin health.

Conclusion

The present study concluded that the research hypotheses are supported and that training the outdoor campus security personnel about SSE has a positive impact on improving their related knowledge, attitudes, and self-reported practices. Furthermore, in the pre-test, significant positive correlations were found between participants' total knowledge scores

and both self-reported practices and attitudes scores, as well as between practices and attitudes scores in both the pre-test and post-test.

Recommendations

1. Incorporating a periodic SSE training program into the occupational health and safety programs for all outdoor campus security personnel to ensure retention of knowledge and maintenance of positive practices and attitudes toward SSE over time. These behavioral improvements are promising and, if sustained, may lead to a decrease in future skin cancer cases.
2. The university administration should develop and implement policies that promote regular skin health monitoring and provide access to resources, such as brochures, posters, and online tutorials, to reinforce SSE practices.

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Conflict of interest

The authors state that there are no conflicts of interest.

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Effect of Application of Digital Game-Based Teaching Method versus Traditional Method on Nursing Students' Performance Regarding Electrocardiogram Procedure

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Abstract

Background: The integration of digital game-based learning (DGBL) into nursing education offers innovative opportunities to enhance both theoretical knowledge and practical competencies. **Aim:** This quasi-experimental study aimed to evaluate the effect of a digital game-based teaching method versus a traditional method on nursing students' knowledge and application of the electrocardiogram (ECG) procedure. **Subjects and Method:** a purposive sample of 80 second-year nursing students was divided into two groups **Tools: I:** "Student Interview Structured Evaluation Form" which consisted of two parts; Part (A): Socio-demographic data and Part (B): Students' Knowledge Assessment Sheet. **Tool II:** "Students practice observational checklists regarding their role towards electrocardiography procedure. **Results:** revealed that students in the digital game-based group demonstrated significantly higher levels of knowledge and practical performance compared to the traditional group, with sustained retention after one month. A positive correlation between knowledge and practice was also observed in the game-based group. **Conclusion:** The findings support the effectiveness of DGBL in improving learning outcomes in complex clinical procedures like ECG **Recommendations:** The study recommends incorporating DGBL as a complementary educational strategy in nursing curricula and encourages further research to explore its long-term impact across diverse clinical contexts.

Keywords: Digital game-based learning; Educational technology; Electrocardiogram (ECG); Nursing education.

Introduction

Nursing education is a practice-oriented field that is concerned with not only acquiring theoretical knowledge but also the development of psychomotor and critical thinking skills essential for effective clinical practice. Nursing education has long been delivered through traditional lecture-based approaches, in which students passively absorb knowledge. However, these approaches are no longer adequate to meet the demands of modern healthcare or to get nursing students ready for practical settings **(Dirgar, Berşe, Bor, & Tosun, 2024)**.

According to constructivist learning theory, students comprehend new information best when it is related to what they already know. This deep understanding is especially important in nursing, where students must recall, connect, and apply essential concepts to ensure patient safety and make informed decisions. Meaningful learning also enables students to confidently manage real-life situations, reinforcing the need for dynamic and practical teaching approaches **(Al-Omari, Dorri, Blanco, & Al-Hassan, 2024)**.

Technological advancements have transformed the educational environment, providing new opportunities for self-directed learning through digital platforms.

Game-based learning (GbL) is an innovative teaching method with beneficial effect. It uses game elements to increase student motivation, engagement, and information retention. Playing games offers an engaging, structured environment that promotes learning in the cognitive, emotional, and psychomotor domains.**(Gegenfurtner & Kollar, 2025)**.

According to research educational games are beneficial for teaching healthcare. Research indicates that including gaming element can enhance academic achievement, encourage positive attitudes, lessen anxiety, and encourage active learning. In nursing specifically, Gamification has been associated with enhanced clinical decision-making, communication, confidence, and time management **(Vázquez-Calatayud, 2024)**. Additionally, students often report greater satisfaction and motivation when learning through games, especially in complex or essential subjects like pharmacology or ECG procedures **(Haque, Asif, Pandey, & Dixit, 2025)**.

The electrocardiogram (ECG) is an essential non-invasive diagnostic technique for tracking heart function and identifying arrhythmias. In

clinical settings, nurses are often the first health care provider to respond to patient needs and play a key role in initiating and managing ECG procedures. This includes using ECG equipment, ensuring correct lead placement, performing the initial interpretation, gathering pertinent data, and quickly alerting the attending physician to enable appropriate medical decisions (Yang, Chung, & Chen, 2022).

As they provide direct patient care, nurses must be competent in both the technical execution of ECGs and data interpretation. However, several studies have identified notable gaps in nurses' ECG related knowledge and procedural skills, highlighting the urgent need for effective educational strategies to enhance their competence and ensure high-quality patient care (Yeom, Yang, & Kim, 2020).

Research Hypotheses:

- Students who receive digital game-based teaching methods about electrocardiogram will exhibit more improvement in performance than students who receive traditional teaching methods.
- Students who receive a traditional teaching method about electrocardiogram will exhibit more improvement in performance than students who receive game-based teaching method.

Game-based learning offers a promising solution by combining theoretical instruction with simulated, hands-on practice in a digital environment. Through game scenarios based on real practical cases, students can enhance their ECG knowledge, strength decision-making skills, and gain confidence in applying what they learn. Therefore, integrating game-based leaning into nursing education, especially in essential competencies like ECG interpretation, has the potential to bridge the gap between classroom learning and clinical practice (Xie & Liu, 2024).

The aim of the study: - This study aimed to evaluate the Effect of Digital Game-Based Teaching Method Versus Traditional Method on Nursing Students' Knowledge and Application of Electrocardiogram Procedure

- Subject & Method

- Design: A quasi-experimental comparative design was used in this study.

- Setting: The study was conducted at the Faculty of Nursing, Tanta University, Egypt. The data collection and interventions took place in Lecture Hall 4, and the Computer Laboratory room. These settings were chosen to provide an appropriate environment for delivering the educational

interventions and assessing the outcomes effectively. Lecture Hall 4 was utilized for theoretical instruction and discussions while the Computer Laboratory room was used for implementing the digital game-based teaching method.

Sample A purposive sample of 80 nursing students from second year were selected and divided into two equal groups; each group consisted of (40) students as the following:

-Study group (I): it consisted of 40 students who received digital game teaching method about ECG procedure.

-Study group (II): it consisted of 40 students who received traditional method about ECG procedure.

The following criteria were used for selected subjects studied: -

-Both sexes

-Student who does not study ECG procedure

Tools of data collection: -

Two tools were used in this study to collect pertinent data: -

Tool I: “Student Interview Structured Evaluation Form” This tool was constructed by the researcher to collect baseline data to the current study. It consisted of two parts as follows:

Part (A): Socio-demographic data.

It was developed by the researcher after reviewing the related literature which includes student code, sex and

age (Bayram & Caliskan, 2019),(ABUMETTLEQ et al., 2023).

.Part (B): Students' Knowledge Assessment Sheet: It was developed by the researcher based on reviewing the related literature (Zhang & Hsu, 2013), (Sheilini & Devi, 2014), (Hernández-Padilla et al., 2017). It was used to assess students' basic information about ECG Procedure knowledge. It includes the definition of ECG, supplies of ECG, pre-procedure preparation; limb leads number, each limb lead color and site, chest pump number, each chest pump site, interpretation of limb leads, chest leads, shape of ECG wave, and its parts.

Scoring system

The knowledge of students was scored as who respond by" choice and correct answer " were given a score of 1, and who respond "wrong and not answer " were given a score of zero.

The total score was calculated and then converted to a percentage out of the maximum possible score as

Poor <60%.

Fair 60% to 75%.

Good >75%.

Tool II: "Students practice observational checklists regarding their role towards electrocardiography procedure: This part was developed

by(Eckman, 2013) and adopted by the researcher, It comprises four phases covering the following: nurses role pre-procedure (eight) steps, nurses role during procedure(nine) steps, nurses' role post-procedure (four) steps, and interpreting the ECG (eight) steps.

Scoring system: Each item was scored as follows:

Done correctly assigned a score of (2)

Done incorrectly assigned a score of (1)

Not done will assigned a score of (0)

Total scores were summed up, converted to percentages, and calculated as follows:

- $\geq 80\%$ satisfactory practice level.
score ≥ 46
- $< 80\%$ unsatisfactory practice level
score < 46 .

Method

The study was accomplished through the following steps:

I -Administrative process:

Approval was obtained from the Dean and Head of Medical-Surgical Nursing Department at Tanta University. Ethical clearance (code 425-3-2024) was secured, and informed consent was taken from all students, ensuring privacy and voluntary participation. Tools were validated by five experts in the field.

3-Content validity

All tools were tested for content validity by five jury of experts in the field of Medical-Surgical Nursing at the Faculty of Nursing.

II - Operational design:

A pilot study was done on 8 students (excluded from the main sample) to check tool clarity. **Reliability** was confirmed using Cronbach's alpha (Tool I = 0.885, Tool II = 0.922).

Data collection lasted 3 months (July–September 2024) from 80 students divided into two equal groups, **Group I** learned via a digital game and **Group II** received traditional teaching.

It was conducted on four phases as follows: -I. Assessment phase:

Assessment of student was done by the researcher After obtaining informed consent for all the study subjects in both study groups make collection baseline data pertinent by using **tool I . Student Interview Structured Evaluation Form:** It was used to assess student knowledge regarding ECG procedure first time (pre implementation the study).

Student Interview Structured Evaluation Form: It was used to assess student basic knowledge regarding ECG procedure first time (pre implementation the study) second time (immediately after using digital game for study group I and after explain procedure for study

group II) and third time (after one month of apply both teaching method)

II-Planning phase:

This phase was formulated based on the study subjects' assessment, use of relevant literature review for design of digital game (**Masoumian Hosseini et al., 2023**), to assess students need and expected outcome.

Expected outcomes were included:

-Enhance student understanding and retention of ECG procedure and make students interested while acquiring knowledge.

-Game design: The game was designed through a collaborative effort between the researcher and the game developer. Its design over a period of 6 months started from the end of November 2023 to the end of May 2024. Creating a web-based game involved a seamless integration of three fundamental web technologies: HyperText Markup Language (HTML), Cascading Style Sheets (CSS), and JavaScript. HyperText Markup Language (HTML) was utilized to structure the content of the game. It provided the foundational framework by defining elements such as buttons, images, and text, which are essential for user interaction. Cascading Style Sheets (CSS) was employed to enhance the visual appeal and user experience. It allowed us to style the game

elements, ensuring a cohesive and aesthetically pleasing design. CSS enabled the customization of fonts, colors, layout, and animations, making the game more engaging and visually attractive. JavaScript, a dynamic programming language, was the core technology that brought interactivity to the game. By leveraging JavaScript, we were able to implement game logic, respond to user actions, and manipulate HTML elements in real time. This included creating functions for game mechanics, tracking user input, and updating the game state. Using JavaScript, we ensured that the game responded to user actions promptly, providing a seamless and interactive experience. The combination of these technologies was critical in developing a functional, responsive, and visually appealing web-based game. HTML laid the groundwork, CSS enhanced the user interface, and JavaScript provided the necessary interactivity, resulting in a well-rounded and engaging gaming experience. This approach not only demonstrates the power of integrating web technologies but also highlights the importance of each technology in contributing to the overall success of web development projects. (**Ranjan et al., 2020**),

III-Implementation phase:

Content of the Digital Game

The Digital game was comprised of (4) main Stages:

- **Stage I** pre-procedure preparation: remove metal objects, remove chest hair and Prepare ECG machine. Notification (hints) was act like a help to aid students to complete stage and ensure that information is received.
- **Stage II** Drag Limb leads: four colored limbs led each of it to attach to a specific limb. Starting from left lower limb the nursing students will select the (green) lead to be dragged to its site, then upper left limb (yellow), and then right upper limb (red) and then to right lower limb (black) to be pointed digitally. Notification (hints) was act like a help to aid students to complete stage and ensure that information is received.
- **Stage III** Drag Chest-Pump: six chest pumps are attached to the patient's chest; each of them has a specific site. Starting from v1 at fourth intercostal space right to sternum border, then v2 at fourth intercostal space left to sternum border, then v4 at fifth intercostal space at the mid clavicular line, then v3 between v2 and v4, then v5 at fifth intercostal space at the anterior axillary line, and then v6 at fifth intercostal space at the mid axillary line to be pointed digitally. Notification (hints) acted like help to aid student to complete stage and ensure that information is received.
- **Stage IV** Displaying ECG cardio electrical wave by clicking on the power button and explaining the interpretation of Limb leads, chest leads shape of ECG wave and its parts to identify normal from abnormal.
- **Score** was given according to the time taken to accomplish each stage. Total score was 100 divided into (4) stages to be each stage 25.
- Maximum time allowed for completing each stage (5) minutes.
- Score given for complete each stage with (1) mint was (25), with (2) mint was 20, with (3) mint was 15, with (4) mint was 10, with (5) mint was 5
- Students were not allowed to progress to the next stage unless they answered the current stage correctly.
- A Score was given to motivate students to replay
- After successfully completing each stage, a banner appeared with the text "Well Done," accompanied by a motivational sound and a checkmark.
- Google sheet was used to assess student sign in and score

Study Group (I):

- Study group was enrolled in digital game teaching through link present in device of computer laboratory

them Where students engage in the game stage in case of delayed response from student notification(hints) was appeared to notify students what to do according to the time taken for the answer scoring was given to students as follow.

- Total score is 100 divided into (4) stages to be each stage 25.
- Maximum time allowed for completing each stage (5) minutes.
- Score given for complete stage with (1) mint was (25), with (2) mint was 20, with (3) mint was 15, with (4) mint was 10, with (5) mint was 5.
- This scoring motivates students to replay and improve their performance
- They also received a link to the digital game which allowed them to practice it at home.

Study Group (II):

- Studied group who received traditional teaching method using PowerPoint, whiteboard, whiteboard marker and mannequin for explain ECG procedure.

Both study groups were informed that they would receive a certificate of appreciation for their participation in the training. Additionally, their performance would be evaluated and assessed, and those who achieved the best performance would be rewarded with monetary prizes after finishing study all students in both

groups will receive same teaching methods to avoid bias.

IV- Evaluation phase:

Every student in Both groups (I and II) assessed as following by **Tool I** was concerned with assessment of students' Knowledge regarding ECG and **Tool II** was concerned with assessment of students' practice regarding ECG procedure immediately and after one month from the applying the Study.

Results

Table (1): Distribution of the studied nursing students regarding their socio-demographic characteristics.

It represented that the most common age group among students is 19 years, representing 82.5% in Group I and 85.0% in Group II.

Regarding to gender, Females are more prevalent in Group I (60%) but slightly less in Group II (47.5%). Conversely, males are more frequent in Group II (52.5%) compared to Group I (40%).

Regarding residence, In Group I, there is an equal distribution between rural and urban areas (50%). Meanwhile In Group II, there is a slight increase in rural students (60%) compared to urban students (40%). There were no statistically significant differences between both groups found

Table (2): Distribution of the studied nursing students regarding their total knowledge level about ECG procedure among the studied groups throughout periods of teaching methods. It was found that pre implementation of the intervention 100% of students in both studied groups had poor knowledge (<60% score). And 100% of students reached a good knowledge level (>75% score) in both studied groups with mean **28.03±1.097, 27.20±1.506** for Group I (digital game) and Group II (traditional method) respectively but Group I significantly outperformed Group II (**P = 0.000**).

While Knowledge retention remained good in category, with Mean, **28.23 ± 0.480** for Group I (Digital Game-Based Method) after one month of intervention. As compared to Group II (Traditional Method) a Slight decline in retention with Mean, **25.43 ± 2.099**. That indicates Group I retained higher scores than Group II, showing better long-term retention. **P = 0.000**

Figure (2) The changes in the mean total knowledge scores about ECG procedure among the studied groups throughout periods of teaching methods.

.It show that pre implementation of the intervention both groups had low baseline knowledge scores below

(5), indicating limited prior understanding of the ECG procedure. And there was a significant improvement in knowledge in both groups immediately after the intervention , with mean scores rising above **25**.

While, one-month post-intervention Group I (digital game-based) maintained a high and relatively stable score, whereas Group II (traditional teaching) showed a slight decline. This indicates that digital game-based teaching may be more effective in supporting long-term knowledge retention.

Table (3): Distribution of the studied nursing students regarding total practice level regarding their role towards ECG throughout periods of teaching methods. It was found that Digital Game-Based Teaching (Group I) Immediately post implementation the intervention **95%** of students achieved satisfactory practice levels, with a mean score **51.10 ± 2.845**.

While, One Month Post implementation the intervention **92.5%** retained satisfactory levels in study group I (digital game base teaching), showing strong practice retention with a mean score **51.28 ± 3.030**. As, No significant change over time **P = 1.00**.

On another hand, Traditional Teaching (Group II) Immediately

post implementation of the traditional teaching method **92.5%** achieved satisfactory practice levels, with a mean score of **51.50 ± 3.803** .

But, One Month Post implementation of the traditional teaching method **65%** retained satisfactory practice levels; there were a significant decline in retention, With Mean score decreased to **45.85 ± 2.860** . as **$P = 0.000$**

Figure (3): Distribution of the nursing students studied regarding total practice level regarding their role towards ECG throughout periods of teaching methods.

It showed that Digital Game-Based Teaching (Group I) Immediately post implementation the intervention **95%** of students achieved satisfactory practice levels.

While, One Month Post implementation the intervention **92.5%** retained satisfactory levels in study group I (digital game base teaching).

On another hand, Traditional Teaching (Group II) Immediately post implementation of the traditional teaching method **92.5%** achieved satisfactory practice levels.

But, One Month Post implementation of the traditional teaching method **65%** retained satisfactory practice levels and there

was a significant decline in retention.

Table (4) Relationship between socio-demographic characteristics of the studied nursing students and their total knowledge score towards ECG among the studied groups throughout periods of teaching methods. It was found that for Effect of Age Immediately Post-Intervention Group I (Digital Game-Based Teaching) Students aged **20 years** scored slightly higher mean score (**28.33 ± 0.577**) than those aged **18 years** mean score (**28.25 ± 0.500**), but the difference is not statistically significant (**$F = 1.405$, $P = 0.258$**).

Also, it remains unchanged for One Month Post-Intervention, with students aged 20 retaining higher scores (**28.15 ± 0.650**), but the differences are still nonsignificant (**$F = 1.405$, $P = 0.258$**). While Group II (Traditional Teaching) shows No significant differences across age groups at any stage (**$P > 0.05$**), indicating age does not impact outcomes under traditional teaching methods.

Regarding Effect of Gender, Group I (Digital Game-Based Teaching) Immediately Post-Intervention the Females (**28.29 ± 0.464**) perform slightly better than males (**28.13 ± 500**), but the difference is not statistically

significant as $P = 0.288$.but, One Month Post-Intervention the males start to score slightly higher, with no significant difference as $P = 0.051$.. while Group II (Traditional Teaching) Immediately Post-Intervention shows the Females (27.32 ± 1.493) perform better than males (27.10 ± 1.546), but the difference is not statistically significant $P = 0.650$.

Also, One Month Post-Intervention: Females continue to perform slightly better, but differences remain nonsignificant $P = 0.071$.

Regarding Effect of residence, Group I (Digital Game-Based Teaching) shows Immediately Post-Intervention: Urban students (28.15 ± 0.489) perform slightly lower than rural students (28.30 ± 0.470), but the difference is not statistically significant $P = 0.329$.

Also, One Month Post-Intervention there was No significant differences between urban and rural students.

Meanwhile, Group II (Traditional Teaching) shows Immediately Post-Intervention that Urban students score significantly higher (27.63 ± 1.258) than rural students (26.92 ± 1.613), with no significant difference $P = 0.147$.

Also, One Month Post-Intervention there was No significant differences between urban and rural students.

Table (5): Relationship between socio-demographic characteristics of the studied nursing students and their total practice score towards ECG among the studied groups throughout periods of teaching methods.

It was found that Group I (Digital Game-Based Teaching) shows a significant age-related difference in practice scores both immediately and after one month, with 20-year-olds consistently scoring higher. While Group II (Traditional Teaching) shows No significant age differences.

Regarding Effect of gender, Group I shows No significant gender differences, indicating equal effectiveness for males and females. While Group II shows Males initially outperform females, but the gap disappears after one month.

Regarding Effect of residence, Group I shows No significant differences between rural and urban students. While Group II shows that urban students perform slightly better, but the difference.

Table (6): Correlation between total knowledge scores of the studied nursing students and their total practice role towards ECG throughout periods of teaching methods. It was found that for Group I (Digital Game-Based Teaching) Immediately Post-

Intervention there was a positive significant correlation between knowledge and practice scores, statistically significant ($r = 0.385$), ($P = 0.014$). Also, the correlation strengthens One Month Post-Intervention, there was a high positive significant association ($r = 0.447$), $P = 0.004$.

Meanwhile, Group II (Traditional Teaching) shows Immediately Post Intervention a weak positive correlation ($r = 0.227$), which is not statistically significant $P = 0.158$. Also, the correlation weakens one Month Post-Intervention ($r = 0.075$), with no statistical significance $P = 0.646$.

Table (1): Distribution of the studied nursing students regarding their socio-demographic characteristics.

Characteristics	The nursing students studied (n=80)				χ^2 P
	Study group I(n=40)		Study group II(n=40)		
	N	%	N	%	
Age (in years)					
18	4	10.0	0	0.0	2.571 0.337
19	33	82.5	34	85.0	
20	3	7.5	6	15.0	
Gender					
Male	16	40.0	21	52.5	FE
Female	24	60.0	19	47.5	0.370
Residence					
Rural	20	50.0	24	60.0	FE
Urban	20	50.0	16	40.0	0.500

FE: Fisher' Exact test

(Table2) Distribution of the studied nursing students regarding their total knowledge level about ECG procedure among the studied groups throughout periods of teaching methods.

Total knowledge level	The studied nursing students (n=80)													
	Study group I (n=4)						χ^2 P	Study group II (n=4)						χ^2 P
	Pre		Immediatel y		Post a month			Pre		Immediatel y		Post a month		
	N	%	N	%	N	%		N	%	N	%	N	%	
Poor	40	100.0	0	0.0	0	0.0	152.76	40	100.0	0	0.0	0	0.0	152.76
Good	0	0.0	40	100.0	40	100.0	0.000*	0	0.0	40	100.0	40	100.0	0.000*
Range	(0-7)		(25-29)		(27-29)		F=516.54 P=0.000*	(0-7)		(25-29)		(22-29)		F=283.68 P=0.000*
Mean ± SD	2.15±2.13		28.03±1.097		28.23±0.48			1.50±2.03		27.20±1.506		25.43±2.09		
	1				0			8				9		
Gp I Vs Gp II														
t	1.39		4.13		6.94									
P	0.167		0.000*		0.000*									

Gp I (Study group I): receive digital game teaching method about ECG procedure

Gp II (Study group II): receive traditional method about ECG procedure

* Statistically significant level at $P < 0.05$

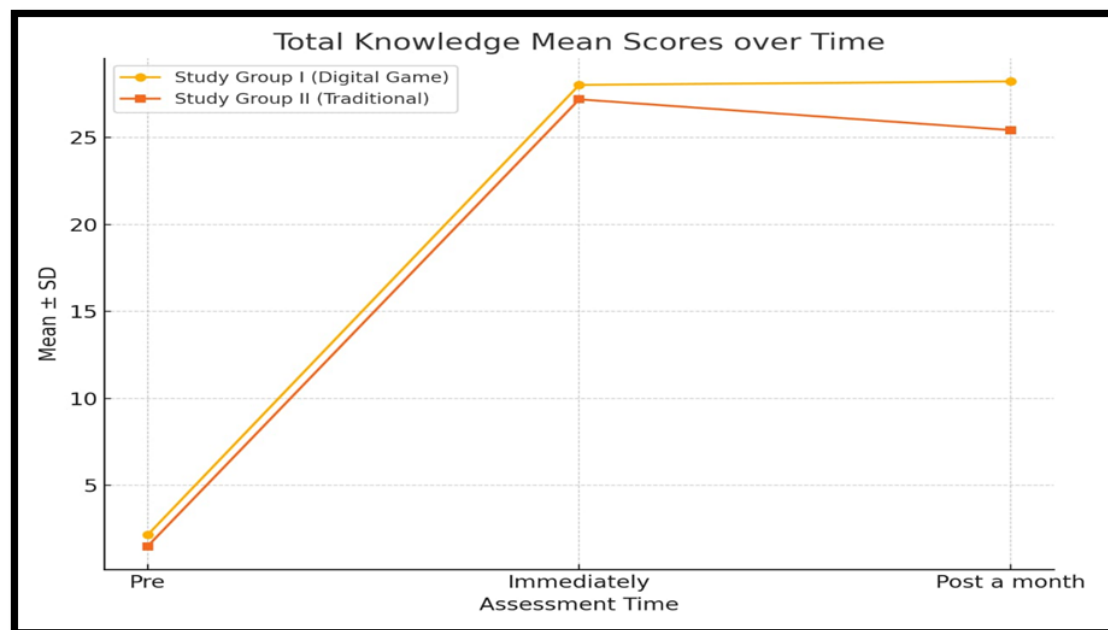


Figure (1) The changes in the mean total knowledge scores about ECG procedure among the studied groups throughout periods of teaching methods.

Table (3): Distribution of the studied nursing students regarding total practice level regarding their role towards ECG throughout periods of teaching methods.

