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Effect of Educational Program on Mothers' Knowledge and Practices regarding Health Hazards of Plastic Use in Domestic Purposes

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Abstract

Background: Plastic is used widely nowadays. It contains harmful compounds to human health. So, mothers have to be aware of these hazards. **Study aim:** Was to evaluate effect of educational program on mothers' knowledge & practices regarding health hazards of plastic use in domestic purposes. **Study design:** Quasi-experimental research design. **Study setting:** The largest Maternal and Child Health Care Centers at Tanta City (Medical center at Sigar & Dr. Mohamed Mashaly center at Saied Street). **Study subjects:** Convenience sample of 166 mothers attending the previous setting. **Study tools:** **Tool I:** including 2 parts: **part (1):** Socio-demographic characteristics of mothers. **Part (2):** Knowledge of mothers regarding plastic usage and its health hazards. **Tool II:** Self-reported practices of mothers regarding plastic products use. **Results:** The program was effective and improved their knowledge & practices regarding health hazards of plastic use. For example, pre-program all of them gave incorrect and don't know answers regarding (health hazards of plastic use on women's health) and after program, more than half (60.2 %) of them had complete and correct answers. As well as, pre-program, most (98.2 %) of them had unsatisfactory practices regarding types of plastic products used and immediately after program, most (90.4 %) of them had satisfactory practices. **Conclusion:** There was significant improvement in their knowledge & practices about plastic usage and its health hazards. **Recommendation:** Ongoing educational programs should be undertaken to raise community awareness about health hazards of plastic use.

Keywords: Knowledge, practices of mothers, health hazards, plastic use, domestic purposes.

Introduction

Plastics are synthetic polymers made by chemical reactions that are not biodegradable. Food containers, water bottles, toys, clothes and other many items are made of plastic. Because plastic is strong, lightweight, inexpensive, flexible, and versatile, people are becoming more reliant on it these days. Many chemicals present in plastic, including phthalates, polyfluorinated compounds and bisphenol A, have serious effects on human health (Adeniran & Shakantu, 2022; Govind & Nishitha, 2023).

In 2022, an astounding 400.3 million metric tons of plastic were produced worldwide. Over 350 million metric tons of plastic trashes are produced annually by humans. Egyptian plastic market is anticipated to expand at a 10% yearly rate over the next ten years, making Egypt Africa's biggest user of plastic. Thermosets and thermoplastics are two types of plastics. During heating cycles, thermosets do not melt or soften. Thus, even at high temperatures, the product's shape doesn't alter (Alves, 2024; Garside, 2024).

In contrast, thermoplastics are materials that become soft and hard during heating and cooling cycles. They are categorized into seven types. Type 1 (polyethylene terephthalate) typically used to create various utensils and disposable water bottles. It is only intended to be used once (Dodiuk, 2021; Kazemi, Kabir, & Fini, 2021).

The most widely used plastic in the world is type 2, or high-density polyethylene. It is used to make toys,

different kinds of plastic bags, and a lot more. These products are thought to be safer for food and drink than type 1. The 'heat-resistant' polymer type 3 is polyvinyl chloride (PVC) (Dodiuk, 2021; Kazemi et al., 2021).

Low-density polyethylene, or type 4, is used to make milk cartons and drinks as well as to package frozen items. This kind is safe to use on food and drink. Type 5 (polypropylene) is frequently used to package ketchup, yogurt, beverages, and many other items. One kind of plastic derived from petroleum is Type 6 (polystyrene). Polystyrene is a substance known to cause cancer in humans. All polymers are referred to as Type 7 (polycarbonate) plastics, with the exception of the ones listed. Because polycarbonate containers contain BPA, their use has significantly declined recently (Dodiuk, 2021; Kazemi et al., 2021). Plastics' monomeric components, such as bisphenol A (BPA), plasticizers or antimicrobial polycarbonate, may pose a risk to human health. Bisphenol A has been connected to a number of health concerns, including ovarian chromosomal damage, lower sperm production, early puberty, rapid immune system changes, cardiovascular disorders, and obesity. Certain harmful substances can injure fetuses and newborns by entering their bodies. During manufacturing of plastic items, many dangerous chemicals are discharged into atmosphere as carbon monoxide (Proshad et al., 2018).

High concentrations of these gases in the air can lead to alteration in

immune system, respiratory and nervous system problems. Most plastics degrade slowly resulting in accumulation of plastic wastes in the environment. Plastic pollution has a major harmful impact on rivers, oceans, lands, and animals. Burning plastic releases a number of harmful and cancer-causing compounds into environment **(Govind & Nishitha, 2023)**.

Both the environment and human health are severely harmed by plastics. Sustainable plastics production, usage, and disposal should be a priority for health authorities. Additionally, people must be informed about chemicals that present in plastic items. Nonetheless, community health nurses are crucial in informing people about dangers of plastic. Practical tasks, such as reducing the use of harmful items, reducing waste, and using other healthy alternatives, must be the main focus of educational programs **(El-shafei, Ahmed, Alaa El-Din, Lotfy, & El Hawy, 2021; Obebe & Adamu, 2020)**.

Public health professionals and environmental protection organizations are crucial in preventing various risks and pollution levels. Educational efforts regarding negative plastic effects to environment and human health are crucial. Both the environment and human health will benefit from this. To give reliable knowledge, it is advised that waste management and plastic pollution programs be incorporated into all levels of schooling **(Hamza & Mahmoud, 2023)**.

Community health education initiatives are a cost-effective and effective way to improve health in the community. The finest environment for health and health awareness is the community, where the nation develops and flourishes. The environment and human health are seriously threatened by plastic in a number of direct and indirect ways. Therefore, it is imperative that plastic waste and usage be decreased. Parents -especially mothers- need to be educated on harmful impacts of plastic use in order to help their children understand these issues **(Sarma & Gandhi, 2023)**.

Mothers knew very little about the risks of plastic and plastic wastes, Community health nurses are hired to carry out or assist with every service provided to the community. Since education has the power to alter people's knowledge, attitudes, and behaviors, nurses educational role is crucial. In order to reduce these potential health risks in the future, it is imperative that plastic alternatives be promoted and plastic garbage disposed safely **(Abid et al., 2020; Sarma & Gandhi, 2023)**.

Significance of the study: As the primary caregivers for their families and children, mothers serve as their children's first teachers. Alongside the rise in women's employment, long hours spent outside the home, and rising food prices, many mothers have a tendency to store a lot of their food in plastic containers and bags. Thus, the current study was intended to assess educational program effect on mothers' behavior and understanding

of health risks associated with plastic use.

Study aim: was to assess educational program impact on mothers' awareness and behavior about health risks associated with plastic using in home.

Subjects and method

Study design:

Quasi-experimental research design.

Study setting:

Medical center at Sigar & Dr. Mohamed Mashaly primary health care center at Saied Street at Tanta city.

Subjects:

Convenience sample of 166 mothers who attended the previous setting.

Tools of data collection:

Tool I: Knowledge of mothers about plastic usage and its health hazards:

It was developed by researcher after reviewing related literature. It included two parts:

Part (1): Mothers socio-demographic characteristics:

Included data about mothers' age, marital status, residence, educational level, occupation, income, family members' number and husband education & occupation.

Part (2): Knowledge of mothers about plastic usage and its health hazards:

It was used to assess mothers' knowledge about health hazards of plastic use in domestic purposes before, immediately after and a month after program. It was created in Multiple Choice Questions (MCQ) form. It consisted of 14 items covering the following areas: characteristics of plastic, types of plastic products, composition of plastic tools, precautions that should

be followed during plastic use, results of unsafe use of plastic products, health hazards from plastic use, environmental hazards regarding unsafe plastic products use and safe disposal of plastic wastes.

Total score for mothers' knowledge was (28) degrees and calculated as follow

- Complete & correct answer was given score two.
- Correct & incomplete answer was given score one.
- Incorrect & don't know answer was given score zero.
- These scores were summed up and total score was converted into a percent score.

Total score of mothers' knowledge was classified as follow

- **High knowledge level** $\geq 70\%$ of total score. (
- **Moderate knowledge level** $60 < 70\%$ of total score.
- **Low knowledge level** $< 60\%$ of total score.

Tool II: Self-reported practices of mothers regarding plastic products use:

It was used to assess mothers' practices regarding plastic products use. It included the following parts: type, frequency of plastic products they use, safe and unsafe use of plastic products, alternatives for plastic use and safe plastic disposal.

Scoring system of mothers' practices was as follow

- Items reported to be done were given score one (1) & items not done were given score zero (0) regarding positive practices.
- Items reported to be done were given score one (1) & items not

done were given score zero (0) regarding negative practices.

- Scores were summed up and total score was converted into a percentage score.
- Higher score indicates a greater level of mothers' practices.

Total score for mothers' practices was (42) degrees and classified as follows

- **Satisfactory practices** $\geq 60\%$ of total score.
- **Unsatisfactory practices** $< 60\%$ of total score.

Method

The study was conducted as follows

1. Administrative approval

- Official permission was obtained from the Dean of Faculty of Nursing and directed to responsible authorities (managers of selected MCH centers) to obtain approval and cooperation to conduct the study.
- Permission to collect data from the selected settings was obtained after informing MCH centers managers about study objectives.

2. Ethical and legal considerations

- Approval of Faculty of Nursing Scientific Research Ethical Committees was obtained to conduct study (code of ethics: 293-8-2023).
- Informed consent was taken from studied mothers after providing explanation about study purpose.
- Each participant was informed that she has right of withdrawal from study any time she wants.
- Study nature didn't cause any harm and/ or pain for entire sample.

- Privacy and confidentiality were put into consideration regarding collected data.

3. Tools development

- Study tools were developed based on literature reviewing.

4. Validity and reliability of study tools

- Study tools were tested for face and content validity by jury test of 5 experts in Community Health Nursing to evaluate individual items and entire instrument as being relevant and appropriate to test what it wanted to measure. Based on experts' opinion, questionnaire face validity was calculated and was 93% and content validity index of its items was 94% for knowledge questionnaire about plastic usage and its health hazards and 92% for practices questionnaire regarding plastic products use. **Total questionnaire content validity index was 93.24%.**

- The questionnaire was tested by pilot subjects to assess reliability, at first session for calculating Cronbach's Alpha which was 0.864 for knowledge questionnaire about plastic usage and its health hazards and 0.825 for practices questionnaire regarding plastic products use. **Total questionnaire Cronbach's Alpha was 0.873.**
- Significance was adopted at $p < 0.05$ for interpretation of tests results.

5. Pilot study

- Pilot study on 10 % of the sample was done by researcher for testing tools clarity, applicability and to

identify obstacles that encountered during data collection and to determine length of time needed to collect data from each mother. Accordingly, necessary modifications were done. Those mothers were excluded from the study sample.

- The researcher met mothers at the educational kitchen as a suitable area in MCH centers to collect data.
- Data was collected by the researcher over five months starting from June 2024 to October 2024.

6. Actual study

- Educational program was carried out as the following phases:

I) Assessment phase

- During this phase the researcher used tool I part one & part two and tool II to assess mothers' knowledge & practices about health hazards of plastic use in domestic purposes through meeting them in MCH centers to collect baseline data as a pre-intervention assessment.

II) Planning phase

- The program was planned according to mothers' needs that determined by pre assessment phase and based on literature review. It included:

A. Formulating goal and setting objectives

- **The program goal:** was to enable mothers to be aware of health hazards of plastic use in domestic purposes and improve their practices of plastic use.

- **Specific objectives were formulated according to each session.**

B. Preparing contents: according to pre-determined needs of mothers and reviewing literatures to meet those needs.

C. Determine teaching methods and audiovisual aids used in the program

- Lectures and discussions were used as teaching methods.
- Teaching aids used were Power point presentation, pictures, videos and handout as (brochures & colored booklet).

III) Implementation phase

- The researcher met mothers in MCH centers according to the convenient date and time for mothers and researcher.
- The program was conducted to mothers by the researcher. Four sessions were provided for them according to their actual needs about health hazards of plastic use. The duration of each session was 45 minutes.

Session (1): Program orientation and expectation.

- This session aimed to orient mothers about the program, its importance, general aim, sessions, and objectives of each session and to assess expectations from each session.

Session (2): Plastics overview.

- This session aim was to give mothers overview of plastics (definition-prevalence (worldwide and in Egypt), characteristics of plastic and types of plastic

products used in domestic purposes).

Session (3): Composition of plastic tools.

- It aimed to inform them about composition of plastic tools & precautions that should be followed on using plastic products, results of false plastic products use, health and environmental hazards from plastic use.

Session (4): Practices regarding the use of plastic food containers.

- It aimed to educate mothers about safe & unsafe types of plastic products, alternatives for plastic, measures to reduce plastic wastes and safe plastic disposal.

IV) Evaluation phase

It aimed to evaluate the effectiveness of the program on knowledge & practices of mothers.

This phase was done three times:

- **Pre-test:** Before program implementation for mothers using (tool I part one & part two and tool II) of the study to assess their baseline data and practices of health hazards regarding plastic use in domestic purposes.
- **Immediately:** Immediately after program implementation using (Tool I part 2 and Tool II).
- **Post-test:** After a month of program implementation using (Tool I part 2 and Tool II).

Statistical analysis of data:

- Version 25 of IBM Corporation's Statistical Package for Social Science was used to code, enter, tabulate, and analyze the gathered data (IBM Corporation, Armonk, NY, USA). Range, mean and

standard deviation were calculated for quantitative data. For qualitative data, which describe a categorical set of data by frequency, percentage of each category, comparison between two groups or more was done using Chi-square test (χ^2 test). For comparison between means of two groups of non-parametric data of independent samples, Z value of Mann-whitney test was used. Kruskal-Wallis (χ^2 value) was calculated to compare between more than two means of non-parametric data. Pearson's correlation coefficient (r) was used to evaluate correlation among variables.

Results

Table (I): Represents studied mothers' distribution regarding their knowledge about health hazards of plastic usage. It showed that there was significant improvement in studied mothers' knowledge about health hazards of plastic use. The differences observed among pre, immediate and after program were statistically significant ($P < 0.001$). It was seen that, pre-program implementation all of the studied mothers gave incorrect and don't know answers regarding (health hazards of plastic use on women's health) and most (98.8 %) of them had incorrect and don't know answers regarding (health hazards of plastic use on foetal and child health). While immediately after program implementation, more than half (60.2 %) and about two-thirds (66.9%) of them had complete and correct

answers regarding the same items respectively.

Figure (1): Describes the mean total knowledge score of studied mothers regarding their total levels of knowledge about plastic usage and its health hazards throughout periods of study. It disclosed that there was significant improvement in studied mothers' knowledge about plastic usage and its health hazards immediately after and a month post program implementation, whereas the mean scores of their knowledge increased from (6.05 ± 2.75) pre-program implementation to (26.15 ± 1.73) immediately post-program and (25.92 ± 1.89) a month after it. These differences were statistically significant ($P < 0.001$).

Figure (2): Represents studied mothers' distribution regarding their source of knowledge about plastic usage and its health hazards. It conveyed that, more than two-thirds (69 %) of them social media served as their information source. and less than one-half (48 %) of them was from television. Furthermore, the least (5 %) of them got their information from educational programs in workplace.

Table (II): Represents studied mothers' distribution regarding frequency of using plastic products in domestic purposes. It illustrates that there was statistically significant improvement in mothers' practices regarding plastic products use in domestic purposes ($P < 0.001$). As less than half (48,8 %) of them were always using plastic products in domestic purposes before program implementation, while half (50%) of them were usually using plastic

products in domestic purposes immediately after implementation and more than half (51.8 %) of them were rarely using plastic products in domestic purposes one month after program implementation.

Figure (3): Represents distribution of studied mothers regarding their practices about plastic products use. It indicated that, there was significant improvement in practices of them throughout periods of study as ($P < 0.001$). As pre-program implementation; all of them had unsatisfactory practices regarding frequency of using plastic products and using of alternatives for plastic products in domestic purposes respectively. Additionally, most (98.2 %) of them had unsatisfactory practices regarding types of plastic products used in domestic purposes and the majority (86.1%) of them had unsatisfactory practices regarding safe plastic disposal. Furthermore, immediately after program, all of them had satisfactory practices regarding frequency of using plastic products and most (90.4 %, 95.2 %, 99.4 %) of them had satisfactory practices regarding types, alternatives for plastic products used in domestic purposes and safe plastic disposal respectively.

Figure (4): Represent total score of practices of studied mothers about plastic products use throughout the periods of the study. It clarified that there was a significant improvement of their practices scores about plastic products use immediately after and a month post program, whereas the mean scores of their practices increased from (6.05 ± 2.75) pre-

program to (26.15 ± 1.73) immediately post-implementation and (25.92 ± 1.89) a month post-implementation. These differences were statistically significant ($P < 0.001$).

Table (IV): Represents relation between studied mothers' total practices score about plastic products use and their socio-demographic characteristics. It was found that there was statistically significant relationship among total practices scores of them and their age, level of education and occupation ($P < 0.001$). In contrary, there was no correlation with other characteristics

of them including their marital status, residence, husband level of education & occupation, income and family members' number.

Table (V): Represents correlation among studied mothers' total knowledge and practices scores regarding plastic usage and its health hazards. It showed that there was statistically significant positive correlation between total knowledge score of studied mothers and their total practices score regarding types of plastic products used in domestic purposes before, immediately after program and one month after it as ($P < 0.001$).

Table (I): Distribution of studied mothers regarding their knowledge about health hazards of plastic usage.

Knowledge about health hazards of plastic usage	Response of studied mothers before and after program (N=166)						χ^2 test P value
	Before		Immediate after		Post-one month		
	N	%	N	%	N	%	
Health hazards of plastic use on human health							
– Incorrect & don’t know answer	147	88.6	-	-	-	-	424.952 0.0001*
– Correct & incomplete answer	18	10.8	48	28.9	49	29.5	
– Complete & correct answer	1	0.6	118	71.1	117	70.5	
Health hazards of plastic use on women’s health							
– Incorrect & don’t know answer	166	100	-	-	-	-	498.169 0.0001*
– Correct & incomplete answer	-	-	66	38.8	69	41.6	
– Complete & correct answer	-	-	100	60.2	97	58.4	
Health hazards of plastic use on foetal and child health							
– Incorrect & don’t know answer	164	98.8	3	1.8	-	-	475.946 0.0001*
– Correct & incomplete answer	1	0.6	52	31.3	52	31.3	
– Complete & correct answer	1	0.6	111	66.9	144	68.7	
Health hazards from burning of plastic wastes							
– Incorrect & don’t know answer	62	37.3	-	-	-	-	350.578 0.0001*
– Correct & incomplete answer	80	48.2	6	3.6	6	3.6	
– Complete & correct answer	24	14.5	160	96.4	160	96.4	
Environmental hazards results from plastics							
– Incorrect & don’t know answer	36	21.7	-	-	-	-	323.600 0.0001*
– Correct & incomplete answer	108	65.1	2	1.2	22	13.3	
– Complete & correct answer	22	13.3	164	98.8	144	86.7	
Safe ways to get rid of and reduce plastic and its wastes							
– Incorrect & don’t know answer	59	35.5	-	-	-	-	329.445 0.0001*
– Correct & incomplete answer	85	51.2	3	1.8	20	12.0	
– Complete & correct answer	22	13.3	163	98.2	146	88.0	

*Statistically significant (P<0.05)

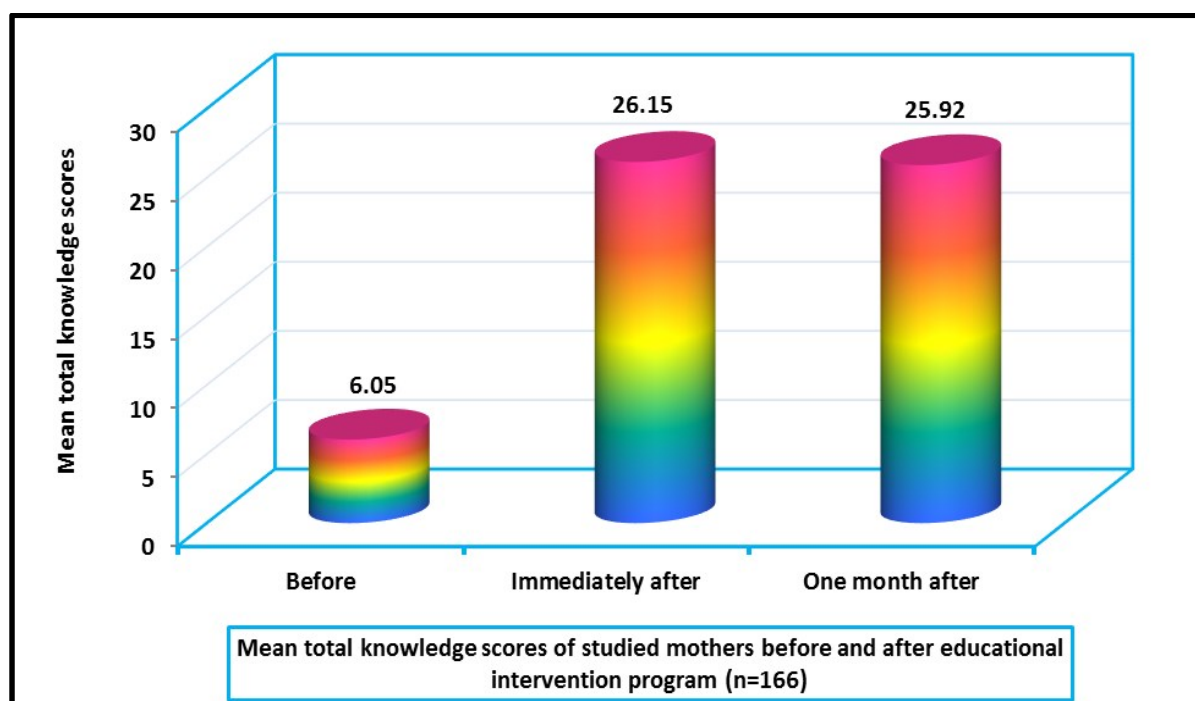


Figure (1): Mean total knowledge score of studied mothers about plastic usage and its health hazards before and after educational program.

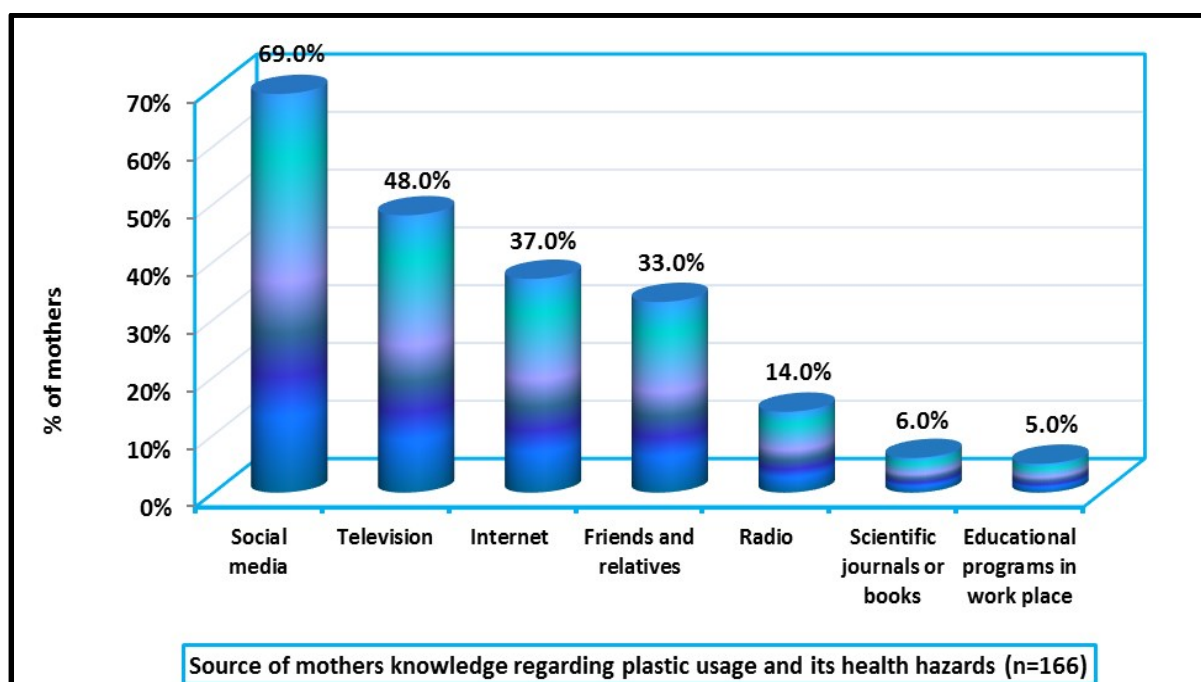
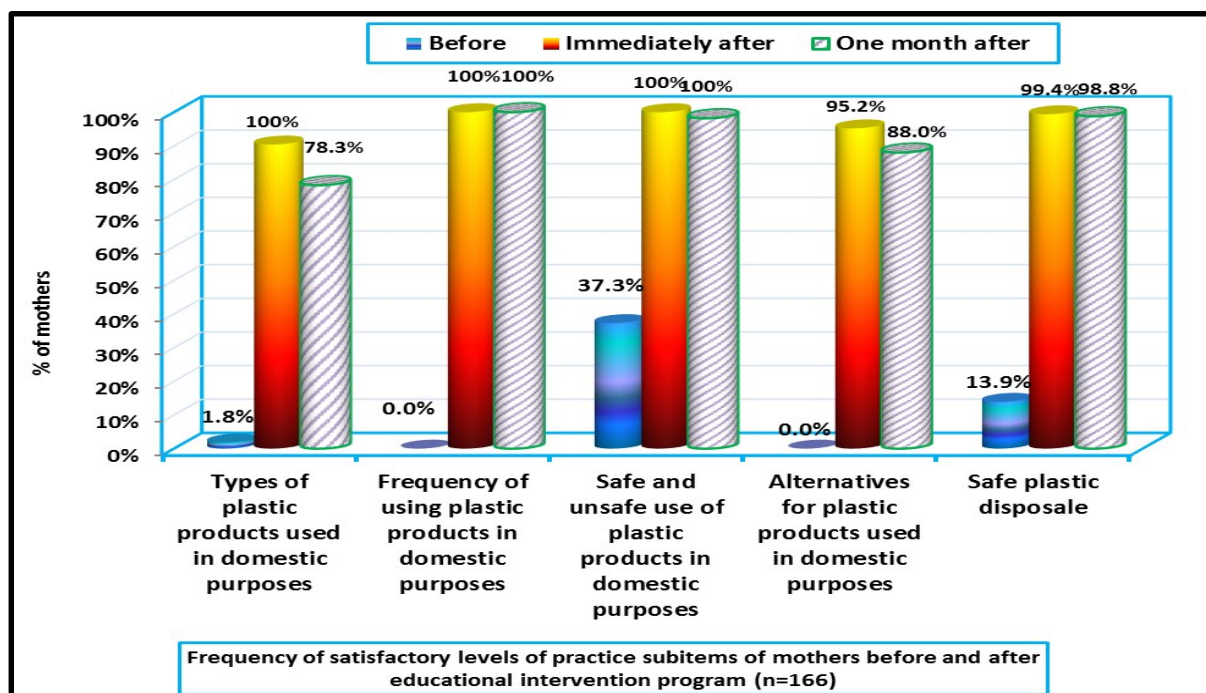


Figure (2): Studied mothers' distribution regarding source of knowledge about plastic usage and its health hazards.

Table (II): Distribution of studied mothers regarding frequency of using plastic products in domestic purposes.

Self-reported practices regarding frequency of using plastic products in domestic purposes	Self-reported practices of studied mothers before and after program (N=166)						χ^2 test	P value
	Before		Immediate after		Post-one month			
	N	%	N	%	N	%		
1-Always use plastic products. Done incorrectly Done correctly	85 81	51.2 48.8	- 166	- 100	- 166	- 100	204.988	0.0001*
2-Often use plastic products. Done incorrectly Done correctly	92 74	55.4 44.6	- 166	- 100	- 166	- 100	225.695	0.0001*
3-Usually use plastic products. Done incorrectly Done correctly	155 11	93.4 6.6	83 83	50.0 50.0	75 91	45.2 54.8	100.176	0.0001*
4-Rarely use plastic products. Done incorrectly Done correctly	166 -	100 -	78 88	47.0 53.0	86 80	51.8 48.2	127.626	0.0001*
5-Never use plastic products. Done incorrectly Done correctly	166 -	100 -	5 161	3.0 97.0	5 161	3.0 97.0	455.557	0.0001*

*Statistically significant (P<0.05)

**Figure (3): Distribution of studied mothers regarding their levels of practices regarding plastic usage and its health hazards.**

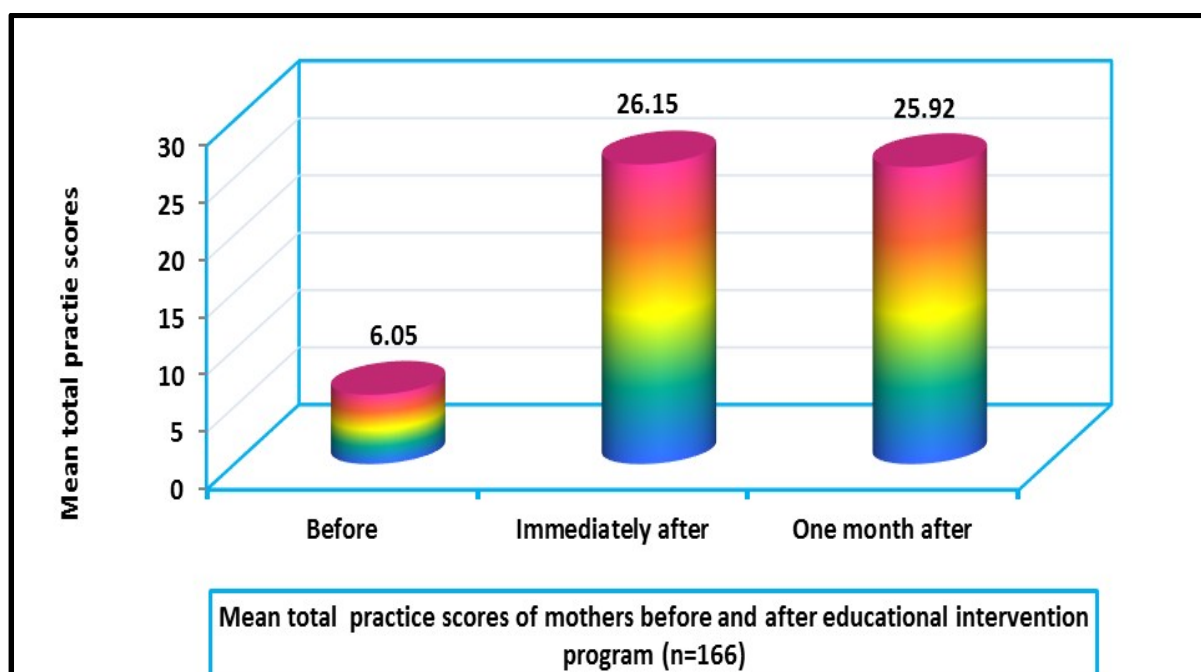


Figure (4): Total practices level of studied subjects about plastic use and its health hazards throughout study periods.

Table (III): Relation between total practice scores of studied mothers about plastic products use and their socio-demographic characteristics.

Socio-demographic characteristics	No.	Total practice scores of studied mothers before and after educational program (N=166)					
		Before		Immediate after		Post-one month	
		Mean±SD	Z or χ^2 P	Mean±SD	Z or χ^2 P	Mean±SD	Z or χ^2 P
Age years							
– ≤ 30	71	12.37±3.64	4.771	31.84±3.37	6.835	32.07±2.42	5.997
– >30 ≤ 40	76	12.37±3.67	0.092	33.84±2.49	0.033*	31.95±2.96	0.043*
– >40-53	19	10.74±2.49		22.62±2.33		30.26±3.44	
Marital status							
– Married	156	12.17±3.61	1.956	33.47±2.62	4.564	31.77±2.88	2.504
– Divorced	8	13.00±3.02	0.376	34.87±2.62	0.102	32.87±2.17	0.286
– Widow	2	10.00±0.00		31.50±2.12		32.87±2.17	
Residence							
– Urban	105	12.00±3.68	0.856	33.50±2.67	0.086	31.86±2.94	0.296
– Rural	61	12.49±3.35	0.393	33.54±2.47	0.931	31.72±2.69	0.767
Mother educational level							
– Illiterate	1	11.00±0.00	16.093	31.00±0.00	12.238	31.00±0.00	6.940
– Read & write	7	10.28±1.25	0.003*	30.86±1.21	0.016*	30.00±0.85	0.139
– Primary level	30	10.63±3.77		33.50±2.27		32.00±2.61	
– Secondary level	64	11.97±3.35		33.36±2.92		31.51±3.17	
– High level & post graduate	64	13.34±3.52		34.01±2.33		32.22±2.69	

Husband educational level							
– Illiterate	5	11.20±2.77	6.909	35.40±1.67	4.454	33.40±3.35	2.537
– Read & write	21	11.24±3.58	0.141	33.05±3.34	0.347	31.67±3.44	0.638
– Primary level	71	11.80±3.03		33.39±2.23		31.62±2.54	
– Secondary level	68	12.93±4.04		33.66±2.75		31.93±3.00	
– High level & post graduate	1	13.00±0.00		33.00±0.00		32.00±0.00	
Mother occupation							
– Not working	90	11.38±3.34	3.033	33.17±2.82	4.052	31.49±3.06	1.578
– Working	76	13.13±3.61	0.002*	33.93±2.25	0.044*	32.18±2.53	0.116
-If working mother, type of occupation	(n=76)						
– Employee	13	14.23±3.65	4.363	34.23±2.71	10.210	33.15±3.08	6.787
– Free business	24	13.25±4.09	0.359	33.46±2.00	0.037*	31.42±2.43	0.148
– Clerical work	7	11.57±3.10		34.71±1.70		32.86±2.54	
– Farmer	3	11.33±1.15		30.33±0.58		30.00±1.00	
– Professional	29	13..10±3.43		34.38±2.11		32.45±2.26	
Husband occupation							
– Clerical work	5	11.20±2.39	2.720	34.60±2.07	7.585	33.00±1.58	5.796
– Craft works	15	12.93±3.01	0.606	33.53±2.44	0.108	31.93±2.49	0.215
– Employee	81	12.04±3.88		33.60±2.75		31.96±3.04	
– Farmer	3	10.33±1.53		29.67±0.58		28.33±2.08	
– Free business	62	12.35±3.42		33.50±2.41		31.64±2.68	
Income							
– Not enough	22	11.86±3.95	1.694	32.59±2.79	5.139	30.81±2.67	4.472
– Enough	106	12.40±3.59	0.429	33.54±2.28	0.077	31.87±2.80	0.107
– Enough and adequate	38	11.74±3.28		34.00±3.18		32.21±2.99	
No. of family members							
– 2 & 3	37	11.89±3.39	2.985	33.65±2.71	0.169	32.16±2.67	0.706
– 4 & 5	120	12.07±3.49	0.225	33.47±2.55	0.919	31.70±2.86	0.702
– 6 & 7	9	14.89±4.46		33.67±2.96		31.78±3.42	

*Statistically significant (P<0.05)

Table (IV): Correlation between total knowledge scores and practice scores of studied mothers about plastic usage and its health hazards.

Practices regarding plastic products use	Total knowledge scores of studied mothers before and after program (N=166)					
	Before		Immediate after		One month after	
	R	P value	r	P value	r	P value
I-Types of plastic products used in domestic purposes	0.052	0.504	0.367	0.0001*	0.046	0.557
II-Frequency of using plastic products in domestic purposes	0.133	0.089	0.103	0.091	0.114	0.143
III-Safe and unsafe use of plastic products in domestic purposes	0.304	0.0001*	0.166	0.033*	0.511	0.0001*
IV-Alternatives for plastic products used in domestic purposes	0.143	0.065	0.118	0.129	0.025	0.745
V-Safe plastic disposal	0.0161	0.038*	0.243	0.001*	0.481	0.0001*
Total practice scores	0.204	0.008*	0.260	0.001*	0.181	0.020*

*Statistically significant ($P < 0.05$)

r=Correlation Coefficient

Discussion

This issue is urgent due to plastic products use widespread and their negative effects on the environment and human health. According to the results of current research, all the studied mothers got incorrect & don't know answers regarding women's health risks from plastic use, while most of them had incorrect & don't know answers regarding foetal & child health hazards resulting from plastic using. As well as the majority of them had incorrect & don't know answers regarding human health hazards from plastic use generally (Table I).

These findings concur with (Kokilamma, Arundhathi, Sreelatha, & Rani, 2024), who conducted assessment study of

knowledge regarding health hazards of plastic in domestic use in India and found that about one half of studied participants had moderate knowledge regarding health hazards of plastic in domestic purposes. This is similar with (Praveena, 2019), who conducted a study to assess knowledge regarding health hazards of plastic in domestic use in India and found that almost two-thirds of studied women had moderate knowledge regarding health hazards of plastic in domestic use.

Furthermore, the present study demonstrates that more than half of studied subjects gave correct & incomplete answers regarding environmental hazards resulting from plastics (Table I). These results aligned with (Ashmi, Amole, Yusuf,

& Michael, 2022), who carried out a study to assess awareness of health and environmental hazards of plastic bag use and available substitutes among health workers and found that most of studied subjects were knowledgeable of harmful environmental effects of plastic bags. Concerning to knowledge of studied mothers of plastic usage and its health hazards, the actual study illustrated that, before program implementation all of them had low knowledge with mean (6.05 ± 2.75), while there was an amazing improvement in their knowledge immediately after program implementation as all of them got high knowledge level with mean (26.15 ± 1.73) (**Figure I**). According to researcher point of view, this can be explained that almost three-quarters of them had postgraduate and secondary/high school degrees.

This outcome is consistent with (**Viji, Suja, Letha, & Christabel, 2023**), who carried out study to assess effect of video-assisted teaching program regarding hazards of plastics. The study reported that there was a significant effect of program as $P < 0.001$. Conversely, the current research findings conflict with (**Upendra et al., 2020**), who conducted a study to assess knowledge of hazards of plastic use and found that more than one-third of studied participants had average knowledge regarding hazards of plastic use.

Individuals gain information from many different sources. These sources can vary from person to person.

Regarding source of knowledge of studied mothers of current study, it

was found that more than two-thirds of them gained their information from social media (**Figure II**). As regard to researcher point of view, this might be because social media use has become a commonplace everyday activity in recent years. Social media is commonly utilized for a variety of reasons, including news and information access and social contact. This outcome is consistent with (**Kokilamma et al., 2024**), who found that above half of studied subjects gained their knowledge from mass media.

Additionally, the actual study findings coincided with (**Hassan et al., 2023**), who applied study to assess knowledge, attitudes and practices of plastic use for food and drinks among sample of Egyptians and observed that the most common sources of knowledge of them were individual experiences, websites and social media while the least-reported source was parents. Frequency of using plastic products varies from place to another and from person to another. The mothers' frequency of using plastic products in domestic purposes can be changed if they become aware of hazards of using these products.

Concerning to frequency of using plastic products in domestic purposes, the present research states that there was statistically significant improvement in mothers' practices regarding plastic products used in domestic purposes as ($P = 0.001$). As less than half of them were always using plastic products in domestic purposes before the program, while half of them were usually using plastic products in domestic purposes

immediately after it and more than half of them were rarely using plastic products in domestic purposes after one month of it (**Table II**).

This outcome is comparable to that of (**Mahmoud, Kabbash, & El-kest 2023**), who established a study to assess educational program effect about hazards of plastic use on knowledge, attitude and practice of teachers and observed that there was statistically significant improvement in studied participants practices as $P=0.001$. As pre-program all of studied participants were using plastic products while more than half of them were using them after program.

Studied mothers socio-demographic characteristics must be kept in mind during program implementation. There are many items of them can affect mothers' levels of knowledge and practices. So that, the actual study reveals that range age of studied mothers' is (19-53) years with a mean of (32.43 ± 6.28) and most of them were married. Also, more than half of them were residing rural areas and more than three-quarters had secondary/high and post graduate educational level. Furthermore, more than half of them were not working with enough income.

As well as, the results of the current research demonstrate that there was significant relation among studied mothers education and their total practices scores about plastic products use pre and immediately after program implementation, while there is no relation after it as ($P=0.003$ & 0.016) respectively. This can prove the positive program effect on studied mothers' practices for all of them

equally regardless their educational level (**Table III**).

Additionally, the present study shows that there was statistically significant relation between occupation of studied mothers and their total practices scores about plastic products use only pre and immediately after program, while there is no relation after its implementation as ($P=0.002$ & 0.044) respectively (**Table III**). This can be justified as studied mothers actually applied their knowledge in plastic use in domestic purposes regardless being working or not. As this indicate the positive effect of educational program on mothers' practices. However, there is no statistically significant difference between the occupation of mothers and the mean scores' practices.

These outcomes concur with (**Hamza et al., 2023**), who discovered that there was statistically significant relation among studied subjects age and their scores of practices of using plastics and its risks. However, it is on the contrary with them as they found that no relation between education and occupation of studied subjects and their practice of using plastics and its risks. Further, these findings match up with (**El-sayed, Marzouk, Mahmoud, & El Magrabi, 2019**), who found that there was statistically significant relation between mean scores' practice of mothers and their education regarding safe plastic containers uses as ($P=0.039$).

Conclusion:

The current study findings indicate that the program was successful in raising mothers' awareness of health

risks associated with using plastic in home.

Recommendations: With reference to current study outcomes, the following suggestions are proposed:

1. Continuous education and orientation programs should be established to raise community awareness of health hazards posed by plastic use.
2. Creation of brief and useful online guide for mothers that describes health hazards related to use of plastic and how to successfully avoid them.
3. Additional researches are required to investigate health and environmental hazards linked to plastic use.

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Effect of Nursing Measures on Orthostatic Hypotension and risk of falling for Patients after Total Hip Replacement Surgery

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Abstract

Background: A notable medical issue in hospitalized individuals, orthostatic hypotension is both widespread and clinically consequential after total hip replacement, yet it remains commonly overlooked. Therefore, it is important for patients to understand the nursing measures that can help prevent orthostatic hypotension, as well as the risk of falling associated with total hip replacement.

Aim: Evaluate the effect of nursing measures on orthostatic hypotension and risk of falling for patients after total hip replacement surgery.

Research design: A quasi-experimental research design.

Sample: A purposive sample of 60 patients who undergoing Total Hip Replacement.

Setting: orthopedic department, trauma unit and its outpatient clinics at Assiut University hospital.

Tools: Tool I; Patient assessment sheet, Tool II; Morse Fall Scale, Tool III; Orthostatic vital signs measurement, and Tool IV; Orthostatic symptoms grading scale.

Results: After implementing nursing measures, the mean value of orthostatic vital signs and orthostatic symptoms was improved among the study group more than the control group with p value = 0.0001 as well as there were statistically significant differences between the studied groups about the risk of falling with p value= 0.001.

Conclusion: Compared to the control group, the study group showed statistically significant improvements in orthostatic hypotension and fall risk following nursing measures.

Recommendations: Replication of this study in multicenter trials with broader participant demographics.

Keywords: Nursing Measures, Orthostatic Hypotension, Total Hip Replacement Surgery.

Introduction

Orthostatic hypotension (postural hypotension) is characterized by a sudden drop in blood pressure upon standing or lying down. Incidence of OH following total hip replacement is about 22% from 117 in post operative period. Post-orthopedic surgical patients experience fall rates of 2.5 incidents per 1000 patient-days during hospitalization. Also, orthostatic hypotension (OH) demonstrates a pronounced age-related progression, with prevalence estimates escalating from 5-11% in middle-aged populations to $\geq 30\%$ among elderly individuals **(Sarnaik & Mirzai, 2025)**.

Postoperative falls represent a significant cause of morbidity in orthopedic populations, necessitating comprehensive investigation into the pathophysiology, risk stratification, and evidence-based prevention of orthostatic hypotension in this vulnerable cohort **(Figueroa et al., 2025)**.

Consensus Committee of the American Autonomic Society established the current diagnostic criteria for orthostatic hypotension, defining it as a sustained reduction of ≥ 20 mmHg in systolic blood pressure or ≥ 10 mmHg in diastolic blood pressure within three minutes of assuming an upright position **(Jordan et al., 2023)**.

In orthostatic hypotension, cerebral hypoperfusion leads to symptoms such as lightheadedness, generalized weakness, cognitive fog, headaches, near-fainting sensations, and in severe cases, syncope. Following this initial

phase, the body triggers compensatory autonomic mechanisms, producing secondary symptoms including nausea, chest discomfort, cold extremities, palpitations, and cold sweating, which may also culminate in syncope if compensatory efforts fail to restore hemodynamic stability **(Brailsford et al., 2025)**.

Postoperative OH in orthopedic patients arises from three main causes: pharmacologic, neurogenic, and non-neurogenic factors. Pharmacologic OH is due to the frequent use of vasoactive medications like vasodilators, antihypertensives (especially α -blockers), diuretics, and opioids. Orthopedic patients often receive multiple such medications postoperatively, increasing iatrogenic risk. This risk is further exacerbated by neurogenic factors (e.g., autonomic neuropathy) and non-neurogenic factors (e.g., blood loss, dehydration, immobilization), creating a high-risk scenario for OH during early mobilization **(Rivasi et al., 2020)**.

Preventing (OH) necessitates a multifactorial strategy targeting modifiable risks: medication optimization by deprescribing or reducing high-risk drugs; maintaining euolemia through monitored fluid intake/output; and educating patients to avoid OH triggers (rapid posture changes, heat, large meals, Valsalva). Clinicians should monitor orthostatic vitals, promote gradual mobilization with physical therapy, and employ non-pharmacologic measures (compression stockings, seated leg exercises) to improve venous return

and mitigate fall risk in high-risk patients (**Wahba et al., 2022**).

OH management focuses on fall prevention, improved orthostatic tolerance (increased standing time/reduced symptoms), and hemodynamic optimization (raising standing BP without worsening supine hypertension). First-line physical counter maneuvers target enhanced venous return through biomechanical effects, increasing peripheral resistance and boosting venous return through rhythmic lower-body contractions (30-sec intervals). Evidence-supported techniques include thigh muscle activation (e.g., leg crossing with contraction), dynamic movements (slow marching in place), and positional adjustments (leg elevation, toe raises, forward bending). These interventions should be initiated at symptom onset and combined with pharmacologic/non-pharmacologic strategies for optimal functional improvement in activities of daily living (**Palma, & Kaufmann, 2024**).

Significance of the study:

In 2023, the Orthopedic Department at Assiut University Hospital recorded 200 admissions for total hip replacement (THR) procedures (**Assiut University Admission Office Census, 2022**) This case volume provides a substantial cohort for investigating postoperative complications such as OH, particularly given this population's dual risk factors of prolonged immobilization and frequent opioid use. The dataset enables quantification of OH incidence rates

and evaluation of prevention protocols in a real-world clinical setting.

Clinical observations in Assiut University Hospital's orthopedic department and outpatient clinic demonstrate a rising annual caseload of total hip replacement (THR) patients, necessitating enhanced perioperative monitoring protocols.

This population requires multidisciplinary care coordination to address life-threatening complications, with OH representing a patient safety concern due to its high incidence (20-40% post-THR) and fall-related morbidity. The present study aims to establish standardized OH assessment metrics that may: improve stabilization of orthostatic vital signs, alleviate symptoms, and decrease fall rates through timed interventions during early mobilization.

Aim:

General aim:

Evaluate the effect of nursing measures on orthostatic hypotension and risk of falling after total hip replacement patients.

This was achieved by:

1. Assess patient's orthostatic vital signs (blood pressure and pulse), risk of falling, and orthostatic symptoms before implementing nursing measures.
2. Design and implement nursing measures about orthostatic hypotension and associated risk of falling for patients after THR.
3. Evaluate the effect of nursing measures on patient's orthostatic vital signs, risk of falling, and

orthostatic symptoms after implementing nursing measures.

Research hypothesis:

- **H0:** No differences in orthostatic hypotension and risk of falling between the study group and control group after nursing measure implementation.
- **H1:** Study groups of patients who received nursing measures will have less risk of falling and have less orthostatic hypotension compared to control groups of patients.
- **H2:** Mean orthostatic vital signs, orthostatic symptoms will be improved among the study groups of patients compared to control groups of patients after nursing measures implementation.

Patients and method**Research design:**

This study utilized a quasi-experimental design to examine the causal relationship between nursing measures (independent variable) and three primary outcomes: (1) orthostatic vital sign stability (defined as <20 mmHg systolic/10 mmHg diastolic drop within 3 minutes of standing), (2) fall risk reduction (measured by Morse Fall Scale scores), and (3) orthostatic symptom severity (using the Orthostatic Hypotension Questionnaire). Participant allocation to study (nursing measure) versus control (standard care) groups followed non-random clinical assignment.

Research setting:

This study was conducted at Assiut University Hospital, the largest care center in southern Egypt, serving a

catchment area of approximately 5 million inhabitants. The research focused on three specialized units: the orthopedic inpatient department, trauma unit, and affiliated outpatient clinics. The orthopedic ward occupies the entire fourth floor, comprising separate male and female departments with identical configurations - each containing 6 patient rooms (36 beds total per department) to ensure gender-specific care standards. This high-volume setting provides an optimal environment for investigating postoperative complications like orthostatic hypotension across diverse patient demographics.

Sample

A purposive sample of 60 patients undergoing total hip replacement was divided equally (30 per group) via shuffled cards (even: control; odd: study). The study groups (received nursing measures before the operation) and the control groups (received routine instructions before the operation). After collecting pilots' study, the sample was calculated by using power analysis in the G*power (v3.1.7) program. In the calculation performed by taking the post application of preventive measure systolic blood pressure during standing position after 3 minutes for study and control groups. The mean difference between the two group was (11.83), the standard deviation for study group and control group was (8.56, 17, 6) respectively, into consideration and seeking a significance level of 0.05 (α) and a statistical testing power of 80% ($1-\beta$) the effect size was calculated to be (d)

0.427 and according to the standard deviation value (SD) the minimum sample size was found to be 23 for each group. (Fawzy & M El-Sayed, 2023).

Inclusion criteria:

Adult patients of both genders, aged from 21-65 years, agreed to participate in the study, who had total hip replacement surgery and were able to communicate with others.

Exclusion criteria:

Patients who had neurological or vascular disorders and disagreed with participating in the study.

Tools:

This study employed four validated tools to capture comprehensive outcome measures:

Tool I: Patient assessment sheet:

It was developed by researchers based on reviews of literature (Gamaa et al., 2023). It was used to assess patient's demographic data and clinical data. It comprised two validated sections:

Part 1: Demographic characteristics: such as code number, age, gender, marital status, educational level, occupation, and residence.

Part 2: Clinical data: which include vital signs, laboratory investigations, and average amount of blood loss, need to have blood transfusion, medical diagnosis, and length of surgery.

Tool II: Morse Fall Scale (MFS):

The assessment tool was originally designed by Morse et al., 1989 as a clinical instrument for predicting fall risk in vulnerable patient populations. It was adopted by the researchers to assess a patient's likelihood of falling

before the operation and after two weeks. The Morse Fall Scale (MFS) incorporates six key clinical variables: prior history of falls, presence of secondary diagnoses, use of ambulatory assistive devices, intravenous therapy or heparin lock placement, gait characteristics, and cognitive status.

Scoring system:

To obtain the Morse Fall score add the score from each category, the score is then tallied and recorded on the patient's chart. Risk level and recommended actions are then identified.

– **0:** No risk for falls, **<25:** Low risk, **25-45:** Moderate risk, and **>45:** High risk

Tool III: Orthostatic vital signs measurement:

It was adopted from Agency for Healthcare Research and Quality, 2013, Gamaa et al., 2021, and American Heart Association, 2023, to measure and record the selected vital signs (heart rate, systolic, and diastolic blood pressure). The measurements were collected with the patient in both supine and upright positions. Initially, the patient remained in a flat, supine position for at least 3 minutes (optimally 5 minutes), during which blood pressure and pulse were recorded. Subsequently, the patient was asked to sit for one minute before standing, after which blood pressure and pulse were reassessed following a 3-minute interval in the standing position. In cases where standing was not feasible, measurements were obtained while

the patient remained seated with legs uncrossed and feet suspended.

Scoring system:

Orthostatic hypotension is diagnosed when a patient exhibits a sustained reduction in systolic blood pressure of ≥ 20 mmHg or a diastolic drop of ≥ 10 mmHg within 3 minutes of standing. Alternatively, an increase in heart rate of ≥ 30 beats per minute (bpm) upon standing.

Tool IV: Orthostatic symptoms grading scale:

It was developed by (Schrezenmaier et al., 2005). This instrument was employed to evaluate orthostatic hypotension (OH) symptoms and their impact on activities of daily living (ADLs). The assessment comprises four core symptoms: fatigue, lightheadedness, cognitive difficulties (problems with thinking and concentrating), and visual disturbances (blurry vision). Each symptom is further categorized into five domains: symptom frequency, symptom severity, triggering conditions, effects on ADLs, and duration of symptoms while standing. The researchers used five subtitles after one day postoperative, and two weeks post operative.

Scoring system:

Each subtitle composed of 4 responses ranged from (0-4), the total score for each symptom ranged from (0-20), and the total score for all 4 symptoms ranged from (0- 80).

- Mild orthostatic symptoms <4,
- Moderate orthostatic symptoms 4–9,
- Severe orthostatic symptoms >9

Nursing measures for orthostatic hypotension and risk of falling for patient after total hip replacement:

After reviewing literature (Criado and Kalafut, 2024, Strumia et al., 2023 and Reilly, 2024) and previous research and articles, the researchers developed the necessary nursing measures to prevent or at least minimize orthostatic hypotension and risk of fall for patients after total hip replacement surgery. It comprised two distinct sections:

a) Theoretical part:

1- Orthostatic hypotension:

Definition of orthostatic hypotension, causes, risk factors associated with OH, signs and symptoms of OH, complications of OH, and how the doctor diagnosis OH.

- ##### **2- Risk of falling:** what is fall, what are the intrinsic factors and extrinsic risk factors of falls (including environmental hazards or improper use of assistive devices), preventive measures to decrease the risk of falls in the subtitles of “Promotion of a better vision through regular assessment and correction”, “Promotion of vitamin D to support musculoskeletal health”, “Guidance on drug interactions which can cause dizziness, syncope, and malaise”, “Steps of using crutches and walkers”, “Guidance on increased safety attention in home through environmental adaptation and modifications , including handrails for stairs, grab rails for bathroom,

good lighting, and slip-resistant surfacing for outside areas.

b) Practical part:

- 1. Orthostatic hypotension:** This comprehensive approach combines preventive strategies and symptom-reduction techniques, including (1) a gradual rising measures (rolling to one side, swinging legs over the bed edge, pushing to seated position, waiting 1-2 minutes before standing), (2) dietary modifications (increased salt intake with medical approval and adequate fluid consumption), (3) physical countermeasures (calf muscle stretches before rising, thigh/abdominal/gluteal muscle contractions), and (4) compression therapy (proper use of medical-grade stockings with correct donning/removal techniques) - all aimed at preventing sudden blood pressure drops and minimizing symptom severity through physiological stabilization and improved venous return.
- 2. Risk of falling:** Exercise Component: The intervention incorporated targeted physical exercises designed to enhance muscular strength (particularly in the lower extremities) and improve balance control. These exercises underwent rigorous validation by a multidisciplinary expert panel comprising nursing specialists and orthopedic surgeons.

Content validity and reliability:

Content validity:

The assessment tools and nursing measures underwent comprehensive evaluation by a multidisciplinary review panel consisting of three professors from the Medical-Surgical and Geriatric Nursing departments at the Faculty of Nursing, and two orthopedic medicine professors from the Faculty of Medicine at Assiut University. Following their expert assessment, appropriate modifications were implemented to enhance clarity and precision of the materials.

Reliability:

The study instruments were evaluated for internal consistency using Cronbach's alpha coefficient (acceptable range: 0.5-1.0). The analysis demonstrated excellent reliability across all tools: Orthostatic Vital Signs Measurement ($\alpha=0.90$), Morse Fall Scale ($\alpha=0.825$), and Orthostatic Symptoms Grading Scale ($\alpha=0.94$), confirming their psychometric robustness for clinical assessment.

Pilot study

A representative sample of 10% ($n=6$) of the total patient cohort participated in preliminary testing to evaluate both the clarity of assessment tools and the time requirements for administration. As no modifications were necessary following this pilot phase, these participants were subsequently included in the main study population.

Ethical Consideration:

This study received formal ethical approval from the Faculty of Nursing Research Ethics Committee (approval code: 1120230633; date: June 25,

2023). Institutional permissions were secured from: the Dean of the Faculty of Nursing, and the relevant clinical departments at Assiut University Hospital (Orthopedics, Trauma Unit, and Outpatient Clinic). Prior to participation, all patients received comprehensive verbal and written information about the study aims and procedures, with emphasis on their right to withdraw without consequence. Written informed consent was obtained from all participants, with strict maintenance of confidentiality throughout data collection and analysis.

Procedure:

The study data were systematically collected over a 12-month period from August 2023 to July 2024, with researchers conducting fieldwork during morning shifts (5-hour) three days per week (Saturday, Monday, and Wednesday) at the designated clinical sites. Through the following phases the data was collected:

Assessment phase

Following official approvals, researchers established direct communication with eligible patients during pre-operative visits (day before surgery). Each participant received individual study briefings including purpose explanation and consent acquisition. Patients were then randomly allocated to two equal groups using a shuffled card method. On operation day, researchers collected: demographic/clinical data via Tool I (Parts 1-2; ~5 minutes) and fall risk assessments via Tool II (Morse Fall Scale; ~5 minutes), totaling approximately 10 minutes per

patient (with variation based on response time). All procedures were completed during scheduled clinical interactions to minimize workflow disruption.

Planning phase:

The researchers designed evidence-based nursing measures by synthesizing current literature from relevant journals and recent articles. These measures were delivered using multimodal educational tools, including PowerPoint presentations, instructional videos, and illustrative images to enhance comprehension. Additionally, each patient received a color-coded booklet written in simple Arabic to serve as a continuing reference, reinforcing the provided information and promoting adherence to the recommended practices.

Implementation phase

- After collecting necessary data as baseline data, the day before the operation, the control groups received the routine department instruction, while the study groups received nursing measures by the researchers.
- Preoperative researchers implement nursing measures in the presence of relatives to be a reminder and motivated to the patients in three sessions.
- The first session covered the theoretical part about orthostatic hypotension and risk of falling. The second session covered the practical part of OH (preventive measures) and the third session includes the practical part about the exercise.

- The session took approximately 30 minutes and 10 minutes for revision.
- Using printed, colorful paper and using terms and words according to the patient's education level, the researchers started to explain the nursing measures, starting by theoretical part, then practical part that focuses on prevention or at least minimize severity of symptoms of orthostatic hypotension, and teach patients actually how to wear and remove stocking by using real stocking.
- At the end of the session, the researchers give time to the patient and relatives to ask questions and summarize what is said and done.
- The researchers used the manner of reinforcement and motivation during the explanation, and every patient was given a copy of the nursing measures.

Evaluation phase

After one day postoperative in the department and two weeks postoperative in the outpatients clinic during the routine follow up, the researchers evaluated both the study and control groups of patients vital signs (heart rate, systolic, and diastolic blood pressure) by using tool III, and symptoms of orthostatic hypotension (2 times, 1 and 15 days) by using tool IV and risk of falling after 2 weeks only by using tool II. Then the researcher compared the findings for both groups.

Statistical design:

Normality was checked using the Anderson-Darling test, and variance homogeneity was confirmed.

Categorical data were presented as frequencies (N, %), while continuous variables were reported as mean $\pm$ SD. Group comparisons used t-tests (two groups) or ANOVA (multiple groups), and Pearson correlation assessed scale score relationships. All tests were two-tailed with $p < 0.05$ significance, analyzed using IBM SPSS (v20.0).

Results

Table (1): Displays that two thirds of the study group (66.7%) and more than one half of control group (56.7%) were more than fifty-five years old. As regards marital status, more than two thirds of the study group (73.3%) and less than two thirds of control group (63.3%) were married. As regards level of education, one third of the study group and control group (33.3%) were primary education. As regards occupational status, less than one third of study group (26.7%) and one third of control group (33.3%) was employer. As regards residence, one half of the study group (50%) and more than one half of the control group (56.7%) were from urban areas with no statistically significant difference between study and control groups.

Table (2): Illustrates that there was statistically significant difference between study and control groups as regards diastolic blood pressure with P-value (0.036). Three fifths of study group (60%) and less than one half of the control group (46.7%) need to have a blood transfusion. More than three fifths of study group and control group (63.3%) their diagnosis were fractures. The majority of study group

(86.7) and control groups (90%) had less than 3 hours in the operation.

Table (3): Clarifies that; one day after the operation, there was a statistically significant difference between the study and control groups as regards diastolic blood pressure during standing position with (P value = 0.024), while after 2 weeks of the operation, there was a statistically significant difference between study and control groups as regard blood pressure only during the standing position with no statistically significant difference for pulse during both position.

Table (4): Reflects that before surgery and before implementing nursing measures the risk for fall were equal between two groups of patients (study and control) group, where the majority of study group (90%) and more than two thirds of control groups (76.7%) had high risk for falling with no statistically significant difference between two groups with p-value (0.788). While after 2 weeks and after implementing nursing measures, more than two fifths of the study group (46.7%) had moderate risk for falling while about two thirds of control group (66.7%) had a high risk of

falling with statistically significant difference (P.value = 0.001).

Table (5): Demonstrates that there was a decrease in the mean of orthostatic symptoms grading among the study group after implementing nursing measures compared with the control group with statistically significant difference between two groups with (P.value = 0.001).

Table (6): illustrated that there is positive a statistically significant correlation between the risk of falling and symptoms of orthostatic hypotension, particularly fatigue and lightheadedness in the study group two weeks post-surgery with (P. value <0.05). Additionally, a stronger correlation was observed in the control group one day after surgery regarding fatigue, lightheadedness and blurry vision with (P. value <0.01).

Table (7): clarifies that there was a statistically significant difference between the risk of falling and age before and after the implementation of the nursing measures among study and control group.

Table 1: Demographic characteristics of study and control group of patients after total hip replacement surgery (n=60)

Demographic characteristics	Study		Control		P. value
	No	%	No	%	
Age group:					
Less than 40 years	4	13.3	3	10.0	0.500
From 40-55 year	6	20.0	10	33.3	
More than 55 years	20	66.7	17	56.7	
Mean±SD	54.93±11.13		52.53±10.37		0.391
Gender:					
Male	24	80.0	21	70.0	0.371
Female	6	20.0	9	30.0	
Marital status:					
Single	2	6.7	1	3.3	0.460
Married	22	73.3	19	63.3	
Widow	6	20.0	10	33.3	
Education:					
Illiterate	9	30.0	10	33.3	0.920
Primary education	10	33.3	10	33.3	
Secondary education	7	23.3	5	16.7	
University	4	13.3	5	16.7	
Occupational:					
Housewife	6	20.0	9	30.0	0.772
Employer	8	26.7	10	33.3	
Farmer	6	20.0	5	16.7	
Student	2	6.7	1	3.3	
Unemployed	5	16.7	2	6.7	
Retired	3	10.0	3	10.0	
Residence:					
Urban	15	50.0	17	56.7	0.605
Rural	15	50.0	13	43.3	

Chi square test for qualitative data between the two groups - Independent T-test quantitative data between the two groups - *Significant level at P value < 0.05, **Significant level at P value < 0.05

Table 2: Clinical data of study and control group of patients after total hip replacement surgery (n=60)

Clinical data	Study		Control		P.value
	No	%	No	%	
Vital signs:					
Pulse	84.9±11.29		82.9±9.11		0.453
SBP	119.67±11.29		122.67±11.12		0.304
DBP	75.67±7.74		79.83±7.25		0.036*
Laboratory investigations:					
HG	12.37±2.33		12.33±1.65		0.949
RBCs	4.61±0.85		4.51±0.86		0.722
Amount of blood loss	1±0.53		0.97±0.52		0.859
Need to have a blood transfusion:					
No	12	40.0	16	53.3	0.301
Yes	18	60.0	14	46.7	
Medical diagnosis:					
Fracture	19	63.3	19	63.3	0.901
Arthritis	7	23.3	8	26.7	
Osteoporosis	4	13.3	3	10.0	
length of surgery:					
Less than 3 h	26	86.7	27	90.0	0.688
From 3 h and more	4	13.3	3	10.0	

Chi square test for qualitative data between the two groups - Independent T-test quantitative data between the two groups - *Significant level at P value < 0.05, **Significant level at P value < 0.001

Table 3: Orthostatic vital signs measurement for study and control group of patients after total hip replacement surgery with one day and after 2 weeks (n=60)

Vital signs	After one day			After 2 weeks		
	Study	Control	P.value	Study	Control	P.value
	Mean±SD	Mean±SD		Mean±SD	Mean±SD	
Laying position:						
SBP	112.33±10.4	116.33±14.02	0.214	122.5±9.35	109±12.13	0.000**
DBP	74.67±6.81	75.83±8.31	0.555	78.83±4.86	74±7.24	0.004**
Pulse	84.03±11.58	81.33±7.98	0.297	85.57±8.54	81.6±7.01	0.054
Standing position after 3 minutes:						
SBP	122±11.86	119.33±10.81	0.366	129.83±8.56	118±21.4	0.007**
DBP	79.67±7.65	75.5±6.21	0.024*	83.33±5.47	77.67±6.26	0.000**
Pulse	85.13±9.07	84.83±7.32	0.888	89.8±7.51	86.97±8.26	0.170

Chi square test for qualitative data between the two groups- *Significant level at P value < 0.05, **Significant level at P value < 0.001

Table 4: Comparison between the study and control group before total replacement surgery and after 2 weeks of surgery according to Morse Fall Scale (n=60)

Risk of falling	Study		Control		P. value
	No	%	No	%	
Before the operation:					
Low Risk	0	0.0	1	3.3	0.313
Moderate Risk	3	10.0	6	20.0	
High Risk	27	90.0	23	76.7	
Mean±SD	61.67±21.06		60.17±21.87		0.788
After operation with 2 weeks:					
Low Risk	9	30.0	0	0.0	<0.001**
Moderate Risk	14	46.7	10	33.3	
High Risk	7	23.3	20	66.7	
Mean±SD	32.83±19.33		59.17±20.22		<0.001**

Chi square test for qualitative data between the two groups - Independent T-test quantitative data between the two groups - *Significant level at P value < 0.05, **Significant level at P value < 0.001

Table 5: Comparison between the study and control group according to orthostatic symptoms grading scale after total hip replacement surgery with one day and 2 weeks (n=60)

Orthostatic Symptoms	After one day			After 2 weeks		
	Study	Control	P.value	Study	Control	P.value
	Mean±SD	Mean±SD		Mean±SD	Mean±SD	
Fatigue	11.73±3.92	13.17±1.51	0.067	5.37±4.3	14.67±3.58	0.001**
Lightheadedness	11.77±5.52	12.87±2.65	0.329	4.73±4.18	14.63±3.67	0.001**
Problems thinking and concentrating	10.77±5.33	11.57±2.25	0.452	4.63±4.57	12.73±4.14	0.001**
Blurry vision	10.2±4.58	11.43±2.46	0.199	4.53±4.16	13.67±3.99	0.001**

Independent T-test quantitative data between the two groups -*Significant level at P value < 0.05, **Significant level at P value < 0.001

Table 6: Relation between orthostatic Symptom and risk of falling for Study and Control group of patients (n=60)

Orthostatic symptoms		Risk of falling			
		Study		Control	
		After one day	After 2 weeks	After one day	After 2 weeks
Fatigue	r	0.316	.436*	.658**	0.241
	P	0.089	0.016	0.000	0.199
Lightheadedness	r	0.266	.368*	.518**	0.339
	P	0.156	0.045	0.003	0.066
Problems thinking and concentrating	r	0.005	0.217	.463*	0.205
	P	0.978	0.250	0.010	0.277
Blurry vision	r	0.199	0.186	.516**	0.337
	P	0.292	0.324	0.004	0.069

*Statistically Significant Correlation at P. value <0.05

**Statistically Significant Correlation at P. value <0.001

Table 7: Relation between risk of falling for study and Control group with their demographic data (n=60)

Demographic data		risk of falling			
		Study		Control	
		After one day	After 2 weeks	After one day	After 2 weeks
Age	r	.406*	.618**	.603**	.567**
	P	0.026	0.000	0.000	0.001
Gender	r	0.141	0.000	-0.034	0.017
	P	0.457	1.000	0.859	0.928
marital status	r	-0.074	0.279	0.249	0.281
	P	0.698	0.136	0.185	0.132
Level of education	r	-0.157	-0.115	-0.046	-0.118
	P	0.407	0.544	0.810	0.536
occupational status	r	0.150	0.276	0.173	0.108
	P	0.430	0.140	0.361	0.568
Residence	r	-0.241	-0.230	-0.220	-0.308
	P	0.199	0.222	0.243	0.098

*Statistically Significant Correlation at P. value <0.05

**Statistically Significant Correlation at P. value <0.01

Discussion

Orthostatic hypotension presents as a significant independent risk factor for multiple adverse health outcomes, most notably: increased cardiovascular morbidity, elevated fall risk with subsequent injury potential, higher all-cause mortality rates, and accelerated cognitive decline. This multifactorial risk profile underscores the critical need for early detection and proactive management of OH in clinical practice. (Hogan et al., 2021). This study aimed to evaluate the effect of nursing measures on orthostatic hypotension and risk of falling after total hip replacement patients.

The current study results revealed that two thirds of the study group and more than one half of control group were older adults. Mohammed et al., 2023 found that, the study population demonstrated a significant proportion

of middle-aged participants, with over one-third of the combined cohort (both study and control) falling within the fifty- five to sixty- five years age range, Smith et al., 2023 found the majority of the studied older adults. Regarding to gender Distribution: The study population showed a male predominance, with males comprising four-fifths of the study group and approximately nearly three quarters of the control group participants. These findings agree with Mohammed et al., 2023, who found that two thirds of them were males. Also, agree with Bakr, 2018, who listed that there were two third of the study group and the control group were males. Male patients were considerably more likely than female to experience orthostatic hypotension.

Concerning marital status, more than two thirds of the study group and less than two thirds of the control group were married. This agreement with

D'Ermo et al., 2024 found that the majority of study and control group were married.

As regards the level of education, one third of the study group and control group were primary education. This support with **Mohammed et al., 2023**, who revealed that about one third of both study and control groups were illiterate. This does not agree with **Bakr, 2018**, who found that more than two thirds of the study group and half of the control group had moderate educational level.

As regards occupational status, less than one third of the study group and one third of the control group were employed. **Hanafy & El-Sayed 2023**, found that more than one third of the study sample were workers.

As regards residence, one half of the study group and more than one half of the control group were from urban areas with no statistically significant difference between study and control groups. This is in the same line with **Lachance et al., 2023**, who observed that fifty percent of the study group and fifty-six percent of the control group resided in urban areas, with no statistically significant difference.

Regarding the clinical data of patients studied, the present study clarifies that there was a statistically significant difference between study and control groups as regards diastolic blood pressure. Three fifths of study group and less than one half of the control group need blood transfusion. More than three fifths of study group and control group their diagnosis were fractures. **Zang et al., 2024** identified total hip replacement, longer surgery time, and fracture diagnosis among

key predictors for perioperative transfusion.

The present study found that the majority of study groups and control groups had less than 3 hours in the operation. **Jenkins and Aaron., 2023**, found that three fifths of the study and control groups stayed in surgery for less than 3 hours.

The study revealed statistically significant intergroup differences in standing diastolic blood pressure measurements when assessed twenty-four hours postoperatively, with the study group demonstrating superior hemodynamic stability compared to controls. This early difference suggests that nursing measures such as gradual mobilization, hydration support, and continuous monitoring were effective in promoting hemodynamic stability immediately after surgery.

While after two weeks after the operation, there was a statistically significant difference between group differences exclusively in seated blood pressure measurements, with no significant variations observed in standing or supine positions, with no statistically significant difference for pulse during. This may suggest that while the interventions positively influenced vascular tone and venous return (reflected in blood pressure changes), they did not substantially impact autonomic heart rate responses.

Gamaa et al., 2021 demonstrated that nursing interventions (hydration bolus, physical counter-maneuvers, leg exercises) produce significant increases in standing BP and improvements in OH symptoms. This

does not agree with **Livesay and Peyton., 2021** confirmed that most postoperative patients had lower blood pressure than preoperatively, indicating that all patients are at risk for orthostatic hypotension, which Suggested that even well-designed nursing protocols may not significantly reduce hypotension .

Hanafy & El-Sayed, (2023) As well, the current study finding showed a statistically significant difference between the study and control groups post intervention related to heart rate, systolic and diastolic blood pressure. They revealed no statistically significant difference between the study and the control group regarding lying position. While highly statistically significant differences were found among them regarding the heart rate in the standing position for three minutes, especially in the second day. It was also found that there were highly statistically significant differences in systolic and diastolic blood pressure after three minutes in the third day post intervention.

This could be interpreted as even though the standing position causes a gravitational displacement of blood from the thorax to the venous vascular beds of the legs, buttock and abdomen, known as venous pooling resulting in a decrease in cardiac output (CO) and arterial pressure (AP).

The present study found that before implementing nursing measures the risk for fall was equal between two groups of patients (study and control) groups, where the majority of study and control groups had high risk for falling with no statistically significant

difference between two groups. This suggests that both groups were initially homogeneous in terms of fall risk, providing a reliable baseline for comparing the effect of nursing measures. While after implementing nursing measures, more than two fifths of study group had moderate risk for falling while about two thirds of control group had a high risk for falling with statistically significant difference.

Yusuf et al., 2025 reported a seventy percent in-hospital fall rate among short-stay patients, particularly impacting THR recipients due to: postoperative mobility restrictions, altered gait mechanics, and preexisting joint dysfunction. These findings highlight the need for continuous fall prevention throughout the perioperative period.

The present study demonstrates that there was a statistically significant difference between both groups regarding the orthostatic symptoms after the implementing the nursing measures, which means the strategies are effective in reducing orthostatic symptoms.

Our results corroborate **Sun et al., 2024** finding showing significant reductions in OH symptoms after targeted nursing interventions. Both studies demonstrate that structured measures (positional training, compression therapy, counterpressure maneuvers) produce rapid, clinically meaningful symptom relief ($p < 0.01$). This cross-validation confirms the reproducibility of non-pharmacological OH management in acute postoperative care."

This finding is also supported by **Mitro et al., 2019** who reported that the effects of the leg maneuver program are explained by ending the vicious cycle that keeps the vasovagal reflex active and demonstrating that an antigravity exercise could stop a potential vasovagal faint.

From the researcher's viewpoint, improving hemodynamic parameters (heart rate, systolic and diastolic blood pressure) after nursing measures among the study group postoperatively will consequently lead to improvement in the related symptoms of orthostatic hypotension as a result of increased venous return and cardiac output.

Post-THR orthostatic hypotension stems from three key mechanisms: perioperative hypovolemia (blood loss/fluid shifts), preexisting patient factors (frailty/comorbidities), and SIRS-induced vasodilation (elevated IL-6/CRP). This triad explains the high OH incidence in THR patients, where surgical trauma combines with hemodynamic instability and endothelial dysfunction to impair early mobilization tolerance (**Donald et al., 2019**).

The present study illustrated that there is a statistically significant positive correlation between the risk of falling and symptoms of orthostatic hypotension, particularly fatigue and lightheadedness in the study group two weeks post-surgery. Additionally, a stronger correlation was observed in the control group one day after surgery. These findings suggest that patients experiencing orthostatic symptoms (e.g., dizziness, fatigue) are at a higher risk of falls, especially in

the early postoperative phase. A study by **Smith et al., 2023** found that orthostatic symptoms, such as dizziness and fatigue, significantly increase fall risk in post-hip replacement patients due to impaired balance and delayed hemodynamic adjustment. Their results align with our findings, reinforcing the need for early intervention in high-risk patients.

However, **Johnson et al., 2022** argued that orthostatic symptoms do not uniformly predict fall risk, as individual factors (e.g., age, mobility, comorbidities) play a moderating role. Their study reported Studies where patients with orthostatic hypotension did not experience falls due to compensatory mechanisms like slower posture changes. The stronger correlation in the control group (one day) versus the study group (two weeks) may reflect the effectiveness of nursing measures (e.g., gradual mobilization, hydration protocols) applied to the study group, reducing symptom severity and risk of fall overtime.

The present study demonstrates that there was a statistically significant difference between the risk of falling and age before and after the implementation of the interventions among case groups, which indicate with increasing the age increase risk of falling.

Quigley et al., 2025 found that older patients and those in long-term care settings remain at significantly higher risk for anticipated physiological falls, particularly due to age-related dysautonomia, polypharmacy, and frailty-related gait instability. These

findings align with earlier research but now incorporate advanced predictive models using wearable technology to stratify fall risk in real-world clinical settings (lee et al., 2025 and Delbaere, 2025).

This may be related to most patients post total hip replacement surgery are relatively elderly and had age-related neuromuscular changes and degenerative joint deformity which may compromise balance and functional ability, which increasing the propensity to fall (Lo et al., 2019).

Conclusion:

The implemented nursing measures demonstrated statistically significant improvements across three key outcomes for total hip replacement patients: enhanced orthostatic hemodynamic stability (evidenced by improved vital sign measurements during positional changes), reduced OH symptom burden, and decreased fall risk during early mobilization. Compared to controls, the intervention group showed superior performance in safe bed-transition techniques, including proper anti-embolism stocking application and graded leg movement exercises, resulting in maintained blood pressure stability (≤ 20 mmHg systolic drop) and pulse consistency (≤ 30 bpm increase) during upright transitions.

Recommendations

Based on the findings of the current study, it is recommended that:

- All patients undergoing total hip replacement, particularly those at risk for orthostatic hypotension, should follow preoperative nursing

measures that include instructions supported by an illustrative guide.

- Replication of this study in multicenter trials with broader participant demographics.
- Explore technology-based solutions (e.g., wearable BP monitors) for real-time orthostatic hypotension detection.
- Virtual reality (VR) training modules to practice symptom recognition and response pre-discharge.

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Knowledge and Attitude of Postpartum and Postaborted Women Regarding Emergency Contraceptive at Fayoum City

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Abstract

Background: Emergency contraception (EC) is one of the modern contraception methods, which is recommended after unprotected sexual intercourse (UPI). EC provides women with the last opportunity to prevent unwanted pregnancy by up to 95%. **Aim:** This study aimed to assess the knowledge and attitude of postpartum and postaborted women regarding emergency contraception at Fayoum city. **Design:** A descriptive research design was used. **Setting:** The study was conducted at the postpartum ward of the obstetrics and gynecological department of Fayoum and Senourse General Hospital. **Sample:** A purposive sample of 385 women. **Tools:** Three tools were used: (1) Structured Interviewing Questionnaire, (2) Knowledge assessment sheet and (3) Attitude Likert Rating Scale. **Result:** The current study showed that, more than two thirds (66.5%) had poor knowledge and more than half of them (59.7%) had negative attitude regarding emergency contraception. **Conclusion:** There was a lack of knowledge about the emergency contraceptive methods among the participants which subsequently influenced their attitude toward using it. **Recommendations:** Enhancing the information, education, and communication activities of family planning programs using mass media, booklets, and simplified brochures in different family planning and MCH centers to increase awareness among the general public about emergency contraceptive methods.

Key words: Knowledge, Attitude, Postpartum, Postaborted women, Emergency contraception.

Introduction

Emergency contraception is one of the modern contraceptive methods which is indicated as early as possible within the first 5 days after unprotected sexual intercourse to prevent pregnancy. The best period to take emergency contraception is 72 hours after unprotected sex. Emergency contraception offers women a last opportunity to prevent pregnancy after unprotected intercourse, so EC can also reduce the prevalence of unwanted pregnancies and unsafe abortions (**Panda, Das, Das, Sharma, & Sharma, 2021**).

Unintended pregnancies occur when access to effective contraception is limited or when contraceptive methods are not used correctly or consistently. As a result, almost 40% of unintended pregnancies globally each year results from ineffective use of contraception, contraceptive failure, or not use contraceptive at all (**Guran et al., 2024**).

Therefore, WHO recommended that emergency contraception is a crucial measure and a highly effective way to prevent unintended pregnancies by up to 95% when used within 5 days of sexual intercourse, which can help clients avoid unsafe abortions and other unfavorable consequences. Emergency contraception is both safe and affordable, it can provide clients with an appropriate option for starting a continuous family planning method. Moreover, emergency contraceptives do not induce abortion, ectopic pregnancies, or birth defects if EC failed and pregnancy occurred and have no impact on woman's long-term

fertility (**McCarthy, & French, 2024**).

WHO recommended two types of emergency contraception which are the emergency contraceptive pills (ECPs) and the copper intrauterine devices (IUDs). Emergency contraceptive pills prevent or delay ovulation, thereby preventing pregnancy. While the copper IUD stops fertilization by altering the sperm and egg chemically before they come into contact (**Alhassan, Adjeso, Yanbom, & Agomuo, 2025**).

As regard, the regimens for the emergency contraceptive pill include three types: Levonorgestrel (LNG), ulipristal acetate (UPA) and combined oral contraceptives (COCs) when taken within 72 to 120 hours after unprotected sexual intercourse, can reduce the risk of pregnancy by 75–85% (**Erko, Demissie, Yabeyu, Haile, & Bilal, 2025**).

Additionally, an efficient method of emergency contraception is copper intrauterine devices (IUDs), as they can prevent pregnancy with an effectiveness of over 99%. So, the extremely highly effective rate, is thought to be the best choice in certain situations where emergency contraceptive pills may not work effectively (**Ibrahim, Maklof, & Mohamed, 2022**).

The postpartum period is critical for women, as the average return to fertility after childbirth occurs within 45 days, while ovulation can happen as early as day 20, especially in the absence of breastfeeding. Since approximately 5.5 percent of

voluntary pregnancy terminations occur in the six months following childbirth each year globally due to non-use of contraceptive methods, it is crucial to initiate using a method of contraception before this period to prevent unplanned and closely spaced pregnancies (**M'bortche et al., 2022**). Thus, women after childbirth are at great risk of unintended pregnancies, particularly in the first year following birth. So, use of postpartum contraceptive methods not only decreases the number of unintended pregnancies, but also enhances the well-being of both mother and child by promoting optimal birth spacing (**Odimegwu, Phiri, Tapera, & Simona, 2023**).

Additionally, it is important to provide an efficient contraceptive method as soon as possible after uterine evacuation or abortion is further highlighted by the reality that most women start having sex again within the first two weeks following early pregnancy loss, this puts women at risk of pregnancy after abortion due to the rapid return of fertility immediately following an abortion (**Hogmark, Envall, Gemzell-Danielsson, & Kopp, 2023**).

Although several Middle Eastern countries, including Egypt, have had emergency contraception available for a long time, many others in the region still lack access to it. This is caused by a variety of worries, such as the belief that these pills might: cause abortion, be too expensive, harm babies, or result in ectopic pregnancies (**Hamdy, Gomaa, & Abd El Fatah, 2023**).

Maternity nurses with extensive knowledge and positive attitude towards emergency contraception can act as an effective counsellor to the public to raise awareness, improve their understanding and change their attitude towards EC. Therefore, it is important to implement an ongoing maternity nurses' in-service training program to enhance their knowledge and attitude toward EC. Also, knowledge coupled with a positive attitude is very important to improve the practice of EC (**Soliman, Ramadan, Abd Elhakam, & Ali, 2024**).

Significance of the Study:

Unplanned pregnancies are a worldwide public health issue that especially affects people in countries with poor and moderate incomes. There were 121 million unwanted pregnancies per year between 2015 and 2019 (64 UPs per 1,000 women of reproductive age). According to WHO estimation 2021, six out of ten (61%) of all unwanted pregnancies end in an induced abortion. exposing 73 million women annually to the risks of this procedure, which is prohibited in many nations and frequently carried out in inadequate circumstances. Furthermore, 5 to 13% of maternal deaths worldwide are caused by unsafe abortions, which account for 45 % of all abortions (**WHO, 2024**).

Egypt's extensive track record of implementing family planning programs, reported that approximately 25% of pregnancies and births in the country are unplanned. Furthermore, every year, 216,000 women in Egypt are

hospitalized due to complications from abortions and this consider a negative consequence of unintended pregnancy (**Hashem, El-Gamal, Elbohoty, & El-Nagar, 2022**).

The problem of unwanted pregnancies persists despite emergency contraception being available and recorded for an extended period of time in Egypt and various other Middle Eastern countries. According to the Egypt Demographic and Health Survey, the majority of married women know about the implant, injection, pill, and IUD as traditional family planning methods, while only 14.7% of women are aware of EC methods (**Soliman et al., 2024**).

Finally, the unintended pregnancy has more serious consequences on women and their children health, so this study is intended to assess the knowledge and attitude of postpartum and postaborted women regarding emergency contraception to enhance their perception about these methods that can play an important role in decreasing this globally problem and its risks.

Aim of study:

This study aimed to assess the knowledge and attitude of postpartum and postaborted women regarding emergency contraception at Fayoum city.

Research questions:

1. What is the knowledge of the postpartum and postaborted women regarding emergency contraception?
2. What is the attitude of the postpartum and postaborted

women regarding emergency contraception?

Subjects and Method:

Research design:

A descriptive research design was utilized to achieve the aim of this study.

Setting:

This study was conducted at the postpartum ward of the Obstetrics and Gynecological Department of Fayoum General Hospital and Senourse General Hospital. These hospitals provide free services for women from urban and rural regions in Fayoum city.

Sample type: A purposive sample was utilized in this study.

Sample size:

Sample size was calculated using Open Epi-program equation of single proportion using the following assumption proportion 60% (**Sabry, Mahmoud, Abd Elzاهر, Ahmed, & Ahmed, 2021**), the confidence level 95%, precision level 5 %, total target population 6000 based on statistics obtained from Fayoum General Hospital, and Senourse General Hospital. The calculated size was 348 women this size was increased by 10 % to overcome non response rate, so the total size was 385 women.

Inclusion criteria:

Postpartum and postaborted women who delivered normally or C.S and willing to participate in the study.

Exclusion criteria:

Postpartum and postaborted women with any acute or chronic diseases as cardiac disease, restrictive lung disease and diabetes mellitus.

Tools of Data Collection:

The data was collected by using three tools.

Tool I: Structured Interviewing Questionnaire:

This tool was developed by the researcher after reviewing the national and international related literature. It was written in a simple Arabic language; it was divided into four parts as follows:

Part I: Socio-demographic characteristics: It was designed to assess the women's characteristics such as age, residence, level of education, and occupation.

Part II: Menstrual history: This was included age of menarche, menstrual regularity, amount of menstruation, duration of menstrual blood flow, and cycle interval.

Part III: Obstetrical history: This was included numbers of pregnancy, abortion, delivery, living children, mode of delivery of the last baby, problems occur during previous pregnancy and postpartum and unintended pregnancy occurred before and the cause of its occurrence.

Part IV: Family planning history: This was included use family planning method before, the type of previous contraceptive method, duration of using this method, complications occurred during using it and the cause of termination.

Tool II: Knowledge assessment sheet:

This tool was adapted from (Sabry et al., 2021 & Ibrahim et al., 2022) and modified by the researcher. It was written in a simple Arabic language; it was consisted of (9) questions to

assess the women's knowledge about emergency contraception such as (the meaning, types, advantages, disadvantages, indications, contraindications, side effect, effectiveness of emergency contraception methods in preventing pregnancy after unprotected sexual intercourse and the suitable recommended time to use.

Scoring system of knowledge:

The questionnaire was contained of 9 questions, the total score of the correct answer was scored as two degrees and incorrect answer or don't know was scored as a one degree. These scores were summed and were converted into a percent score. It was classified into 3 categories:

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

Source of postpartum and postaborted women's information regarding emergency

contraception: such as from the physician, nurse, family planning health centers, relatives, friends, social media, school, university, radio, T.V, magazine and newspaper.

Tool III: Attitude Likert Rating Scale:

The Attitude Likert Rating Scale utilized in this study was adapted from (Sabry et al., 2021) and modified by the researcher to assess the women's attitude regarding the emergency contraception. The scale contained 14 statements, and for each statement,

women were presented with three response options:

- A positive response, indicating agreement, was assigned a value of 3 degrees.
- No opinion or uncertainty, denoted as indifference, was assigned a value of 2 degrees.
- A negative response, indicating disagreement, was assigned a value of 1 degree.

Scoring system of attitude: The total score for each participant ranged from 14 to 42. It was classified into 2 categories:

- **Positive attitude** if the total score $\geq 60\%$ (26-42).
- **Negative attitude** if the total score $<60\%$ (14-25).

Tools Validity:

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

Tools Reliability:

Reliability was estimated among the same sample of 10 mothers by using the test-retest method on two occasions and then compared the scores through SPSS computer package. The Cronbach's coefficient alpha indicated that the questionnaire is reliable to detect the objectives of the study.

Tool	Alpha Cronbach	Internal consistency
Knowledge	0.870	Good
Attitude	0.871	Good

Ethical considerations:

Ethical aspects were considered before starting the study, Approval from the Ethical Research Committee of Fayoum University was obtained before conducting the study. An official permission from the selected study settings was obtained for the fulfillment of the study. The researcher explains the purpose of the study and its consequences confirming the confidentiality of the data. Women granted informed consent before data collection. To ensure anonymity, the completed tool was allocated a code number. The researchers informed the women that the information they had gathered would be kept private, and each woman had a right to withdraw at any time without giving a reason. The study didn't harm dignity, tradition and religious aspects of the women.

Operational item:

Includes the preparatory phase, pilot study and field work.

A. Preparatory phase:

It includes reviewing of the current and relevant related literature and theoretical knowledge of the various related aspects of the study using books, articles, scientific journal and internet with the aim of acquiring in-depth knowledge about the study. During this phase, the researcher also visits the selected places to get acquainted with the personnel and the study settings. The development of the tools was under supervisors' guidance

and experts' opinions were considered.

B. Pilot study:

A pilot study was carried out on 10% from total sample size (40 of postpartum and postaborted women under the study) in a period of three weeks before conducting the actual study to test the feasibility, clarity, applicability and the efficiency of the tools in addition to estimate the time needed to fill in the tools. The pilot study revealed that some items need to be added which help in achieving the study objectives and some items needed to be modified, such as simplification and rephrasing of some questions to be simpler for understanding and other items need to be omitted. So, pilot study was excluded from the study sample later.

C. Field work:

Data were collected after attaining the approval to conduct the study, sample was collected from the postpartum ward of the obstetrics and gynecological department at Fayoum and Senourse General Hospital 3 days weekly for each hospital from 9a.m to 2 p.m. The studied sample was carried out through six months in the period from February 2024 to July 2024. At the beginning, the researcher introduced herself to the women and explained the purpose of the study to establish trust and encourage their participation. Informed consent was obtained from each participant before proceeding. The researcher asked the women and filled the tools by herself for all women. The interview was conducted individually by the researcher. A structured interviewing

questionnaire sheet was used to gather information about the women's characteristics, as well as their previous and current obstetrical history. Tool I took about 10-15 minutes. Then the researcher assessed the women's knowledge regarding emergency contraceptives using Tool II took from 10-15 minutes. The attitude of the postpartum and postaborted women regarding emergency contraceptives was assessed using the Likert rating scale Tool III took from 5- 10 minutes. The total time needed to fill in the questionnaire was about 20 to 30 minutes.

Administrative item:

An official letter to carry out this study clarifying the purpose and setting of the study was obtained from the Dean of the Faculty of Nursing, Fayoum University to the manager of Fayoum General Hospital and Senourse General Hospital as an approval to obtain permission and cooperation.

Statistical item:

The statistical analysis of data was done by using the computer software of Microsoft Excel Program and Statistical Package for Social Science (SPSS) version 22. Data were presented using descriptive statistics in the form of frequencies and percentage for categorical data, the arithmetic mean ($\bar{X}$) and standard deviation (SD) for quantitative data. Qualitative variables were compared using chi square test, P-value to test association between two variables. Correlation coefficient test (r) was used to test the correlation between studied variables. Reliability of the

study tools was done using Cronbach's Alpha.

Degrees of Significance of results were considered as the following:

- P-value > 0.05 indicates statistically insignificant difference (NS).
- P-value ≤ 0.05 indicates statistically significant difference (S).
- P-value ≤ 0.01 indicates statistically highly significant difference (HS).

Results:

Table (1): Shows distribution of the studied sample according to their socio-demographic data. Regarding to the age was noted that, nearly half of the studied sample (46.8%) their age group 20-<30 years. Regarding the level of education, the study finding showed that, more than half of them (57.9%) had secondary education. Also more than two thirds of them (67.3%) were housewife. Moreover, regarding to residence more than half of them (54.5%) lived at rural areas.

Table (2): Shows distribution of the studied sample regarding to their menstrual history. More than two fifth of the studied sample (44.7%) their age of menarche was 9-11years, a Mean SD of age of menarche was 11.88 ± 1.52 years. Also, the majority of them (92.5% and 90.9%) had regular and moderate amount of menstruation, respectively.

Table (3a): Shows distribution of the studied sample according to their obstetrical history. More than two thirds of them (70.9%) don't have history of abortion. While, nearly one fifth of them (17.4) have one time of

abortion before and the minority of them (7.8% and 3.9%) have twice and more than three times of abortion, respectively.

Table (3b): Shows that, more than third of the studied sample (39.2%) had problems during her previous pregnancy, (41.0%) of them suffered from anemia. Additionally, more than two fifth of them (42.1%) had unintended pregnancy, (46.3%) of them due to missing contraceptive pills.

Table (4): Shows distribution of the studied sample according to their family planning history. More than two thirds of them (74.8%) had used a family planning method before, more than two fifth of them (43.4%) had used an IUD, more than two fifth of them (42.0%) had used a family planning method from one to two years.

Table (5): Shows distribution of the studied sample according to their knowledge about emergency contraception. More than two thirds (70.1% and 69.9%) of the studied sample didn't know the meaning and advantages of emergency contraception, respectively. Also, more than three quarters (76.6%) and the majority of them (83.4%) didn't know the disadvantages and contraindications of emergency contraception, respectively.

Figure (1): Illustrates percentage distribution of the studied sample according to their source of information about emergency contraception. About one third of them (32.8%) had information about emergency contraception from social

media. Also, about one quarter of them (24.4% and 23.1%) had information from family planning health centers and friends / relatives, respectively.

Figure (2): Illustrates percentage distribution of the studied sample according to their total knowledge score about emergency contraception. More than two thirds of them (66.5%) had poor level of total knowledge about emergency contraception. While, the minority of them (13.2%) had good level of total knowledge.

Table (6): Shows distribution of the studied sample according to their attitude regarding emergency contraception. More than half (50.6% and 50.4%) of them disagreed that, using emergency contraception is necessary in case of failure of the regular used birth control method and if unprotected sexual intercourse occur, respectively. Additionally,

nearly two thirds (63.9% and 62.6%) of them disagreed that, emergency contraception doesn't cause birth defects and ectopic pregnancy or abortion, respectively.

Figure (3): Illustrates percentage distribution of the studied sample according to their total attitude score regarding emergency contraception. More than half of them (59.7%) had negative attitude regarding emergency contraception. While, two fifth of them (40.3%) had positive attitude.

Table (7): Shows correlation between total knowledge score and total attitude regarding emergency contraception among the studied sample. There was highly significant positive correlation between total knowledge score and total attitude score regarding emergency contraception among the studied women ($r=0.875$, $p<0.01$)

Table (1): Distribution of the studied sample regarding to their socio-demographic data (n=385).

Socio-demographic data	No.	%
Age (years)		
<20	24	6.2
20-<30	180	46.8
30-<40	164	42.6
≥ 40	17	4.4
Range	(19-45)	
Mean ± SD	29.88±6.12	
Educational level		
Can't read or write.	36	9.4
Basic education	49	12.7
Secondary education	223	57.9
University education	77	20.0
Occupation		
Employee	126	32.7
Housewife	259	67.3
Residence		
Rural	210	54.5
Urban	175	45.5

Table (2): Distribution of the studied sample regarding to their menstrual history (n=385).

Menstrual history	No.	%
Age of menarche (years).		
9-11	172	44.7
12-14	151	39.2
> 14	62	16.1
Range Mean ± SD	(9-15) 11.88±1.52	
Menstrual regularity.		
Regular	356	92.5
Irregular		
Amount of menstruation.		
Scanty	24	6.2
Moderate	350	90.9
Heavy	11	2.9
Duration of menstrual blood flow (Days).		
Three days	21	5.5
Four days	77	20.0
Five days	216	56.1
More than five days	71	18.4
Range Mean ± SD	(3-7) 4.96±0.91	
Interval of menstrual cycle (Days).		
<21	4	1.0
21<25	97	25.2
25<30	264	68.6
30<35	15	3.9
>35	5	1.3

Table (3a): Distribution of the studied sample according to their obstetrical history (n=385).

Obstetric history	No.	%
Gravidity		
1-2	135	35.1
3-4	145	37.7
≥ 5	105	27.3
Parity		
1-2	143	37.1
3-4	213	55.3
≥ 5	29	7.5
Numbers of abortion.		
None	273	70.9
One	67	17.4
Twice	30	7.8
Three and more	15	3.9
Numbers of living children.		
1-2	147	38.2
3-4	212	55.1
≥ 5	26	6.8
Mode of delivery of the last baby.		
Normal delivery	175	45.5
Cesarean Section	210	54.5

Table (3b): Distribution of the studied sample according to their obstetrical history (n=385).

Obstetric history	No.	%
Problems during previous pregnancy.		
Yes	151	39.2
No	234	60.8
If the answer is yes, what are the problems? (n=151)		
Hyperemesis gravidarum	15	9.9
Hypertension	12	8.0
Gestational diabetes	7	4.6
Anemia	62	41.0
Premature rupture of membrane	43	28.5
Hemorrhage	12	8.0
Problems during previous postpartum.		
Yes	23	6.0
No	362	94.0
If the answer is yes, what are the problems? (n=23)		
Puerperal sepsis	4	17.4
Postpartum hemorrhage	19	82.6
History of unintended pregnancy.		
Yes	162	42.1
No	223	57.9
If the answer is yes, what is the cause of its occurrence? (n=162)		
Missing pills	75	46.3
Failure of contraceptive method	62	38.3
Not using contraceptive method	25	15.4

Table (4): Distribution of the studied sample according to their family planning history (n=385).

Family planning history	No.	%
Use family planning method before.		
Yes	288	74.8
No	97	25.2
If the answer is yes, what is the type of previous contraceptive method? (n=288)		
Pills	101	35.1
IUD	125	43.4
implant	25	8.7
Injectable	37	12.8
Duration of using this method. (n=288)		
<1 year	29	10.1
1-2 years	121	42.0
3-4 years	75	26.0
5-6 years	63	21.9
Mean ± SD	2.74±1.6	

Complications during using it. (n=288)		
Yes	51	17.7
No	237	82.3
*If the answer is yes, what is the complication? (n=51)		
Menstrual irregularity	29	56.9
Bleeding	46	90.2
Infection	4	7.8
Causes of termination of family planning method.(n=288)		
Pregnant while using	76	26.4
Wanted pregnancy	174	60.4
Side effects or complication	38	13.2

Table (5): Distribution of the studied sample according to their knowledge about emergency contraception (n=385).

Items	Correct answer		Incorrect answer / Don't know	
	No.	%	No.	%
1. Definition of emergency contraception.	115	29.9	270	70.1
2. Types of emergency contraception.	140	36.4	245	63.6
3. Advantages of emergency contraception.	116	30.1	269	69.9
4. Disadvantages of emergency contraception.	90	23.4	295	76.6
5. Indications of emergency contraception.	101	26.2	284	73.8
6. Contraindications of emergency contraception.	64	16.6	321	83.4
7. Side effect of emergency contraception.	52	13.5	333	86.5
8. Are emergency contraception methods effective in preventing pregnancy after unprotected sexual intercourse?	77	20.0	308	80.0
9. The suitable recommended time to use emergency contraception.	115	29.9	270	70.1

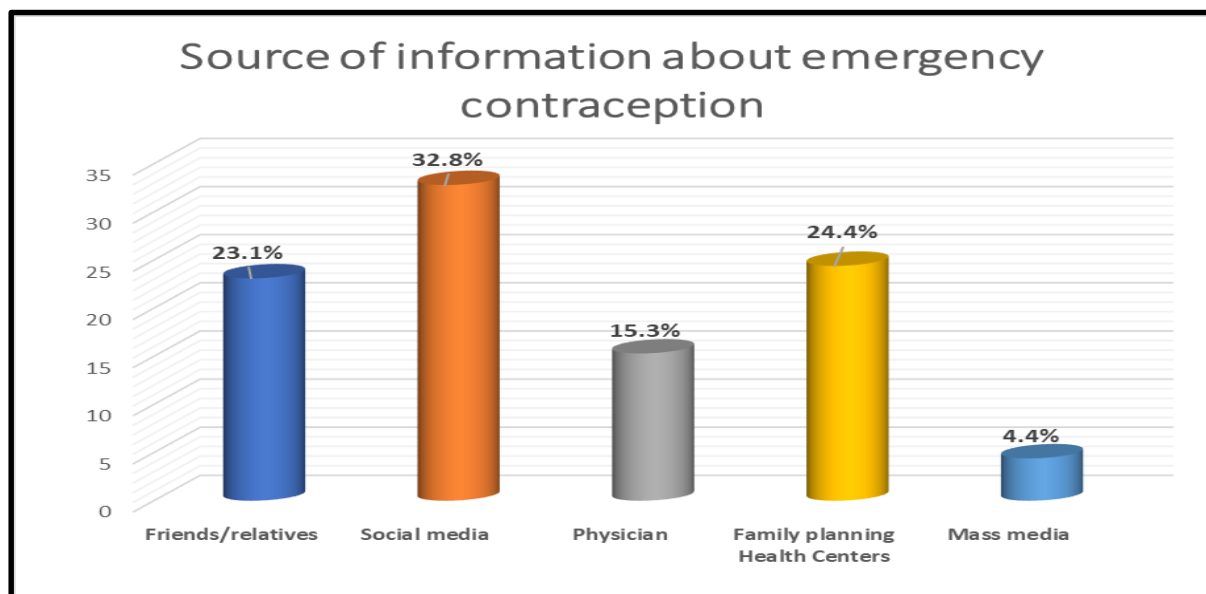


Figure (1): Percentage distribution of the studied sample according to their source of information about emergency contraception (n=385).

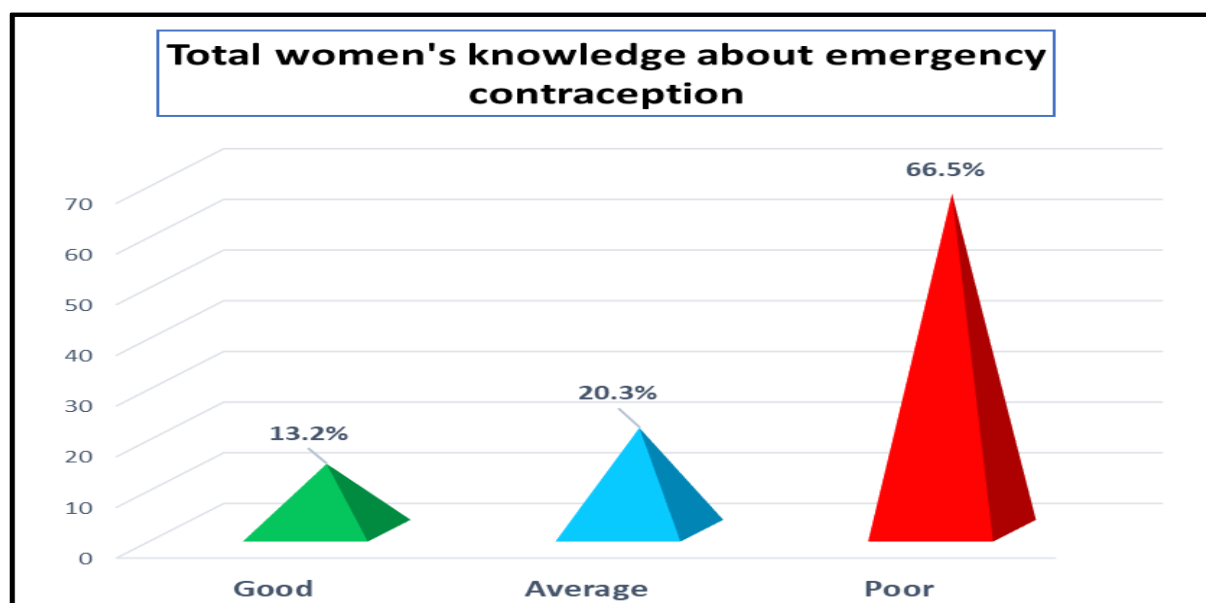


Figure (2): Percentage distribution of the studied women according to their total knowledge about emergency contraception (n=385).

Table (6): Distribution of the studied sample according to their attitude regarding emergency contraception (n=385).

Statements	Agree		Uncertain		Disagree	
	No.	%	No.	%	No.	%
1. Emergency contraception is safe to use.	38	9.9	114	29.6	233	60.5
2. Using emergency contraception is necessary in case of failure of the regular used birth control method.	77	20.0	113	29.4	195	50.6
3. Using emergency contraception doesn't affect negatively on the regular used birth control method.	76	19.7	112	29.1	197	51.2
4. It is easy to deal with side effect of emergency contraception.	38	9.9	195	50.6	152	39.5
5. If unprotected sexual intercourse occur; I will use emergency contraception.	78	20.3	113	29.3	194	50.4
6. Emergency contraception available without medical prescription or consult of a pharmacist.	39	10.1	208	54.0	138	35.9
7. It is necessary to increase level of awareness about emergency contraception between the women.	220	57.2	96	24.9	69	17.9
8. Using emergency contraception doesn't affect the fertility in the future.	26	6.7	90	3.4	269	69.9
9. Using emergency contraception after unprotected sexual intercourse is more effective than using regular birth control method.	63	16.4	51	13.2	271	70.4
10. Getting emergency contraception without a prescription minimize the use of other regular contraceptive methods.	88	22.8	63	16.4	234	60.8
11. Emergency contraception doesn't cause birth defects.	13	3.4	126	32.7	246	63.9
12. Emergency contraception doesn't cause ectopic pregnancy or abortion	39	10.1	105	27.3	241	62.6
13. Using emergency contraception is a good idea for all female.	84	21.8	198	51.4	103	26.8
14. Emergency contraception doesn't provide protection against HIV (AIDS) and other sexually transmitted diseases.	64	16.6	128	33.3	193	50.1

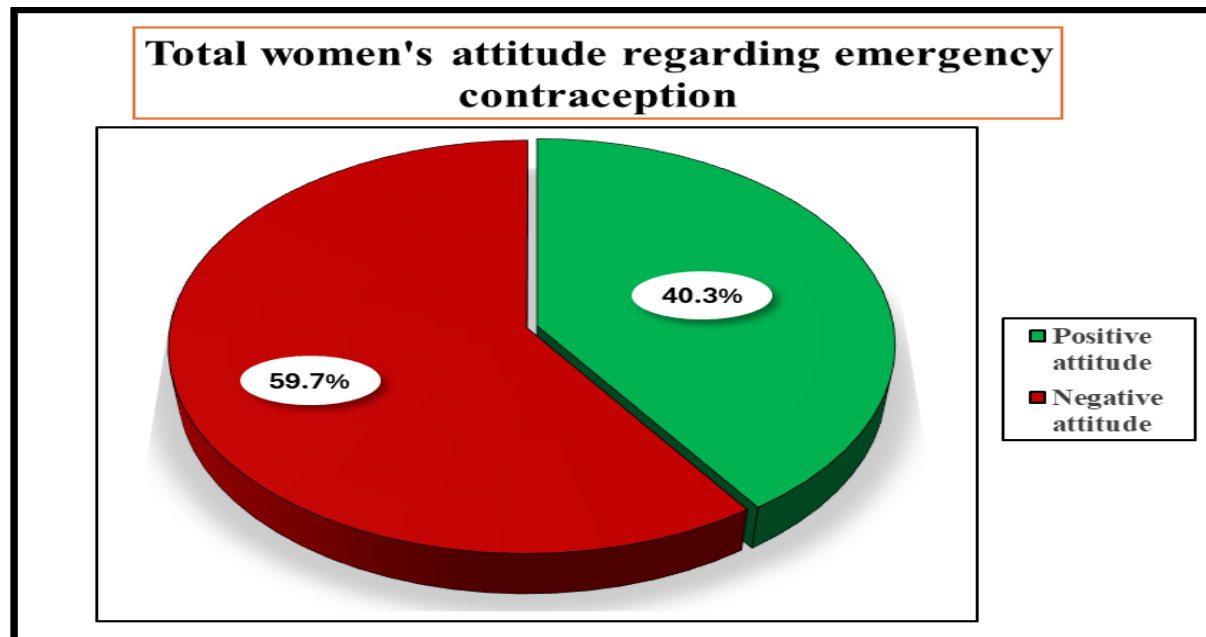


Figure (3): Percentage distribution of the studied women according to their total attitude regarding emergency contraception (n=385).

Table (7): Correlation between total knowledge score and total attitude regarding emergency contraception among the studied sample (n=385).

Variables	Total knowledge score	
	r	P-Value
Total attitude score	0.875	0.000**

(r)= Pearson correlation test. **highly significant correlation at $p < 0.01$.

Interpretation of r: Weak (0.1-0.24) Intermediate (0.25-0.74) Strong (0.75-0.99) Perfect (1).

Discussion

Emergency contraception is one of the best family planning strategies for lowering the chance of an unwanted pregnancy and the associated risks, including maternal disability and death. Unintended pregnancy is a global health problem that affecting women, families and the society and has more serious consequences on women and children health (Yeboah, Appiah, & Kampitib, 2022).

Regarding socio-demographic characteristics of the studied sample, the finding of current study revealed that, nearly half of the studied sample was between 20-30 years with mean age 29.88 ± 6.12 years and regarding residence, it was observed that more than half of the women were living in rural areas. This finding was congruent with a study by Sabry et al., (2021) that entitled "Awareness of Postpartum and Post Aborted Women Regarding Emergency Contraception"

in Egypt, who reported that, about half of the women in the study were between the ages of (20-30yrs) with a mean age 28.00 ± 5.84 years, and was found that over half of them lived in rural areas.

Concerning the women's education, this study showed that, only one fifth of studied sample had university education while more than half of them had secondary education. This result was in disagreement with a study by **Hashem et al., (2022)** that entitled "Effect of Educational Instructional Module on Childbearing Women's Awareness Regarding Emergency Contraception" in Egypt, who revealed that, nearly three quarters of participants had post graduate education degrees or university education and only one quarter had secondary education.

Regarding to the menstrual history of the studied sample, the finding of the present study revealed that, the majority of studied sample had regular menstruation, more than half of them had five days of menstrual blood flow and more than two thirds of them had menstrual cycle every $25 < 30$. This result was congruent with a study by **Abdelsamiea, Khamis, & Ibrahim, (2023)** that entitled "Awareness and Attitudes of Child Bearing post-partum Women regarding Billing Ovulation Family Planning Method" in Egypt, who reported that, the most of women in the study had regular menstruation, with intervals of 25–30 days and duration ranging from 3–5 days with a mean of 4.59 ± 1.07 days, respectively.

Concerning the women's obstetrical history, this study revealed that, more

than quarter of studied sample had one or more abortion before and more than two thirds of them did not have abortion before. This result was in agreement with the study by **Ibrahim et al., (2022)** that entitled "Effect of educational program on knowledge and attitude of childbearing women about intrauterine copper device as emergency contraceptive method" in Egypt, who reported that, about one third of studied women had previous abortion and more than two thirds of them did not have abortion before.

Concerning to the number of unintended pregnancy, the present study revealed that, more than two fifth of studied sample had unintended pregnancy. This result came on the line with **Hashem et al., (2022)** who reported that, over one quarter of the studied women had unplanned pregnancy. Also, the finding of this study was congruent with a study by **Ali, Gonied, & Elsebeiy, (2023)** that entitled "Assessment of Reproductive Age Women Health Related Behavior Regarding Emergency Contraception Methods" in Egypt, who revealed that, about one-third of the women in the study had previously experienced an unwanted pregnancy as a result of unprotected sexual activity.

Regarding the cause of unintended pregnancy, this study illustrated that, more than two fifth of studied sample forgot to take hormonal contraceptive pills that in turn led to unintended pregnancy. This finding congruent with the study by **Hassan, El-Kurdy, Yousef, & Lamadah, (2020)** that entitled " The Effect of an Educational Guidelines on Childbearing Women's Knowledge, Attitude and their

Intention regarding Emergency Contraceptive Use" in Egypt, who revealed that, over half of women forget to take the pills, which is the primary cause of unplanned pregnancies, which affect about one-third of women.

The researcher believes that, this result may be due to the lack of national educational programs for the general public about the importance and the correct way for using of family planning methods including emergency contraception, which can help the women to avoid unplanned pregnancy.

Regarding the family planning history, the current study illustrated that, more than two thirds of studied sample had used family planning methods before and only one quarter of them didn't use family planning methods before. This result was in agreement with a study by **Hashem et al., (2022)** who stated that, over three quarters of the women in the study had used previous or current contraceptive method for a duration ranging from five to fifteen years and over one fifth of them had never used family planning methods before.

Regarding to the level of knowledge about emergency contraception, the result of the current study revealed that, more than two thirds of the studied sample don't know the meaning and advantages of emergency contraception, respectively. This result was congruent with a study by **Hassan et al., (2020)** who revealed that, prior to the guidelines' intervention, over two-thirds and over three-quarters of the women in the study didn't know the

proper definition and advantages of emergency contraception, respectively.

According to the source of information about emergency contraception, the finding of the present study revealed that, about one third of the studied sample had information about emergency contraception from social media. Also, about one quarter of them had information from family planning health centers and friends / relatives, respectively. This finding was congruent with a study by **Hamdy et al., (2023)** that entitled "Counselling Program for Married Women Regarding Emergency Contraceptive Methods" in Egypt, who stated that, about one third of women had information about emergency contraception from social media and health care facilities, respectively.

The researcher believes that, this outcome can be the result of growing technology and the widespread use of social media, which has a significant and obvious impact on people nowadays because it is utilized by everyone worldwide.

According to the total knowledge score about emergency contraception, the result of the current study showed that, more than two thirds of the studied sample had poor level of total knowledge about emergency contraception. This finding came in the same line with a study by **Saleh, Asham, & Ismail, (2023)** that entitled "Awareness and use of emergency contraception among women attending Kidwany MCH center, Assiut City" who illustrated that, above three fifths of sample had poor

knowledge about emergency contraception. In addition, **Sabry et al., (2021)** who stated that, more than half of the studied women had poor knowledge about emergency contraception.

The researcher believes that this low level of knowledge about emergency contraception because of about one third of studied sample obtained information about emergency contraception from social media. This information from social media may also be insufficient, incorrect and incomplete. Additionally, there is currently no national plan developed to promote emergency contraception and educate the public, particularly women of reproductive age, about its importance.

Concerning the studied sample's total attitude regarding emergency contraception, the present study found that, more than half of the studied sample had negative attitude regarding emergency contraception, while two fifth of them had positive attitude. This result came on the same line with a study by **Abera, Sema, Guta, & Belay, (2021)** that entitled "Emergency contraceptive utilization and associated factors among college students in Dire Dawa City, Eastern Ethiopia" who reported that, the most of participants had a negative attitude regarding emergency contraception and only one quarter of them had positive attitude.

Also, this finding is supported by the study by **Oshodi et al., (2020)** who founded that, majority of the studied women demonstrated negative attitude regarding emergency contraception.

On the other hand, the result of the present study was incongruent with a study by **Hassan, H., & Ali, L. (2024)** who reported that, slightly more than one half of studied women had positive attitude regarding emergency contraception while more than two fifth of them had negative attitude. Also, **Yeboah et al., (2022)** who reported that, above half of studied sample had positive attitude toward emergency contraception.

The researcher believes that the contradiction between these results and the findings of the current research may be due to differences in the level of education, which affects the level of awareness, which in turn affects women's behaviour.

Lastly, the present study indicated that, there was highly significant positive correlation between total knowledge score and total attitude score regarding emergency contraception among the studied sample. This finding came in agreement with a study by **Davis, Sarasveni, Krishnan, Bhat, & Kodai (2020)** that entitled "Knowledge and attitudes about the use of emergency contraception among college students in Tamil Nadu, India" who reported that, there was significant correlation between the participant's knowledge and attitude toward emergency contraception. Also, this result supported by **Erko et al., (2025)**.

Conclusion

Based on the results of this study, it can be concluded that participants' attitudes regarding utilizing emergency contraceptives were influenced by their lack of knowledge

of these methods. The present study demonstrated that over two- thirds of the studied sample had poor knowledge and more than half of them had negative attitude toward emergency contraception. Overall, the findings of the current study achieved the study's aim and answered the research questions. Thus, it is crucial to initiate health education programs for increasing awareness and utilization of emergency contraception.

Recommendations:

- Enhancing the information, education, and communication activities of family planning programs for couples regarding emergency contraceptive methods using mass media, a clear language booklet, and simplified brochures especially in different family planning and maternal & child health centers to increase awareness among the general public about emergency contraception.
- Simple reliable online and social media sources should be available to women regarding emergency contraception.
- Train and educate all health care providers, particularly who work in family planning centres about the emergency contraception.
- The importance of incorporating emergency contraception into family planning counselling, particularly in the postpartum period, to prevent unintended pregnancies.

Further researches:

- Additional research is required to evaluate the factors that are related to and affect women's use of emergency contraception.
- Conduct a prolonged study involving a large sample across various settings such as: family health centers and other maternity care facilities in different areas of Egypt, to assess knowledge and attitudes about emergency contraception and to be able to generalize the results.

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Relation between the Indoor Home Environment and Physical Health Problems of Children Under Five Years

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Abstract

Background: The indoor home environment significantly influences the physical health status of young children. **Aim of the study:** was to assess the relationship between the indoor home environment and physical health problems among under five children. **Design:** Analytical cross sectional study design. **Settings:** The current study was conducted at five Maternal and Child Health (MCH) centers in Tanta City. **Subjects:** A convenience sample of 432 children under five years old was included in the current study. **Tool:** A structured interview schedule was used in the current study which consisted of three parts: Part I): Socio-demographic characteristics of the child. Part II): Assessment of child's health status. Part III): Assessing scoring system of indoor home environment. **Results:** more than two-thirds (69.0%) of the studied children's mothers had un-sanitary indoor environment, while less than one-third (31.0%) of them had sanitary indoor environment. In addition, there was a statistical significance relation between sanitary level of indoor home environment and prevalence of common physical health problems such as respiratory, gastrointestinal, skin, eye and ear infections as well as home accidents and frequency of childhood illness among under five children. **Conclusion and recommendations:** poor housing conditions, inadequate ventilation, improper waste disposal, and overcrowding contribute to the prevalence of respiratory, gastrointestinal, skin, and infectious diseases among under five children. Socio-demographic factors such as parental education, occupation, and income levels also play a crucial role in determining household sanitary conditions and, consequently, children's health outcomes. Community health nurses should implement community-based awareness programs on home hygiene and how to maintain sanitary indoor home environment to help parents create a healthier environment for their children.

Key words: Indoor, environment, physical, health, problems.

Introduction

The physical health of young children is a crucial determinant of their long-term well-being, and early childhood health is strongly influenced by environmental factors (**Likhar, Baghel, & Patil, 2022**). Among these, the indoor home environment plays a significant role in shaping the health outcomes of children, particularly those under the age of five, who are most vulnerable to health risks. As this age group undergoes rapid physical and cognitive development, the quality of their immediate surroundings, including air quality, safety, sanitation, and the presence of environmental toxins, has profound implications on their physical health (**Vardoulakis et al., 2020**).

The World Health Organization (WHO) 2020 estimates that household air pollution causes 3.2 million deaths year, including more than 237 000 deaths of children under five worldwide. After being exposed to air pollution, children are twice as likely to acquire pneumonia. Children under five (≤ 5 years) in low-to-middle income countries (LMICs) experience 1.7 billion episodes of diarrhea and around half a million diarrhea-related fatalities annually (**Puthumana, Ngaage, Borrelli, Rada, Caffrey and Rasko .2021**).

Diarrhea is the second leading cause of death for children under five in Egypt. As per the Egyptian Family Health Survey (EFHS) (2021), diarrhea is more common in children under five years old that 12% of them get it (**Said, 2024**).

A child's physical health is closely tied to the quality of their living

environment. Substandard housing with poor ventilation, mold, pests, lead-based paint, and inadequate sanitation can increase the risk of respiratory illnesses, allergies, and infections. For example, exposure to mold and dampness is known to exacerbate asthma symptoms and contribute to respiratory infections, which are common in children. Furthermore, children in poorly maintained homes may face higher risks of accidents and injuries, such as falls, burns, or poisoning, due to unsafe living conditions (**Tusting et al., 2020**).

Environmental factors, such as exposure to pollution or environmental toxins, can also affect child health and development. For instance, children living near industrial areas or heavy traffic may be exposed to higher levels of air pollution, which can lead to respiratory problems and developmental delays. Housing policies and urban planning that prioritize clean, safe environments contribute to healthier child development. (**Street et al., 2024**).

Long-term housing stability is essential for positive child development outcomes. Children who experience stable housing are more likely to grow up in an environment that fosters healthy physical, emotional, and cognitive development. Secure housing allows families to invest in long-term goals, such as education and healthcare, including chronic stress, poor academic performance, and behavioral problems. (**DeCandia, Volk, & Unick, (2022)**).

A Community Health Nurse – Child Health and Environment (child health refers to the physical, mental, emotional and social wellbeing of children and environment means all the surroundings that affect child's health and development, including physical environment as air, water, food, housing condition, cleanliness...est. focuses on the health of children within a community, specifically concerning environmental factors that can impact their well-being. They provide education to families and communities about the importance of maintaining a healthy indoor and outdoor environment for children's health, such as ensuring proper sanitation, safe drinking water, and clean air. Community Health Nurses also advocate for policies and programs that improve environmental conditions in communities. Their role is essential in preventing and mitigating the long-term effects of environmental risks on child health **(McCabe, Davis, Mandy, & Wong, (2022).**Community environmental health specialists educate families on the impact of their home and community environments on their child's health and help implement changes to reduce risks. They collaborate with healthcare providers, community organizations, and policymakers to promote environmental health standards that protect children from harmful exposures. This role is particularly important in providing direct care and education to families living in areas with high environmental risks, ensuring that children grow up in

environments conducive to good health. **(Hookway, & Brown, 2023).**

Significance of the study

Children health and well-being are impacted by the quality of their indoor environment. Children's exposures in the home will be significantly influenced by their play activities and housekeeping tasks. Numerous environmental factors can impact children under five year's old health and raise the occurrence of disorders. Air, water, and food pollution, household waste, rodent and insect management, and safe housing are some of the elements that lead to a variety of chronic health impacts. A young child's prospects of survival and development are greatly influenced by their home environment.**(Ferguson, Penney, & Solo-Gabriele, (2017).**Several studies have focused on the correlation between specific aspects of the home environment, such as indoor air quality, the presence of pollutants, and physical health issues such as asthma, respiratory infections, and general developmental delays in children. However, comprehensive data examining the cumulative effects of multiple indoor environmental factors on the physical health status of children under five is still limited. Addressing these gaps can provide valuable insights for policy makers and healthcare providers looking to improve child health outcomes through targeted interventions at the community and household level. Therefore, this study aims to evaluate the relationship between the indoor home environment and the under five physical health problems **(Kumar et al., 2023).**

The aim of this study was to

Assess the relation between indoor home environment and under five physical health problems.

Research questions:

1. What are the common physical health problems affecting under five children?
2. What is the level of sanitation at indoor home environment of under five children?
3. What is the relation between indoor home environment and physical health problems of children under five years?

Subjects and method**Subjects****Study design**

For achieving the aim of the current study, Analytical cross sectional study design was used in this study.

Study settings

The current study was conducted at two medical Centers and three Maternal and Child Health Centers (MCH) in Tanta City, which are affiliated to Ministry of Health at El Gharbia Governorate (Dr. Mohamed Mashally medical center, El-Imbaby MCH center, Segar medical center, Kohafa MCH center and Elegize MCH center).

Study subjects

A convenient sample of total (432) under- five children attending the previous setting for physical checkup or immunization were selected and included in the study. The sample size and power analysis were calculated using Epi-Info software statistical package created by World Health organization (WHO) and center for Disease Control and Prevention (CDC), Atlanta, Georgia,

USA version 2002. The total number of children attending the child clinic with their mothers at the five MCH centers during the last month was found to be 3600 child with their mothers. The sample size was found to be (432) children (which constitute 12% of the suspected sample).

Tools of data collection

A structured interview schedule was developed by the researcher to collect the necessary data for the study after reviewing the related literatures Alburaiqi, Hany, Riad, & Osman, (2021); Bush, Wakschlag, LeWinn, Hertz-Picciotto, & Nozadi, (2020); Kininmonth, Smith, Llewellyn, Dye, & Lawton, (2021), Marsh, Dobson & Maddison. (2020). Thoreia, Nazek, Shokrla & Safaa. (2011). & Zhong, Kuhn, Wang, Liu, & Luo. (2020). which consisted of three parts as follows:

Part I: Socio-demographic characteristics of the studied under five children: It included 12 items including Age, sex, birth order, residence, mother's and father's level of education and mother's and father's occupation, family income, number of family members, number of rooms and crowding index.

Part II: -Assessment of child's health status: It composed of 25 questions to assess the child's health status and child's health problems in the last 6 months as follows:

- A. Child's health history:** it consisted of 7 questions covering history of:
- Respiratory health problems such as bronchial asthma, cough, colds and its frequency, inflammation of

the tonsils (sore throat, fever)
Cough and its frequency)

- Gastrointestinal health problems such as diarrhea, abdominal colic, parasitic diseases).
- Infectious diseases such as (measles, German measles, chickenpox, parotitis, poliomyelitis, whooping cough, diphtheria, rheumatic fever, jaundice and typhoid).
- Domestic accidents such as (poisoning and its causes, injury in an accident, burns and its causes, an animal bite and suffocation and its causes).
- Skin health problems such as boils, scabies, and warts.
- Eye health problems such as (bacterial eye infection, allergies to the eye and inflammation of the cornea).
- Ear health problems such as (bacterial ear infection, infection (redness) in the outer ear and blockage in the ear canal).

B. Anthropometric measurements: it consisted of 5 questions which included child (weight in kilograms, length/height, Head circumference, Chest circumference and Arm circumference).

C. Assessment of the Child General appearance. It consisted of 13 questions as (general hygiene, face, condition of skin, hair, nail, eyes, nose, ear, throat, mouth (teething), chest, abdomen and extremities.).

Part III: -Assessing of Indoor Home environment (IHE): This part assessed the nature of children indoor home environment as reported by their mothers it consisted of 34 questions as;

Type of building material, sources of nature and artificial ventilation, sources of nature and artificial lighting, source of water, sewer type, sewage disposal, dispose of garbage bathroom and its sanitary condition, the kitchen and its sanitary condition, presence of an animal barn and its location, presence of domestic birds and its location, presence of pets, storage of the medicines in the house, type of pesticides and its storage, type of industrial detergents and its storage, Chemical fertilizers storage, cleaning of the house, presence of moisture in the house and method of heating.

Scoring system of Indoor Home environment

Each item of an indoor home environment was given a score. One score (1) was given to the Presence of positive items and score zero (0) was given to absence of positive items and presence of negative items.

The total score of indoor home environment was calculated and classified as

- **Healthy indoor environment** $\geq$ 85% of total score
- **Unhealthy indoor environment** $<$ 85% of total score.

Method

1. Obtaining approvals

An official permission to carry out the current study was obtained from Dean of the Faculty of Nursing to director of Directorate of Health Affairs at El Gharbia Governorate which affiliated to ministry of health and population.

The director of Directorate of Health Affairs at El Gharbia Governorate was informed about the objectives of the study to gain their permission and cooperation to collect data from the

selected previously mentioned settings.