Total practice level	The studied nursing students (n=80)									
	Study group I (n=40)				χ^2 P	Study group II (n=40)				χ^2 P
	Immediately		Post a month			Immediately		Post a month		
	N	%	N	%		N	%	N	%	
Unsatisfactory	2	5.0	3	7.5	FE	7	7.5	26	65.0	FE
Satisfactory	38	95.0	37	92.5	1.00	33	92.5	14	35.0	0.000*
Range	(42-58)		(42-58)		t=0.071	(44-58)		(41-52)		t=7.509
Mean ± SD	51.10±2.84		51.28±3.030		P=0.79	51.50±3.80		45.85±2.860		P=0.000
	5				1	3				*
Gp I Vs Gp II										
t	0.533		8.235							
P	0.596		0.000*							

<80% Unsatisfactory

≥80% Satisfactory

Gp I (Study group I): receive digital game teaching method about ECG procedure

Gp II (Study group II): receive traditional method about ECG procedure

FE: Fisher' Exact test

* Statistically significant level at P<0.05

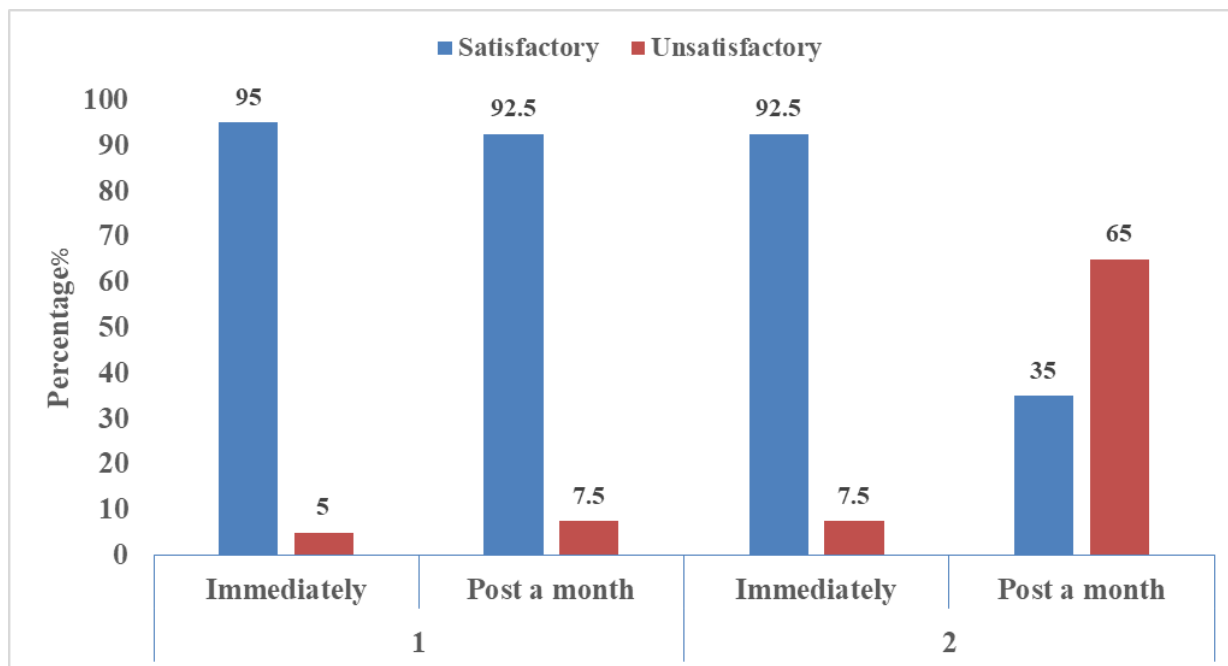


Figure (2): Distribution of the studied students regarding total practice level regarding their role towards ECG throughout periods of teaching methods.

Table (4): Relationship between socio-demographic characteristics of the studied nursing students and their total knowledge score towards ECG among the studied groups throughout periods of teaching methods.

Characteristics	The studied nursing students (n=80)					
	Total knowledge score					
	Study group I (n=40)			Study group II (n=40)		
	Pre	Immediately	Post a month	Pre	Immediately	Post a month
Age (in years)						
- 18	0.25±0.500	28.25±0.500	27.25±1.708	-	-	-
- 19	2.42±2.208	28.21±0.485	28.15±0.870	1.56±2.063	27.06±1.575	25.29±2.125
- 20	1.67±1.155	28.33±0.577	27.67±2.309	1.17±2.041	28.00±0.632	26.17±1.941
F, P	2.044, 0.144	0.089, 0.915	1.405, 0.258	0.185, 0.670	2.047, 0.161	0.879, 0.354
Gender						
- Male	2.06±2.081	28.13±0.500	28.44±0.512	0.95±1.746	27.10±1.546	24.86±1.682
- Female	2.21±2.206	28.29±0.464	27.75±1.294	2.11±2.208	27.32±1.493	26.05±2.368
- t, P	0.044, 0.835	1.164, 0.288	4.063, 0.051	3.387, 0.074	0.210, 0.650	3.439, 0.071
Residence						
- Rural	2.15±1.981	28.30±0.470	28.20±0.834	1.04±1.756	26.92±1.613	25.13±1.918
- Urban	2.15±2.323	28.15±0.489	27.85±1.309	2.19±2.287	27.63±1.258	25.88±2.335
t, P	0.00, 1.00	0.977, 0.329	1.017, 0.319	3.206, 0.081	2.190, 0.147	1.233, 0.274

Study group I: receive digital game teaching method about ECG procedure

Study group II: receive traditional teaching method about ECG procedure

* Statistically significant level at $P < 0.05$

Table (5): Relationship between socio-demographic characteristics of the studied nursing students and their total practice score towards ECG among the studied groups throughout periods of teaching methods.

Characteristics	The studied nursing students (n=80)			
	Total practice score			
	Study group I (n=40)		Study group II (n=40)	
	Immediately	Post a month	Immediately	Post a month
Age (in years)				
- 18	49.00±4.830	48.25±4.349	-	-
- 19	51.61±2.397	51.42±2.750	51.91±3.511	45.62±2.775
- 20	48.33±2.517	53.67±1.528	49.17±4.875	47.17±3.251
F, P	3.405, 0.044*	3.322, 0.047*	2.779, 0.104	1.515, 0.226
Gender				
- Male	51.25±1.807	51.69±2.056	50.43±3.789	45.48±2.502
- Female	51.00±3.401	51.00±3.551	52.68±3.544	46.26±3.229
t, P	0.072, 0.789	0.488, 0.489	3.758, 0.060	0.750, 0.392
Residence				
- Rural	51.15±2.519	51.65±2.540	50.83±3.886	45.17±2.615
- Urban	51.05±3.203	50.90±3.478	52.50±3.559	46.88±2.986
t, P	0.012, 0.913	0.607, 0.441	1.886, 0.178	3.657, 0.063

Study group I: receive digital game teaching method about ECG procedure

Study group II: receive traditional method about ECG procedure

* Statistically significant level at P<0.05

Table (6): Correlation between total knowledge scores of the studied nursing students and their total practice role towards ECG throughout periods of teaching methods.

Total practice score	The studied nursing students (n=80)			
	Total knowledge score			
	Study group I (n=40)		Study group II (n=40)	
	Immediately	Post a month	Immediately	Post a month
r	0.385	0.447	0.227	0.075
P	0.014*	0.004**	0.158	0.646

r: Pearson' correlation coefficient

* Statistically significant level at $P < 0.05$

** Highly statistically significant level at $P < 0.01$

Discussion

The integration of digital game-based learning (DGBL) into educational settings has gained significant attention in recent years, particularly in fields that require practical skills and knowledge. Nursing education, with its focus on both theoretical and practical learning, provides a unique opportunity to explore how game-based learning can influence students' understanding and application of critical skills (Lee et al., 2024).

This study examined the effect of applying a digital game-based teaching method on nursing students'

performance in the electrocardiogram (ECG) procedure, compared to traditional teaching methods. This section discusses the findings in relation to previous studies, highlighting their implications for nursing education and skill development.

The finding of present study regarding age of student revealed that Most of the students were 19 years old, which reflects that they were at the beginning of their university education. This may be attributed to the study conducted on second-year students. This finding was matched with Berg & Steinsbekk (2021) who stated that

most studied nursing students were aged less than 20 years old.

Concerning to sex of the participant was a nearly equal distribution of males and females in the digital game-based group, while males were slightly more represented in the traditional group. This could be attributed to the fact that male students were more willing to participate in the study, which increased their number. After the distribution into both groups, their number slightly increased in the traditional group. This finding agreed with **Terlecki et al., (2017)** who pointed out that the readiness of males to try different teaching methods is greater than that of females.

Concerning residence, the sample equally included students from both rural and urban areas, which allowed for a comparison of the impact of the social environment on learning.

In relation to the knowledge level before application of the intervention, it was revealed that both study groups had a poor level of knowledge, which reflects the students' limited understanding of the ECG procedure prior to the implementation of the teaching methods. This also minimized differences between the two groups, reducing bias and enhancing the

generalizability and applicability of the results.

Regarding the immediate impact of the teaching methods, both studied groups achieved a good level of knowledge. However, the improvement observed in the group taught using the digital game-based method was superior to that of the traditional method. This could perhaps be explained by the active learning environment that digital games provide as suggested by **(Adipat, Laksana, Busayanon, Asawasowan, & Adipat, 2021)**, which supports the research hypothesis

This finding agreed with **Boedeker et al. (2025)**, who stated that students in interactive sessions achieved higher grades compared to those in traditional lectures.

Similarly, the results of a systematic review conducted by **Lee et al., (2024)** found that digital serious games can be used more effectively as learning tools in practical courses than in theoretical ones. Furthermore, **Gudadappanavar, Benni, & Javali (2021)** reported that the knowledge scores of students who were taught using a game-based method were higher than those of students in the traditional teaching group.

In contrast to the findings of **Rondon, Sassi, & Furquim de Andrade (2013)**, who reported that both methods were equally effective, this difference may be explained by the limited time available for students to engage in the game. As in their study, only one computer was available, and each student had to play quickly to give others a turn. Whereas, in our study, a fully equipped computer lab with multiple devices was used, allowing the students to immerse themselves in educational experience.

Regarding practice performance, the study found that performance improved immediately in both groups following the implementation of the teaching methods. However, it was noted that most students in the group taught using the game-based method achieved a satisfactory level of performance, whereas more than a third of students in the traditional method group demonstrated an unsatisfactory level of application. This reflects the positive impact of the game-based teaching method on students. This could be explained by the fact that game-based learning (GBL) has been shown to positively influence motivation by aligning with Self-Determination Theory (SDT), which emphasizes the importance of autonomy, competence, and relatedness in

fostering intrinsic motivation. When GBL meets these psychological needs, it leads to improved engagement and performance (**Hwang & Chang, 2024**) which supports the research hypothesis

This finding is supported by **Seong, Cheng, Ling, Krishnan, Zaman, & Lokithasan, (2024)**, who stated that game-based learning (GBL) has a positive impact on enhancing motivation and fostering students' sense of competence, autonomy, and relatedness. This is further supported by **Fulya Eyupoglu & Netfeld (2019)**, who reported that the competition inherent in game-based learning environments positively influences students' intrinsic motivation.

Similarly, this finding aligns with the results of **Bayram & Caliskan (2019)**, who found that the final practical scores of students in the experimental group, which used game-based learning, were higher than the average scores of students in the control group. Also, **Tan, Lee, et al. (2017)** reported that game-based learning can promote students' psychomotor performance compared to traditional methods.

In contrast to the finding of **Butt (2015)** who found that the game-based approach was equivalent to the traditional method in its effect on students' performance in practical

procedures. This could be attributed to the difficulties students faced while navigating the game, as many experienced headaches and dizziness during gameplay.

Regarding student performance after one month of using both teaching methods, it was found that the levels of knowledge and practice remained stable in the group taught using the digital game-based teaching method. This indicates strong knowledge and skill retention among students. In contrast, students in the traditional teaching group showed a decline in both knowledge and practice. This difference can be attributed to several factors. **Firstly**, the digital game-based learning environment promotes active learning, where students are engaged in the learning process rather than passively receiving information. (Boedeker et al., 2025). This is finding agreed with Asniza, Zuraidah, Baharuddin, Zuhair, & Nooraida, (2021), who confirmed the positive effect of game-based approaches in enhancing student engagement and active learning.

Secondly, repetition played a crucial role in reinforcing knowledge and skills. Data from Google sheet, which was used to monitor student engagement, revealed that many students repeatedly accessed the

game to improve their performance and increase their scores. This aligns with the findings of Verkuyl et al. (2016), whose study indicated that students immersed themselves in the game and were enthusiastic about continuing to play, which made them eager to repeat it in order to finish and score higher.

In Addition, this retention may also be linked to the hedonic factor, which refers to the elements that enhance a learner's experience based on pleasure or emotional satisfaction derived from the learning process (Oluwajana et al., 2019). As stated by Sharma, Tak, & Kesharwani (2020), hedonic value positively impacts the intention to continue playing online games. This includes aspects that make learning more engaging and enjoyable for students, as digital games provide a stimulating and enjoyable experience. Such engagement enhances students' motivation to engage in continuous learning, ultimately contributing to better long-term retention of acquired knowledge and skills as confirmed by (Vaghela & Parsana, 2024).

This finding aligns with Kulakaç & Çilingir (2024) who found that retention rates, knowledge test scores, and skill performance were higher in the game-based learning

group compared to the traditional group. Similarly, **Pitt, Borman-Shoap, & Eppich (2015)** reported that well-designed educational games provide an ideal environment for memory retention by increasing student involvement, motivation, enthusiasm, and interest in the material. In addition, **Masoumian Hosseini et al. (2023)** , provided evidence that game-based instruction demonstrated longer-term sustainability in promoting learning retention compared to traditional instruction.

In contrast **Drummond et al. (2017)**, **Almashayek, Al-Khateeb, & Bader, (2022)**, reported that game-based instruction was ineffective in promoting retention and long-term memory compared to traditional instruction, this could be attributed to the students' inability to repeatedly access the game and engage fully in the learning process in both studies. Whereas in our study the game was open access available for students at any time in any place.

Concerning the relationship between socio-demographic characteristics and total performance the results revealed that socio-demographic characteristics may influence knowledge acquisition and the improvement of practical

performance in learning electrocardiogram (ECG) procedures. As the findings showed that age, sex, and place of residence impacted knowledge and practice scores in both studied groups.

Regarding age, the predominance of 19-year-old participants reflects the nature of the sample, which was drawn from second-year undergraduate students, indicating a degree of homogeneity. Nevertheless, differences in knowledge and performance emerged among different age groups, with older students (20 years and above) performing better on some measures. This may be attributed to their higher cognitive maturity and increased ability to benefit from active learning strategies, such as digital games as suggested by **(Brod, 2021)**

This finding aligns with **Valença et al. (n.d.)**, whose study indicated that game-based learning enhances the engagement of older students, leading to improved academic outcomes. Additionally, **Nadeem, Oroszlanyova, & Farag, (2023)** reported that students with a growth mindset are more likely to attempt new approaches multiple times until they succeed contrast, younger students may be more engaged with educational games; however, their lack of prior

academic experience may limit their overall benefit from these games (**Papastergiou, 2009**), resulting in no statistically significant differences between age groups. While, in traditional settings, no clear differences were observed between age groups, suggesting that traditional methods may not provide additional advantages for older students compared to their younger counterparts (**Hattie, 2008**)

In terms of sex, there was a relatively balanced distribution between males and females in the group that received game-based learning, strengthening internal comparisons. The Females performed better in the game-based learning group. This can be explained by the fact that females are often more committed and engaged with organized and directed activities (**Bennett & Maton, 2010**). Additionally, well-designed digital games can provide a safe and engaging learning environment that enhances female participation and reduces distractions or stress factors, positively reflecting on their performance. This aligns with **Nadeem et al. (2023)**, who reported that female students generally showed a slightly higher level of enjoyment toward the games compared to male students.

In contrast, **Rondon et al. (2013)** found that male students learned better through digital games. Therefore, it is recommended to consider gender differences when designing game-based learning activities. This discrepancy may be attributed to the lack of access to physical play within the study setting and the reliance on a single computer, which reduced the level of organization and limited the presence of structured, guided activities, factors that may have particularly affected female students' engagement.

Regarding place of residence, the diversity between urban and rural participants enriched the sample and allowed for the examination of how the social and economic environment affects learning. It was observed that students from urban areas scored higher in both knowledge and practice by traditional learning methods compared to their peers from rural areas. This may be attributed to greater access to transportation for city students, which enables them to easily attend the college for traditional education as evidenced by (**Wood, 2023**).

However, the difference was less pronounced in the group that used digital games, indicating that this approach may help reduce the

educational gap related to place of residence, as it allows for learning without being restricted to a specific location as suggested by (Tang et al., 2024). This finding aligns with Liao, Wu, Gunawan, & Chang, (2024), who stated that "Games are a promising tool for helping learners in both rural and urban areas to develop their skills."

Regarding the correlation between knowledge and practice, the study results showed a strong positive correlation between the knowledge and practice in the digital game-based learning group, while this correlation was not observed in the traditional group. This difference can be attributed to Contextual Learning Theory, which suggests that learning involving real and interactive contexts enhances the connection between knowledge and practice as evidenced by (Chuang, 2021). This aligns with Hu (2024), whose study highlighted the importance of digital game-based learning in enhancing contextual understanding and cognitive processes, contributing to creating a meaningful and engaging learning environment. In contrast, the gap between theory and practice in the traditional method significantly impacted this relationship (Saifan et al., 2021)

This can be attributed to the continuous feedback, which was

achieved by encouraging banners for good performance, along with an overall final score to assess progress. That plays a significant role in motivating learners and increasing their desire to repeatedly engage with the game. Learners feel a sense of progress and improvement, which enhances their sense of accomplishment and self-motivation, driving them to return and engage with the gam Davidson & Candy's (2016) e repeatedly, as confirmed in study.

This finding aligns with, Buttussi et al. (2013), who discuss the role of educational games in improving knowledge and performance, their relationship with enhancing practical application, and their potential for repeated training and practice.

In contrast to the findings of Tan, Lau, et al. (2017), who found that there was no clear relationship between the knowledge and skills acquired through game-based learning, which can be attributed to the lack of repetition and the absence of feedback.

In the end, the results of this study can highlight the fact that game-based learning provides an impactful learning experience that promotes active, engaging, and repetitive learning. As well as increasing students' motivation and improves knowledge retention.

Conclusion

Based on the finding of current study, it can be concluded that digital game-based learning (DGBL) is effective in enhancing nursing students' knowledge and practical skills, especially in complex procedures like electrocardiogram (ECG). The results support the integration of DGBL as a complementary tool in nursing education, offering more interactive and effective learning experiences in nursing education.

Recommendation

For faculty of nursing

Adopt digital game-based learning as a complementary teaching strategy in clinical courses, particularly in complex procedures like ECG, due to its effectiveness in enhancing both knowledge and practical skills.

For future research

Replicate this study across other nursing faculties and clinical procedures to validate the effectiveness of digital game-based learning in different contexts.

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Mothers' Knowledge and Practices regarding Safe Disposal of Electronic Waste

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Abstract

Background: Electronic wastes have potential hazards due to their composition which cause systemic diseases in the body. Mothers play a pivotal role in safe handling and disposal to protect health of the community members from bad effect of electronic waste. **Aim:** Assess the mothers' knowledge and practices regarding safe disposal of electronic waste. **Design:** A descriptive research design. **Setting:** Two Maternal and Child Health Care Centers (MCH) in Tanta city. **Subjects:** A sample of (650 mothers) was selected randomly from the previously mentioned settings. **Tools:** **Tool (I): Part (1):** Mothers socio-demographic data. **Part (2):** Knowledge of mothers, includes: General information about electronic waste, its risks, safe disposal and recycling. **Tool (II):** Self-reported practices of mothers regarding electronic waste management, contained 26 statements include: practices that mothers follow to deal with and to dispose of electronic waste. **Results:** There were 84.9% and 97.2% of mothers had low level of knowledge regarding safe disposal and recycling of electronic waste total score. Moreover, 94.2% and 99.7% of mothers had unsatisfactory practices regarding practices that mothers follow to deal with and to dispose of electronic waste. **Conclusion:** Majority of studied mothers had low level of knowledge as well as, unsatisfactory level of practice. There was a significant positive correlation between studied mothers' total score of knowledge and their total score of practices regarding safe disposal of electronic waste. **Recommendations:** health authorities should plan and develop health classes for all mothers to increase their knowledge and enhance their practices regarding safe disposal of electronic waste.

Keywords: Electronic waste, Knowledge, Practice, Safe disposal.

Introduction

Electronic waste refers to various electronic equipment, from computer-related and telecommunications equipment, household appliances, lighting and hospital equipment that discarded without any intention of reuse **Srivastav et al., (2023)**. Electronic waste is a growing problem globally as technology continues to advance and more electronic devices produced and discarded. According to the Global electronic waste Monitor 2020 report, approximately 53.6 million metric tons of electronic waste generated worldwide in 2019 **(Moossa, Qiblawey, Nasser, Al-Ghouti & Benamor, 2023)**.

Electronic waste contains more than 1,000 different substances such as lead, mercury, arsenic, cadmium, selenium, hexavalent chromium, and flame-retardants that create dioxins emissions when burned. Toxins arising from electronic waste found to cause brain damage, birth defects, allergic reactions, and cancer. Presence of hazardous materials such as lead, nickel and brominated flame-retardants increases the complexity of electronic waste treatment **(Malhotra & Jain, 2023)**.

Informal recycling of electronic waste toxic leachates flow into the environment, contaminating potable water sources and poisoning

vegetables and fruits in the surrounding dumpsites and landfills. In addition, communities engaged in informal electronic waste management exposed to diseases such as blood disorders, congenital disabilities, nausea, asthma, lung diseases and depressed immune systems **(Maphosa & Mashau, 2023)**.

Poor handling, recycling, and disposal of electronic waste can cause severe impacts on public health and the environment **(Mane, Patil, Durgawale & Kakade, 2019)**. The biggest challenge with managing electronic waste is the lack of regulation as illegal and informal workers recycle electronic waste using rudimentary tools to disassemble electronic equipment and often burn components to extract valuable materials. Burning and incineration release hazardous pollutants, causing environmental risks and health hazards **(Rajesh, Kanakadhurga & Prabakaran, 2022)**.

Community health nurses play a vital role in protecting the health of individuals and communities affected by electronic waste. The community health nurses help mitigate the negative impacts of electronic waste on public health through raising the public awareness about the importance of safe disposal of

electronic waste and empower individuals to take action to protect their health and their environment. Also, they provide education conducting assessments, advocating for policy changes, and collaborating with others (Ali & Akalu, 2022; Singhal, Lyngdoh, Prabhakaran, 2021).

Significance of the study

Electronic waste's informal processing and disposal have raised critical concerns related to human and environmental health worldwide. Inadequacy of policies, deficient budgets, and unsatisfactory public awareness towards waste management are some key factors behind this situation. Therefore, lack of awareness and absence of strong regulatory policy are giving rise to future challenge to public health (Ali & Akalu, 2022). So, the community health nurses should play essential role in promoting safe electronic waste disposal practices and protecting public health from the hazards of electronic waste.

Aim of this study:

Assess the mothers' knowledge and practices regarding safe disposal of electronic waste.

Research question:

What are the levels of mothers' knowledge and practices regarding safe disposal of electronic waste?

Subjects and method:

Study Design

A descriptive study design was used.

Setting

The study was carried out at the two largest Maternal and Child Health Care Centers (MCH) in Tanta city, which named as (medical center at Sigar and Dr. Mohamed Mashaly primary health care center at Saied Street, which affiliated to Ministry of Health and Population)

Subjects: A sample of 650 mothers were selected randomly from the previously mentioned settings according to number of mothers attending to each setting.

Tools of data collection: The data was collected by using the following tools.

Tool (I): Knowledge of mothers regarding electronic waste:-

It was developed by the researcher based on the literatures review (Mane, Patil, Durgawale & Kakade, 2019; Azlan, Razak & Indiran, 2021; Ali & Akalu, 2022; Almulhim, 2022). It comprised two parts as follows:

Part (1): Socio-demographic data of the mothers:

This part was used to collect data about mothers' general characteristics included; age, residence, educational level, family income, occupation and number of family member.

Part (2): Knowledge of mothers regarding electronic waste disposal: This part was used to assess knowledge of mothers about electronic waste disposal, which included the following sections:

- a) Information about electronic waste included (10 items)
- b) Risks of electronic waste included (4 items)
- c) Safe disposal of electronic waste included two parts, first part included (9 items), second part included (11 items)
- d) Electronic waste recycling included two parts, first part included (8 items), second part included (1 item)

The total score of knowledge was calculated and converted into percent score as follows:

- **High level of knowledge** $\geq 75\%$ of the total score.
- **Moderate level of knowledge** $60 < 75\%$ of the total score.
- **Low level of knowledge** $< 60\%$ of the total score.

Tool (II): Self-reported practices of mothers regarding electronic waste management: It was developed by the researcher after reviewing the recent related literatures (Mane, et al., 2019; Arpitha & Patil, 2020; Hamzah, Yahya & Shafie, 2020). It was used to assess mothers' general practices for disposal of electronic waste which contained 26 statements as follow:

- Practices that mothers follow to deal with electronic waste included 9 statements.
- Practices that mothers follow to dispose of electronic waste included 17 statements.

The total score for level of practice was calculated as follows:

- **Satisfactory practices** $\geq 70\%$ of the total score.
- **Unsatisfactory practices** $60 < 70\%$ of the total score.

Method

1. Administrative approval: An official permission was sent by Dean of the Faculty of Nursing to the Directorate of Health Affairs Gharbiya Governorate and the directors of Maternal and Child Health Centers of the selected settings requesting their assistance and consent for data collection.

2. Ethical and legal considerations:

- An approval of the Scientific Research Ethical Committee was obtained to conduct the study (**code (294-9-2023)**).
- Informed consent was taken from every participant after explanation the purpose of the study.
- The participant has the right to withdrawal at any time during the data collection period.
- The researcher ensured that the nature of the study didn't cause any harm or pain for the entire sample.

Privacy and confidentiality of the collected data were taken into consideration.

3. Tools' development: Tools (I&II) were developed by the researcher after reviewing the recent related literatures and was translated into Arabic language to suit the level of understanding of the mothers.

- **Validity:** The study tools were tested for construct and content validity by jury of five experts in the field of Community Health Nursing, corrections and modifications were done accordingly.

- **Reliability:** the study tools were tested by using Cronbach's Alpha test. They were (0.833, 0.825 and 0.620) respectively for all the study tools, knowledge part and practice part.

4. A pilot study was conducted on 10% of the total sample (65 mothers) to test the clarity and applicability of the developed tools.

5. The actual study:

- Data collection was conducted in a period of six months ranged from the beginning of April 2024 to the end of September 2024.

- The researcher attended at the previously mentioned settings at the morning shift from 9.00 A.M. to 1 P.M four days/week as follows; (two days from medical center at Sigar and two days a week from Dr. Mohamed

Mashaly primary health care center at Saied Street) until the predetermined sample size obtained.

- The data was collected individually through face-to-face interview with each mother.

- The averaged time spent for collect the data from each mother was 15-20 minutes and the number of mothers taken each day were range from 6-8 mothers.

Statistical analysis:

- The collected data were organized, tabulated and statistically analyzed using statistical package for social studies (SPSS) version 23.

- For quantitative data, the mean, standard deviation and range were calculated for quantitative data. One sample t test was used.

- For categorical variables numbers and percent were calculated. Comparison was done using chi-square test (χ^2). Pearson's correlation coefficient (r) was used to identify correlation between variables.

- A significance was adopted at $P < 0.05$ for interpretation of results of tests of significance.

- Highly significant was adopted at $P < 0.01$ for interpretation of results of tests of significance.

Results

Table (1): It shows that; age of studied mothers ranged between 19 –

60 years old with mean 36.23 ± 8.823 years. More than two thirds (69.2%) of them aged from 19-40 years and 30.8% of them their age was ranged from 41-60 years. Concerning studied mother's educational level, it was reported that the highest percentage were secondary education general/ technical and university education (44.5 % and 26.9%) respectively. Concerning the studied mothers place of residence, it was noted that more than two-thirds (65.4%) of them were from rural region and one-third (34.6%) of them were from urban region.

It was also observed that less than two thirds (62.6%) of them had enough income. Also, the number of family member of studied mothers ranged between 2-10 members with mean 4.29 ± 1.227 members, more than two-thirds (68.9%) of them between 4-6 members and more than one quarter (27.6%) of them between 2-3 members.

Figure (1): It reveals that, the total level of knowledge of studied mothers, it ranged between 0 – 110 with a mean 44.37 ± 19.485 . The majority (90.0%) of studied mothers had low level of knowledge regarding electronic waste compared to only 9.4 % and 0.6 % of them had moderate and high level of knowledge regarding safe disposal of electronic waste respectively. The

difference was highly statistically significant $p = 0.001$.

Table (2): The table clarifies that, the majority of (93.2 % and 97.2%) of studied mothers had low level of knowledge regarding risks of electronic waste total score and recycling of electronic waste total score respectively. Also, three quarters (75%) of them had low level of knowledge regarding information about electronic waste total score. Moreover, more than four fifths (84.9%) of the studied mothers had low level of knowledge regarding safe disposal of electronic waste total score. On the other hand, minority (6.2% and 4.5%) of them had high level of knowledge regarding information about electronic waste total score and safe disposal of electronic waste total score.

Figure (2): Illustrates the distribution of the studied mothers according to their total levels of reported practices regarding electronic wastes. It reveals that; the total levels of practices of studied mothers; it ranged between 1- 21 with a mean score of their practice was 6.61 ± 2.80 . The majority (99.7%) of studied mothers had unsatisfactory practices, compared to only 0.3% of them had satisfactory practices. The difference was a highly statistically significance ($p = 0.001$).

Table (3): Shows the distribution of the studied mothers according to their levels of practices sub-scales and total levels of practices about electronic wastes. It represents that majority (94.2% and 99.7%) of studied mothers had unsatisfactory level of practices regarding practices of mothers in dealing with electronic wastes and practices of mothers in disposing of electronic waste respectively.

Table (4): The table reveals that there was a highly statistically significant relation between the studied mothers' total score level of knowledge and the education level, income and occupation ($P= 0.001$). Also, there was a statistically significant relation between the studied mothers' total score level of knowledge and their age ($p= 0.013$). On the other hand, there were no a statistically significant relation between the studied mothers' place of residence and number of family member and their total score of knowledge ($p= 0.697$ & 0.599) respectively.

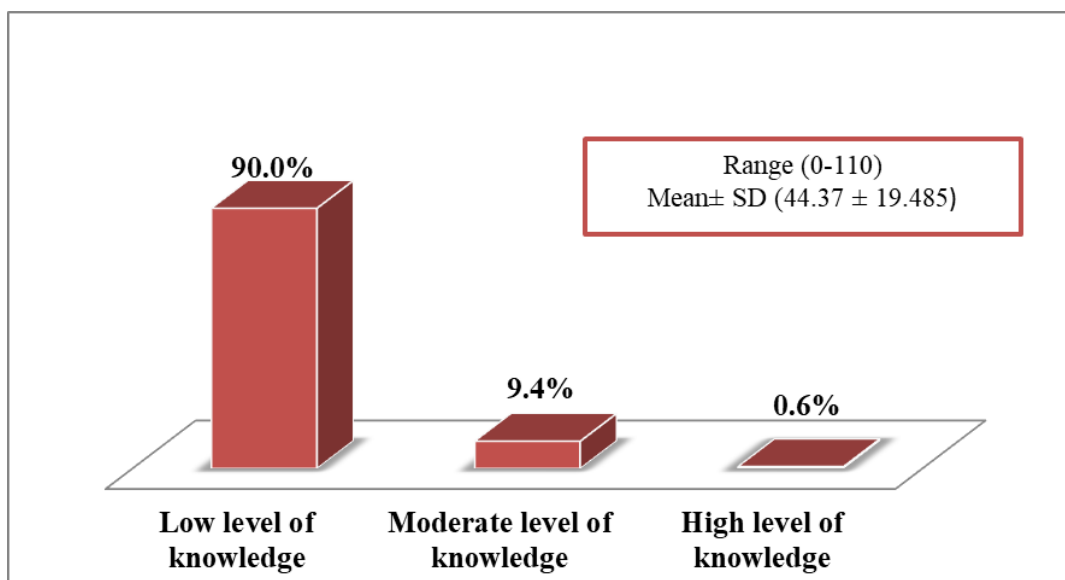
Table (5): The table demonstrates that, there was a significant relationship between the studied mother's total score level of practices and their place of residence ($P= 0.052$). Conversely, there were no

statistically significant relation between the studied mother's total levels of reported practices and their age, education level, income, occupation and number of family member.

Table (6): Represent correlation between age, number of family members, total knowledge score and total practice score. It illustrates that there was a statistically significant positive correlation between the studied mothers' total practices score and their total knowledge score where $r=0.400$ and $P=0.001$. The table shows that there was a statistically significant negative correlation between the studied mothers' total knowledge score, the total practices score and their age, where ($r= -0.075$ - and -0.167 - $p= 0.055$ and 0.001) respectively. Moreover, there was a statistically significant negative correlation between the studied mother's total knowledge score, total practices score and the number of family, where ($r= -0.013$ - and -0.042 - $p= 0.740$ and 0.283) respectively.

Table (1): Distribution of the studied mothers according to their socio-demographic characteristics.

Socio-demographic characteristics	The studied mother (n= 650)	
	No	%
Age		
- 19-40	450	69.2
- 41-60	200	30.8
Range	19 – 60	
Mean $\pm$ SD	36.23 $\pm$ 8.823	
Mother's educational level		
- Illiterate	60	9.2
- Basic education	92	14.2
- Secondary education general/technical	289	44.5
- University education	175	26.9
- Post university education	34	5.2
Place of residence		
- Rural	425	65.4
- Urban	225	34.6
Income		
- Not enough	182	28.0
- Enough	407	62.6
- Enough and saved	61	9.4
Occupation		
- Working	332	51.1
- Housewife	318	48.9
Number of family member		
- 2-3	179	27.6
- 4-6	448	68.9
- More than 6	23	3.5
Range	2 – 10	
Mean $\pm$ SD	4.29 $\pm$ 1.227	

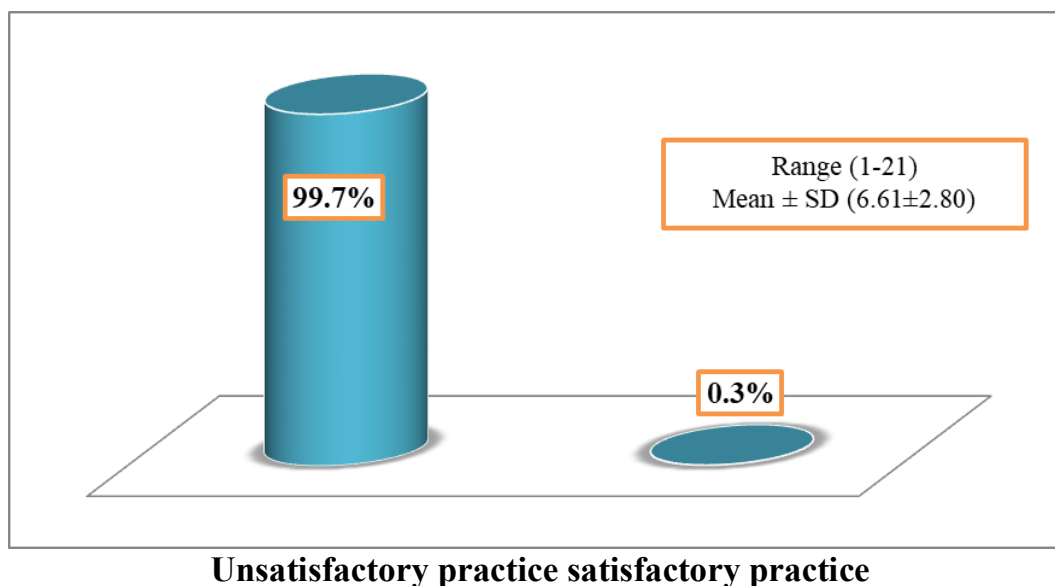


Total levels of knowledge of the studied mothers about electronic wastes

Figure (1): Total levels of knowledge of the studied mothers about electronic wastes

Table (2): Distribution of the studied mothers according to their levels of knowledge sub-scales about electronic wastes.

levels of knowledge sub-scales about electronic wastes	The studied mothers (n=650)					
	Levels of knowledge					
	Low level of knowledge		Moderate level of knowledge		High level of knowledge	
	no	%	no	%	no	%
- Information about electronic waste total score	493	75.8	117	18.0	40	6.2
- Risks of electronic waste total score	606	93.2	30	4.6	14	2.2
- Safe disposal of electronic waste total score	552	84.9	69	10.6	29	4.5
- Recycling of electronic waste total score	632	97.2	14	2.2	4	0.6



Total levels of practices of studied mothers regarding electronic wastes.

Figure (2): Total levels of practices of studied mothers regarding electronic wastes.

Table (3): Distribution of the studied mothers according to their levels of practices sub-scales about electronic waste.

Levels of practices sub-scales and total levels of practices about electronic waste.	The studied mothers (n=650)			
	Levels of Practices			
	Unsatisfactory practices		Satisfactory practices	
	no	%	no	%
- Practices that mothers follow to deal with electronic wastes	612	94.2	38	5.8
- Practices that mothers follow to dispose of electronic waste	648	99.7	2	0.3

Table (4): Relation between socio-demographic characteristics of the studied mothers and their total levels of knowledge about electronic wastes.

Socio-demographic characteristics	The studied mothers (n= 650)							x ² p
	levels of knowledge							
	Low level of knowledge (n=585)		Moderate level of knowledge (n=61)		High level of knowledge (n=4)			
	no	%	no	%	no	%		
Age								
- 19-40	396	88.0	52	11.6	2	0.4	8.689	
- 41-60	189	94.5	9	4.5	2	1.0	0.013*	
Mother's educational level								76.268
- Illiterate	60	100.0	0	0.0	0	0.0	0.001**	
- Basic education	91	98.9	0	0.0	1	1.1		
- Secondary education general/technical	272	94.1	16	5.5	1	0.3		
- University education	139	79.4	36	20.6	0	0.0		
- Post university education	23	67.6	9	26.5	2	5.9		
Place of residence								0.723
- Rural	385	90.6	38	8.9	2	0.5	0.697	
- Urban	200	88.9	23	10.2	2	0.9		
Income								18.079
- Not enough	174	95.6	8	4.4	0	0.0	0.001**	
- Enough	363	89.2	40	9.8	4	1.0		
- Enough and saved	48	78.7	13	21.3	0	0.0		
Occupation								13.876
- Working	285	85.8	45	13.6	2	0.6	0.001**	
- Housewife	300	94.3	16	5.0	2	0.6		
Number of family member								2.756
- 2-3	156	87.2	21	11.7	2	1.1	0.599	
- 4-6	408	91.1	38	8.5	2	0.4		
- More than 6	21	91.3	2	8.7	0	0.0		

p<0.05* significant

p<0.01** highly significant

Table (5): Relation between socio-demographic characteristics of the studied mothers and their total levels of reported practices about electronic wastes.

Socio-demographic characteristics	The studied mothers (n= 650)				x ² p
	level of practices				
	Unsatisfactory practices (n=648)		Satisfactory practices (n= 2)		
	no	%	no	%	
Age					0.892
- 19-40	448	99.6	2	0.4	0.345
- 41-60	200	100.0	0	0.0	
Mother's educational level					0.985
- Illiterate	60	100.0	0	0.0	0.912
- Basic education	92	100.0	0	0.0	
- Secondary education general/technical	288	99.7	1	0.3	
- University education	174	99.4	1	0.6	
- Post university education	34	100.0	0	0.0	
Place of residence					3.789
- Rural	425	100.0	0	0.0	0.052
- Urban	223	99.1	2	0.9	
Income					1.198
- Not enough	182	100.0	0	0.0	0.549
- Enough	405	99.5	2	0.5	
- Enough and saved	61	100.0	0	0.0	
Occupation					2.094
- Working	332	100.0	0	0.0	0.148
- Housewife	316	99.4	2	0.6	
Number of family member					0.905
- 2-3	179	100.0	0	0.0	0.636
- 4-6	446	99.6	2	0.4	
- More than 6	23	100.0	0	0.0	

p<0.05* significant

p<0.01** highly significant

Table (6): Correlation between age, number of family members, total knowledge score and total Practice score.

Variables	Age	Number of family	Total knowledge score
Age	r p	r p	r p
	-	-	-
Number of family	0.291 - 0.000**	-	-
Total knowledge score	-0.075- 0.055	-0.013- 0.740	-
Total practice score	-0.167- 0.001**	-0.042- 0.283	0.400 - 0.001**

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

Discussion

Improvements in lifestyle and progressive evolution in technology, the use of electronics and electrical appliances in day-to-day life make the electrical and electronics equipment become an essential and integrated part of our daily life that we cannot imagine our life without it. Electronic gadgets or electrical appliances have become indispensable in everyday lives, which have resulted in an exponential demand for electronic equipment and a significant increase in the rate of electronic waste generation (Li, Zeng & Li, 2023).

Generally, the present study results reveal that, the majority of studied mothers had low level of knowledge regarding electronic waste, with mean $\pm$ SD 44.37 ± 19.485 and range 0 – 110 (Figure 1). This result was attributed to that, the mothers

not give attention accessing information about electronic wastes and awareness campaigns or environmental education might not be emphasized about electronic waste which, leading to a general lack of knowledge about this problem. Additionally, half of studied mothers were worked (Table 1), and electronic waste might not be a priority for them, as they are often more focused on their family, work and daily responsibilities.

This result was consistent with the findings of a study conducted by Nuwematsiko et al., (2021), who assessed the knowledge, perceptions, and practices of electronic waste management among consumers in Kampala, Uganda, who reported that, two thirds (67.0%) of the study subjects had low level of knowledge regarding electronic waste. As well

as this finding was consistent with the study results that carried out by **Almulhim, (2022)**, who assessed household's awareness and participation in sustainable electronic waste management practices in Saudi Arabia, concluded that, more than two thirds (69.0%) of the study subjects had low level of knowledge regarding electronic waste. On the other hand, this finding not harmony with **Nisha, Shajil, Dutta, & Jain, (2022)**, who assessed consumer awareness and perceptions about e-waste management in semi-urban area of Northern Tamil Nadu, reported that, three quarters (76.0%) of the study subjects had high level of knowledge. This difference may be attributed to greater exposure to technology and higher levels of formal education, which can lead to an improved understanding of electronic waste issues. Furthermore, individuals engaged in occupations requiring technical skills or professional expertise are more likely to exhibit a higher level of awareness regarding electronic waste.

Regarding to Information about electronic waste, the present study findings show that, three quarters of studied mothers had low level of knowledge regarding information about electronic waste (**Table 2**),

this could be due to that, more than two fifths of studied mothers were from rural area (**Table1**), where adverse environmental, social, and economic conditions profoundly influence their daily lives and priority, such challenges frequently lead to limited access to educational opportunities and informational resources, thereby constraining their awareness and comprehension of electronic waste management.

The current study results are in agreement with the study conducted by **Prakash, Manasi, & Bino, (2022)**, who assessed knowledge, attitude, and practices on e-waste management among general public in Tamil Nadu, India, revealed that, more than three quarters (79.4%) of the study participants were unaware of the local legislation regarding e-waste. Also, nearly three fifths (59.0%) of them were unaware of the meaning of electronic waste. As well, the current study results are supported by the results of the Egyptian study conducted by **El-Zaki & Al-Aswad, (2023)**, who assessed e-waste management and its role in achieving sustainable development for the Egyptian family in light of Egypt's Vision 2030, who reported that, there was a general lack of awareness among the study subjects regarding the dangers of e-waste. Also, the study found that,

participation in e-waste awareness programs among the surveyed mothers was minimal.

Otherwise, the current study results are disagreed with **Azman, Abdullah, Ibrahim, Mohd Amin, & Mohd Lud, (2020)**, who assessed e-waste management awareness among young adults in Malaysia, reported that, the majority of the study subjects were aware of electronic waste. Also, almost all of them were ready to attend awareness program on electronic waste. This difference might be due to the presence and effectiveness of local awareness campaigns, which play a critical role in shaping public knowledge of electronic waste. These campaigns often lead to a substantial interest among individuals in acquiring more detailed information and practical guidance on responsible e-waste management.

As regarding to risks of electronic waste, the findings of the current study reveal that, the majority of the studied mothers had low level of knowledge regarding risks of electronic waste (**Table 2**). These results might be attributed to absence of clear and standardized guidelines that contain essential information about the risks associated with electronic waste. Also, lack of information about possible sources

of knowledge that mothers need to improve their understanding of electronic waste hazards.

The current study findings are supported by a study result that conducted in Ethiopia by **Ali & Akalu, (2022)**, who found that, less than two thirds (63.0%) of the study subjects gave correct incomplete answer about the risks of electronic wastes.

Regarding to safe disposal of electronic waste, the current study findings show that, more than four fifths of the studied mothers had low level of knowledge regarding safe disposal of electronic waste (**Table 2**). This could be due to that, many mothers tend to rely on their personal experiences and informal sources of information, such as family and friends rather than formal educational programs. This informal knowledge transfer, while helpful in some areas, often lacks accuracy and depth, further widening the knowledge gap regarding proper electronic waste disposal practices. The findings of the current study are in the same line with a study done in Saudi Arabia conducted by **Almulhim et al., (2022)**, which illustrated that, more than two thirds (69.8%) of the study subjects lacked knowledge about proper disposal practices and related environmental policies. Also, a study done by

Rajasekar & Murugan, (2022), who assessed awareness and disposal practices of e-waste among households in semi-urban areas of northern Tamil Nadu, India, which reported that, more than one third (36.1%) of the participants were unaware of available options for disposing of electronic waste.

In contrast, **Kumar & Prabu, (2022)**, who assessed awareness on e-waste management among semi urban households in Northern Tamil Nadu, which revealed that; majority (95.4%) of the study subjects knew about handling electronic waste before disposal, such as reusing or donating. It may be due to that, a large proportion of the participants collectively acknowledged the hazardous nature of electronic waste and identified specific electronic devices as potential sources of environmental harm. This recognition suggests a conscious understanding of the environmental impacts of improper electronic waste disposal. Notably, some participants had received information about electronic waste through media campaigns and community discussions, which likely played a significant role in shaping their awareness.

In relation to recycling of electronic waste, the current study findings illustrate that, the majority

of studied mothers had low level of knowledge regarding recycling of electronic waste (**Table 2**), this result could be due to that, lack of convenient disposal facilities and insufficient infrastructure, which hinders the mothers from properly recycling electronic waste at the household level. Furthermore, the absence of accessible collection centres and the limited knowledge about available recycling options.

The current study results are compatible with **Ramzan, Afzal, & Ramzan, (2019)**, who assessed young consumers' awareness and participation in sustainable e-waste management practices, who revealed that, more than four fifths (81.0%) of the study subjects possessed either no or minimal knowledge about e-waste recycling practices and half of them didn't know the formal way to collect electronic wastes. Furthermore, the current study result was supported by the study conducted in Ethiopia by **Ali & Akalu, (2022)**, who reported that, nearly half (48.8%) of the study subjects didn't know about the presence of recyclable precious metal in electronic wastes.

Otherwise, the current study results were disagreed with **Islam, Huda & Rahman, (2025)**, who carried out a study aimed to understanding young consumers' e-waste recycling

behaviour in Bangladesh, who found that there was a substantial portion of the consumers actively participated in electronic waste recycling initiatives. It might be due to the accessibility and convenience of recycling facilities, along with the availability of comprehensive information regarding recycling options, significantly enhanced consumers intentions to engage in electronic waste recycling. Furthermore, the consumers demonstrated strong motivation driven by potential economic benefits, including monetary incentives and discounts on new electronic products, which encouraged their active participation in electronic waste recycling programs.

Concerning total score level of practices of the studied mothers regarding electronic wastes, the current study reveals that, the majority of studied mothers had unsatisfactory total score level of practice regarding electronic wastes, with mean $\pm$ SD 6.61 ± 2.800 and range 1 – 21 (**Figure 2**). As, the majority of studied mothers had unsatisfactory level of practices regarding practices of mothers in dealing with electronic wastes and practices of mothers in disposing of electronic waste (**Table 3**).

These results can be attributed to the limited knowledge of electronic waste among most of the studied mothers, which in turn contributes to their low level of engagement in proper electronic waste management practices. Furthermore, when individuals have lack of essential information about the risks and correct disposal methods, become less motivated to participate in recycling or safe disposal practices.

These current findings are similar with the study done in Bangladesh conducted by **Rahman, Kabir, Sultana, Uddin, & Alam, (2024)**, who assessed occupational practices and knowledge among informal e-waste workers, reported that, more than two thirds (70.0%) showed low engagement in safe disposal practices and nearly two thirds (65.0%) of participants keep old electronics at home instead of disposing of them properly. Also, the study findings were in accordance with the study conducted in Nigeria by **Yusuf, Ali, & Kodiya, (2024)**, reported that, more than four fifths (82.4%) of the study subjects didn't wear personal protective equipment.

Concerning relationship between sociodemographic characteristics of studied mothers and their total level of knowledge about electronic wastes, the current study findings shows that, there was a

statistically significant relation between the studied mother's total score level of knowledge and their level of education and the income ($P= 0.001$) (**Table 4**). From the researcher point of view, the finding of the current study suggests that, as the income and education may influence mothers' knowledge, they are not the sole determinants for knowledge level. As, there was a low proportion of knowledgeable mothers, even among those with higher education and socioeconomic status, which may be attributed to the lack of targeted awareness campaigns, limited integration of electronic waste topics into mainstream education or health communication, and insufficient access to reliable information sources.

These study findings are agreed with the study conducted by **Hamzah, Yahya, & Shafie, (2020)**, who assessed knowledge, attitude, and practices on e-waste recycling among public in Port Dickson, Prtanika, who mentioned that; there was a highly statistically significant relation between total knowledge of studied subject and their demographic characteristics related to educational level. Also, **Zainal, Hashim, & Yusof, (2022)**, who assessed knowledge of e-waste recycling among communities in

Selangor, Malaysia, found that, educational attainment, occupation, and income significantly influenced understanding of electronic waste recycling, as respondents with higher education, private sector employment, and higher income had better understanding.

As regard to relationship between socio-demographic characteristics of the studied mothers and their total levels of reported practices about electronic wastes, the current study findings shows that, there was a significant relationship between the studied mother's total score level of practice and their place of residence ($P= 0.052$) (**Table 5**). From the researcher point of view, the finding of the current study suggests that, urban residents typically have better access to electronic waste collection centers and recycling services, which significantly encourages proper disposal practices. In Egypt, such facilities and organized programs are predominantly located in major governorates or large cities like Cairo and Alexandria. Conversely, rural areas and smaller villages often lack these essential services, leading to limited opportunities for mothers to engage in appropriate electronic waste management practice. This disparity in access contributes to the observed differences in electronic

waste disposal behaviors between urban and rural populations.

These findings were supported by a study done by **Zhang, Luo, & Zhang, (2024)**, who conducted a comparative study of factors influencing residents' waste sorting behavior in urban and rural areas of China, found that, urban residents exhibited better waste sorting practices than their rural counterparts. This difference was attributed to factors such as higher personal norms and the effectiveness of policy restraints in urban areas.

The current study results illustrate that, there was a statistically significant positive correlation between the studied mothers' total practices score and their total knowledge score ($r=0.400$ and $P=0.001$). As, the mothers with higher levels of knowledge about electronic waste more likely to adopt appropriate and environmentally responsible practices (**Table 6**). This result might be due to the fact that indicate presence of knowledge has a direct influence on mothers' practices, as once individuals acquire accurate information, begin to feel a greater sense of personal responsibility for their actions, knowing the potential environmental and health consequences of improper electronic waste disposal or create a psychological sense of

accountability, which motivates individuals to act more cautiously and responsibly. This explains the strong association observed in the current study between knowledge and practice levels related to electronic waste management.

This study finding was supported by **Ibrahim, Abd Ellatef, & Mohamed, (2019)**, who investigated family health practices regarding household waste management in El-Zawia El-Hamra, who concluded that, there was a statistically significant correlation between total knowledge level and practice level among the study subjects.

Conclusion

Based on the findings of the present study, it can be concluded that; the majority of studied mothers had low level of knowledge about electronic waste and unsatisfactory level of practice regarding safe disposal of electronic waste. Also, there was a highly significant relationship between the studied mothers' total knowledge score and their reported practices in dealing with electronic wastes.

Recommendations

Educational campaign in both rural and urban health units should be available for mothers focus on their role in safe disposal of electronic waste to enhance their knowledge,

practice as well as take their responsibility regarding it.