2. Ethical and legal consideration

- The approval of the Faculty of Nursing Scientific Research Ethical Committee was obtained to conduct the study (code: 146-12-2022).
- An informed consent was obtained from all study subjects after providing appropriate explanation about the purpose of the study.
- Nature of the study didn't cause any harm or pain for the entire sample.
- Anonymity, confidentiality and privacy were considered regarding the collected data.

3. Developing the study tools

The study tool was developed by the researcher based on literature review and prepared in Arabic language.

The study tool was tested for face and content validity by jury of seven professors' expertise in the field of Community Health Nursing before conducting the study. Validity result ranged from (95% to 98%).

4. Pilot study

A pilot study was carried out by the researcher on 10% of the sample for testing the tool for its clarity, applicability and to identify obstacles that may be encountered with the researcher during data collection. No necessary modifications were made so, this sample were included in the study.

5. Reliability of the study tools

The study tool was tested for its reliability using Cronbach's Alpha test. It was found to be (0.665) for the entire study tool, with confidence

level 95% and significant difference < 5%.

6. The actual study

- The data collection of the present study was done by the researcher through meeting the studied children with their mother at the Maternal and Child Health Centers (MCH).
- The aim of the study was explained to each mother.
- The structured interview sheet was individually fulfilled from each mother with her child at the previously mentioned settings through asking questions and getting answers.
- The researcher met the subjects three days per week. (Saturday, Monday and Wednesday).
- The average time spent for collecting the data from each subject was 30-45 minutes.
- The data was collected by the researcher over a period starting from beginning in early March 2024 and ended late in June 2024.

7. Statistical analysis

The collected data was organized, tabulated and statistically analyzed using statistical package for social studies (SPSS) version 23. The mean, standard deviation and range were calculated for quantitative data, comparison was done using chi-square test (χ^2). Pearson's correlation coefficient (r) was used to identify correlation between variables. A significance was adopted at $P < 0.05$ for interpretation of results of tests of significance (*). Also, highly significant was adopted at $P < 0.01$ for interpretation of results of tests of significance (**).

Results

Table (1): Distribution of the studied under five children based on their socio-demographic characteristics. The table shows that the age of the studied under five children ranged from 1-5 years old with a mean age (2.94 ± 1.395) year. Slightly less than two thirds (60.2%) were aged between 3 and 5 years. Also, about half (50.9%) of them were males. While more than one-third (38.4%) of them their birth order was second-born, and more than two-thirds (68.5%) of them lived in rural areas.

Concerning mothers' education, it was obvious that, nearly half (49.5%) of the studied under five children's mothers had secondary education and about one-quarter (26.4%) of them had university or postgraduate education. Regarding mothers' occupation, it was found that, slightly less than two-thirds (63.2%) of the studied under five children's mothers were housewives and more than one-quarter (29.9%) of them were employed. Regarding fathers' occupation and education, it was found that nearly half (44.7%, 45.1% and 48.8 %,) of the studied under five children' fathers had secondary education, daily wage workers and employees respectively. As regards family income, the table illustrates that, nearly half (49.8%) of the studied under five children's families had enough income, while about one-third (31.2%) of their families had not enough income.

Regarding number of family members it was found that half (50%) of the studied under five children's families

had 3-4 members. Regarding the number of rooms in the household, it was found that about half (50.5%) of the studied under five children's houses consisted of 1-2 rooms and the other nearly half (49.5%) of them their houses consisted of 3-4 rooms. As regards to crowding index, the majority (82.4%) of the studied under five children's households had a crowding index of two rooms or less.

Table (2): represents means and standard deviations of indoor sanitary environment items for the studied under five children as reported by their mothers. The table shows that kitchen facilities and Building facilities show the highest mean score at (12.48 ± 2.123) and (11.63 ± 0.782) respectively, followed by Garbage facilities, Bathroom facilities and Storage medicine facilities which had mean scores of (6.23 ± 1.044), (5.92 ± 1.110) and (5 ± 0.462) respectively. The lowest mean scores were found among presence of birds and pets at home which represent (0.69 ± 0.570), and (0.85 ± 0.358) respectively. The total means and standard deviations of indoor sanitary environment was (82.72 ± 7.665).

Figure (1): represents the distribution of the studied under five children according to their total levels of sanitary indoor environment. The figure illustrates that, more than two-thirds (69%) of the studied under five children had Un-sanitary indoor environment, this compared to less than one-third (31.0%) of them had sanitary indoor environment.

Table (3): Represents the relationship between socio-demographic characteristics of the studied under five children and the levels of indoor home environment.

The table shows that, there was a highly significant relationship between levels of indoor home environment and socio -demographic characteristics of the studied under five children regarding age in years, birth order, mother's educations, father's educations, father's occupation, mother's occupation, family income, number of rooms and crowding index $p < (0.001)$. It also reveals that, there was a statistically significant relationship between levels of indoor sanitary environment and their sex and place of residence $p < (0.05)$.

Table (4): Represents the relationship between the history of exposure to eye, ear and skin infection of the studied under five children as reported by their mothers and the levels of indoor home environment. The table illustrates that, there was a highly significant relationship between indoor home environment and their history of exposure to eye and ear infection such as: (bacterial eye infection, inflammation of the cornea, bacterial ear infection, infection in the outer ear and a blockage in the ear Canal) $P = (0.001^{**})$. On the other hand, there is a significant relationship between the levels of indoor home environment and occurrence of allergic to the eye of the children $P = (0.018^{*})$. Also, the table shows that, there was a highly significant relationship between indoor home

environment and the history exposure to all skin problems during the last six months $p = (0.001)$, except with scabies and skin allergy.

Table (5): Represents the relationship between the history of respiratory problems of the studied under five children as reported by their mothers and the levels of indoor home environment. The table illustrates that, there was a highly significant relationship between indoor home environment and the history of exposure to respiratory problems such as: (frequency of colds attacks, tonsillitis and its frequency attacks, cough and its attacks) among the children $P = (0.001)$. On the other hand, there is no significant relationship between the levels of indoor home environment and the occurrence of bronchial asthma and the frequency of its attacks $p = (0.416 \& 0.391)$ respectively.

Table (6): shows the relationship between gastrointestinal (GIT) problems in the studied under five children as reported by their mothers and the levels of indoor home environment. The table shows that, there was a highly significant relationship between indoor home environment and the history of exposure to gastrointestinal (GIT) problems such as: (frequency and severity of diarrheal and frequency of its attacks and chemical poisoning) $P = (0.001^{**})$. As regard to history of parasitic infection, the table shows that two thirds (66.9%) of children having an unsanitary indoor home environment had history of parasitic infection compared to only one third (33.1%) of those having sanitary

indoor environment. However, there was no significant relationship between indoor environment and history of parasitic infestation.

Table (7): represents the relationship between the histories of infectious diseases of studied under five children, as reported by their mothers, and levels of indoor home environment. The table reveals that, there was a highly significant relationship between indoor home environment and history of the studied under five children regarding exposure to measles and german measles and chicken pox during the last six months $p < (0.01)$ No

significant relation was found with parotitis and whooping cough $p > (0.05)$.

Table (8): represents the relationship between the history of home accidents among children as reported by their mothers and the levels of indoor home environment. The table illustrates that, there was a highly significant relationship between indoor home environment and exposure of the children to home accidents during the last six months such as, falling, burn, animal bite and suffocation. $p = (0.001)$.

Table (1): Distribution of the studied under five children according to their socio-demographic characteristics

Variables	The studied sample (n=432)	
	No	%
Age in years		
1-2	172	39.8
3-5	260	60.2
Mean±SD `range	2.94±1.395 1-5	
Sex		
Males	220	50.9
Females	212	49.1
Birth order		
First	67	15.5
Second	166	38.4
Third	109	25.2
Fourth	83	19.2
Fifth	7	1.6
Place of residence		
Rural	296	68.5
Urban	136	31.5
Mothers' educations		
Illiterate or read & write	52	12.0
Basic education	52	12.0
Secondary education	214	49.5
University and post graduate education	114	26.4
Mother occupation		
House wife	273	63.2
Daily wage worker	30	6.9
Employee	129	29.9
Fathers' educations		
Illiterate or read & write	111	25.7
Basic education	4.9	4.9
Secondary education	193	44.7
University and post graduate education	107	24.8
Fathers occupation		
Not working	26	6.0
Daily wage worker	195	45.1
Employee	211	48.8
Family income		
Enough	215	49.8
Enough and save	82	19.0
Not enough	135	31.2
Number of family member		
3-4	216	50.0
5-6	209	48.4
More than 6	7	1.6
Range	3-7	
Mean±SD	4.58±2.56	
Numbers of rooms		
1-2	218	50.5
3-4	214	49.5
Range	1-4	
Mean±SD	2.56±0.629	
Crowding index:		
≤ 2	356	82.4
> 2	76	17.6

Table (2): Means and standard deviations of indoor sanitary environment items of the studied under five children homes as reported by their mothers

Sanitary indoor environment items	The studied under five children (n=432)
	Mean $\pm$ SD
Building facilities	11.63 $\pm$ 0.782
Ventilation facilities	2.22 $\pm$ 0.413
Lighting facilities	2.00 $\pm$ 0.000
Water and sewage facilities	2.75 $\pm$ 0.768
Garbage facilities	6.23 $\pm$ 1.044
Bathroom facilities	5.92 $\pm$ 1.110
Kitchen facilities	12.48 $\pm$ 2.123
Animal barn control	4.03 $\pm$ 0.504
Presence of birds	0.69 $\pm$ 0.570
Presence of pets	0.85 $\pm$ 0.358
Storage medicine facilities	5.000 $\pm$ 0.462
Pesticide storage	3.83 $\pm$ 0.968
Industrial detergents storage	2.75 $\pm$ 0.984
Chemical fertilizer storage	1.65 $\pm$ 0.752
Presence of insect and rodent	1.81 $\pm$ 0.909
Cleaning home facilities	3.86 $\pm$ 0.517
Ventilating home activities	2.55 $\pm$ 0.696
Home moisture	1.55 $\pm$ 0.772
Heating activities in home	3.42 $\pm$ 0.802
Total indoor sanitary environment	82.72 $\pm$ 7.665

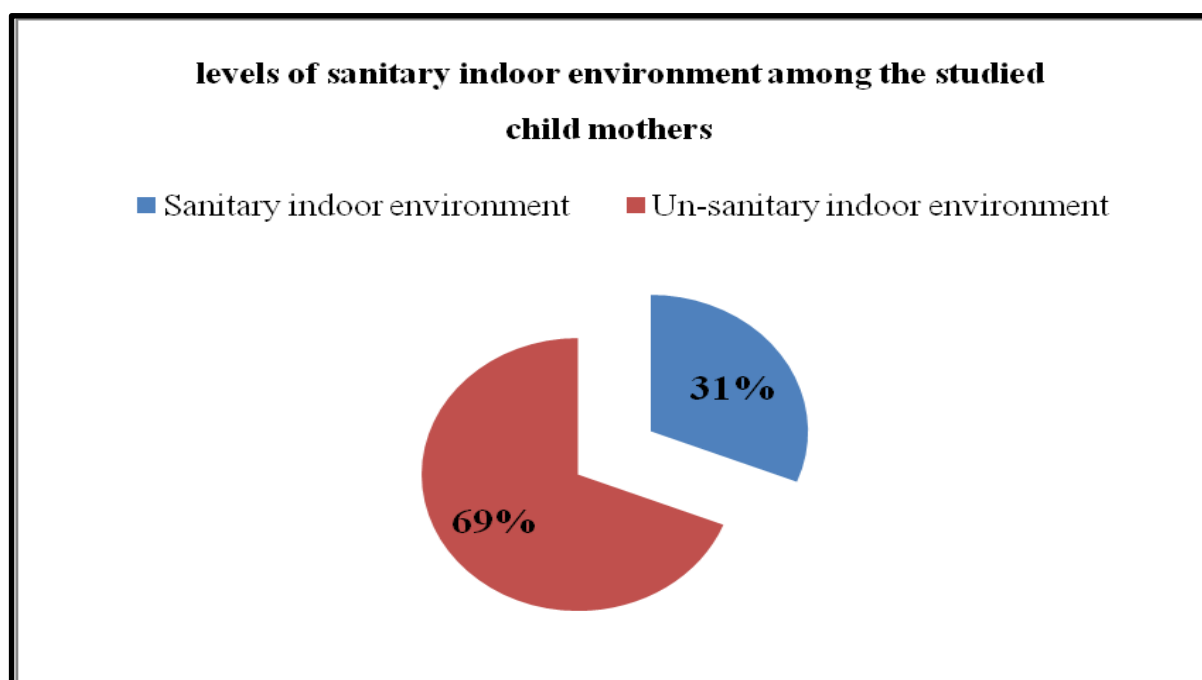
**Figure (1): Distribution of the studied under five children according to their levels of sanitary indoor environment.**

Table (3): Relation between socio-demographic characteristics of the studied under five children and levels of indoor home environment.

Variables	Un-sanitary indoor environment (n=298)		Sanitary indoor environment (n= 134)		X ² p
	No	%	No	%	
Age in years					10.640
1-2	134	77.9	38	22.1	0.001**
3-5	164	63.1	96	36.9	
Sex					4.123
Males	142	64.5	78	35.5	0.042*
Females	156	73.6	56	26.4	
Birth order					18.504 0.001**
First	56	83.6	11	16.4	
Second	103	62.0	63	38.0	
Third	82	75.2	27	24.8	
Fourth	50	60.2	33	39.8	
Fifth	7	100.0	0	0	
Place of residence					5.866 0.015*
Rural	215	72.6	81	27.4	
Urban	83	61.0	53	39.0	
Mothers' educations					46.691 0.001**
Illiterate or read & write	28	53.8	24	46.2	
Basic education	20	38.5	32	61.5	
Secondary education	178	83.2	36	16.8	
University and post graduate education	72	63.2	42	36.8	
Fathers' educations					28.270 0.001**
Illiterate or read & write	57	51.4	54	48.6	
Basic education	20	95.2	1	4.8	
Secondary education	148	76.7	45	23.3	
University and post graduate education	73	68.2	34	31.8	
Father occupation					12.697 0.002**
Not working	26	100.0	0	0	
Daily wage worker	133	68.2	62	31.8	
Employee	139	65.9	72	34.1	
Mother occupation					18.386 0.001**
House wife	194	71.1	79	28.9	
Daily wage worker	29	96.7	1	3.3	
Employee	75	58.1	54	41.9	
Family income					42.949 0.001**
Enough	117	54.4	98	45.6	
Enough and save	66	80.5	16	19.5	
Not enough	115	85.2	20	14.8	
Number of family member					5.292 0.071
3-4	141	65.3	75	34.7	
5-6	150	71.8	59	28.2	
More than 6	7	100.0	0	0.0	
Number of rooms					6.893 0.009**
1-2	163	74.8	55	25.2	
3-4	135	63.1	79	36.9	
Crowding index:					
≤ 2	231	64.9	125	35.1	15.850
> 2	67	88.2	9	11.8	0.001**

p<0.05* significant

p<0.01** highly significant

Table (4): Relation between the history of exposure to eye, ear and skin infection of the studied under five children and levels of indoor home environment as reported by their mothers

History of exposure of children to eye, ear and skin infection during the last six months	The studied under five children (n=432)				X ² P
	Un-sanitary indoor environment (n=298)		Sanitary indoor environment (n= 134)		
	No	%	No	%	
Having bacterial eye infection					
Yes	141	75.4	46	24.6	6.351 0.008**
No	157	64.1	88	35.9	
Having allergic to the eye					
Yes	145	74.4	50	25.6	4.804 0.018*
No	153	64.6	84	35.4	
Suffering from inflammation of the cornea (redness of the whites of the eye)					
Yes	187	79.9	47	20.1	28.521 0.001**
No	111	56.1	87	43.9	
Having bacterial ear infection (pus secretions)					
Yes	152				14.446 0.001**
No	146	78.4 61.3	42 92	21.6 38.7	
Having an infection (redness) in the outer ear					
Yes	17	29.8	40	70.2	47.053 0.001**
No	281	74.9	94	25.1	
Having a blockage in the ear canal (Bead- pin- glass ball)					
Yes	21	42.0	29	58.0	19.238 0.001**
No	277	72.5	105	27.5	
Having boils in the skin (impetigo)					
Yes	105	86.8	16	13.2	24.875 0.001**
No	193	62.1	118	37.9	
Frequency of boils attack					0.001**
From 1-2 times	94	85.5	16	14.5	
From 3-4 times	11	100.0	0	0.0	
Having scabies					
Yes	43	76.8	13	23.2	1.831 0.176
No	255	67.8	121	32.2	
Having lice					
Yes	32	39.5	49	60.5	40.479 0.001**
No	266	75.8	85	42.2	
Having an allergic reaction to the skin (red spots on the skin or small red blisters)					
Yes	113	71.5	45	28.5	0.750 0.387
No	185	67.5	89	32.5	

p<0.05* significant p<0.01** highly significant

Table (5): Relation between histories of exposure to respiratory problem of the studied under five children as reported by their mothers and levels of indoor home environment

History of exposure of children to respiratory diseases during the last six months	The studied under five children (n=432)				
	Un-sanitary indoor environment (n=298)		Sanitary indoor environment (n= 134)		X ² P
	No	%	No	%	
Frequency of colds attack among children					
From 1-2 times	90	64.7	49	35.3	69.524 0.001**
From 3-4 times	118	97.5	3	2.5	
5 and more	90	52.3	82	47.7	
Having tonsillitis (difficulty swallowing – fever)					
Yes	231	63.5	133	36.5	32.9 0.001**
No	67	98.5	1	1.5	
Frequency of tonsillitis attack					
No attack	67	98.5	1	1.5	37.2 0.001**
From 1-2 times	125	67.6	60	32.4	
From 3-4 times	64	62.7%	38	37.3	
5 and more	42	54.5	35	45.5	
Suffering from cough					
Yes	298	78.4	82	21.6	131.4 0.001**
No	0	0.0	52	100.0	
Frequency of cough attack					
No attack	0	0.0	52	100.0	159.8 0.001**
From 1-2 times	83	89.2	10	10.8	
From 3-4 times	119	77.3	35	22.7	
5 and more	96	72.2	37	27.8	
Suffering from bronchial asthma					
Yes	153	68.3	71	31.7	0.100 0.416
No	145	69.7	63	30.3	
Frequency of bronchial asthma					
From 1-2 times	123	69.9	53	30.1%	3.006 0.391
From 3-4 times	24	68.6	11	31.4	
5 and more	6	100.0	0	0.0	

p<0.05* significant p<0.01** highly significant

Table (6): Relation between histories of exposure to gastrointestinal (GIT) problems of the studied under five children as reported by their mothers and levels of indoor home environment

History of exposure of studied under five children to gastrointestinal (GIT) problems during the last six months	The studied child's mothers (n=432)				X ² P
	Un-sanitary indoor environment (n=298)		Sanitary indoor environment (n= 134)		
	No	%	No	%	
Having diarrhea					
Yes	248	67.9	117	32.1	2.454 0.075
No	50	74.6	17	25.4	
Frequency of diarrhea attack in the last 6 months					
From 1-2 times	177	77.0	53	23.0	31.376 0.001**
From 3-4 times	65	50.4	64	49.6	
5 and more	6	100.0	0	0.0	
severity of diarrhea					
Mild diarrhea	138	80.7	33	19.3	29.139 0.001**
Moderate diarrhea	95	54.6	79	45.4	
Severe diarrhea	15	75.0	5	25.0	
poisoning by a chemical					
Yes	42	60.0	28	40.0	3.149 0.053
No	256	70.7	106	29.3	
Causes of chemical poisoning					
Chlorine	23	45.1	28	54.9	22.650 0.001**
Medicines	12	100.0	0	0.0	
Insecticides	7	100.0	0	0.0	
Infected with parasitic worms					
Yes	103	66.9	51	33.1	0.492 0.276
No	195	70.1	83	29.9	
Type of parasite					
Oxyuris	103	66.9	51	33.1	0.492 0.276

p<0.05* significant p<0.01** highly significant

Table (7): Relation between histories of exposure to infectious diseases of the studied under five children as reported by their mothers and levels of indoor home environment

Environment

History of infectious disease	The studied under five children (n=432)				
	Un-sanitary indoor environment (n=298)		Sanitary indoor environment (n= 134)		X ² P
	No	%	No	%	
infected with any of these infectious diseases					
Measles Yes No	17 281	33.3 73.8	34 100	66.7 26.2	34.344 0.001**
German measles Yes No	4 294	14.8 72.6	23 111	85.2 27.4	39.491 0.001**
Chicken pox Yes No	4 294	40.0 69.7	6 128	60.0 30.3	4.018 0.045*
Parotitis Yes No	0 298	0.0 69.1	1 133	100.0 30.9	2.229 0.135
Whooping cough Yes No	52 2	78.8 67.2	14 120	21.2 32.8	3.501 0.061

p<0.01** highly significant p<0.05* significant

Table (8): Relation between history of exposure to home accidents of the children as reported by their mothers and levels of indoor home environment

History of children to home accidents	The studied sample (n=432)				
	Un-sanitary indoor environment (n=298)		Sanitary indoor environment (n= 134)		X ² P
	No	%	No	%	
Exposed to falling					
No, not exposed	18	29.0	44	71.0	62.245
Yes, Falling down from the stairs of the house	84	86.6	13	13.4	0.001**
Yes, Skating on the floor	64	68.1	30	31.9	
Yes, Falling from the chair	132	73.7	47	26.3	
Suffering from burns					
No, not exposed	222	72.3	85	27.7	18.200 0.003**
Yes from Boiling water	53	66.3	27	33.8	
Yes from gas stove	8	38.1	0	0.0	
Yes from wabour Jazz	3	100.0	0	0.0	
Yes from boiling oil	8	47.1	9	52.9	
Yes from caustic materials	4	100.0	0	0.0	
Bitten by an animal					
No	228	65.7	119	34.3	16.693
Yes from dog	32	100.0	0	0.0	0.001**
Yes from cat	37	71.2	15	28.8	
Yes from mouse	1	100.0	0	0.0	
child suffocated					
No suffocation	245	64.6	134	35.4	27.165
Yes from smoking	10	100.0	0	0.0	0.001**
Yes from Burning wood or firewood	43	100.0	0	0.0	

p<0.05* significant p<0.01** highly significant

Discussion

Healthy children are essential assets for ensuring the future well-being and prosperity of any society. The early years of life play a pivotal role in shaping the physical, cognitive, and emotional development of children. However, numerous factors threaten the health and growth of children, particularly those under the age of five, who are among the most vulnerable groups in any population. These threats include inadequate living conditions, poor sanitation, malnutrition, and exposure to

environmental pollutant (Likhar, Baghel, & Patil (2022)). The indoor home environment significantly influences the physical health status of young children. As children spend a considerable amount of their time indoors, their health is profoundly impacted by factors such as air quality, ventilation, cleanliness, water quality, and exposure to harmful chemicals. (Vardoulakis et al., 2020.). So, the aim of this study was to assess the relationship between indoor home environments and the physical health problems of children under

five. Regarding to the socio-demographic characteristics of the studied children the current study results found that, nearly two-thirds of the studied children aged 3–5 years and more than half of them were male and more than two-thirds of them lived in rural areas (**Table I**). These results consistent with a study conducted by **Attia, ElKashlan & Saleh. (2024)** about early childhood caries risk indicators among preschool children in rural Egypt, Egypt, which reported that more than half of the studied children their age ranged from 3–5 years. And also consistent with a study conducted by **Abdelhady and Farag (2023)** about understanding inequities in child mortality in Egypt which reported that more than half of the studied children were male and more than two-thirds of the studied children reside in rural areas, also found that rural residence in Egypt is associated with higher child mortality rates due to socioeconomic and environmental inequities compared to urban areas respectively.

In relation to occupation and education of the studied under five children's mothers, The present study findings was attributed that, only more than one-quarter of them were employed and had university or postgraduate education respectively (**Table I**). This findings are in the same line with **Mohammed, Wassif, Hakim & Moustafa, M. E. (2019)** who conducted a study about unintentional home injuries in children under five in Cairo, Egypt, and found that more than one-quarter of the studied under five children's mothers were employed and had

university or postgraduate education. These results assure that the education and working status of the mothers are still need to more attention as this may affect the access to health information, health care services and awareness of the importance of the sanitary environment which may influence the overall child health status.

As regard to means and standard deviations of indoor sanitary environment items for the studied under five children, the current study results reported that, the lowest mean scores was found among presence of birds and pets at home which represent (0.69 ± 0.570), and (0.85 ± 0.358) respectively. The total means and standard deviations of indoor sanitary environment was (82.72 ± 7.665) (**Table 2**). These results are consistent with a study by **Budge et al. (2022)** conducted in Ethiopia, which examined the role of domestic animals in bacterial contamination of infant transmission pathways, the study found that the presence of domestic animals including birds and pets at home significantly contributed to increased bacterial contamination on surfaces and hands, potentially increasing infection risks for young children. Also, mean scores was found among cleaning home facilities and ventilating home activities which represent (3.86 ± 0.517), and (2.55 ± 0.696) respectively (**Table 2**). These results These practices are closely aligned with public health guidelines and strongly supported by **Abdel-Salam (2022)** and **Vardoulakis et al. (2020)**, who emphasized the critical role of household cleaning and ventilation in preventing airborne and

surface-transmitted diseases in children.

Generally, the present study results highlighted that, according to the total levels of sanitary indoor environment, more than two-thirds of the studied under five children had un-sanitary indoor environment (**Figure 1**). This finding aligns with **Mondal& Paul, (2020)**, who study effects of indoor pollution on acute respiratory infections among under-five children in India and found that more than two-thirds of the under five children had poor indoor environment, poor ventilation and low socioeconomic status which increase rates of respiratory infection and infectious disease among young children that emphasizing the critical impact of un-sanitary indoor environment on health of under five children.

In relation to the relationship between socio-demographic characteristics of the studied under five children and the levels of indoor home environment, the current study findings illustrated that, a highly significant relationship between levels of indoor home environment and socio -demographic characteristics of the studied under five children regarding age in years, birth order, mother's and father's educations, father's and mother's occupation, family income, number of rooms and crowding index $p < (0.001)$ (**Table 3**). These findings are strongly supported by **Abdel-Salam (2022)** and **Likhar et al. (2022)**, who noted that higher parental education and income levels are consistently linked to safer and healthier household environments. Additionally, the study found a significant relationship

($p < 0.05$) between environment scores and sex and residence, suggesting potential gender-based vulnerability or urban-rural disparities. **Nyamusi (2021)** similarly reported better sanitation practices in urban than in rural households in East Africa.

As regard to the relation between levels of indoor home environment and different physical health problems among studied under five children the current study revealed that, there was a highly significant relationship ($p = 0.001$) between poor indoor home environments and history of exposure to eye and ear infections, including bacterial eye infection, corneal inflammation, and ear canal blockages (**Table 4**). This aligns with studies by **Abdel-Salam (2022)** and **Sadrizadeh et al. (2022)**, both of which link indoor air pollution, moisture, and vector presence to increased ENT infections. Notably, there was a significant relationship with allergic eye conditions ($p = 0.018$), this result could be due to their multifactorial etiology, including genetic predisposition or external allergens not confined to the home.

Additionally, the current study showed that, a highly significant relationship ($p = 0.001$) between the indoor environment and the frequency of respiratory issues such as colds, tonsillitis, and cough. However, there was no significant relationship with bronchial asthma and its frequency ($p = 0.416, 0.391$) (**Table 5**). This results may be attributed to the chronic nature of asthma that goes beyond short-term environmental exposure and involves immunologic and genetic factors also not all children are equally sensitive to

indoor environmental triggers, while some may develop asthma symptoms due to dust, mold, as discussed by **Bozzola et al. (2024)** also, These findings were supported by **El-Koofy, El-Shabrawi, Abd El-alim, Zein& Badawi. (2022)**. who reported high prevalence rates of respiratory infections among under-five Egyptian children, particularly in overcrowded or low-ventilation households. Otherwise, the study result was incongruent with results of the study conducted by **Gruenwald, Seals, Knibbs& Hosgood. (2023)**. This demonstrated a significant positive relationship between indoor environment and the incidence of childhood asthma in the United States. The study concluded that childhood asthma cases could be attributed to exposure to nitrogen dioxide emitted from gas cooking appliances.

Moreover, the present study results highlighted that, there was a highly significant relationship ($p=0.001$) between the indoor home environment and gastrointestinal (GIT) issues, including the frequency of diarrheal attacks, types of diarrhea, and chemical poisoning. Children from homes with unsanitary environments were more likely to suffer from repeated diarrhea and chemical exposure (**Table 6**). This aligns strongly with the findings of **Bekele, Rawstorne& Rahman. (2020)**. who demonstrated that poor water quality, inadequate sanitation, and unsafe chemical storage significantly increase the risk of gastrointestinal illnesses. **Abdel-Salam (2022)** also noted that households using

unregulated pesticides and cleaning agents without safety protocols reported higher rates of child poisoning and enteric diseases.

Concerning to the relationship between the indoor environment and exposure to infectious diseases such as measles, German measles, and chickenpox ($p < 0.05$). The current study findings reflected how inadequate home hygiene and ventilation can contribute to the spread of infectious agents within families (**Table 7**). **Abdelhady and Farag (2023)** noted that crowding and poor household conditions often contribute to outbreaks of vaccine-preventable diseases, especially when herd immunity is compromised. However, no significant associations were observed for parotitis and whooping cough, potentially due to effective immunization coverage or lower seasonal prevalence during the study period. These results underscore that while household conditions influence disease transmission, vaccination plays a dominant role in preventing specific infectious diseases.

Regarding the relationship between the histories of home accidents among children as reported by their mothers and the levels of indoor home environment, the current study findings revealed that, there was a highly significant relationship between indoor home environment and exposure of the children to home accidents during the last six months as, falling, burn, animal bite and suffocation. $p = 0.001$ (**Table 8**). These findings strongly correlate with **Kamal (2013) and Mohammed et al.**

(2019), who showed that children living in crowded poorly designed or unsupervised homes are at greater risk for domestic accidents. **Abdel-Salam (2022)** emphasized that environmental safety features such as proper storage, ventilation, and structural layout (e.g., secured stairways, separate kitchens) are essential for reducing injury risk in households with young children. These results affirm that improving the indoor home environment not only enhances health but also prevents injury-related morbidity.

Conclusion

Based on the findings of the present study, it can be concluded that, Poor housing conditions, inadequate ventilation, improper waste disposal, and overcrowding contribute the prevalence of physical health problems among children under five years. There was statistically significant relationships between the sanitary level of indoor home environment and the physical health problems among studied under five children such as: (eye and ear infection, respiratory, gastrointestinal diseases, exposure to home accidents, poor skin, and health history of infectious disease, frequent childhood illness as well as the general appearance of children. Socio-demographic factors such as parental education, occupation, and income levels also play a crucial role in determining household sanitary conditions and, consequently, children's health outcomes. In addition, the results emphasize the urgent need for improved housing conditions and greater awareness of

home hygiene to promote better child health and well-being.

Recommendations

Based on the results of the present study the following recommendations were suggested

1. Community health nurses should implement community based awareness programs through mass and social media to large sector of community about important of maintaining sanitary and safe indoor home environment, home hygiene and disease prevention to help parents create a healthier environment and foster healthier outcome for their children.
2. Encourage public health campaigns and mass media campaigns to raise awareness among large sectors of community about the impact of indoor home environment on child health.
3. Support regulation on indoor air quality and toxic chemical use in homes and enhance policy decisions regarding public health guidelines aimed to improving the indoor home environment for under five children.
4. Further research needs to assess the effect of indoor home environment on other health aspects of young children.

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Effect of White Noise and Brahms' Lullaby on Infants' Pain, and Physiological Parameters during Invasive Interventions

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Abstract

Background: Pain relief is achieved through pharmacological and non-pharmacological methods. White noise and lullaby sounds are suggested as non-pharmacologic strategy to relief pain that can be applied to infants during invasive interventions. **Aim:** Evaluate the effect of white noise and Brahms' lullaby on infants' pain and physiological parameters during invasive interventions. **Design:** randomized controlled trial. **Subjects & Setting:** purposive sample of 90 infants from Neonatal and Pediatric Intensive Care Unit of Tanta Main University Hospital and Elmagbara Hospital. **Tools:** **Tool I:** Infants' bio-social characteristics, **Tool II:** Infants' Physiological Parameters, **Tool III:** Infant Pain Scale. **Results:** The infants in the white noise group had none to mild pain, while the lullaby group experienced mild to moderate pain as compared to the control group who experienced severe pain. **Conclusion:** White noise and Brahms' lullaby were effective in reducing infants' pain and improve physiological parameters during invasive interventions. **Recommendation:** Pediatric nurses should adopt non-pharmacological approaches including white noise and Brahms' lullaby to relieve pain during invasive interventions on infants.

Keywords: Brahms' lullaby, infants, invasive interventions, pain, physiological parameters & white Noise

Introduction

Pain can be identified as a special sensation with emotional and psychological issue. It is one of the most common feelings among newborns and infants, which can be brought on by illness, trauma, and different medical interventions (**Bourgois, Shaha, Vanoni, Jaques, Newman& Simonetti, 2020**). Infants requiring intensive care undergo on average between 7 times to 17 numerous invasive painful interventions per day during their hospital stay. The most common interventions are heel lancing, suctioning, In addition to, venous or arterial catheterization, blood samples from the vein, intubation of chest tube, aspiration, injections and surgical operations that can cause pain. Thus, it is crucial to manage infants' pain in order to assess and eradicate it so; both non-pharmacological and pharmacological approaches are employed (**Gilam, Gross, Wager, Keefe, Mackey, 2020 & Kassab, Alhassan, Alzoubi& Khader, 2019**). Nurses are responsible for reducing the discomfort felt by infants undergoing painful invasive interventions. Non-pharmacologic strategies are the strongest evidence used to mitigate pain following invasive interventions. (**Yıldırım& Gerçeker, 2023& Wang, Guo& Xiong, 2022**).

White noise and lullaby are non-pharmacological approaches that utilize audio based stimulants that work well as a cognitive technique to help and divert infants' attention from the discomfort. (**Kahraman, et al., 2020**). White noise is a continuous,

monotonous sound that conceals distracting sounds from the outside world and has a relaxing effect. The sounds in a mothers' womb are comparable to white noise. The infant is influenced by the mother's heartbeat while still in the womb, and after delivery, being exposed to these comforting sounds and rhythms has a calming effect (**Komann, Weinmann, Schwenkglens& Meissner, 2019**).

Lullaby is a relaxing music that can be used to divert attention from pain as it increase endorphins and regulate vital signs. Lullaby sounds are warm, gentle, and soothing, which can help an infant to relax and fall asleep. This is crucial to shield the brain from the detrimental impacts of stress and suffering in early life. During painful procedures, lullabies can help infants feel less pain (**See, Ng & Ignacio, 2023& Özgürbüz, Bahar, Tuna &Çopur, 2024**). So this study aims to evaluate the effect of white noise and Brahms' lullaby on pain, and physiological parameters during invasive interventions applied to infants.

Significance of the study

Pain is one of the worst sensations for infants. Non-pharmacological interventions become very important to alleviate it. White noise is similar to sounds heard in the mothers' womb. It influencing the nervous system and altering pain perception. Specifically, it can reduce activity in the auditory cortex and thalamus, key areas involved in processing sensory information, including pain. Lullaby music is work as distractor of attentions by influencing

physiological parameters like heart rate and blood oxygen saturation, and also by affecting pain perception through cognitive and emotional engagement. This may involve a combination of sensory input, emotional responses, and cognitive distraction, ultimately leading to a state of relaxation and reduced pain. It is difficult to assess the efficacy of pain management therapies for infants due to their nonverbal communication. Behavioral (cries, facial expression), physiological indicators (heart rate, respiration rate, oxygen saturation), and pain scores by observers are commonly used to evaluate nonpharmacological interventions for pain relief. (Walco et al., 2018)

Aim of the study

Evaluate the effect of white noise and Brahms' lullaby on infants' Pain and physiological parameters during invasive interventions.

Research hypotheses

- Both white noise and Brahms' lullaby are expected to improve infants' pain and physiological parameters in the studied groups than the control group.
- White noise is expected to relieve infants' pain and improves physiological parameters during invasive interventions than Brahms' lullaby

Subjects and method

Study design

A randomized controlled trial study design was used for this study.

Setting

This study was conducted at Neonatal and Pediatric Intensive Care Unit of Tanta Main University Hospital which

is affiliated to the Ministry of Higher Education and Scientific Research and Elmagbara Hospital which is affiliated to the Ministry of Health and Population.

Subjects

A purposive sample of 90 infants. The size of sample was based on the following equation $n = \frac{M}{\{(S^2 \times (M-1)) \div pq\} + 1}$ (n) sample size, (M) population size, (S) desired confidence level equal 1.69, (P) the desired level of precision equal 0.5, (q) the estimated proportion of an attribute that is present in the population and equal $1 - p$. They were randomly assigned into three groups. The researcher uses simple random technique to classify infants into groups. A slip of paper with the infants' identification code was inscribed in each place, tucked inside a container, thoroughly mixed, and then a subject was chosen at random. The first selection was for white noise group. The second one for Brahms' lullaby group and the third one was for control group. Each group consisted of 30 infants

Criteria for infants' selection

- Age from birth until one year
- Full term
- Has no hearing or nervous problem
- Conscious

Tools of the study

Tool I: Infants' bio-social characteristics as: it was developed by the researchers as age, sex, residence, types of invasive procedures.

Tool II: Infants' Physiological Parameters: as respiratory rate, heart rate and O_2 saturation.

Tool III: Infants' Pain Scale: it was adopted from (Lawrence, et al., 1993), it can be used to assess pain in infants. It assesses five behavioral indicators: arms, legs, crying facial expression, and degree of alertness. The total pain score ranges from 0 to 7, with 0–2 points representing mild to no pain, 3–4 points representing mild to moderate pain, and scores greater than 4 points representing severe pain.

Method

An official permission was secured from the directors of the previous settings of Tanta Main University Hospital and Elmagbara Hospital after outlining the goal of the research, setting the time for beginning the study.

Ethical approval was obtained from the Research Ethics Committee of the Faculty of Nursing, Tanta University. The code number was 611-3-2025.

Consent to participate in the study from the parents of infants was taken after explaining the goal of the study and giving them the option to withdraw at any time without having to give a reason or affecting their infants' care,

The study tools were constructed after revision of recent related literatures

Tool Validity: Pediatric nursing specialists evaluated the study's instruments for content validity. It was 96%.

A pilot study was carried out before the actual data gathering phase on (10%) of infants to assess the tool's feasibility, clarity, and application as well as to identify any possible obstacles throughout the data collection process.

Content reliability: The study tools were tested by the pilot subjects. High reliability of the tools was indicated by Cronbach's alpha and the value was 0.89 for tool I, II and 0.960 for tool III. **The study was carried out through four phases**

- **Assessment Phase:** The researcher was conducted an assessment of all the infants to gather baseline data regarding their bio-socio characteristics and physiological parameters using tool I,II prior to the intervention.
- **Planning Phase:** the researcher reviewed relevant literatures and prepared the non-pharmacological approaches used in the current study (white noise & Brahms's lullaby).
- **Intervention Phase:** The researchers were attended to the study settings alternately, three days/week at the morning shift. The researchers began collecting the data of infants (Tool I) within 10 minutes. Physiological parameters were assessed during and after invasive interventions by (tool II) and pain was assessed after invasive interventions by (Tool III). The researchers were presented in the place of the study and applied white noise sound or Brahms' lullaby for infants in each group.

White noise group: The infants were prepared by placing them in a comfortable position according type of intervention. Prior to painful procedures, they listened to white noise sound for an average of one minute, and this lasted during the interventions. The duration of white

noise application depended on how long the interventions lasted. The white noise was played at a minimum distance of 30 cm and a maximum of 45 cm from the infant. In the meantime, the behavioral reactions to pain were documented during intervention. The infant's heart, breathing, and oxygen saturation rates were assessed both during and after the intervention.

Brahms' lullaby group: The infants were prepared by placing them in comfortable position according to invasive technique and then the infants listened to Brahms' lullaby that downloaded in mobile for an average of one minute before painful interventions and continued during the procedure. The duration of the listening varied depending on the duration of interventions. The playing of the lullaby was carried out at a minimum distance of 30 cm and a maximum of 45 cm from the infant. In the meantime, the behavioral reactions to pain were documented during intervention. The infants' heart, breathing, and oxygen saturation rates were assessed both during and after the intervention.

Control group: Infants were exposed to different painful interventions without any intervention (white noise and lullaby not played). Behavioral responses of the infants' pain were recorded during interventions and the heart rate, respiration, and oxygen saturation rates were measured during, and after the interventions. Data collection was performed from March to May 2025

– **Evaluation Phase:** Evaluation was carried out during and after

invasive interventions using tool (II & III) for the three groups and compared them to each other. Data was collected through three months from March to May 2025.

Statistical analysis

The collected data were organized, tabulated and statistically analyzed using SPSS software (Statistical Package for the Social Sciences, version 26, SPSS Inc. Chicago, IL, USA). For quantitative data, the range, mean and standard deviation were calculated. For qualitative data, which describe a categorical set of data by frequency, percentage or proportion of each category comparison between two groups and more was done using Chi square test (χ^2). For comparison between more than two means of parametric data, F value of ANOVA test was calculated. Correlation between variables was evaluated using Pearson's correlation coefficient (r). Significance was adopted at $P < 0.05$ for interpretation of results of tests of significance, highly significance was adopted at $P < 0.001$ for interpretation of results of tests of significance (White, 2019)

Results:

Table (1): shows distribution of infants' bio-social characteristics. Similar results of bio-social characteristics were found in the three groups. Regarding their sex, it was found that 66.7 % of infants in both white noise group and lullaby group were male while 63.3 % of infants were male in control group. It was evident that mean of infants' age in month was 4.07 ± 1.55 , 4.07 ± 1.55 and 4.00 ± 1.54 in white noise, lullaby and control group respectively. It was

clear that 70.0% of infants in both white noise and lullaby group were from urban, while 73.3% of the infants in the in control group were from rural areas. As regards different invasive procedures. It was evident that infants were exposed to injection procedures 30%, 33.3% and 43,3% in white noise, lullaby and control group respectively while, blood draws were experienced between 53.3%, 56.7% & 40% in the same order.. It was found that 10% in white noise and lullaby groups had aspiration compared to 16.7% of the control group.

Table (2): illustrates total mean score of physiological parameters of infants in white noise, lullaby and control groups during and after invasive interventions. Regarding white noise group, it was observed that physiological parameters were within the normal range during and after invasive intervention as the mean of respiratory rate, heart rate during and after were 32.83, 33.20, 116.20 and 116.20 respectively. As regard lullaby group, it was founded that the mean of respiratory rate, heart rate during and after were increased but still with normal rang as it become 36.27, 47.90, 135.57 and 136.80 respectively. In control group, the mean of respiratory rate, heart rate during and after were increased more. The mean of respiratory rate, heart rate during and after were 43.55, 43.55, 158.00 and 160.69 respectively. Oxygen saturation was observed to be in the normal range in white noise and lullaby group but decrease little in the control group

during and after invasive intervention as the mean values were 95.93, 96.07, 95.93, 96.07, 93.41 and 93.41 respectively. There were a highly statistical significance difference of all items of physiological parameters during and after invasive interventions for all three groups as p value= <0.001 except in respiratory rate after as p value= 0.274.

Table (3): shows total infants' pain level during invasive interventions for white noise, lullaby and control groups. It was observed that all infants in the white noise group (100%) had no pain to mild pain during procedures, while, all of the infants in the lullaby and control groups (100%) had mild to moderate pain and severe pain respectively with highly statistical significance difference ($p = 0.001$).

Table (4): shows correlation between Infants' pain level and physiological parameters during and after invasive interventions for white noise, lullaby and control groups. It was observed that there were positive correlation between infants' pain during invasive interventions and respiratory rate during and after invasive interventions in white noise and lullaby groups with high statistical significant correlations as P value = 0.009, <0.001 , 0.014 and <0.001 respectively. There were also positive correlation between Infants' pain during invasive interventions and heart rate during and after invasive interventions in white noise and lullaby groups as P value = <0.001 , <0.001 , 0.005 and <0.001 respectively.

Table (1): Distribution of infants' bio-social characteristics (no=90)

Infants' bio-social characteristics	White noise group (30)		Brahms' lullaby group (30)		Control group (30)		Tests	
	N	%	N	%	N	%	f/ X ²	P-value
Sex								
Male	20	66.7	20	66.7	19	63.3	0.098	0.952
Female	10	33.3	10	33.3	11	36.7		
Age (months.)	4.07±1.55		4.07±1.55		4.00±1.54		0.018	0.982
Residence								
Urban	21	70.0	21	70.0	22	73.3	0.108	0.947
Rural	9	30.0	9	30.0	8	26.7		
Different invasive procedures								
Injection	9	30.0	10	33.3	13	43.3	6.767	0.149
Blood draws	16	53.3	17	56.7	12	40.0		
Aspiration	5	16.7	3	10.0	5	16.7		

Table (2): Total mean score of physiological parameters of infants in white noise, lullaby and control groups during and after invasive interventions (n=90).

Physiological parameters	White noise group (30)	Brahms' lullaby group (30)	Control group (30)	ANOVA	
	Mean±SD	Mean±SD	Mean±SD	f	P-value
Respiratory rate					
During	32.83±1.49	36.27±1.01	43.55±2.98	220.637	<0.001*
After	33.20±1.37	47.90±61.98	43.55±2.98	1.316	0.274
Heart rate					
During	116.20±9.79	135.57±5.28	158.00±18.26	85.839	<0.001*
After	116.20±9.79	136.80±4.03	160.69±3.80	343.673	<0.001*
O² saturation					
During	95.93±0.78	95.93±0.78	93.41±0.68	109.430	<0.001*
After	96.07±0.69	96.07±0.69	93.41±0.68	145.125	<0.001*

* Significant Difference at (P<0.05), ** Highly statistical significant difference at (p≤0.001)

Table (3): Total infants' pain level during invasive interventions for white noise, lullaby and control groups. (n=90).

Infant Pain during invasive interventions	White noise group (30)		Brahms' lullaby group (30)		Control group (30)		Chi-square	
	N	%	N	%	N	%	X ²	P-value
No pain to mild	30	100.0	0	0.0	0	0.0		
Mild to moderate pain	0	0.0	30	100.0	0	0.0	180.000	<0.001**
Sever pain	0	0.0	0	0.0	30	100.0		

* Statistically Significant difference at (P<0.05)

** Highly statistical significant difference at (p≤0.001)

Table (4): Correlation between infants' pain level and physiological parameters during and after invasive interventions for white noise, lullaby and control groups

Physiological parameters during and after invasive interventions	infants' Pain during invasive interventions					
	White noise		Brahms' lullaby		Control	
	r	P-value	r	P-value	r	P-value
Respiratory rate						
During	0.453	0.009*	0.359	0.014*	0.300	0.107
After	0.516	<0.001*	0.645	<0.001*	0.300	0.107
Heart rate						
During	0.507	<0.001*	0.497	0.005*	-0.177	0.350
After	0.626	<0.001*	0.565	<0.001*	0.204	0.280
O2 saturation						
During	0.259	0.167	0.186	0.325	-0.287	0.124
After	0.033	0.864	0.185	0.329	-0.287	0.124

* Statistically Significant difference at (P<0.05)

** Highly statistical significant difference at (p≤0.001)

Discussion

Sounds and music can be a powerful stimulator for pain relief. Audial stimulation distracts the attention effectively and provides a cognitive strategy for pain control and suppression of the pain response (Bergomi, Scudeller, Pintaldi & Molin, 2018). It is well recognized that non pharmacological pain management techniques are simple,

inexpensive, time-efficient, and free of adverse effects. There are also effective non-pharmacological audial interventions, which are employed in distraction (Inan & Inal, 2019) the current study aimed to evaluate the effect of white noise and Brahms' lullaby on infants' pain and physiological parameters during invasive interventions.

As regards mean score of studied infants related to their physiological parameters in both white noise and lullaby groups. The present study revealed that physiological parameters were within the normal range during and after invasive intervention in white noise group. While in lullaby group, it was increased but still within normal range. This may be due to positive effect of both approaches on physiological parameter as it affects neurobehavioral development. These results were contradict with the result of **Çuhacı, Efe & Güneş (2024)** who founded that music did not affect the physiological parameters positively. The study conducted by **Fooladi, Ghaljaei, Keikhaei & Miri-Aliabad (2019)** who discovered that the heart rate changed before and after distraction, indicating a decreasing in the intervention group and more stable conditions with statistically significant differences, was in accordance with the current study's findings. The results of **Kozlowski, Koepf, Timothy, Kayleigh & Victor (2018)** who mentioned that the pulse rates and breathe rate of the distraction techniques groups were lower than in the control group during inhalation therapy was also on the same line with the present study. Regarding oxygen saturation in the current study, it was observed that oxygen saturation was within normal range in white noise and lullaby group but decrease little in the control group during and after invasive intervention. This may be due to oxygen saturation are not sensitive and specific indicators to evaluate the effects of

interventions in infant pain relief. This result was disagreeing with the results of **Sajedi , Kashaninia, Rahgozar & Noghabi (2017)** who concluded that non-pharmacological pain management techniques, such as distraction, could have a substantial impact on SaO₂, resulting in more stable arterial blood oxygen saturation levels for infants in the intervention group following traumatic operations. **Taplak & Bayat (2021)** who reported that heart rate and oxygen saturation were not different during the procedure were in the same line of the present study. The study conducted by **Kahraman et al., (2020)** showed that the white noise group's mean SpO₂ was higher than the control group was also in agreement with present study. Regarding pain level in the current study. It was observed that all infants had no to mild pain, mild to moderate pain and severe pain in white noise, lullaby group and control group during invasive interventions respectively. It might be because white noise distracts infants' attention away from painful stimulus, influencing nervous system and potentially blocking pain pathway distract infants' attention away from painful stimulus, influencing nervous system and potentially blocking pain pathway. These results were in agreement with **Taplak & Bayat (2021)** who showed that score of pain in the experimental group decreased close to mild pain faster than in the control group after the needle withdrawal. Regarding white noise, it was founded that the pain scores of the infants in the white noise group were

significantly lower than those in the control group, both during and after the invasive interventions. The reason for this could be that it is a constant, repetitive sound that is comparable to the sound the fetus hears in the mother's uterus, so it can conceal distracting environmental sounds and have a calming, relaxed impact. Pain score of the premature neonates in the white noise group were significantly lower than in the control group which reported by **Kahraman et al., (2020)** was in agreement with the present study. Also, in the same line with the present study, white noise was more effective in minimizing the pain experienced by infants undergoing potentially painful procedures as mentioned by **Martins ., et al (2025)**. The study by **Cetinkaya, Yavas & Özdemir (2022)** who mentioned that during painful treatments, white noise was a simple and efficient technique. **Döra & Büyük (2021)** discovered that infants' pain levels were higher in the control group and lower in the white noise group. **Ren, Wang, Yang, Kong & Feng (2019)** discovered that white noise helped preterm infants feel less pain after retinopathy scans. **Taplak & Bayat (2021)** They indicated that white noise was good at relieving pain in infants prior to endotracheal aspiration. **Ren, Li, Lin, Zhong & Wang (2022)** discovered that in infants experiencing procedural pain, a white noise intervention had no positive effects on pain-related brain responses, pain ratings, or behavioral and physiological indicators. In the present study, infants' pain scores in the lullaby group were

significantly lower than those in the control group, both during and after the invasive interventions. It is believed that relaxation and distraction play an important role in decreasing pain. **Shabani, Nayeri, Karimi, Zarei & Chehrizi (2024)** and **Tekgündüz, Polat, Gürol & Apay (2019)** supported this result who reported that music had positive effects on preterm infants' physical and behavioral responses during a blood draw and conclude in their study that exposure to lullabies in infants significantly reduce pain during the removal and replacement of the tracheal tube. **Döra & Büyük (2021)** who mentioned that the lullaby group had a lower pain score compared to the control group was also in agreement with the present study. **Uematsu & Sobue (2019)** reported that Brahms' lullaby facilitated the addition and holding of sucking in non-nourishing mothers, and that it resulted in a reduction in pain levels in infants during heel lance. In the same line, **Barandouzi, Keshavarz, Montazeri, Ashayeri & Rajaei (2020)** report that music had a soothing effect on pain in infants during the establishment of vascular access. In addition to, **Rossi, Molinaro & Savi (2018)** who used the neonate pain scale to assess three music-based therapies in infants and discovered that the experimental group of newborns' perceptions of pain was much lower than those of the control group.

The present study revealed that there was statistical significance difference in total infant's pain level based on neonatal infant pain scale during

invasive interventions for white noise, lullaby and control groups .In the same line with current results, **Midilli & Ergin (2023)** reported that, both during and after the surgery, the infants' pain mean scores of the babies in the Brahms' lullaby and white noise groups were noticeably lower than those of the control group.

Conclusion

It can be concluded from the results of the current study that: White noise and Brahms' lullaby were effective in reducing infants' pain and improve physiological parameters during invasive interventions. White noise was the most effective method in reducing infants' pain and improves physiological parameters during invasive interventions.

Recommendations

The following are suggested and recommended:

- Integration of pain assessment and physiological parameters into the usual assessment of infants.
- Pediatric nurses should adopt non-pharmacological approaches including white noise and Brahms' lullaby to relieve pain and enhance physiological parameters during invasive interventions.

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Perception of Premarital Screening and Genetic Counseling among Prospective Marital Individuals in Maternal and Child Health Centers at El-Fayoum City

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Abstract

Background: Premarital screening and genetic counseling are one of the most important strategies for preventing genetic disorders and congenital anomalies

Aim of the study: to evaluate perception of premarital screening and genetic counseling among prospective marital individuals in maternal and child health centers at El-Fayoum city. **Design:** A descriptive research design was used.

Setting: The study was conducted at two maternal and child health centers located in El-Fayoum city. **Sample:** A convenience sample of 220 prospective marital individuals.

Tools of data collection: two tools were utilized, **Tool I:** Structured interviewing questionnaire, it includes three parts: part(1): socio-demographic characteristics, part(2): Level of knowledge and part(3): Perception of the studied prospective marital individuals regarding premarital screening and genetic counseling, **Tool II:** Attitude of the studied prospective marital individuals regarding premarital screening and genetic counseling. **Results:** The study results showed that 69.5% had an unsatisfactory level of knowledge and 54.5% had a positive attitude regarding premarital screening and genetic counseling.

Conclusion: two-thirds of studied group had an unsatisfactory level of knowledge and more than half of studied group had a positive attitude regarding premarital screening and genetic counseling. **Recommendation:** Design an educational program to raise perception of prospective marital individuals and families about premarital screening and genetic counseling.

Keywords: Premarital screening, Genetic counseling, Prospective marital individuals.

Introduction

Premarital screening and genetic counseling is a service provided to couples before marriage to guide, educate, and prepare them for a healthy family. This service is particularly important in Middle Eastern countries where the consanguineous marriage rate is rising. Also, premarital counseling is known as premarital education, premarital therapy, and marriage preparation programs. It helps prospective marital individuals understand and accept their readiness for marriage (**Hafiz et al., 2025**).

Premarital counseling is the promotion of the health and wellbeing of women and her partner before marriage so it is considered a worldwide activity aiming to diagnose, treat unrecognized disorders and reduce transmission of genetic and infectious diseases to couples (**Prismadianto, Endrawati, & Putra, 2025**).

In addition, premarital counseling is considered a vital topic as teaches client's information about married life, enhances clients' communication skills, encourages clients to develop conflict resolution skills, and allows clients to speak about certain sensitive topics, such as sex (**Widodo & Manara, 2024**).

Genetic counseling is often an integral part of premarital screening, it includes discussing the prospective marital individuals' options, educating them about the danger of genetic disease transmission, and explaining the implications of test results. In addition to screening, this service

ensures that prospective marital individuals receive emotional and psychological assistance so they may make well-informed decisions about their future (**Nurafifah, Rahayu, Cahyati & Farida, 2025**).

Egyptian Ministry of Health and Population has implemented a comprehensive premarital screening protocol that includes tests for various conditions. These tests include chronic disorders, infectious diseases and genetic conditions. There are over 300 authorized premarital screening centers across Egypt which are the only facilities approved to conduct the necessary tests. The process of screening concludes with a certificate of completion, which may be required to proceed with legal marriage documentation (**Zalat, Abo-Alyazeed & El-Metwally, 2021**).

Egypt has witnessed a substantial increase in the number of individuals undergoing premarital screening in 2025. According to the Egyptian Ministry of Health and Population, approximately 110,000 individuals underwent premarital medical tests. Also, over 3.1 million young men and women have completed premarital screening examinations (**Gomaa, Eladawi & Haries, 2025**).

Perception of premarital screening is shaped by a variety of cultural, religious, educational, social, and economic factors. Also, perception is greatly influenced by education and knowledge. People with greater education are more likely to recognize the medical significance of screening. However, the level of knowledge regarding premarital screening and

genetic counseling varies in low and middle income countries (LMICs) Particularly in conservative societies where marriage is viewed as a religious or social duty (**Elhadi et al., 2023**).

The nurse is heart of health care system as the nurse plays a significant role in providing premarital screening and genetic counseling services that include assessment of genetic risk, providing information, discussing available testing options and provision of appropriate counseling. Moreover, nurses should also educate couples and provide them with accurate and unbiased information and nurses ensure that the couples are aware of all components and activities of premarital screening and genetic counseling to apply and increase the wellbeing of prospective couples (**Al-Ghamdi, 2024**).

Additionally, Nurses have a crucial role to play in premarital screening and genetic counseling. They communicate with clients verbally and nonverbally so requires much skill to do this and with the considerations of various domains: biological, psychological, socio culture, spiritual and environment. Furthermore, the role of nurses is very complex which includes their role as educators, communicators, counselor, care provider, empowering agents, administrator, researchers, and trainers (**Osman, Baraia& Abdelati, 2021**).

Significance of the study

Premarital screening and genetic counseling (PMSGC) is one of the most important strategies for

prevention of genetic disorders and congenital abnormalities. Genetic disorders are considered the main causes of infant and child death, morbidity and disability in Arab countries. So, early identification may lower the prevalence of these disorders by empowering couples to make educated decisions about marriage and family planning (**Howard, 2020**).

According to World Health Organization (WHO), approximately 240 million people are carriers of genetic disorders and at least 200,000 affected individuals are born annually, 30% congenital anomalies worldwide (**Dewi, Susanti, Rinawan, Gondodiputro, & Martini, 2022**). Moreover, it is estimated that 5.3% of new born will suffer from a genetic disorder (**Adeyemo, Ogunmuyiwa& Ajibade, 2022**).

Furthermore, chronic illnesses make up a significant amount of Egypt's overall disease burden. Couples are examined for a variety of chronic diseases, including as diabetes, hypertension and anemia, as part of premarital screening. So, premarital screening and genetic counseling can enhance quality of life, minimize long-term healthcare expenditures, and prevent pregnancy difficulties by detecting such disorders early (**ROSHAN, 2020**).

Aim of the study:

Evaluate perception of premarital screening and genetic counseling among prospective marital individuals in maternal and child health centers at El-Fayoum city. This aim is achieved through:

1. Assess prospective marital individuals ' knowledge regarding premarital Screening and genetic counseling.
2. identify prospective marital individuals ' attitudes toward premarital Screening and genetic counseling.

Research questions:

1. Are prospective marital individuals have knowledge regarding premarital Screening and genetic counseling?
2. What are the prospective marital individuals ' attitude toward premarital Screening and genetic counseling?
3. Are there relation between prospective marital individuals ' knowledge and their attitude toward premarital Screening and genetic counseling?

Subjects and Method

The subjects and methods for this study were portrayed under the following four main items:

I- Technical design.

II- Operational design.

III- Administrative design.

IV- Statistical design.

I- Technical design:

It includes research design, setting of the study, subjects of the study, and tools for data collection.

Research design: A descriptive research design was utilized to achieve the aim of this study.

Setting: The study was conducted at two maternal and child health centers (Alhadiqah and Kaiman faris) located in fayoum city which are the main health centers that have the highest

flow rate of prospective marital individuals.

Subjects of the study:**Sample type:**

A convenience sample technique was utilized in this study.

Sample size:

The subjects of this study were consisted of 220 prospective marital individuals attending in (Alhadiqah and Kaiman faris) Maternal and Child Health centers at fayoum city.

Tools of Data Collection:

The data was collected by using two tools: -

Tool I: (A structured interviewing questionnaire):

This tool was developed by the researcher after reviewing the national and international related literatures, it was written in simple Arabic language and it included three parts:

Part (1): Socio demographic characteristics of the studied prospective marital individuals as age, gender, education, residence, occupation, marital status, relationship between couples and personal history of hereditary disease.

Part (2): It was composed of (25) questions and Included data related to level of knowledge of the studied prospective marital individuals regarding concept of premarital screening and genetic counseling such as (objectives of premarital screening and genetic counseling, components of premarital screening and genetic counseling, laboratory tests that are involved in premarital screening services, know hereditary diseases that are focused by premarital

screening and genetic counseling, sources of knowledge about premarital screening and genetic counseling).

The scoring system:-

Each question was scored by “1 point = correct answer, and 0 point = incorrect answers”. Total score was 25 points. The knowledge level categorized into two levels as;

- Unsatisfactory level if scores of < 70% of total scores (<18 points)
- Satisfactory level if scores $\geq$ 70% of total scores ($\geq$ 18 points)

Part (3): It was composed of (14) questions and Included data related to perception of the studied prospective marital individuals regarding premarital screening and genetic counseling such as (PMSGs is important, It is important to rising awareness about PMSGs, PMSGs will reduce the prevalence of genetic disease, PMSGs will reduce of the prevalence of some sexual transmitted disease, Consanguinity can increase the risk of hereditary disease, PMSGs should be confidential, PMSGs cause anxiety to the couples and Religious people should adopt ideas in their discussion).

The scoring system:-

Each question was scored by Likart scale, as following: (agree=2, neutral =1, disagree =0). The total score was 28. The perception level was categorized into two levels as:

- Positive level if scores $\geq$ 70% of total scores ($\geq$ 20 points).
- Negative level if total score < 70% of total scores (< 20 points).

Tool II: Attitude of the studied prospective marital individuals regarding premarital screening and genetic counseling:

This tool was composed of (12) questions and was used to assess attitude of prospective marital individuals regarding premarital screening and genetic counseling such as (there is a need for PMSGs ready to prepare lectures PMSGs, PMSGs are important for both couples, PMSGs have an important impact on the future of the family, it is important to tell the other partner about any Hereditary disease If present, Consanguineous marriage is considered one of the main causes of genetic diseases, My knowledge that future husband/ future wife has genetic or sexual disease does not affect my choice to marry him/her).

The scoring system:-

Each question was scored by Likart scale, as following: (agree=2, neutral =1, disagree =0). The total score was 24. The attitude level was categorized into two levels as:

- Positive attitude if scores $\geq$ 70% of total scores ($\geq$ 17 points).
- Negative attitude if total score < 70% of total scores (< 17 points).

Content validity:

The tools were submitted to a panel of three experts in the field of maternal and neonatal health nursing to test content validity. Each of the experts was asked to assess the tools for content coverage, clarity, wording, length, format, and overall appearance. There was modifications and was done to the tool.

Tools reliability:

- Cronbach Alpha coefficient test were used to measure the reliability of the tools used in the current study. The internal consistency coefficient (Cronbach's alpha) reflects the reliability of a scale.

- Alpha Cronbach Reliability Analysis of the Used Tool:

Scores	number of questions	Cronbach's alpha	p-value
- Knowledge score	25	0.885	<0.001
- Perception score	14	0.913	<0.001
- Attitude score	12	0.915	<0.001
Total questionnaire	51	0.934	<0.001

Ethical considerations:

- Primary approval permission was obtained from of research ethics committee of Fayoum University to conduct current study on October 2023 then the second permission was obtained from administrative personnel in MCH centres to conduct study.
- Written informed consent was obtained from each of prospective marital individuals after explaining the purpose, nature, benefits of the study.
- The researcher emphasized that the participants in the study was entirely voluntary.
- Anonymity and confidentiality was assured by allocation of a code number for each participant.
- Each participant had the right to withdraw from the study at any time without any rationale

Operational design: Included preparatory phase, Pilot study and Field work.