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Mothers' Knowledge and Attitude Regarding Child Sexual Harassment

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Abstract:

Background: Sexual harassment is a matter of concern in all societies. Mother's knowledge regarding child sexual harassment, could play an important role in child protection and prevention of sexual harassment. **Aim:** The current study aimed to assess mothers' knowledge and attitude regarding child sexual harassment. **Research design:** A descriptive design was used. **Setting:** Three nursery schools at Tanta City were included in the current study. **Subjects:** Seventy mothers (70) who attended the previously mentioned settings were involved. **Tools:** Two tools were utilized, Mothers' Knowledge Regarding Sexual Harassment Questionnaire and Mothers' Attitudes Regarding Sexual Harassment. **Results:** A few percentage of the studied mothers 10% had high level of knowledge regarding sexual harassment. Regarding prevention sexual harassment more than half of the mothers (52.9%) had low level of knowledge. More than one third of the mothers had positive attitude toward sexual harassment. **Conclusion:** According to the findings of the current study, it was revealed that nearly two thirds of mothers had low level of knowledge about sexual harassment and had negative attitude regarding sexual harassment. **Recommendation:** Establish an awareness program for mothers regarding child sexual harassment. An orientation program about sexual harassment must be available at nursery and primary schools for school personnel.

Keywords: Attitude, Children, Mothers' Knowledge & Sexual Harassment

Introduction

Sexual harassment is a problem in all societies regardless of cultural and/or religious backgrounds. It is rarely reported because of embarrassment, guilt, and lack of awareness regarding victim's rights. Other reasons may include unwillingness to confront the legal system, the need to keep the event hidden from significant people, and fear of not being believed **Vosz et al., (2023)**. Sexual harassment victimizes children of all ages, the most vulnerable children are the preschoolers. There are programs widely presented nationally, and are designed to teach children how to fend off a sexual harassment **Prihidko & Kenny, (2021)**.

Child sexual harassment is difficult to rated accurately because of its sensitivity and criminal nature. It is often unreported to professionals or adults for many complex reasons, including fear of punishment, as well as the stigma and shame **Gyawali, Budhathoki & Poudel, (2021)**. The world Health Organization estimates that 36 -62 % of all sexual assault victims are aged below 15 years. Complementary data from Nairobi Women`s Hospital indicate that 55 % of these violated are girls **World Health Organization (2022)**.

Childhood is a critical developmental stage, where children begin to form an understanding of the world around them, including their bodies and sexual

identity **Rofiah, (2021)**. Young children are at risk of sexual harassment, both boys and girls equally because they still weak, as well as not being able to prevent the sexual harassment of aggressive adult and perpetrators. However, equipping mothers with knowledge about sexual abuse prevention is necessary so that they can be alert, detect and prevent unusual behaviors from children **Hang, Nguyen, Thao Trang &Thanh, (2022)**.

Consequences of sexual harassment and unresolved traumatic experiences may lead to suffering caused by remembrances of the event. Participation in social, academic, professional, or personal context may be affected. Long-term psychiatric disorders such as physical issues, emotional or behavioral problems, and bonding disruptions may occur after traumatic experiences in general. Psychological consequences of child sexual harassment are diverse and range from short- to long-term such as flashbacks, fears, and depression **Canton-Cortes, Cortes, & Canton, (2020)**. Physical consequences are closely linked to psychological issues that manifest as psychosomatic symptoms on the physical level. Besides, infection of the genitals and sexually transmitted diseases are directly related to sexual acts

consequences **Salloum, Johnco & Zepeda-Burgos, (2020).**

Child sexual harassment has a significant impact on health and well-being of children and adolescents worldwide. The impact varies in relation to the nature, severity and duration of the abuse. It also affected developmentally in relation to the child's ability to understand the sexual harassment, their coping strategies and the responses from family, friends, wider community and services **Wismayanti, Farida, Patrick, Tilbury, & Tjoe, (2021).** A child who is sexually harassed is also at greater risk of experiencing other types of violence or abuse. The consequences can be life long and include issues with intimacy, affecting relationships and socio-economic consequences such as homelessness and unemployment **Manheim, Felicetti & Moloney, (2020).**

Mothers are playing a vital role in taking care of their children, to provide love and support constantly through their life. As a primary caregiver they can easily identify the symptoms of child sexual harassment. So that mothers should be educated about preventive aspect of child sexual harassment. Parents are important actors in protecting their children from any kind of violence including sexual harassment. Knowledge, attitudes and practices with responsible parenting are

instrumental in prevention of child sexual harassment **Khoori, Gholamfarkhani, Tatari & Wurtele, (2020).**

Nurses had a unique role in the awareness against child sexual harassment due to their role in providing health care in a variety of settings. Nurses should provide an effective educational intervention to increase the knowledge of parents especially mothers and their children on how to prevent, recognize, and react responsibly to child sexual harassment. It is essential for parents to understand sexual harassment, how to react to, and how to stop it and cope with any form of sexual harassment **Elfreich, Stevenson, Sisson, Winstead & Parmenter, (2020)**

Significance of the study:

Child sexual harassment is a form of anti-social behavior with the children that cause potential harm to the health, development and dignity of the child. According to UNICEF, each year, millions of girls and boys around the world are sexually harassed at home, school, or in their community. The growing use of digital technologies has also increased child sexual harassment risks **(UNICEF 2023).**

The World Health Organization report **(WHO 2020)** stated that all nations have laws and rules prohibiting sexual assault. Consequently, the global communities have recognized the

urgency of addressing and preventing this dangerous phenomenon to protect children from its harmful effects. In Egypt, there is a lack of accurate epidemiological studies to assess the full extent of the problem. Mothers are the most important group to target in child sexual harassment prevention training. Mothers can provide developmentally appropriate education for their children **Fatouh, Soliman, Hamed & Mohamed, (2020)**. So, this study is crucial to assess mothers' knowledge and attitude regarding children sexual harassment.

Aim of the study:

The present study aimed to assess mothers' knowledge and attitude regarding children sexual harassment

Research Questions:

- What is the mothers' level of knowledge regarding children sexual harassment?
- What is the mothers' attitude regarding children sexual harassment?

Subjects and Method:

Research design: A descriptive research design was used in the current study.

Setting:

The present study was conducted at three nursery schools at Tanta City: Two of them were affiliated to the Ministry of Education and Technical Education and one was affiliated to Private Educational Academic Center in Tanta City.

Subject:

The current study involved (70) mothers who accompanied their preschool children to the previously mentioned settings.

Tools of data collection:

Two tools were used in the current study:

Tool (I): Mothers' Knowledge regarding Sexual Harassment:

Questionnaire sheet was developed by the researcher after reviewing the related literatures **Mileva, Goshev & Alexandrov, (2020); Salloum, Johnco, Zepeda, (2020); Goswami, Arora, Thomas, 2019)**. It consisted of three main parts:

Part (1): Socio-demographic characteristics of mothers.

It was included data related to mothers such as age, marital status, residence, type of family, educational level, occupation, previous awareness about sexual harassment, source of information about harassment.

Part (2): Mothers' Knowledge about Sexual Harassment: This part was consisted of three sections as follow:

a- Sexual Harassment questionnaire:

It was included data such as, meaning of harassment, types, indicators of sexual harassment, causes, physical / psychological /social impact of child sexual harassment.

b-Sexual Harassment Prevention Questionnaire:

This part was included assessment of mothers' knowledge about prevention of sexual harassment for their children.

c-Sexual Harassment Safety Instructions Questionnaire:

Such as teaching child correct names of body parts, avoid punish the child when touching genitals, draw the child's attention to something else, teach child how to clean his / her genitals by himself / herself, avoid kissing or touching child' private body parts.

The total score of mothers' knowledge was calculated and classified as follow:

- Low level of knowledge less than 50%.
- Moderate level of knowledge from 50-75%
- High level of knowledge more than 75%.

Tool (II): Mothers Attitudes Regarding Sexual Harassment Scale:

The scale was developed by the researcher after reviewing of literatures **Russell, Higgins & Posson, (2020); Rueda, Ferragut, Cerezo & Ortiz-Tallo, (2021)**. It included 16 items in Arabic language. It is Likert type scale ranged between agree (2 points), uncertain (1 points) and disagree (0 point). It included statements such as: Parents should be role models for their children. Children often make up stories about being sexually harassed. Child should be taught to react to the bad

touch by anyone. Children should be given some training for self-defense.

The scores of the items were summed-up and the total divided by the number of the items, giving a mean score.

Scoring system of attitude scale:

- Positive attitude $\geq 50\%$ (range 16-32).
- Negative attitude $< 50\%$ (range 0-15).

Method

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, Tanta University directed to administrators responsible for the selected nursery schools.

2- Ethical consideration:

- a. Ethical approval was taken from the Scientific Research Ethics Committee of the Faculty of Nursing, Tanta University before conducting the study code No. 235/4/2023.
- b. Confidentiality and privacy were taken into consideration regarding the data collection and was maintained by coding number.
- c. Mothers' informed consents to participate in this study were obtained after explanation the aim and benefits of the current study. Mothers had the right to withdraw from the study at any time.

- d. Privacy and confidentiality for mothers and their children were assured.
- e. Nature of the study did not cause any harm to the mothers or children

Tools Development: Two tools were developed by the researcher after reviewing of recent literatures

4- Pilot study:

A pilot study was carried out on 10% of mothers (7mothers) to test the tools for clarity, applicability, feasibility and to determine any obstacles that may encountered the researcher during the data collection. The pilot study was excluded from the total sample.

5- Content validity:

The tools of the study were presented to a jury of five experts in the field of Pediatric Nursing. Content validity index was =98.5%.

6- Reliability of tools:

Test of reliability was done using Cronbach's alpha coefficient test. It was 0.960 for tool (I) and 0.832 for tool (II).

7- Mothers' knowledge and attitude regarding child's sexual harassment were fulfilled by mothers through individualized interview with the researcher. The data was collected within six months.

Statistical analysis:

The collected data were organized, tabulated, and statistically analyzed using SPSS software (Statistical Package for the Social Sciences, version 20.0). For quantitative data were

described using number and percent, mean and standard deviations were calculated.

Results:

Table (1): Explain distribution of the studied mothers according to their socio-demographic characteristics. It was observed that nearly one third of mothers (32.9 %) their age was ≥ 35 years old with mean $\pm$ SD was 30.985 ± 7.137 years. Regarding educational level, it was found that nearly half of mothers (48.6%) had basic education. Regarding mothers' occupation, 60% of mothers were working and majority of them (94.3%) lived in urban areas. It was clear that most of the mothers (84.3%) did not have previous knowledge about sexual harassment, 45.4% of those who had previous knowledge gained their knowledge from TV programs followed by internet 27.3%, and the least source of knowledge was books (9.1%)

Table (2): Reveals distribution of mothers' knowledge regarding sexual harassment. It was found that, 21.4% of mothers had correct/complete answers regarding meaning of child sexual harassment and social symptoms of sexual harassment. Only 20% of the mothers had correct and complete answer about good and bad touch. Concerning mothers' total knowledge about sexual harassment, it was noticed that less than one quarter of the mothers (20%) had correct & complete answer.

Table (3): Shows distribution of mothers' knowledge regarding prevention of sexual harassment. It was evident that less than one third of the mothers (34, 3%) reported about teaching their children to say no to any bad touch & 28,6% of them reported that they keep attention to the child's complaints.

Table (4): Indicate percentage distribution of total mothers' knowledge regarding prevention of sexual harassment. It was revealed that nearly one quarter of the mothers (25.7%) had correct/complete answer about ways of prevention sexual harassment prevention. As regards role of the family in sexual harassment prevention, it was observed that more than one quarter of mothers (28.6%) had correct and complete answer. Concerning total mothers' knowledge about prevention of sexual harassment, it was noticed that less than half of the mothers (47.25%) had wrong answers.

Table (5): Depicts distribution of mothers' total knowledge regarding sexual harassment safety instructions. It was clear that less than one quarter of mothers (21.4%) had correct /complete answer regarding mothers' reaction when the child touches his/her genital organs. It was clear that 20% & 22.9% of them had correct and complete answer regarding protection of child from exposure to sexual harassment at the home and regarding teaching

children about physical development respectively. Nearly half of mothers (42.9%) had wrong answer about safety instructions.

Figure (1): Refers mothers' total level of knowledge regarding sexual harassment, sexual harassment prevention and sexual harassment safety instructions. It was observed that 10% of the mothers had high level of knowledge regarding sexual harassment. Regarding mothers' knowledge about prevention of sexual harassment & sexual harassment safety instructions, it was noticed that equal percentage (11.4%) of mothers had high level of knowledge.

Figure (2): Shows mothers' total level of knowledge about sexual harassment. It was found that 67.2% of mothers had low level of knowledge about sexual harassment.

Table (6): Demonstrates distribution of mothers' attitudes regarding sexual harassment. It was evident that slightly more than one- third of mothers (35.7%) were agreed that parents should be role models for their children. It was also observed that 18.6 % of the mothers agreed that the great majority of victims are abused by familiar harasser.

Figure (3): Declares mothers' total attitude about sexual harassment. It was noticed that nearly one third of the mothers (38.6%) had positive attitude

while 61.4% of them had negative attitude.

Table (1): Distribution of the Studied Mothers According to their Socio-Demographic Characteristics (n=70).

Mothers' characteristics	No.	%
Age/ years		
20-<25	18	25.7
25-<30	17	24.3
30-<35	12	17.1
≥ 35	23	32.9
Mean ±SD	30.985±7.137	
Educational level		
Illiterate	3	4.3
Basic education	34	48.6
Secondary education	22	31.4
University education	11	15.7
Occupation		
Working	42	60.0
Not working	28	40.0
Residence		
Urban	66	94.3
Rural	4	5.7
Family type		
Single mother	10	14.3
Nuclear	51	72.8
Extended	9	12.9
Marital status		
Married	60	85.7
Divorced	6	8.6
Widow	4	5.7
Previous knowledge about sexual harassment		
Yes	11	15.7
No	59	84.3
Source of knowledge(n=11)		
Books	1	9.1
Magazines	2	18.2
TV programs	5	45.4
Web internet	3	27.3

Table (2): Distribution of Mothers' Knowledge Regarding Sexual Harassment (n=70).

Mothers Knowledge about sexual harassment	Correct & complete		Correct & incomplete		Wrong answer	
	No.	%	No.	%	No.	%
Meaning of harassment	15	21.4	31	44.3	24	34.3
Types	10	14.3	20	28.6	40	57.1
Risk factors	14	20.0	12	17.1	44	62.9
Causes	17	24.3	17	24.3	36	51.4
Suggestive behaviors	12	17.1	49	70.0	9	12.9
Bad touch	14	20.0	40	57.1	16	22.9
Good touch	14	20.0	31	44.3	25	35.7
Physical symptoms	9	12.8	20	28.6	41	58.6
Psychological symptoms	20	28.6	28	40.0	22	31.4
Social symptoms	15	21.4	40	57.2	15	21.4
Total	14	20.0	29	41.4	27	38.6

Chi-square test, * statistically significance $p \leq 0.05$,

**highly statistically significance $p \leq 0.001$

Table (3): Distribution of Mothers' Knowledge Regarding Prevention of Sexual Harassment (n=70).

Sexual harassment prevention's				
	Yes		No	
	No	%	No	%
Prevention of sexual harassment through teaching the child the following:				
Avoid any harmful situations	21	30.0	49	70.0
Say no to any bad touch	24	34.3	46	65.7
The correct names of the body parts	28	40.0	42	60.0
The defend himself	21	30.0	49	70.0
Role of the family				
Advise the child not to go with strangers	24	34.3	46	65.7
Orient the child not to take things from strangers	22	31.4	48	68.6
Never leave the child alone	26	37.1	44	62.9
Listen and investigate any complain of the child	22	31.4	48	68.6
Protect the child from exposure to social problems	16	22.9	54	77.1
Keep attention to the child's complaints	20	28.6	52	71.4

Table (4): Percentage Distribution of Total Mothers' Knowledge Regarding Prevention of Sexual Harassment (n=70).

Total Knowledge about prevention of sexual harassment prevention	Correct & complete		Correct & incomplete		Wrong answer	
	No.	%	No.	%	No.	%
Ways to prevent sexual harassment	18	25.7	22	31.4	30	42.9
Role of the family	20	28.6	14	20.0	36	51.4
Total	19	27.1	18	25.7	33	47.2

Chi-square test, * statistically significance $p \leq 0.05$

Table (5): Distribution of Mothers' Total Knowledge Regarding Sexual Harassment Safety Instructions (n=70).

Knowledge related to safety instructions	Correct & complete		Correct & incomplete		Wrong answer	
	No.	%	No.	%	No.	%
Safety instructions regarding sexual harassment	20	28.6	18	25.7	32	45.7
Mothers' reactions to child's touches genital organs	15	21.4	25	35.7	30	42.9
Protect child from expose to sexual harassment at home	14	20.0	22	31.4	34	48.6
Teach a child physical development	16	22.9	32	45.7	22	31.4
Total	16	22.9	24	34.2	30	42.9

Chi-square test, * statistically significance $p \leq 0.05$,

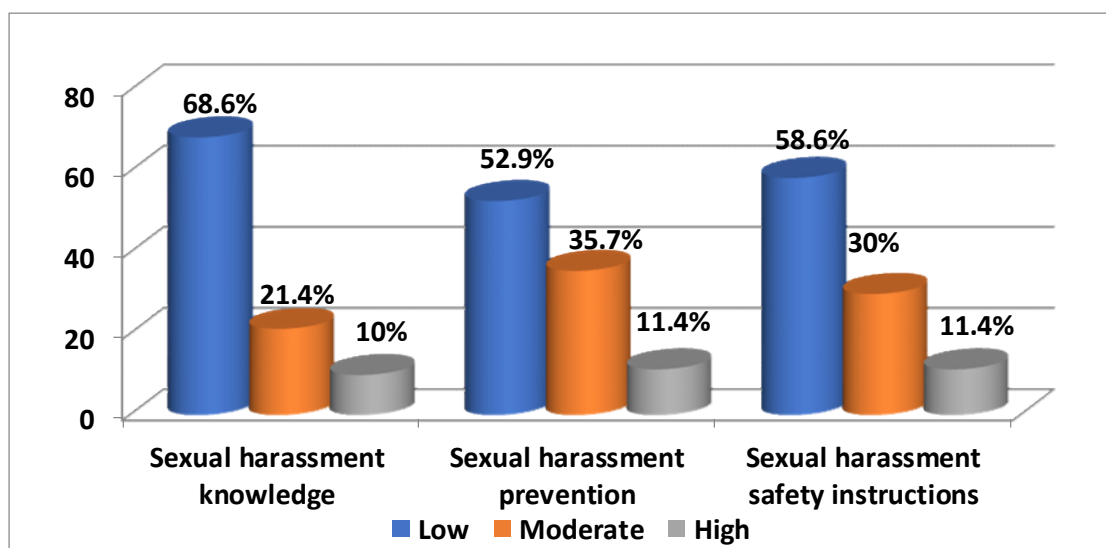


Figure (1): Mothers' Level of Knowledge Regarding Sexual Harassment, Sexual Harassment Prevention and Sexual Harassment Safety Instructions

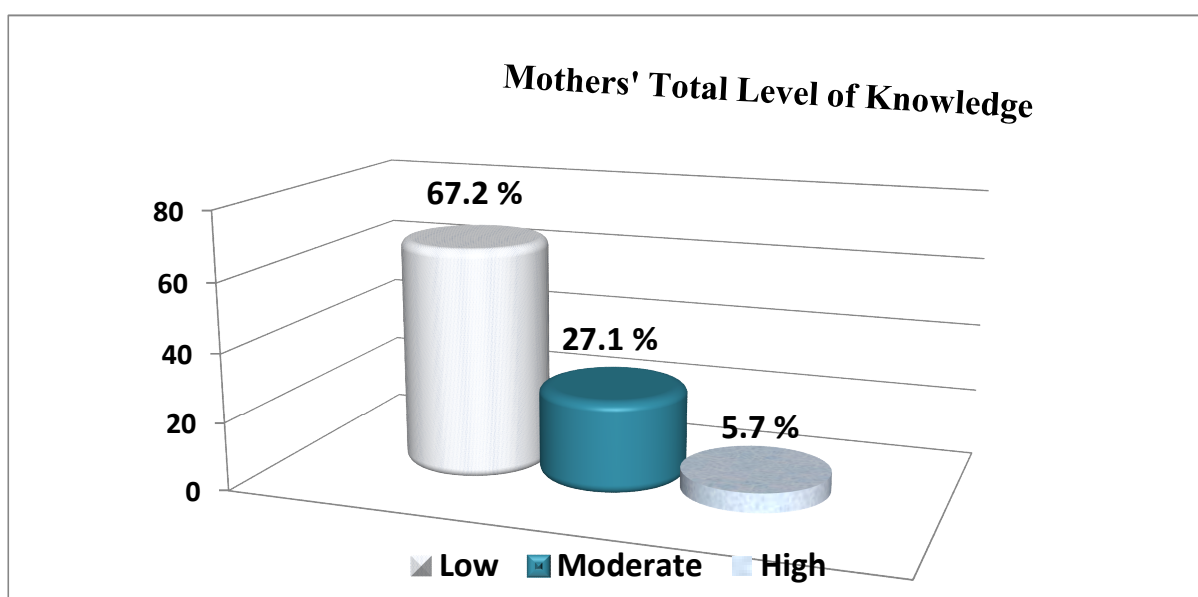
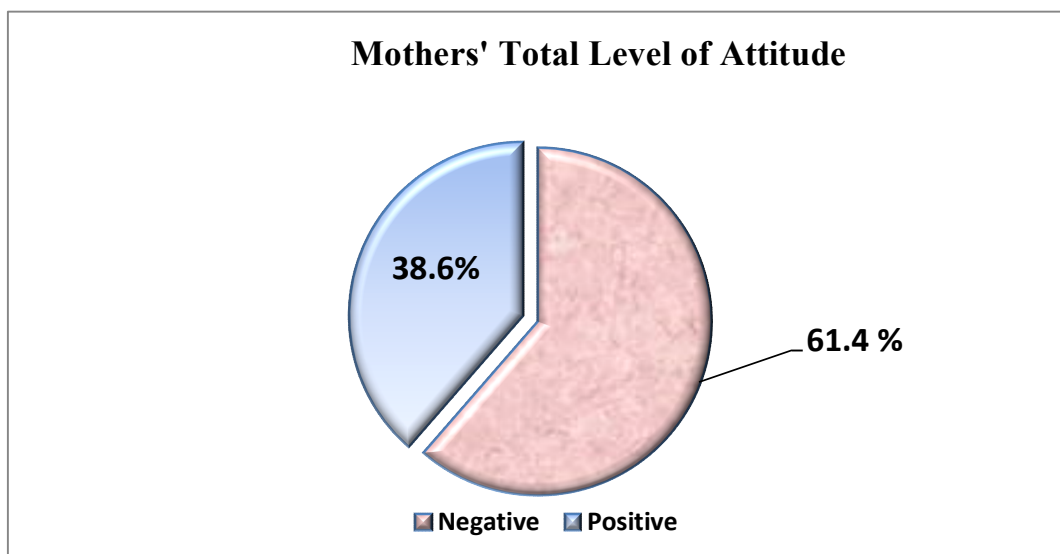


Figure (2): Mothers' Total Level of Knowledge about Sexual Harassment.

Table (6): Distribution of Mothers' Attitudes Regarding Sexual Harassment (n=70).

Items	Agree		Uncertain		Disagree	
	No.	%	No.	%	No.	%
Parents should be role models for their children.	25	35.7	25	35.7	20	28.6
Children have no freedom to discuss their physiological changes	16	22.9	16	22.9	38	54.2
Children often make up stories about being sexually abused	11	15.7	35	50.0	24	43.3
Child should be taught to react to the bad touch by anyone.	22	31.4	34	48.6	14	20.0
Children should be trained for self-defense.	16	22.9	32	45.7	22	31.4
Parent should ensure a school premise is safe for their children.	28	40.0	21	30.0	21	30.0
It is not good for child to know about the child sexual abuse in the school	9	12.9	8	11.4	53	75.7
Females are at greater risk for being abused than males.	5	7.1	12	17.1	53	75.7
The great majority of victims are abused by familiar harasser.	13	18.6	34	48.6	23	32.9
Adults are responsible for the protection of children.	22	31.4	28	40.0	20	28.6
A child who is sexually abused lives with sense of insecurity and feels unwanted	10	14.3	33	47.1	27	38.6
Reporting a case of child sexual abuse to the social services usually does more harm than good.	16	22.9	19	27.1	35	50.0
Most of the children do not tell anyone about being sexually abused.	16	22.9	13	18.6	41	58.6
Sexual victimization as a child may be related to psychological difficulties in later life.	26	37.1	20	28.6	24	34.3
parent responsible to ensure safe transport of the child to nursery	31	44.3	23	32.9	16	22.9
Parental absence and poor intra family relationships seem too related to abuse	11	15.7	30	42.9	29	41.4

Chi-square test, * statistically significance

**Figure (3): Mothers' Total Attitude regarding Sexual Harassment**

Discussion

Mothers should have the support they need to protect their children from sexual harassment. Specific interventions should include a well-established educational program that is implemented by nurses targeting the most vulnerable families **Xi & Lantolf, (2021)**. The current study was carried out to assess mothers' knowledge and attitude regarding children's sexual harassment

Regarding mothers' previous knowledge about child sexual harassment. It was clear that most of the mothers did not have previous knowledge about sexual harassment, and nearly half of those who had previous knowledge gain their knowledge from TV programs and more than one quarter of them gain knowledge from web internet. From researcher point of view, mass media starts in the last years to focus on sexual harassment as a developing problem in many societies.

This finding was supported by **Pahantasingh & Samantary, (2020)** who conducted a study entitled "Knowledge and attitude of mothers toward prevention of child sexual abuse" who reported that the majority of

mothers with previous knowledge on prevention of child sexual abuse gain their knowledge from mass media.

Concerning mothers' knowledge about sexual harassment, it was found that only one fifth of studied mothers had correct and complete answer regarding meaning of harassment. These results may be explained by a lack of efforts to raise public awareness about sexual harassment. This could contribute to existing knowledge gaps. Additionally, the lack of national resources and support systems may also play a role as the most of the families fear from stigma associated with sexual harassment. These findings were in the same direction with **Fatouh, Soliman, Hamed & Mohamed, (2020)** who illustrated that less than half of the mothers had correct knowledge regarding to meaning of sexual harassment

The current result also revealed that one quarter of the studied mothers had correct and complete knowledge about psychological symptoms of sexual harassment. From the researcher perspective the current results were consistent with the previous findings that

the majority of the mothers hadn't previous knowledge about sexual harassment and nearly half of them had basic education so, they had lack knowledge about psychological symptoms of sexual harassment. This finding was in the same direction with **Abdullah, Abou-Abdou & Kafil, (2021)** who conducted a study entitled "Assessment of mothers' knowledge about early detection of child Abuse at child health centers in Ismailia City". They revealed that, the majority of mothers had unsatisfactory knowledge regarding effects of child abuse.

The current study showed that one quarter of mothers had correct and complete answer regarding mothers' total knowledge ways of child sexual harassment prevention. This might be due to that nearly half of mothers had basic education think that discussing sexual topics with their children is inappropriate and they may struggle to understand medical, psychological or legal aspects of child sexual harassment due to limited literacy skills.

This finding was in accordance with **Kaushik & Daniel, (2019)** who conducted a study about

"Knowledge and attitude of mothers regarding prevention of child sexual abuse in New Delhi", who reported that most of mothers in their study had inadequate knowledge regarding child sexual abuse. On the other hand, this finding was contradicted with **Pahantasingh & Samantary, (2020)** who found that more than half of the mothers in their study had average level of knowledge regarding prevention of child sexual abuse.

Regarding all items of sexual harassment safety instructions, the present study revealed that the majority of mothers had limited level of knowledge. This may due to most of mothers didn't receive any programs or public awareness about sexual harassment. This finding was supported by **Hokmabadi, Khoori, Tatari & Wurtele, (2024)** who conducted a study entitled "Preventing child sexual abuse in Iran: mothers teaching body safety to their sons" who reported that there was no significant improvement in child sexual abuse prevention skills among children before their mothers taught them a personal safety instruction.

The current study found that the majority of studied mothers had low level of total knowledge about sexual harassment. This finding is in the same line with **Saboula, El-Nagar, El-Malky, & El-Said, (2019)** who reported that there was no statistical significant improvement in the total parents' awareness pre intervention.

Concerning mothers' attitude regarding sexual harassment, the current study revealed that slightly more than one- third of mothers had agreed that parents should be role models for their children & great majority of victims are abused by familiar harasser. These results may be due to sexual harassment is a complex topic and has many social, cultural, and psychological dimension and not all cases in Egypt are recorded. This result was in the same line with **Swailam, Oueda, Aboelyazied & Abdelbary, (2023)**, who illustrated that slightly more than two-thirds of the mothers in their study had negative attitude towards child sexual harassment protection education pre intervention.

On the other hand, the present result was not in harmony with **Kaushik & Daniel, (2019)** as

they mentioned that most of mothers had positive attitude regarding prevention of child sexual abuse. This was adversary to **Ekram, Wahaj, Khan, Khafagy & Shahad, (2024)** who studied "Knowledge, perception, and attitude of Saudi mothers towards discussing child sexual abuse" and found that the majority of mothers in their study had agreed that educating their children about sexual abuse will protect them and the majority of them had favorable attitudes toward child sexual abuse prevention.

The present study cleared that nearly two thirds of mothers had negative attitude regarding reporting sexual harassment. This may due to mothers fear speaking out if their children have been harassed because fear of scandal and shame. The current result was congruent with **Pahantasingh & Samantary, (2020)** who found that more than half of mothers had negative attitude towards prevention of child sexual abuse

Conclusion: According to the findings of the current study, it was revealed that nearly two thirds of mothers had low level of knowledge about sexual harassment and had negative

attitude regarding sexual harassment.

Recommendations: In light of the study's findings the following recommendations are made:

- 1- Well-established educational program regarding child sexual harassment must be implemented to enhance parents' awareness about sexual harassment.
- 2- Diverse educational materials should be used for mothers to increase their awareness and reduce the prevalence of child sexual harassment.
- 3- Community awareness through mass media should be focused on prevention and combating sexual harassment.

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Knowledge about Bullying as Perceived by Healthy Children and Children with Special Needs

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Abstract

Background: Bullying is a widespread issue affecting healthy and special needs children globally. It involves repeated aggressive behavior intended to harm others. Understanding how children perceive bullying is essential for developing effective prevention and intervention strategies. **Aim:** the present study aimed to assess knowledge about bullying as perceived by healthy children and children with special needs. **Research design:** A descriptive research design was utilized. **Setting:** The study was conducted at three inclusive primary schools at Tanta city, Gharbiya, Egypt. **Subject:** A purposive sampling of 120 children (60 children with special needs and 60 healthy children) were involved **Tools:** Two tools were used, tool (1): children's bullying knowledge questionnaire, and tool (11): Bullying perception questionnaire. **Results:** majority of healthy children had low knowledge about bullying and vast majority of special needs children had low knowledge about bullying. Also, more than a third of the special needs children were highly exposed to bullying and more than a quarter of the healthy children had high level of bullying behavior. **Conclusion:** Both healthy children and children with special needs had low level of knowledge regarding bullying. **Recommendations:** Developing bullying awareness programs for healthy children and children with special needs to prevent bullying behavior.

Key words: Bullying, Healthy Children, Knowledge, Special needs

Introduction

Bullying is a serious and widespread global problem with detrimental consequences for the physical and mental well-being of children. It is a repeated and deliberate pattern of aggressive or hurtful behavior targeting individuals perceived as less powerful. Bullying manifests in various forms, such as physical, verbal, social/relational, and cyberbullying with unique characteristics (**Waseem & Nickerson, 2023**)

Understanding children's knowledge about bullying is critical for developing effective prevention and intervention strategies. Children's awareness of what constitutes bullying, its forms, and its consequences can influence their responses and their ability to seek help or support peers. However, perceptions of bullying may vary significantly between different groups of children, particularly between healthy children and those with special needs (**Waseem & Nickerson, 2023**).

Typically developing children have a more comprehensive understanding of social dynamics and peer interactions. They often learn about bullying through direct experiences, media portrayals, and educational programs. Healthy children recognize bullying behaviors and articulate the emotional

consequences for both the victim and the perpetrator. Their perceptions are influenced by their social networks, parental guidance, and school policies regarding bullying (**Armitage, 2021**). While, children with special needs experience bullying differently. Their perceptions are influenced by their unique developmental trajectories, communication abilities and social interactions (**Iqbal et al., 2021**).

Nurses play a significant and positive role in fostering a safer and more supportive environment for all children, particularly those with special needs by working with parents and educators to develop strategies for recognizing and responding to bullying and educating children about bullying and its impact with age-appropriate manner and focus on developing empathy and understanding of different perspectives (**Yosep et al., 2023**).

Significance of the study

The World Health Organization (WHO) stated that “the frequency of bullying was estimated to be 8- 30 % and reach 50% in many studies”. There was a great variation in the prevalence rates of bullying among different countries, but the rate among the Arab world was the highest (**Khalil et al., 2021**). The increasing needs for bullying management for children with disabilities constantly a

challenge. Also, bullying has profound psychological effects on children, significantly impacting their emotional well-being and academic performance. Victims of bullying experience heightened levels of anxiety, depression and low self-esteem which lead to a pervasive sense of fear and isolation these psychological struggles manifest in school-related issues as difficulty concentrating, decreased motivation, and reluctance to participate in classroom activities. As a result, bullied children see a decline in their academic performance leading to lower grades and disengagement from school (Hendricks and Tanga, 2019).

Therefore, this study was conducted to assess knowledge about bullying as perceived by healthy children and children with special needs

Aim of the study

The present study aimed to assess knowledge about bullying as perceived by healthy children and children with special needs.

Research questions

1. What is the level of children's knowledge about bullying?
2. What extent healthy and specially needs children perceive bullying?

Subjects and Method

Research design

A descriptive research design was utilized in the current study.

Setting

The present study was conducted at three inclusive primary schools that involved both healthy and specially needs children; the selected primary schools were affiliated to Ministry of Education and Technical Education at Tanta city, Gharbiya Governorate.

Subject

A purposive sampling of 120 children distributed as 60 children with special need and 60 healthy children was included

Inclusion criteria:

- Both sexes.
- Age from 6-12 years.
- Able to communicate.

Exclusion criteria

Children with mental or psychological problems.

Tools of the study

Two tools were utilized as follows:

Tool (I): Bullying Knowledge Questionnaire:

A structured interview Questionnaire was developed by the researcher after reviewing of recent and related literatures (Dietrich & Cohen, 2021; Lalit, 2021; Yosep et al., 2022). It was divided into 2 parts:

Part (1): Children's socio-demographic characteristics: such as

age, sex, birth order, residence, number of family members, type of family, and data related disability for children with special needs as type of disability, causes, and duration of disability.

Part (2): Children' knowledge about bullying: It was used by the researcher to assess knowledge of both study groups. It included data related to definition of bullying, types, causes and effect of bullying, previous bullying exposure, type of bullying, actions and reaction taken after exposure to bullying.

Scoring system: Children's knowledge was scored as follow:

- Correct and complete answer was scored (2)
- Correct and incomplete answer was scored (1)
- Wrong answer or don't know was scored (0)

The total score of Children's knowledge was calculated as follows: -

- Less than 60% was considered low level of knowledge.
- From 60 < 75% was considered moderate level of knowledge.
- From 75-100 % was considered high level of knowledge.

Tool (II): Bullying perception - questionnaire.

That was developed by researcher - after reviewing the literature **Solberg and Olweus (2003)**. It was used to

assess children perception of bullying. It was developed in Arabic to assess bullying experience of children with special needs and bully behaviors among healthy children at the selected schools. This tool was consisted of the following parts:

Part (1): Victim Questionnaire:

The researcher utilized victim scale to assess bullying experience among children with special needs. The victim scale included 23 items such as, somebody punched, kicked, or pushed me, some body pulled my hair or scratched me.

Part 2: bully Questionnaire:

The researcher utilized bully scale to assess bullying behavior among healthy children. It included 23 items such as, I hit, kicked, or pushed someone, I pulled someone's hair or scratched them

Scoring system: The answers were scored as follow

Never = (1).

Once or twice a month = (2).

Around once a week = (3).

Several times a week= (4).

Low bullying experience was considered for the score is between (23-45)

Medium bullying experience was between (46-68)

High bullying experience was considered for the score is between 69-92.

Method:

The study was accomplished through the following steps

1- Administrative**Process:**

To carry out this study, an official permission obtained from the Dean of the Faculty of Nursing, and the responsible authorities of the selected schools.

2- Ethical considerations:

- Prior study conduction, approval was obtained from scientific research and ethics committee of the Faculty of Nursing, Tanta University code No. 233/4/2023.
- Nature of the study didn't cause any harm to the entire subjects.
- Confidentiality and privacy was taken into consideration.
- Informed consent was obtained from each child prior to participate in the study.

3- Tools development

Two tools were developed by the researcher to collect the needed data

4- Content validity

A jury committee of five experts specialized in pediatric nursing checked the content. The content validity index was 98.0%.

5- Pilot study

A pilot study was conducted on 10% of healthy children (6 healthy children) and (6 specially needs children). The pilot was excluded

from the study sample because significant modifications were done.

6- Reliability test:

Testing reliability of proposed tools was done by Cronbach's alpha test through SPSS computer package. It was 0.762 for Children's Bullying Knowledge Questionnaire, and 0.758 for Children Perception Questionnaire. Which indicate that the two tools were reliable to detect the objectives of the study.

Statistical analysis:

Data were fed to the computer and analyzed using IBM SPSS software package version 20.0. (Armonk, NY: IBM Corp). Quantitative data were described using mean and standard deviation. Qualitative data were described using number and percent. Comparison between two groups was done using chi-square test (χ^2). For comparison between more than two means of parametric data, F value of ANOVA test was calculated. The Kolmogorov-Smirnov test was used to verify the normality of distribution. Level of significance was set as p value < 0.05 and highly significance was adopted at P value < 0.001 for all significant tests.

Results

Table (1): demonstrates socio-demographic characteristics of healthy children. It shows that half of the children (50%) were in the age

group ranged between 10-12 years, and the second child in their families. Nearly two thirds of children (65%) are male, and near half of the children (48.3%) had 3-4 family members. More than half of the children (58.3%) lived in rural areas and 51.7% live within extended families

Table (2): presents socio-demographic characteristics of children with special needs. It was revealed that nearly half of the studied children (45%) were in the age group 10-12 years and more than two thirds of them (70%) are males. Also, more than half of children (55%) have a family consisted of 5-6 members. More than one third of children (38.4%) are the second child in their families. Furthermore, the majority of them (93.3%) lived in rural areas and nearly two thirds of children (63.3%) lived within nuclear families.

Table (3) Reveals healthy children's knowledge about bullying, It was evident that 80% of children had incomplete answer about meaning of bullying, nearly one quarter of the children (21.7%) had correct complete answer about types of bullying and (36.7% and 46.7%) of them had wrong answers about causes and effect of bullying respectively. As regards, previous exposure to bullying, it was found that three quarters of the healthy children (75%)

were exposed to bullying and more than two thirds of the healthy children who exposed to bullying (68.9%) were exposed to verbal bullying followed by physical bullying (31.1%) and social bullying (4.4%). Nearly two thirds of children (66.7%) use revenge of others after exposure to bullying.

Table (4) reveals special needs children's knowledge about bullying. It was evident that 68.3% of children with special needs had wrong answer about meaning of bullying, less than half of them (45%) had wrong answers about types of bullying and (75%) of the children had wrong answer about causes of bullying. As regard, previous exposure to bullying, it was found that, all of children with special needs (100%) were exposed to bullying and majority of children (85%) who exposed to bullying experienced to verbal bullying followed by physical and social bullying 63.3% & 33.3%, respectively. Moreover, more than three quarters of children (78.3%) used revenge to others as response after exposure to bullying.

Table (5) shows the children with special needs perception of victims' response/behavior. It was revealed that the mean and SD of all forms of exposure to bullying were high which

mean that they were highly exposed to bullying.

Table (6) shows the healthy children perception of bullying behavior. It was evident that the mean and SD of all forms of bullying were high which mean that they had high level of bullying behavior.

Table (1): Distribution of the studied healthy children according to their socio-demographic characteristics (n= 60)

Socio-demographic characteristics	No.	%
Age (years)		
6 -< 8	7	11.7
8 -< 10	23	38.3
10 – 12	30	50.0
Sex		
Male	39	65.0
Female	21	35.0
Number of family members		
3-4	29	48.3
5-6	28	46.7
7-8	3	5.0
Mean ± SD	4.72 ± 0.92	
Birth order		
First	10	16.7
Second	30	50.0
Third	11	18.3
Fourth or more	9	15.0
Residence		
Urban	25	41.7
Rural	35	58.3
Type of family		
Nuclear family	29	48.3
Extended family	31	51.7

Table (2): Distribution of studied children with special need according to socio-demographic characteristics (n = 60).

Socio-demographic characteristics	No.	%
Age (years)		
6 -< 8	9	15.0
8 -< 10	24	40.0
10 – 12	27	45.0
Sex		
Male	42	70.0
Female	18	30.0
Number of family members		
3-4	21	35.0
5-6	33	55.0
7-8	6	10.0
Birth order		
The First	17	28.3
The Second	23	38.4
The Third	11	18.3
Fourth or more	9	15.0
Residence		
Urban	4	6.7
Rural	56	93.3
Type of family		
Nuclear family	38	63.3
Extended family	22	36.7

Table (3): Percentage distribution of the studied healthy children according to knowledge about bullying (n = 60).

Healthy children' knowledge about bullying	No.	%
Meaning of bullying.		
Wrong answer	12	20.0
Correct and incomplete	48	80.0
Types of bullying.		
Wrong answer	15	25.0
Correct and incomplete	32	53.3
Correct and complete	13	21.7
Causes of bullying.		
Wrong answer	22	36.7
Correct and incomplete	38	63.3
Effect of bullying on a child.		
Wrong answer	28	46.7
Correct and incomplete	32	53.3
Previous exposure to bullying.		
No	15	25.0
Yes	45	75.0
#If yes, type of bullying behavior (n = 45)		
Physical bullying	14	31.1
Verbal bullying	31	68.9
Social bullying	2	4.4
Child's response after being bullied?		
Anxiety	5	11.1
Revenge of others	30	66.7
Withdrawal	10	22.2
#: More than one answer		

Table (4): Percentage distribution of the Studied Children with Special Needs according to Knowledge about Bullying (n= 60).

Children' knowledge about bullying	No.	%
Meaning of bullying.		
Wrong answer	41	68.3
Correct and incomplete	19	31.7
Types of bullying.		
Wrong answer	27	45.0
Correct and incomplete	27	45.0
Correct and complete	6	10.0
Causes of bullying.		
Wrong answer	45	75.0
Correct and incomplete	15	25.0
Effect of bullying on a child.		
Wrong answer	33	55.0
Correct and incomplete	27	45.0
Have you ever been bullied?		
No	0	0.0
Yes	60	100.0
#If yes, type of bullying child exposed to (n = 60)		
Physical bullying	38	63.3
Verbal bullying	51	85.0
Social bullying	20	33.3
Psychological bullying	15	25.0
Electronic bullying	3	5.0
Child's response after being bullied.		
Anxiety	4	6.7
Revenge to others	47	78.3
Withdrawal	9	15.0

#: More than one answer

Table (5): Mean perception of children with special needs according to victim response (n = 60)

The children with special needs' perception of bullying behavior	Pre							
	Never		Once or twice a month		Around once a week		Several times a week	
	No.	%	No.	%	No.	%	No.	%
-Some body punched, kicked, or pushed me.	4	6.7	6	10.0	23	38.3	27	45.0
-Some body pulled my hair or scratched me	5	8.3	7	11.7	23	38.3	25	41.7
- Was threatened	6	10.0	10	16.7	20	33.3	24	40.0
-Was forced to hand over my money or belongings	3	5.0	11	18.3	21	35.0	25	41.7
-Some body snatched my money or belongings without my consent	0	0.0	10	16.7	16	26.7	34	56.7
-Somebody broke my things	6	10.0	8	13.3	22	36.7	24	40.0
-Some body yelled at me	0	0.0	5	8.3	14	23.3	41	68.3
-Was insulted because of my color or race	6	10.0	9	15.0	21	35.0	24	40.0
-Was insulted because of my special ability or a physical characteristics	1	1.7	4	6.7	16	26.7	39	65.0
-Was bulled because of my sexual preference or mannerism	40	66.7	6	10.0	9	15.0	5	8.3
-Some body made fun of my accent	0	0.0	10	16.7	21	35.0	29	48.3
-Some body laughed and pointed at me	2	3.3	5	8.3	24	40.0	29	48.3
-Some body gave me nicknames i didn't like	3	5.0	8	13.3	26	43.3	23	38.3
-Was cornered or pushed against wall	6	10.0	4	6.7	16	26.7	34	56.7
-Was followed inside or outside school	2	3.3	4	6.7	21	35.0	33	55.0
-Was sexually harassed	50	83.3	4	6.7	4	6.7	2	3.3
-Was not allowed to join a group of classmates	1	1.7	12	20.0	13	21.7	34	56.7
-Was completely ignored by others	2	3.3	5	8.3	18	30.0	35	58.3
-Some body falsely accused me of taking things from my classmates	29	48.3	8	13.3	16	26.7	7	11.7
-Somebody said bad things about me or my family	15	25.0	18	30.0	17	28.3	10	16.7
-Some body tried to make others dislike me	6	10.0	12	20.0	25	41.7	17	28.3
-Was forced to physically harm a classmate	27	45.0	12	20.0	9	15.0	12	20.0
-Some body used the internet or a cell phone to harm me	30	50.0	12	20.0	11	18.3	7	11.7
Average score	2.90 ±0.26							

Table (6): Distribution of the healthy children according to perception of bullying behavior (n= 60).

The healthy children perception of bullying behavior	Pre							
	Never		Once or twice a month		Around once a week		Several times a week	
	No.	%	No.	%	No.	%	No.	%
-Hit, kicked, or pushed somebody.	3	5.0	3	5.0	19	31.7	35	58.3
-Pulled somebody hair or scratched them	1	1.7	7	11.7	19	31.7	33	55.0
-Threatened some one	4	6.7	8	13.3	24	40.0	24	40.0
-Forced somebody to give me their money or belongings	6	10.0	13	21.7	23	38.3	18	30.0
-Snatched money or things from others	23	38.3	11	18.3	14	23.3	12	20.0
-Damage other peoples belongings	14	23.3	11	18.3	20	33.3	15	25.0
-Yelled at some body	0	0.0	6	10.0	21	35.0	33	55.0
-Insulted somebody because of their color Or race	3	5.0	4	6.7	19	31.7	34	56.7
-Insulted some body because of special ability or a physical characteristics	3	5.0	6	10.0	18	30.0	33	55.0
-Bulled some body because of their sexual preference or mannerism	42	70.0	15	25.0	1	1.7	2	3.3
-Made fun of some body because of their accent	1	1.7	12	20.0	27	45.0	20	33.3
-Laughed and pointed at some body	0	0.0	3	5.0	32	53.3	25	41.7
-Make nicknames for others that they didn't like	6	10.0	12	20.0	15	25.0	27	45.0
-Cornered or pushed some body against wall	9	15.0	15	25.0	19	31.7	17	28.3
-Followed some body inside or outside school.	4	6.7	15	25.0	20	33.3	21	35.0
-Sexually harassed some body.	48	80.0	10	16.7	0	0.0	2	3.3
-Didn't let somebody join a group of classmates.	2	3.3	3	5.0	18	30.0	37	61.7
-Completely ignored some body.	1	1.7	3	5.0	21	35.0	35	58.3
-Falsely accused some body of taking belongings of classmates.	9	15.0	18	30.0	21	35.0	12	20.0
-Said bad things about somebody or their family.	12	20.0	19	31.7	19	31.7	10	16.7
-Tried to make others dislike some body.	10	16.7	24	40.0	18	30.0	8	13.3
-Forced somebody to physically harm (hit) a classmate.	43	71.7	13	21.7	4	6.7	0	0.0
-Used the internet or a cell phone to harm a classmate.	52	86.7	8	13.3	0	0.0	0	0.0
Average score	2.73 ±0.28							

Discussion

Concerning healthy children's knowledge about bullying, the results of the present study showed that the majority of children had incomplete answer about meaning of bullying, nearly one quarter of the children had corrected complete answer about types of bullying and less than half of children had wrong answers about causes and effect of bullying this is may be due to lack of understanding about bullying among children.

The previous results were consistent with **El Swerky et al. (2022)**. Who conducted the study about "Effect of coping strategies education regarding bullying on knowledge and behavioral change among secondary school students" and noticed that there knowledge were poor pre-intervention. Also, confirmed by study of **Abayomi and Daniels (2021)** who conducted a study entitled "Creating awareness of bullying, its impact on children, and strategies towards behavioral change" and revealed that children knowledge was low before intervention in the areas of their understanding of bullying, the reason behind children being bullied, the impact on the victim and strategies in addressing and preventing bullying.

As regards, the previous exposure to bullying, it was found that three quarters of the healthy children were exposed to bullying. According to the researcher point of view, that bullying behavior may be experienced by all children even those without disabilities. The finding was in the same line with **Galal et al. (2019)** in a study of "Prevalence and correlates of bullying and victimization among school students in rural Egypt" and stated that more than three quarters of the children had exposed to bullying.

Furthermore, it was noticed that more than two thirds of the healthy children who exposed to bullying were exposed to verbal bullying followed by less than one thirds who exposed to physical bullying and low percent exposed to social bullying. This may be due to ease of using verbal bullying, difficulty in using physical bullying at school setting as it isn't allowed and easily detected by supervisors.

The previous results was not in the same line with **Elsisi et al. (2020)** who conducted a study of "Bullying behavior and its effect on preparatory school student" and found that more than two fifth of the children were exposed to verbal and social bullying. While less than two fifth was exposed to physical

bullying. On other study by **Ibrahim et al. (2023)** entitled "Bullying among school students; prevalence, cofactors, and its relation to student's mental status" was quite contradicted with the current results as they stated that most of the students exposed to physical bullying and about two thirds of them exposed to social bullying, and more than half exposed to verbal bullying, then less than half exposed to physical bullying and other types.

Children response after being bullied revealed that nearly two thirds of children use revenge of others after exposure to bullying, from researcher point of view this may be due to increasing the aggressive behavior between children and lack of knowledge about bullying behavior. The finding was similar to the review results conducted by **Hikmat et al. (2024)** entitled "A scoping review of anti-bullying interventions: reducing traumatic effect of bullying among adolescents" they stated that activities such as education, counseling, and training programs are used to prevent bullying behavior in schools that reduce the impact of trauma, revenge desire on bullying victims.

In relation to specially needs children's knowledge about bullying

this study presented that none of children had correct and complete answer about meaning of bullying, three quarters of the children had wrong answer about causes of bullying and near half of them had wrong answer about type of bullying. This mean that children with special needs didn't have knowledge about bullying and didn't perceive it's meaning.

This result was in harmony with **Sabry et al. (2021)** who conducted a study entitled "Effect of nursing intervention for hearing impairment adolescent students regarding bullying" and illustrated that one quarter of the children with special need had correct complete answer about bullying pre intervention. The previous results were congruent with **Patterson (2018)** who conducted a study entitled "The inclusion classroom: implementing the Olweus bullying prevention program to improve the classroom environment" and showed that the students had poor understanding about bullying at pretest.

As regard, previous exposure to bullying, it was found that, all of children with special needs were exposed to bullying. From the researcher perspective children with special need are at increased risk of bullying due to misunderstandings from their peers, communication

barriers and physical differences. They may have social cues, making them more susceptible to manipulation or aggression.

The previous result was in the same line with **Lebrun-Harris et al. (2019)** who conducted a study about "Bullying victimization and perpetration among United states children and adolescents" and found that children with disabilities were significantly more likely to experience bullying victimization and engage in bullying perpetration than those without disabilities

It was noticed in the present study that the majority of children who exposed to bullying were experienced verbal bullying followed by nearly two thirds who exposed to physical bullying and one third of them was exposed to social bullying. This may be due to ease of using verbal bullying and difficult to be detected than physical bullying that need strength. Also, children with special needs were in close observation during school day so, verbal bullying outweigh other types of bullying. Since, the verbal bullying was more common among vulnerable groups because of its delicacy, which made it harder to identify and handle.