Pilot study:

The pilot study was carried out among 10% of the total sample size (22) prospective marital individuals to identify any difficulties that needed to be handled before, to confirm the clarity of applying questionnaire items and approximately identify the time needed to answer the questions. The sample of Pilot study was excluded from the studied sample.

Fieldwork:

- The researcher attended the previous mention study setting 2 days per week (Sunday and Wednesday from 9am: 1 pm).
- Data was collected through a period of 6 months, started from the beginning of October 2023 to the end of March 2024.
- The researcher introduced herself to prospective marital individuals and explained the purpose, importance and benefits of the study to obtain their acceptance to participate in the study as well as to gain their cooperation.
- The researcher was facing the prospective marital individual, asked them questions in Arabic language and recorded their answers on the questionnaire sheet.
- The researcher interviewed about 5 prospective marital individuals each day and data collection with each participant required approximately 30 to 45 minutes to complete the structured interview.

Administrative Design:

An official permission for data collection was obtained from the ethics committee of faculty of nursing Fayoum University and an official permission for data collection was obtained from the maternal and child health centers administrative personnel to carry out the study.

Statistical Design:

- Data collected and coded to facilitate data manipulation and double entered into Microsoft Access and data analysis performed using the Statistical Package of Social Science (SPSS) software version 22 in windows 7 (SPSS Inc., Chicago, IL, USA).
- Simple descriptive analysis in the form of numbers and percentages of qualitative data, and arithmetic means as central tendency measurement, standard deviations as a measure of dispersion of quantitative parametric data.
- Quantitative data included in the study first tested for normality by One-Sample Kolmogorov-Smirnov test in each study group then inferential statistic tests selected.

Significant level:

- P-value > 0.05 Not significant (NS)
- P-value $\leq$ 0.05 Significant (S)
- P-value $\leq$ 0.01 Highly Significant (HS).

Limitations of the study:-

Some of the prospective marital individuals did not agree to fill out the questionnaire and some of them refused to communicate

Results:

Table (1): shows that the socio demographic characteristics of the prospective marital individuals. Approximately two-thirds (69.5%) of the study group were aged less than 30 years while one-third (30.5%) of the study group were aged equal or more than 30 years with a mean age among study group was (26.9 $\pm$ 7.5). Also age range of study group was (<30 - $\geq$ 30) years. More than half (50.9%) the study group was males versus less than half (49.1%) the study group was females. As regard level of education approximately half (50.5%) of the study group were educated to secondary level. Moreover, in relation to residence approximately two-thirds (68.2%) of study group was lived in urban areas. Also, majority (82.3%) of study group had a negative consanguinity between couples.

Table (2): shows that approximately three-quarters of the prospective marital individuals (70%) mentioned that, they know the objectives of premarital screening and genetic counseling before. When asking about the component of PMSGs the two-thirds (64.1%) answered they know it. Moreover (58.6%) know about laboratory investigation. The approximately two-thirds of prospective marital individuals (64.5%) mentioned that they do not know hereditary diseases that are focused by premarital screening and genetic counseling while about half of them (52.7%) do not know about infectious diseases. Approximately two-thirds of the prospective marital individuals (69.1%) mentioned that

they know about personnel who responsible for providing premarital counseling. About one –third of prospective marital individuals (31.8%) didn't know maternal and child health care centers that provide premarital screening and genetic counseling services in Fayoum city. Approximately three-quarters of prospective marital individuals (70.9%) mentioned that they don't know permissible period for a pre-marital screening before the marriage contract and valid period of the marriage certificate.

Table (3): represents attitudes of prospective marital individuals regarding premarital screening and genetic counseling. Approximately three-quarters (72.7%) of the study sample agreed to there is a need for PMSGs. Approximately two-thirds (62.3%) of the study group agreed to that PMSGs are important for both couples, (61.8%) It is important to tell the other partner about any hereditary disease if present and (60%) advise future couples to conduct PMSGs. More than half (54.1%) of the study group agreed to PMSGs have an important impact on the future of the family, While less than half (43.2%)

of the study group agreed to be ready to attend lectures PMSGs, Also, (43.2%) consanguineous marriage is considered one of the main causes of genetic diseases. More than one-third (35.9%) of the study group agreed that the financial cost of pre-marital screening is high. More than one-third (33.6%) of the study group didn't agree that knowledge that future husband/ future wife has genetic or sexual disease doesn't affect choice marry him/her, Approximately two-thirds (60%) of the study group didn't agree that going to PMSGs is a waste of time and (59.1%) there are obstacles to do PMSGs. More than half (52.7%) of the study group didn't agree that premarital counseling and examination must be done in the case of consanguineous marriage only

Table (4): illustrates that there was a highly statistical significant difference between knowledge level, perception level and attitude level among participants with (p-value <0.001) (there is a relation between prospective marital individuals ' knowledge, Perception and their attitude toward premarital Screening and genetic counseling).

Table (1): Distribution of the studied sample according to their socio-demographic characteristics (n=220):

Variables	Number (n=220)	
	No.	%
Age (years)		
<30 years	153	69.5%
≥ 30 years	67	30.5%
Mean ±SD	26.9±7.5	
Range	<30 - ≥ 30	
Sex		
Male	112	50.9
Female	108	49.1
Level of Educational		
Primary education	34	15.5
Secondary education	111	50.5
University education	75	34.1
Residence		
Rural	70	31.8
Urban	150	68.2
Marital status		
Single	172	78.2
Divorced	43	19.5
Widowed	5	2.3
Occupation		
Not Work	85	38.6
Work	135	61.4
Parental consanguinity:		
No	181	82.3
Yes	39	17.7

Table (2): knowledge of studied sample about premarital screening and genetic counseling (PMSGs) (n=220):

Knowledge items about premarital screening and genetic counseling	Knowledge about			
	Incorrect		Correct	
	No.	%	No.	%
1. Do you know objectives of premarital screening and genetic counseling?	66	30%	154	70%
2. Do you know components of premarital screening and genetic counseling?	79	35.9%	141	64.1%
3. Do you know laboratory tests that are involved in premarital screening services?	91	41.4%	129	58.6%
4. Do you know Infectious diseases that are focused by premarital screening and genetic counseling?	116	52.7%	104	47.3%
5. Do you know hereditary diseases that are focused by premarital screening and genetic counseling?	142	64.5%	78	35.%
6. Who should provide premarital counseling?	152	69.1%	68	30.9%
7. Are the maternal and child health care centers the ones that provide premarital screening and genetic counseling services in Fayoum city?	70	31.8%	150	68.2%
8. What is the permissible period for a pre-marital screening before the marriage contract?	156	70.9%	64	29.1%
9. How long is the marriage certificate valid for?	156	70.9%	64	29.1%
Total knowledge score (mean± SD)	11.7±9.02			

Table (3): Distribution of studied sample attitude toward premarital screening and genetic counseling (PMSGs) (n=220):

Attitude items	Disagree		Neutral		Agree	
	No.	(%)	No.	(%)	No.	(%)
1. I think that there is a need for PMSGs	8	3.6	52	23.6	160	72.7
2. I ready to attend lectures PMSGs	72	32.7	53	24.1	95	43.2
3. I think that PMSGs are important for both couples	29	13.2	54	24.5	137	62.3
4. I think that PMSGs have an important impact on the future of the family	51	23.2	50	22.7	119	54.1
5. I think that it is important to tell the other partner about any Hereditary disease If present	28	12.7	56	25.5	136	61.8
6. I think that Consanguineous marriage is considered one of the main causes of genetic diseases	71	32.3	54	24.5	95	43.2
7. My knowledge that future husband/ future wife has genetic or sexual disease does not affect my choice to marry him/her	74	33.6	82	37.3	64	29.1
8. I advise future couples to conduct PMSGs	26	11.8	62	28.2	132	60
9. I think that going to PMSGs is a waste of time	132	60	52	23.6	36	16.4
10. I think that there are obstacles to do PMSGs	130	59.1	50	22.7	40	18.2
11. I see that the financial cost of pre-marital screening is high	66	30	75	34.1	79	35.9
12. Premarital counseling and examination must be done in the case of consanguineous marriage only	116	52.7	48	21.8	56	25.5
Total attitude score	15.7±6.7					

Table (4): Relation between prospective marital individuals ' knowledge, Perception and their attitude toward premarital Screening and genetic counseling (n=220):

Variables	Knowledge level				X ²	P-value	Sig.
	Unsatisfactory (n=153)		Satisfactory (n=67)				
	No.	%	No.	%			
Perception level							
Negative	86	56.2%	16	23.9%	19.5	<0.001	HS
Positive	67	43.8%	51	76.1%			
Attitude level							
Negative	82	53.6%	18	26.9%	13.4	<0.001	HS
Positive	71	46.4%	49	73.1%			

Discussion

Pre-marital screening and genetic counseling (PMSGC) is becoming more and more recognized as a crucial public health intervention in many countries. PMSGC programs are carried out all around the world in prospective marital individuals before marriage to learn about reproductive health and to lessen the burden of hereditary and infectious disorders (Osei-Tim et al., 2020).

So, the study aim was to evaluate perception of premarital screening and genetic counseling among prospective marital individuals in maternal and child health centers at El-Fayoum city.

As regarding knowledge about objectives of premarital screening and genetic counseling, the results of the current study found that, approximately three-quarters of the

studied group know the objectives of premarital screening and genetic counseling before. This result was inconsistent with **Osman et al., (2021)**. That entitled, "Awareness and attitude university students regarding premarital counseling and examination" who reported that, less than three-quarters of the studied group didn't know about the objectives of premarital screening and genetic counseling.

From the researcher point of view, may be due availability of the sources of information about premarital screening and genetic counseling such as media or educational materials related to premarital screening and genetic counseling.

Concerning with knowledge about component of premarital screening and genetic counseling the finding of

the current study showed that, approximately two-thirds of studied group know the component of premarital screening and genetic counseling. This result was on the same line with **Ezzat & Gomaa, (2022)**. That entitled, "Effect of counselling-based program on technical nursing students' perception regarding reproductive health" who reported that, about two-thirds of the participants know the component of premarital screening and genetic counseling.

In relation to knowledge about laboratory tests that are involved in premarital screening services, the study found that about two thirds of studied group knew about laboratory investigation included in premarital screening and genetic counseling (PMSGC). This result was matching with **Sedek, Emam & Abd Elrahim, (2022)**. That entitled, "Effect of Educational Program for Premarital Counseling among technical school student" who report that, about two thirds of study group knew about laboratory investigation included in PMSGC.

Concerning with knowledge about hereditary diseases that are focused by PMSGC the results of the current study found that, two-thirds of studied group don't know hereditary diseases that are focused by premarital screening and genetic counseling program this results opposed to **Mahmood, Sadraldeen, Othman, Shabila, Saleh & Ismail, (2024)**. That entitled, "Knowledge, perception, and attitude toward premarital screening among university students in Kurdistan

region-Iraq" who reports that, more than two-thirds of studied group knew hereditary diseases that are focused by PMSGC program.

As regarding knowledge about personnel who responsible for providing premarital counseling, the results of the current study found that, they three-quarters of studied group didn't know who responsible for providing premarital counseling, this result was in contradiction with **Fattah, (2020)**. That entitled, "Effectiveness of wellbeing instruction on the knowledge and attitude of university students on pre-marriage screening and counseling" who report that, more than three-quarters of study group knew who responsible for providing premarital counseling.

Concerning with knowledge about places that provide premarital screening and genetic counseling services the results of current study found that, about one –third of prospective marital individuals didn't know maternal and child health care centers that provide premarital screening and genetic counseling services, this result in agreement with **Gomaa et al., 2025)**. That entitled, "Awareness of Importance of Premarital Counseling among Students of Kafr El-Sheikh University, Egypt" who report that, about one third of studied group didn't know Places designated to provide premarital counseling and screening in Egypt.

As regarding knowledge about permissible period for a premarital screening before the marriage contract the finding of the current study

revealed that, approximately three-quarters of studied group don't know permissible period for a premarital screening before the marriage contract this results was in agreement with **More, (2021)**. That entitled, "A review of importance of premarital checkup and counselling among young adults "who reported that, approximately three-quarters of studied group don't know permissible period for a premarital screening before the marriage.

In relation to knowledge about period the marriage certificate is valid the results of current study found that, approximately three-quarters of studied group don't know the valid period of the marriage certificate, this results aligned with **Zedan et al., (2022)**. That entitled, "Predictors of premarital screening and genetic counseling knowledge and attitude among deaf and hard hearing females in Tabuk, Saudi Arabia" who reported that, approximately three-quarters of studied group do not know validity of healthy marriage certificate.

As regarding knowledge about Sources of information about premarital screening and genetic counseling (PMSGs) the results of the current study found that, more than half studied group gained information of PMSGs from marriage official then One-third of studied group gained information from friends and relatives while the minority of studied group gained information from internet and social media and only few of them heard from school and faculty this results not aligned with **Alkalash, Badr & Eldeen, (2021)**. That entitled, "Awareness Attitude, and

Satisfaction of Egyptian Adults by Premarital Care Services" who reported that, the majority studied group received their information about PMSGC from the healthcare provider, while the minority studied group received their information from more than one source as, family and relatives, mass media and school.

From the researcher point of view, which may be attributed to the greater trust placed in healthcare provider and marriage official, limited public dissemination of information through communication channels, or the absence of structured health education about premarital screening and genetic counseling in schools and media platforms.

As regarding level of total knowledge score about premarital screening and genetic counseling (PMSGs) the current study found that, approximately two-thirds of studied group had an unsatisfactory level of knowledge about PMSGs, this result was in line with **Sabbah, AbdEl-mohsen & Saad, (2023)**. That entitled, "Awareness of Clients Attending Maternal and Child Health Center Regarding Premarital Counseling" who reported that, more than two-thirds studied group had an unsatisfactory level of knowledge about PMSGs.

Furthermore, these finding was compatible with **Samy, Fahmy & Saleh, (2024)**. That entitled, "Effect of Premarital Counseling on Knowledge and Attitude of Female Technical Students ", who reported that, about two thirds of studied group had unsatisfactory level of knowledge about PMSGs.

From the researcher point of view, the agreement between the results of the current study and previous studies might be due to limited access to health education resources, lack of targeted awareness rising programs about premarital screening and genetic counseling, or lower educational backgrounds that affect their ability to seek, understand, or retain health-related information.

In relation to attitude about neediness for PMSGs the results of the current study found that, approximately three-quarters of the studied group agreed to there is a need for PMSGs this result was similar to **Alkalbani et al., (2022)**. That entitled, "Factors Affecting the Willingness to Undertake Premarital Screening Test among Prospective Marital Individuals" who reported that, about three-quarters of the studied group agree that there is a need for PMSGs. Concerning with attitude about readiness to attend lectures PMSGs the study found that less than half of the studied group agreed to be ready to attend lectures PMSGs this result agreed with **Fattah, (2020)**. That entitled, "Effectiveness of wellbeing instruction on the knowledge and attitude of university students on pre-marriage screening and counseling" who reported that, less than half of the studied group agreed to attend lectures about pre-marriage screening and counseling.

As regarding to attitude about Consanguineous marriage is considered one of the main causes of genetic diseases the study found that less than half of the studied group agreed that, consanguineous marriage

is considered one of the main causes of genetic diseases. This result was in line with **Aljulifi et al., (2022)**. That entitled, "Awareness and acceptance of premarital screening test and genetic counseling program in Riyadh area, Saudi Arabia" who reported that, less than half of the studied group agreed that, consanguineous marriage is considered one of the main causes of genetic diseases.

Concerning with attitude about decision to marry future husband/ future wife after knowing that he /she has genetic or sexual disease, the study found that, about one-third of the participants were willing to cancel their marriage, after knowing that he /she has genetic or sexual disease. On the other hand, **AlOtaiby et al., (2023)**. That entitled, "Comprehension of premarital screening and genetic disorders among the population of Riyadh" who reported that, about one-third of the participants were not willing to cancel their marriage, after knowing that he /she has genetic or sexual disease.

Furthermore, this result was inconsistent with **Almoliky et al., (2022)**. That entitled, "Knowledge and attitude of Engaged and Recently Married Couples toward Premarital Screening: A Cross-Sectional Study" who reported that, more than one-third of the respondents tend to go ahead for marriage in case of positive results.

As regarding attitude about advising future couples to conduct PMSGs the study found that, approximately two-third of the studied group agreed to advise future couples to conduct

PMSGs. This result matched with **Aljulifi et al., (2022)**. That entitled, "Awareness and Acceptance of Premarital Screening Test and Genetic Counseling Program in Riyadh area, Saudi Arabia" who reported that, more than two-third of the studied group agreed to advise future couples to conduct and support PMSGs.

In relation to attitude about going to PMSGs is a waste of time the study found that, approximately two-thirds of the study group didn't agree that, going to PMSGs is a waste of time. This result aligned with **Alhetar et al., (2024)**. That entitled, "Knowledge and Attitudes of Secondary Schools students Towards Premarital Screening and Counseling in Taiz, Yemen" who reported that, more than two-thirds of the studied group didn't agree that, going to PMSGs is a waste of time.

Concerning with attitude about the highness of financial cost of pre-marital screening the study found that, more than one-third of the studied group agreed that, the financial cost of pre-marital screening is high. This result was similar to **Al Eissa et al (2024)**. That entitled, "The perception of genetic diseases and premarital screening tests in the central region of Saudi Arabia" who reported that, more than one-third of the studied group agreed that, the financial cost of pre-marital screening is high.

In relation to attitude about premarital counseling and examination must be done in the case of consanguineous marriage only. The study found that, more than half of the studied group didn't agree that, premarital

counseling and examination must be done in the case of consanguineous marriage only. This result was consistent with **Ahmed & Elkhateeb, (2024)**. That entitled, "Assessment of students' Knowledge and attitude regarding Premarital Examination at Aswan University" who report that, more than half of the studied group didn't agree that, premarital counseling and examination must be done in the case of consanguineous marriage only.

As regarding level of total attitude score, the study found that, more than half of the studied group had a positive attitude to PMSGs. This result was in in agreement with **Saleh & Abd El-Kader, (2022)**. That entitled, "University Students Attitude towards the National Premarital Screening Program of UAE" who reported that, more than half of the study group had a positive attitude to PMSGs

Also, this result was congruent with **Abdulrhman et al., (2022)**. That entitled, "Knowledge and attitude of Engaged and Recently Married Couples toward Premarital Screening: A Cross-Sectional Study" who reported that, more than half of the studied group had positive attitude and willingness regarding premarital screening tests.

From the researcher point of view, changing attitude toward PMSGC possibly due to increased awareness of its role in preventing, most opted to prevent the transmission of the diseases to their offspring's, or to ensure for their partner's health and ensure fitness of marriage. However, negative attitude may be due to

limited knowledge, fear of discovering unfavorable results, concerns about social stigma, or misconceptions that such screening could interfere with personal or emotional choices related to marriage also had fears for carrying out the PMS.

As regarding relation between prospective marital individuals' knowledge, and their attitude toward premarital Screening and genetic counseling the study found that, there was a highly statistical significant difference between knowledge level and attitude levels among participants. This result was the same line with **Hamed, Eshra, Ali & Khalil, (2022)**. That entitled, "Perception of Premarital Screening and Genetic Counseling among Future Couples" who reported that, there was a highly statistical significant difference between knowledge levels and attitude levels among study group.

Also, this result was in the same line with **Kaynak & GUNES, (2025)**. That entitled, "Evaluation of young people's knowledge and attitudes about the Premarital Screening Program in Turkey" who reported that, there was a highly statistical significant difference between knowledge levels and attitude levels among study group.

From the researcher point of view, knowledge level plays a crucial role in shaping individuals' attitudes toward premarital screening and genetic counseling services. Also, individuals with greater knowledge about premarital screening and genetic counseling (PMSGC) are more likely to understand its benefits and thus

develop a more positive attitude, while limited knowledge may lead to fear, misconceptions, or disinterest.

Conclusion:

Based on the findings of the current study it can concluded that, two-third of studied group had an unsatisfactory level of knowledge regarding premarital screening and genetic counseling (PMSGS) while only one-third studied group had a satisfactory level of knowledge. Additionally, less than half of the study group had a negative attitude to PMSGS, while more than half of the study group had a positive attitude to PMSGS. Furthermore, there was a significant positive relationship between total knowledge regarding premarital screening and genetic counseling and total positive attitude regarding PMSGS among the studied group. So, the aim of the study was achieved and research questions were answered

Recommendations:

The finding of the present study suggested the following recommendations:

- Design an educational program to raise perception of prospective marital individuals and families about premarital screening and genetic counseling.
- Designing booklet and brochures on premarital screening and genetic counseling and distributing them in MCH centers.

For further research in this field:

- Conducting a long-term research study on premarital screening and genetic counseling and its impact on the health of prospective marital individuals.

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Health-Related Quality of Life in Patients with Stroke

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Abstract

Background: Stroke is a neurological disorder due to a sudden decline in blood flow to a localized area of the brain. It is the second most common cause of death and the third most common cause of disability worldwide. Quality of life (QOL) is increasingly being used as an outcome measure designed to assess the health-related quality for patients with stroke. **Aim of the study:** This study aimed to assess health-related quality of life in patients with stroke. **Research design:** A descriptive design was used to conduct this study. **Setting:** The study was conducted at the Medical Neurological Departments & Outpatient Clinics of El-Fayoum General Hospital. **Sample:** A convenience sample composed of 100 post stroke patients. **Data collection tools:** **Part I:** Socio-demographic and medical data questionnaire. **Part II:** Stroke-specific quality of life scale (SS-QOL). **Results:** The mean score of overall HRQOL (118.97) was poor for the study patients. There was a significant relation between quality of life (QOL) and research variables regarding age, level of education, stroke duration, compliance with medication, and family history of stroke. **Conclusion:** Based on the results of present study, it can be concluded that all quality-of-life post stroke patients were poor. There is a statistically significant relation with QOL with age, stroke duration, compliance with medication, and family history of stroke. **Recommendations:** The study recommended to design health education program to promote stroke patient HRQOL.

Keywords: Stroke, Health-Related Quality of Life (HRQOL), SS-QOL.

Introduction:

A stroke is a disorder where a sudden reduction in the supply of blood to a specific part of the brain causes neurological impairments. A stroke is a type of cerebrovascular disease or the outcome of altered blood flow in the brain that causes a temporary or permanent loss of function in one or more brain regions. It happens when there is a disruption in the blood supply to the brain. This might occur from blood clotting obstructing an artery in the brain or from a blood vessel bursting in the brain. It usually affects one side of the body and is abrupt, sudden, and can cause weakness and loss of feeling right away **(Hinkle & Cheever, 2021)**.

(Timby & Smith, 2020) mentioned that the non-modifiable like age, gender, race, history of previous stroke, and inheritance that are unavoidable and modifiable risk factors that can be altered by medical intervention, such as managing high blood pressure, adhering to a healthy lifestyle, or giving up smoking.

Health-related quality of life (HRQOL) is known as a person's sense of their own place in life within a cultural context and the values they adhere to in terms of expectations, interests, and accomplishments **(Tonon, 2022)**. HRQOL is increasingly being used as an outcome measure in clinical trials and observational studies designed to assess the quality of care for patients with stroke **(Alkadry, Wilson, & Nicholas, 2021)**.

Stroke can impact on multiple dimensions of health-related quality

of life (HRQOL) in stroke patients such as physical health such as muscle weakness, paralysis, fatigue, pain, limited mobility, psychological well-being e.g., depression, anxiety, emotional lability, cognitive deficits, social functioning as reduced participation in family, work, or community life due to disabilities, independence in daily activities such as difficulty with self-care e.g., bathing, dressing, feeding, communication such as aphasia or dysarthria affecting ability to speak or understand others, role functioning where there is a loss of job or inability to fulfill previous responsibilities **(Clare, 2020)**.

Significance of the study:

Stroke is the second leading cause of both disability and death worldwide, with the highest burden of the disease shared by low- and middle-income countries **(Saini, Guada, & Yavagal, 2021)**.

As per the American Stroke Association 2022, 33 million strokes occurred globally in 2019, accounting for 11.13% of all global fatalities **(Rajati, Rajati, Rasulehvandi, & Kazeminia, 2023)**.

In Egypt, the overall crude prevalence rate of stroke is high (963/100,000 inhabitants), and the incidence of stroke annually is approximately 150,000 -210,000. About 25% of Egyptians have high blood pressure, which puts them at the highest risk of dying from heart failure, renal failure, cerebrovascular illnesses, and other conditions **(Morsy, Elfeky, & Ahmed, 2021)**. The prevalence of

stroke in Fayoum governorate was 16 of 1000 (Shaheen, Wahed, & Hasaneen, 2019).

Aim of the study:

The aim of the study was to assess health-related quality of life in patients with stroke.

Research questions:

1. What is quality of life among the studied patients with stroke?
2. What are the factors that affect the health-related quality of life among the studied stroke patients?

Subjects and Method:**Research design:**

A descriptive research design utilized in this study.

Setting:

This study was conducted at the Medical Neurological Departments & Outpatient's Clinics of El-Fayoum General Hospital.

Sample:

The sample consisted of 100 post stroke patients aged between 21- 60, both genders, agree to participate in this study, have ability to understand questions and respond verbally.

Tools of data collection:

Data were collected by using the two following tools:

Tool 1: Stroke' 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, level of education, occupation, marital status, and area of residence.

B. Medical data such as patient diagnosis, surgical history, causes of

hospitalization, associated disease, and family history.

Tool 2: Stroke-Specific Quality of Life Scale (SS-QOL):

This tool was developed by (Williams, Weinberger, Harris, Clark, & Biller, 1999) to measure health-related quality of life (HRQOL) and was adopted by the researcher and translated to Arabic language. It is a five-point Likert scale, and consists of twelve domains, merged in two subtotal scores. The first six domains (e.g., self-care, mobility, upper extremity function, language, vision, and work or productivity) in a physical subtotal score and the last six domains (e.g., thinking, family roles, social roles, personality, mood, and energy) in a psychosocial subtotal score, ranged from total help - Couldn't do it at all - Strongly agree (1) to no help needed - No trouble at all - Strongly disagree (5).

Validity and Reliability:

Content validity done by a jury of five experts in the field of Medical-Surgical Nursing to review the tools for clarity, relevance, comprehensiveness, accuracy, understandable, applicability and minor modifications were done.

Reliability: Cronbach's Alpha was used to measure the internal consistency of the tools used in this study.

Pilot study:

A pilot study was conducted on 10% of studied post stroke patients to test the applicability, clarity and the efficiency of the study tool. As well as to estimate the time needed to answer

it. The modifications were done for the used tool then the final form was developed. Patients of the pilot study were excluded from the studied group.

Field work:

- Permission was obtained from the director of El-Fayoum General Hospital for conduct of the study in Medical Neurological Departments and Outpatient's Clinics.
- Informed consents were obtained for data collection after the nature and purpose of the study were explained to patients.
- Sampling and data collection were started and completed from January 2024 until January 2025 in the selected settings.
- Testing validity and reliability of the tools was done.
- The researcher personally conducted the interviews. On average, each interview lasted 10-15 minutes.
- The researcher collected data using sociodemographic, medical data for each patient, and also Specific Quality of Life Scale (SS-QOL) for post stroke patients.

Ethical consideration:

Ethical approval was obtained from Fayoum University Supreme Committee for Scientific Research Ethics was assured that confidentiality and privacy were considered. Each patient has the right to withdraw from the study at any time. Ethics, values, culture and beliefs were respected.

Statistical design:

Statistical presentation and analysis of the present study was conducted, using the mean, standard deviation, unpaired student t-test was used to compare between two groups in quantitative data, and ANOVA test was used for comparison among different times in the same group in quantitative data by (*IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY: IBM Corp.*).

- $P > 0.05$ non-significant
- $P \leq 0.05$ significant
- $P < 0.001$ High significant

Results:

Table (1): Illustrated that, nearly three-quarters (72%) of the patients were aged from 50 to 60 years, (21%) were aged from 40 to less than 50 years, while (3%) were less than 30 years. About two-thirds (69%) were male, and a similar proportion were married. Regarding occupation, (34%) were workers, 31% were employed, (20%) were housewives, while (15%) were without work. For the level of education, (24%) were able to read and write, (20%) were illiterate and another (20%) had secondary school certificates. The majority (70%) were resided in rural areas.

Table (2): revealed that, the majority (90%) of patients had an ischemic stroke, (10%) were hemorrhagic strokes. Also, more than half (54%) had their first stroke incidence within the past month, while 30% had it between one and six months ago. Medication compliance was high, with 86% adhering to their prescribed treatment. Regarding associated

diseases, 38% had heart diseases, 34% had hypertension, while 28% had diabetes mellitus. Concerning surgical history, the majority (95%) had no surgical history, (5%) had surgical history. A strong family history of stroke was evident, as 90% of patients reported having relatives with a similar condition.

Table (3): The findings revealed that, all sub-domains demonstrated high internal consistency, with Cronbach's alpha values ranging from 0.836 to 0.897. The highest mean score was observed in the overall quality of life domain (118.97 ± 35.07), followed by the total physical (64.10 ± 21.09) and total psychosocial domains (54.87 ± 14.65). Among individual sub-domains, mobility (15.23 ± 5.14) and mood (12.43 ± 4.36) had relatively higher mean scores.

Table (4): Revealed that, age and educational level showed statistically significant relation with all domains ($p < 0.05$), with the highest QOL scores observed among patients aged

40–<50 and those with a university education. In contrast, gender, marital status, employment status, and residence showed no statistically significant differences across the QOL domains ($p > 0.05$).

Table (5): Revealed that, total QOL was highly significantly related to stroke duration ($p < 0.001$), medication compliance ($p < 0.001$), and family history of stroke ($p = 0.011$). Early-stage stroke survivors and those adhering to medication reported higher total QOL, reinforcing the value of early and sustained medical intervention. Interestingly, although associated diseases such as hypertension and diabetes had high mean scores, statistical significance was not achieved ($p > 0.05$). Patient diagnosis (stroke type) had no impact on total QOL.

Table (1): Distribution of socio-demographic data among studied stroke patients (N=100)

Research variable	N	%
Age		
<30	3	3
30 < 40	4	4
40 < 50	21	21
50 ≤ 60	72	72
Mean ± SD	51.9 ±15.3	
Gender		
Male	69	69
Female	31	31

Marital status		
Single	8	8
Married	69	69
Widowed	15	15
Divorced	8	8
Occupation		
Employed	31	31
Worker	34	34
House wife	20	20
Without work	15	15
Level of education		
Illiterate	20	20
Read and write	24	24
Primary school	6	6
Preparatory school	13	13
Secondary school	20	20
University education	17	17
Area of residence		
Rural	70	70
Urban	30	30

Table (2): Distribution of medical data among studied patients (N=100)

Research variable	N	%
Patient diagnosis		
Ischemic stroke	90	90
Hemorrhagic stroke	10	10
Duration from first incidence of stroke		
< One month	54	54
One month $\geq$ six months	30	30
$\geq$ six months	16	16
Compliance with medication		
Yes	86	86
No	14	14
Associated diseases		
Heart disease (e.g., MI, AF, HF)	38	38
Hypertension	34	34
Diabetes mellitus	28	28
Surgical history		
Yes	5	5
No	95	95
Family history of stroke		
Yes	90	90
No	10	10

Table (3): Distribution of QOL domains among the studied patients (N=100)

SS-QOL sub-domains	Reliability coefficient	Range (Min-Max)	Mean $\pm$ SD	Median
Self-Care	0.862	5-25	11.91 $\pm$ 5.11	11
Mobility	0.863	7-28	15.23 $\pm$ 5.14	15
Upper extremity function	0.864	5-24	10.47 $\pm$ 4.52	9
Language	0.865	5-25	12.16 $\pm$ 4.56	11.5
Vision	0.872	4-13	7.11 $\pm$ 2.20	7
Work / Productivity	0.870	5-16	7.22 $\pm$ 2.60	6
Total physical	0.836	35-117	64.10$\pm$21.09	56
Thinking	0.871	4-14	7.19 $\pm$ 2.58	7
Family roles	0.870	4-15	7.91 $\pm$ 2.70	7
Social roles	0.869	8-23	12.33 $\pm$ 3.58	12
Personality	0.873	5-13	7.85 $\pm$ 2.06	8
Mood	0.864	7-23	12.43 $\pm$ 4.36	11
Energy	0.871	4-14	7.16 $\pm$ 2.47	7
Total psychosocial	0.841	39-93	54.87$\pm$14.65	48
Overall QOL	0.897	75-208	118.97$\pm$35.07	103

Table (4): Relation between total Quality-of-Life domains and sociodemographic factors among the studied patients (N=100)

Research variables	Total QOL domains			
	Mean	SD	t/f	P-value
Age				
<30	133.33	19.14	4.119	0.009*
30 <40	109	30.24		
40 <50	140.71	41.96		
50 ≤ 60	112.58	31.21		
Gender				
Male	120.65	37.44	0.714	0.477
Female	115.23	29.33		
Marital status				
Single	118	25.65	0.404	0.751
Married	121.39	36.93		
Widowed	112.2	35.14		
Divorced	111.75	28.2		
Occupation				
Employed	130.58	43.13	1.842	0.145
Worker	111.24	29.08		
House wife	114.45	30.89		
Without work	118.53	30.79		

Level of education				
Illiterate	98.45	6.97	12.381	<0.001*
Read and write	103.38	9.61		
Primary school	93.33	10.42		
Preparatory	120	47.52		
Secondary	131.3	34.62		
University	158.88	35.29		
Area of residence				
Rural	119.43	36.81	0.199	0.843
Urban	117.9	31.18		

t=T-test, f=ANOVA

* Significance at P<0.05

Table (5): Relation between total Quality-of-Life domains and clinical factors among the studied patients (N=100)

Research variables	Total QOL domains			
	Mean	SD	t/f	P-value
Patient diagnosis				
Ischemic stroke	118.98	35.12	0.007	0.995
Hemorrhagic stroke	118.9	36.44		
Duration from first incidence of stroke				
< One month	133.72	39.06	13.106	<0.001*
One month < six months	103.67	21.48		
< six months	97.88	10.31		
Compliance with medication				
Yes	123.47	35.71	3.336	<0.001*
No	91.36	8.54		
Associated diseases				
Heart disease	108.24	22.21	2.986	0.055
Hypertension	125.56	42.24		
Diabetes mellitus	125.54	37.29		
Family history of stroke				
Yes	121.91	35.59	2.588	0.011*
No	92.5	11.5		

t=T-test, f=ANOVA

* Significance at P<0.05

Discussion

Discussion of the present study was categorized into the following parts:

Part (I): Sociodemographic data among studied stroke patients:

The findings of the present study revealed that the majority of patient were aged between 50 and 60 years. This finding is consistent with **(Sobeih, Abd- Ella, Mohammed, & Mohammed, 2021)**, who found that about more than half of the study sample ages ranged between 50 years and more. Additionally, this finding is aligning with study by **(Helmy, Essa, & El Batch, 2022)**, who reported that the common age group was between 45-65 years and this was significantly high compared with the other age groups.

Regarding gender, more than two third of the sample were males. This is in line with study by **(Reeves et al. 2022)** who reported that more than two third of the subjects were male which may be due to stresses of everyday life as females were weaker and more sensitive than male. Also, there is agreement **(Dewey et al., 2019)**, who reported that there was higher stroke incidence in men, especially in younger and middle-aged groups. These findings had disagreement with **(Sobeih et al., 2021)**, who reported that more than half of the study samples were females.

Regarding marital status, the majority of patients were married. The findings supported by **(Ali, 2020)**, who found that marital status can influence recovery outcomes, as married

individuals often benefit from stronger social support networks, which are known to positively impact rehabilitation and emotional well-being.

As regards the occupation, the present study demonstrated that more than third of studied patients were worker, and also more than third were employed in other sectors. The finding is in accordance with **(Addo et al., 2022)**, who found that occupational status is often a proxy for socioeconomic status, which has been associated with stroke risk and post-stroke outcomes. Individuals in manual labor or without employment may face more barriers in accessing timely and comprehensive stroke care. Concerning, level of education of the studied patients, the current study showed that less than half were illiterate & read and write, and one fifth were secondary school. This finding is with disagreement **(Dayapoglu & Tan, 2020)** who reported that the incidence of stroke was significantly higher among low educated patients in comparison with highly educated patients. In addition to **(Grimaud, Bejot, Heritage, Koifman, & Giroud, 2021)**, who discovered that the association between lower educational attainment and stroke incidence is well-documented, with limited education often linked to poorer health literacy, inadequate disease prevention practices, and lower treatment adherence. Approximately the same findings were found by **(Leite, Nunes, & Correa, 2021)**, who found illiteracy among more than one-third of patients with stroke.

Regarding, area of residence, the present study showed that less than three quarters were living in rural areas. This finding is an agreement with **(Fawi, Corea, Abbas, Thabit, & Comi, 2020)**, who found that majority of stroke involved residents in rural areas due to insufficient health service in rural communities. In addition to **(Wang, Rudd, & Wolfe, 2021)**, who founded that rural populations often have higher stroke burdens due to limited access to healthcare services, delayed hospital arrival, and fewer rehabilitation options. In contrast, **(Aziz, Rizian, Tawfik, & Mekky, 2023)**, who founded that the majority of the studied group were from urban areas. Additionally, this finding was disagreement with **(Tavangar, Shamsaee, Chitsaz, Akbari, & Saadatnia, M. 2022)**, where they found that urban population had a higher probability of stroke, hypertension, ischemic heart disease and diabetes than rural population.

Part (II): Medical data among studied patients:

The findings of the present study indicated that the vast majority of patients had ischemic stroke, while minority were diagnosed with hemorrhagic stroke. This finding with agreement with **Aziz et al., (2023)**, who found that majority (90%) of his samples had ischemic stroke, while 10% had hemorrhagic stroke. Additionally, **(Feigin, Norrving, & Mensah, 2024)**, who reported that ischemic strokes account for approximately 85–90% of all strokes. Over half of the patients experienced stroke less than one month, while one

third were between one month and six months post-stroke, and minority had strokes six months or more prior. These findings with agree with **Aziz et al., (2023)**, who found that (53.8%) of the sample suffered from stroke with a duration less than one month.

Regarding medication compliance, the majority was reported among patients. These findings align with **(Burnier & Egan, 2019)**, who found that majority of the study were compliant with the medication.

In relation to associated diseases, the current study reported that more than one third were heart disease, followed by more than one third hypertension and less than third diabetes mellitus. These findings are in line with **(Wolf, Abbott, & Kannel, 2022)**, who found that atrial fibrillation, heart failure, and myocardial infarction significantly increase the risk of both ischemic and embolic strokes. Similarly, **Katsanos et al., (2022)**, who reported that hypertension is widely recognized as the most significant modifiable risk factor for stroke globally, and diabetes contributes to increased stroke risk through mechanisms such as atherosclerosis and endothelial dysfunction.

Regarding family history of stroke, 90% of patients reported a positive family history of stroke, which may indicate a genetic predisposition or shared lifestyle and environmental risk factors within families. This finding is consistent with **Aziz et al., (2023)**, who found that 90 % of the patient with positive family history of stroke.

Part (III): Distribution of QOL domains among the studied patients:

The current study revealed that, the total physical domain mean was 64.10, indicating moderate impairment. This corroborates with **(Dorman, Dennis, & Sandercock, 2021)**, who identified physical disability as a leading factor affecting QOL in stroke survivors.

Regarding, the total psychosocial domain mean score 54.87, which reflects moderate psychosocial impact. **(Jaracz and Kozubski, 2023)**, who found similar results, emphasizing the need for psychosocial intervention as part of stroke rehabilitation.

The overall QOL mean score of the present study was 118.97, indicating a poor level of perceived quality of life among the patient. This result is consistent with **(Hilari, Byng, Lamping, & Smith, 2023)**, who found that stroke survivors often report poor QOL scores due to residual physical, cognitive, and emotional impairments.

Part (IV): Relation between total Quality-of-Life domains and sociodemographic factors among the studied patients:

There was a statistically significant relation, particularly regarding age and level of education, whereas other factors like gender, marital status, occupation, and area of residence did not show significant differences.

Age was significantly associated with overall QOL ($p = 0.009$). The highest mean QOL scores were reported in patients aged 40–<50 and those under 30. These findings align with those of

Dewey et al. (2019), who reported that younger stroke survivors tend to have higher QOL scores than older adults due to better functional capacity and recovery potential. Similarly, **(Rombough, Howse, Bagg, & Bartfay, 2022)**, highlighted the negative impact of aging on stroke outcomes and psychosocial adjustment. However, contrarily, **(Naess, Waje-Andreassen, Thomassen, Nyland, & Myhr, 2022)**, found no significant age-related differences in QOL, attributing this to individual variations in coping mechanisms and support systems.

The current study showed that there was no significant relation between QOL and gender. This finding is consistent with studies by **(Hsu, Tsao, Sung, & Hsieh, 2024)**, which reported that gender relations in post-stroke QOL are often minor or absent when adjusting for stroke severity and comorbid conditions. However, these findings in contrast with study by **(Jaracz, Kozubski, & Grabowska-Fudala, 2022)**, who noted that females may report lower QOL, possibly due to a higher prevalence of depression post-stroke.

The current study showed no significant relationship between marital status and QOL domains ($p > 0.05$). This contradicts the findings of **(Ali, 2020)**, who reported that married stroke survivors generally experience better social support and higher QOL. However, our result may reflect a culturally shared burden of care among family members in both marital and non-marital contexts, particularly in collectivist societies.

Regarding, occupation was not significantly associated with total QOL domains ($p > 0.05$). This is in line with **(Lai, Studenski, Duncan, & Perera, 2022)**, who found that employment status alone is not a consistent predictor of QOL unless it is tied to functional independence and psychological satisfaction. Nevertheless, the observed trend supports the idea that engaging in work may provide a sense of purpose and structure, which can enhance recovery motivation.

Level of education was significantly associated with all QOL domains. Patients with university education had the highest QOL scores, whereas those who were illiterate or had only primary education reported the lowest scores. This finding is strongly supported by **(Carod-Artal, Egido, González, & Varela de Seijas, 2020)**, who emphasized that higher educational attainment is associated with better stroke outcomes and QOL due to better health literacy, access to care, and coping skills. Likewise, **(Clarke & Black, 2022)**, who found education level to be a robust predictor of psychological adjustment after stroke. These findings indicate the need for tailored educational and support programs for patients with low literacy to enhance their recovery outcomes.

The current study, stated that no significant relationship was observed between QOL domain and residence areas (rural & urban). This contrasts with the findings of **(Clarke & Black, 2022)**, who suggested urban residents typically have better access to health services, influencing recovery and

QOL. Also, **(Gelin, Gall, Sturm, Macdonell, 2020)**, who showed that poor QOL was significantly associated with rural residence.

Part (V): Relation between total Quality-of-Life domains and clinical factors among the studied patients:

The current study showed that, there was no statistically significant relation in QOL scores between patients with ischemic and hemorrhagic strokes. This finding aligns with the work of **Carod-Artal et al. (2020)**, who found that stroke type alone is not a strong predictor of QOL outcomes, as both types can result in varying degrees of disability depending on location and severity. Conversely, **Dewey et al. (2019)** found that hemorrhagic strokes tend to have worse outcomes in the acute phase, which might not persist in long-term QOL assessments.

A significant association was found between overall QOL and the time elapsed since the first stroke incident ($p < 0.001$). Patients assessed within one month of stroke onset reported the highest QOL scores, with a marked decline among those whose stroke occurred more than six months ago. This trend may reflect early optimism, reduced disability accumulation, and active rehabilitation efforts during the initial post-stroke period. These results are in line with findings by **Lai et al. (2022)**, who documented that QOL tends to decline over time without consistent rehabilitative interventions.

Compliance with prescribed medication was significantly associated with overall QOL. Patients who adhered to their treatment plans

had substantially better QOL scores compared to non-compliant individuals. This finding is supported by (Jaracz et al. 2022), who concluded that medication adherence improves not only physical recovery but also psychological well-being due to better disease control and fewer complications.

Concerning associated diseases, there was no statistically significant relation between total QOL and associated diseases. These findings are disagreed with (Clarke & Black, 2022), who found that there was association between total QOL and patients with hypertension or diabetes.

Regarding family history of stroke, there was statistically significant relation with total QOL and family history. These findings echo those of Hsu et al. (2024), who noted that patients with familial experience of stroke may be better prepared for coping with the illness.

Conclusion:

Based on the results of the present study, it can be concluded that the overall quality-of-life post stroke patients were poor. There was statistically significant relation with QOL with research variables such as age, level of education, stroke duration, compliance with medication, and family history of stroke.

Recommendations:

- Implementation of rehabilitation programs on QOL for post stroke patients.
- Provide booklet and educational handouts for patients about the management and care of stroke patients.

- Application of the study on large samples from different regions to generalize the findings.

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Effect of Implementing Nursing Educational Program on Perioperative Nurses' Knowledge and Attitude Regarding Robotic- Assisted Surgery

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Abstract

Background: Robotic assisted surgery is considered a major technological advancement in minimally invasive surgery and artificial intelligence integration. **Aim:** To evaluate the effect of implementing nursing educational program on perioperative nurses' knowledge and attitude regarding robotic-assisted surgery. **Design:** A quasi-experimental research design **Setting:** Operation Department of New Surgical Hospital at Tanta Main University Hospital. **Subjects:** All available nurses (80) who work directly with patients undergoing surgery. **Tools:** Two data collection tools were utilized. **Tool I:** Structure Interview Schedule for nurses, **Tool II:** General Attitudes towards Robots Scale (GAToRS). **Results:** Highly significant improvement in total nurse's knowledge levels and attitude regarding robotic-assisted surgery since p value was (0.001) post implementing the program. It was determined that preprogram (95 %) had low level of knowledge compared to the majority (91.25 % and 87.50%) immediately and two-month post educational program. Also, preprogram the minority of the studied nurses (10 %) had a positive attitude compared to the majority (86.20 %) had a positive attitude post program. **Conclusions:** Implementation of the nursing educational program associated with significant improvement in the total mean score of nurse's knowledge and attitude. **Recommendations:** Training program should be conducted for nursing staff in the operating room regarding robotic assisted surgery.

Keywords: Attitude, Educational program, Knowledge, Robotic assisted surgery.

Introduction

Technology plays a fundamental role in recent advancements in the surgical field. A surgical robot is a tool under constant direction of the surgeon. The robot does not operate independently. Undoubtedly, the future will witness greater integration of AI and automation in surgical robots **(Power, 2024)**. The da Vinci robot was utilized for over 13 million surgical operations worldwide at the end of 2023. Globally, over 8,200 da Vinci robots are in operation, reflecting the rapid expansion of robotic-assisted surgery **(Lengyel, Chinnadurai, Corr, Lumsden, & Bavare, 2024)**. In October 2021, surgeons in Egypt at Ain Shams Specialized Hospital used robotic assisted surgery for the very first time **(Darweesh, Abdel-Rahman, & Diab, 2024)**.

Robotic assisted surgery acquired worldwide acceptance over the past decade. Robot-assisted surgery (RAS) is an advanced form of minimally invasive surgery in which a surgeon utilizes a surgical robot to perform surgical procedures. RAS has been applicable in various specialties which include general surgery, cardiac surgery, vascular surgery, thoracic surgery, urology surgery, neurosurgery, orthopedics surgery, ophthalmology, otolaryngology, oncology surgery, bariatric surgery, dental surgery, and plastic surgery **(Fairag et al., 2024)**.

Benefits and advantages include keyhole incisions, reduced post-operative pain, less scar, less bleeding, shorter hospital stays, faster recovery, decrease incidence of surgical site infection, greater

precision and dexterity, scaling motion, tremor filtration, improved visualization, reduced surgeons' fatigue during surgery **(Fairag et al., 2024)**. Disadvantages of RAS are very expensive, lack tactile feedback, longer operative time to robotic surgery compared to traditional surgery. Potential for technical malfunction of robotic arms and power outages, software defects **(Lawrie et al., 2022)**.

Ethical implication of artificial intelligence in robotic assisted surgery: - Currently, legal framework and malpractice in the medical field, specifically robotic surgery is complex **(Power, 2024)**. Exploring the ethical dilemmas surrounding AI-powered decision-making in surgery. Accountability and responsibility are divided among key contributors such as the surgeon, software provider, and algorithm designer. **(Power, 2024)**. Confidentiality and cybersecurity; Patient privacy and data security are concerns arising from the involvement of external parties beyond the treating team. Hospital data related to RAS needs protection from cyberattacks **(Vilanilam & Venkat, 2022)**.

Key components of a robotic surgery system: - Software components; Da Vinci OS4 which operates the fourth generation da Vinci robot, My Initiative applications and video processor. Hardware components: the da Vinci system includes three major hardware components that include the surgeon's console, patient cart (robotic arm cart), and vision cart **(Rivero-Moreno et al., 2023)**.

Role of nurse in robotic surgery: Nurses have a crucial role in robotic surgery extend across all phases, from pre-operative assessments to intra-operative assistance and post-operative patient monitoring (**Takagi et al., 2024**). Prepare the robotic system; make sure power and system cables, and auxiliary device cables are connected. Make sure all cables are intact. Robot battery has been charged in the past 24 hours. Also, prepare sterile robotic instruments and an endoscopic camera. Also, some laparoscopic instruments and open surgical instruments must be prepared in case of conversion to open surgery. Additionally, draping the surgical robot by sterile drapes (**Malik, 2022**). The operating room nurses have basic roles in setting up, turn-on, shut-down robotic system, docking and undocking, malfunction, errors management and troubleshooting (**Wang, Zeng, & Sheng, 2021**). Robotic surgery safety management protocols are the responsibility of all OR team members, including nurses (**Nyein & Condon, 2024**).

Significance of the study

In Egypt, implementation of robotic surgery into surgical field aligns with the rapid growth of the health sector in recent years, which contributes to achieve governmental plans for sustainable development in compliance with Egypt's Vision 2030. It was found that nurses have

deficiencies in education, inadequate training, and restricted access to information as obstacles in their role, resulting in greater stress (**Moloney, Coffey, Coffey, & Brien, 2023**).

The aim of the Study

Evaluate the effect of implementing nursing educational program on perioperative nurses' knowledge and attitude regarding robotic-assisted surgery.

Research Hypothesis

1. Perioperative nurses' knowledge about robotic assisted surgery exhibited improvement after the implementation of the nursing educational program.
2. Perioperative nurses' attitude about robotic assisted surgery is exhibited to be positive after the implementation of the nursing educational program.

Subjects and Method

Research design; A quasi-experimental research design was utilized in current study.

Setting: The study was conducted at Operation Department of New Surgical Hospital at Tanta Main University Hospital.

Subjects: All available nurses (80) from the above-mentioned setting who work directly with patients undergoing surgery.

Tools of the study: Two tools were utilized for data collection as the following: **Tool (I): Structure Interview Schedule for nurses**

about robotic assisted surgery Questionnaire. It involved two parts **Part (A):** Nurses socio-demographic characteristics as nurses' code, age, gender, marital status, education level, occupation, years of experience and previous training about robotic-assisted surgery.

Part (B): Nurses' Knowledge Assessment Sheet: This tool was developed by the researcher based on a review of relevant literature.

(Zbigniew Nawrat., 2023; Suryawanshi, Shah, Khanna, Ghodki, Bhati, & Ashok, 2023) to evaluate nurses' knowledge before and after implementation of nursing educational program regarding robotic-assisted surgery.

Total scoring system of knowledge

Three levels of scoring for questions were done as the following; Correct and complete answer scored (2), Correct and incomplete answer scored (1), Don't know or incorrect answer scored (0). The total scoring system of nurse's knowledge was calculated and classified as the following:

- **High** → >80% of the total score
- **Moderate** → ≥ 60% to 80% of the total score.
- **Low** → < 60% of the total score.

Tool (II) General Attitudes towards Robots Scale (GAToRS)

General Attitudes towards Robots Scale developed by (Nomura, Suzuki, Kanda & Kato, (2006), and Syrdal, Nomura & Dautenhahn,

2013) and adopted by the researcher. It is useful tool in understanding attitudes towards new technologies such as Robots and artificial intelligences. GAToRS were composed of 20 statements focused on attitudes towards robots, technology and artificial intelligence, divided into four subscales which included Personal Level Positive Attitude (comfort and enjoyment around robots), Personal Level Negative Attitude (unease and anxiety around robots), Societal Level Positive Attitude (rational hopes about robots in general), Societal Level Negative Attitude (rational worries about robots in general).

Scoring system; each item is scored according to a 5-point Likert scale ranging from 1-5, 1 (Strongly disagree), 2 (Disagree), 3 (Neutral), 4 (Agree) and 5 (Strongly agree). The subscale scores were calculated by averaging the scores of the items in the subscale. Total Scoring System: Based on cut of value 60%, the nurses' attitude is determined as negatively ≤60 and positive attitude >60.

Method

1. Administrative process:

Official letters from the Faculty of Nursing were submitted to the relevant authorities in the targeted area for approval. Written formal approval hospital permission to carry out the study was approved by the director of the Operation Department of New

Surgical Hospital, in Tanta Main University Hospital

2. Ethical and legal consideration

- Ethical and legal approval was obtained from Faculty of Nursing Scientific Research Ethical Committee (Code. No 424-3-2024).
- An Informed consent was obtained from all nurses in this study after explaining the aim of the study and the right to withdrawal at any time.
- Confidentiality and privacy were taken into consideration regarding data collection. Names were substituted with assigned code numbers.

3. Tools development: Two tools were used. Tool (I) Part (A): Nurses' socio-demographic characteristics. Tool (I) Part (B): Nurses' Knowledge Assessment Sheet. Tool (II) General Attitudes towards Robots Scale (GAToRS).

4. Validity of Tools: The content of all tools was examined by seven jury of experts in Medical-Surgical Nursing and General Surgery for transparency, comprehensibility and applicability and modifications were done. The calculation indicated a value of (98%).

5. The reliability of all tools was calculated by Cronbach's Alpha test: it was 0.852 for Tool I (Part A), 0.893 for Tool I (part B),

0.905 for Tool II and 0.874 for the sheet in total.

6. A pilot study was carried out on 10% of operating room nurses to test the feasibility and applicability of the tools and to detect any obstacles that occurred during data collection period. Modifications were made following experts' review by the researcher before the main study. The pilot study was included in the total sample of the study.

7. The data collection for the current study was implemented a full 6 months from August 2024 to January 2025.

8. The educational program was performed through four phases (Assessment, planning, implementation and evaluation).

Assessment phase, the studied nurse's knowledge and attitude were assessed by using Tool I and Tool II.

Planning phase

A. preparing the environment; specific field suitable room for interview questionnaire, keeping suitable and comfortable chairs, maintaining good ventilation and calmness during teaching program implementation and using audiovisual materials that were necessary as PowerPoint presentations and videos by using laptop and projector.

B. Creating content of educational program: Illustrative colored educational booklet was organized and expressed in both Arabic and English using simple language with illustrated figures as a reference manual for the nurses under study.

Multiple methods were utilized such as booklet, videos, power point and group discussion which were prepared by the researcher.

Implementation phase, the nursing educational program regarding robotic assisted surgery was designed and conducted by the researcher for nurses implemented in 4 sessions.

- **The First session:** knowledge about the meaning of robotic surgery, causes, benefits, advantages, and disadvantages, conditions treated with robotic surgery, and risks.
- **The second session:** knowledge about the difference between robotic and traditional surgery and specialty applications of robotic technology.
- **The third session:** knowledge about the ethical considerations of artificial intelligence in RAS, components of robotic surgical systems, equipment, and anaesthesia.
- **The fourth session:** knowledge about the description of robotic-assisted surgery, preparation for surgery, surgical team roles,

nursing roles pre-, during, and post-robotic surgery, robotic-assisted surgery safety, infection control measures, and pain management.

Evaluation phase: The researcher evaluated nurses' knowledge and attitude immediately after, and two months after implementation of an educational program by using Tool (I) parts (A) and (B) and Tool (II). A comparison between pre- and post-educational programs was conducted to determine the effect of implementing educational programs.

Methods of data analysis

The collected data was organized, tabulated and statistically analyzed by using (IBM SPSS Statistics for Windows, Version 26, Armonk, NY: IBM Corp.). Measures of central tendency and dispersion, including the range, mean, and standard deviation, were applied to the quantitative data. Qualitative data were expressed as frequency and percentage. A Pearson correlation test was performed to explore the relationship between two normally distributed quantitative variables, and the reliability of the study tool was confirmed via Cronbach's Alpha. Significant level:

- $p > 0.05 \rightarrow$ non-significant
- $p < 0.05^* \rightarrow$ Significant
- $p < 0.001^{**} \rightarrow$ Highly significant

Results

Table (1) Distribution of the studied nurses according to their socio demographic characteristics. It illustrated that the majority (90 %) of the studied nurses were in the age group from (21-<30) years old; also, the table demonstrates that more than two-thirds (66.3 %) of the studied nurses were females, and more than half (51.3 %) of the studied nurses were married.

Regarding occupation and educational level, more than two-thirds (71.3 %) of the studied nurses were surgical nurses; in addition, more than two-thirds of them (68.8 %) had bachelor's degree. Regarding experience and previous training, more than two-thirds (71.3%) of the studied nurses had (1-<5) years of experience in the operating room.

Table (2): Distribution of the studied nurses regarding their total knowledge level about robotic-assisted surgery throughout periods of the study. It showed that there was a statistical significance improvement in the level of knowledge among studied nurses in relation to robotic assisted surgery immediately post, two-months post educational program implementation than pre-program since $p = (0.001^{**})$. Also, it was found that the mean of total knowledge of studied nurses 18.56 ± 29.39 , 198.74 ± 14.98 , 190.04 ± 15.88 at pre,

immediately post and after two months respectively.

Figure (1) Distribution of the studied nurses regarding their total knowledge level about robotic-assisted surgery throughout periods of the study, it showed that statistically significant improvement has occurred in total level of knowledge for studies nurses as pre implementation of the educational program the majority (95%) had low level of knowledge, and the minority studies nurses (5%) had a moderate level of knowledge. Moreover, immediately after implementation of the educational program the majority (91.25%) of studies nurses had high level of knowledge and the minority studies nurses (8.75%) had a moderate level of knowledge.

Post two months post implementation of the educational program the majority (87.50%) of studies nurses had high level of knowledge. Moreover, the minority studies nurses (12.50%) had moderate level of knowledge.

Table (3): Distribution of the studied nurses regarding their general attitudes level towards robots scale throughout periods of implementing nursing educational program. It illustrated that there was a statistical significance improvement regarding general attitude level towards robots among studied nurses immediately post implementing of the

educational program than pre-program since $p = (0.001^{**})$. Also, it was found that the mean of general attitude level towards robots of studied nurses 27.86 ± 16.25 , 91.75 ± 15.58 at pre, immediately post implementing of the educational program respectively.

Figure (2) Distribution of the studied nurses regarding their general attitude level towards robots scale throughout periods of implementing nursing educational program. It showed that statistically significant improvement has occurred in general attitude level towards robots for studies nurses as pre implementation of the educational program the majority (90%) had negative attitude level, and the minority studies nurses (10%) had a positive attitude level. Moreover, immediately post implementation of the educational program the majority (86.20%) of studies nurses had a positive attitude level and the minority studies nurses (13.80%) had negative attitude level.

Table (4): Percentage comparison and correlation between total knowledge level of the studied nurses and their general attitude level towards robots scale throughout periods of implementing nursing educational program. It demonstrated that there was a highly statistically improvement strong positive correlation between nurses' total knowledge and their general attitude level pre, and immediate post program since $p < 0.05$.

Figure (3): Percentage comparison and correlation between total knowledge level of the studied nurses and their general attitude level towards robots scale throughout periods of implementing nursing educational program. It showed that there was a highly statistically significant strong positive correlation between nurses' total knowledge and their general attitude level pre and immediate post program

Table (1): Distribution of the studied nurses regarding their socio-demographic characteristics.

Characteristics	The studied nurses (n=80)	
	N	%
Age (in years)		
- (21-<30)	72	90
- (30-<40)	8	10
Range	(23-38)	
Mean $\pm$ SD	26.78 $\pm$ 3.46	
Gender		
- Male	27	33.7
- Female	53	66.3
Marital status		
- Single	39	48.8
- Married	41	51.3
Occupation		
- Surgical nurse	57	71.3
- Anesthetic nurse	14	17.5
- Supervised nurse	8	10
- Head nurse	1	1.3
Educational level		
- Technical institute	19	23.8
- Bachelor's degree	55	68.8
- Postgraduate studies	6	7.5
Experience in operating room (in years)		
- (1-<5)	57	71.3
- (5-<10)	20	25
- (10-<20)	3	3.7
Range	(1-15)	
Mean $\pm$ SD	4.18 $\pm$ 2.469	
Previous training about robotic assisted surgery		
- Yes	0	0
- No	80	100

Table (2): Distribution of the studied nurses regarding their total knowledge level about robotic-assisted surgery throughout periods of implementing nursing educational program

Total knowledge level	The studied nurses (n=80)						χ^2 P
	Pre		Immediately		Post 2 months		
	N	%	N	%	N	%	
- Low	76	95	0	0	0	0	226.166 0.001*
- Moderate	4	5	7	8.75	10	12.50	
- High	0	0	73	91.25	70	87.50	
Range	0 – 142		148 – 210		144 – 210		
Mean ± SD	18.56 ± 29.39		198.74 ± 14.98		190.04 ± 15.88		

<60% Low

(60-80)% Moderate

>80% High

* Significant at level P =0.001*

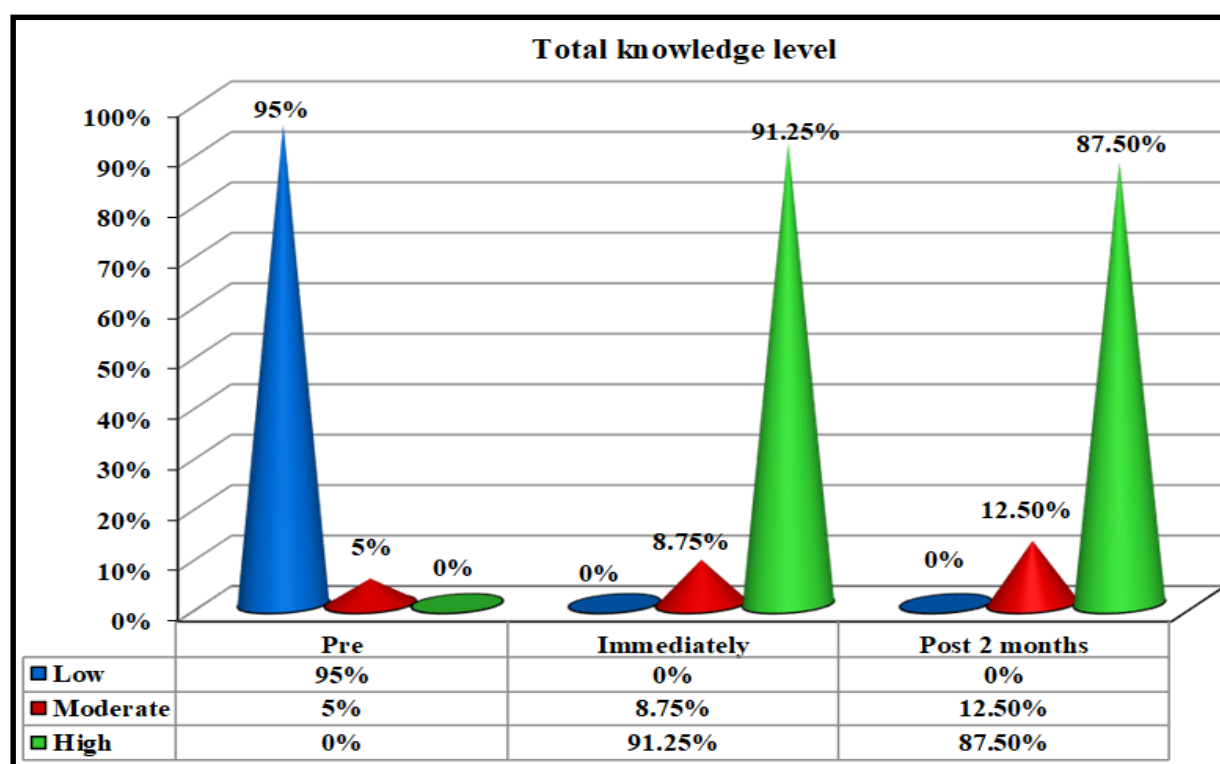


Figure (1) Distribution of the studied nurses regarding their total knowledge level about robotic-assisted surgery throughout periods of implementing nursing educational program.

Table (3): Distribution of the studied nurses regarding their general attitude level towards robots scale throughout periods of implementing nursing educational program.

General attitude level	The studied nurses (n=80)				χ^2 P
	Pre		Immediately		
	N	%	N	%	
- Negative	72	90	11	13.80	93.156 0.001*
- Positive	8	10	69	86.20	
Range	20 – 81		49 – 100		
Mean $\pm$ SD	27.86 $\pm$ 16.25		91.75 $\pm$ 15.58		

* Significant at level P =0.001*

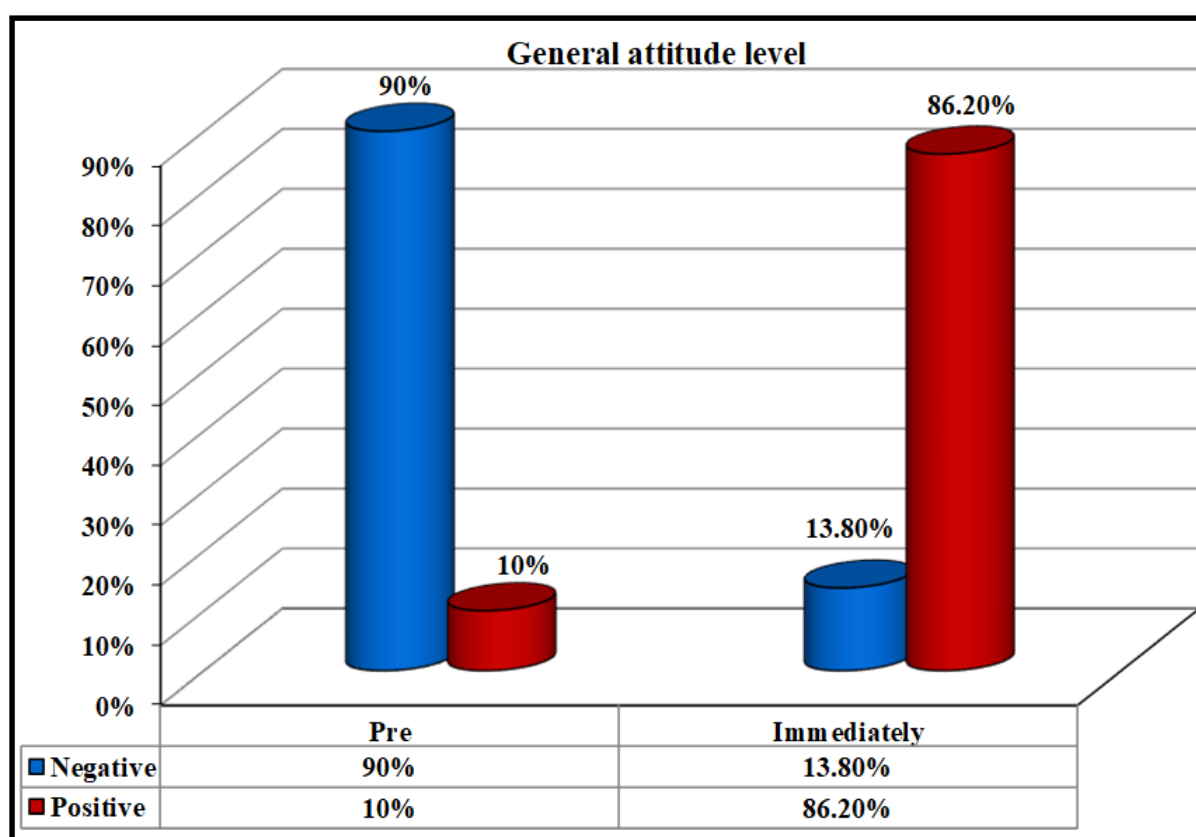


Figure (2) Distribution of the studied nurses regarding their general attitude level towards robots scale throughout periods of implementing nursing educational program.

Table (4): Percentage comparison and correlation between total knowledge level of the studied nurses and their general attitude level towards robots scale throughout periods of implementing nursing educational program.

Total knowledge level	The studied nurses (n=80) General attitude level				χ^2 P
	Negative		Positive		
	N	%	N	%	
Pre					
▪ Low	68	85	8	10	0.468 0.494
▪ Moderate	4	5	0	0	
▪ High	0	0	0	0	
r P	0.361 0.023*				
Immediately					
▪ Low	0	0	0	0	0.002 0.966
▪ Moderate	1	1.25	6	7.5	
▪ High	10	12.5	63	78.75	
r P	0.435 0.017*				

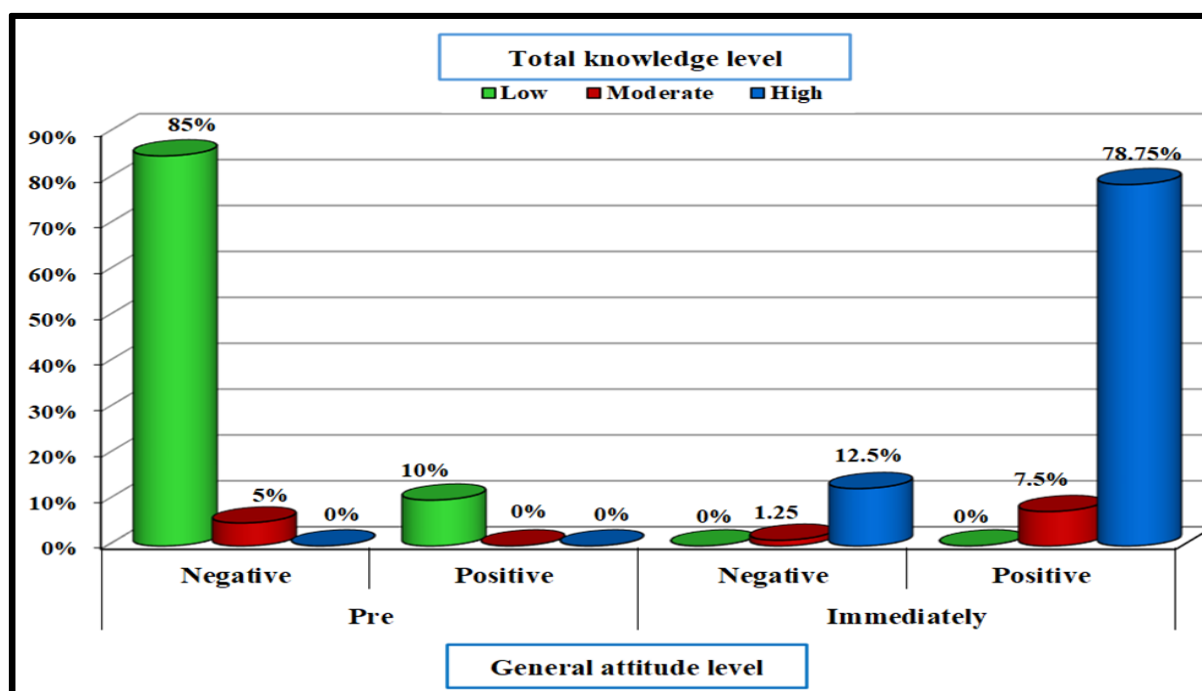


Figure (3): Percentage comparison and correlation between total knowledge level of the studied nurses and their general attitude level towards robots scale throughout periods of implementing nursing educational program.

Discussion

Robotic-assisted surgery acquired worldwide acceptance over the past decade and gained significant popularity so that it is representing a significant technological advancement in the surgical field (Ragusa et al., 2024).

The integration of robotic surgery and nursing digital era is pioneering in healthcare, so professional operating room nurses must continuously adapt to emerging technologies to optimal outcomes. Nurses play a major role in robotic surgery extend across all phases, from pre-operative assessments to intra-operative assistance and post-operative patient monitoring (Takagi et al., 2024). Robotic surgery nurses need to identify components of robotic system, understand the procedural steps of use it, prepare robotic system before to surgery, be familiar with intraoperative emergency management, understand the cleaning protocol for the robot and troubleshoot error messages. It was important for hospitals to have a robotics nurse specialist. (Gudeloglu & Parekatil, (2021). Therefore, this study was conducted to evaluate the effect of implementing educational program on nurse's knowledge and attitude regarding robotic assisted surgery.

Concerning to socio-demographic characteristics of the studied operating room (OR) nurses, the results of the current study revealed that most studied OR nurses were in the age group between (21-<30) years. This result could be due to high work pressure in OR. Young studied OR

nurses may have more physical power and able to adapt with high-pressure nature of the work and anticipated that nurses of a younger age are more enthusiastic and more accepting of new technologies. These results were agreed with **Ji Yong Shin & Eun Hee Jang, (2023)** who reported more than half of operating room nurses were in the age group between (23-<30) years. But this finding disagreed with, **Darwish, EL Berry, Elfiky, Ali, & Abd El Mageed, (2023)** who reported that, more than half of OR nurses ages from 40 to 50 years.

Concerning to gender, the present study showed that more than two-thirds of the OR nurses were female. This may be due to higher proportion of the nurses in Egypt was females and may be also related to nursing education in Egyptian universities were restricted for female before recent years. This finding was in the same line with, **Thomas Porto & Catal., (2021); Sırmaz, Kara, Seyhan, & Özbaş (2025)** who reported that, the most the studies nurses in operating field were females. Conversely, this result disagrees with **Lawrie et al., (2022)** who reported that, most of the studies nursing staff in operating room were males.

Concerning to marital status, the present study illustrated that more than half of studies OR nurses were married. These results were agreed with **Thomas Porto & Catal., (2021)** who reported that, more than half the studies nurses in operating theatre were married. Conversely, this result disagrees with **Altınbaş, Uslu, Kamaş, Van Giersbergen, (2024)**

who reported that, more than half the studies surgical nurses were single.

In relation to educational level, the present study revealed that more than two-thirds of the studied OR nurses had bachelor's degree. This result could be due bachelor's degree studied nurses have high educational level, critical thinking skills and more proficient to adapt and use of new technology. This finding was in the same line with, **Thomas, Porto, & Catal, (2021)** who reported that, educational background about more than two-thirds have obtained a bachelor's degree. In contrast, this result was contradicted by **Darwish et al., (2023)** who illustrated that the minority of the studied nurses in surgical field had bachelor's degree

Concerning to total knowledge regarding robotic surgery which including the meaning, causes of using robotic surgery, advantages and disadvantages of robotic surgery, conditions treated with robotic surgery, risks, the difference between robotic and traditional surgery, and specialty applications of robotic technology, the ethical considerations of artificial intelligence in RAS, components of the robotic surgical system, equipment, anaesthesia, a description, preparation for surgery, surgical team roles, the nursing role pre, during, and post robotic surgery, robotic-assisted surgery safety, infection control measures, and pain management. The present study demonstrated that low percentage of studies nurses had good total knowledge regarding robotic-assisted surgery before implementing the education program. This inadequacy

of total nurses' knowledge might have been because above than two thirds of studied nurses had from 1 to 5 years of experience in the operating room, all studies nurses had no experience about robotic surgery, lacked up-to-date knowledge, there was a noticeable lack of interest and motivation, unavailability of educational books, learning materials, absence training programs and courses about robotic surgery.

On the other hand, the implementation of educational program had a positive effect on nurses' knowledge as the most of study subjects had excellent and high knowledge after implementing the educational program. This enhancement in knowledge reflects success of the educational program, learning sessions, using a colored educational booklet with clear attractive photos, videos and PowerPoint presentation that prepared by the researcher. Also, this finding may be related to more than two third of studies OR nurses had bachelor's degree, nurses' commitment to gaining new knowledge and their regular participation in the program sessions that was evident in the higher knowledge scores observed in the participating OR nurses.

This result was agreed with **Patel, (2022)** who reported that more than two third of OR nurses had low level of knowledge before giving informational booklet about robotic surgery and improved post giving it with significance at the level of 0.05. It was concluded that the mean post-test knowledge score was higher than the mean pre-test score following the

distribution of the knowledge booklet on robotic surgery. Furthermore, **Gudeloglu & Parekattil., (2021)** documented the more than half of OR nurses did not have any knowledge at all prior implementation of nurses training program on robotic surgery than post implementation.

This result is congruent with **Yeşilyurt, & Durmaz, (2023)** who declared that more than two third of the surgical nurses their knowledge level about robotic surgery was partially sufficient and about third quarter of them got knowledge from the internet, A statistically proven increase in knowledge levels regarding robotic operating room nursing ($p=0.035$). The outcomes of current study were in line with **Vigo et al., (2022)** who reported that the effect of an organized educational protocol on enhancing the performance of a team both junior surgeons and expert nurses which denotes that increasingly active role of operating room nurses. A four-phase training strategy was applied over 4 years, comprising theoretical knowledge, practical skills training, and team communication skills improvement.

Also, these results were agreed with **Gudeloglu & Parekattil., (2021)** who illustrated that after the program about robotic surgery, about third quarters of the trainees confirmed that robotics training program positively influenced professional growth. Generally, the majority of them acknowledged the value of the program, they would endorse the robotic program to others healthcare professionals. **Møller et al., (2024)** who performed study in Denmark

titled “Training and education of operating room nurses in robot-assisted surgery: a systematic review” enforce the present study results as they reported that lack of extensive research regarding the training of OR nurses in robot-assisted surgery, with the existing literature primarily highlighting surgeon education. Further research is required to create evidence-based training programs for OR nurses in robotic surgery. This result was accepted with **Melnyk et al., (2021)** who reported that implementation of a simulation-based training program leads to significant improvements in the operative team’s confidence, knowledge, and crisis management related to robotic surgery. In addition to **Bergonzini et al., (2024)** who reported that the most response of operating room nurses was totally adequate knowledge about robotic surgery. **Raheem et al., (2017)** who performed study titled “Robotic nurse duties in the urology operative room” enforce the present study results as they reported that robotic nurse require comprehensive knowledge and practical skills in robotic systems, particularly in troubleshooting in managing troubleshooting procedures and robotic failures. Nurses in robotic surgery have different specialties, including nurse coordinator, scrub nurse, and circulating nurse, with each role having specific job descriptions. Conversely, this result disagrees with **Kang et al., (2016)** who reported that there were not enough educational programs or educational opportunities for nurses on RS. Also, **McBride et al., (2019)** who reported that the most

operating room staff reported have knowledge of RAS, while most nursing staff had no knowledge. These results contradicted **Darwish et al., (2023)** who revealed that the level of acceptance, understanding, and use of information associated with robotic surgical procedures among OR nurses was low.

Regarding their general attitude level towards robots scale throughout periods of implementing nursing educational program. The present study demonstrated that the minority of studies nurses had positive attitude and the majority of them had negative attitude toward robotic-assisted surgery before education program implementation. The negativity in general nurses' attitude might be because poor of nurse's knowledge about robotic assisted surgery before implementation of program, all studies nurses had no prior experience about robotic surgery and unfamiliarity with new technology in OR.

On the other hand, the implementation of educational program had a positive effect on nurses' attitude as most of the studied nurses had positive attitude toward robotic surgery after implementing the educational program. This positive change in attitude demonstrates higher success to educational program, learning sessions that was done by the researcher and good knowledge post implementation program has positive effect on attitude.

These results were agreed with **Azhar et al., (2018)**; **McBride et al., (2019)**; **Stai et al., (2020)**; **Barkati et al.,**

(2023) who found that most participants have a positive perception, positive view, and favorable attitude about RAS than negative, About half of the study participants reported a positive level of trust in the application of robotic-assisted surgery. **Sultan et al., (2022)** who performed study in Saudi Arabia titled "Medical Students' Attitude Towards Robotic Surgery: Cross-sectional Survey" enforce the present study results as they reported that Most participants exhibited positive attitude and optimistic expectations regarding this technology..This finding was agreed with **Uslu et al., (2019)**; **Okgun Alcan et al. (2019)**, who revealed that nurses in Turkey have already experienced enhancement, a favorable and positive change in attitude and perception, expressed greater openness, positive view of nurses about robotic surgery. These outcomes were in agreement with **Darweesh et al., (2024)** who reported that most of surgeons at Ain Shams University Hospitals demonstrated exhibiting excellent practice and attitude about robotic surgery.

Also, these results were agreed with the study conducted in Korea by **Kang et al. (2016)** Who revealed that nurses practicing in robotic surgery settings, despite feeling burdened, reported satisfaction and a sense of pride in contributing to a technologically advanced surgical team.

Additionally, these results were supported by **Kang et al. (2016)**; **Gudeloglu & Parekattil., (2021)** who showed that prior to the program about robotic surgery, more than two

thirds of the trainees reported feeling uneasy and discomfort when operating the surgical robot. After the program, all participants conveyed a sense of confidence and ease in dealing with the robotic system.

While these results were congruent with **Darwish et al., (2023)** who illustrated that the majority of studied nurses had moderate stress level and more than half of them burnout was moderate. **Chan et al., (2022)** who performed study titled “Awareness, perception, knowledge, and attitude toward robotic surgery in general surgical outpatient clinic in Singapore, Asia: Cross-sectional Study contradicted with the present study results as they reported that the majority of the participants showed poor acceptance and not prefer robotic surgery. Also, these outcomes contrasted with **Göransson et al., (2008)** who illustrated that the frequency of positive and negative attitudes, were similar toward using AI and robot technology in operating room.

Concerning the correlation between nurse's total knowledge and general attitude level towards robots. The study demonstrated a highly significant positive correlation between the total knowledge among nurses and their general attitude level regarding robotic assisted surgery pre, immediately post program. According to the researcher, this may be due to studies nurses who had high knowledge post implementation of educational program about RAS helped them to change their attitude from negative to positive. This finding was accepted with, **Thomas Porto &**

Catal., (2021) who revealed that OR nurses who had received training and education before starting work with the robotic team were more familiar and more adapted than nurses not participated training with the difference being statistically significant $p < .001$. Also, this finding was declared with **Balázs Szabó et al., (2024)** who confirmed that there was a strong positive correlation between knowledge of surgical robots and attitude with ($p < 0.001$).

Concerning the Relation between sociodemographic characteristics and total knowledge; this study demonstrates that there was not statistically improvement relation regarding nurses' sociodemographic characteristics and their total knowledge. This outcome corresponds with **Balázs Szabó et al., (2024)** who confirmed that there was non-significant correlation between age and the score on the surgical robot knowledge questionnaire in the sample ($p = 0.184$).

Concerning the Relation between socio-demographic characteristics of the studied nurses and their general attitude score towards robots scale, this study demonstrates that there was not statistically significant relation regarding nurses' sociodemographic characteristics and their general attitude. This finding was disagreed with **Balázs Szabó et al., (2024)** who reported that there was statistically significant difference between gender and attitude of trust towards surgical robots as $p = 0.038^*$.

Conclusion

Based on the findings of the current study, it can be concluded that

significant improvement in the total Level of knowledge and attitude to studies nurses after implementation the educational program.

Recommendations

It was recommended that training programs should be provided for all nurses about robotic assisted surgery. Further studies should be implemented on large sample size obtained from different hospitals in Egypt to evaluate effect of implementation nursing educational program regarding robotic surgery among patients undergoing surgery.

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Effect of Implementing Educational Approach on Female Nursing Students' Perception regarding Respectful Maternity Care

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Abstract

Background: Respectful maternity care (RMC) is emerging as a new and essential concept for ensuring the respect and safety of women, which is based on the principles of women's rights during maternity care. **The aim:** was to evaluate the effect of educational approach on nursing students' perception regarding RMC. **Research design:** A quasi-experimental research design was utilized. **Setting:** The research was carried out at Faculty of Nursing, Tanta University. **Subjects:** A representative sample of 120 female nursing students was included from the total of 310 undergraduate female nursing students in the third year, who were enrolled in Maternal and Neonatal Health Nursing Clinical Course at the previously mentioned study setting. **Four tools** were utilized for data collection; **Tool (I):** Nursing students' knowledge regarding respectful maternity care, which included two parts: **part (1):** Nursing students' personal profile, **part (2):** Nursing students' knowledge regarding respectful maternity care. **Tool (II):** Nursing students' attitudes toward respectful maternity care scale. **Tool (III):** Reported disrespect and abuse care scale. **Tool (IV):** Observational checklist for nursing students' practices regarding respectful maternity care. **Results:** A statistically significant improvement of studied female nursing students' knowledge, attitudes, as well as practices was demonstrated immediately and two weeks after implementation of the educational approach regarding RMC. **Conclusion and recommendations:** understand the concept of RMC and its approach during pregnancy, childbirth, and postpartum period, which should be revised, updated according to the evidence based researches and to be included in the curricula of basic and postgraduate nursing education.

Keywords: Educational Approach, Students' Perception, Respectful Maternity Care.

Introduction

Maternity care encompasses a range of health services aimed at supporting women, newborns, and families throughout pregnancy, childbirth, and the postpartum period. **RMC** is one of the domains of the WHO quality framework and basic human rights which respect women's rights during maternity care (**Butler, Fullerton, & Aman, 2020**).

History of RMC traced back as a response to the increasing recognition of women's rights in healthcare, particularly during the late 20th century. Today, RMC is recognized not just as the absence of mistreatment but as a proactive approach to deliver respectful and inclusive care (**Habib, Mwaisaka, Torpey, Maya, & Ankomah, 2023**).

The most common barrier to implementing RMC is the lack of resources and staffing in healthcare facilities. Also, disrespectful practices may be normalized that making it difficult for healthcare providers to change their behaviors (**Mgawadere & Shuaibu, 2021**). **Egypt** faces several significant barriers toward RMC such as; financial, cultural, personal, and provider-related barriers that lead to disrespectful practices, poor communication and inadequate supportive care (**Tajvar, Shakibazadeh, Alipour, & Khaledian, 2022**).

Strategies for promotion of RMC involve, improving healthcare infrastructure, enhancing healthcare providers training, and fostering a supportive cultural environment for women when seeking maternity care (**Amri & Simbolon, 2023**). The

RMC Charter is a powerful tool to advocate for better maternal health services globally. **The charter outlines the fundamental principles** of RMC which include; freedom from harm and mistreatment, right to information, informed consent, respect for choices, confidentiality and privacy, dignity and respect, and equitable care. Also, the charter addresses the issue of disrespect and abuse toward women who are utilizing maternity services (**Jolivet et al., 2020**).

Disrespectful maternity care is a significant issue affecting every woman globally. It encompasses of range of abusive practices that violates women's rights during maternity care. **Types of disrespectful care include;** physical, verbal abuse, abandonment, coercive payment demands and performing procedures without consent. In health services, disrespectful care adversely affects quality of care in addition neonatal and maternal outcomes (**Gebeyehu, Adella, & Tegegne, 2023**). Disrespectful and abusive care continues despite the global attention to respectful care. However many efforts to combat disrespectful care are underway, with organizations that advocating for RMC as a fundamental human right (**Adinew, Adella, & Tegegne, 2023**).

Nursing students play a crucial role in promoting RMC, as they are the future healthcare providers for women and can have a profound influence on their maternity care, they should understand the RMC concept and be motivated to improve their knowledge in various ways and apply it in their

future practices to enhance RMC (Dhakal, Creedy, Gamble, Newnham, & McInnes, 2022).

Significance of the study

Globally, the reported prevalence of abusive and disrespectful care during childbirth ranges from 15% in Nigeria to 98% in Ethiopia (Bekele, Bayou, & Garedew, 2020). In Egypt the prevalence of disrespected and abusive care through maternity care ranges from 30% to 60% (Kamal, Abdel-Wahab, & Mansour, 2024). While the exact prevalence varies across studies, disrespectful and abusive maternity care appears to be a significant issue (Khalil, Carasso, & Kabakian, 2022).

RMC is recognized as a pivotal human right, emphasizing the dignity and autonomy of women during maternity care. It aims at preventing disrespect and abuse, which can lead to adverse health outcomes for both women and their newborns (Haghdoost, Iravani, Rahmani, & Montazeri, 2024). Implementing RMC not only aligns with ethical healthcare practices but also contributes to achieving broader public health goals, involving reducing maternal mortality and morbidity rates globally (Asefa, McPake, Langer, Bohren, & Morgan, 2020).

Nursing students play a vital role in the implementation of RMC, as their understanding of maternal rights directly influences their future clinical practices. Therefore, it is important for nursing students to acquire the skills regarding RMC for achieving a key element for high quality maternity care (Huang et al., 2024).

This study aimed to: Evaluate the effect of the educational approach on nursing students' perception regarding RMC.

Operational definition

Educational approach

It is an instructional method focuses on a particular topic, student-centered learning activities and culminates in a study for students to demonstrate their understanding.

Research hypotheses

- Nursing students' knowledge regarding respectful maternity care is expected to be improved after implementation of the educational approach.
- Nursing students' attitude regarding respectful maternity care is expected to be improved after implementation of the educational approach.
- Nursing students' practices regarding respectful maternity care is expected to be improved after implementation of the educational approach.

Subjects and method

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

Setting: The study was carried out at Faculty of Nursing, Tanta University, which is affiliated to the Ministry of Higher Education and Scientific Research.

Subjects: A representative sample of 120 female nursing students from the total 310 undergraduate female nursing students in the third year, Faculty of Nursing, who were enrolled in Maternal and Neonatal Health Nursing Clinical Course. The sample size and power analysis were

calculated using Epi-Info software statistical package created by the WHO and center for Disease Control and Prevention, Atlanta, Georgia, USA version 2021.

Criteria used for the sample size calculation were as follows; Z confidence level at 95% with a margin of error at 5% and population proportion 50%.

Data collection tools: Four tools were used to achieve the aim of this study.

Tool I: Nursing students' knowledge regarding respectful maternity care: This tool was developed by the researcher after reviewing the recent related (Camlibel, & Uludag, 2023; Dhakal et al., 2022; Hajizadeh, Vaezi, Meedya, Charandabi, & Mirghafourvand, 2020). It involved two parts;

Part one: Nursing students' personal profile: This part was utilized to collect data about students' general characteristics which included; age in years, marital status, residence, and pre-university education.

Part two: Nursing students' knowledge regarding respectful maternity care: This part was utilized to measure students' knowledge regarding RMC. It included questions regarding the following items; meaning of RMC, disrespectful maternity care and human rights, also importance, objectives, advantages and consequences of RMC. In addition, disadvantages and effects of disrespectful maternity care.

The scoring system of knowledge was categorized as follows

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

The total score for knowledge was calculated as follows

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

Tool II: Nursing students' attitudes toward respectful maternity care scale: This tool was adapted from (Dhakal et al., 2022; Garcia, Torres, Olvera, & Hulme, 2021). It was used to measure students' attitudes regarding RMC. It consisted of 24 statements. The scale was divided into three subscales. **The first one was respectful care subscale which included** statements such as; health care providers have the responsibility to help woman feel safe during maternity care and the laboring woman need a birth space free from unnecessary disturbance by others.

The second one referred to the safety and comfort subscale which included statements such as; greet woman and explain benefits and risks to the women before any procedure and keep the woman in a clean bed with safety side rails is from human rights. **Finally, the third supportive care subscale** included three statements; women should be encouraged to actively participate in their care, the healthcare providers should support woman during maternity care, and women can talk to

each other about their maternity experiences.

Scoring system: Nursing students' attitudes was measured on a 5-point Likert Scale ranging from 1 to 5 where; 1= strongly disagree, 2=disagree, 3=unsure, 4=agree, 5=strongly agree, with higher scores indicating higher perceptions.

The total score of students' attitudes was calculated as follows

- Positive attitudes $\geq 60\%$.
- Negative attitudes $< 60\%$.

Tool III: Reported disrespect and abuse care scale: This tool was adapted from (Dhakar et al., 2022; Afulani, Diamond, Golub, & Sudhinaraset, 2017). It was used to assess nursing students' stated abusive or disrespectful care during their clinical placement in obstetrics and gynecological department. It included statements about disrespect and abuse care such as; shouting, slapping, and scolding the woman, also performing nursing procedures without explanation or consent of woman and without maintaining privacy.

Scoring system: Nursing students' reported disrespectful or abusive care was measured on response scale from 1 to 4 (1= No, never /2= Yes, a few times /3= Yes, most of the time/4= Yes, all the time). With higher scores indicating higher reported disrespectful or abusive care.

The total score was calculated as follows:

- High reported disrespect and abuse $\geq 75\%$.
- Moderate reported disrespect and abuse $50\% - < 75\%$.
- Low reported disrespect and abuse $< 50\%$.

Tool IV: Observational checklist for nursing students' practices regarding respectful maternity care: This tool was adapted from (Esan, Maswime, & Blaauw, 2022; Rosen et al., 2015). It was utilized to assess nursing students' practices regarding RMC. It included fifteen items concerning students-women interactions during providing maternity care such as; welcoming/greeting woman in a respectful manner, introduce themselves to the woman and encouraging her to have a supportive person during maternity care.

Scoring system:

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

The total score of nursing students' practices was calculated as follows

- Satisfactory practices $\geq 80\%$.
- Unsatisfactory practices $< 80\%$.

Method

The study was implemented according to the following steps

Administrative approval: An official permission was obtained from the Dean of Faculty of Nursing at Tanta University clarifying the purpose of the study to obtain their cooperation and approval for carrying out the study.

Ethical considerations: The approval of the Scientific Research Ethical Committee Faculty of Nursing was obtained code number (375-2-2024).
- Informed written consent was obtained by the researcher from all participants after being aware of

their right to withdraw at any moment.

- The researcher was responsible to making sure that the nature of the study wouldn't cause any harm or pain to the entire sample.
- Confidentiality and privacy were taken into consideration through data collection.
- The study tools were tested for face and content validity by **jury test of five experts** in the field of Maternal and Neonatal Health Nursing. The face validity of the questionnaire was calculated based on experts' opinion and it was 94% and the content validity index was 95% for knowledge questionnaire, 93% for attitudes questionnaire, 94% for reported disrespectful and abusive care questionnaire and 93% for questionnaire about practices regarding RMC and total questionnaire content validity index was 93.65%
- After development of tools, a **pilot study** was carried out on 10% (12) of the female nursing students (120 students) to test the clarity and feasibility, simplicity, and applicability of the developed tools. It was applicable and no modifications were done, accordingly data obtained from the pilot study were included in the current study sample, the pilot study was conducted before the actual data collection.
- The reliability of the study tools was tested by using suitable statistical test as Cronbach's Alpha test which indicated high reliability (0.812, 0.850, 0.84 and 0.864 respectively) for knowledge,

attitude, reported disrespectful and abusive care and practices questionnaire regarding RMC and the total questionnaire Cronbach's Alpha was 0.848.

- Data was collected in a period of six months from March 2024 to August 2024.

The educational approach was conducted through four phases (**assessment, planning, implementation and evaluation**) as follows:

Phase I: Assessment phase

During this phase, the researcher introduced herself to the participants, explained the aim of the study, asked the students to participate in the study after explaining the purpose of the study, obtained their consent to participate in the study and informed them that their participation is voluntary and wouldn't be included in their academic evaluation.

The researcher used **Tool I part (1)** to assess nursing students' personal profile and **Tool I part (2)** to assess nursing students' knowledge regarding RMC, **Tool II** to assess nursing students' attitudes regarding RMC, **Tool III** to evaluate nursing students' reported disrespect and abuse care and **Tool IV** to assess nursing students' practices regarding RMC before implementation of the educational approach.

Phase II: Planning phase

a. Preparation of the educational approach sessions: The educational approach included three sessions. The subjects (120 female students) were divided into 6 groups and each group included (20) students.

The educational approach sessions were conducted 3 days/week, 2 groups/ day, at the clinical obstetric skills lab by the researcher. The researcher ascertained that the subjects included completed two clinical rotations in the obstetrics and gynecological department to be sure that they had noticed the care provided to women. The time of each session ranged from 30 to 45 minutes.

b. Setting the goal and objectives of the educational approach

The goal of the educational approach

Improve the studied female nursing students' knowledge, attitudes and practices regarding RMC.

Objectives of the educational approach

After implementation of the educational approach the studied female nursing students will be able to identify objectives, importance, advantage and consequences of RMC. Also, explain the timeline of the RMC movement globally and in Egypt.

Prepare the content of the educational approach: An educational English booklet about RMC supplemented by photos and illustrations to help students understand the content was developed by the researcher based on female nursing students' pretest assessment and research goal, using recent relevant literatures available locally and internationally. The booklet was given to each student to be used as a guide for self-learning and retention of information.

Prepare the teaching strategy: The educational methods used were discussion, interactive lectures and

role playing. Educational materials included PowerPoint presentation and videos.

Phase III: Implementation phase

- This phase was conducted in the clinical obstetric laboratory skills at Faculty of Nursing Tanta University, after completion of their daily course.
- The educational approach included three sessions as follows

First Session: It included assessment of female nursing students' knowledge about meaning, types of human rights, also definition, objectives, importance, advantage, domains, and consequences of RMC.

Second Session: It included orientation of the nursing students about common respectful and disrespectful maternity care practices, prevalence of disrespect and abuse globally, barrier of implementing RMC, also factors associated with disrespectful and abusive care and their effect.

Third Session: It included strategies required to promote RMC such as; respectful care policies, staff training, quality improvement initiatives, women's feedback mechanisms, supportive groups, technological strategies, as well as RMC educational approach for nursing students.

Phase IV: Evaluation phase

After implementing the educational approach sessions, the researcher used **(Tool I, part two)** to assess the effect of the educational approach on nursing students' knowledge regarding RMC, **(Tool II)** to evaluate the effect of the educational approach on nursing students' attitudes

regarding of RMC and (**Tool IV**) to assess nursing students' practices regarding RMC immediately after and two weeks after the sessions.

Statistical analysis

SPSS (Statistical Package for Social Science) version 25 (IBM Corporation, Armonk, NY, USA) was used to coded, entered, tabulated and analyzed collected data (**Dawson, & Trapp, 2001**).

Results

Table (1): Reveals that (49.2%) of studied female nursing student's age was 20 years old ranged from 20-22 years with mean age $\pm$ SD = 20.91 $\pm$ 0.94. Regarding their marital status, it was observed that (75%) of them were single, and (58.3%) of them were from rural areas. It is also observed that (79.1%) of studied female nursing students had pre-university education in higher secondary schools.

Figure (1): reveals that only (6.7%) of studied female nursing students had high level of knowledge before implementation of the educational approach, which increased to (96.7%) immediately after, then slightly decreased to (90.0%) two weeks later, with highly statistical significant difference ($P < 0.0001$).

Figure (2): Clarifies that (66.7%) of the studied students had a positive level of attitude regarding RMC before implementation of the educational approach which increased to the entire subjects (100%) immediately after, then slightly decreased to (97.5%) two weeks later, with high statistically significant difference ($P < 0.05$).

Figure (3): Reveals that (53.4%) of the studied students reported high

level of disrespectful and abusive maternity care, (45.8%) reported a moderate level of abusive and disrespectful maternity care and only (0.8%) reported low level of disrespectful and abusive maternity care.

Figure (4):- Displays that thirds (64.2%) of studied female nursing students had satisfactory practices before implementation of the educational approach which increased among vast majority of them (99%) immediately after, then slightly decreased to (98%) two weeks after the educational approach implementation, with high significance difference (χ^2 value = 75.596, $p = 0.0001$).

Figure (5): Demonstrates a significance positive correlation was found between total knowledge scores and total attitudes scores of the studied female nursing students regarding RMC immediately after implementation of the educational approach where $r = 0.367$ and $p = 0.0001$.*

Figure (6): Represents that a significance positive correlation between total knowledge scores and total practices scores of the studied female nursing students regarding RMC was detected immediately after implementation of the educational approach where $r = 0.434$ and $p = 0.0001$.*

Table (2):- Represents the relationship between total knowledge mean scores of the studied nursing students regarding RMC and their personal profile before, immediately and two weeks after implementation of the educational approach, shows

that a significant relationship between total mean knowledge scores of studied female nursing students and their age, marital status, and residence was found before implementation of the educational approach (χ^2 value = 14.149, 5.150, and 3.735, respectively, $p = 0.001^*$, 0.0001^* , and 0.0001^* respectively).

Also, a significant relationship between total mean knowledge scores of female nursing students and their marital status and residence was detected immediately after implementation of the educational approach (χ^2 value = 2.103 and 7.853 respectively, $p = 0.035^*$ and 0.005^* respectively).

Table (3):- Displays the relationship between total attitudes mean scores of the studied nursing students regarding RMC and their personal profile before, immediate and two weeks after implementation of the educational approach, a significant relationship was presented between total mean attitude scores of studied female nursing students and their pre-university education before implementation of the educational approach (χ^2 value= 2.334, $p= 0.020^*$).

Also, a significant relationship between total mean attitude scores of studied female nursing students and their age, marital status and pre-university education was found immediately after implementation of the educational approach (χ^2 value=

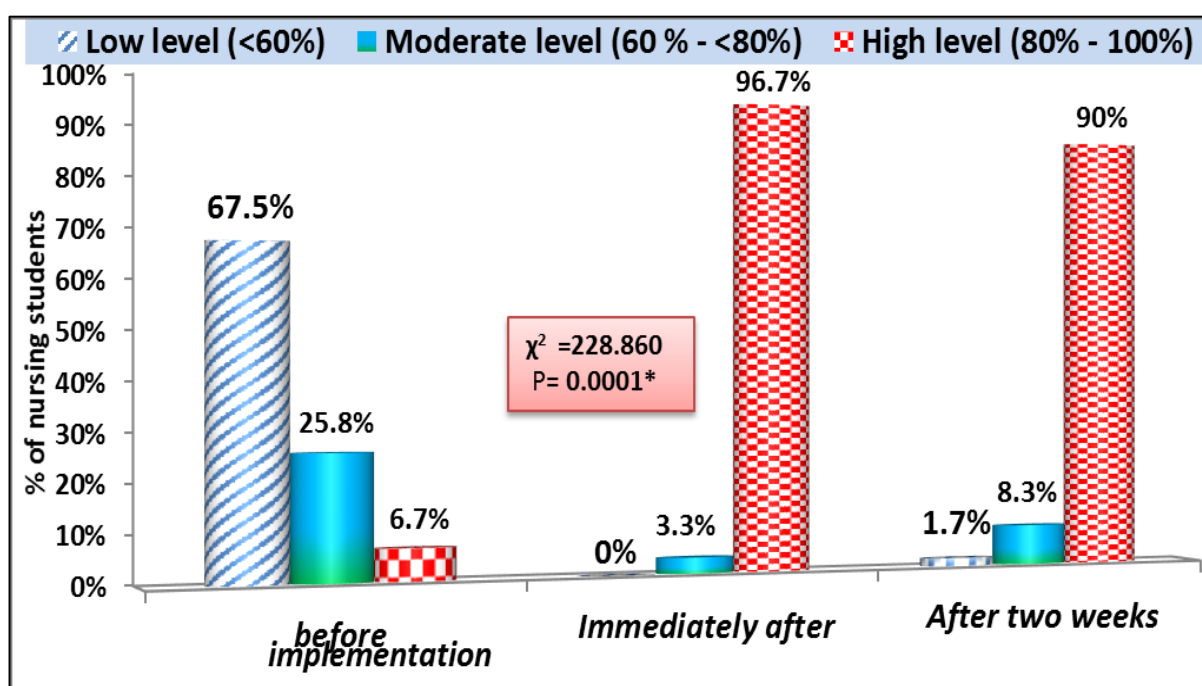
13.903, 2.747 and 4.712 respectively, $p = 0.001^*$, 0.006^* , 0.0001^* respectively). Moreover, a significant relationship between total mean attitudes scores of studied female nursing students and their age, marital status and pre-university education was detected two weeks after implementation of the educational approach (χ^2 value = 12.469, 3.778 and 5.120 respectively, $p = 0.002^*$, 0.0001^* and 0.0001^* respectively).

Table (4):- Reveals the relationship between total practices mean scores of the studied female nursing students regarding RMC and their personal profile before, immediate and two weeks after implementation of the educational approach, a significant relationship was found between total mean practices scores of studied female nursing students and their age, marital status, and pre-university education before implementation of the educational approach (χ^2 value= 9.796, 3.045, and 3.654 respectively, $p= 0.007^*$, 0.002^* , and 0.0001^* respectively).

Also, a significant relationship between total mean practices scores of studied female nursing students and their age, marital status, residence and pre-university education was found immediately after implementation of the educational approach (χ^2 value= 29.125, 2.463, 8.244 and 4058 respectively, $p = 0.0001^*$, 0.014^* , 0.004^* and 0.0001^* respectively).

Table (1):- Personal profile of the studied female nursing students. (n=120)

Personal data	The studied female nursing students (n=120)	
	N	%
Age (years)		
20	59	49.2
21	13	10.8
22	48	40.0
Range	20-22	
Mean±SD	20.91± 0.94	
Marital status		
Married	30	25.0
Single	90	75.0
Residence		
Rural	70	58.3
Urban	50	41.7
Pre-university education		
Higher secondary school	95	79.1
Nursing Institute	25	20.9

**Figure (1): Total knowledge score level of the studied female nursing students about RMC before, immediate and two weeks after implementation of the educational approach.**

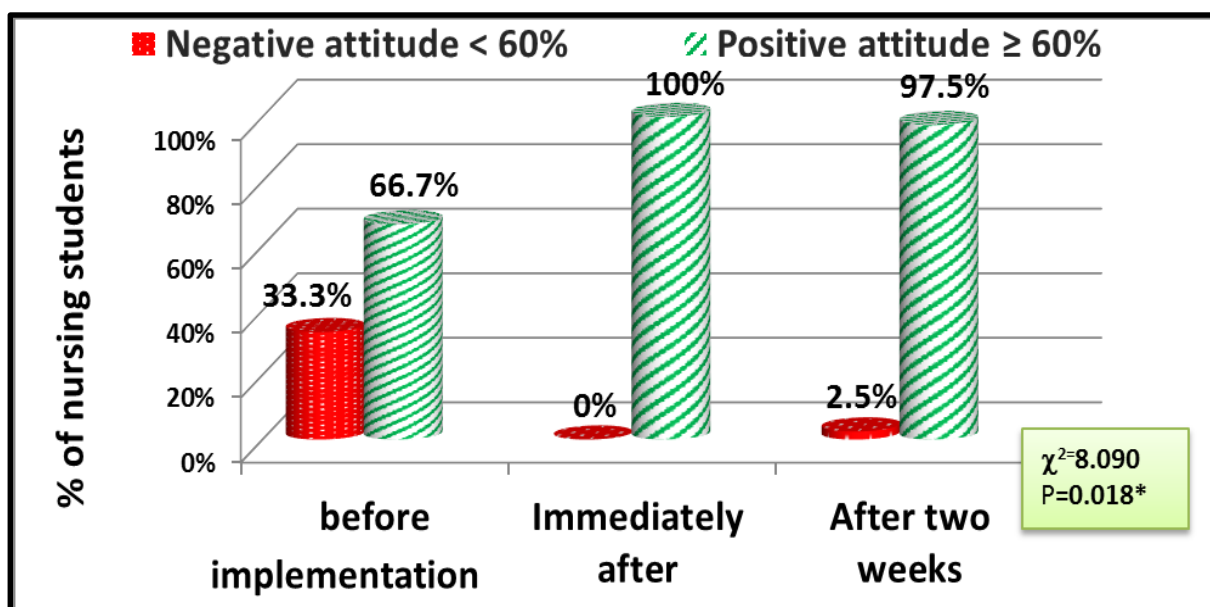


Figure (2): Total attitudes score level of the female nursing students towards RMC before, immediate and two weeks after implementation of the educational approach.

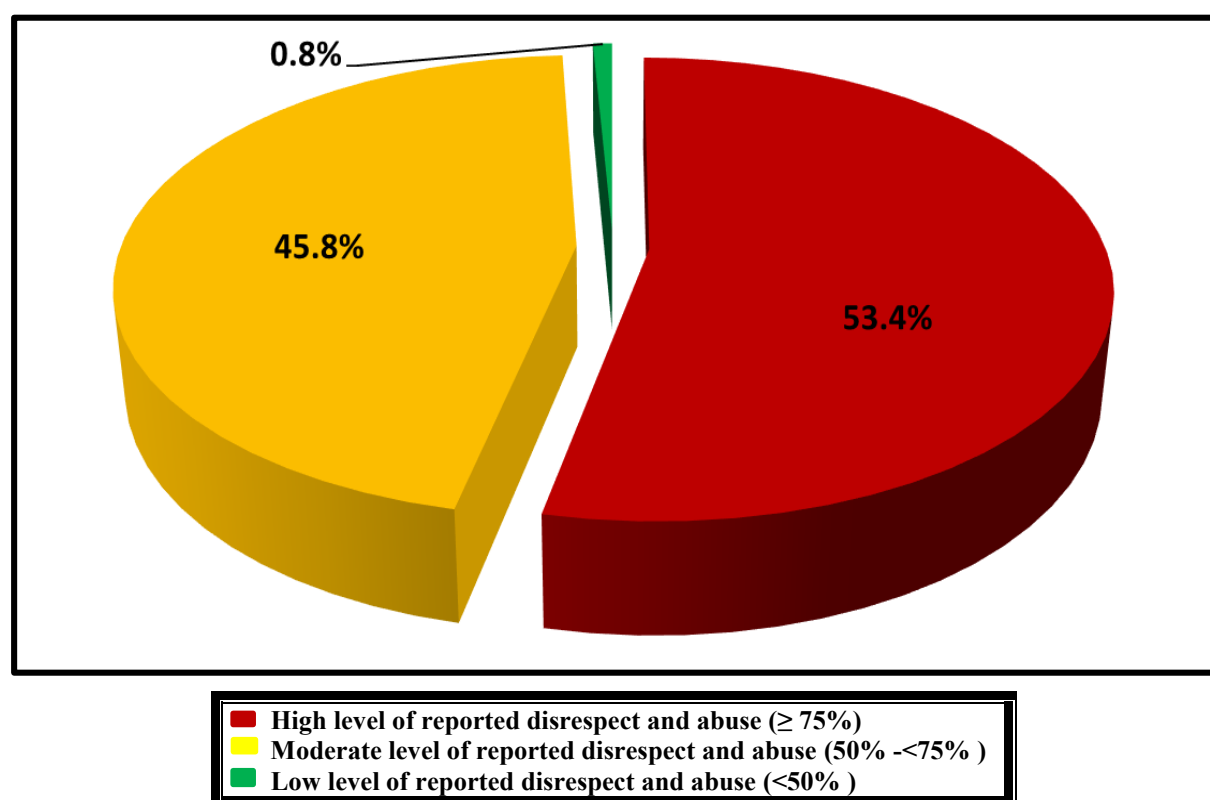


Figure (3): Total score level of reported disrespectful and abusive care by the female nursing students regarding maternity care before implementation of the educational approach.

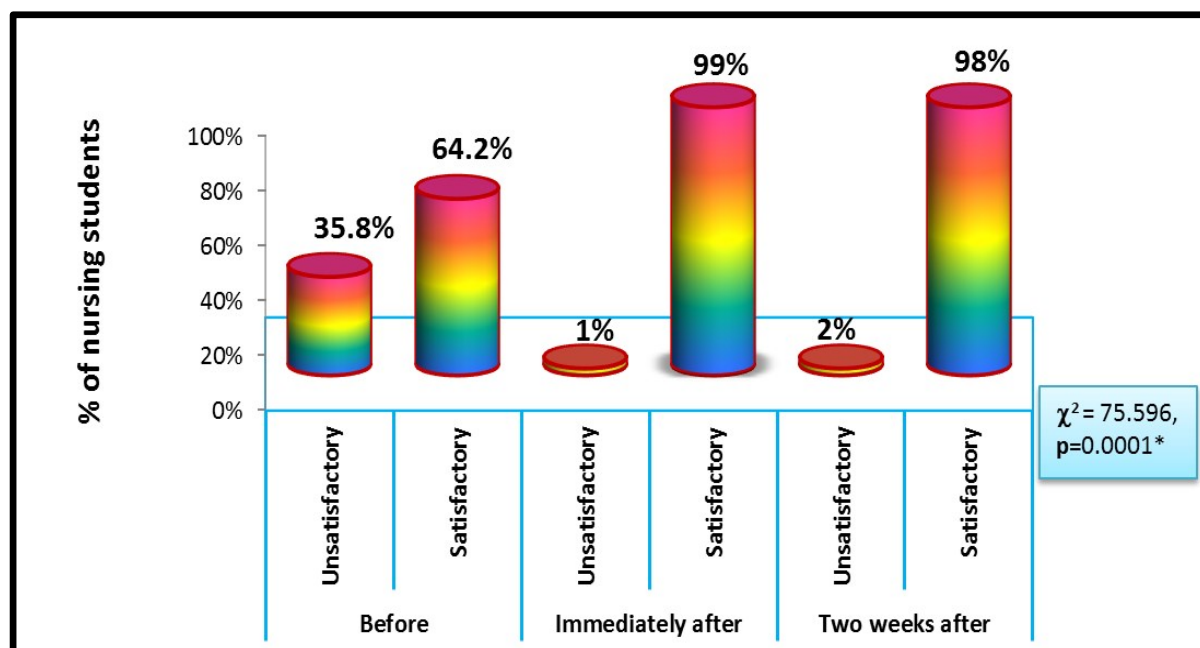


Figure (4): Total observed practices score level of the studied female nursing students regarding RMC before, immediate and two weeks after implementation of the educational approach.

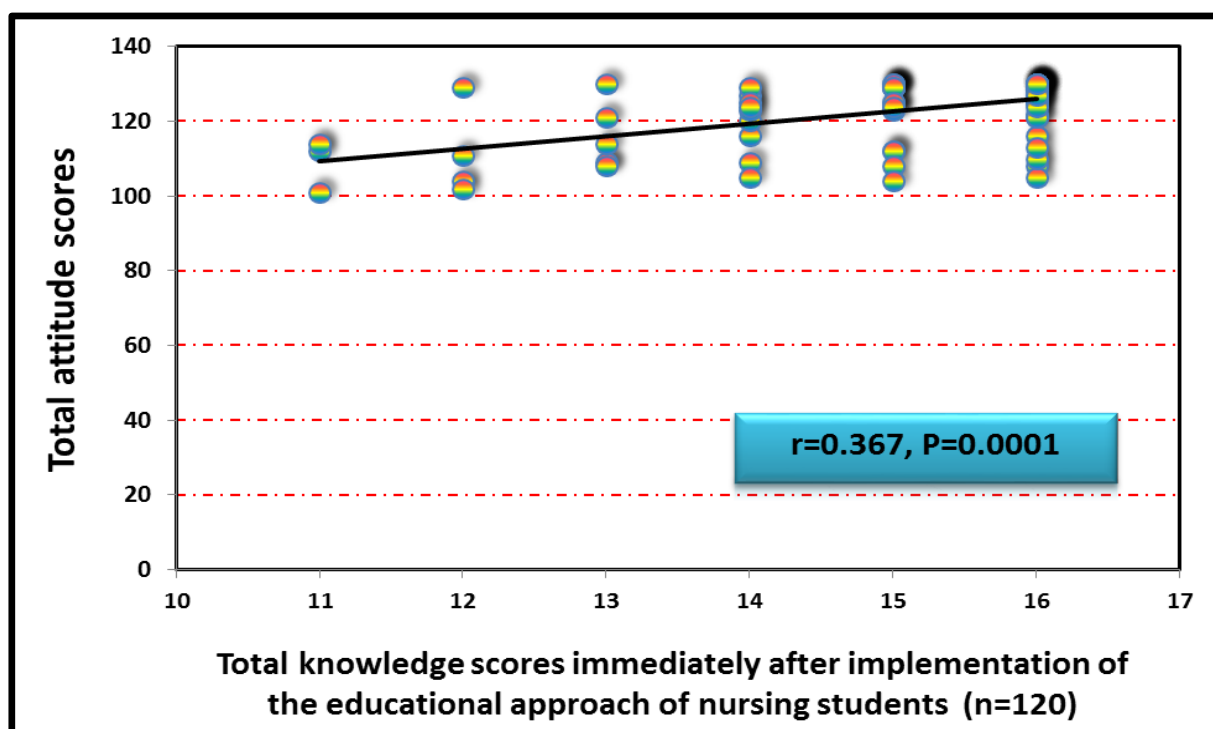


Figure (5): Correlation between total knowledge scores and total attitude scores of the studied female nursing students regarding RMC immediately after implementation of the educational approach. (n=120)

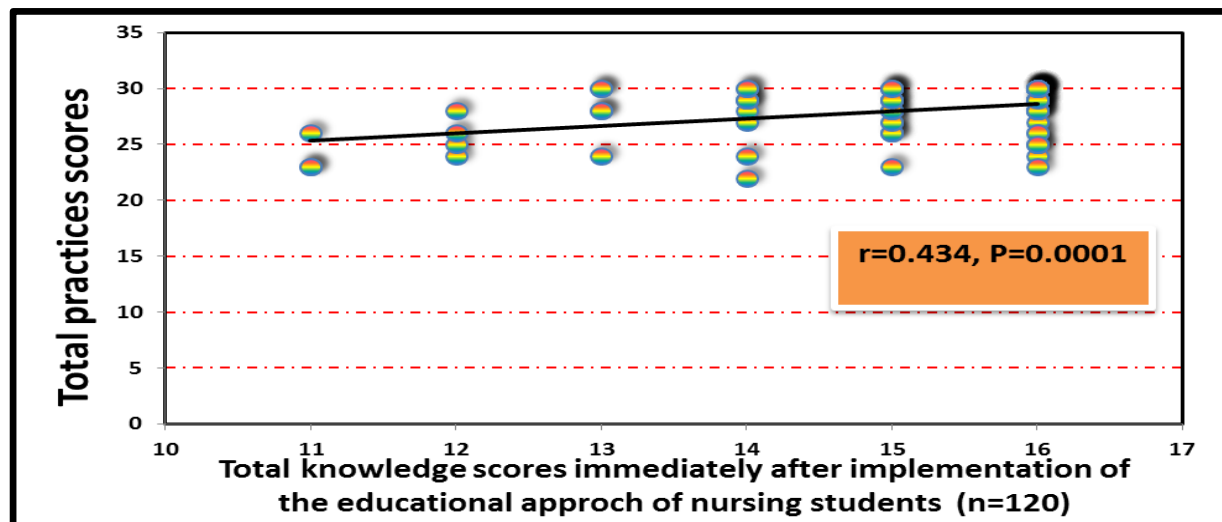


Figure (6): Correlation between total knowledge scores and total practices scores of the studied female nursing students regarding RMC immediately after implementation of the educational approach.

Table (2):- Relationship between total knowledge mean scores of the studied nursing students regarding RMC and their personal profile before, immediately and two weeks after implementation of the educational approach. (n=120)

Variables	No.	Total knowledge mean scores of the studied nursing students (n=120)					
		Before		Immediate after		Two weeks after	
		Mean±SD	Z or χ^2 P	Mean±SD	Z or χ^2 P	Mean±SD	Z or χ^2 P
Age (years)							
20	59	7.15±2.30	14.149	15.41±1.02	5.086	14.72±1.42	0.231
21	13	9.97±1.80	0.001*	15.38±1.19	0.079	14.77±1.53	0.891
22	48	9.08±3.17		14.89±1.43		14.73±1.76	
Marital status							
Married	30	11.40±1.90	5.150	14.77±1.52	2.103	14.63±1.56	0.509
Single	90	8.61±2.44	0.0001*	15.34±1.09	0.035*	14.77±1.57	0.611
Residence							
Rural	70	9.98±2.63	3.735	15.44±1.04	7.853	14.78±1.41	0.045
Urban	50	8.36±2.29	0.0001*	14.86±1.40	0.005*	14.60±1.77	0.954
Pre-university Education							
Higher secondary School	95	9.13±2.44	1.194	15.22±1.22	0.298	14.65±1.60	1.201
Nursing Institute	25	10.00±3.15	0.232	15.12±1.30	0.766	15.04±1.43	0.230

*Statistically significant (P<0.05)

Table (3):- Relationship between total attitudes mean scores of the studied nursing students regarding RMC and their personal profile before, immediate and two weeks after implementation of the educational approach. (n=120)

Variables	No.	Total attitudes mean scores of the studied nursing students (n=120)					
		Before		Immediate after		Two weeks after	
		Mean±SD	Z or χ^2 P	Mean±SD	Z or χ^2 P	Mean±SD	Z or χ^2 P
Age (years)							
20	59	104.29±7.22	1.668	125.64±7.76	13.903	123.91±4.23	12.469
21	13	100.54±10.10	0.434	125.08±9.53	0.001*	121.15±7.39	0.002*
22	48	104.48±4.86		123.89±7.51		118.87±8.20	
Marital status							
Married	30	104.90±6.75	0.938	121.20±9.27	2.747	117.67±6.74	3.778
Single	90	103.64±6.85	0.348	126.11±6.93	0.006*	122.91±6.35	0.0001*
Residence							
Rural	70	103.48±7.40	0.656	125.46±7.35	1.112	122.78±4.79	0.561
Urban	50	104.62±5.91	0.512	124.08±8.49	0.292	119.94±8.69	0.575
Pre-university Education							
Higher secondary School	95	104.99±5.69	2.334	126.43±6.50	4.712	123.22±5.82	5.120
Nursing Institute	25	100.04±9.13	0.020*	119.00±9.68	0.0001*	115.44±6.90	0.0001*

*Statistically significant (P<0.05)

Table (4):- Relationship between total practices mean scores of the studied female nursing students regarding RMC and their personal profile before, immediate and two weeks after implementation of the educational approach. (n=120)

Variables	No.	Total practices mean scores of the studied nursing students (n=120)					
		Before		Immediate after		Two weeks after	
		Mean±SD	Z or χ^2 P	Mean±SD	Z or χ^2 P	Mean±SD	Z or χ^2 P
Age (years)							
20	59	20.23±5.32	9.796	29.29±1.49	29.125	27.69±1.76	4.155
21	13	25.00±5.50	0.007*	29.46±0.97	0.0001*	28.46±1.20	0.125
22	48	24.33±5.65		27.50±2.34		27.29±1.64	
Marital status							
Married	30	20.83±6.11	3.045	27.70±2.53	2.463	27.50±1.92	0.056
Single	90	25.34±5.08	0.002*	28.89±1.76	0.014*	27.65±1.78	0.956
Residence							
Rural	70	23.86±5.89	0.965	28.93±1.90	8.244	27.86±1.70	1.900
Urban	50	24.72±5.39	0.335	28.12±2.13	0.004*	27.28±1.93	0.057
Pre-university Education							
Higher School	95	25.34±5.02	3.654	28.96±1.72	4058	27.59±1.91	0.096
Nursing Institute	25	19.96±6.13	0.0001*	27.20±2.52	0.0001*	27.72±1.40	0.924

*Statistically significant (P<0.05)

Discussion

Concerning the personal profile of the studied female nursing students, nearly half of them were 20 years old and their age ranged from 20-22 years with mean age $\pm$ SD= 20.91 $\pm$ 0.94. Also, the majority of them were single and less than three fifths of them were from rural areas. In addition, more than three quarters of the studied female nursing students had pre-university education in higher secondary school.

Pertaining to total knowledge score level and total mean score of the studied female nursing students regarding RMC. The minority of them had high level of knowledge regarding RMC before implementation of the educational approach, which increased to the majority immediately and two weeks after implementation with highly statistical significant difference. These findings are matching with the result of **Dzomeku et al., (2021)**, who assessed midwives' experiences after implementing four- days RMC training in daily maternity care practices. They stated that the training enhanced their rapport with women. Also, **Rana, (2024)**, who determined the effectiveness of structured teaching program on knowledge regarding RMC among nurses working in maternity wards of selected hospital, in Bangalore. She revealed a considerable increase in the knowledge of her studied subjects regarding RMC after implementing the structured teaching program.

At the same context **Devassy, & Sangeetha, (2023)**, who assessed the knowledge on RMC among nursing

staff, they reported that a minority of their participants had enough knowledge on RMC. Also, **Ojong, Chukwudozie, Nsemo, & Enebeli, (2022)** evaluated midwives' perception and practices of RMC during pregnancy and childbirth in selected health facilities in Cross River State, Nigeria and discovered a general moderate level of knowledge of their participants regarding RMC. Moreover, **Salma, Samanta, & Jash, (2024)**, who assessed knowledge, practices and challenges regarding RMC among midwives in labor room of selected public healthcare facilities in West Bengal. They found that less than one quarter of their subjects had good knowledge regarding RMC. From the researcher's point of view, the improvement in the level of knowledge after implementation of the educational approach regarding RMC in the present study and in several other studies may be due to different educational program provided to them.

Regarding total attitudes score level of the studied female nursing students towards RMC, less than two thirds of them had positive attitudes regarding RMC before implementation of the educational approach which improved to the entire subjects immediately after and slightly decreased two weeks later with high statistically significant difference. These findings were in the same line with **Wilson-Mitchell, Robinson, & Sharpe, (2018)** who taught RMC using an intellectual partnership model in Tanzania, and emphasized the creativity, innovation, and context-specific social ideas

relating to RMC. They concluded that this model encourages critical thinking and fosters collaboration between educators and learners to co-create solutions for ethical challenges during maternity care.

These findings were also harmonized with **ElShora, Osman, Abd Elnabi, & Dwedar, (2023)** who revealed a highly statistical significant difference in the total students' perceptions of RMC scores in the pretest compared to the posttest after implementation of the educational program regarding RMC. From the researcher's point of view, these differences in the attitudes in the current study and other studies may be due to the fact that subjects may hold certain beliefs and after implementation of educational program regarding RMC can challenge these beliefs, resulting in a shift in attitudes as they reconcile their previous views with new experiences. Also, presence of role models and working in a team can inspire the students, increase their confidence, and commitment to high-quality care, then positively shape their attitudes.

Regarding the total scores level of reported disrespectful and abusive care by the female nursing students regarding maternity care, more than half of them reported high level of disrespectful and abusive maternity care. Contradictory **ElShora, et al., (2023)**, reported that the majority of their participants observed disrespectful behavior to women by health care providers during maternity care. **Yohannes, et al., (2024)** also determined the impact of disrespectful maternity care on childbirth complications in Ethiopia, stated that

more than three quarters of their subjects reported being treated disrespectfully in their study. From the researcher's point of view, the difference in the reported disrespectful and abusive care may be due to difference the working condition, funding, resources, staff workforce, and communication skills of the healthcare providers. It may be also due to lack of knowledge about RMC contributing to unprofessional attitudes and behaviors, or lack of women's awareness about their rights regarding maternity care.

As regards, the total observed practices score level of the studied female nursing students regarding RMC, it was evident that less than two thirds of studied female nursing students had satisfactory practices before implementation of the educational approach regarding RMC which increased among the vast majority (99%) of them immediately after and slightly decreased two weeks after with high significance difference. This finding corresponds with **Salma, et al., (2024)**, who assessed knowledge, practices and challenges regarding RMC among midwives posted at labor room of selected public healthcare facilities, they presented that less than three quarters of their subjects had satisfactory practices regarding RMC. From the researcher's point of view, the significant improvement in practices among the studied nursing students may be due to the improvement in their knowledge regarding RMC principles and the training on the practical communication skills through the

educational program which resulted in enhanced respectful care practices during maternity care.

Concerning the correlation between total knowledge scores and total practices scores of the studied female nursing students, there was a positive correlation between total knowledge scores and total practices scores of the studied female nursing students regarding RMC immediately after implementation of the educational approach. This finding was in agreement with **Salma, et al., (2024)**, who represented a significant positive correlation between knowledge and practices of midwives regarding RMC. In contrast, **Dzomeku, et al., (2020)**, who explored midwives' understanding of RMC in Ghana, they depicted that there was negative correlation between knowledge and practices score. From the researcher's point of view, these differences may be due to the fact that some learners are capable to practice what they have learned more than others, while others may understand RMC concept but failed to practices it correctly.

Regarding relationship between total knowledge mean scores of the studied nursing students regarding RMC and their personal profile, a significant relationship between total mean knowledge scores of studied female nursing students and their personal profile was found before implementation of the educational approach. This finding not matched with **Rana, (2024)**, who declared that there was no significant association between pretest knowledge of their

participants regarding RMC and their socio-demographic variables.