The previous results were in the same line with a systematic review conducted by **Pinquart (2017)** who reported that bullying

disproportionately affects children with disabilities, and the verbal aggressiveness was the prevalent form of maltreatment that these students faced. However, the current results were contradicted with **Sabry et al. (2021)** who mentioned that the most type of children's' bullying was social bullying, followed by physical bullying then verbal bullying.

Moreover, this study showed that more than three quarters of children used revenge to others as a response to bullying exposure. This result was in the same line with **Trapani (2021)** who studied "Using a peer-mediated bullying safety skills intervention for children with disabilities" and demonstrated that there bullying incidents was high before intervention.

Concerning the studied children with special need perception of bullying behavior, the study results revealed that the mean and SD of all forms of exposure to bullying were high which mean that they were highly exposed to bullying. The previous result was contradicted with **Khasawneh (2020)** in a study entitled "The Extent of bullying against students with learning disabilities according to the age variable" that reported low levels of verbal and physical bullying among students with disability pre intervention.

In relation to the healthy children perception of bully behavior, it was evident that the mean and SD of all forms of bullying were high which mean that they had high level of bullying behavior. The finding was in the same line with **Limber et al. (2018)** who conducted study entitled "Evaluation of the Olweus bullying prevention programs: a large-scale study of U.S. students in grades 3–11" and mentioned that All grades showed high level of bullying before program implementation.

Conclusion

The current study concluded that both healthy children and children with special needs had low level of knowledge regarding bullying.

Recommendations

In the light of the study findings, the following recommendations are suggested:

1. Developing bullying awareness programs for healthy children and children with special needs to prevent bullying behavior.
2. Illustrated materials such as brochures, videos, posters about bullying must be available at all schools.
3. Mass media must be directed to enhance children perception of bullying.
4. Further researches are needed to establish protocols for dealing with

children's bullying behavior at different setting.

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Effect of Educational Program for Mothers on Nutritional Status of Children with Non-Organic Failure to Thrive

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Abstract

Background

Non-Organic Failure to Thrive include inadequate caloric intake caused by behavioral or psychological problems such as emotional deprivation, maternal neglect, poor maternal child relationship and disordered interactions between a child and caregiver. **Aim :** The present study was aimed to evaluate the effect of educational program for mothers on nutritional status of children with non-organic failure to thrive. **Research design:** A quasi-experimental research design was used. **Setting:** The study was conducted at outpatient clinic gastroenterology and nutrition of Tanta Main University Hospital **Subjects :** A purposive sampling of sixty mothers and their children with nonorganic failure to thrive were involved in the study **Tools :** Two tools were utilized to collect the required data Tool (I): Mothers' Knowledge Questionnaire about Non - Organic Failure to Thrive, Tool (II): Nutritional Assessment Sheet. **Results:** The majority of the mothers had poor knowledge pre educational program, while immediate and three month after educational program the total scores of mothers' knowledge were improved. **Conclusion:** It was concluded that mothers' knowledge in relation to care of children with non-organic failure to thrive were improved after implementation of an educational program. **Recommendations:** conducting in-service educational program about nonorganic failure to thrive to nurses and mothers at pediatric outpatient endocrine clinic to improve their knowledge regarding non-organic failure to thrive.

Keywords: Children, Mothers, Non-Organic Failure to Thrive, Nutritional status.

Introduction

Nutrition is an important factor in early childhood survival and development, but also life long health. Nutritional deficiencies have negative effects across generations. Stunting impairs cognitive and learning abilities, whereas wasting result in developmental delays. The growth of every child is unique. Children develop and learn continuously, but not always in a predictable way (**Gokalp, Yıldız & Halicioğlu Baltalı, 2021**).

During infancy and early childhood, young children experience significant physiological changes due to their rapid growth and nutritional susceptibility.

The early years of life are crucial for developing healthy behaviors to continue lifelong. (**Şenol & Şenol, 2023**).

Inadequate growth in early childhood is referred to as failure to thrive (FTT). It is applied to children whose current weight or weight gain rate is significantly lower than that of others of their own age and sex (less than the fifth percentile) (**Hill, 2023**). Faltering Growth (FG), malnutrition are the more recent definition and often associated to express the imbalance between dietary intakes and needs for macro- and micronutrients. (**Goodwin, Buel**

& Cantrell, 2023) Globally, malnutrition remains a challenge. Currently, child in every five children less than of five years is stunted worldwide, 6.7% are wasted (**Global Nutrition report, 2021**). According to statistical records of Paediatric Hospital of Tanta Main University Hospital, number of children attended to the outpatient clinic gastroenterology and nutrition diagnosed with non - organic failure to thrive, were 75 child in 2022, 160 child in 2023 and 180 in 2024. (**Medical Statistical Records of Tanta Main University Hospital at Paediatric Medical department. 2024**). The most commonly used etiologic classifications are nonorganic or organic. While there are several possible causes of organic FTT, most children have a nonorganic reason of their poor development and/or weight gain (**Khalil , Husain , Alkhateeb & Alezzi , 2019**).

Inadequate feeding practices, neglect, physical abuse, emotional trauma, mental health issues like depression, and other elements like poverty can all contribute to inadequate nutrition, which is the most common cause of failure to thrive (**Mertens et al., 2023**).

Most FTT children who present in a primary care setting are nonorganic

and do not have an underlying medical condition. As children to grow and develop regularly, parents or caregivers caring is just as crucial as proper nourishment. **(Mohamed, El Shehaby, Mohamed, Saleh & El-Asheer, 2022).**

The common manifestations of non-organic FTT are lack of weight gain, learning impairments, and delays in achieving developmental milestones like rolling over, crawling, and talking. Growth variables like height and weight do not increase as expected, they exhibit delayed motor development, exhaustion, and irritability, and they exhibit a lack of emotions like smiling, laughing, or making eye contact. Excessive sleepiness and lack of vocalization **(Johns, 2022).** The long-term effects of FTT/malnutrition are a higher prevalence of developmental delay, a somewhat lower IQ than anticipated, some prolonged weight and height loss later in childhood, learning challenges, and behavioral issues are some of. Children's development may be hampered by the emotional and environmental issues that frequently lead to malnutrition **(Franceschi, et al., 2021).**

Nonorganic FTT is most prevalent and therefore dietary guidance and

careful observation of the child's weight gain and development rate by the primary care physician are essential aspects of medical care. Family's feeding habits, also are crucial component of nutritional assessment of a child with FTT not only evaluation of food intake. Intake of macro and micronutrients may be impacted by food allergies. A child may not receive a sufficient diet due to social and environmental issues, including family finances, caregivers' cooking skills, and family attitudes on what constitutes a healthy diet. The existing diet needs to be nutritionally analyzed. **(Ayed, Ali & Sayed, 2021).**

Teaching to the caregivers about healthy eating should be the first step in nutritional intervention. This should involve age-appropriate nutrition and suitable feeding practices for catch-up growth. Protein and calories must be added to the diet. Giving a toddler nutritional supplements could be a reasonable strategy to increase their intake of calories and protein. Commercially available instant breakfast powders or dry skim milk powder can be used to fortify milk. Oil, margarine, or butter can be used to increase calories without raising serving sizes **(Sabino et al., 2020).**

Significance of the study

Mortality rates and deaths of under-five children from malnutrition was 6.9 million are concentrated in Africa. Undernourished children have weakened immunity and impaired cognitive function, which leads to their poor health outcomes, loss of future productivity and low academic performance. (Karlsson, Kim, Guerrero, Hasman& Subramanian, 2022). Mothers are the first caregiver of children. Therefore, there is a strong relation between children's nutritional status and mothers' nutritional knowledge. The nutritional outcomes of children are affected by the knowledge, awareness, and skill levels of mothers, which in turn influence their practices. avoid nutritional problems in children and achieve optimal growth (Anato, 2022). Therefore, the aim of the present study was to evaluate the effect of mothers' educational program on nutritional status of children with non-organic failure to thrive.

Aim of the Study

The study was aimed to evaluate the effect of educational program for mothers on nutritional status of children with non-organic failure to thrive.

Research Hypothesis

The nutritional statues of children with non-organic failure to thrive expected to be improved after implementation of an educational program for mothers.

Subjects**Research Design:**

A quasi-experimental research design was utilized in the current study.

Study Setting:

The study was conducted at outpatient clinic gastroenterology and nutrition of Tanta Main University Hospital which is affiliated to Ministry of higher education and scientific research.

Subjects:

A purposive sampling of sixty mothers and their children with nonorganic failure to thrive were included in the study.

Inclusion Criteria for Children:

-Both sexes, with non-organic failure to thrive, aged from 1- 5 years.

Exclusion Criteria:

- Free from chronic diseases that may affect nutritional status e.g., heart disease, diabetes mellitus, kidney disease and bronchial asthma.

Tools of data collection

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

Tool I: Mothers' Knowledge Questionnaire about Non-Organic Failure to Thrive:

It was developed by the researcher after reviewing the relevant and recent literatures to assess mothers' knowledge regarding children with non-organic failure to thrive. (Erica, 2023; Hasan & Fatema, 2020). It was composed of two parts:

Part (1): Socio-demographic characteristics which includes:

a-: Mothers' characteristics as age, level of education, occupation, residence, marital status, number of siblings in the family, family income and family type.

b - Children characteristics as age, sex, birth order

Part (2): Mothers' knowledge regarding non- organic failure to thrive

It was developed by the researcher after reviewing the recent literatures to assess mothers' knowledge regarding non- Organic Failure to Thrive such as definition, manifestations, types, causes, complications, prevention, management, food pyramid (definition, food pyramid groups, benefits of healthy nutrition, hazards of malnutrition on health.

(Hasibuan, Batubura & Suryani, 2019).

Scoring system for mothers' knowledge was as the following: -

-Correct and complete answer was scored (2).

-Correct and incomplete answer was scored (1).

-Wrong or don't know was scored (0).

Total scoring system for mothers' knowledge was categorized as the following: -

-High level of knowledge was considered from 70 - 100%.

-Moderate level of knowledge was considered from 50 < 70%.

-Low level of knowledge was considered < 50%

Tool II: Nutritional Assessment Sheet: It was developed by the researcher after reviewing the recent literatures to assess nutritional status of children with non-organic failure to thrive (Díaz , Ontai, Shilts, Lanoue, Townsend,2022).

1-Anthropometric measurements included weight and height according to standard measurement by world health organization.

2- Daily dietary intake: 24 hours recall method to calculate the daily calorie consumption per day.

Method

The study was accomplished through the following steps:

1-Administrative process:

A formal permission to carry out this study was obtained from Faculty of Nursing directed to administrators of gastroenterology and nutrition pediatric department at Tanta Main University hospital to obtain their approval and collaboration in conducting this study.

2-Ethical and legal considerations:

Committee approval from faculty of nursing was obtained with scientific research ethics committee code **No 238 / 4 / 2023**. Mothers were informed about the confidentiality of the information obtained from them. The nature of the study didn't cause any harm or pain to the entire sample. Mothers' oral consents were obtained to participate in the study after providing appropriate explanation about the aims of the study. Mothers who agreed to participate were included in the present study, and they had the right to terminate participation from the study at any time.

3 -Tools development:

Two tools were utilized in the present study. Study tools were developed and modified based on the review of the related literatures.

4-Content validity:

The tools of the study were revealed to a jury of five experts in the field of Pediatric Nursing to check

content validity and clarity of the questionnaire. Modifications were conducted accordingly. The face validity of the questionnaire was estimated based on experts' opinion after calculating content validity index of its items and it was 99.1%.

5-Apilot study:

A pilot study was carried out on 10 % of the sample (6 mothers and their children) to test clarity; visibility and applicability of the study tools and the essential modification were done. The Pilot study was excluded from the study sample.

6- Reliability:

Reliability of the developed tool was tested through the internal consistency by using Cronbach's alpha coefficient test it was 0.81 for mothers' knowledge, 0.863 for nutritional assessment and 0.80 for daily dietary intake indicating high reliability of tests.

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

I-Assessment Phase:

-The researcher carried out meeting with mothers, who participated in the study in order to explain the aim of the study, collect data about mothers and their infants to assess mothers' knowledge about non-organic failure to thrive by using (tool I, II)

2-Planning phase:

Educational program was planned according to mother's educational needs assessment and based on literature review which was included the following:

- Setting specific objectives of the educational program.

- Preparation of the content of educational program which was translated into Arabic.

- Different methods and materials of educational program were used including interactive lectures, group discussion, demonstration and video-based learning, pictures, books and posters

3- Implementation phase:

An educational program was carried out through conduction of successive sessions with every mother and child, they were divided into 10 subgroups, and each subgroup was attended three sessions and scheduled in the morning twice a week. The time for each session was about 30 – 45 minutes that was based on the response of the mother and the child condition.

The sessions covered the following topics:

- First session:** It focused on definition, manifestations of children with non-organic failure to thrive.

- Second session:** It focused on precipitating factors, causes,

complications, management of nonorganic failure to thrive.

- Third session:** It focused on instructions regarding daily dietary intake using the food guide pyramid such as the number of meals, snack types and forms of eating between meals consumption of fast food, carbonated beverages according age groups.

- Data was collected within one year. From July 2023 to June 2024.

4- Evaluation phase:

Evaluation of the effects of educational program on mothers' knowledge about non-organic failure to thrive was conducted using the same assessment tools (Tool I, II). Each mother was evaluated immediately and three months after implementing educational program.

Statistical analysis:

Recorded data were analyzed using the statistical package for social sciences, version (28). Quantitative data were expressed as mean $\pm$ standard deviation (SD). Qualitative data were expressed as frequency and percentage. The following tests were done Chi-square test: For categorical variables, to compare between different groups. Paired t-test: For normally distributed quantitative variables, to compare between two periods. Student t-test: For normally distributed

quantitative variables, to compare between two categories-tests (ANOVA): For normally distributed quantitative variables, to compare between more than two categories. Pearson coefficient: To correlate between two normally distributed quantitative variables. Cronbach's Alpha: Reliability Statistics was assessed using Cronbach's Alpha test (Beth, Robet, 2019). The confidence interval was set to 95% and the margin of error accepted was set to 5%. So, the p-value was considered significant as the following: **Probability (P-value):** P-value $\leq$ 0.05 was considered significant. P-value $>$ 0.05 was considered insignificant.

Results

Table (1) shows socio-demographic characteristics of the studied mothers, it was revealed that, most of them (86.7 %) aged from 20 to less than 30 years, with Mean $\pm$ SD (26.90 $\pm$ 4.003). It was found that, more than two thirds of the studied mothers (70.0%) had secondary education. Regarding mothers' occupation, it was noticed that majority of them (90%) were housewife.

Table (2) indicates socio-demographic characteristics of studied children. It was observed that, nearly two thirds of the studied

children (63.3%) aged from 1 to less than 3 years with Mean $\pm$ SD (2.80 $\pm$ 1.286). The study revealed that, most of them (80%) were males but only one fifth of them (20%) were females, 43.3% were the first children in the family.

Figure (1) illustrates the mean scores of total mothers' knowledge. It was noticed that, most of the studied mothers (80%) had low level of knowledge before program while 68.3%, 63.3% of them had high knowledge immediate and after three months of educational program respectively with significant improvement between before, immediately, and after three month of educational program implementation P (1) =0.000* P (2) =0.000* respectively.

Table (3) depicts percentage distribution of the anthropometric measurements of children with non-organic failure to thrive. It was noticed that, close to one third (30%) of children had low birth weight. Regarding to weight for age, it was noticed that, nearly two thirds (63.3%) of children had moderate underweight before educational program but they improved and decreased to be 51.7% after three months of educational program. There was statistically significant difference between before, and after three

months of educational program for weight according to children' age at $P(2) = 0.000^*$.

Regarding to length or height 26.8% of children had severe stunted before program but they improved and decreased to be 21.7% after three months of educational program. There was statistically significant difference between before, and after three months of educational program for length or height according to children' age at $P = 0.000^*$.

Table (4) presents percentage distribution of children concerning to their 24h daily dietary intake. It was noticed that, nearly two thirds (61.7%) of children had adequate daily requirement allowances of carbohydrate before educational program while after three months of program it improved to be 78.3% and only 30% of them had adequate daily requirement allowances of protein before educational program while after three months of program it improved to be 50.0%. Regarding fat daily requirement allowances, it was reported that 60.0% of children had adequate daily requirement allowances of fat before educational program while after three months of program it

improved to be 75%. Also, it reported that all (100%) of children had not given adequate daily requirement allowances of energy (kcal/d) before educational program while after three months of program it improved to be 23.3% had adequate daily requirement allowances of energy. There was statistically significant difference between before and after three months of educational program implementation at $p(2) = 0.000^*$

Table (5) presents positive correlation between studied mothers' total knowledge and anthropometric measurements of their children with non-organic failure to thrive before, immediately & after three months educational program. The study showed that, there were statistically significantly correlation in (weight for age/underweight, length or height/stature ($r=0.537$, $p=0.000^*$), ($r=0.328$, $p=0.010^*$) respectively.

Table (1): Percentage Distribution of the Studied Mothers regarding Socio-Demographic Characteristics:

Mothers' Characteristics	Studied Mothers (60)	
	No.	%
Age/ years		
20 <30	52	86.7
30 <40	6	10.0
≥ 40	2	3.3
Mean ±SD	26.90±4.003	
Educational level		
Illiterate/read and write	4	6.7
Preparatory education	10	16.6
Secondary education	42	70.0
University education	4	6.7
Occupation		
Working	6	10.0
Housewife	54	90.0
Residence		
Urban	18	30.0
Rural	42	70.0
Marital status		
Married	55	91.7
Divorced	3	5.0
Widow	2	3.3
Number of siblings in the family		
One	16	26.7
Two	18	30.0
Three	22	36.7
More than three	4	6.7
Income		
Not enough	38	63.3
Enough	22	36.7
Family type		
Nuclear	21	35.0
Extended	39	65.0

Table (2): Percentage Distribution of Children regarding Socio Demographic Characteristics:

Children's Characteristics	Studied Children (60)	
	No.	%
Age/ years		
<3	38	63.3
3-5	22	36.7
Mean ±SD	2.80±1.286	
Gender		
Male	48	80.0
Female	12	20.0
Birth order		
The first	26	43.3
The second	18	30.0
The third	14	23.3
More than the third	2	3.3

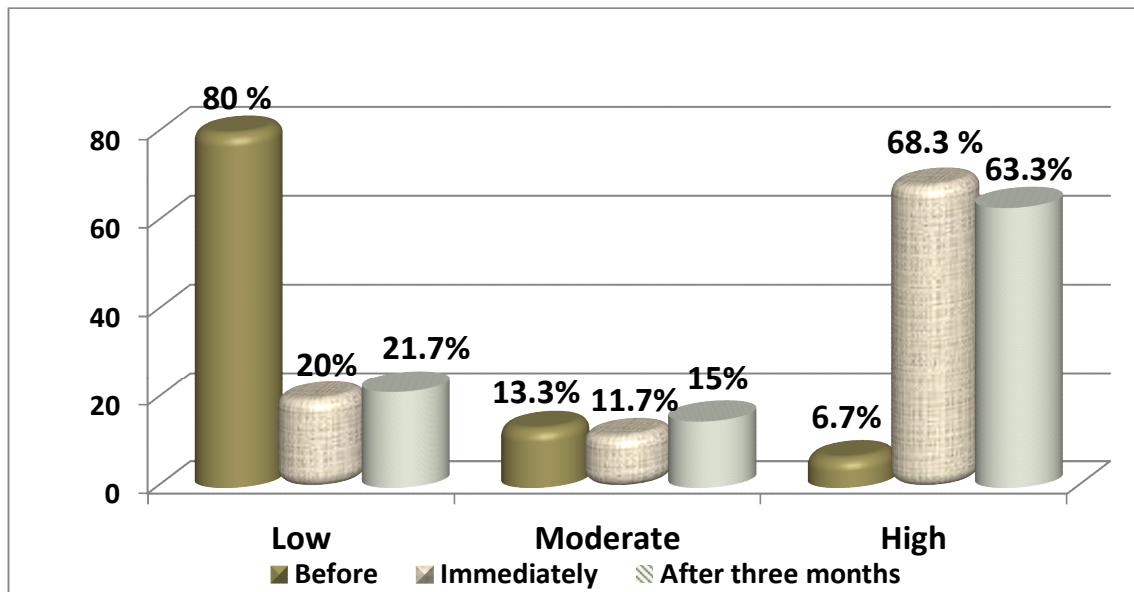
**Figure (1): Mothers' Total Level of Knowledge about Non- Organic Failure to Thrive.**

Table (3): Percentage Distribution of the Anthropometric Measurements of Children with Non- Organic Failure to Thrive.

Anthropometric measurements	Studied children (60)						Chi-square test		
	Before		Immediately		After three Months				
	No.	%	No.	%	No.	%	X ²	X ²	X ²
							P1	P2	P3
Birth weight									
Normal	42	70.0							
Low < 2,500 gr	18	30.0							
Weight for age/ underweight Z score									
Mild (-1to -1.9)	4	6.7	4	6.7	14	23.3	5.305	59.321	1.845
Moderate (-2to-2.9)	38	63.3	39	65.0	31	51.7	0.275	0.000*	0.070
Sever (≤ -3)	18	30.0	17	28.3	15	25.0			
Length or height/stunted Z score									
Mild (-1to -1.9)	22	36.7	22	36.7	26	43.3	8.494	4.883	4.883
Moderate (-2to-2.9)	22	36.7	22	36.7	21	35.0	0.075	0.000*	0.000*
Sever (≤ -3)	16	26.8	16	26.8	13	21.7			

Chi-square test, * statistically significance $p \leq 0.05$, No statistically significance $p > 0.05$

Table (4): Percentage Distribution of the 24-hour Dietary Intake by Children with Non- Organic Failure to Thrive.

Dietary intake	Studied children (60)						Chi-square test / Paired t test		
	Before		Immediately		After three Months		X ² P1	X ² P2	X ² P3
	No.	%	No.	%	No.	%			
CHO (gm/d)									
Adequate RDA	37	61.7	38	63.3	47	78.3	2.000 0.128	10.455 0.002*	16.430 0.000*
Less than RDA	23	38.3	22	36.7	13	21.7			
Mean ±SD (t-p-value)	52.700±11.177		53.058±11.015		59.17±7.833		0.191 0.849	4.628 0.000*	4.553 0.000*
Protein (gm/d)									
Adequate RDA	18	30.0	19	31.7	30	50.0	2.674 0.089	5.079 0.024*	3.774 0.047*
Less than RDA	42	70.0	41	68.3	30	50.0			
Mean ±SD (t-p-value)	17.38±4.603		17.70±4.691		20.07±5.90		0.392 0.697	3.543 0.001*	3.239 0.002*
Fat(gm/d)									
Adequate RDA	36	60.0	37	61.7	45	75.0	2.303 0.106	18.148 0.000*	6.792 0.011*
Less than RDA	24	40.0	23	38.3	15	25.0			
Mean ±SD (t-p-value)	30.933±10.072		31.133±9.992		34.100±10.375		0.122 0.903	2.730 0.008*	1.937 0.058
Energy (kcal/d)									
Adequate RDA	0	0.0	0	0.0	46	76.7	-	-	-
Less than RDA	60	100.0	60	100.0	14	23.3			
Mean ±SD (t-p-value)	508.37±159.786		508.52±159.894		693.83±382.631		0.009 0.993	4.331 0.000*	4.182 0.000*

Chi-square test, Paired t test, * statistically significance $p \leq 0.05$, No statistically significance $p > 0.05$

Table (5): Correlation between Studied Mothers' Total Knowledge and Anthropometric Measurements of their Children with Non- Organic Failure to Thrive.

Children Anthropometric Measurements		The studied Mothers		
		Total Knowledge		
		Before	Immediately	After three months
Weight for age/ underweight	r	0.402	0.027	0.537
	P	0.001*	0.838	0.000*
Length or height/stature	r	0.162	0.003	0.328
	P	0.216	0.984	0.010*

Pearson Correlation Coefficient, * statistically significance $p \leq 0.05$

Discussion

Failure to Thrive (FTT) is an abnormal growth pattern determined by insufficient nutrition and an imbalance between requirements and energy intake. The most frequent cause is insufficient caloric intake, but other potential causes include excessive metabolism or insufficient nutrient absorption. The first indicator of FTT is difficulty achieving or maintaining a healthy weight. In serious cases, undernutrition can result in abnormal head circumference, height, and cognitive or immunological impairment. Enhancing mothers' knowledge about failure to thrive is important for improving their practices when caring for their infants with failure to thrive. **Lezo, Baldini & Asteggiano (2020)**.

Regarding the socio-demographic characteristics of mothers, the current study showed that, almost two thirds of the studied mothers, their educational level was secondary education. From the researcher point of view, this may be due to the majority of mothers were from rural areas that characterized with low economic status and not concerned with girls' education and mothers who had secondary education not have enough knowledge about failure to

thrive. This finding was in aligned with **Hasan & Fatema (2020)** who observed that, the maximum of the studied mothers had secondary education. Concerning age of the studied mothers, the study showed that, the majority of the studied mothers their age was from twenty to less than thirty. From the researcher point of view, the lack of maternal experience in this young age group. So, mothers who were less than thirty years not have enough knowledge about failure to thrive to enhance their practice regarding care of their children with failure to thrive. This finding was in aligned with **Zakaria, El Sayed & Elsayed (2023)** who reported that, more than half of the studied mothers their age were less than thirty years.

Concerning the job of the studied mothers, almost of the studied mothers not working and housewife, from the researcher point of view, this may be explained by the fact that the prevalence of FTT varies depending on population factors, such as poverty, infectious diseases, low-income settings, and poor nutrition. **El-Asheer, Shafek, Abdel-Hafez, & El Gendy (2022)** agreed with the current study.

Regarding the socio-demographic characteristics of studied children, the current study revealed that, nearly two thirds of them aged from one to less than three years. From a viewpoint of the researcher, children under the age of four years are more susceptible to malnutrition. As their bodies require adequate nutrients for growth and development, in addition, they are more susceptible to illnesses that might eventually cause malnutrition **Afolabi, Ogunwale& Aiyesetenikan (2020)** agreed with this and revealed that, the age of 24 months or less was associated with malnutrition. Moreover, **Kassie& Workie (2020)** who reported that children under the age of four years old had a significant frequency of malnutrition.