Regarding the total attitudes mean scores of the studied female nursing students in relation to their personal profile, a significant relationship between total mean attitudes scores and personal profile of the students such as; age, marital status and pre- university education was detected immediately after implementation of the educational approach. According to, **Drake, et al., (2022)** who assessed the relationship between socio-demographic factors and attitudes of their participants, they noted that the attitude of their subjects apparently varied according to their socio-demographic characteristics.

Concerning total practices mean scores of the studied female nursing students in relations to their personal profile, a significant relationship between total mean practices scores and personal profile of the students such as; age, marital status, pre-university education was found before implementation of the educational approach. This finding was similar with **Kandasamy, Vasantha, & Pandiselvi, (2024)** who assessed the RMC practices during labor among nurses, they found a significant association between selected socio-demographic variables of their subjects as age, marital status, and RMC practices.

Conclusion

The research hypotheses had been supported and confirmed, where significant improvement of studied female nursing students' knowledge, attitudes as well as practices regarding RMC were achieved immediately and

two weeks after implementation of the educational approach regarding RMC.

Recommendations

- The concept of RMC should be included in the curricula of basic and postgraduate nursing education.
- Refreshing courses and in-service training programs regarding RMC should be provided to all healthcare providers. **Further studies are needed to assess barriers that influence maternity nurses' compliance with RMC practices.**

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Electronic Health Literacy among Students of Humanistic Science Faculties of Tanta University

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Abstract

Background: Electronic health literacy is the skills that required to find, understand, and use electronic health sources , these skills can be improve health status between university students .**Aim of the study:** To assess electronic health literacy among students of humanistic science faculties of Tanta university. **Study design:** - A descriptive study design was used. **Study settings:-** This study was conducted in humanistic science faculties at Tanta University. **Study subjects:** - A stratified and systematic random sample techniques were be used to choose 827 from the previous settings. **Tools of data collection:** - A structured questionnaire sheet was be used in this study. It consisted of three parts: **Part (I):** Socio-demographic characteristics and health history of the student, **Part (II):** Student knowledge about electronic health literacy, and **Part (III):** Electronic Health Literacy Questionnaire (e-HLQ). **Results:** - It was founded that more than one half (56 %) of the studied students had good e-health literacy level. Meanwhile, 44% of them had poor e-health literacy level. **Conclusion:** - The result concluded that slightly more than one third of them had high level of knowledge about electronic health literacy and exhibited poor e-health literacy level. **Recommendations:-** This result recommended that initiating program of e-health literacy for university students. In which them may be given clinical practices on the electronic health information resources available online.

Key words: Electronic Health Literacy, Humanistic Science Faculties and University students.

Introduction

Health literacy (HL) is described as a person's ability to get and understand knowledge for maintaining and improving health, adapted to both personal and systemic contexts. This includes the social resources and personal characteristics required for people and societies to obtain, understand, evaluate, and apply information and facilities for making decisions about their health. **(Hasannejadasl, Roumen, Smit, Dekker, & Fijten, 2022).**

Electronic Health Literacy (e-HL) is a new concept that refers to "the ability to recognize and explain a health problem, to recognize, appraise, and apply digital health information and technologies in the social, cultural and situational frame and to use the knowledge to deal with the health problem." It is based on health literacy within the information technology framework **(Kristjánsdóttir, Welandar, Stenström, Castor, & Kristensson, 2023).**

Electronic health literacy is affected by a wide range of characteristics, for example age, grade level, parental education, and socioeconomic status. Information about health-related behaviors, financial situation, chronic disease, and previous hospital admission are additional potential factors. For instance, just as basic literacy levels rise with age and grade, so does the capacity to locate health information online through e-health literacy. **(Park, 2019).**

University students are forming a wider variety of social and personal relationships, compared to earlier in

their academic careers. They are also becoming more independent of their parents, responsible for their education, facing a variety of conflicts, and dealing with health issues particular to the learning process. Therefore, raising university students' health literacy will improve both their own health and the health of society as a whole in the years of their future employment **(Yokoyama et al., 2023).**

University age refers to the age range between 18 and 25 years old, during which people continue higher education at colleges or universities. Students in this age frequently face the challenges of adulthood, including adjusting to their newfound freedom and responsibilities. They are preparing for their future occupations, face intellectual challenges, social interactions, and personal growth that shape their identities and desires. This stage is marked by self-awareness, self-discovery, and a wide range of experiences that support their general growth and maturation **(Mastora, Panagopoulou, & Raikou, 2020).**

Community health nurses (CHNs) contribute significantly to raising health literacy. They can assess the individual's level of knowledge regarding a problem or illness, as well as the health literacy abilities. The insertion of health literacy in all settings of care and at any time will facilitate the achievement of optimal health outcomes and client involvement, empowerment, and activation. They have a crucial role in informing students with health information and promotion. In addition to being their primary

competency, they also promote clients' health (Abdoh, 2022).

Significance of the study

Focusing on health literacy at an early age can lead to positive health effects and behaviors later in life, particularly among university students. So, increasing electronic health literacy level and health education at this stage are very important to encourage healthy promotion behaviors to improve their health and prevent health problems. Meanwhile, there are a few studies on health literacy in Egypt have been conducted particularly among university students. Thus, the aim of this study was to assess level of electronic health literacy among students of humanistic science faculties of Tanta University.

The aim of this study was to

Assess electronic health literacy among students of humanistic science faculties of Tanta University.

Research question

What is the level of electronic health literacy among students of humanistic science faculties of Tanta University?

Subjects and Method

Study design: - Descriptive study design was used in the study.

Study settings: - This study was conducted at humanistic science faculties in Tanta University. The number of humanistic science faculties in Tanta University are six faculties (Faculty of Education, Faculty of Specific Education, Faculty of Physical Education, Faculty of Commerce, Faculty of Arts, and Faculty of Law). Two faculties were selected randomly using simple random sample technique: (Faculty of

Arts and Faculty of Physical Education).

Study subjects: - Students were selected from the previous settings using stratified and systematic random sample techniques. Five percent (5%) of students from each faculty from second to fourth grade during the academic year 2023/2024 were included in the study. The first grade was excluded as their exact number is unknown. The number of students that included in the study was 827 (157 students from faculty of Physical Education and 670 students from faculty of Arts).

Study tools

A structured questionnaire sheet was used in this study to collect the necessary data. It consisted of three parts.

Part (I): Socio-demographic characteristics and health history of the student

It included sociodemographic data as: age, sex, grade, name of faculty, level of fathers' & mothers' education, fathers' & mothers' job, place of residence and family income. Also, it included data regard health history as: history of chronic disease, smoking, and routine checkup.

Part (II): Student knowledge about electronic health literacy

This part was developed by the researcher based on literature review (Akhtar & Ajmal, 2022). It included 7 questions about students' knowledge about electronic health literacy as: definition, benefits, and fields of electronic health literacy, electronic health platforms and applications, electronic health applications in Egypt, students'

applications of electronic health literacy, and their sources of information about electronic health.

Scoring system

Each question of the knowledge was scored as "zero" for an incorrect answer or a "don't know", and "one" for the correct answer. Total score was 17, all scores were summed up, converted into percent, and classified as:

- **Low level of knowledge:** < 60% (0-9) from the total score.
- **Moderate level knowledge:** 60 - ≤75% (10-13) from the total score.
- **High level knowledge:** >75% (14-17) from the total score.

Part (III): Electronic Health Literacy Questionnaire (e-HLQ):

Electronic Health Literacy Questionnaire (e-HLQ) that was developed by **Kayser et al., (2018)**. It was adapted by the researcher in this study to assess electronic health literacy. The e-HLQ consisted of 35 items in seven domains including, one: The use technology to process health information (5 items). Two: the understand of health concepts and language (5 items). Three: the ability to actively engage with digital services (5 items). Four: Feeling safe and in control (5 items). Five: The motivated to engage with digital services (5 items). Six: Access to digital services that work (6 items). Seven: The digital services that suit individual needs (4 items).

Scoring system

All items were rated on a three Likert scales as following: disagree (0), neutral (1) and agree (2). Total score was range from 0 to 70, all scores was

summed up, converted into percent, and classified as follows:

- Poor e-health literacy level: < 60% (0- 41) from the total score.
- Good e-health literacy level: ≥60 % (42-70) from the total score.

Method

Obtaining approval

An official permission letter was obtained before conducting the study, from the Dean of Faculty of Nursing Tanta University to the Deans of Faculties that were included in the study to obtain their permissions to collect data from selected settings.

Ethical considerations

- Consent of the Scientific Research Ethical Committee of the Faculty of Nursing was obtained with code number (280-7-2023).
- An informed consent was obtained from the chosen students to participate in this study after providing appropriate explanation about the purpose and benefits of the study at the beginning of the questionnaire.
- Each participant was informed that he/she has the right to withdraw from the study at any time he/she wanted.
- Nature of the study was not causing any harm or pain for the entire sample.
- Confidentiality and privacy were put into consideration regarding the data collected.

Developing the tools of data collection

- Parts (I and II) of the study tool were developed by the researcher based on literature review.
- Part III of study tool were translated into Arabic.

- The study tools were tested for content validity by a jury of five expertise in the field of Community Health Nursing, Faculty of Nursing in Tanta University before conducting the study.

A pilot study

A pilot study was carried out by the researcher on 10% (83 university students) of the subjects for testing the tool for its clarity, applicability and identify obstacles that may be encountered with the researcher during data collection. Accordingly, the necessary modifications were done. Those students were excluded from the study sample.

Reliability of the study tools was done by Cronbach's Alpha test and it was found to be (0.893) for the study tool. For knowledge (0.856) and for electronic health literacy questionnaire (e-HLQ) (0.882).

6- Actual study

- The data were collected by the researcher over a period of six months starting from October 2023 to the end of March 2024.
- The study students were asked to fill the questionnaire according to the schedule of their lectures and sessions by online Google form.
- The average time spent for each student to fill the questionnaire was 20 minutes.

Statistical analysis

- The data were organized, tabulated and statistically analyzed using statistical package for social studies (SPSS) version 23. The mean, standard deviation and range were calculated for quantitative data. For 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 (*). Also, highly significant was adopted at $P < 0.01$ for interpretation of results of tests of significance (**).

Results

Table (I): Represents the studied students' distribution according to their socio-demographic characteristics .

The table shows that, slightly less than half (49.3%) of the studied students were in the age group 18-≤20 years and nearby two-thirds (65.4%) of them were females. Additionally, the table shows that (47.6% and 39.9%) of studied students' fathers 'and mothers' education respectively had university and post university education. The majority (89%) of students' fathers studied were working compared to (39.2%) of their mothers.

Regarding the place of residence, slightly more than one half (50.4%) of the studied students were from urban areas. Slightly more than two-thirds (67%) had enough income.

Table (II): Represents the studied students' distribution according to their health history.

This table illustrates that the majority (86.3% and 93%) of the studied students respectively did not suffer from any chronic disease and did not smoke, only 7.6 % were suffering from anemia. However, less than three

quarters (71.7%) did not perform routine checkup.

Figure (1): Represents the studied students' distribution according to their sources of information about electronic health literacy. The figure represents that more than three-quarters (78.2%) of the studied students used social media to find information about electronic health followed by less than two-thirds (63.6%) used web pages, then electronic health application (59.5%), more than one-half (56.2%) used books, journal and magazine, articles. On the other side, 31.1% of them did not use any source to find electronic health information.

Figure (2): Represents the studied students' distribution according to their levels of knowledge about electronic health literacy. The figure shows that, 38.3% of the studied students had low level of knowledge and slightly more than one third (35.4%) of them had high level of knowledge. While slightly more than one quarter (26.2%) had moderate level of knowledge.

Figure (3): Represents the studied students' distribution according to their levels of electronic health literacy. The figure shows that, more than one half (56 %) of the studied students had good e-health literacy level. Meanwhile, 44% of them had poor e-health literacy level.

Table (III): Represents the relation between studied students' socio-demographic characteristics and their levels of knowledge about electronic health literacy. The table reveals that, there was a highly statistically significant relation

between level of knowledge and socio-demographic characteristics of the studied students including academic year, age, level of mother education, and place of residence ($\chi^2=19.203, 21.603, 19.439$, and 21.327), ($p<0.01^{**}$). Also, a statistically significant relation was found between level of knowledge sex, level of father education, and father's occupation ($\chi^2=6.192, 16.592$, and 6.428), ($p<0.05^*$). Meanwhile, there was no statistically significant relation between the level of knowledge and other socio-demographic characteristics including working in health field, mother's occupation, and family income ($\chi^2=3.555, 3.882$, and 4.103).

Table (IV): Represents the relation between studied students' socio-demographic characteristics and their levels of electronic health literacy. The table reveals that, there was a highly statistically significant relation between levels of electronic health literacy and socio - demographic characteristics including academic year, level of father education, and place of residence ($\chi^2=10.817, 21.375$, and 8.217), ($p<0.01^{**}$). Additionally, a statistically significant relation was found between levels of electronic health literacy and age ($\chi^2=7.466$), ($p<0.05^*$). Meanwhile there was no statistically significant relation between their levels of electronic health literacy and others socio - demographic variables including sex, level of mother education, father's and mother's occupation, working in health field, and family income

($\chi^2=0.32$, 3.832, 0.819, 1.040 and 4.442).

Table (V): Relation between students' routine medical checkup and electronic health literacy levels.

The table reveals that, there was a statistically significant relation between students' routine medical checkup ($\chi^2=7.619$) and their levels of electronic health literacy ($p<0.05^*$).

Table (VI): Represents the relation between students' knowledge about electronic health literacy and electronic health literacy levels. The table reveals that, there was a highly statistically significant relation between levels of students' knowledge about electronic health literacy ($\chi^2=129.766$) and their levels of electronic health literacy at ($p<0.01^{**}$).

Table (VII): Represents the relation between sources of the studied students' knowledge about electronic health and their levels of

electronic health literacy. The table shows that, there was a highly statistically significant relation between all sources of the studied students' knowledge about electronic health including (social media, books, journal and magazine articles web page, and electronic health application) ($\chi^2=47.909$, 15.262, 40.141, and 74.567) and their levels of electronic health literacy ($p<0.01^{**}$).

Table (VIII): Represents correlation between age of the studied students, total knowledge score and total e- health literacy score. The table reveals that, age of the studied students was negatively and statistically significantly correlated with their total knowledge and total e- health literacy score. On the other hand, total knowledge score was positively and statistically significantly correlated with total e- health literacy score.

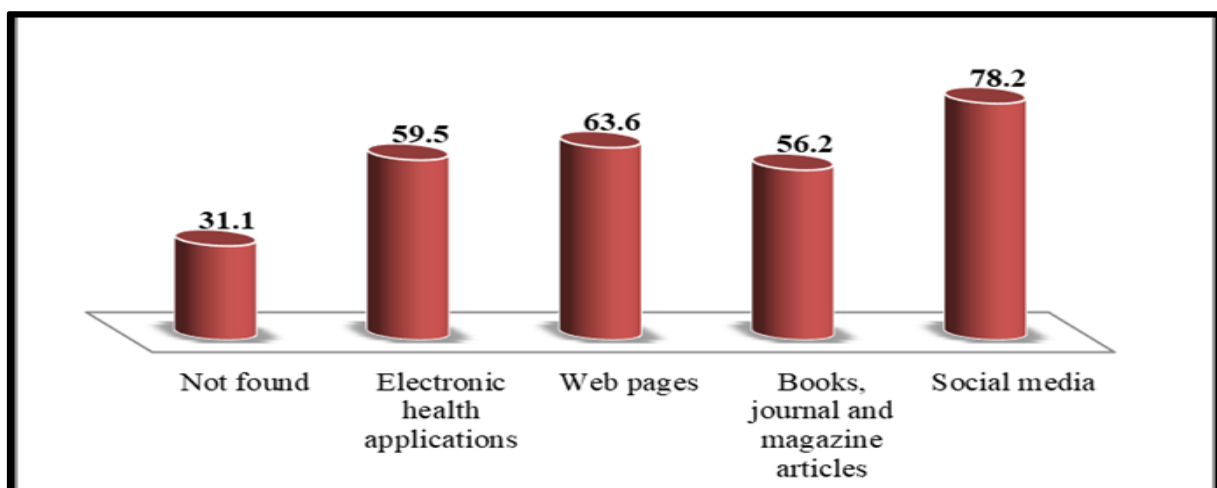
Table (I): The studied students' distribution according to their socio-demographic characteristics

Students' socio-demographic characteristics	The studied students (n=827)	
	No	%
Name of faculty		
Faculty of Art	670	81.0
Faculty of Physical Education	157	19.0
Academic year		
Second level	264	31.9
Third level	251	30.4
Forth level	312	37.7
Age in years		
18-20	408	49.3
21-22	352	42.6
23-25	67	8.1
Sex		
Male	286	34.6
Female	541	65.4
level of fathers' education		
Illiterate or reading and writing	48	5.8
Elementary education	111	13.4
Secondary education	274	33.1
University and post university education	394	47.6
level of mothers' education		
Illiterate or reading and writing	60	7.2
Elementary education	114	13.8
Secondary education	323	39.1
University and post university education	330	39.9
Fathers' occupation		
Work	736	89.0
Not work	91	11.0
Mothers' occupation		
Work	324	39.2
Housewife	503	60.8
Place of residence		
Rural	410	49.6
Urban	417	50.4
Family income		
Enough	554	67.0
Not enough	138	16.7
Enough and save	135	16.3

Table (II): The studied students' distribution according to their health history

Health history	The studied students (n=827)	
	No	%
# Suffering from any chronic diseases		
Don't suffer any chronic diseases	714	86.3
Hypertension	25	3.0
Heart disease	20	2.4
Joint and bone diseases	42	5.1
Autoimmune diseases	29	3.5
Diabetes	16	1.9
Kidney diseases	16	1.9
Anemia	63	7.6
Other diseases	28	3.4
Smoking		
Yes	58	7.0
No	769	93.0
Performing routine checkup		
Don't perform a routine checkup	593	71.7
Every six months	98	11.9
Every year	136	16.4

More than one disease was allowed.

**Figure (1): The studied students' distribution according to their sources of information about electronic health literacy**

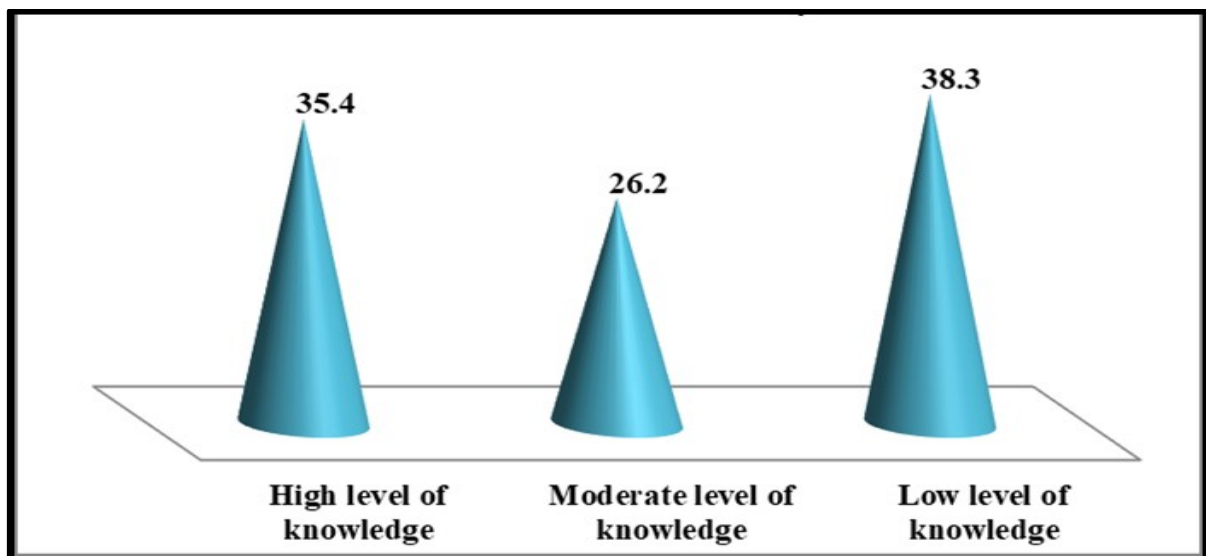


Figure (2): The studied students' distribution according to their levels of knowledge about electronic health literacy

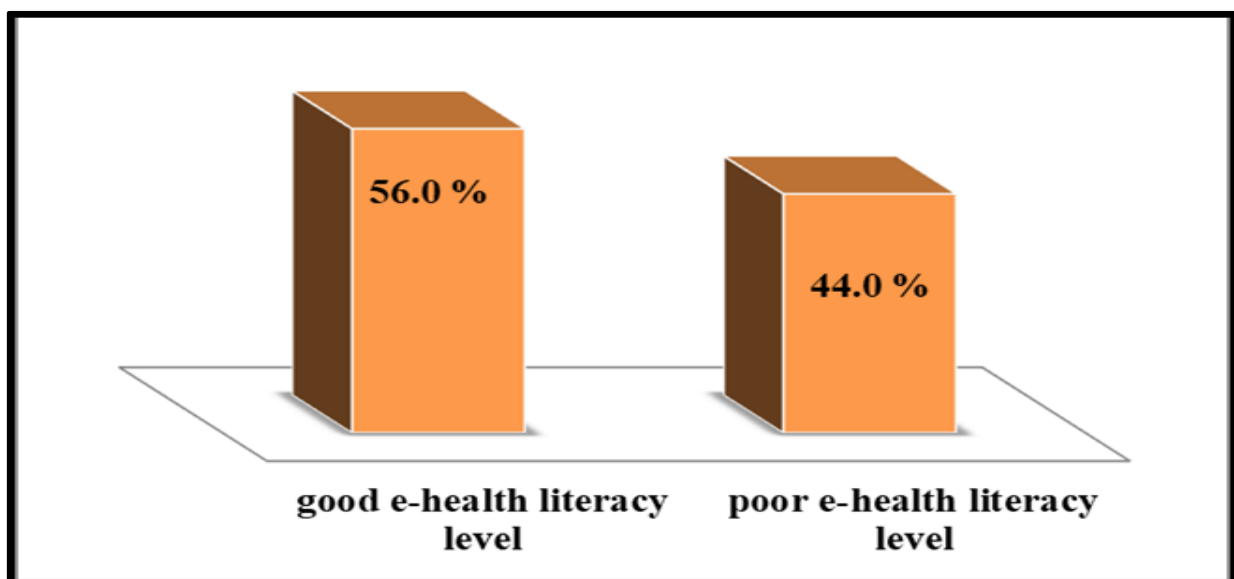


Figure (3): The studied students' distribution according to their levels of electronic health literacy

Table (III): Relation between studied students' socio-demographic characteristics and their levels of knowledge about electronic health literacy

Socio-demographic characteristics	The studied students (n=827)						χ^2 P
	Levels of knowledge						
	Lowknowledge (n=317)		Moderate knowledge (n=217)		High knowledge (n=293)		
	No	%	No	%	No	%	
Academic year							19.203 0.001**
Second level	79	29.9	88	33.3	97	36.7	
Third level	95	37.8	66	26.3	90	35.9	
Forth level	143	45.8	63	20.2	106	34.0	
Age in years							21.603 0.001**
18-20	136	33.3	127	31.1	145	35.5	
21-22	147	41.8	70	19.9	135	38.4	
23-25	34	50.7	20	29.9	13	19.4	
Sex							6.192 0.045*
Male	126	44.1	70	24.5	90	31.5	
Female	191	35.3	147	27.2	203	37.5	
level of fathers' education							16.592 0.011*
Illiterate or reading and writing	15	31.3	7	14.6	26	54.2	
Elementary education	36	32.4	28	25.2	47	42.3	
Secondary education	109	39.8	85	31.0	80	29.2	
University and post university education	157	39.8	97	24.6	140	35.5	
level of mothers' education							19.439 0.003**
Illiterate or reading and writing	18	30.0	9	15.0	33	55.0	
Elementary education	45	39.5	22	19.3	47	41.2	
Secondary education	130	40.2	98	30.3	95	29.4	
University and post university education	124	37.6	88	26.7	118	35.8	
Fathers' job							6.428 0.040*
Work	123	39.0	199	27.0	250	34.0	
Not work	194	33.0	18	19.8	43	47.3	
If the fathers' works, does he work in the health field							3.555 0.169
Yes	111	35.0	39	33.3	37	31.6	
No	206	38.9	178	25.1	256	36.1	
Mothers' job							3.882 0.144
Work	129	39.8	93	28.7	102	31.5	
Housewife	188	37.4	124	24.7%	191	38.0	
If the mothers' works, does she work in the health field							1.469 0.480
Yes	24	32.9	23	31.5	26	35.6	
No	293	38.9	194	25.7	267	35.4	
Place of residence							21.327 0.001**
Rural	125	30.5	119	29.0	166	40.5	
Urban	192	46.0	98	23.5	127	30.5	
Family income							4.103 0.392
Enough	209	37.7	142	25.6	203	36.6	
Not enough	61	44.2	33	23.9	44	31.9	
Enough and save	47	34.8	42	31.1	46	34.1	

p<0.05* significant

p<0.01** highly significant

Table (IV): Relation between the studied students' socio-demographic characteristics and levels of electronic health literacy

Socio-demographic characteristics	The studied students (n=827)				χ^2 P
	Levels of electronic health literacy				
	Poor e-health literacy level (n=364)		Good e-health literacy level (n=463)		
	No	%	No	%	
Academic year					10.817 0.004**
Second level	103	39.0	161	61.0	
Third level	101	40.2	150	59.8	
Forth level	160	51.3	152	48.7	
Age in years					7.466 0.024*
18-20	171	41.9	237	58.1	
21-22	153	43.5	199	56.5	
23-25	40	59.7	27	40.3	
Sex					0.327 0.568
Male	122	42.7	164	57.3	
Female	242	44.7	299	55.3	
level of fathers' education					21.375 0.001**
Illiterate or reading and writing	24	50.0	24	50.0	
Elementary education	27	24.3	84	75.7	
Secondary education	122	44.5	152	55.5	
University and post university education	191	48.5	203	51.5	
level of mothers' education					3.832 0.280
Illiterate or reading and writing	25	41.7	35	58.3	
Elementary education	41	36.0	73	64.0	
Secondary education	147	45.5	176	54.5	
University and post university education	151	45.8	179	54.2	
Fathers' job					0.211 0.646
Work	326	44.3	410	55.7	
Not work	38	41.8	53	58.2	
If the fathers 'works, does he work in the health field					0.819 0.210
Yes	56	47.9	61	52.1	
No	308	43.4	402	56.5	
Mother's job					1.817 0.178
Work	152	46.9	172	53.1	
Housewife	212	42.1	291	57.9	
If the mothers' works, does she work in the health field					1.040 0.308
Yes	28	38.4	45	61.6	
No	336	44.6	418	55.4	
Place of residence					8.217 0.004**
Rural	160	39.0	250	61.0	
Urban	204	48.9	213	51.1	
Family income					4.442 0.108
Enough	240	43.3	314	56.7	
Not enough	71	51.4	67	48.6	
Enough and save	53	39.3	82	60.7	

p<0.05* significant

p<0.01** highly significant

Table (V): Relation between students' routine medical checkup and electronic health literacy level

Routine medical checkup	The studied students (n=827)				χ^2 P
	levels of electronic health literacy				
	Poor e-health literacy (n= 364)		Good e-health literacy (n= 463)		
	No	%	No	%	
Do you perform a routine checkup					7.619 0.022*
No, don't perform a routine checkup	278	46.9	315	53.1	
Yes, Every six months	39	39.8	59	60.2	
Yes, Every year	47	43.6	89	65.4	

Table (VI): Relation between students' knowledge about electronic health literacy and levels of electronic health literacy

Knowledge levels	The studied students (n=827)				χ^2 P
	Levels of electronic health literacy				
	Poor e-health literacy (n= 364)		Good e-health literacy (n= 463)		
	No	%	No	%	
Low level of knowledge	216	68.1	101	31.9	129.766 0.001**
Moderate level of knowledge	79	36.4	138	63.6	
High level of knowledge	69	23.5	224	76.5	

Table (VII): Relation between sources of the studied students' knowledge about electronic health and levels of electronic health literacy

Sources of students' knowledge about electronic health	The studied students (n=827)				χ^2 P
	levels of electronic health literacy				
	Poor e-health literacy level (n=364)		Good e-health literacy level (n=463)		
	No	%	No	%	
Social media					47.909 < 0.001**
Yes	244	37.7	403	62.3	
No	120	66.7	60	33.3	
Books, journal and magazine articles					15.262 < 0.001**
Yes	177	38.1	288	61.9	
No	187	51.7	175	48.3	
Web page					40.141 < 0.001**
Yes	188	35.7	338	64.3	
No	176	58.5	125	41.5	
Electronic health application					74.567 < 0.001**
Yes	156	31.7	336	68.3	
No	208	62.1	127	37.9	
Not found					1.808 0.102
Yes	122	47.5	135	52.5	
No	242	42.5	328	57.5	

p<0.05* significant

p<0.01** highly significant

Table (VIII): Correlation between age of the studied students, total knowledge score and total e- health literacy (e-HL) score

Variables	Total knowledge score	Total e - health literacy score
	r P	r P
Age	-0.129- 0.001**	-0.143- 0.001**
Total knowledge score	-	0.560 0.001**

Discussion

One of the most important concerns that requires proper communication is the availability of health information. Improving health care quality and health education programs face a basic issue in health literacy. People with e-health literacy abilities are able to use electronic health information resources appropriately and efficiently in such a setting, as well as locate reliable and high-quality health information online (Almeida, Pinto, Correia, Veiga, & Almeida, 2024). Information technology and internet are becoming a more common use in education institutions especially among university students so, it expected to increase electronic health literacy level. This was approved by the current study as; it was found that slightly more than one half of the studied students had good e-health literacy level (**figure 3**). From researcher's perspective, this can be justified as the majority of students' fathers studied were working and slightly more than two-thirds of the studied student had enough income to use internet and smart phones to search on information in the current study and more than one half of the

studied students were from urban areas where the internet and information technology were found (**Table I**).

Similarly, **Mekawy, Ismail, and Mohamed, (2020)**, who conducted a study to assess electronic level of health-literacy between university nursing students in Egypt and found that 50.1% of students had high level of digital health literacy and about 40.4% of them had moderate level . This may be due to the similarity of educational culture and availability of internet to find and evaluate e-health information.

On the other hand, **Uysal, Ceylan and Koç, (2020)** conduct a study applied to university in nursing, law and Islamic sciences students to assess health literacy at a university in Turkey found that 58.9% had inadequate and problematic health literacy level. From the research investigator point of view, this may be due to low awareness of students in this study about health literacy and access to the internet is limited.

Improving knowledge and increasing awareness of student about electronic health literacy is crucial to improve their skills and abilities to find good

health informatio. By the way, the current study found that slightly more than one third of them had high level of knowledge concerning electronic health literacy (**Figure2**).

The findings of the current study is in contrast with the findings of the study conducted by **Tarihoran, Anggraini, Juliani, Ressa, and Fardan, (2021)** who applied a study to assess electronic health literacy among Indonesian student nurses and found that the majority (92.6%) had good level of knowledge and internet skill about e-health such as where to find and evaluate health information resources on the internet.. From the researcher point of view, this may be due to the spread of social media used between the studied students in the current study to search for health information easily, but this information may be incorrect since more than three-quarters of the studied students used social media to find information about electronic health (**Figure 1**).

The level of student's knowledge regarding health literacy can be affected by many factors. In the current study, there was a statistically significant relation between level of knowledge and socio-demographic characteristics of the studied students including academic year, age, sex, level of parent education, place of residence, father's occupation. Meanwhile, there was no statistically significant relation between the level of knowledge and other socio-demographic characteristics which were included working in health field,

mother's occupation, and family income (**Table III**).

These findings are consistent with **Top and Yigitbas, (2020)** who conducted a study to assess electronic level of health literacy in adolescents and they found that socio demographic data such as educational level, sex and age have a major impact on knowledge level about electronic health literacy. From researcher's perspective, this can be justified by the entrance of technology in all life fields and become useful for all age group.

On the other hand, **Aldebasi, Alhassan, Al-Nasser and Abolfotouh. (2020)** who conducted a study to assess degree to which Saudi medical students are aware of the development and use of online resources for health-related information to support healthcare services and found that the level of knowledge about electronic health affected by family income. From researcher's perspective, this can be justified by the high cost of using internet technology to search and evaluate about health information.

The electronic health literacy level was affected by many determinants. This was approved by the current study as there was statistically significant relation between levels of electronic health literacy and socio-demographic characteristics which were included academic year, level of father education, place of residence, age, and students' routine medical checkup .Meanwhile, there was no statistically significant relation with sex, father's and mother's occupation,

working in health field, and family income (**Table IV and V**).

Likewise, a study conducted by **Holt ,Overgaard, Engel and Kayser , (2020)** who assess digital literacy, e-health literacy, and health literacy among entry- and graduate-level Danish nursing students and found that health condition and routine checkup influence on students' electronic health literacy and parents' job in the medical field had no effect on e-health literacy. Conversely, **Top and Yigitbas, (2020)** found that there was no effect was found between the level of electronic health literacy level and routine checkup among students in their study. This is justified by similarity of educational level and age group in those studies and the current study. Meanwhile, the study of **Top and Yigitbas, (2020)** had the difference in age group and different culture in this study than the current study.

Regarding the relation between sources of the studied students' knowledge about electronic health and their levels of electronic health literacy, **the** current study revealed a statistically significant relation between all sources of the studied students' knowledge about electronic health and their levels of electronic health literacy (**Table VII**).

The results of the present study are similar to **Almeida et al.,(2024)** who conducted a study to assess Portuguese university students' e-health literacy, knowledge, attitude, and online health information and found that higher e-health literacy among students led to greater

utilization of health information sources. From the research point of view, this can be justified by frequent access to sources, allows students to acquire more health-related knowledge and improve their capacity to assess it.

Enhancing knowledge and awareness of student about electronic health literacy and interfere the concepts of health literacy in their curriculum can have appositive effect on electronic health literacy level. The current study found that there was a statistically significant relation between levels of students' knowledge about e-health literacy and their electronic health literacy level (**Table VI**). Also, the total knowledge score was positively and statistically significantly correlated with total e- health literacy score (**Table VIII**).

The findings of the present study are congruent with **Li, Cui, Kaminga, Cheng, and Xu, (2021)** who conduct a study to assess the relationships between Chinese college students' health literacy, e-health literacy, and COVID-19-related health behaviors and found that knowledge levels were positively associated with e-health literacy. From the researcher point of view, this can be justified as the more the students know about use of technology to get health information, the more they will they use it .

Electronic health literacy and level of knowledge are affected by age. The current study reveals that, age of the studied students was significant negative correlation with their total knowledge and total e- health literacy score (**Table VIII**). Similarly, **kemp**

et al., (2021) who conducted a study to assess health literacy, digital health literacy and the implementation of digital health technologies in cancer care and found that age impact on electronic health literacy, raising age group has negative effect on level of health literacy. From researcher' s perspective, this may be due to the increasing of age group make the individual become preoccupied with the other responsibility and lower the motivation to use technology .

On the other hand , **Shekofteh, Ghaedi, Valizadeh-haghi, and Baghestani, (2022)** who assess healthcare students' e-health literacy and the impact of demographic factors and found that significant positive correlation between age and e-health literacy This correlation can be explained by increased experience with using technology in the healthcare system. Older students are more equipped to interact with healthcare experts and navigate the healthcare system due to their increased age and experience.

Conclusion

Based on the findings of the present study, it can be concluded that there were significant gaps in electronic health knowledge and literacy among humanistic science students, highlighted by a high reliance on social media and web pages as primary information sources. While a notable more than one- third of students demonstrated low knowledge levels about electronic health literacy and exhibited poor e-health literacy level.

Recommendations

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

- Initiation program of e-health literacy for university students. In which students may demonstrate clinical practices on resources of e-health on the internet.
- Providing workshops for the university students about basic concepts of medical terminology and the information given on medications and have the ability to read prescriptions in order to treat health-related issues.
- Further studies should be conducted on humanistic students about implement health educational program to improve electronic health literacy level.

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The Effect of Educational Package on Nurses' Knowledge and Practices Regarding Patient Care Undergoing Cardiac Catheterization

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Abstract

Background: Cardiac catheterization is a medical procedure used to diagnose and treat that are certain heart conditions. **Aim:** This study aimed to evaluate the effect of educational package on nurses' knowledge and practices regarding patient care undergoing cardiac catheterization. **Research design:** Quasi-experimental research design was utilized to conduct study. **Setting:** The study was conducted at the cardiac catheterization Unit and Cardiac Care Unit at Fayoum University Hospital. **Sample:** A convenience sample of 40 cardiac nurses of both genders was included. **Data collection tools:** Tool I: Structured Interview Questionnaire: It consisted of two parts: Part A: The nurses' demographic characteristics, Part B: Cardiac Nurse's Knowledge regarding patient care. Tool II: Nurses' Observational Checklist regarding Cardiac Catheterization **Results:** There was a statistically significant improvement in the nurse's total knowledge score post the educational package program than pre education program markedly ranging from (17.5% to 75.0%). Also, the total level of nurses' practices significantly improved post the educational program than pre education program demonstrating adequate practice increased from 22.5% to 77.5%. **Conclusion:** It can be concluded that there was a significant improvement in the knowledge and practice of nurses regarding cardiac catheterization care post educational package program than preprogram. **Recommendations:** The study recommended that nurses who work in cardiac unit must be engaged in continuous education program to improve their knowledge and practice skill regarding cardiac catheterization care.

Key words: Cardiac catheterization, Educational package, Knowledge & Practice.

Introduction

Cardiac catheterization (CC) is a widely and commonly invasive standard of the diagnosis and therapeutic treatment of cardiac and coronary artery disease, it is a crucial procedure that provides valuable information about the anatomy and physiology of the heart's chambers, valves, and coronary arteries. This procedure involves evaluation of both the left and right sides of the heart, as well as the coronary arteries (**Ahmed, Hamad, and Sayed, 2023; El Mwafie, Abdelaziz and Tork, 2022; Jaber, Taha, and Metwally, 2022**).

Also is used to gather information on the adequacy of blood supply through the coronary arteries, blood pressures, blood flow throughout the heart chambers, collection of blood samples, and X-rays of the heart's ventricles or arteries (**Khaliel, Mohamed and Ghonaem, 2022; Hamid, 2022; Mahmood, Ibrahim, Hassan and Abdulghani, 2021**).

The catheter being guided into the heart under x-ray visualization. During the procedure, coronary angiography is performed, which involves injecting a colorless dye or contrast material through the catheter. This contrast material blocks the passage of x-rays, allowing clear visualization of the coronary arteries and x-ray images to be obtained and to detect specific obstructions to the coronary vasculature related to abnormalities of the heart and coronary artery (**Praseya & Handian, 2023**).

Cardiac catheterization identification of the extent and severity of CAD, to

determine semilunar valve stenosis, endocardial mapping, before interventional catheterization, to assess hemodynamic and anatomy of CVS, to confirm congenital heart disease in infant and children, to take endocardial biopsy, to assess pressure and causes of angina (**Ternus et al., 2020**).

Nursing role is crucial for patients undergoing cardiac catheterization to be involved in monitoring the patient's physiological condition and managing any complications that may arise as well as maintain safety, patient advocates, providing reassurance and emotional support (**Hojjatoleslami, Borzou, Negandeh, Soultanian, and Sadeghi 2024**). The nurse responsible for caring for these patients should have a deep understanding of the possible complications and possess assessment skills that enable them to identify these complications quickly and quickly provide nursing management (**Jaber, Taha, and Metwally, 2022**).

Significance of the study

Cardiac catheterization is one of the most widely performed cardiac procedures. In the United States, more than 1,000,000 cardiac catheterization procedures are performed annually (**Bangalore, Maron, Hochman, 2021**). All invasive procedure is associated with varying complications. In Egypt, cardiac catheterization complications varies from vascular complications (2.2%), arrhythmias (1.8%), heart failure (0.8%) and myocardium infarction (2.2%), in addition to the unpleasant experience for the patient

(Bakr, Shehab, and El-Zayat, 2020).

The nurses receive inadequate information and support and not enable to contribute in the provision of care for patients undergoing cardiac catheterization to the degree that they would desire. So, cardiac nurses should be aware about the guidelines for preventing safe practice, early detect, and manage these complications (Kousar, Yaqoop, Afzal, and khan, 2022). Thus, the current study evaluates the of education intervention on cardiac nurses' knowledge and practice regarding cardiac catheterization care.

Aim of the study

This study aimed to evaluate the effect of educational package on nurses, knowledge and practice regarding patient care undergoing cardiac catheterization.

Research Hypothesis

- **H1:** Nurses who receive the educational package will exhibit improved knowledge mean scores post implementation than pre implementation.
- **H2:** Nurses who receive the educational package will exhibit improved practice mean scores post implementation than pre implementation.

Subjects and Method

Research design

Quasi experimental research design was utilized to conduct study.

Setting

This study was conducted at the Cardiac Catheterization Unit and Cardiac Care Unit at Fayoum University Hospital.

Sample

The sample consisted of 40 nurses working in Cardiac Catheterization Unit and Cardiac Care Unit at Fayoum University Hospital. They recruited based on the following criteria: both genders, above 20 years of age, who having at least six months of experience dealing with Cardiology Units and agree to participate in the study. Those who took previous course about cardiac catheterization will be excluded.

Tools of data collection:

Data was collected by using the two following tools:

Tool I: Structured Interview

Questionnaire: It was developed by researchers based on review of the recent relevant literature. It consisted of two parts:

Part A: The nurses' demographic characteristics:

This part was used to collect data about cardiac nurses as age, gender, educational status, marital status, clinical area, year of experience, attending training courses etc.

Part B: Cardiac nurse's knowledge regarding patient care:

This part aimed to assess nurses' knowledge regarding patient care for cardiac catheterization it was adopted from by the researcher (Rajesh, 2018; Kousar et al., 2022) and adapted by the researcher, composed of 54 items such as cardiac physiology, disease, ECG interpretation, indications, cardiac catheterization activity care , cardiac medication ,follow up and complication .

Scoring system

Each correct answer was assigned score one and zero for “incorrect”. The scores of items summed up. The total nurses’ knowledge score of each subject was calculated, converted into percentage and interpreted as follows:

- <50%: Inadequate knowledge
- 50-75%: Moderately adequate knowledge
- ≥ 75%: Adequate knowledge

Tool II: Nurses’ Observational Checklist: This tool was adopted from (Williams, and Wilkins, 2011 Rajesh, 2018). This tool used to assess nursing practice regarding patient care before, during and after cardiac catheterization. It consists of 20 items. The gathered data was assess using 3 points Likert scale ranging from 0 to 2 where (0) means not applicable, (1) means not done, and (2) means done correctly.

Scoring system

The score of each item was used 3 points Likert scale ranging from 0 to 2. The total score of observation of checklist was collected and distributed as follows:

- < 50 % Inadequate practice
- 50 - 75%: Moderately adequate practice
- ≥75%: Adequate practice

Validity and Reliability

Content validity done by a jury of five experts in the field of Medical Surgical Nursing to review the tools for clarity, relevance, comprehensiveness, accuracy, understandable and applicability. Minor modifications were done. Cronbach’s Alpha was used to measure the internal consistency of

the tools used in this study. The nurses, Knowledge was (0. 871) and practice checklist was (0.862).

Pilot study

A pilot study was conducted on 10% of studied sample to test the applicability, clarity and the efficiency of the study tool. As to estimate the time needed to answer it. The modifications were done for the used tool into the studied group.

Field work

- An approval was obtained from a scientific ethical committee of Fayoum University.
- An approval was obtained from the director of El-Fayoum University Hospital.
- An oral informed consent was obtained from each participant prior to data collection after an explanation of the aim of the study.
- Data collection was started and completed within four months beginning of September (2024) until the end of December (2024).
- Purpose of the study was simply explained to the nurses who agreed to participate in the study prior to any data collection.
- Each participant was given a questionnaire about nurses' data, years of experience, education level.
- Data collection and teaching session was done 3days /week by the researcher from 9 am to 4 pm for collecting data from nurses in morning and afternoon shift.
- Regarding nurses' practice, the observational checklist was used prior, during and after cardiac cath. It had taken 10 to 15 minutes for

every nurse, the researcher observed the nurses self-administrated questionnaire to ensure the maximal realistic observations of the nurses' performance and minimize bias possibility.

- Developed program based on Nurses' need, relevant recent literature. The researcher implemented education program using power point, photo, and hardout about cardiac catheterization patient care.
- The nurses were divided into six group and each group consist of six to eight nurses according to work schedule. One session per day through 3 days per week, one session for theoretical and two session for practice, the duration of each session range from 45-60 minutes to provide nurses time to nurses of sufficient knowledge, discuss and answer questions.
- The researcher evaluated the participants using the questionnaire sheet and observation checklist pre implementing the program and post ending the program.

Ethical considerations

Ethical approval will be obtained from Fayoum University Supreme Committee for Scientific Research Ethics and will be assured that confidentiality and privacy were considered. Each patient has the right to withdraw from the study at any time. Ethics, values, culture and beliefs were respected.

Statistical design

The collected data were organized, tabulated and statistical analyzed using the statistical package for social science (SPSS). The statistical analysis was done using percentage range, chi square (X^2), T- test, and ANOVA.

- $P > 0.05$ Non significant
- $P \leq 0.05$ significant
- $P < 0.001$ High significant

Results

Table (1): Frequency distribution of demographic characteristics of studied nurses. It presents the majority of nurses (65.0%) were aged between 21–25 years, with a mean age of 25.08 ± 2.45 years. Female nurses represented 55.0% of the sample, and more than half were married (57.5%). Most participants held a Technical Institute Qualification (82.5%) and had 1–<5 years of general nursing experience (80.0%), with a mean of 3.90 ± 1.80 years. Similarly, 87.5% had 1–<5 years of experience specifically in cardiac catheterization, averaging 3.56 ± 1.49 years. Notably, only 27.5% of nurses had previously attended a heart catheterization training course.

Table (2): Knowledge levels pre & post educational program among studied sample. It shows that all knowledge domains, the proportion of nurses with adequate knowledge increased significantly following the educational intervention. In cardiac physiology, adequacy rose from 15.0% to 72.5%, and in cardiac pathology from 12.5% to 75.0%. In ECG interpretation, it increased from 20.0% to 80.0%, and in cardiac

catheterization definition and indication from 17.5% to 82.5%. Likewise, in intervention care, adequacy improved from 7.5% to 80.0%; in catheterization care from 15.0% to 80.0%; and in cardiac medication from 12.5% to 75.0%. Follow-up care showed an increase from 10.0% to 70.0%, knowledge of complications from 7.5% to 67.5%, and patient education and activity from 15.0% to 77.5%. All changes were statistically significant ($P < 0.001$)

Table (3): Comparison of total nurses' knowledge levels pre and post the educational package program among studied nurses. It points that significant improvement in the overall knowledge levels of nurses after the educational intervention. The proportion of nurses with adequate knowledge increased markedly from 17.5% to 75.0%, while those with inadequate knowledge decreased from 55.0% to 7.5%. The total knowledge score range shifted from 12–29 pre-intervention to 33–48 post-intervention. The mean score also increased significantly from 16.5 ± 2.67 to 45.9 ± 4.70 .

Table (4): Comparison of total nurses' practice levels pre and post the educational package program among studied nurses. It shows the total level of nurses' practice significantly improved after the educational package program. The percentage of nurses demonstrating adequate practice increased from 17.5% to 80%, while those with inadequate practice decreased from 60% to 5%. The total practice score range shifted

from 9–20 pre-educational program to 23–36 post program, with a significant rise in the mean score from 12.59 ± 2.56 to 31.67 ± 4.35 . These improvements were statistically significant ($P < 0.001$).

Figure (1): Shows that there was a clear and statistically significant improvement in nurses' practice levels following the program. The percentage of nurses demonstrating adequate practice increased markedly from 22.5% to 77.5%, while inadequate practice declined from 47.5% to 7.5%. The moderate level also decreased from 30.0% to 15.0%.

Table (5): Relation between nurses' total knowledge scores and demographic characteristics pre and post the educational program. It shows that there was a statistically significant relation between age and nurses' total knowledge scores before and after the educational program. Younger nurses aged 21–25 years showed a significant improvement from 18.33 ± 5.10 to 37.29 ± 3.74 at ($P < 0.001$), and although nurse aged 26–30 years also improved, nurses with a B.Sc. qualification had significantly higher knowledge scores than nurses from institutes both pre and post the educational program ($P < 0.05$). Similarly, nurses with more experience in general nursing and cardiac catheterization showed significantly higher knowledge gains (P values ranged from 0.002 to 0.003).

Table (6): Relation between nurses' total practice scores and their socio-demographic characteristics pre and post the educational intervention. It shows that a significant relationship

was observed between nurses' total practice scores and several socio-demographic characteristics. Nurses aged 21–25 years showed a marked improvement from 13.63 ± 3.50 pre-intervention to 28.75 ± 3.50 post-intervention ($P < 0.001$), with significantly lower scores than those aged 26–30 years, who achieved higher post-intervention scores (32.38 ± 2.75). Also, significant differences were also noted based on level of education, where Bachelor nurses outperformed institute graduates both pre ($P = 0.006$) and post ($P = 0.002$) the intervention. Likewise, nurses with more years of experience in general nursing and cardiac catheterization demonstrated significantly better practice scores in both phases (P values from 0.002 to 0.030). Nurses who had previously

attended a heart catheter course had significantly higher total practice scores than those who had not, both pre ($P = 0.019$) and post the educational program ($P = 0.003$). In contrast, gender and marital status were not significantly associated with practice scores at any stage ($P > 0.05$). **Table (7):** Correlation between nurses' total knowledge and practice scores pre and post the educational program among studied nurses. It represents that there was a strong statistically significant positive correlation between nurses' total knowledge and total practice scores. pre the educational program, the correlation coefficient was $r = 0.851$, at ($P < 0.001$). There was statistical correlation between total knowledge score and total practice $cr = (0.641, p < 0.001)$.

Table (1): Frequency distribution of sociodemographic characteristics of studied nurses (n=40)

Variables	N	%
Age		
21-25	26	65.0
26-30	14	35.0
Mean $\pm$SD	25.08 $\pm$ 2.45	
Gender		
Male	18	45.0
Female	22	55.0
Marital status		
Single	17	42.5
Married	23	57.5
Level of education		
Technical of nursing institute	33	82.5
Bachelor nursing nurse	7	17.5

Years of experience in nursing		
1to <5 years	32	80.0
5to <10 years	8	20.0
Mean ±SD	3.90 ± 1.80	
Years of experience in cardiac catheterization		
1- <5 years	35	87.5
5- <10 years	5	12.5
Mean ±SD	3.56 ± 1.49	
Training course about cardiac catheterization		
Yes	11	27.5
No	29	72.5

Table (2): Knowledge levels pre & post educational program among studied sample (n=40)

Items of knowledge	Pre						Post						Chi-square	
	Adequate		Moderately		Inadequate		Adequate		Moderately		Inadequate		X ²	P-value
	N	%	N	%	N	%	N	%	N	%	N	%		
Cardiac physiology	6	15.0	16	40.0	18	45.0	29	72.5	8	20.0	3	7.5	28.495	<0.001*
Cardiac pathology	5	12.5	13	32.5	22	55.0	30	75.0	6	15.0	4	10.0	32.898	<0.001*
ECG Interpretation	8	20.0	9	22.5	23	57.5	32	80.0	5	12.5	3	7.5	30.927	<0.001*
Cardiac Catheterization Definition and indication	7	17.5	17	42.5	16	40.0	33	82.5	7	17.5	0	0.0	37.067	<0.001*
Cardiac Catheterization intervention	3	7.5	15	37.5	22	55.0	32	80.0	6	15.0	2	5.0	44.552	<0.001*
Cardiac Catheterization care	6	15.0	16	40.0	18	45.0	32	80.0	7	17.5	1	2.5	36.522	<0.001*
Cardiac Medication	5	12.5	11	27.5	24	60.0	30	75.0	8	20.0	2	5.0	36.946	<0.001*
Follow up for cardiac catheterization patient	4	10.0	12	30.0	24	60.0	28	70.0	9	22.5	3	7.5	34.762	<0.001*
Complication of Cardiac Catheterization	3	7.5	10	25.0	27	67.5	27	67.5	11	27.5	2	5.0	40.799	<0.001*
Education and Activities after Cardiac Catheterization	6	15.0	11	27.5	23	57.5	31	77.5	6	15.0	3	7.5	33.747	<0.001*

Table (3): Comparison of total nurses' knowledge levels pre and post the educational intervention among studied nurses (n=40)

Total knowledge	Pre		Post		Tests	
	N	%	N	%	t/X ²	P-value
Adequate	7	17.5	30	75.0	29.626	<0.001*
Moderately	11	27.5	7	17.5		
Inadequate	22	55.0	3	7.5		
Range	12-29		33-48		34.399	<0.001*
Mean ± SD	16.5±2.67		45.9±4.70			

Table (4): Comparison of total nurses' practice levels pre and post the educational intervention among studied nurses (n=40)

Total practice	Pre		Post		Tests	
	N	%	N	%	t/X ²	P-value
Adequate	7	17.5	31	80	25.736	<0.001*
Moderately	9	22.5	6	15.0		
Inadequate	24	60	2	5		
Range	9-20		23-36		23.908	<0.001*
Mean ± SD	12.59±2.56		31.67±4.35			

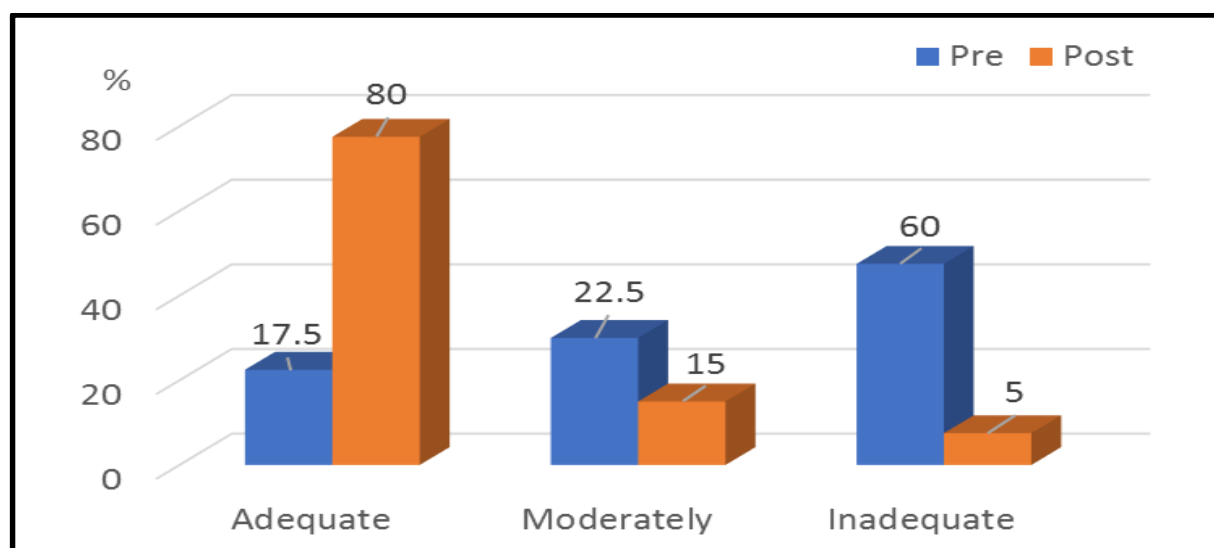
**Figure (1): Distribution of nurses' total practice levels before and after the educational intervention.**

Table (5): Relation between nurses' total knowledge scores and demographic data pre and post the educational practice program (n=40)

Items	Total knowledge							
	Pre		T-test		Post		T-test	
	Mean	SD	t	P-value	Mean	SD	T	P-value
Age								
21-25	18.33	5.10	3.033	0.004*	37.29	3.74	4.854	<0.001*
26-30	23.69	6.00			43.44	4.19		
Gender								
Male	21.44	5.80	0.920	0.363	40.39	5.60	0.737	0.466
Female	19.68	6.21			39.23	4.37		
Marital status								
Single	20.57	6.03	0.109	0.914	39.30	5.07	0.660	0.513
Married	20.35	6.18			40.35	4.82		
Professional qualification								
Institute	19.24	5.88	3.110	0.004*	38.55	4.54	3.928	<0.001*
B.Sc.	26.29	1.80			45.43	1.51		
Years of experience in nursing								
1- <5	19.31	5.65	2.621	0.013*	38.59	4.46	3.329	0.002*
5- <10	25.13	5.41			44.38	4.07		
Years of experience in cardiac catheterization								
1- <5	19.54	5.85	2.813	0.008*	38.91	4.66	3.144	0.003*
5- <10	27.00	1.22			45.60	1.82		
Participated in a heart catheter course								
Yes	24.09	5.99	2.492	0.017*	43.73	4.63	3.590	<0.001*
No	19.10	5.52			38.24	4.20		

Table (6): Relation between nurses' total practice scores and their demographic data pre and post the educational package program (n=40)

Items	Total practice							
	Pre		T-test		Post		T-test	
	Mean	SD	t	P-value	Mean	SD	t	P-value
Age								
21-25	13.63	3.50	2.890	0.006*	28.75	3.50	3.478	<0.001*
26-30	16.88	3.46			32.38	2.75		
Gender								
Male	15.61	3.62	1.034	0.308	30.00	3.68	0.309	0.759
Female	14.36	3.93			30.36	3.72		
Marital status								
Single	14.83	3.89	0.189	0.851	29.91	3.49	0.572	0.571
Married	15.06	3.78			30.59	3.95		

Professional qualification								
Institute	14.18	3.71	2.938	0.006*	29.42	3.54	3.247	0.002*
B.Sc.	18.43	1.72			33.86	1.07		
Years of experience in nursing								
1- <5	14.28	3.62	2.253	0.030*	29.34	3.57	3.317	0.002*
5- <10	17.50	3.59			33.63	1.19		
Years of experience in cardiac catheterization								
1- <5	14.34	3.69	2.776	0.008*	29.63	3.55	2.839	0.007*
5- <10	19.00	1.00			34.20	0.84		
Participated in a heart catheter course								
Yes	17.18	3.66	2.459	0.019*	32.91	2.17	3.208	0.003*
No	14.07	3.54			29.17	3.61		

Table (7): Correlation between nurses' total knowledge and practice scores pre and post the educational intervention among studied nurse (n=40)

Total practice	Total knowledge	
	R	P-value
Pre	0.851	<0.001*
Post	0.641	<0.001*

Discussion

Cardiac illnesses are the most vital cause of morbidity and mortality worldwide. Cardiac catheterization remains the most definitive procedure for diagnosis and evaluation of coronary artery disease and considered the gold standard for the diagnosis and treatment of cardiac diseases (Mangla et al., 2017).

Patients undergoing Cardiac catheterization require assistance from a wide variety of health professional. Nurse plays a vital role in helping cardiologists and providing care to patients undergoing cardiac catheterization procedures (Abo El-ata, Shehab, and El Zayat, 2020). So, the purpose of the current study was to evaluate the effect of educational package on nurses' knowledge and practices regarding

patient care undergoing cardiac catheterization.

Regarding demographic characteristics, current study showed that two third of nurses' age were between twenty to thirty years, the majority of them were female, more than half of them were married. These findings disagree with **Atia & Abdelwahid, (2023)** who founds that less than half of nurses' age were between thirty to less than forty years, the majority of them were female, half of them were married. **El said et al., (2023)** stated that nurses mean age 34.90 ± 7.26 ; the highest percentage were married and female. This outcome aligns with a previous study conducted by **Bayan (2018)**, who revealed that cardiac nurses' participants were falling within the age range of 26-30 years and Bayan's

work reinforces the notion that many cardiac catheterization units have a significant number of younger nurses, likely due to recent graduates entering the field.

In relation to educational level, that the most of the nurses' study are graduated from Institute qualification This finding in line with study by Sayed and colleagues (2020) who found that less than two thirds were technical institute of nursing Also, the resent results align with study by El Sayed et al., (2022) who stated that less than half of the studied nurses had technical institute of nursing. **Bangalore, Patel, and Sharma (2023)** who supported the previous study. These results are contradicted with results of **Fekry and Abd Elwahab (2020)** who revealed that the three quarters of their studied samples had diploma of secondary school.

As regards years of cardiac experiences, the current study showed that most participants had from one to less than 5 years of experience. This finding is in line with study by **El Sayed et al., (2022)** who stated that three quarters of nurses had experience from 1 to more than 3 years of experience.

Regarding the nurse's knowledge, the present study shows that over half of nurses' knowledge were inadequate pre-educational package program compared with three quarters of nurses were adequate post program. This might be related to the majority of nurses had a technical institute of nursing. In addition, another cause for a lack of knowledge is that most of nurses were not receiving any

previous training about cardiac catheterization care for updating information regarding cardiac care.

This finding of the present study consistent with the study of **Yaqoob et al., (2019)** who shows that the majority of the nurses, 54.3%, had adequate, 40% nurses had inadequate, knowledge scores after intervention program. Similarity, study by **Aysha & Ahmed, (2019)** who found a statistically significant difference between pre and post educational training regarding cardiac catheterization, nurses' level of knowledge. In the same line with **Kousar et al., (2022)** who showed that there was an improvement in the nurses knowledge scores 97.5% ($p \leq 0.00$), related to pre and post than pre angiography care after interventional lecture session. This explained by educational program was effective in improving nurses' knowledge level regarding cardiac catheterization care. **Regarding nurses' practice**, the current study revealed that two third of the studied nurses had an inadequate practice level (pre-test), while majority of nurses had adequate level of practice immediately after the educational program for cardiac catheterization care. The results also, showed that there was a highly statistically significant difference between the total nurses' practice level pre and post receiving educational program CC. The findings of the current study are supported by **Sania et al., (2022)** who showed that significant difference between nurses' practice after the implementation of the educational training shows (66.7%) inadequate practice before

the intervention, while (83.3%) of them had an adequate level of practice after the intervention; it is also found to be a significant p-value ≤ 0.001 .

Barton, Bruce & Schreiber, (2018) in the same line with the current study findings, their study revealed that an improvement in nurses' practice after the attendance at continuing nursing education sessions.

In this study there was a positive correlation between total nurses' knowledge and total performance scores which means that if nurses' knowledge is adequate the nurses' performance will be improved. These findings are supported by **Jabr, Taha, & Metwally, (2022)** who revealed that there was a statistically significant positive correlation between knowledge score and practice score. In addition, this result was in the same line with **Khaliel, Mohamed, and Ghonaem (2022)** who revealed that there was a positive correlation between total nurse's knowledge and total practice score. It also agreed with **Ali & Ali, (2019)** who showed that there was positive statistically significant correlation between total nurse's knowledge and total practice score post program implementation compared to preprogram implementation.

Conclusion

It can be concluded that:

- More than half of study sample were female, two thirds of studied nurses ages were (21-25) Years.
- There was a significant improvement in the knowledge and practice of nurses about cardiac catheterization after implementation of educational

package program.

- There was improved in knowledge and practice of cardiac nurses regarding cardiac catheterization after education program.

Recommendations

- It is recommended to encourage continuous educational program for all nurses working in the cardiac catheterization.
- Future research about patient satisfaction and improvement in nurses' performance from the patient perspective.

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Effect of Blended Learning Program on Maternity Nurses' Performance regarding Prevention of Obstetric Fistula

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Abstract

Background Obstetric fistula has a major health burden for women that lead to severe morbidities, as well as it is a barrier for achieving the third sustainable developmental goal. **The aim of this study** was to evaluate the effect of blended learning program on maternity nurses' performance regarding prevention of obstetric fistula. **Design:** A quasi-experimental research design was used. **Subjects and method:** The study was carried out at obstetrics and gynaecological departments of Tanta University Hospital and El-Menshawy General Hospital. All nurses (80) who are working at the previously mentioned study settings were included in the study. **Two tools** were used for data collection. **Tool (I): Maternity nurses' knowledge regarding prevention of obstetric fistula. Tool (II): Observational checklists for maternity nurses' practices** which included four Parts: I- Vaginal examination during labor, II- Perineal supportive techniques during second stage of labor, III- Perineal examination, and V- Episiotomy care. **Results:** It was illustrated that (30% and 22.5% respectively) maternity nurses had a high level of knowledge and satisfactory practice level pre implementation of the blended learning program that increased to (95% and 90% respectively) immediately post program. **Conclusion:** The blended learning program provided to the maternity nurses obviously improved their performance regarding the prevention of obstetric fistula. **Recommendations:** The present study recommends providing continuing evidence-based in-service training programs for maternity nurses to enhance their knowledge and practices regarding the prevention of obstetric fistula.

Keywords: Blended Learning, Nurses' Performance, Obstetric Fistula.

Introduction

Obstetric fistula is the primary cause of morbidity and mortality among women. It is a severe medical condition that has physical, psychological, social, and cultural issues. Obstetric fistula is an abnormal opening between the vaginal tract and the urinary tract or rectum. There are numerous classifications of obstetric fistula, such as recto-vaginal (RVF), vesico-vaginal (VVF), urethro-vaginal, uretero-vaginal, vesico-uterine, vesico-cervical, and perineo-vaginal fistula (**Chinthakanan, Sirisreetreerux, & Saraluck, 2023; Wall, Ouedraogo, & Ayenachew, 2021**).

Obstetric fistula is associated with different signs and symptoms that include urinary and fecal incontinence, dyspareunia, bad odor, weakness and numbness of the lower extremities muscles caused by nerve damage, recurrent urinary tract or vaginal infections, pain or irritation in the vagina or surrounding areas. Obstetric fistula also has a variety of psychological signs and symptoms such as anxiety, feelings of worthlessness, low self-esteem, changing mood, stigma, social isolation and depression (**Kamel, Ramadan, El Banna, & Ali., 2023; Nwala., et al 2022**). Scientific research studies revealed that there are three causes of obstetric fistula. These include prolonged and obstructed labor, precipitous delivery or obstetric maneuvers and poorly terminated abortion (**Bulndi, Ireson, Adama, & Bayes, 2023**).

Moreover, there are variable risk factors that contributes to the

occurrence of obstetric fistula such as early marriage, rural residences, low level of education, malnutrition, anemia, inadequate spacing between pregnancy, lack of antenatal follow up, bearing down and use of instrumental delivery before complete cervical dilation during the first stage of labor, prolonged labor, any factors that increase intra-abdominal pressure, injury during gynecological or obstetric surgeries such as (hysterectomy, and poorly repaired episiotomy), coital trauma and sexual violence (**Woldegebriel et al., 2023; Gedefaw, Wondmienenh, Getie, Bimerew, & Demis, 2021**).

Obstetric fistula expose women to life threatening complications including renal damage due to ascending infection, vaginal stenosis, pelvic inflammatory disease, cervical incompetence and infertility. It is also lead to psychological consequences such as humiliation from their smell, which lead to severe socio-cultural stigmatization, worry about developing another fistula in future pregnancies and the inability to fulfill their family responsibilities. Besides that, it may also result in social issues such as adverse impact on sexual intercourse, as well as an increase in the incidence of divorce and separation (**Nduka, Ali, Kabasinguzi, & Abdy, 2023**).

Despite these serious complications the obstetric fistula is a preventable disease that can be prevented during pregnancy, labor and post-partum period. During pregnancy it can be prevented through regular antenatal care, providing healthy nutrition, practicing kegal exercises and

avoiding the factors that increase the intra-abdominal pressure. During labor, the obstetric fistula can be prevented through timely access to obstetric care, empty of the bladder, avoid bearing down and use of instrumental delivery before complete cervical dilation, and avoid prolonged labor (**Alemu, Ukumo, Agago, & Hadaro, 2023**).

In addition to apply supportive techniques during the second stage of labor, avoid fundal pressure and safe caesarean sections for woman in obstructed labor. During the post-partum period, the obstetric fistula can be prevented through assessing the site of episiotomy for REEDA, providing health instructions to avoid chronic cough and constipation, have healthy nutrition, practice kegal exercises, frequently empty the bladder and frequently have perineal care (**Alemu et al., 2023; Hurissa, Koricha, & Dadi, 2022**).

Maternity nurses are at the forefront of healthcare system, and they are instrumental in reducing both fetal and maternal morbidity, and mortality. Furthermore, they had imperative role in the prevention along with management of obstetric fistula and the subsequent reintegration of women into, the society. (**Slinger & Trautvetter, 2020**).

So, there is an urgent need to maintain and improve the maternity nurses' knowledge and practices through providing them with the most up to date evidence-based theoretical and practical nursing education regarding preventive measures of obstetric fistula. This can be achieved through

different methods of teaching other than face to face learning, such as blended learning that is an educational approach which integrates online educational resources with classroom-based methods to facilitate interaction. (**Gedefaw et al., 2021; Singh, 2021**).

Blended learning boost proactive learning practices rather than that result from instructions which provide nurses with more opportunities to learn and engage on their own at their preferred place and time (**Ma & Lee, 2021**). Globally, there are no scientific researches that determine the effect of blended learning on nurses' performance regarding prevention of obstetric fistula (**Alemu et al., 2023**). Therefore, this study will be conducted.

Significance of the study

In 2020, World Health Organization (WHO) reported that the prevalence of obstetric fistula was approximately 50,000 to 100,000 new cases worldwide, while the prevalence of fistula was 30,000–130,000 new cases per year in Africa and 200 per 100,000 cases per year in Egypt (**Asefa, Amenu, & Berhe, 2020**).

The prevention of obstetric fistula is a contributing factor to the inquiry of Sustainable Development Goal 3, which is devoted to the enhancement of maternal health (**Asfaha, Berhe, Siyoum, & Gebremeskel, 2021**). While if it is neglected will lead to different maternal hazards and severe morbidities.

Aim of the study:

Determine the effect of blended learning program on maternity nurses'

performance regarding prevention of obstetric fistula.

Research Hypothesis:

- Knowledge of maternity nurses is expected to be improved after implementation of the blended learning program regarding prevention of obstetric fistula immediately and one month later.
- Practices of maternity nurses are expected to be improved after the implementation of the blended learning program regarding prevention of obstetric fistula immediately and one month later.

Subjects and Method

Research design:

The research was conducted using a quasi-experimental research design.

Setting: The study was conducted at:

- Tanta University Hospital (Main Hospital), which is affiliated to the Ministry of High Education and Scientific Research where the obstetric and gynecological department is comprised of four inpatient units (two obstetric units and two gynecological units each unit is equipped with 12 beds), an ultrasonography room, as well as delivery and operation units.
- El-Menshawey General Hospital affiliated to the Ministry of Health and Population where the obstetric and gynecological department located in the third floor and consisted of three inpatient units (each unit consisted of 6 beds), a vaginal delivery unit and an operation unit.

Subjects: The study included all nurses (80) who are employed at the aforementioned study settings (50 nurses from Tanta University, and 30

nurses from El-Menshawey General Hospital).

Tools of data collection:

To accomplish this research, two tools were developed and used by the researcher.

Tool I: Maternity nurses' knowledge regarding the obstetric fistula:

The researcher developed it after conducting a review of recent related literatures (Azanu, Dassah, & Agbeno, 2020; Asefa et al., 2020; Balcha, Nigussie, Beyene, & Tesfu, 2020; Heera, Nirmala, Mangala, Gayatri, & Surya, 2019) and used to evaluate knowledge of the maternity nurses regarding obstetric fistula. It consisted of the subsequent two components:

Part (a): Socio-demographic characteristics of the studied maternity nurses: The basic details of maternity nurses were collected in this part, including their age, marital status, place of residence, level of education, years of experience, attendance of prior obstetric fistula training courses, and the location of those courses.

Part (b): Maternity Nurses' Knowledge regarding the obstetric fistula and its prevention: This part was used to assess the maternity nurses' knowledge regarding the obstetric fistula and its prevention that included questions regarding definition, classification, types, causes, predisposing factors, signs and symptoms, diagnosis and complications of the obstetric fistula. The prevention of the obstetric fistula during ante-natal, labor and post-partum period.

Scoring system for maternity nurses' knowledge was rated as follows:

- Correct and complete answers were given a score of (2).
- Correct and incomplete answers were given a score of (1).
- Incorrect answers or didn't know were given a score of (0).

The total knowledge was scored as follows:

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

Tool II: Observational checklists of maternity nurses' practices regarding the preventive measures of obstetric fistula:

This tool was adapted by the researcher from (Ali, El Banna, & Abd Elmordy., 2022; Davidson, London, & Ladewig, 2020) and used to assess maternity nurses' practices to prevent the occurrence of obstetric fistula. It comprised of 4 procedures including standardized steps or tasks for each one as follows:

Part one: Vaginal examination to assess progress of labor.

Part two: Perineal supportive techniques during second stage of labor.

Part three: Perineal examination.

Part four: Episiotomy Care.

The scoring system of nurses' practices was categorized as follows:

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

The score of each item of the practiced skills was summed up and converted into percent score as follows:

- **Satisfactory practices** ($\geq 80\%$).
- **Unsatisfactory practices** ($< 80\%$).

Method

The study was implemented according to the following steps:

Administrative approval

To obtain permission to conduct the study, the responsible authorities of the selected locations were provided with an official letter from the Faculty of Nursing Tanta University that clarified the purpose of the study.

Ethical considerations:

- The Faculty of Nursing's Scientific Research Ethical Committee approved the accomplishment of the research with the acceptance code (376-2-2024).
- Every participant was informed about the purpose of the study.
- Every study participant gave their informed consent after being aware of their right to withdraw at any moment and the collected data will only be used for the purpose of this study.
- The researcher was responsible for making sure that the nature of the study would not cause any pain or suffering to the entire sample.
- Confidentiality and privacy were taken into consideration through data collection.

Tools development:

- **Tool I and Tool II** were developed by researchers after reviewing recent and related literature. A jury of five experts in the field of Maternal and Neonatal Health Nursing evaluated the individual

items and the entire instruments to determine whether they were relevant and appropriate to test the intended variables of the study. The face validity of the questionnaire was determined to be 94% based on the opinions of experts. The content validity index for the knowledge questionnaire was 95%, and the content validity index for the checklists of nursing practices regarding prevention of obstetric fistula was 93%. The total content validity index for the questionnaire was 93.65%.

- The reliability of the study tools was tested by Cronbach's Alpha test which indicated high reliability (**0.841 and 0.819 respectively**) for knowledge and practices of maternity nurses regarding prevention of obstetric fistula. The total questionnaire Cronbach's Alpha was 0.848.
- After development of the study tools, a pilot study was carried out on 10% (8) of the maternity nurses to test the clarity and feasibility, simplicity, and applicability of the developed tools before the actual data collection.
- No modifications were made in response to the results of the pilot study, and the instruments were prepared for use. The data from the pilot study were incorporated into the current research sample because the tools remained unchanged.

Data collection:

- Data collection was conducted over a period of six months, from the beginning of June 2024 to the end of November 2024.

- Tool (I) part two and Tool (II) were used three times to assess maternity nurses' knowledge and practices regarding prevention of the obstetric fistula before, immediately and one month post implementation of the blended learning program.
- The researcher was present at the study settings three days per week in the morning and afternoon shifts to collect the data until the predetermined sample size was reached.
- **The blended learning program:** was conducted through the following four phases (**Assessment, planning, implementation and evaluation**):

Phase I-Assessment phase:

- During this phase, the researcher greeted the maternity nurses, introduced herself, and provided them with a comprehensive overview of the study's purpose, duration, and activities. The maternity nurses' consent to participate in the study was obtained after the researcher determined the most suitable time for each group and provided them with an orientation on how to use the Google Meeting program.
- Data was gathered by the researcher through the distribution of Tool I, part (a) to assess maternity nurses' socio-demographic characteristics, part (b) to assess maternity nurses' knowledge regarding the obstetric fistula and its prevention. The average time taken to fill in the tool was about 20-30 minutes.

- After evaluating (pre-test) the maternity nurses' practices regarding obstetric fistula prevention using Tool II (observational checklists), the researcher distributed an educational booklet in Arabic language with colored illustrations that was divided into two sections (theoretical and practical).

Phase II- Planning phase:

A. Preparation of the blended learning program sessions:

- The blended learning program was consisted of six sessions for each group, three sessions for the theoretical part via the Google Meeting program and three sessions for the practical part (face-to-face).
- The overall sample was assigned into ten groups. Six groups at Tanta University Hospital (four groups with eight nurses and two groups with nine nurses), and four groups at El-Menshawey General Hospital (two groups with eight nurses and two groups with seven nurses).
- Three days per week were planned for the implementation of the program. Each theoretical session was conducted at a suitable time for nurses through the Google Meeting program and lasted between 30 to 45 minutes. The sessions were recorded and sent to those who were unable to attend. On the other hand, the practical sessions were conducted during the morning and afternoon shifts using the previously prepared models.

B. Setting the goals and objectives of the blended learning program:

- A.** The goal of the blended learning program was to enhance maternity nurses' knowledge and practices regarding the prevention of the obstetric fistula.
- B.** The objectives of the blended learning program were to improve maternity nurses knowledge and practices regarding; identify definition of obstetric fistula, differentiate between different types of obstetric fistula, list causes and predisposing factors of obstetric fistula, determine different signs and symptoms of obstetric fistula, identify the diagnosis and complications of obstetric fistula, demonstrate prevention of the obstetric fistula during ante-natal, labor and post-partum period.

- C. Prepare the content of the blended learning program:** An educational booklet was developed by the researcher based on nurses' performance from the assessment phase using recent relevant literature available locally and internationally (**Alemu et al., 2023**). Also, the researcher utilized various types of instructional strategies including lectures, group discussions, simulations, role-playing, demonstrations, and re-demonstrations. Additionally, employed instructional media in the form of videos and supported materials including models of vaginal, vulvar, and episiotomy parts.

Phase III: Implementation phase:

The theoretical sessions: (three theoretical sessions were conducted through Google Meeting).

The first session was initiated by introduction about the blended learning program by the researcher who also provided the nurses with a comprehensive understanding of obstetric fistula, including its definition, classifications, types, major causes, predisposing factors, signs and symptoms, diagnosis, and complications.

The second session included knowledge about the prevention of the obstetric fistula during pregnancy and labor.

The third session included knowledge about the prevention of the obstetric fistula during the post-partum period.

The practical sessions: (three practical sessions which were conducted face to face). They included demonstration and re-demonstration on vaginal, vulvar and episiotomy parts models.

The fourth session included demonstration by the researcher and re-demonstration by the studied maternity' nurses for proper and needed practical skills regarding **vaginal examination including:**

A. Pre-procedure tasks included four preparations (19 items), which are preparation of the equipment such as clean or sterile gloves, lubricant K-Y gel and sterile pad. Preparation of the (woman, environment, and nurse).

B. Procedure tasks; included 9 items as follow; assist the woman in assuming a dorsal recumbent position, ask the woman to separate or spread

her legs without using force, encourage the woman to breathe naturally, prepare the area with an antiseptic solution, and lubricate the index and middle fingers of dominant hand with k-y lubricating jelly, using thumb and fore finger of non-dominant hand to spread the labia. Inspect the general area of introitus. The nurse inserts the dominant hand well-lubricated index and middle fingers gently into the vagina. Then, the hand is turned sideways and move the fingers until touch the cervix to determine the state of the cervix, effacement and dilatation, membranes, presenting part, position, station, and engagement.

C. Post procedure tasks (six items); Redressing the woman, assisting her in achieving a comfortable position, removing the equipment and gloves as well as washing hands, documenting the findings, and providing health education regarding the procedure.

The fifth session included demonstration by the researcher and re-demonstration by the maternity nurses for proper practical skills regarding perineal supportive techniques during the second stage of labor including:

A. Pre-procedure tasks included four preparations (18 items): Preparation of the equipment (Gloves, screen, woman's record & pen). Preparation of the (woman, environment and nurse).

B. Procedure tasks included the following (6 items): Help the woman lie in the lithotomy position, tell her to take deep breaths, place the left hand's fingers on the fetal occiput to keep

the fetal head flexed at the crowning, place the right hand on the perineum just in front of the coccyx, using the U-shaped technique with the thumb and index of the dominant hand on the lateral parts of the perineum, once the anterior shoulder was delivered gently pull upward to help deliver the posterior shoulder, remove the right hand from the posterior perineum and support the fetus's neck using one hand, while the other hand supports the fetus's body once both shoulders have been delivered.

C. Post procedure tasks: as mentioned before.

The sixth session featured a demonstration by the researcher and a re-demonstration by the maternity nurses of the necessary practical skills for perineal examination and episiotomy care that involved:

Part one: Perineal examination steps:

A. Pre-procedure tasks included (20 items) for:

- Preparation of equipment such as (Gloves, screen, sterile perineal pad, flashlight, woman's record and a pen)
- Preparation of the (woman, environment and nurse).

B. Procedure steps; included seven items, which are assist the woman in assuming the Sim's position, lower the perineal pad and the superior buttocks are lifted. Utilize a flashlight, examine the episiotomy or laceration for (REEDA), examine for perineal laceration, and note the number and size of hemorrhoids,

additionally, take note of the location and degree of any bruising or edema, as these conditions may be signs of a developing hematoma.

C. Post procedure tasks: as mentioned before.

Part two: Episiotomy Care observational checklist:

A. Pre-procedure tasks included:

- Preparation of the equipment such as (Gloves, mackintosh, bed pan, kidney basin, anti-septic solution (betadine), cotton gauze, towels, light source, pin and paper). Preparation of the (woman, environment and nurse)

B. Procedure steps/tasks included the following ten items: Ask the woman to lie in the dorsal recumbent position with her knees slightly bent, legs separated, and foot flat on the bed. Place a large mackintosh under the woman's hips, help the woman sit correctly on the bedpan. Remove the soiled perineal pad from the front to the back and discard it according to the procedure, evaluate the episiotomy and suture for the presence of hematoma or infection and the healing process in accordance with REEDA. Additionally, note the number and size of hemorrhoids if present. Perform perineal care in accordance with the procedure. Clean the episiotomy site with antiseptic solution (betadine) and gauze, apply a gentle pressure technique and avoid fractioning the episiotomy sutures. Instruct the woman to turn to the side opposite of the nurse to remove the bedpan, dry the woman's buttocks and

thighs with cotton, and apply a clean perineal cloth.

C. Post procedure tasks: as mentioned before.

Phase IV: Evaluation phase: After implementing the blended learning program, the researcher used the same previous pretest-tools (tool I part (b) and tool II) as post-test-tools to evaluate the effect of blended learning program on maternity nurses' knowledge and practices regarding the prevention of the obstetric fistula immediately and one month post implementation of the blended learning program.

Statistical analysis

SPSS (Statistical Package for Social Science) version 25 (IBM Corporation, Armonk, NY, USA) was used to code, register, tabulate, and analyze the collected data.

Results

Table (1): Reveals that the mean age of the studied maternity nurses was 40.65 ± 10.40 years and 90.0% of them were married, (52.5%) from rural areas and had diploma in nursing technician, (63.7%) had experience of 15 years or more and (90.0%) hadn't any training courses regarding the obstetric fistula.

Figure (1): Clarifies that (30%) of studied maternity nurses had a high level of knowledge regarding obstetric fistula and its prevention pre-program, which is increased to (95%) immediately post with highly statistically significance differences.

Table (2): Notices that the total practices' level of the studied maternity nurses regarding the preventive measures of the obstetric fistula improved immediately and post

one month compared to pre-program, where (28.7%, 25.0%, 26.3% and 25.0% respectively) of nurses had satisfactory practice pre-program, compared to the majority of them immediately that slightly decreased one month later with highly statistical significant differences ($p=0.0001$).

Figure (2): illustrates that (22.5%) of studied maternity nurses has satisfactory practice level pre-program which is increased to (90%) immediately and (82.5%) one month after implementation of the blended learning program.

Table (3): Proves that no significant correlation between total knowledge level and total practice scores of the studied maternity nurses' pre, immediately and post implementation of the blended learning program.

Table (1): Socio-demographic characteristics of the studied maternity' nurses (n=80).

Socio-demographic characteristics(n=80)	N	%
Age/years		
24-30	19	23.7
>30-40	17	21.3
>40-58	44	55.0
Range	24-58	
Mean ±SD	40.65±10.40	
Marital status		
Single	3	3.7
Married	72	90.0
Divorced	5	6.3
Residence		
Urban	38	47.5
Rural	42	52.5
Educational Qualification		
Diploma of Nursing Technician	42	52.5
Nursing Technical Institute	33	41.2
Bachelor of Nursing	5	6.3
Experience years		
<5	10	12.5
5-10	11	13.8
>10-15	8	10
>15	51	63.7
Attended training courses on obstetric fistula		
No	72	90.0
Yes	8	10.0
If yes, Where?		
At hospital	4	50.0
Ministry of health	4	50.0

*Statistically significant (P<0.05)

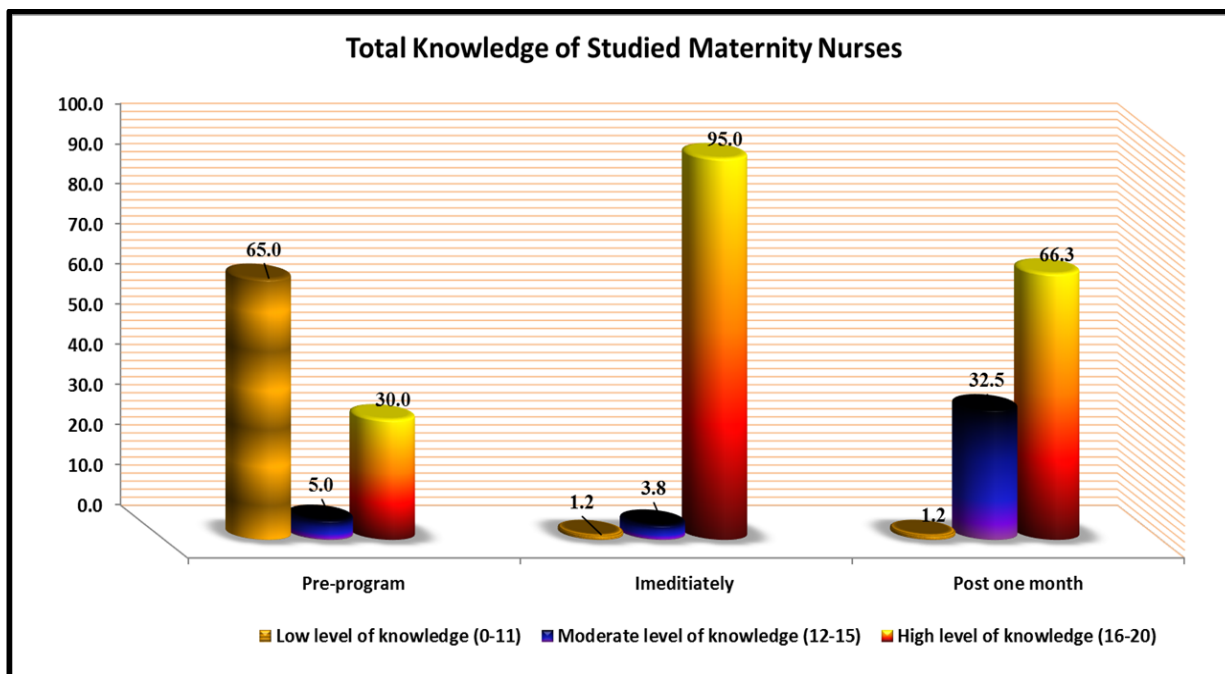


Figure (1): Total knowledge level of the studied maternity' nurses regarding obstetric fistula and its prevention pre, immediately and one month post implementation of the blended learning program (n=80).

Table (2): Total practices level of the studied maternity' nurses regarding the preventive measures (four procedures) of the obstetric fistula pre, immediate and one month post implementation of the blended learning program (n=80).

Total practices scores	Pre		Post				χ^2	p
			Immediately		One month			
	N	%	N	%	N	%		
I-Practices of vaginal examination procedure								
I-Pre-procedure tasks								
Unsatisfactory (0-6)	63	78.7	16	20.0	24	30.0	64.528	0.0001*
Satisfactory (7-8)	17	21.3	64	80.0	56	70.0		
II-Procedure tasks								
Unsatisfactory (0-14)	59	73.7	10	12.5	17	21.2	76.364	0.0001*
Satisfactory (15-18)	21	26.3	70	87.5	63	78.8		
III-Post-procedure tasks								
Unsatisfactory (0-7)	59	73.7	7	8.7	18	22.5	82.527	0.0001*
Satisfactory (8-10)	21	26.3	73	91.3	62	77.5		
Total practice level vaginal examination procedure								
Unsatisfactory (0-28)	57	71.3	8	10.0	15	18.7	79.013	0.0001*
Satisfactory (29-36)	23	28.7	72	90.0	65	81.3		

II-Practices of perineal supportive techniques during second stage of labor procedure								
I-Pre-procedure tasks								
Unsatisfactory (0-6)	63	78.7	23	28.7	28	35.0	47.619	0.0001*
Satisfactory (7-8)	17	21.3	57	71.3	52	65.0		
II-Procedure tasks								
Unsatisfactory (0-9)	62	77.5	7	8.7	15	18.7	97.033	0.0001*
Satisfactory (10-12)	18	22.5	73	91.3	65	81.3		
III-Post-Procedure tasks								
Unsatisfactory (0-7)	59	73.7	8	10.0	19	23.7	78.321	0.0001*
Satisfactory (8-10)	21	26.3	72	90.0	61	76.3		
Total practice level of perineal supportive techniques during second stage of labor procedure								
Unsatisfactory (0-23)	60	75.0	8	10.0	14	17.5	89.954	0.0001*
Satisfactory (24-30)	20	25.0	72	90.0	66	82.5		
III- Practices of perineal examination								
I-Pre-procedure tasks								
Unsatisfactory (0-6)	64	80.0	17	21.2	24	30.0	65.321	0.0001*
Satisfactory (7-8)	16	20.0	63	78.8	56	70.0		
II-Procedure tasks								
Unsatisfactory (0-11)	61	76.2	6	7.5	14	17.5	98.728	0.0001*
Satisfactory (12-14)	19	23.8	74	92.5	66	82.5		
III-Post-Procedure tasks								
Unsatisfactory (0-7)	57	71.3	8	10.0	15	18.7	79.013	0.0001*
Satisfactory (8-10)	23	28.7	72	90.0	65	81.3		
Total practice level of perineal examination procedure								
Unsatisfactory (0-25)	59	73.7	9	11.2	21	26.6	72.589	0.0001*
Satisfactory (26-32)	21	26.3	71	88.8	58	73.4		
IV-Practices of episiotomy care procedure								
I-Pre-procedure tasks								
Unsatisfactory (0-6)	61	76.2	13	16.2	23	28.7	66.579	0.0001*
Satisfactory (7-8)	19	23.8	67	83.8	57	71.3		
II-Procedure tasks								
Unsatisfactory (0-15)	61	76.2	8	10.0	14	17.5	93.083	0.0001*
Satisfactory (16-20)	19	23.8	72	90.0	66	82.5		
III-Post-procedure tasks								
Unsatisfactory (0-7)	60	75.0	8	10.0	15	18.7	87.999	0.0001*
Satisfactory (8-10)	20	25.0	72	90.0	65	81.3		
Total practice level of episiotomy care procedure								
Unsatisfactory (0-30)	60	75.0	8	10.0	15	18.7	87.999	0.0001*
Satisfactory (31-38)	20	25.0	72	90.0	65	81.3		

Total practice scores were classified into; unsatisfactory level (<80% of scores) and satisfactory level (≥80% of scores)

*Statistically Significant (P<0.05)

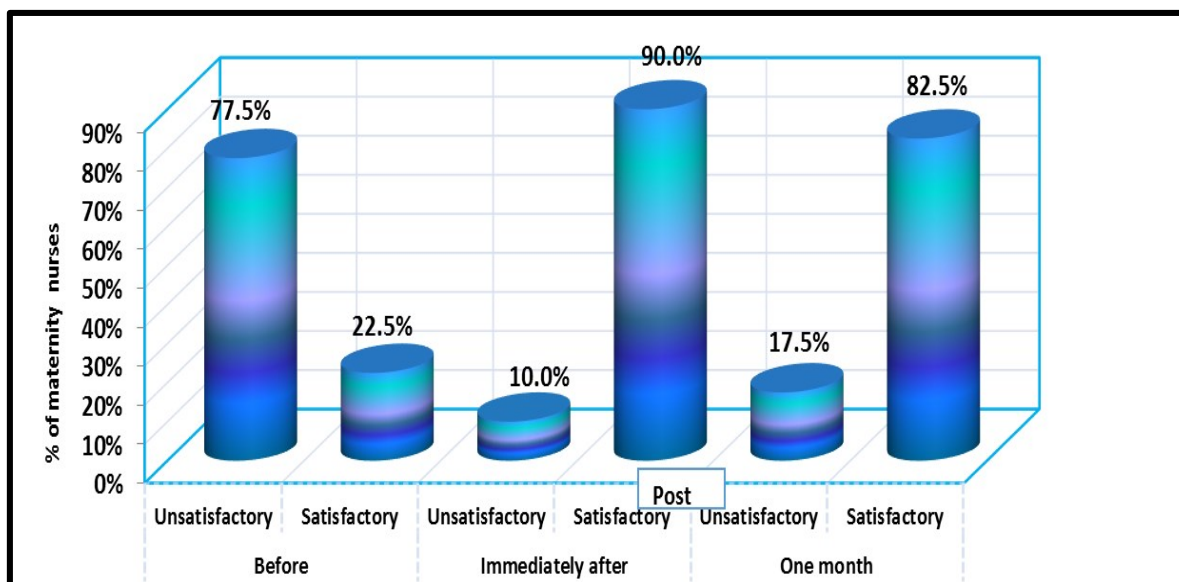


Figure (2): Total practices' scores of the studied maternity' nurses regarding the preventive measures of the obstetric fistula pre, immediate and one month post implementation of the blended learning program(n=80).

Table (3): Correlation between total knowledge and total practices scores of the studied maternity nurses pre, immediately, and one month post implementation of the blended learning program(n=80).

Correlation	The studied maternity nurses (n=80)					
	Pre		Immediate Post		One month Post	
	r	P value	r	P value	r	P value
Total knowledge versus total practices scores	0.100	0.375	0.172	0.128	0.010	0.932

Discussion

Obstetric fistula is a serious health problem which has devastating consequences on the woman's life **Chinthakanan et al., (2023)**. It is a preventable condition whereby maternity nurses had a fundamental role in preventing and decreasing its rate **Woldegebriel et al., (2023)**. Accordingly, the current study had peel glows on the effect of blended learning program on maternity nurses' performance regarding prevention of the obstetrics fistula.

The results of the current study demonstrated that nearly three fifths of the studied maternity nurses' age ranged between 24-58 years and the majority of them were married, almost one half of them were from rural areas and had diploma in nursing technician. Furthermore, more than three fifths of them had experience of 15 years or more and the majority hadn't previous training courses regarding the obstetric fistula.

Maternity nurses' knowledge regarding obstetrics fistula and its prevention becomes one of the fundamental steps for prevention and reduction of maternal morbidity, and mortality **Ali et al., (2022)**.

Pertaining to the total score of knowledge regarding obstetric fistula and its prevention, the current study revealed that approximately one third of the studied maternity nurses had a high level of knowledge preprogram which is significantly improved immediately and one month post program. This finding is strongly similar to **Ali et al., (2022)** who

declared that about one third of the studied maternity nurses had good knowledge regarding obstetric fistula preprogram with evident improvement post program. From the researcher's point of view, the similarity between the current study and this study preprogram may be due to the overloaded area of working and insufficient discussion in clinical areas about common gynecological problems. On the other hand, improvement of maternity nurses' knowledge post program implementation can be attributed to the evident effect of the blended learning that facilitated learning at any time, the readiness to learn and the regular attendance of the sessions.

In contrast, the findings of the present study disagreed with **Splendor, Onuigbo, Chikeme, Utazi, & Nnamani (2024)** who observed that there was adequate knowledge regarding obstetrics fistula among the health care providers. According to the researcher's perspective, this difference between the current result and the above study may be due to different hospitals' policies where in the above study the subject had continuous education, training and updating knowledge, while in the present study the nurses had lack of prior knowledge or experience regarding obstetrics fistula.

Concerning the total practices of maternity nurses regarding vaginal examination during labor, there is a remarkable improvement in all categories of the studied maternity nurses' practices post program compared to preprogram, where only

one third of them had satisfactory practice preprogram with prominent improvement post-program. This result goes hand by hand with **El-Kashif, Abd-El hady, Elsaïad, Baker & Thabet (2023)**. They identified the effect of evidence-based practice program on internship students' performance at the maternity nursing departments and found that nearly one quarter of the studied maternity' nurses had satisfactory practices toward vaginal examination during labor preprogram with evident improvement post program. From the researcher's stand point of view, the agreement between the current study and the mentioned study preprogram may be due to lack of in-service training programs and lack of clinical guidelines for performing the procedure.

On the other hand, the finding of the present study contradicts with **Downe, Gyte, Dahlen & Singata (2013)** who studied routine vaginal examinations for assessing progress of labour to improve outcomes for women and babies at term. They revealed that maternity nurses had adequate practice concerning vaginal examinations. From the researcher's viewpoint, the difference between the present study and this cited study might be related to the fact that most of the maternity nurses had attended training programs regarding vaginal examination during labor and the presence of highly quality system for supervision and evaluation for nursing practice.

Regarding the studied maternity nurses' total practice level of perineal supportive technique during second

stage of labor, the finding of the present study illustrated that one quarter of studied maternity nurses had satisfactory practice level before program implementation. On the other hand, immediately and one months after program there were a highly significant improvement in their practices. This finding matching with **Rodrigues, Silva, Esperança& Escuriet (2024)**. They studied "Perineal massage and warm compresses implementation study of a complex intervention in health" and demonstrated that there was a marked change in overall practices of the studied maternity nurses' where nearly one half of them had satisfactory practices preprogram that highly improved post program.

From the researcher's point of view, unsatisfactory performance of the studied' nurses pre-program may result from lack of following the latest evidence based nursing practices where most of maternity nurses hadn't any knowledge about this procedure, while the findings markedly improved immediately after implementation of the program may be because the effect of blended learning that allows opportunity of learning at the suitable time for nurses and allows frequent demonstration and re-demonstration of the procedure.

On the other hand, this result disagreed with **Roper, Thakar, Hurt & Sultan (2023)** who investigated "Diagnosis, management and training in perineal trauma". They showed that nearly two third of studied maternity nurses had satisfactory practices about perineal supportive technique during the second stage of labor. According

to the researcher's outlook, this difference might be related to different hospital policy where this hospital may be follows evidence based clinical guidelines.

Regarding the total practices' level of perineal examination, the findings of the present study revealed that pre-program about one quarter of the studied maternity nurses had satisfactory level of practices that improved immediately and one month post program implementation. This result is in congruence with **Saad, El-Refaey, &Gaheen (2022)** who mentioned that about one quarter of studied maternity' nurses had satisfactory practice level regarding performance of perineal examination preprogram with noticeable improvement post program implementation.

From the researcher's point of view, the consistency between the current study and the mentioned study preprogram may be due to insufficient system of training and evaluation, while their practice profoundly improved post program can be attributed to use of different method of teaching and learning such as online learning that allow frequent seeing the procedure at any times and that decrease after one month due to absence of continuing in-service training and learning.

Related to the total practice level of episiotomy care, the findings of the present study explained that about one quarter of studied maternity nurses had satisfactory level of practice preprogram with evident improvement post program. This result is strongly in agreement with

Said, Elbana & Salama (2022) who investigated “Effect of educational guidelines on nurses' performance regarding postnatal care of mothers” and clarified that nearly one quarter of the studied maternity nurses demonstrated satisfactory level of practice about episiotomy care preprogram with highly improvement post-program. From the researcher's point of view, the alignment between the current study and the mentioned study regarding unsatisfactory practices pre implementation of the program may be due to lack of adequate training, while the satisfactory practices post program may be due to their readiness to learn and use of videos that allow frequent demonstration of the procedure.

On the other hand, the findings of the present study contradict with **Novelia, Lubis &SulistiYorini (2021)**. They studied the “Relationship between health worker's knowledge and the implementation of episiotomy wound care in the post-partum mother” and revealed that the majority of the studied sample had adequate practice regarding performance of episiotomy care.

Considering the correlation between total knowledge level and total practice scores of the studied maternity nurses' it was obvious that there is no significant correlation between total knowledge level and total practice scores of the studied maternity nurses' pre, immediate and post implementation of the blended learning program. The finding of the present study contradicts with **Metwally et al., (2024)** who illustrated that there was positive

correlation between total knowledge level and practice score. According to the researcher's vantage point, the difference between the current study and these studies may be due the fact that high levels of knowledge don't guarantee effective practices, the nurses may understand the information but cannot implement it. So, the findings of this study are building up enough research studies to establish evidence about the prevention of obstetric fistula. As nursing is the logical discipline to be the hub of the wheel of integrative services. Hence an opportunity exists for maternity nursing to enhance their knowledge and practices for improving maternal health, quality of their life and ultimately reducing maternal morbidities and mortalities.

Conclusion

- Remarkable improvement was observed in the maternity nurses' level of knowledge and practices regarding obstetric fistula and its prevention during antenatal, labor and post-partum period immediately and one month after implementation of the blended learning program compared to preprogram. So, the aim of the study was achieved and supported the study hypothesis that reflect positive effect on nurses, women' health, as well as the overall nursing profession

Recommendations

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

- Providing continuing in-service evidence-based training programs for maternity nurses to enhance

their knowledge and practices regarding the prevention of obstetric fistula.

- Instructional booklets should be available to raise maternity nurses' awareness about preventive measures for obstetric fistula during antenatal, labor and post-partum period.

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Head Nurses' Coaching Leadership Behaviors and Staff Nurses' Cohesion at Tanta University Main Hospital

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Abstract

Background: Coaching as a leadership approach is a powerful vehicle to enhance staff nurses' cohesion as it supports teamwork by the provision of a framework for conversation and therefore enhancing communication, focusing and clarifying participated goals, developing trust, collaboration and achieving collective outcomes. **Aim:** Assess the relation between head nurses' coaching leadership behaviors and staff nurses' cohesion. **Design:** A descriptive correlational design was used. **Setting:** The present study was carried out at Tanta University Main Hospital. **Subjects:** include all (N=35) available head nurses and a simple random sample (n=260) of staff nurses. **Tools:** two tools were used to collect data; coaching leadership behaviors' and staff nurses' cohesion structured questionnaires. **Results:** More than two thirds (68.6%) of head nurses had high level of coaching leadership behaviors. While, the majority (83.5%) of staff nurses perceived that head nurses had low level. As well as, more than half (55%) of staff nurses had low level of cohesion and more than forty (45%) of them had moderate level. **Conclusion:** There was a significant positive correlation between head nurses' coaching leadership behaviors and staff nurses' cohesion. **Recommendation:** Developing activities and events that strengthen the head nurses and staff nurses' relationships and create a sense of belonging to the organization, designing and implementing continuous training programs for encouraging and increasing knowledge about coaching leadership behaviors and taking into account factors that can either strengthen or weaken group cohesion.

Keywords: Coaching leadership, Cohesion, Head nurses, Staff nurses.

Introduction

Leadership is the art of influencing others to put forth their best effort in order to accomplish any task, goal or effort **(Poels, Verschueren, Milisen, & Vlaeyen, 2020)**. Leadership in nursing is pivotal for delivering advanced patient care, fostering efficient growth, and ensuring the effective functioning of healthcare systems. It encompasses a range of roles and responsibilities that extend beyond clinical expertise to include strategic decision-making, team coordination and the promotion of evidence-based practices **(Liapa-Rodriguez, d'Oliveira, Lopes Neto, & Campos, 2021)**.

Effective nurse leaders foster environments of trust and open communication, guiding their teams through change and uncertainty **(Sherman, 2019)**. Among the different leadership models, coaching leadership is prioritized. It is an innovation among nurses and signifies a new course for health institutions. Coaching leadership is described as the practice of directing groups to accomplish targets and simultaneously enable staff nurses to develop skills, knowledge and attitudes **(Lima, Bernardes, Baldo, Maziero, Camelo, & Balsanelli, 2023)**.

Coaching for head nurses is a strategic approach to enhance leadership capabilities, improve team dynamics and elevate patient care quality. By focusing on personal and professional development, coaching empowers head nurses to navigate the complexities of healthcare environments effectively **(Silva, Camelo, Soares, Resck, & Chaves,**

2022). Furthermore, organizations that invest in leadership coaching for nurses see higher retention rates, as it contributes to job satisfaction and professional growth. Also, coaching enhances head nurses' emotional intelligence enabling them to manage stress and respond to challenges with resilience **(Mustafa, & Mahfouz, 2021)**.

Coaching leadership dimensions involve communication, giving and receiving feedback, delegating power and exerting influence and supporting the team to attain organizational result. Communication is the process of comprehending and disseminating messages sent and received, fostering the interaction between leaders and followers. Coaching head nurses can communicate with their staff nurses to accomplish shared goals **(Machado, Aguiar, Lacerda, Oliveira, & Lemos, 2024)**. Giving and receiving feedback is known as exchanging information on staff nurses' performance between head nurses and staff nurses in order to provide resources for professionals and organizations to succeed **(Menezes, et al, 2023)**.

Delegating power and exerting influence suggests that activities are naturally and spontaneously decentralized by head nurses and transmit authority to staff nurses to make decisions. Finally, supporting team describes the loyalty provided by head nurses to their staff nurses for integrating nurses' assumptions with the healthcare goals. Coaching behaviours help clarify roles and reduce ambiguity among staff nurses which is a factor that can strengthen

team cohesion (**Hayashida, Bernardes, Moura, Gabriel, & Balsanelli, 2023**).

Team cohesion is a powerful process which shows how a group sticks together and stays united to achieve its objectives for nurses' affective needs. Staff nurses' cohesion is necessary for successful team functioning (**Sanko, 2025**). Cohesion promotes higher levels of quality care, better patients' satisfaction, and reduces staff nurses' stress and turnover. Cohesion plays an essential role in strengthening effective team qualities (communication, situation monitoring, conflict resolution, and shared goals) that directly contribute to the formation of a strong culture of safety (**Paunova, & Li, 2023**).

Staff nurses' team cohesion is conceptualized into four dimensions including individual attractions to the group task, individual attractions to the group-social, group integration-task and group integration-social. The first dimension is individual attractions to the group task, which relates to nurses' perceptions about their role regarding the functions, goals and productivity of the group.

The second dimension is nurses' attractions to the group-social, which is explained as nurses' perception about their intimate approval in the group. The third dimension is group integration-task and is considered as nurses' awareness regarding the task performance and goals of the nursing group. The last dimension is group integration-social which refers to nurses' perceptions surrounding the harmony, intimacy and connection of the group as a social unit (**Carron,**

Widmeyer, Brawley, Wheeler, & Stevens, 2021).

Coaching is a powerful vehicle to enhance staff nurses' cohesion as it promotes teamwork by offering a platform for discussion and therefore enhancing communication, giving priority and transparency to common goals and building trust and cooperation that enables staff nurses to see beyond each other's professional image, which facilitates a systematic proposal to problem-solving, decision-making and commitment to achieving these goals (**Abd-Elrhman, & Abd-Allah, 2021**).

Significance of the Study

Head nurses need to recognize cohesion as a critical group factor and put effort toward developing practices that encourage staff nurses' cohesion in order to reduce healthcare associated errors. Coaching as a leadership approach can be used in advancing nurses' professionalism and help them to identify their unique set of strength and weakness to improve their performance. Coaching leaders are focused on bringing out the best in their team by guiding them through goals and obstacles. A study done by **Eltantawy, (2024)** emphasis on importance of head nurse coaching as an appropriate intervention in helping staff nurses to work more effectively. So, this study needs will be addressed to assess congruency of head nurses' coaching leadership behaviors with staff nurses' cohesion.

Aim of the study

Assess the relation between head nurses' coaching leadership behaviors and staff nurses' cohesion.

Research Question

What is the relation between head nurses' coaching leadership behaviors and staff nurses' cohesion?

Subjects and Method

Research Design

A descriptive correlational design was used to conclude the aim of the current study. This design is appropriate for the kind of the subject being studied. This design used questionnaires to determine variables and relationship between them when sufficient data was available (**Edmondson, & McManus, 2020**).

Setting

The current study was conducted at all departments (Gynecology and Obstetrics, Cardiac, Neurology, Pediatric, Hematological, Central Lab, Blood Bank, Tropical, and Oncology departments) of Tanta University Main Hospital affiliated to Minister of Higher Education and Scientific Research. Tanta University Main Hospital is a general sector where comprehensive and ongoing care is administered for critically ill patients who can benefit from services provided. The capacity of Tanta University Main Hospital is 573 beds.

Subjects

The subjects of this study included two groups

- All (N=35) available head nurses at the previously mentioned setting.
- A simple random sample (n=260) of staff nurses was selected from total number of staff nurses (841). The technique for selecting the sample from the previously mentioned setting was proportional to the number of nurses in each department. The sample size and power analysis was calculated

using Epi-info software statistical package to ensure that a suitable and representative size is obtained. The criteria used for sample size calculation was as follow; Z =confidence level at 95% (1.96) & d =Error proportion (0.05).

Tools of data collection

To fulfill the aim of this study, two tools were used.

Tool I: Coaching Leadership Behaviors' Structured Questionnaire

It consisted of two parts as follow;

Part 1: personal and work-related characteristics included age, gender, marital status, years of experience, years of experience in the working unit, educational level, attending previous training program about coaching leadership and department.

Part 2: Coaching leadership behaviors' structured questionnaire of head nurses; this tool was developed by the researcher guided by **Passmore (2015)**, **Kabeel (2016)** and **Hayashida, Bernardes, Moura & Gabriel (2021)**; it was used to evaluate head nurses' coaching leadership behaviors from head nurses and staff nurses' perspective. This tool consisted of 25 items and it divided in four dimensions as follow;

Communication included 7 items.

Giving and receiving feedback included 5 items.

Delegating power and exerting influence included 7 items.

Support the team to attain the organizational results included 6 items.

Scoring system

Nurses' responses were measured on a 5-points Likert scale ranging from 1-5, where 1 = never, 2=rarely, 3=not

always, 4=almost always and 5 = always. The total scores were calculated by summing scores of all categories. The total scores represented in varying levels according to statistical cutoff point as follow;

- High level of coaching leadership behaviors > 75% of total score (equal 101-125).
- Moderate level of coaching leadership behaviors 60%- 75% of total score (equal 85-100).
- Low level of coaching leadership behaviors < 60% of total score (equal 25-84).

Tool II : Staff Nurses' Cohésion Structured Questionnaire

This tool was created by the researcher guided by **Byrne & Nelson (2015), Yoon (2017) and Carron, Brawley & Widmeyer (2021)** to assess staff nurses' cohesion. This tool consisted of 26 items and it divided in four dimensions as follow;

- **Individual attractions to the group-task** included 6 items.
- **Individual attractions to the group-social** included 8 items.
- **Group integration-task** included 8 items.
- **Group integration-social** included 4 items.

Scoring system

Staff nurses' responses were measured on a 5-points Likert scale ranging from 1-5, where 1 = strongly disagree, 2= somewhat disagree, 3= neutral, 4= somewhat agree and 5= strongly agree. They were concluded into 3 points where strongly agree + agree = agree and strongly disagree + disagree = disagree. The total scores were calculated and summing scores of all categories. The total scores

represented in varying levels based on statistical cutoff point as follow;

- High level of cohesion > 75% of total score (equal 105-130).
- Moderate level of cohesion 60%- 75% of total score (equal 89-104).
- Low level of cohesion < 60% of total score (equal 26-88).

Method

1. Official approval to conduct the study was obtained from the Dean of Faculty of Nursing and was sent to administrator of Tanta University Main Hospital.

2. Ethical considerations

- An approval of the Ethical Committee at Faculty of Nursing was obtained.
- All participants were informed about the purpose of the study.
- Nature of the study was not caused any harm or pain to participants.
- An informed consent was taken from each participant in the study including the right to withdraw at any time.
- Confidentiality and privacy were taken into consideration regarding data collection.

3. Tools of data collection were developed and translated into the Arabic language by the researcher based on a related literature review.

4. **The study tools** were presented to a jury of five experts in the area of specialty from the Faculty of Nursing Tanta Universities to check content validity of each tool after translation. They were three professors and two assistant professors of Nursing Administration from Faculty of Nursing Tanta University and the necessary modifications were done

based on their opinions. The experts' responses were represented in four points rating scale ranged from 4= strongly relevant 3= relevant 2= little relevant and 1= not relevant. Necessary modifications were done including clarifying and simplifying work-related words. The content validity for tool (I) was 95% and for tool (II) was 92.12%.

5. **A pilot study** was conducted by the researcher on 10% of the subjects (n= 30) to check and verify the clarity, applicability, and feasibility of the tools and identify obstacles and problems that were encountered during data collection. Also, it was used to estimate how long it would take to complete the study tool. Answering the questionnaire took approximately 20 minutes.
6. **Reliability of tools tested** using Cronbach's Alpha coefficient factor, its value for the tool I was (0.923) and for tool II was (0.877).
7. **Data collection** for this study was conducted by the researcher through self-administered questionnaires. The questionnaires were hand-delivered to the study subjects in their work settings after explaining the aim of the study, during morning and afternoon shifts, according to their workload. The researcher met the nurses in small groups .
8. The questionnaires were completed by nurses in the presence of the researcher to ensure all items were answered and provide explanations required.

9. Data collection period extended for more than five months starting from the beginning of March 2022 up to the end of July 2022.

Statistical analysis of the data

Data were fed to the computer and analyzed using IBM SPSS software package version 20.0. (Armonk, NY: IBM Corp). Qualitative data were described using number and percent. Quantitative data were described using range (minimum and maximum), mean and standard deviation. Significance of the obtained results was judged at the 5% level .

The used tests were the Chi-square test for categorical variables, to compare between different groups, **Pearson coefficient r** to correlate between two normally distributed quantitative variables, **Student t-test** to compare mean scores between pre and post program, **Standard deviation**, to compare each data point to the mean of all data points, **F-test (ANOVA)** to compare among more than two categories for quantitative variables that follow a normal distribution and **Cronbach's Alpha**; reliability Statistics was assessed using Cronbach's Alpha test. Significant was adopted at $p < 0.05$ for interpretation of results of test of significance. Also, a highly significant was adopted at $p < 0.01$ for interpretation of results of test of significance.

Results

Table (1) demonstrates personal and work related characteristics of study subjects. Regarding age, more than half (57.1%) of head nurses were in the age group ≥ 40 with mean 40.34 ± 4.19 while above half (53.5%) of staff

nurses were in the age group below 40 with mean 39.07 ± 7.99 . All (100%) head nurses and majority (93.8%) of staff nurses were females. The majority (94.3%, 95%) of head nurses and staff nurses were married. Regarding years of experience, more than sixty (62.9%) of head nurses were 10<20 years with a mean of 16 ± 4.12 . On the other hand, 40.8% of staff nurses were 10<20 years with a mean of 17.07 ± 8.30 . The same table revealed that, all (100%) head nurses had a bachelor's degree in nursing while majority (83.5%) of staff nurses had a technical institute of nursing. Regarding attending previous training programs about coaching leadership, the majority (97.7%, 94.3%) of head nurses and staff nurses respectively didn't attained previous training programs about coaching leadership. In terms of the department, an equal percentage (11.4%) of head nurses worked in Gynecology and Obstetrics, Cardiac, Neurology, Hematological, Central Lab, Blood Bank, Tropical and Oncology departments. Similarly, staff nurses were distributed across different departments working in Gynecology and Obstetrics (16.2%), Cardiac (14%), Neurology (12.8%), Pediatric (14.6%), Hematological (9.6%), Central Lab (6.9%), Blood

Bank (6.5%), Tropical (8.9%), and Oncology (10.5%) departments.

Figure (1) illustrated that more than two thirds (68.6%) of head nurses had high level of overall coaching leadership behaviors while, the majority (83.5%) of staff nurses reported that their head nurses had low level of overall coaching leadership behaviors.

Figure (2) shows that more than half (55%) of staff nurses had low level of overall cohesion. while, more than two fifth (45%) of them had moderate level.

Table (2) demonstrates the correlation between head nurses' coaching leadership behaviors and staff nurses' cohesion dimensions. There was a statistically significant positive correlation between total of each coaching leadership dimensions and total of each cohesion dimensions (at $p \leq 0.05$) except for communication, delegating power and exerting influence and support the team to attain the organizational results dimensions with individual attraction to the group-social.

Figure (3) Showed a statistically significant positive correlation between overall head nurses' coaching leadership behaviors and overall staff nurses' cohesion (at $r=0.588$, $p<0.001$).

Table (1): Personal and work related characteristics

Variables	Head nurses (n =35)		Staff nurses (n =260)		Total (n = 295)	
	No.	%	No.	%	No.	%
Age						
- <40	15	42.9	139	53.5	154	52.2
- ≥40	20	57.1	121	46.5	141	47.8
Min. – Max.	33.0 – 47.0		24.0 – 59.0		24.0 – 59.0	
Mean ± SD.	40.34 ± 4.19		39.07 ± 7.99		39.22 ± 7.64	
Median	40.0		39.0		39.0	
Gender						
- Male	0	0.0	16	6.2	16	5.4
- Female	35	100.0	244	93.8	279	94.6
Marital status						
- Single	1	3	6	2.3	7	2.4
- Married	33	94	247	95.0	280	94.9
- Other	1	3	7	2.7	8	2.7
Years of experience						
- <10	2	5.7	50	19.2	52	17.6
- 10-<20	22	62.9	106	40.8	128	43.4
- 20-<30	11	31.4	78	30.0	89	30.2
- ≥30	0	0.0	26	10.0	26	8.8
Min. – Max.	9.0 – 22.0		2.0 – 39.0		2.0 – 39.0	
Mean ± SD.	16.0 ± 4.12		17.07 ± 8.30		16.95 ± 7.93	
Median	15.0		17.0		17.0	
Years of experience in the working unit						
- <10	2	5.7	63	24.2	65	22.0
- 10-<20	28	80.0	107	41.2	135	45.8
- 20-<30	5	14.3	75	28.8	80	27.1
- ≥30	0	0.0	15	5.8	15	5.1
Min. – Max.	9.0 – 20.0		2.0 – 39.0		2.0 – 39.0	
Mean ± SD.	13.83 ± 3.49		15.13 ± 7.82		14.98 ± 7.45	
Median	13.0		14.0		14.0	
Educational level						
- Bachelor nursing degree	35	100	37	14.2	72	24.4
- Technical institute of nursing	0	0.0	217	83.5	217	73.6
- Diploma nursing degree	0	0.0	6	2.3	6	2.0
Attending previous training program about coaching leadership						
- Yes	2	5.7	6	2.3	8	2.7
- No	33	94.3	254	97.7	287	97.3
Department						
- Gynecology and Obstetrics	4	11.4	42	16.2	46	15.6
- Cardiac	4	11.4	37	14.2	41	13.9
- Neurology	4	11.4	33	12.7	37	12.5
- Pediatric	3	8.8	38	14.6	41	13.9
- Hematological	4	11.4	25	9.6	29	9.8
- Central Lab	4	11.4	18	7	22	7.5
- Blood Bank	4	11.4	17	6.5	21	7.1
- Tropical	4	11.4	23	8.8	27	9.2
- Oncology	4	11.4	27	10.4	31	10.5

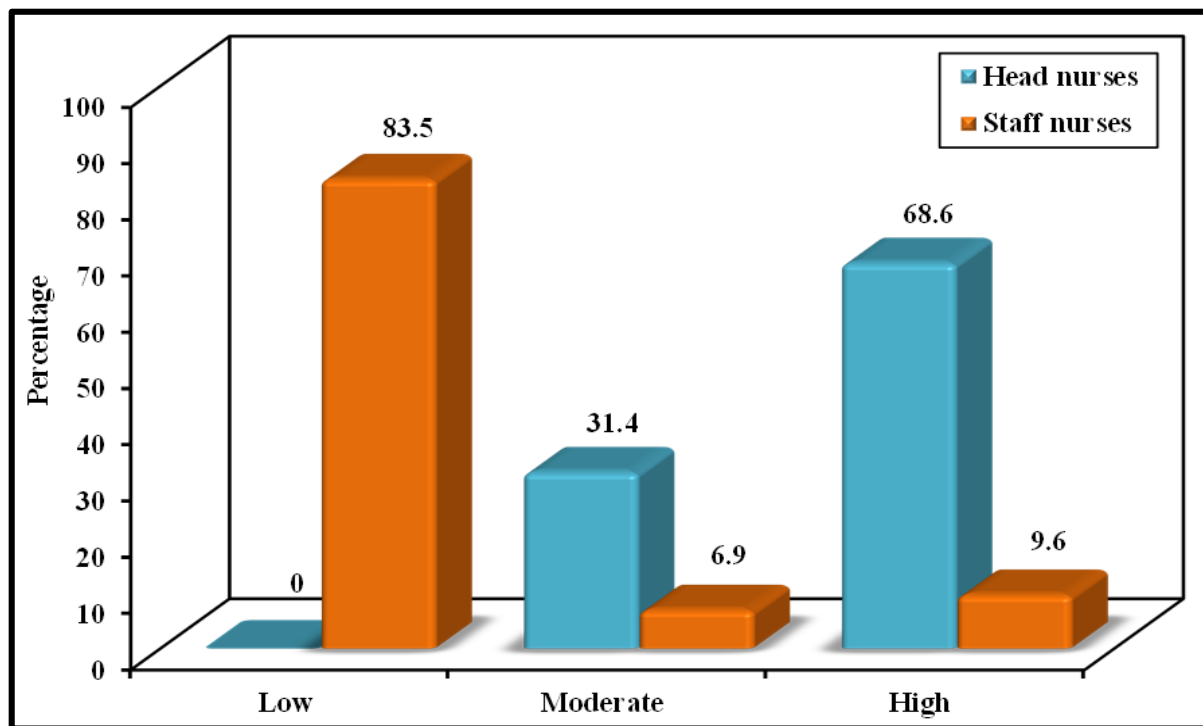


Figure (1): Levels of head nurses' and staff nurses' overall coaching leadership behaviors

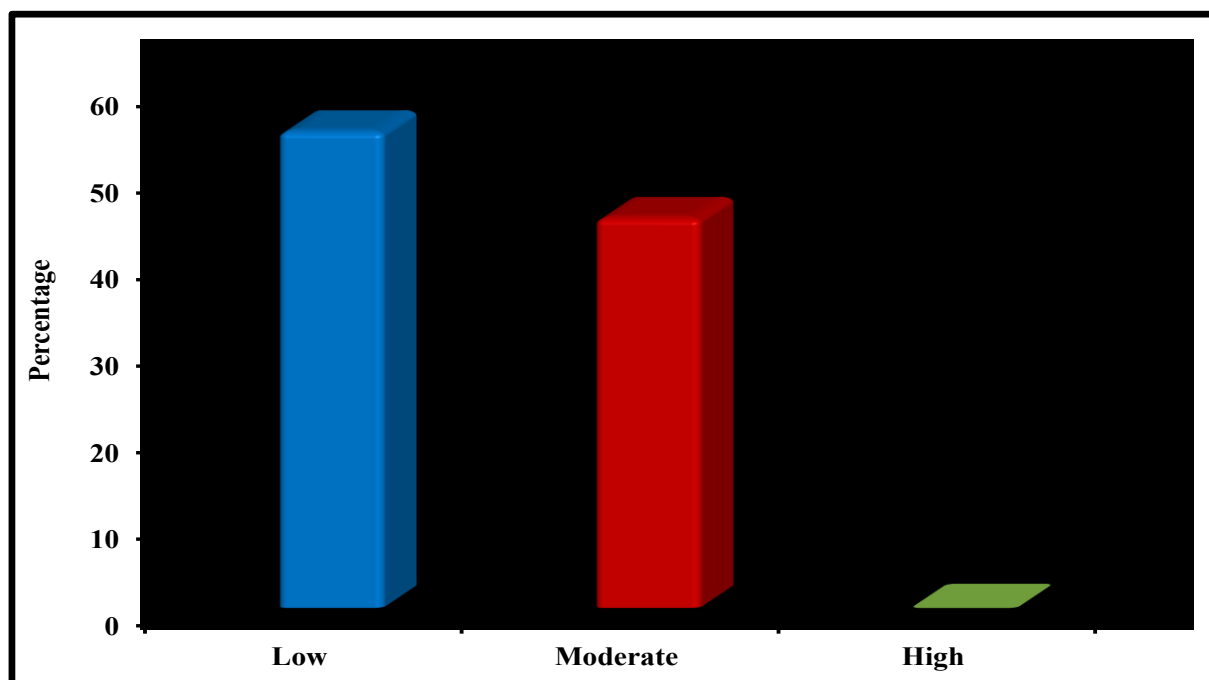
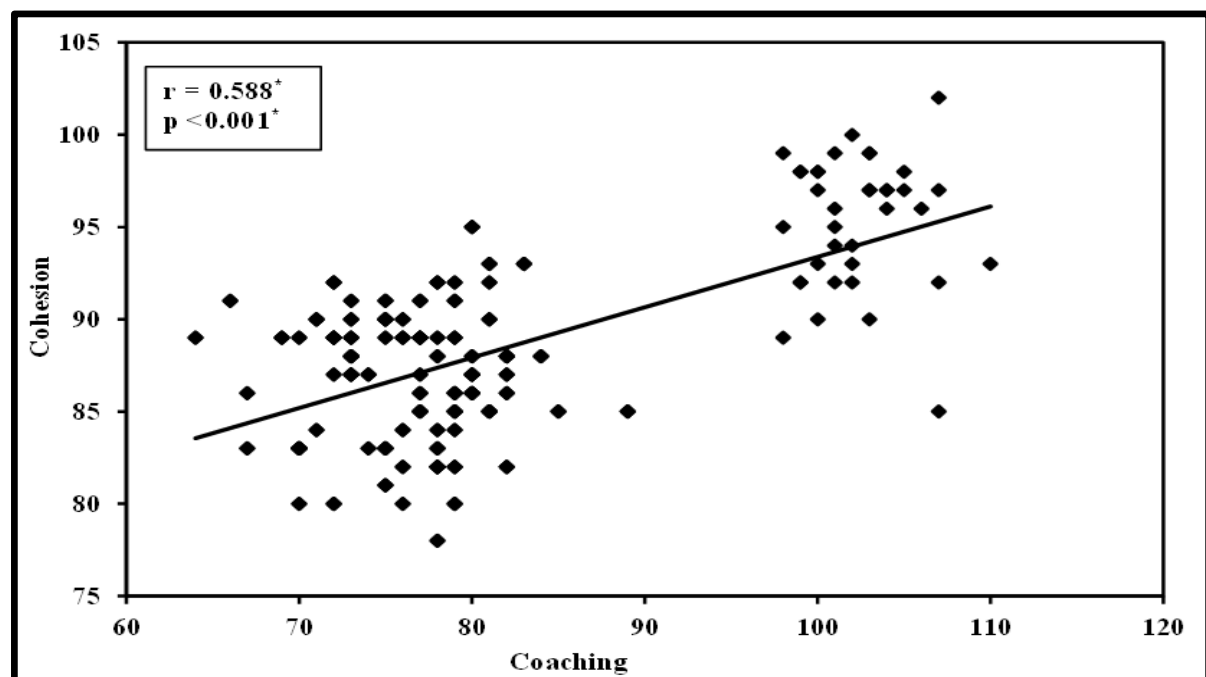


Figure (2): Levels of overall cohesion among staff nurses

Table (2): Correlation between head Nurses' coaching leadership behaviors and staff nurses' cohesion dimensions

Coaching		Staff nurses' cohesion				
		Individual Attractions to the Group-Task	Individual Attractions to the Group-Social	Group Integration-task	Group Integration-Social	Overall
Communication	r	0.338*	0.025	0.514*	0.209*	0.460*
	P	<0.001*	0.690	<0.001*	0.001*	<0.001*
Giving and receiving feedback	r	0.433*	0.200*	0.417*	0.261*	0.535*
	P	<0.001*	0.001*	<0.001*	<0.001*	<0.001*
Delegating power and exerting influence	r	0.420	0.104	0.409*	0.205*	0.471*
	P	<0.001*	0.095	<0.001*	0.001*	<0.001*
Support the team to attain the organizational results	R	0.475*	0.116	0.539*	0.174*	0.554*
	P	<0.001*	0.062	<0.001*	0.005*	<0.001*

**Figure (3): Correlation between head nurses' overall coaching leadership behaviors and overall staff nurses' cohesion****Discussion**

Coaching leadership has emerged as an effective approach to enhance nurses' professionalism and improving their performance (Kiwauka, Nanyonga, Sak-Dankosky, Muwanguzi, & Kvist,

2021). By utilizing coaching techniques, head nurses can help staff nurses to identify their strengths and weaknesses and provide guidance in setting and achieving goals (Ferreira, de Mesquita, de Oliveira, Porcari, & Gasparino, 2022). Therefore, this

study was conducted to determine the relation between head nurses' coaching leadership behaviors and staff nurses' cohesion.