Concerning the sex of the studied children, it was found that the majority of studied children were males, and the others were females. From the researcher point of view, the female children had a weight advantage than male peers at all regarded as quantiles. The result of the present study was secured by **Thurstans et al., (2020)** who found that, undernutrition in children under five years is more likely to affect male than females, male children had higher odds of being wasted than females. Regarding total

scores of mothers' knowledges, the present study showed that, most mothers had poor level of knowledge about non-organic failure to thrive before educational program while immediately after educational program, mothers' knowledge improved and the majority of them obtained good scores. But three months after educational program, the total scores of mothers' knowledge still improved but slightly reduced to about two thirds of them. From the researcher point of view, this could be attributed to lack of simple Arabic references about non-organic failure to thrive, low mother's educational attainment,

limited qualifications of nurses, no available time for physician and nurses to provide mothers with proper knowledge. While immediately improved mothers' knowledge due to the content of educational program. This finding was supported by **Sadiq, Adai & Hussein (2020)** who mentioned that two thirds of the studied mothers were categorized as having low knowledge before educational program while majority of the mothers have good knowledge about pre-school children nutrition after educational program.

Regarding anthropometric measurements the current study showed that, nearly one third of studied children with a low birth weight experienced more growth failure compared to those who had normal birth weight. From the researcher point of view, this could be attributed to children with low birth weight are more liable to diseases, experience breastfeeding failures more frequently, and are at a higher risk of growth problems, as in contrast to children with appropriate birth weight. This finding was confirmed and supported by the study of **Ntenda (2019)** who found that there is a significant relationship between children's birth weight and malnutrition. Children with low birth weight have the highest risk of malnutrition.

In relation to weight for age, the current study found that, nearly one third of the studied children had severe undernutrition. From the researcher's point of view, In Egypt food insecurity is linked to poor eating habits, a lack of nutritional awareness among the general public, and limited access to a balanced diet for the lowest segments of society. These results were in the same line with the research done by **Li, Kim; Vollmer& Subramanian (2020)** who

noticed that more than one quarter of the studied children were underweight. In relation to height for age, nearly more than one quarter of the studied children had severe stunting. From the perspective of the researcher, it confirmed a lack of health awareness among mothers inappropriate feeding practices, lack of dietary diversity, and insufficient complementary feeding practices. This was consistent with a study conducted by **George & Murthy (2021)** who found that, nearly one quarter of the studied children were stunting among the studied children. Also, **Elmighrabi, Fleming &Agho (2024)** which studied "Factors Associated with Childhood Stunting in Four North African Countries found the same results and found that, Stunting was more prevalent among children from Sudan and Egypt.

Regarding daily dietary intake, the present study reported that, almost of the studied children had not taken adequate requirement of daily allowance of energy (kcal/d). From the researcher point of view, this can be attributed to the low intake of nutrients needed for growth. Insufficient calorie intake is the most frequent cause of FTT. The current study's findings were supported by

Khalili, Teimouri& Babaeian (2023) who found in their study prevalence of Failure to Thrive and associated risk factors in in-patients under 5 years of age, that the most common cause of FTT is not taking enough calories, poor feeding practices, low birth weight, and residence in rural areas. are the risk factors that could lead to malnutrition. In this study, the majority of the studied children had less than adequate requirement of daily allowance of protein (gm/d). From point view of the researcher, this may be related to most mothers had in adequate income and had poor socioeconomic status which indicates the burden of this factor on nutritional status of children. These findings are supported by the results of **Vega& Fewtrell (2024)** who found that, inadequate protein consumption is associated with FTT occurrences. Long-term protein deficiency will cause disturbances in body and growth hormone regulation, which can cause nutritional problems such as FTT. In the current study, more than one third of the studied children had less than adequate Requirement of Daily Allowance (RDA) of carbohydrate CHO (gm/d), from the researcher point of view, macronutrient deficiency in children is related to

insufficient intake of nutrients. These results are supported by the study of **Von Salmuth et al., (2021)** who clarified that, carbohydrates are the primary provider of energy.

Regarding correlation between studied mothers' total knowledge and anthropometric measurements of their children with non-organic failure to thrive, the current study showed that, there is a statistically significantly correlation in (weight for age/ underweight, length or height/stature. From the researcher point of view, mothers with above primary level education can significantly decrease stunting and wasting in children. This was in line with **El-Nmera, Salamab & Elhawaryc (2021)** in their study reported that, maternal nutritional knowledge is positively associated with the nutritional status of children

Conclusion

It was concluded that mothers' knowledge in relation to care of children with non-organic failure to thrive were improved after implementation of an educational program.

Recommendations:

-Conducting in-service educational program about nonorganic failure to thrive to nurses and mothers at pediatric outpatient endocrine clinic to

improve their knowledge regarding non-organic failure to thrive.

-Educational booklet and handouts about care of children with nonorganic failure to thrive should be available in endocrine clinic to mothers and nurses as a reference.

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Effect of Mothers' Using Smartphone on Their Quality of Life and Family Functions

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Abstract

Background: Smartphone used widely in everyday life. However, mothers' smartphone overuse and misuse can affect on family quality of life and functions. **Aim of the study:** to assess the effect of mothers' using smartphone on their quality of life and family functions.

Design: A descriptive cross-sectional research design. **Setting:** This study was conducted at (MCH) Centers at Tanta City. **Subjects:** A convenience sampling of 700 mothers. **Tools:** Four tools were used. **Tool (I):** Mothers' knowledge regarding smartphone use consisted two parts:

part (1): Socio-demographic characteristics of the mothers. **Part (2):** Smartphone use knowledge questionnaire. **Tool (II):** Smartphone addiction scale (SAS). **Tool (III):** Family quality of life (FQL) scale. **Tool (IV):** Family Assessment Device (FAD) of McMaster model

Family functioning. **Results:** about two-thirds (66%) of them had low level of knowledge, more than two fifth (42.3%) had moderate level of smartphone addiction and more than half (54.4%) addicting smartphone had unsatisfied FQOL, and the majority (83.1%) of them had unhealthy family functions. **Conclusion:** There was a highly statistically significant correlation

between total knowledge score with total smartphone addiction scale and total family functioning score. Also, there was a statistically significant correlation between total score of family quality of life and total score of family functioning. The largest percentage of those

having smartphone addiction had an unsatisfied family quality of life and unhealthy family function. **Recommendation:** continuous education programs are recommended about effect of smartphone misuse on FQOL and functions and encouraging them to find alternative such as

sports, shopping, and other outdoor activities rather than smartphone use.

Key words: Smartphone Addiction, Family Quality of Life, Family Functions.

Introduction:

Nowadays, smartphones and other mobile digital devices are essential components of modern household technology. The use of smartphones has increased significantly globally. With the speed at which information and communication technology is developing, smartphones are becoming an essential part of our everyday life. Around the world, people of all ages use smartphones due to their great mobility, accessibility, and lack of physical limitations. Parents may use a number of crucial services on their smartphones in their daily lives. It is not limited to the leisure and information-gathering sectors of telecommunications. Like anything else, though, overuse and misuse can cause problems. Both good and bad consequences on our everyday lives might result from using digital media. **McDaniel, (2019), Wolfers et al., (2023).**

In addition to many other health-related tasks, smartphone applications have enhanced health and health-related behavioral outcomes by sharing health information and facilitating illness detection, control, and management. Smartphone integration into family life has several advantages, such as facilitating

communication, transferring family values through games, and making it easier to balance work and home life **Mahmood et al., (2019).**

Despite its advantages, telephones can often negatively affect family life. One of the most frequent issues is that family members may become distracted by their phones and become a common source of distraction for family members, which makes them spend less time together **Akrim& Dalle, (2021).** Mothers' use of smartphones is rapidly increasing as they want to stay in touch with their partners, friends, and employers during the often-distant times of parenthood **Knitter et al., (2020).** Because they use screens for both personal and professional purposes throughout the day, mothers are more likely to use smart devices when interacting with their children. Digital media devices can harm children's social-emotional development by taking mothers' focus away from their children's needs and toward their device during family quality time, such as meals, playtime, and bedtime **Panjeti-Madan & Ranganathan, (2023).**

More than 86% of the population around the globe owns a smartphone, as it has become an essential part of

our day-to-day lives. The number of smartphone users will reach to 7.1 billion in 2024. The number of smartphone users increased by 4.2% compared to the previous year **WHO,(2024)**.

The mother is the primary caregiver and has the biggest impact on how a child develops socially and how attached they are to their family **Kim et al., (2022)**. Mothers who build strong relationships with their children are generally thought to influence their overall cognitive, emotional, and social development through their parenting style **Chavda & Nisarga, (2023)**.

Using their smartphones excessively caused mothers to speak with their children less frequently and to be less receptive to their needs and attention-seeking tendencies. After a youngster repeatedly tried to get the mother's attention, the mother would occasionally seem irritated or even aggressive **Konradetal, (2021)**. Maternal neglect, reduced parenting effectiveness, increased anxiety and aggression, social disengagement, and smartphone addiction in children are just a few of the issues that can result from excessive smartphone use **Gown & Chyung, (2018)**.

Community health nurses (CHN) play a vital role in assessing patterns of mothers' smartphone use, time mothers' spent on smartphone daily, history of pervious exposure to health problem related to smartphone misuse and the effects of mothers smartphone misuse on their quality of life and family functions **Gasperini et al.,(2023)**.

Community health nurses (CHN) should also raise awareness about smartphone misuse and overuse's effects on family activities and lives. She can contribute to reducing the detrimental impacts of excessive smartphone use and fostering positive, healthy family interactions by educating and supporting families. Furthermore, they might emphasize the value of in-person interactions and family time. Additionally, they can offer advice on how to manage smartphone use during family time, including establishing limits and allocating particular periods for activities that don't involve smartphones **Webster et al., (2020)**.

Significance of the study:

The use of mobile phones has increased in popularity as technology has developed. Smartphones have become a significant aspect of contemporary life, and it is anticipated

that new technology will have a variety of effects on future family structures and relationships. Mothers report using their smartphones more when their children are around, even though they feel guilty and worry about not being a good parent, which results in a decrease in their responsiveness. Mothers' strong emotional bonds and family members' communication are crucial for emotional stability and wholesome connections, both of which are necessary for a happy and healthy family life. Therefore, the present study aims to assess the effect of mothers' smartphone use on family life and family functions.

Aim of the Study: The study aimed to assess the effect of mothers' using of smartphone on their quality of life and family functions.

Research Questions:

- 1-What's the effect of smartphone use on mothers' quality of life?
- 2- What's the effect of smartphone use on mothers' family functions?

Subjects and method:

Subjects

Study design: A descriptive cross sectional research design was used in this study.

Study settings: This study was conducted in the two largest maternal

and child health care centers in Tanta city, El-Gharbeya Governorate, including the medical center at Sigar and the Dr. Mohamed Mashaly primary health care center at Saied Street, which are affiliated with the Ministry of Health and Population.

Study subjects: The study included a convenience sample of 700 mothers who have smartphone and who attended to the previous mentioned settings for any service.

Tools of data collection:

The researcher used four tools to collect the necessary data for this study.

Tool I: Mothers' knowledge regarding smartphone use

questionnaire: It was developed and used by the researcher after reviewing the related literature **Blut & Wang, (2020), Thulin& Vilhelmson, (2017)**. It was consisted of two parts:-

Part(1):Socio-demographic

characteristics of the mothers: This part included data about age, education, occupation of mother, marital status, residence, family type, monthly family income, husband education, occupation, number of children, and history of previous exposure to health problems related to smartphone use.

Part (2): Smartphone use knowledge

questionnaire: It was used to assess the mothers' knowledge about smartphone use. It consisted of five questions that covered the following areas: purpose of using a smartphone, effects of maternal smartphone use on mother-child interaction, effects of smartphones on their daily lives, advantages and disadvantages of smartphone use, and problems of smartphone misuse and overuse.

Scoring system:

The statements were provided with two options; every correct answer was given a score of one (1); the incorrect answer and don't know were given a score of zero (0). These scores were summed up, and the total score ranged from 0 to 61 points, which was converted into a percentage score and classified as follows:

- Low knowledge < 60% (0 - 36 points) from the total score.
- Moderate knowledge 60% - 75% (37 - 46 points) from the total score
- High knowledge >75 % (47 - 61 points) from the total score.

Tool II: Smartphone addiction scale

(SAS): It was developed by **Kwon et al, (2013)**, It was adapted by the researcher to measure level of smartphone use among studied mothers. It comprises of ten items

concerning; daily-life disturbance, positive anticipation, withdrawal, cyberspace –oriented relationship, overuse, and tolerance. Each item is rated on a three-point likert scale. The statements were provided with two options; every correct answer was given a score of one (1); the incorrect answer and don't know were given a score of zero (0). These scores were summed up, and the total score ranged from 0 to 61 points, including disagree (0), neutral (1), and agree (2). Each participant's scores were summed up, with a higher score indicating more extensive smartphone use. The total score ranged from 0 to 20 points, which was converted into a percentage score and classified as follows:

- High smartphone use $\geq 70\%$ (≥ 14 points) from the total score.
- Moderate smartphone use: 50%-<70% (10 - <14 points) from the total score.
- Low smartphone use: < 50% (< 10 points) of the total score.

Tool III: Family quality of life among studied mothers use Smartphone:

The Beach Center Family Quality Of Life (FQOL) scale which assesses families' perceptions of their satisfaction with different aspects of family quality of life. which developed

by Zuna et al., (2009) was adapted by the researcher in this part. It comprises of 20 items covering four subscales: family interaction, parenting, emotional well-being, physical / and material well-being. The statements of the scale were rated on a 5-point likert scale where 1 = never, 2 = nearly, 3 = sometimes, 4 = often, and 5 = always. Scores of all items will be summed up to calculate the total score of the family satisfaction level toward their family quality of life. The total score ranged from 0 to 100 points, which was converted into a percentage score and classified as follows:

- Satisfied with > 75% (> 75 points) of the total score.
- Neutral 60%-75% (60-75 points) of the total score.
- Unsatisfied: < 60% (< 60 points) of the total score.

Tool IV: Family functioning among studied mothers :

Family functioning of studied mothers was assessed using the McMaster Family Assessment Device (FAD) which developed based on McMaster model of family functioning. It was developed by Epstein et al.,(1983). Three subscales of FAD were adapted by the researcher in this study, which were mostly affected by smartphone use, including the 3 dimensions of

McMaster of Family Function (MMFF):

- Problem solving (5 items)
- Communication(6 items)
- General functioning (12 items)

Responses on the subscale items were measured on a 4-point Likert scale ranging from (4) = “strongly agree” to (1) = “strongly disagree.” The rating score was reversed in items 2 and 5 in the communication part and in items 1, 3, 5, 7, 9, and 11 in the general functioning part to be (1) for “strongly agree” to (4) = “strongly disagree.” The average score was used in subsequent analyses. Higher scores indicated healthier family functioning points, which were converted into percentage scores and classified as follows:

- Healthy family functions $\geq 70\%$ (≥ 48 points) of the total score.
- Unhealthy family functions $< 70\%$ (< 48 points) of the total score.

Method

The study was conducted as follows:

1. Obtaining approval

- An official permission to conduct the study was obtained from the Dean of the faculty of Nursing and directed to the managers of MCH centers in order to take their permission to collect data from the selected settings.

2. Ethical and legal considerations:

- Approval of the faculty of nursing scientific research ethical committee was obtained to conduct the study, code of ethics: (291-8/2023).
- An informed consent was obtained from all the chosen mothers after providing appropriate explanation about the purpose of study.
- Nature of the study was not cause harm and/or pain for the entire sample.
- Confidentiality and privacy were put into consideration regarding collected data.
- Each mother was informed that she has the right to withdraw from the study any time she wants.

3-Developing the study tools:

- Tool I was developed by the researcher based on a literature review; Tools II, III, & IV were adapted by the researcher and translated into the Arabic language to suit the studied subjects.

4-Validity of the study tools:

- The study tools were tested for face and content validity by a jury of five professors with expertise in the field of community health nursing before conducting the study to evaluate the individual items as well as the entire instrument as being relevant and appropriate to test what it wants to measure. The total questionnaire

content validity index was found to be 94.35%.

5. Pilot study:

- The researcher conducted a pilot study on 10% of the sample to test the tools for clarity and applicability, identify possible barriers for the researcher during data collection, and estimate the time required to collect data from each mother. Consequently, the required adjustments were made. These mothers were not included in the study's sample.

6-Reliability:-

Reliability was calculated to study the tool using Cronbach's alpha test. The total questionnaire Cronbach's alpha was 0.74 for all the study tools. For socio-demographic and knowledge items, it was found to be 0.514 & 0.829, respectively. For the smartphone addiction scale, the family quality of life scale, and the family functioning scale, it was found to be 0.731, 0.862, and 0.757, respectively.

- Significance was at $p < 0.05$ for interpretation of the results.

7. Actual study:

- The researcher met with the mothers only two days per week (Monday and Thursday) in the waiting areas selected at MCH center Tanta city, El-Gharbeya Governorate.

-The structured interview sheet was individually fulfilled from each mother at the three previously selected MCH centers.

- It took an average of 20 minutes to gather the data from each mother.

-Data was collected by the researcher over a period of six months starting from January 2024 to the end of July 2024.

8. Statistical analysis of the data:

SPSS (Statistical Package for Social Science) version 25 (IBM Corporation, Armonk, NY, USA) was used to code, enter, tabulate, and analyze the data that was gathered. Range, mean, and standard deviation were computed for quantitative data. Chi-square test was used for qualitative data, which describe a categorical set of data by frequency, percentage, or proportion of each category, comparison between two groups, and more. The Z value of the Mann-Whitney test was used to compare the means of two groups of independent samples' non-parametric data. To compare more than two non-parametric data means, Kruskal-Wallis was computed. Pearson's correlation coefficient (r) was used to assess the relationship between the variables.

Results:

Table 1: Distribution of studied mothers according to their socio-

demographic characteristics. The table shows that, about two-thirds (64.43%) of the studied mothers were in the age group (20-40) years. The age of the studied mothers ranged between 20 - 70 years with a mean age of (37.93±11.011) years. Regarding mothers' and their husbands' educational level, nearly half (47.7% - 47.3%) of them received university and postgraduate education respectively.

Concerning the working status of the studied mothers and their husbands, more than half of them (54.0%-56.0%) were workers (office work). Also, more than half (55.3%) of them live in urban areas.

In relation to family type, more than half (54.6%) of them had nuclear families, and more than one-quarter (29.6%) of them had extended families. Regarding family income, slightly less than two-thirds (60.3%) of them had enough family income. As regards the number of children, nearly half (44.7%) of them have two children, and more than one-third (39.0%) have more than two children.

Table 2: Distribution of the studied mothers according to time spend on smartphone and pervious exposure to health problems related to smartphone use. This table revealed

that, regarding the number of calls the mothers made daily, more than half (59.4%) of them made 1-5 calls daily. Concerning the time mothers spend daily on their mobile phones, about two-thirds (64.9%) of them spend 1-5 hours/day, and slightly less than one-third (31.1%) of them recharge twice with a mean of 1.47 ± 0.642 . In relation to having a history of exposure to health problems related to smartphone use, the table revealed also that nearly half (43.4%) of the studied mothers had previous exposure to health problems related to smartphone use.

Table 3: Mean and standard deviation of mother knowledge regarding smartphone use in relation to purpose, effect, advantages and disadvantages. The table shows that, regarding the mean knowledge score of the studied mothers, it was obvious that the highest mean knowledge score was found with mothers' knowledge regarding disadvantages and problems of smartphone misuse and overuse (10.41 ± 3.566). This followed by advantages of smartphone use (7.96 ± 2.626), the purpose of using smartphone (5.52 ± 1.894), effects of smartphones on her daily lives (5.43 ± 1.627) and regarding the effects of maternal smartphone use on mother-

child interaction (5.36 ± 1.847). The total mean score of mothers' knowledge regarding smartphone use (34.68 ± 8.252).

Figure (1): Represents the distribution of the studied mothers according to their level of knowledge regarding smartphone use. The table shows that about two-thirds (66%) of the studied mothers had a low level of knowledge, while more than one-quarter (26.1%) of them had a moderate level of knowledge, and very few (7.9%) of them had a high level of knowledge.

Table 4: represents the distribution of the studied mothers regarding to smartphone addiction. The table reveals that nearly half (41.9%-43.0%) of the studied mothers, respectively, agreed about feeling pain in their wrists or at the back of their necks while using a smartphone, and people around them told them that they used smartphone too much. More than half of them (54.3%, 57.1%, and 57.3%) respectively were neutral about missing work that they planned due to smartphone use, having difficulty concentrating while doing household chores and at work due to using a smartphone, and having a smartphone on their mind even when they were not using it.

Also, the table reveals that about one-third (31.3%-34.3%-39.1%) of them, respectively, agreed that they wouldn't be able to stand having a smartphone, they constantly checked their smartphone so as not to miss conversations between other people on Twitter and Facebook, and they used their smartphone longer than intended.

Figure (2): Distribution of the studied mothers regarding to their addiction levels of smartphone use.

The table reveals that more than two-fifths (42.3%) of the studied mothers had a moderate level of smartphone addiction, and more than one-quarter (29.3%) of them had a high smartphone addiction. On the other hand, 28.4% of them had low smartphone addiction.

Table 5: Mean and standard deviation of family quality of life dimensions including family interaction, parenting, emotional wellbeing and physical / material well-being of among the studied mothers addicting smartphone. The table illustrates that the highest mean score of family quality of life among the studied mothers was regarding the parenting dimension (20.74 ± 4.916), followed by family interaction was (20.06 ± 4.669), the physical/material well-being dimension was ($12.71 \pm$

3.401), and the emotional well-being dimension was (12.29 ± 3.062). The total mean score of family quality of life was 65.81 ± 13.01 .

Figure (3): Distribution of the studied mothers according to their total levels of Family quality of life regarding smartphone use.

The table reveals that, more than half (54.4%) of studied mothers using smartphone had unsatisfied family quality of life, and only 14.3% of them had satisfied family quality of life.

Table 6: Mean and standard deviation of family functioning dimensions including ability to solve problem, communication between family members and General family functions among the studied mothers using smartphone. The table presents that the highest mean score was found regarding general family functioning among the studied mothers (32.58 ± 5.367), regarding communication between family members (16.28 ± 2.077), and regarding ability to solve problems (14.78 ± 2.240). The total mean score of the family functioning was 63.64 ± 7.075 .

Figure (4): levels of Family Functioning among the studied mothers using smartphone. The table illustrates that, the majority (83.1%) of

the studied mothers using smartphone had unhealthy family functions, and only (16.9%) had healthy family functions.

Table 7: Represents the relation between socio-demographic characteristics of the studied mothers and their levels of knowledge regarding smartphone use and their levels of addiction regarding smartphone use. The table illustrates that, there was a highly statistically significant relationship between mothers' level of education and family type with their levels of knowledge regarding smartphone at ($p<0.01$). Also there was a statistically significant relation between mothers age, place of residence and monthly family income with their levels of knowledge regarding smartphone at ($p<0.05$). And there was a highly statistically significant relation between mothers level of education, place of residence, family type, monthly family income related to smartphone use with their levels of addiction regarding smartphone use at ($p<0.01$).

Table 8: Represents relation between socio-demographic characteristics of the studied mothers using smartphone and their levels of family quality of life and their levels

of family functioning. The table The table represents that there was a highly statistically significant relation between all items of socio-demographic characteristics of the studied mothers using smartphones and their levels of family quality of life at $p<0.01$. And there was a statistically significant relation between all elements of socio-demographic characteristics of the studied mothers using smartphones and their levels of family functioning ($p<0.01$), except for place of residence and monthly family income.

Table 9: Represents the correlations between total scores of knowledge of the studied mothers, total addiction score, total quality of life and total family functioning scores. The table presents that there was a highly statistically significant correlation between the total knowledge score with the total score of the smartphone addiction scale and the total family functioning score. Also, there was a statistically significant correlation between the total score of family quality of life and the total score of family functioning. Also, there was a negative correlation between the total smartphone addiction score with the total family quality of life score and the total family functioning score.

Table (1): Distribution of the studied mothers according to their socio-demographic characteristics

Socio-demographic characteristics	The studied mothers (n=700)	
	No	%
Age in years:		
20-40	451	64.43
41-60	225	32.14
61-70	24	3.43
Mean ± SD	37.93±11.011	
Mothers' educations		
Read, write and basic education	149	21.3
Secondary education	217	31.0
University and postgraduate education	334	47.7
Husband' educations		
Read and write / basic education	75	10.7
Secondary education	294	42.0
University and postuniversity education	331	47.3
Mother job		
Housewife (not working)	242	34.6
Working (craft work)	80	11.4
Working (office work)	378	54.0
Husband job		
Not working	45	6.4
Working (craft work)	263	37.6
Working (office work)	392	56.0
Marital status		
Married	568	81.1
Divorced	81	11.6
Widow	51	7.3
Residence		
Rural	313	44.7
Urban	387	55.3

Table (1): (Continue) Distribution of the studied mothers according to their socio-demographic characteristics

socio-demographic characteristics	The studied mothers (n=700)	
	No	%
Family type		
Nuclear Family	382	54.6
Extended Family	207	29.6
Blended Family	60	8.6
Single Parent	51	7.3
Family income		
Not enough	235	33.6
Enough	422	60.3
Enough and save	43	6.1
Number of children		
One	114	16.3
Two	313	44.7
More than two	273	39.0

Table (2): Distribution of the studied mothers according to time spent on smartphone and pervious exposure to health problems related to smartphone use.

Time spend on smartphone	The studied mothers (n=700)	
	No	%
The number of calls the mothers make daily		
1-5	416	59.4
6-10	205	29.3
More than 10	79	11.3
The time you spend daily on your mobile phone		
1-5 hours	454	64.9
6-10 hours	208	29.7
More than 10 hours	38	5.4
The number of times mothers recharge their phone or Wi-Fi package per month		
One time	425	60.7
Twice	218	31.1
More than Twice	57	8.1
Mean $\pm$ SD	1.47 $\pm$ 0.642	
History of previous exposure to health problems related to smartphone		
Yes		43.4
No	304	56.6
	396	

Table (3): Mean and standard deviation of mother knowledge regarding smartphone use in relation to purpose, effect, advantages and disadvantages

Mothers' knowledge regarding smartphone use	The studied mothers (n=700)
	Mean $\pm$ SD
Purpose of using smartphone	5.52 $\pm$ 1.894
Effects of maternal smartphone use on mother-child interaction	5.36 $\pm$ 1.847
Effects of smartphones on mothers' daily lives	5.43 $\pm$ 1.627
Advantage for smartphone use	7.96 $\pm$ 2.626
Disadvantage and problems of smartphone misuse and overuse	10.41 $\pm$ 3.566
Mothers' total knowledge mean score regarding smartphone use	34.68 $\pm$ 8.252

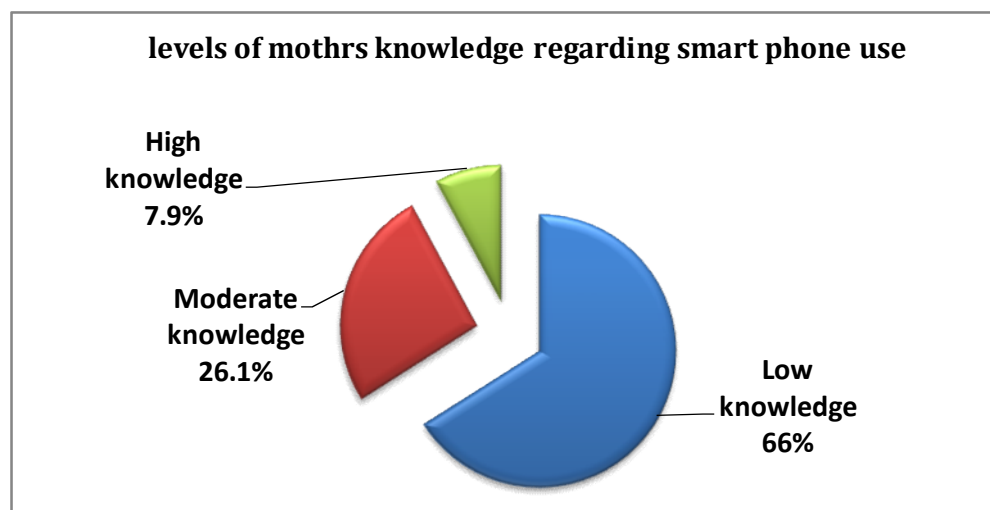


Figure (1): Distribution of the studied mothers according to their knowledge levels regarding smartphone use.

Table (4): Distribution of the studied mothers regarding to smartphone addiction.

Smartphone addiction among studied mothers	The studied mothers (n=700)					
	Agree		Neutral		Disagree	
	No	%	No	%	No	%
I miss work that I planned, due to smartphone use	152	21.7	380	54.3	168	24.0
I have difficulty concentrating while doing household chores and at work due to using a smartphone	162	23.1	400	57.1	138	19.7
I wouldn't be able to stand without having a smartphone	219	31.3	338	48.3	143	20.4
I feel pain in wrists or at the back of neck while using a smartphone	293	41.9	340	48.6	67	9.6
I feel impatient and fretful when I am not holding smartphone	222	31.7	357	51.0	121	17.3
I have smartphone on mind even when I am not using it	162	23.1	401	57.3	137	19.6
I would never give up using smartphone even if daily life were greatly affected by it	179	25.6	354	50.6	167	23.9
I constantly check smartphone so as not to miss conversations between other people on Twitter and Facebook.	240	34.3	348	49.7	112	16.0
I use smartphone longer than intend.	274	39.1	345	49.3	81	11.6
People around me tell me that, I use smartphone too much	301	43.0	311	44.4	88	12.6

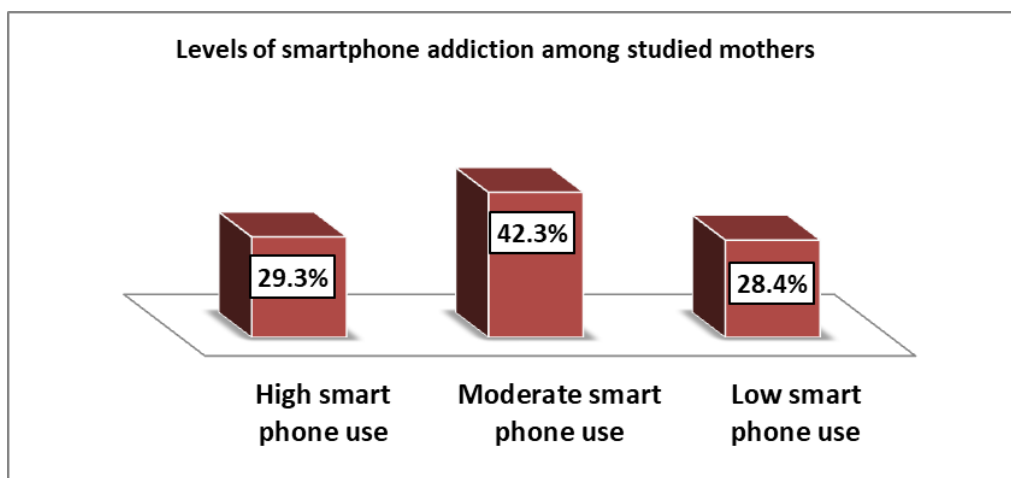


Figure (2): Distribution of studied mothers according to their addiction levels of smartphone use.

Table (5): Mean and standard deviation of family quality of life dimensions including family interaction, parenting, emotional wellbeing and physical / material well-being among the studied mothers.

Family quality of life among the studied mothers	The studied sample (n=700)
	Mean $\pm$ SD
Family Interaction	20.06 $\pm$ 4.669
Parenting	20.74 $\pm$ 4.916
Emotional Well being	12.29 $\pm$ 3.062
Physical / Material Well-being:	12.71 $\pm$ 3.401
Total score of family quality of life	65.81$\pm$13.01

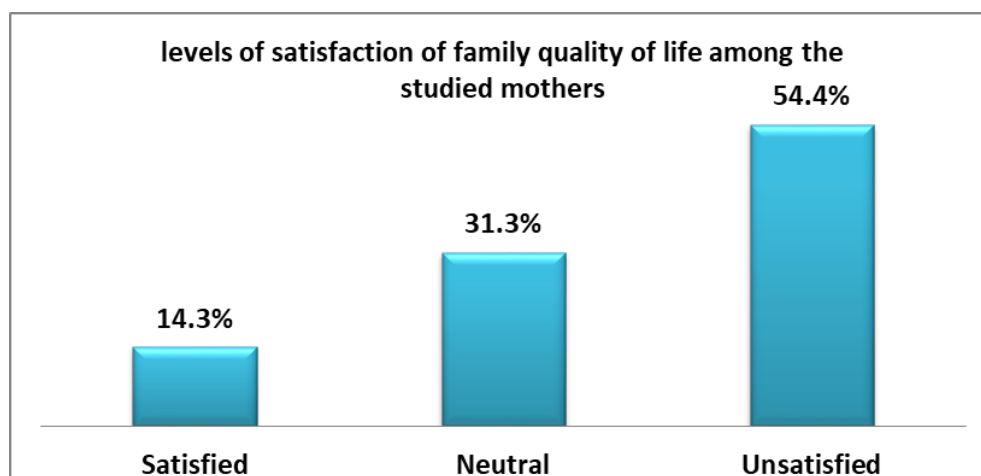


Figure (3): Distribution of the studied mothers according to their levels of satisfaction of family quality of life.

Table (6): Mean and standard deviation of family functioning dimensions including ability to solve problem, communication between family members and general family functions among the studied mothers.

Family functioning among the studied mothers	The studied sample (n=700)
	Mean $\pm$ SD
Ability to solve problems	14.78 $\pm$ 2.240
Communication between family members	16.28 $\pm$ 2.077
General family functions	32.58 $\pm$ 5.367
Family Functioning total mean score	63.64$\pm$ 7.075

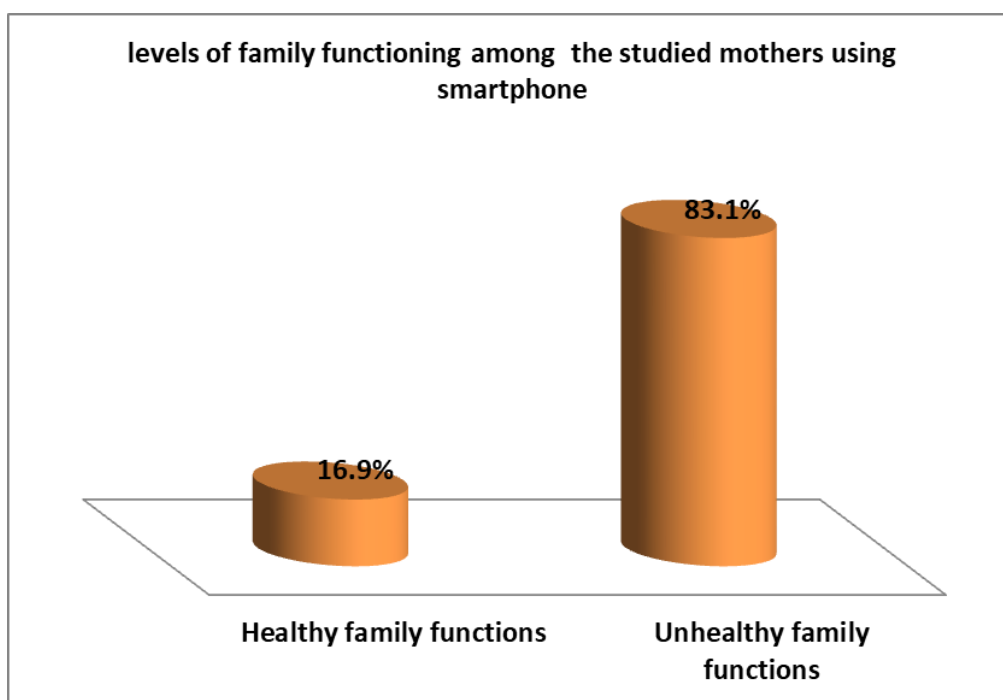


Figure (4): levels of family functioning among the studied mothers using smartphone

Table (7): Relation between socio-demographic characteristics of the studied mothers and their levels of knowledge regarding smartphone and their levels of addiction regarding smartphone use

Socio-demographic characteristics	The studied mothers(n=700)						X ² _p	The studied mothers(n=700)						X ² _p
	Levels of knowledge							Levels of smartphone addiction						
	low knowledge (n=462)		Moderate knowledge (n= 183)		High knowledge (n= 55)			Low smartphone addiction (n=199)		Moderate smartphone addiction (n=296)		High smartphone addiction (n=205)		
	No	%	No	%	No	%		No	%	No	%	No	%	
Age														
20-40	278	61.6	133	29.5	40	8.9	12.08	119	59.8	197	66.6	135	65.9	8.161
41-60	165	73.3	45	20.0	15	6.7	1	69	34.7	88	29.7	68	33.1	0.086
61-70	19	79.2	5	20.8	0	0.0	0.017	11	5.5	11	3.7	2	1.0	
Mothers level of education														
Read and write / essential education	124	83.2	23	15.4	0	0.0	28.03	34	17.1	73	24.7	42	20.5	15.171 0.004**
secondary education	137	63.1	62	28.6	18	8.3	4	77	38.7	92	31.1	48	23.4	
University and post university education	201	60.2	98	29.3	35	10.5	< 0.001	88	44.2	131	44.3	115	56.1	
Mother job							**							
Not working (house wife)	167	69.0	63	26.0	12	5.0		68	34.2	110	37.2	64	31.2	2.006 0.735
Working (craft work)	56	70.0	18	22.5	6	7.5	5.870	24	12.1	32	10.8	24	11.7	
Working (office work)	239	63.2	102	27.0	37	9.8	0.209	107	53.8	154	52.0	117	57.1	
Place of residence														
Rural	222	70.9	74	23.6	17	5.4	7.676	102	51.3	143	48.3	68	33.2	16.044 0.001**
Urban	240	62.0	109	28.2	38	9.8	0.022	97	48.7	153	51.7	137	66.8	
Family type							*							
Nuclear family	228	59.7	120	3.4	34	8.9		97	48.7	162	54.7	123	30.0	24.586 0.001**
Extended Family	160	77.3	38	18.4	9	4.3		59	29.7	97	32.8	51	24.9	
Blended Family	48	80.0	9	15.0	3	5.0	32.69	30	15.1	32	7.1	9	4.4	
Single Parent	26	51.0	16	31.4	9	17.6	4 < 0.001	13	6.5	16	5.4	22	10.7	
Monthly family income														
Not enough	148	63.0	65	27.7	22	9.4	11.92	52	26.1	104	35.1	79	38.5	14.879 0.005**
Enough	282	66.8	114	27.0	26	6.2	8	141	70.9	169	57.1	112	54.6	
Enough and save	32	74.4	4	9.3	7	16.3	0.018	6	3.0	23	7.8	14	6.8	

Table (8): Represents relation between socio-demographic characteristics of the studied mothers and their satisfaction levels of family quality of life and their levels of family functioning

Socio-demographic characteristics	The studied mothers(n=700)						X ² _p	The studied mothers(n=700)				X ² _p
	levels of Family quality of life							Levels of family functioning				
	Unsatisfied (n=381)		Neutral (n=219)		Satisfied (n=100)			Un-healthy family functions (n=582)		Healthy family functions (n=118)		
	No	%	No	%	No	%		No	%	No	%	
Age												
20-40	220	48.8	160	35.5	71	15.7	20.239 < 0.001**	358	79.4	93	20.6	12.870 0.002**
41-60	141	62.7	56	24.9	28	12.4		202	89.8	23	10.2	
61-70	20	83.3	3	12.5	1	4.2		22	91.7	2	8.3	
Mothers level of education												
Read and write / essential education	114	76.5	24	16.1	11	7.4	41.029 < 0.001**	130	87.2	19	12.8	33.492 < 0.001**
secondary education	116	53.5	71	32.7	30	13.8		202	93.1	15	6.9	
University and post university education	151	45.2	124	37.1	59	17.7		250	74.9	84	25.1	
Mother job												
Not working (house wife)	150	62.0	57	23.6	35	14.5	15.076 < 0.005**	204	84.3	38	15.7	5.607 0.061*
Working (craft work)	41	51.3	33	41.3	6	7.5		73	91.3	7	8.8	
Working (office work)	190	50.3	129	34.1	59	15.6		305	80.7	73	19.3	
Place of residence												
Rural	169	54.0	99	31.6	45	14.4	0.978 0.044*	264	84.3	49	15.7	0.584 0.445
Urban	212	54.8	120	31.0	55	14.2		318	82.2	69	17.8	
Family type												
Nuclear family	170	44.5	147	31.4	65	17.0	58.269 < 0.001**	302	79.1	80	20.9	13.679 0.003**
Extended Family	151	72.9	44	18.4	12	5.8		188	90.8	19	9.2	
Blended Family	33	55.0	10	15.0	17	28.3		51	85.0	9	15.0	
Single Parent	27	52.9	18	31.4	6	11.8		41	80.4	10	19.6	

Monthly family income												
Not enough	133	56.6	76	32.3	26	11.1	17.542	200	85.1	35	14.9	1.057
Enough	220	52.1	140	33.2	62	14.7	< 0.002**	346	82.0	76	18.0	0.590
Enough and save	28	65.1	3	7.0	12	27.9		36	83.7	7	16.3	

* Significant $p < 0.05$ ** highly significant $p < 0.01$

Table (9): Correlations between the total score of knowledge, of the studied mothers and their total quality of life and the total family functioning scores.

Total score of knowledge ,smartphone addiction, quality of life and family functioning	Total score of the studied mothers (n=700)			
	Total knowledge score	Total Smartphone Addiction score	Total Family Quality of Life score	Total family functioning score
	r p	r P	r p	r p
Total knowledge score	--	0.227 0.001**	.071 0.059	-.105- 0.005**
Total smartphone addiction score	0.227 0.001**	--	-0.001- 0.975	-0.037- 0.326
Total family quality of life score	0.071 0.059	-0.001- 0.975	--	0.324 0.001**

* significant $p < 0.05$ ** highly significant $p < 0.01$

Discussion:

Smartphones have become an indispensable aspect of life. While smartphones have many positive elements, such as increased interaction and convenience in everyday life, they also have certain negative side effects due to their vast range of potential applications. **Wickord& Quaiser-Pohl, (2023)**. Mother' excessive smartphone use may have severe effects on the increase in the frequency of family conflicts and poor/troubled family relationships and also impaired family quality of life, family functions, and well-being. **Busch& McCarthy ,(2021)**. Therefore, the aim of this study was to assess the effect of mothers' using of smartphone on their quality of life and family functions.

Knowledge of the studied mothers plays a vital role in controlling the smartphone misuse problem, as the mothers are the main caregivers for their family. The present study revealed that about two-thirds of the studied mothers had low level of knowledge about smartphone use, while more than one quarter of them had a moderate level of knowledge, and very few (7.9%) of them had a high level of knowledge about smartphone use (**Figure1**). This result may be because they didn't aware about physical and psychological

hazards and social effect of smartphone misuse and overuse. Also, insufficient educational program to the public to increase their awareness and knowledge about the effect of smartphone misuse on family functions and different aspect of daily life, that nearly half of them living in rural area. This finding was similar to Egyptian study conducted by **Abdallah Mostafa et al.,(2024)** and found that two-thirds of their studied mothers had an unsatisfactory level of knowledge compared to one-third of them, who had a satisfactory level of knowledge about the misuse of smartphones.

This finding goes also in the same line with **Mohamed et al.,(2021)** who observed that the majority of the studied mothers had poor knowledge about smartphone use.

The current study revealed that the highest mean knowledge score was regarding advantage of smartphone use (7.96 ± 2.626) and disadvantage and problem of smartphone misuse and overuse (10.41 ± 3.566) (**Table III**). This result is accordance with **Latif et al ., (2019)** who conducted a study about "Use of smartphones and social media in our life: trends, advantages, challenges, and barriers" and demonstrated that the majority of their studied mothers reported instant and fast communications to save time

and obtaining information quickly via the internet as advantages for smartphone use. And with a study done by **McDaniel et al.,(2024)** who conduct a study about " Daily smartphone use predicts parent depressive symptoms, but parents' perceptions of responsiveness to their child moderate this effect" which illustrated that most of studied mothers know that misuse and overuse of smartphone cause feelings of distraction, wasted time and impaired daily sleep quality.

Regarding mothers smartphone addiction, the result of the present study revealed that more than half of the studied mothers were neutral about missing work that they planned due to smartphone use and difficulty concentrating while doing household chores and at work due to using a smartphone, and they had their smartphone on their mind even when they were not using it, and nearly half of them agreed that people around them told them that they used smartphones too much. **(Table IV)**. This may be due to that excessive smartphone use or addict it had become a habit for most peoples in their different family relationships, and also due to that the mothers try to deny their actual situation in relation to addict smartphone use. This result supported by **Ali et al.,(2022)** who

conducted a study about" Examining the association s between smartphone use and mother–infant bonding and family functioning" and shows that excessive smartphone use can be sufficiently distracting the mothers from their different responsibilities. Regarding the levels of addiction to smartphone use among the studied mothers. In this regard, the current study illustrated that more than two-fifths of the studied mothers had a moderate level of smartphone addiction, and more than one-quarter of them had high smartphone addiction. **(Figure II)**.This results was supported by the finding reported in **(table II)** that about two-thirds of the studied mothers spent 1-5 hours/day on the smartphone, more than half of the studied mothers made 1-5 calls daily, and more than two-fifths of them had previous exposure to health problems related to smartphone use.

Besides, human by their nature refuses to admit mistakes against himself and they suggest the quantity of time they spent on the smartphone doesn't necessary to negate positive interaction with family members because they frequently used it to connect with their children, find helpful parenting resources, or manage family schedules. And also, sometimes they used it as a way to

cope with stress, find support, or have moments of personal time, which could indirectly benefit the family's well-being. This result goes in line with a study done by **Sariyıldız& Erus, (2024)** who found that mothers had moderate levels of smartphone addiction and suggested that using a smartphone for taking or uploading photos, online shopping, and Internet searches could be considered a lifestyle; mothers may enjoy such activities, which enable them to express themselves and connect with the outside world through media.

Family quality of life is very important for all family members, in which smartphone overuse and misuse may affect individuals' quality of life and make them unsatisfied with their life. In this regard, the current study revealed that the main affected dimension of family quality of life among the studied mothers was parenting with mean(20.74 ± 4.916), family interaction with mean(20.06 ± 4.669) and emotional wellbeing with mean(12.29 ± 3.062) (**Table V**).

This finding was in the same line with a study done by **Lederer et al.,(2022)** who studied "The effects of maternal smartphone use on mother–family member interaction and child development" and reported that the maternal smartphone misuse

and over use which can reduce both the quantity and the quality of mother–family interaction. This result is also accordance with a study conducted by **Lee& Kim (2021)** who conducted a study about "Effect of maternal factors on problematic smartphone use among elementary school children" and found that parenting and emotional well-being inside family was affected according to amount of time mothers spent daily on smartphone.

In relation to the level of satisfaction of family quality of life, the current study reported that it illustrated that more than half of the studied mothers using smartphones were unsatisfied with their family quality of life, and only a few of them were satisfied with their family quality of life. (**Figure III**).

This finding is supported by chines study conducted by **Luk et al.,(2020)** who found that mother smartphone use has a direct effect, which has been associated with depression symptoms and increased loneliness, which might produce an estrangement of family members and an unsatisfactory family quality of life. On the other hand, it had an indirect effect on mothers with lower levels of family well-being, and unsatisfied family quality of life might refer to mothers using smartphones as an emotion

compensator to regulate or alleviate negative emotions and relieve stress in family life. This finding was corresponding with a study done by **Anaya et al.,(2018)** who found that the excessive time spent on smartphones leads to distractions, less family interaction, and more conflict. Smartphone users were often distracted and did not participate in other family members' conversations, family vacations, and activities, which appeared to affect the quality of interaction and lead to family members being unsatisfied about the family quality of life.

Family functioning is playing important role to the overall well-being of its members and the stability of society. Mothers smartphone misuse and overuse may affect all aspect of family functions as ability to solve problems, communication between family member and others general family functions, In this regard, the current study revealed that the main affected dimension of family functions among studied mothers were general family functions with mean (32.58 ± 5.367), communication between family members with mean (16.28 ± 2.077) and ability to solve problems with mean (14.78 ± 2.240)(**TableVI**). This finding was in the same line with a study done by **Elhai et al.,(2019)** who conducted a

study about "The relationship between anxiety symptom severity and problematic smartphone use" and reported that smartphone use affected family functions such as communication, problem-solving, and other general family functioning dependent on the time and duration of smartphone use by family members.

In relation to the levels of family functioning among the studied mothers using smartphones, The result of the present study showed that the majority of the studied mothers using smartphones had unhealthy family functions, and only a few of them had healthy family functions. (**Figure IV**). This is also supported by the fact that nearly half of the studied mothers had a history of previous exposure to health problems related to smartphone overuse and misuse. This is justified by excessive smartphone use by the mothers, which can have significant negative consequences for mother-child relationships, mothers' practices, and overall family well-being. Foster balance, and be mindful of smartphone use during family interaction; it is crucial for healthy family functioning.

This result was similar to the findings of other studies. A Jordan study conducted by **Ali et al .,(2022)** and Chinese study conducted by **Guo et**

al.,(2019) which found that, excessive smartphone use by most of mothers leads to unhealthy family functioning and impaired family functioning.

In accordance with the correlations between total scores of knowledge of the studied mothers, total addiction score, total quality of life, and total family functioning scores. The current study illustrated that there was a statistically significant correlation between the total knowledge score and the total smartphone addiction scale and the total score of family functioning.

Also, there was a statistically significant correlation between the total score of family quality of life and the total score of family functioning (**Table IX**). This may be due to poor mothers' knowledge about the effect of smartphone misuse and excessive use that leads to increased risk of smartphone addiction and already leads to impaired family functioning. This is also supported by the results reported before that about two-thirds of the studied mothers had a low level of knowledge regarding smartphone addiction. (**Figure1**). In addition to that, the majority of the studied mothers using smartphone had unhealthy family functions (**Figure 4**).

This result was supported by study done by **Kil et al.,(2021)** and

Mohamed Hassan Nassar & Ata Mohammed,(2021) who found highly statistically significant relation between level of knowledge and smartphone addiction. And similar with the study done by **Guo et al .,(2019)** and **Gugushvili et al .,(2022)** who illustrated that there was a statistically significant relation between the studied mothers' level of knowledge and their level of family functioning.

The finding of this result agrees also with a study carried out by **Mackay et al.,(2022)** who stated that there was a significant correlation between smartphone addiction and the level of knowledge about the effect of smartphone use.

Conclusion

Based on the finding of the present study, it can be concluded that, about Two-thirds of the studied mothers had a low level of knowledge regarding smartphone use. Less than half of them had a moderate level of smartphone addiction. More than half of them using smartphones were unsatisfied with their level of family quality of life, and the majority of them using smartphones had unhealthy family functions.

In addition, there was a highly statistically significant correlation between the total knowledge score with the total score of smartphone

addiction and the total family functioning score. Also, there was a statistically significant correlation between the total score of family quality of life and the total score of family functioning.

Recommendations

Based on the findings of the current study, the following recommendation are suggested:

- 1) Continuous education programs are recommended to improve the mothers' awareness about the effect of smartphone misuse on overall family quality of life and family functions
- 2) Booklets, brochures, and posters with illustrated pictures about smartphone addiction and how to prevent it among mothers should be available at all area provide maternity services such as maternal and child health care centers.
- 3) Education and orientation program for mothers about alternative ways to handle family stress and problems instead of immersing themselves on smartphone use, such as sports and shopping and encouraging specific areas of the home as phone free-zone such, bedrooms or dining rooms.
- 4) Development and enhancement family relationships and ties through planning for regular family activities that don't involve screens, such as board games and outdoor

activities, to encourage open communication among all family members.

- 5) The mass media should develop strategies that will help parents change their own technology-using behaviors and educate parents about the benefits and consequences of various types of technology use and its effect on all aspects of family functions.

- 6) Future study should consider for developing strategies to reduce smartphone use among mothers in order to reflect on the health of all family members.

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