Nurses' coaching leadership behaviors

Regarding the two studied groups' overall levels of coaching leadership behaviors, the current study showed that more than two thirds of head nurses had high level of coaching leadership behaviors. This result is explained that the majority of those head nurses exhibited delegating power and exerting influence, giving and receiving feedback and communication skills.

On the other hand, the current study found that the majority of staff nurses perceived that their head nurses had low level of coaching leadership as more than three quarters of them perceived that their head nurses had low levels in giving and receiving feedback, supporting the team to attain the organizational results and communication skills. In the same line with this study are **Abdelhafiz, Alloubani, & Almatari, (2021)** who found that higher levels of coaching leadership were linked to increased job satisfaction between nursing staff. Another study carried out by **Galiotti, Moura, Cunha, Gasparino, & Balsanelli, (2022)** clarified that coaching leadership was perceived positively by nurses.

Staff nurses' cohesion

The results of the current study revealed that more than half of staff nurses had low level of overall cohesion and more than two fifth of them had moderate level. Tis result may be attributed to the majority of staff nurses had low level in individual

attractions to the group-social, more than two thirds of them had moderate level in group integration-social and more than half of them had low level in individual attractions to the group-task and moderate level in group integration-task. From the researcher point of view, these results may be due to stressful work-environment, dissatisfaction due to unresolved conflicts or lack of supportive work culture leading to difficulties in providing and receiving help ultimately affecting team cohesion. This result is supported by **Zeng, Kunaviktikul, & Thungjaroenkul, (2022)** who found that nurses perceived overall group cohesion at a moderate level. However, **Zaheer, Ginsburg, Wong, Thomson, & Wulffhart, (2021)** showed that perceptions of team cohesion can vary widely among nurses. While some may view their team as functioning fairly, others might experience significant stress and dissatisfaction due to unresolved conflicts or lack of support.

Correlation between head Nurses' coaching leadership behaviors and staff nurses' cohesion

There was a statistically significant positive correlation between head nurses' coaching leadership behaviors and staff nurses' cohesion. This means that head nurses' overall coaching leadership behaviors significantly predicted staff nurses' cohesion. Head nurses who displayed coaching leadership behaviors including (providing support, feedback and guidance) were associated with higher levels of staff nurses' cohesion indicating that coaching leadership behaviors can

positively impact the team's overall performance. Team coaching helped to develop personal and interpersonal relationships and dynamics by breaking down barriers, creating a sense of belonging and a deep, empathetic understanding of each other.

In the same line with this result, **Metwally, & Elghabbour, (2020)** who highlighted a positive association between leadership and effective teamwork. Another study conducted by **Woodhead, (2021)** demonstrated that coaching supports team working by providing a forum for dialogue and thereby improving communication, giving focus and clarity of shared goals, increasing trust and collaboration that allows participants to see beyond each other's professional image, and enabling a systemic understanding and approach to problem solving, decision making and commitment to achieving collective outcomes. Also, **Erçelik, & Cyprus, (2023)** reported that was a positive statistically significant relation between coaching leadership style and teamwork behaviors.

This study finding is also along with **Almamoun, Abdelrahman, Thabet, & Mostafa, (2024)** who revealed that there was a positive statistically significant correlation between coaching leadership skills and nurses' teamwork behaviors. Also, **Kohnen, Schaufeli, Bruyneel, Välimäki, & Li, (2024)** highlighted that coaching leadership style was positively associated with nurses' teamwork behavior. These studies reported that nurses who perceived their leaders as coaches had higher teamwork scores. On contrary, **Hassan, Mohammed,**

Zakaria, & Ibrahim, (2024) found that there is no significant relation between coaching leadership style and teamwork behavior among nurses.

Conclusion

The present study was conducted to assess the head nurses' coaching leadership behaviors and staff nurses' cohesion. The findings of the present study concluded that more than two thirds of head nurses had high level of coaching leadership behaviors. While, majority of staff nurses perceived that head nurses had low level. Specifically, the highest dimension was delegating power and exerting influence and the lowest dimension was giving and receiving feedback. As well as, more than half of staff nurses had low level of cohesion and more than forty of them had moderate level. Specifically, the highest dimension was group integration-social and the lowest dimension was individual attractions to the group-social. Also, there was a significant positive correlation between head nurses' coaching leadership behaviors and staff nurses' cohesion at Tanta University Main Hospital.

Recommendations

Considering the findings of this study, the following recommendations were proposed:

For management level

- Providing open channels of communication and trustful relationships with head and staff nurses to provide constructive feedback and support.
- Holding regular meeting with head nurses and allowing them to discuss their needs and interests.
- Showing recognition and appreciation for head nurses for

their effort in mentoring their staff nurses.

- Maintaining environment that encourages head nurses to provide coaching function to their staff nurses.
- Developing activities and events that strengthen the head nurses and staff nurses relationships and create a sense of belonging to the organization.
- Evaluating head nurses' knowledge regularly to recognize the areas for training for enhancing their coaching leadership behaviors and therefore team cohesion.
- Designing and implementing ongoing education and training programs for promoting and enhancing their knowledge about coaching leadership behaviors.
- Developing strategies that enhance the culture of teamwork and cohesion.

For head nurses

- Promoting nurses' active participation in hospital affairs for developing the quality and efficiency of nursing care services and the outcomes of the healthcare institutions.
- Guiding and counseling staff nurses to meet their professional needs.
- Pay attention to verbal and non-verbal communication in dialogue, show interest in keeping dialogue with staff nurses and involve them in work-related decisions.
- Ask open-ended questions to reveal the details of any issues.
- Use appreciation to encourage better performance and ask how

staff nurses prefer to receive recognition for good behaviors.

- Encouraging cooperation and team work spirit among staff nurses to facilitate knowledge and experience sharing.
- Recognize the importance of sharing power and involving all team members in decision-making processes.

For staff nurses

- Communicate clearly their problems, needs and what their expectations are of others.
- Attend seminars and workshops to be up dated that improve their perception about teamwork, enable them to work in teams and improve their performance.
- Build good relationship with their colleagues depend on respect and trust.

For educational level

- Coaching leadership need to be studied in the curriculum of Faculty of Nursing.

For further research

- More researches need to prove the results of the current study in various healthcare organizations.
- Additional studies about factors affecting team effectiveness and cohesion between staff nurses.
- Study the relation between team cohesion and work overload.

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Communication Competence, Intimacy, and Recovery among patients with Schizophrenia

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Abstract

Background: Studies indicate that intimate relationships are common unmet needs among patients with schizophrenia. Those patients most of the time encounter significant challenges interacting with their immediate environment. Communication competence and intimacy are major contributing factors of everyday life of patients with schizophrenia that has significant influence on patient's recovery. By examining the intricate connection between communication competence, intimacy and recovery. **Aim:** to assess communication competence, intimacy and recovery among patients with schizophrenia and to explore the relationship between these three variables. **Research design:** A descriptive correlational design was utilized in this study. **Subject:** a convenient sample of 135 patients with schizophrenia at the inpatient psychiatric department, Tanta university hospital and Psychiatry, Neurology and Neurosurgery Center of Tanta university hospital. **Tools:** Four tools were used for this study namely, A socio-demographic and clinical data questionnaire, Interpersonal Communication Competence Scale, Intimacy scale and Recovery scale. **Results:** the study revealed a statistically significant positive correlation between communication competence and recovery as well as between intimacy and recovery. **Conclusion:** communication competencies and intimate relationships are interrelated and significantly influence mental health and recovery of patients with schizophrenia. **Recommendations:** Healthcare professionals and mental health practitioners should integrate interventions that improve communication and foster intimacy to enhance patients' outcomes. Additionally, holistic models of patient's care should be implemented to improve mental health recovery and foster community integration.

Key words: Communication Competence, Intimacy, Recovery, Schizophrenia

Introduction

Schizophrenia is a durable, complicated mental health condition affecting approximately 23 million people globally (**GBD (2019) Diseases and Injuries Collaborators (2020)**). Symptoms are described as positive ones (hallucinations, delusions and alterations in behavior), negative symptoms (decreased ability to speak, flat, blunted, apathy affect and avolition), and cognitive symptoms (disturbed executive functioning and associative learning deficits). Schizophrenia as a chronic condition has its impact on social engagement, decision making, family interactions, and maintenance of interpersonal relationships with a devastating effect on patients' ability to communicate in a competent way (**Jauhar , Johnstone, & McKenna 2022**) (**Fritah, Chakit, Kassal, & El Hessni, 2024**).

Communication competence is defined as the ability to effectively and appropriately convey, interpret, and respond to messages in various interpersonal contexts. It involves not only speaking and listening skills but also understanding social cues, emotional expression, empathy, and adapting communication styles based on the situation and relationship (**Gonçalves, Sousa, Arasaratnam-Smith, Rodrigues, & Carvalho, 2020**). Interpersonal communication competence plays a vital role in shaping adaptive functioning and health outcomes among individuals with schizophrenia (**Commey, Ninnoni, Ampofo, & Miezah, 2023**). Effective communication and social interaction require a complex

combination of skills, such as cognitive abilities, accurate facial expressions, and the ability to recognize emotions (**van Kleef & Côté, 2021**). However, individuals with schizophrenia often exhibit significant impairments in communication competence, with emotional recognition being a central aspect of this deficit. In social settings, misinterpreting emotional cues can lead to heightened stress and disrupt interpersonal connections (**Javed & Charles, 2018**). This stress, in turn, may exacerbate schizophrenic symptoms and contribute to the development of psychosis (**Dean, Scott, & Park, 2021**).

Patients with schizophrenia have deficits in both verbal and nonverbal communication including disorganized speech, difficulties in identifying and describing feelings and difficulty interpreting social cues, these impairments can lead to misunderstanding, withdrawal or social rejection, further reinforcing loneliness and isolation. Also, it can hinder the development of trust, empathy and reciprocity which is considered a key component of intimacy (**Chapellier, Pavlidou, Maderthaner, von Känel, & Walther, 2022**).

Intimacy is regarded as a key component of social relationships, encompassing the sense of closeness, personal connection, and mutual belonging. It involves a deep emotional bond that develops through shared understanding and experiences. Individuals with schizophrenia frequently experience

difficulties in fulfilling their intimacy needs, which can hinder their recovery and overall well-being. (Antony, Munivenkatappa & Desai, 2025). The onset of schizophrenia is often accompanied by the deterioration of intimate relationships, and feeling of loneliness as individuals with schizophrenia struggle to establish intimate relationships for various reasons. (Ropaj, Keatley, Dickson, Milroyd & Taylor, 2023). First, psychotic symptoms can cause social withdrawal, making it hard to initiate and maintain interaction with others. Second, individuals may face mental health-related discrimination which can lead to internalized stigma and reduced self-esteem (Chan, Ho, & Bressington, 2019). Despite these challenges, studies have shown that individuals with schizophrenia often express strong desire to love and companionship. Therefore, mental health professionals play a crucial role in addressing intimacy concerns, promoting healthy relationships and integrate these issues into comprehensive recovery plans (Budziszewska, Babiuch-Hall, & Wielebska, 2020).

Recovery is a process that enables individuals to enhance their health and well-being, pursue autonomous way of living, and endeavor to realize their full potential. This concept pertains to transcending the detrimental impacts of mental illness, encompassing symptom resolution and the cultivation of new meaning and purpose in life (Sánchez-Guarnido, Ruiz-Granados, Garrido-Cervera, Herruzo,

&Herruzo, 2024). Recovery encompasses a four-dimensional framework: symptomatic, societal, functional, and personal recovery. *Symptomatic recovery* represents a biomedical framework for evaluating the outcomes of mental illness treatment, focusing on the objective alleviation of symptoms and the averting the relapse (Mezes, Lobban, Costain, Longson, & Jones, 2021)., *Societal recovery* concerns addressing public stigma surrounding mental disorders and enhance the status and rights of patients within the community (van Aken et al., 2021). *Functional recovery* represents a comprehensive and evidence-driven methodology that assists clients in transcending mere symptom management to attain an enhanced quality of life and adapt to skill deficits (van Aken et al., 2021) (Badu, O'Brien, & Mitchell, 2021). *Personal recovery* is a person-centered methodology for treating mental illness, encompassing the process of individual psychological adaptation and development. It involves not merely returning to the premorbid self but rather achieving growth beyond it. Personal recovery involves an individual's perceived capacity to treat mental illness, their sense of purpose, and their confidence in leading a fulfilling life, regardless of the severity of the disorder (Skar-Fröding et al., 2021).

While much attention has traditionally been placed on symptom management, this research emphasizes the importance of social functioning and interpersonal connection as critical components of

holistic recovery. It is of great importance to expand our comprehension of the psychosocial dimensions of schizophrenia, particularly the interrelationship between communication competence, intimacy, and recovery. By exploring how communication skills influence the capacity for intimacy and, in turn, affect recovery outcomes

Aim of the Study

Assess communication competence, intimacy and recovery among patients with schizophrenia, and explore the relationship between communication competence, intimacy and recovery among patients with schizophrenia

Research questions

- What are the levels of communication competence, intimacy and recovery among patients with schizophrenia?
- What is the relationship between communication competence, intimacy and recovery among patients with schizophrenia?

Materials and method

Research design

A descriptive correlational design was utilized in this study.

Research setting

This study was conducted at the inpatient psychiatric department of Tanta university hospital with a capacity of 26 beds (13 beds for male and 13 beds for female) as well as at Psychiatry, Neurology and Neurosurgery Center. The center composed of two floors for psychiatric male with a capacity of 30 beds, one floor for psychiatric female with a capacity of 20 beds, two floors for child psychiatry and one floor for substance drug users. Both settings

are affiliated to the Ministry of higher education and scientific research.

Subjects

Subjects of the current research were a convenient sample of 135 patients with schizophrenia. Epi-Info software was used to calculate the sample size based on the following parameters; a total population of (N=350 in 6 months), 95% confidence limit and a margin of error 5%. The program showed the minimum number of patients to be approached equal 124. Therefore, 135 patients were included in the study with the following criteria; 18 years or older, not in acute stage and absence of mental retardation, substance use disorder and other psychiatric comorbidity.

Tools

Tool I: Sociodemographic and clinical data questionnaire:

It was prepared by the authors to get necessary data about Socio-demographic status example patient age, sex, marital status, educational level, occupation, place of residence, income, and cohabitation. Clinical characteristics such as age of onset of illness, number of previous psychiatric hospitalization and mode of admission.

Tool II: interpersonal Communication competence scale (ICCs)

It was developed by **Rubin & Martin (1994)** to measure interpersonal communication competence. It is composed of 30 statements divided into ten subscales namely, self-disclosure, empathy, social relaxation, assertiveness, expressiveness, interaction management, supportiveness,

immediacy, altercentrism, and environmental control. All items rated on a five-point likert type ranging from 1 (almost never) to 5 (almost always). The scale covers 10 interpersonal communication skills. The total score ranged from 30 to 150. The higher the score the greater competence. The cutoff points of total competence reflected that; High competence >120, Moderate competence 90-120, Low competence <90.

Tool III. Functional Analytic Psychotherapy FAPIS Intimacy scale)

This instrument was developed by **Leonard et al 2014**. It is 14 self-report measures developed to evaluate intimacy related behavior in interpersonal relationships (how open, emotionally, expressive and connected an individual feeling in interpersonal relationship). Each item is measured on seven points Likert type scale from 0=not at all to 6=completely. The score is reversed in items from 10 to 14. The total score ranged from 0-84. The higher the score the greater the intimacy. Cutoff points represented as follows; low level of intimacy: 0-41, Moderate level of intimacy: 42-58, High level of intimacy: 59- 84

Tool IV: Recovery scale

It was established **Corrigan, Salzer, & Ralph, 2004**. It is a self-administered tool designed to assess recovery in individuals with serious mental illness. The instrument composed of 38 items classified into four recovery domains; Functional recovery (6 items) that measure "Doing Things I Value", for example;

It is important to have fun, Personal recovery that measure (18 items) "Looking Forward", for example; I can handle it if I get unwell again, Clinical recovery (7 items) that measure "Mastering My Illness", for example; I can identify the early warning signs of becoming unwell, and Social recovery (7 items) that measure Connecting and Belonging, for example; I have people that I can count on. Each item of the scale is rated on four points Likert scale in which "4=completely true", "3=mostly true", "2=a bit true" and "1=untrue". The total score of this scale are from 38 to 152. The higher scores indicate a high level of recovery, and the lower scores mean low level of recovery. Levels of recovery were calculated by cutoff points and summing scores as follows: low level of mental health recovery: 1-75, Moderate level of mental health recovery: 76-106, High level of mental health recovery: 107-152.

Method

- An official letter was presented to the authority of the director of the research settings to have the required permissions
- **Ethical considerations**
Ethical approval was obtained from ethical committee at Faculty of Nursing, Tanta University. The code number is (491-6-2024). Consent was obtained from the patients after clarification of the aim of the study, privacy and confidentiality were assured, patients were reassured that the obtained information is confidential and used only for

purpose of the study, patients' right to refuse participation in the study were respected.

- Tools of the study were translated into Arabic language by the researchers and then back translation was done.
- A panel of five experts in psychiatric medicine and nursing examine the validity of the study tools.
- The pilot study was done on 14 patients to assure clarity and applicability of tools. Those clients are excluded from the actual study subjects.
- Cornbrash's Alpha was used to test reliability of communication competency scale, intimacy scale, and recovery scale and proved to be reliable (0.80, 0.91, and 0.85. respectively)

- **Actual study**

Each patient with the predetermined criteria was contacted on an individual base and interviewed in privacy by the researchers. This was done to establish rapport and initiate relationship with clients, explain the purpose of the study then sign informed consent and complete the study tools.

Each interview lasted between 30 to 45 minutes. Data collection was completed over a period of 3 months and started from June to September

Statistical analysis

SPSS software version 20 was utilized to process and validate the study data for tabulation and statistical analysis. Quantitative data were analyzed using measures such as mean, range, and

standard deviation. A two-tailed test was applied with an alpha level of 0.05, considering a p-value ≤ 0.05 as statistically significant. Categorical data were presented using frequency tables and analyzed using the chi-square test. Pearson's correlation coefficient was employed to examine the relationships between variables.

Results

Table (1) presents the distribution of the patients studied according to their sociodemographic and clinical characteristics. The mean age was 10.09 ± 35.56 years with the highest percentage being in the age group between 30-45 years. Concerning sex, 51.1% were female. As regards marital status, 42.2% of the subjects were single compared to 2.2% were widows.

Additionally, the about half of the subjects had secondary level of education (43.7 %), while 7.4% were illiterate. Speaking about residence, more than one half of them 64.4% lived in urban areas. Regarding working status, 65.9% weren't working compared to 34.1% were working. Those who stated that they haven't enough income represented 71.1 % and 72.6 % were living with their families.

As regard to age of onset of illness, the highest percentage 79.3% get the disease between age 20-30 years. While the number of previous hospitalization 74.1% of the subjects were admitted to the hospital more than three times. Finally regarding mode of admission to psychiatric hospital, 89.6% entered the hospital involuntary and only 10.4% were voluntary admission.

Table (2) illustrates the distributions of the studied patients according to their levels and mean scores of interpersonal communication competence subscales and total ICC. The table shows that 59.3% of the studied patients have low level of total interpersonal communication competence, in comparison to only 17.7% of them who had high level of total interpersonal communication competence. It can also be noticed that the total mean score of interpersonal communication competence was 72.47 ± 26.84 . **Regarding mean scores of ICC subscales,** it was noticed that, altercentrism, interaction management takes the highest mean 7.6 ± 2.75 followed by immediacy 7.5 ± 2.70 , whilst assertiveness, expressiveness take the same mean score 7.4 ± 2.72 , followed by social relaxation, supportiveness 7.1 ± 2.9 and finally self-disclosure and empathy takes the same mean 6.9 ± 3.1 , then the lowest one is environmental 6.9 ± 3.05 .

Figure (1) reveals the distributions of the studied patients according to their levels of recovery. It can be noticed that 48.1%, 43.0% of the studied patients had low level of social and personal recovery compared to 42.2% and 41.5%, who had high levels respectively. Regarding clinical and functional recovery, it was observed that 45.2% and 43.7% of the patients had moderate levels respectively as compared to 34.8% for both subscales who had low levels. Additionally, the figure shows that nearly half of the

studied subjects had moderate level of total recovery (48.9%) compared to only 11.1% who had high level of total recovery.

Table (3) describes mean scores of recovery assessment subscales among the studied patients. The table elicits that studied patients' functional recovery, personal recovery, clinical recovery, and social recovery mean scores constituted (13.5 ± 3.6 , 38.8 ± 10.6 , 15.7 ± 3.9 , 14.2 ± 3.7) respectively. Also, the mean score of total recovery was 82.2 ± 18.7 .

Figure (2) represents distributions of the studied patients according to their levels of intimacy scales, it illustrates that 43 % of them had a low level of intimacy while 39% of them had moderate level and only 18% had high level of intimacy.

Table (4) represents correlation matrix between recovery assessment scale, interpersonal communication competence scale, and intimacy of patients. Regarding the correlation between ICC and intimacy; a statistical significant positive correlation was found between ICC (self-disclosure, immediacy, environmental control, empathy, social relaxation, altercentrism, supportiveness, total ICC) and intimacy ($p=0.050^*$, $p=0.031^*$, $p=0.039^*$, $p=0.002^{**}$, $p=0.000^{**}$, $p=0.000$, $p=0.000$, and $p=0.000$ respectively), On the other hand, ICC subscales (assertiveness, interaction management and expressiveness) has no significant correlation with intimacy ($p=0.088$, $p=0.204$, $p=0.094$ respectively).

As regards the correlation between ICC and total recovery, a statistical significant positive correlation was

evident between ICC (self-disclosure, empathy, social relaxation, assertiveness, alter centrism interaction management, expressiveness, supportiveness, immediacy, environmental control and total ICC) and recovery ($p=0.010$, $p=0.000$, $p=0.022$, $p=0.000$, $p=0.018$, $p=0.002$, $p=0.000$, $p=0.013$, $p=0.000$, $p=0.000$, $p=0.000$ respectively).

Concerning the correlation between Intimacy and recovery; a positive significant correlation was noticed between recovery (functional, personal, clinical, social and total score) and intimacy ($p=0.000$, $p=0.011$, $p=0.005$, $p=0.000$, and $p=0.000$ respectively).

Table (1): Distributions of the patients studied according to their socio-demographic & clinical characteristics (No= 135).

Socio-Demographic characteristics	Number	%
Sex		
Male	66	48.9
Female	69	51.1
Age		
<30	49	36.6
30-45	59	43.7
>45	27	20
Mean ± SD	10.09±35.56	
Range	(20-58)	
Marital status		
Single	57	42.2
Married	46	34.1
Divorced	29	21.5
Widow	3	2.2
Educational Level		
Illiterate	10	7.4
Read & write	46	34.1
Secondary education	59	43.7
University degree	20	14.8
Residence		
Rural	48	35.6
Urban	87	64.4
Occupation		
Work	46	34.1
Not Work	89	65.9
Income		
Enough	39	28.9
Not Enough	96	71.1
Cohabitation		
Alone	37	27.4
With family	98	72.6

Age of onset of illness		
<20	<20	<20
20-30	20-30	20-30
>30	>30	>30
Mean ± SD	26.4 ± 5.05	
Range	40-20	
Number of previous psychiatric hospitalization		
Once	7	5.2
Twice	28	20.7
More than three time	100	74.1
Mode of current admission		
Voluntary	14	10.4
Involuntary	121	89.6

Table (2) Distributions of The Studied Patients According to their Levels and mean scores of Interpersonal Communication Competence Subscales and total ICC (No= 135)

Interpersonal Communication Competence Subscales		Low	Moderate	High	Mean $\pm$ SD	χ^2 p
Self-Disclosure	Number	83	33	19	6.9 $\pm$ 3.1	759 0.000
	%	61.5	24.4	14.1		
Empathy	Number	83	29	23	6.9 $\pm$ 3.1	
	%	61.5	21.5	17.0		
Social Relaxation	Number	85	27	23	7.1 $\pm$ 2.9	
	%	63.0	20.0	17.0		
Assertiveness	Number	76	35	24	7.4 $\pm$ 2.72	
	%	56.3	25.9	17.8		
Altercentrism	Number	71	44	20	7.6 $\pm$ 2.75	
	%	52.6	32.6	14.8		
Interaction Management	Number	66	48	21	7.6 $\pm$ 2.75	
	%	48.9	35.6	15.6		
Expressiveness	Number	76	36	23	7.4 $\pm$ 2.72	
	%	56.3	26.7	17.0		
Supportiveness	Number	84	29	22	7.1 $\pm$ 2.9	
	%	62.2	21.5	16.3		
Immediacy	Number	71	44	20	7.5 $\pm$ 2.70	
	%	52.6	32.6	14.8		
Environmental Control	Number	84	27	24	6.9 $\pm$ 3.05	
	%	62.2	20	17.8		
Total ICC	Number	80	31	24	72.47 $\pm$ 26.84	
	%	59.3	23	17.7		

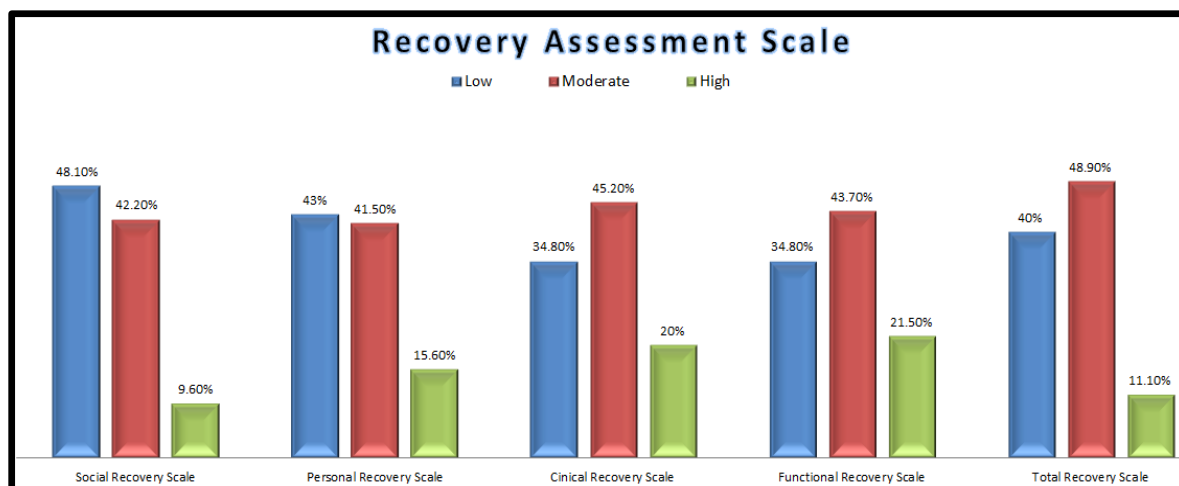


Figure (1) Distributions of the patients studied according to their levels of Recovery Assessment Scale (No= 135)

Table (3) Mean Scores of Recovery Assessment Subscales among the Studied Patients (No= 135)

Recovery Assessment Subscales	Mean ± SD	χ^2 p
Functional Recovery Assessment	13.5±3.6	644 0.000
Personal Recovery Assessment	38.8±10.6	
Clinical Recovery Assessment	15.7±3.9	
Social Recovery Assessment	14.2± 3.7	
Total Recovery Assessment Scale	82.2±18.7	

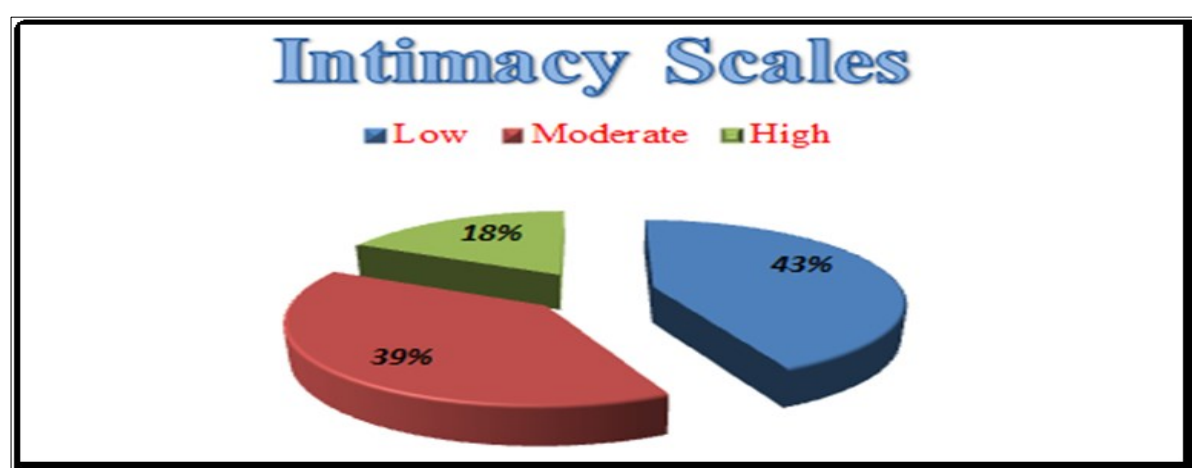


Figure (2) Distributions of the studied patients according to their levels of Intimacy (N= 135).

Table (4) Correlation Matrix between Recovery Assessment Scale, Subscales and Total Interpersonal Communication Competence Scale, and intimacy among studied patients

ICC	Intimacy		Recovery Subscales									
			Functional Recovery		Personal Recovery		Clinical Recovery		Social Recovery		Total Recovery	
	r	P	r	P	r	P	r	P	R	P	r	P
Self-Disclosure	0.169	0.050*	0.068	0.436	0.170	0.049*	0.048	0.010*	0.533	0.000**	0.052	0.010*
Empathy	0.087	0.002**	0.461	0.000**	0.137	0.112	0.627	0.000**	0.087	0.000**	0.421	0.000**
Social relaxation	0.885	0.000**	0.152	0.078	0.197	0.022*	0.862	0.01*	0.819	0.000**	0.610	0.022*
Assertiveness	0.148	0.088	0.234	0.006**	0.660	0.000**	0.033	0.002*	0.128	0.138	0.889	0.000**
Altercentrism	0.829	0.000**	0.116	0.197	0.011	0.895	0.101	0.246	0.214	0.013*	0.215	0.018*
Interaction Management	0.110	0.204	0.271	0.003**	0.004	0.961	0.062	0.01*	0.069	0.426	0.021	0.002**
Expressiveness	0.145	0.094	0.149	0.085	0.032	0.709	0.941	0.000**	0.326	0.000**	0.506	0.000**
Supportiveness	0.689	0.000**	0.886	0.000**	0.506	0.000**	0.176	0.041*	0.747	0.000**	0.514	0.000**
Immediacy	0.056	0.031*	0.126	0.145	0.421	0.000**	0.113	0.191	0.102	0.011*	0.717	0.013*
Environmental control	0.178	0.039*	0.132	0.127	0.118	0.174	0.106	0.220	0.710	0.000**	0.588	0.000**
Total (ICC)	0.767	0.000**	0.161	0.031*	0.666	0.000**	0.892	0.015*	0.109	0.025*	0.353	0.000**
Intimacy	----	----	0.871	0.000**	0.907	0.011*	0.636	0.005*	0.769	0.000**	0.817	0.000**

Discussion

Communication in schizophrenia is a complex area with significant challenges. Patients with schizophrenia may experience many difficulties with various aspects in relation to communicating with others **(Fiorillo, & Sartorius, 2021)**. Communication competence continues to emphasize its multifaceted nature and its crucial role in various aspects of life. It is seen as more than just effective message transmission. Moreover, Communication competence and intimacy are deeply intertwined, therefore, effective communication skills are essential for building and maintaining intimate relationships. Competency entitles the individuals' ability to clearly express their thoughts, feelings, and needs, and actively listen to their partners. This competency fosters a deeper sense of connection and understanding. In turn, strengthens the emotional bond and intimacy between people **(Soid, Muhammad, & Norman, 2025) (Comme, et al., 2023)**.

The current research showed that most of the patients demonstrated low or moderate level of intimacy (fig.2). Patients with schizophrenia may lack the ability to form an intimate relationship for many reasons. Among these reasons, symptoms of schizophrenia are either positive or negative. Negative symptoms such as apathy, blunting affect, and avolition are likely to reduce the quality of a relationship. These symptoms also make patients indifferent to their surroundings, facing obstacles in creating meaningful social contacts,

and gradually diminish their interactions with others **(lee, et al., 2024)**. Consequently, they withdraw into an inner private world and experience difficulties communicating, approaching or engage with other people. Moreover, the patients impaired capacity to understand the emotions of others as well as to express their own emotions definitely hinder their ability to form social bonds **(Kimhy, et al., 2012)**.

Additionally, positive symptoms such as delusional beliefs lead to difficulty trusting others, being open to people, as well as feeling lack of security within intimate relationships. Moreover, the underlying dynamics of low self-esteem and low self-confidence are undoubtedly interfered with the formation or maintenance of meaningful intimate relations or even any form of competent communication. **(Benavides, Brucato, & Kimhy, 2018)**. Hallucinations as a positive hallmark of schizophrenia may also act a critical role in the problems of intimacy. They significantly absorb patients to the extent that affect patients' attention to surrounding people and their willingness to relate to others. **(Abdelraof, Hamed, & Abd ELhay, 2023)**.

Another contributing factor to intimacy difficulties in patients with schizophrenia is the experience of discrimination linked to their mental illness, which often results in internalized stigma and feeling of inadequacy **(Caiada et al., 2024)**. When individuals internalize such negative perceptions, it can lead to social withdrawal and a diminished

sense of self-worth within intimate relationships. These outcomes (social isolation and feelings of worthlessness) are ultimately impair social functioning and reduce opportunities for forming close emotional bonds (**Mannarini, Taccini, Sato, & Rossi, 2022**). Supporting this view, **Gronholm, Ali, Brohan, & Thornicroft, 2023**) found that nearly two-thirds of individuals with schizophrenia anticipated being discriminated against, prompting them to avoid pursuing intimate relationships. **Barker & Vigod (2020)** further noted that other factors, such as repeated hospitalizations and difficulties maintaining independent living, can also hinder the development and sustainability of intimate connections in this population.

Consistent with the present study findings, **Yang et al., (2023)** stated that patients with schizophrenia are unable to experience enjoyment, preventing them from initiating intimate relations, as well as the claim of **Geiger et al. (2005)** that flatness and inadequacy of affect, lack of interest, and concentration deficits hamper the social ability and skills of psychotic patients to initiate intimate relationships. Moreover, **Doron et al. (2014)** found that there was a statistically significant lower grades of commitment for relationships among patients with schizophrenia. Astonishingly, all these findings were in conflict with **Yechieli (2004)** who reported high rates of cohesion in relationship among couples with schizophrenia.

Findings of the present study revealed that more than half of the studied patients had low level of communication competence. This reflects the patients' inability to create, end conversations, reveal information and /or achieve communication goals that influence contact in social situations. The nature of schizophrenia itself might be the cause of communication with this competence disturbance. Language impairments (oral and expressive language) in patients with schizophrenia affect definitely verbal and non-verbal communication. These language and communication impairments are also linked to executive function deficits & social cognition impairments which are characteristics in schizophrenia. This result goes with the study of **Porcelli et al. (2020) and Park & Han (2018)** that people with chronic schizophrenia are characterized by core communication disturbances, related to emotional expression, empathy competence, communication competence, and interpersonal relationship skills dimensions.

The manifested low level of communication competency in the present study could be attributed also to the socio-demographic characteristics of the studied patients. As the highest percentage of the studied patients in this study were single, divorced, or widow and unemployed. This goes in accordance with **Fernández Modamio et al., (2017)** found that being single, divorced or widowed, in addition to unemployment may affect

interpersonal communication competence.

Results of the present study showed that most of the patients studied have low and moderate levels of recovery. This might be attributed to chronicity of schizophrenia and severity of its symptoms. Literatures reported other contributing factors such as noncompliance with medication, lack of social support, stigma, prolonged hospitalizations, and restricted access to psychosocial interventions and/or rehabilitation services (**Bian et al., 2019**) (**Franco-Rubio , Puente-Martínez , & Ubillo-Landa ,2024**). Consistent with this result, **Jääskeläinen et al (2013) & Charlson et al (2018)** reported that the proportion of individuals with schizophrenia who met the criteria for recovery and appeared stable over time was only 13.5%, suggesting that functional recovery is undoubtedly impaired in schizophrenia. In addition, **Lahera, Gálvez, Sánchez, & Pérez-Fuster, 2018** claimed that functional recovery as a desired outcome in schizophrenia is low and heterogeneous. Conversely, a study by **Vita and Barlati (2018)** stated that roughly half of schizophrenia patients recovered or significantly improved over the long term, suggesting that functional remission in schizophrenia is possible. Moreover, **Mahmoud, Ali, & Elbaz, 2021** conveyed that most patients with schizophrenia in their study had a high level of functional recovery.

The current study revealed a statically significant positive correlation between total levels of intimacy and recovery. Explanations that could be

given for this finding is that when patients with schizophrenia are involved in intimate relationships, they receive strong social support. Strong social support equip the patients with a sense of being respected and cared for by others.

Consequently, they are less likely to experience societal discrimination which in turn maximizes their levels of recovery. Moreover, support from families and/or friends plays an important role in promoting patient compliance with treatment plan through encouraging optimism, self-esteem and self-control, and buffering the stress of being ill which in turn decrease symptoms and improve recovery. (**Faraji, et al., 2015; Barbieri, Amato, Passafaro, Dal Corso, & Picciau, 2014**).

Consistent with this finding a study by **El-Monshed, & Amr, (2020)** stated that patients with schizophrenia who have limited relationships with family, friends, and romantic partners experience poorer mental health recovery. Additionally, a study by **Hamza, Berma, & El-said, 2022** found a statistically significant positive correlation between the perceived social support and recovery. Furthermore, this comes in agreement with the research carried out by **Skar-Froding et al., (2021)** reported that, recovery was significantly associated with higher perceived social support. Concerning the relationship between intimacy and communication competence, the finding shows that there was a statistically significant correlation between communication competence and intimacy. It was reported that communication

competence and intimacy are deeply intertwined, as effective communication skills are essential for building and maintaining intimate relationships. When individuals clearly express their thoughts, feelings, and needs, and actively listen to their partners, this fosters a deeper sense of connection and understanding. In turn, this can strengthen the emotional bond and intimacy between partners. Communication competencies in relationships can deeply foster intimacy by forming a close emotional connection with other people through mutual self-disclosure. Consistent with this finding, a study by **(Laurenceau, Barrett, & Pietromonaco, 1998)** found that self-disclosure, as a key aspect of communication competence, is positively associated with intimacy in relationships. Similarly, a study by **Guerrero, Andersen, and Afifi (2007)** demonstrated that effective conflict management skills, as another component of communication competence, are linked to higher levels of intimacy and relationship satisfaction. These findings highlight the crucial role of communication in fostering intimacy and the importance of developing effective communication skills for building and maintaining healthy relationships.

Conclusion

The study provides evidence that intimate relationship and communication competence plays an important role in recovery among patients with schizophrenia. Patients with higher communication competence are more capable of

forming and maintaining intimate relationships, which in turn contributes positively to their recovery process.

Recommendations

- Social inclusion program should be integrated with the treatment plan for patients with schizophrenia.
- Promote holistic, recovery-oriented approaches that go beyond symptom management to address intimacy and communication skills training.
- Enhancing intimate relationships and communication competence among patients with schizophrenia may be a major aim of psychiatric nursing interventions in mental health services.
- Integrating social skills training and emotional awareness interventions in treatment programs is a must. This can contribute to the development of more person-centered, recovery-oriented mental health services, ultimately improving patients' quality of life, social inclusion, and long-term well-being.
- Policy makers and mental health professionals need to prioritize psychosocial rehabilitation alongside pharmacological treatment in schizophrenia care.

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Effect of Implementing Educational Program about Head Nurses' Collaborative Behaviors on Nurses' Errors

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Abstract

Background: Collaboration is a significant concept in healthcare organization and especially in nursing as improving collaboration leading to improve nursing performance and decrease nursing errors. **Aim of the study:** Determine the effect of implementing educational program about head nurses' collaborative behaviors on nurses' errors. **Design:** Quasi-experimental design was used. **Setting:** The study was conducted in two different setting, Tanta University Psychiatry and Neurology center and Tanta University Main Hospital. **Subjects:** Two groups; the first group consisted of all (N=52) head nurses, the second group contained 360 nurse. **Tools:** Three tools; Collaborative Behaviors Knowledge, Head Nurses' Collaborative Behaviors self - report and Nurses' Errors Structured Questionnaire. **Results:** About 61.5% of head nurses had a moderate level of knowledge about collaborative behaviors preprogram which improved to be 100%, 96.2% had a high level immediately and after three months post program. Preprogram, 53.8% of them rated themselves as low level of collaborative behaviors. While, post and follow up program implementation, 92.3%, 73.1% had a high level of collaborative behaviors. **Conclusion:** There was a significant improvement of head nurses' knowledge and their collaborative behaviors post program. The majority of nurses had a low level of medication and documentation errors preprogram that can be improved immediately and after three months post program. **Recommendation:** Periodically in-service training program was required to maintain and enhance head nurses' knowledge and practice regarding collaborative behaviors.

Key words: Collaborative behaviors, Educational Program, Head Nurses, Nurses' Errors.

Introduction

Collaboration is a process connecting two or more individuals jointly working to accomplish a mutual goal based on valuing contributions of each group member **(Ellis&Han, 2021)**. In nursing, collaboration refers to intra professional interactions within nursing professionals or between nurses and non-nursing professionals **(Emich, 2018)**. Collaboration is a significant principle in medical organization particularly in nursing, as improving collaboration leading to improve nursing performance and decrease nursing errors. Also, it leads to improvement in safety of patients, quality of care, patient satisfaction, decrease mortality rates, length of hospital stay and rates of turnover and enhance job satisfaction **(Avci, & Avci, 2025; Ibraheem, 2020; Ylitörmänen, Kvist, & Turunen, 2022)**. Head nurses' collaborative behavior refers to ability of head nurses to act and collaborate as a team, create a cooperative environment to find a mutually agreeable solution. Along with accepting new ideas from others, the head nurse should reward nursing team members for their hard work **(Abozied, 2021)**. Head nurses collaborative behaviors consist of six behaviors that are an essential requirement for clinical practice which include communication, coordination, shared process, conflict management, decision making and professionalism **(Shalaby, Shazly, & Elsayed, 2022; Prentice, Moore,**

Fernandes, & Larabie, 2022). Collaborative communication behavior is an act of exchanging information, ideas, thoughts and feelings between head nurse and nurses **(Eid, 2019)**. Coordination collaborative behavior includes organizing nursing team efforts in hospital to achieve shared objectives and enhance quality of care by ducking lapping and duplication of work **(Abdallah&Mostafa, 2021)**. Shared process is a necessity for head nurses' collaboration as head nurses and nurses share objectives and goals; and decision making **(Emich, 2018)**. Collaborative conflict management behavior refers to the various methods that head nurses and nurses can use to cope with conflict **(Dewi, Yanti, Rahajeng, & Krisnawati, 2022)**. Head nurses' decision making behavior has been defined as the process through which head nurse and nurses reach a conclusion about what to do next given a set of goals and resources constraints **(Martins, Babajide, Maani, Abdalla, & Gómez et al., 2021)**. Head nurses' collaborative professionalism refers to knowledge, attitudes and behaviors of head nurses that make up proficient nursing practice with minimal error **(Sci&Altuntaş, 2019)**.

Nurses' errors are mistakes or failures in the nursing process in which nurses are accountable that result in harm or potential harm to patients. The most common nursing errors are medication errors and documentation

errors (Younes, Elsabahy, & Kassem, 2022; Ayesh, Fekry, & Elewa, 2023). It is necessary to identify nursing errors in order to increase patient safety and to attain a high level of care quality (Jachan, Müller-Werdan, & Lahmann, 2021). A medication error is any avoidable incident that may lead to improper use of medication or patient injury (WHO, 2022). Such events include incorrect medication preparation, wrong administration technique and ignoring or avoiding the administration which threatening patient life (Eltaybani, Abdelwareth, AbouZeid, & Ahmed, 2020; Alandajani, Khalid, Ng, & Banakher, 2022). Documentation errors involve inaccurate, illegible, incorrect chart recording, missing documentation or charting that is unclear or incomplete (Kaihlanen, Gluschkoff, Saranto, Kinnunen, & Heponiemi, 2021; Maryniak, 2023).

Significance of the study:

Collaboration is a crucial behavior in both national and international quality improvement plans. It is necessary to change the avoidance and isolation culture that keeps nurses making mistakes and improving patients' outcomes (Martin & Bryant, 2023). Especially psychiatric nurses deal with a number of issues, including overwhelming work load, patient's serious health, absence of collaboration role with supervisors and coworkers, relational conflict, feeling of humbleness, lack of job

satisfaction. Therefore, susceptibility of errors can take place between nurses during their work (Hammed, & Allo, 2018). According to Marten, & Bryant, (2020) poor collaborative behavior among care providers is one of the most common and important sources of nursing errors. It is crucial for head nurses to have the fundamental information of how to convey the new vision of collaborative behavior practice as a way to reduce errors in nursing environment, so the study intended to determine the effect of implementing educational program about head nurses' collaborative behaviors on nurses' errors.

Aim of study

Determine the effect of implementing educational program about head nurses' collaborative behaviors on nurses' errors.

Research hypothesis

After implementing the educational program, it is expected that head nurses' knowledge and practice about collaborative behaviors will be improved and nurses' errors will be decreased.

Subjects and Method:

Research design:

A quasi-experimental design was employed to fulfill the aim of the study.

Setting:

The study was conducted in two different setting, Tanta University Psychiatry and Neurology center and Tanta University Main Hospital.

Subjects:

The study subjects consisted of two groups:

- The first group consisted of all (N=52) available head nurses that was divided into 25 head nurses from Tanta University Psychiatry and Neurology center and 27 head nurses from Tanta University Main Hospital.
- The second group contained a representative sample (35%) from all (N=791) nurses working at Tanta University Main Hospital included (n=276) nurse and from all (N=241) nurses working at Tanta University Psychiatry and Neurology center included (n=84) nurse. A total number was 360 nurse.

Tools of data collection

Data collected using three tools:

Tool I: Collaborative Behaviors Knowledge Structured

Questionnaire: This tool was developed by the investigator directed by Almutairi, (2011); Dean,(2010) and Mohsenpour et al.,(2017). It was used to assess the head nurses' knowledge about their collaborative behaviors. It included two parts:

Part I: Head nurses' personal characteristics and work related data. It included age, marital status, educational level, department, years of experience and previous attending educational program about collaborative behaviors.

Part II: Head Nurses' Collaborative Behaviors Knowledge Structured

Questionnaire. It consisted of (56) questions presented in true & false, multiple choices, cross matching in addition to situations on collaborative practice.

Scoring system:

Question of knowledge test was allotted score of one for correct answer and wrong answer given zero. The overall scores represented varying levels of head nurses' knowledge according to statistical cut-off points (60%) as follows: Highly knowledge level >80% equal to (>44.8), moderately knowledge level 60 - 80% equal to (33.6 – 44.8), low knowledge level < 60% equal to (< 33.6).

Tool II: Head Nurses' Collaborative Behaviors self - report Structured

Questionnaire: the investigator developed the tool depending on Liao et al., (2015); Lamont et al., (2015) and related literatures (Temuçin et al., 2019; Taskiran Eskici, & Baykal, 2021; Hafez, 2022). It used to determine to what extent collaborative behaviors exist between head nurses and nurses. 35 items included in this tool and it was divided into six behaviors as follows; communication (5 items), coordination (7 items), shared process (7 items), conflict management (6 items), decision making (6items), professionalism (4 items).

Scoring system:

Head nurses' answers were measured on a five points Likert Scale ranging from (1-5) where; never = 1, rarely =

2, sometimes = 3, often = 4 and always = 5. The total scores were calculated by summing scores of all categories. The total score represented varying levels of head nurses' collaborative behaviors according to statistical cut-off points (60%) as follow: High level of head nurses' collaborative behaviors > 80% equal to (>140), moderate level of head nurses' collaborative behaviors 60-80% equal to (105 - 140), low level of head nurses' collaborative behaviors < 60% equal to (<105).

Tool III: Nurses' Errors Structured Questionnaire: Based on Zeighami et al., (2015); El Sayad, (2017) and Eltaybani et al., (2018), the investigator developed the tool. It was used to assess to what extent errors exist amongst nurses. It contained two parts:

Part one: Nurses' personal data and work related data: As age, marital status, educational level, department and years of experience.

Part two: Nurses' Errors Structured Questionnaire. It consisted of 47 items, included two dimensions as follow:

A. Medication error consisted of 24 items which divided into 3 subscales: Pre administration (6 items), during administration (16 items) and after administration (2 items).

B. Documentation error consisted of (23 items).

Scoring system: Nurses' comebacks measured on a five points Likert Scale

ranging from (1-5) where; never=1, rarely = 2, sometimes = 3, often = 4, and always = 5. The total score planned by summing scores of all classes. The overall scores represented varying levels according to statistical cut- off points (60%) as follow: High level of errors > 80% equal to (>188), moderate level of errors 60-80% equal to (141-188), low level of error < 60% equal to (<141).

Method

1. An official permission was obtained from Dean of Faculty of Nursing at Tanta University and send to Tanta University Psychiatry and Neurology center and Tanta University Main Hospital responsible authority.

2. Ethical considerations

- Approval code no (15/2/2021) was obtained from ethical committee at Faculty of Nursing.
- All participants were informed about purpose of the study.
- An informed agreement was gotten from head nurses and nurses after explanation of the nature and the aim of the study.
- The investigator assured to study sample that the nature of the study does not root any harm.

3. Discretion and the privacy were taken into consideration.

4. Tools I, II and III were developed by the investigator based on relevant literatures review.

5. A jury of five experts check tools for content validity. The experts were four Professors and one

Assistant Professor of Nursing Administration from Tanta University, Faculty of Nursing.

6. Tools reliability was verified by using Cronbach Alpha Coefficient test, its value was (0.737) for tool I, (0.957) for tool II and (0.891) for tool III.
7. Pilot study was conducted on (10%) of head nurses = (6) and (10%) of nurses = (36) to check and ensure the clarity of the tools. This sample was excluded from the total study subjects.
8. The tools I, II and III were used before, immediately after and three months post the program implementation.
9. The educational program for head nurses was prepared by the investigator based on review of recent relevant different literature.

Results

Table (1) illustrates that 51.9% of head nurses from Tanta University Main hospital and 48.1 % of them from Tanta University Psychiatry and Neurology center. The mean age 39.27 ± 5.28 and 78.8% of them were in age group >35 years. Majority (98.1%, 94.2%, 90.4%) of head nurses were female, married and had bachelor degree. Nearly one third (30.8%) worked in Tanta University Psychiatry and Neurology intensive care units. More than half (57.7%) had $15 \leq 20$ years of experience with mean years of experience 16.73 ± 5.22 . All of head nurses (100%) didn't attend

any previous training program about collaborative behavior.

Table (2) represented that 76.7% of nurses were from Tanta University Main hospital. High percent (65.6%) of nurses ranged from 25-35 years with mean age 31.89 ± 8.59 . The majority (83.6%, 78.9%) of nurses were married and female respectively. Two third (66.4%) of nurses had nursing institute degree and 16.4% had bachelor degree. Less than fifth (15.0 %) worked in Chest ICU and the lowest (1.4%) worked in addiction ward. Nearly one third (32.5%) of nurses had $5 \leq 10$ years of experience with mean (10.76 ± 9.52) .

Table (3) shows a highly statistically significant improvement in total levels of head nurses' knowledge about collaborative behaviors immediately and after 3th months post program at $p < 0.001$. Preprogram, nearly two third (61.5%) of head nurses had a moderate knowledge level about collaborative behaviors changed to be all (100%) of them had high level immediately post program and then slightly decline to majority (96.2%) of them had a high knowledge level after 3th months post program. The total mean score was 35.25 ± 4.94 preprogram improved to be 53.15 ± 1.94 immediately and 47.81 ± 1.73 after 3th post program.

Table (4), Figure (1) illustrate a highly statistically significant improvement in head nurses' collaborative behaviors preprogram, immediately and 3th months after

program ($p < 0.001$). More than half (53.8%) of head nurses had a low level of collaborative behaviors preprogram changed to be none of them had low level immediately and after 3th months post program.

Table (5) reveals that there was a statistically significant improvement in overall level of errors preprogram, immediately and 3th months after program ($p < 0.05$). Preprogram, the majority (99.2%) of nurses had a low

level of errors which improved to be all (100%) of nurses had a low level of errors immediately and 3th months after program. Also, the majority (99.2%, 98.9%) of nurses had a low level of documentation and medication errors preprogram which improved to be all (100%) of nurses had a low level of documentation and medication errors immediately and 3th months after program.

Table (1): Distribution of studied head nurses according to their personal characteristics & work related data (n= 52)

Head nurses ' characteristics	No.	%
Hospital name		
Tanta University Psychiatry and Neurology	25	48.1
Tanta University Main Hospital	27	51.9
Age (years)		
≤ 35	11	21.2
>35	41	78.8
Min. – Max.	32.0 – 55.0	
Mean ± SD.	39.27 ± 5.28	
Sex		
Male	1	1.9
Female	51	98.1
Marital status		
Married	49	94.2
Not married	3	5.8
Level of education and qualification		
Bachelor	47	90.4
Master	5	9.6
Doctorate	0	0.0
Department		
Tanta University Psychiatry and Neurology ICUs	16	30.8
Psychiatry wards	5	9.6
Addiction ward	1	1.9
Neurological wards	3	5.8
Cardiac ICUs	9	17.3
Chest ICU	6	11.5
Gynecology and obstetric	2	3.8
Internal medicine	2	3.8
Plastic surgery	1	1.9
Dermatology and natural medicine	1	1.9
Neurological ICUs	6	11.5
Years of experience		
5 ≤ 10	1	1.9
10 ≤ 15	12	23.1
15 ≤ 20	30	57.7
20 ≤ 25	4	7.7
≥ 25	5	9.6
Min. – Max.	8.0 –33.0	
Mean ± SD.	16.73 ±5.22	
Attend any previous training program about collaborative behaviors		
No	52	100.0
Yes	0	0.0

SD: Standard deviation

Table (2): Distribution of studied nurses according to their personal characteristics & work related data (n = 360)

Nurses' characteristics	No.	%
Hospital name		
Tanta University Psychiatry and Neurology	84	23.3
Tanta University Main Hospital	276	76.7
Age (years)		
<25	49	13.6
25 –35	236	65.6
>35	75	20.8
Min. – Max.	21.0 – 60.0	
Mean ± SD.	31.89 ± 8.59	
Sex		
Male	76	21.1
Female	284	78.9
Marital status		
Married	301	83.6
Not married	59	16.4
Level of education and qualification		
Nursing diploma	62	17.2
Nursing institute	239	66.4
Bachelor	59	16.4
Department		
Tanta University Psychiatry and Neurology ICUs	21	5.8
Psychiatric wards	36	10.0
Addiction ward	5	1.4
Neurological ward	22	6.1
Cardiac ICUs	40	11.1
Chest ICU	54	15.0
Gynecology and obstetric	51	14.2
Endemic interior	33	9.2
Plastic surgery	27	7.5
Dermatology and natural medicine	20	5.6
Neurological ICUs	51	14.2
Years of experience		
<5	100	27.8
5 ≤ 10	117	32.5
10 ≤ 15	68	18.9
15 ≤ 20	10	2.8
20 ≤ 25	5	1.4
≥ 25	60	16.7
Min. – Max.	1.0 – 42.0	
Mean ± SD.	10.76 ± 9.52	

SD: Standard deviation

Table (3): Total levels and mean scores of head nurses' knowledge about collaborative behaviors preprogram, immediately and after 3th months post program (n = 52)

Knowledge	Preprogram		Immediately post program		After 3 th months post program		Test of Sig.	P
	No.	%	No.	%	No.	%		
Low (<60%)	18	34.6	0	0.0	0	0.0	F=97.444	<0.001*
Moderate (60 – 80%)	32	61.5	0	0.0	2	3.8		
High (> 80%)	2	3.8	52	100.0	50	96.2		
Total score (0 – 56)							F=426.006	<0.001*
Min. – Max.	24.0 – 47.0		48.0 – 56.0		44.0 – 51.0			
Mean ± SD.	35.25 ± 4.94		53.15 ± 1.94		47.81 ± 1.73			
Average Score (0 – 1) (Mean ± SD.)	0.63 ± 0.09		0.95 ± 0.03		0.85 ± 0.03			

SD: Standard deviation F: Friedman test F: F test (ANOVA) with repeated measures
 p: p value for comparing between the different periods *: Statistically significant at $p \leq 0.05$

Table (4): Distribution of the studied head nurses according to levels of collaborative behaviors dimensions preprogram, immediately and after 3th months post program (n =52)

Head nurses ' collaborative behaviors	Preprogram		Immediately post program		After 3 th months post program		F	P
	No.	%	No.	%	No.	%		
Communication								
Low (<60%)	26	50.0	1	1.9	0	0.0	61.483	<0.001*
Moderate (60 –80%)	17	32.7	8	15.4	17	32.7		
High (> 80%)	9	17.3	43	82.7	35	67.3		
Coordination								
Low (<60%)	31	59.6	0	0.0	0	0.0	64.000	<0.001*
Moderate (60 –80%)	13	25.0	13	25.0	26	50.0		
High (> 80%)	8	15.4	39	75.0	26	50.0		
Shared process								
Low (<60%)	30	57.7	0	0.0	0	0.0	73.973	<0.001*
Moderate (60 –80%)	14	26.9	3	5.8	17	32.7		
High (> 80%)	8	15.4	49	94.2	35	67.3		

Conflict management								
Low (<60%)	26	50.0	0	0.0	1	1.9		
Moderate (60 –80%)	18	34.6	2	3.8	9	17.3	75.632	<0.001*
High (> 80%)	8	15.4	50	96.2	42	80.8		
Decision making								
Low (<60%)	30	57.7	0	0.0	0	0.0		
Moderate (60 –80%)	13	25.0	7	13.5	14	26.9	67.900	<0.001*
High (> 80%)	9	17.3	45	86.5	38	73.1		
Professionalism								
Low (<60%)	27	51.9	0	0.0	2	3.8		
Moderate (60 –80%)	9	17.3	4	7.7	7	13.5	49.117	<0.001*
High (> 80%)	16	30.8	48	92.3	43	82.7		
Overall								
Low (<60%)	28	53.8	0	0.0	0	0.0		
Moderate (60 –80%)	16	30.8	3	5.8	14	26.9	75.872	<0.001*
High (> 80%)	8	15.4	49	94.2	38	73.1		

SD: Standard deviation

p: p value for comparing between the different periods

F: Friedman test

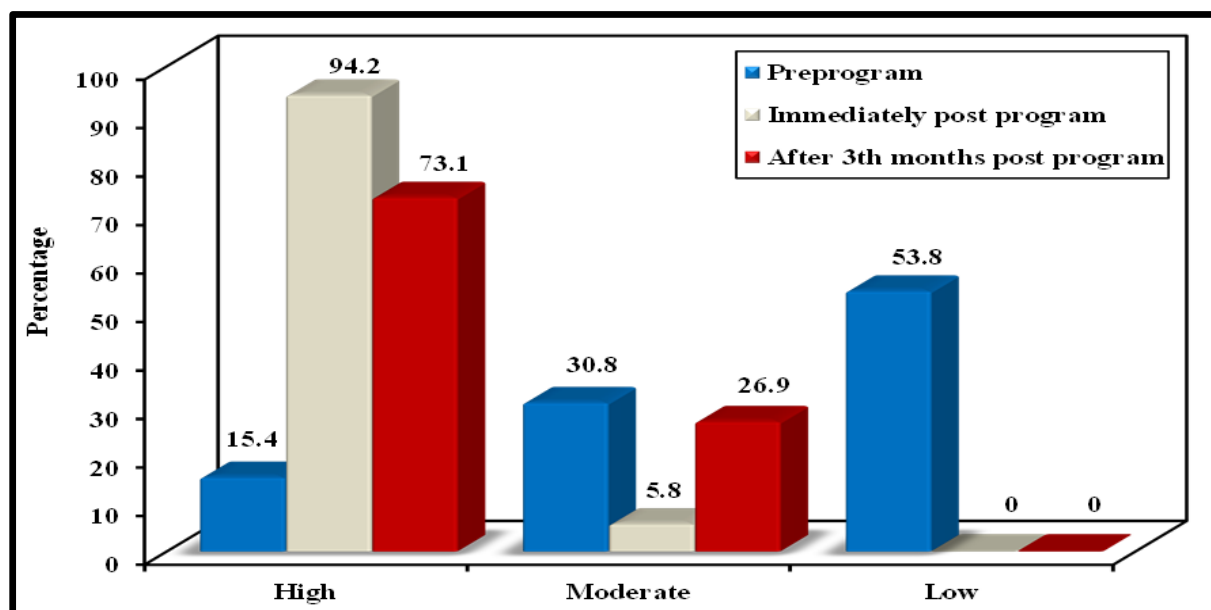
*: Statistically significant at $p \leq 0.05$ 

Figure (1): Distribution of the studied head nurses' overall level of collaborative behaviors preprogram, immediately and after 3th months post program

Table (5): Distribution of the studied nurses according to levels of errors preprogram, immediately post program and 3th months after program (n = 360)

Nurses' errors	Preprogram		Immediately post program		After 3 th months post program		Q	P
	No.	%	No.	%	No.	%		
Medication error								
Low (<60%)	356	98.9	360	100.0	360	100.0	8.000	0.018*
Moderate (60 –80%)	4	1.1	0	0.0	0	0.0		
High (> 80%)	0	0.0	0	0.0	0	0.0		
Documentation errors								
Low (<60%)	357	99.2	360	100.0	360	100.0	6.000	0.049*
Moderate (60 –80%)	3	0.8	0	0.0	0	0.0		
High (> 80%)	0	0.0	0	0.0	0	0.0		
Overall								
Low (<60%)	357	99.2	360	100.0	360	100.0	6.000	0.049*
Moderate (60 –80%)	3	0.8	0	0.0	0	0.0		
High (> 80%)	0	0.0	0	0.0	0	0.0		

SD: Standard deviation

p: p value for comparing between the different periods

Q: Cochran's test

*: Statistically significant at $p \leq 0.05$

Discussion

Regarding head nurses' collaborative behaviors knowledge: Preprogram assessment of head nurses' total knowledge about collaborative behaviors revealed that nearly two third of head nurses had a moderate level of knowledge about collaborative behaviors. This may be due to above half of head nurses had more than twenty years of experience working in healthcare settings where collaboration is essential; experience can lead to a greater understanding of

collaborative behaviors, therefore enhancing their knowledge. Also, nursing profession is based on team work as, head nurses through their day to day work, they had likely developed a deep understanding of how to effectively work with others to achieve common goals. Furthermore, head nurses are typically in leadership positions within their teams or departments, they are responsible for facilitating collaboration among team members, promoting effective

communication and fostering a culture of teamwork.

The study result is inconsistent with a study **Abo El-Naga, Eid, & Mahfouz, (2024)** found that the majority of nurses had a low knowledge preprogram. **Ibraheem, Eid, & Rashad, (2020)** revealed that all head nurses had a low level of knowledge and recommended about importance of training workshops for nurses on their knowledge, skills. **Wang, Wan, Lin, Zhou, & Shang, (2018)** concluded that the nurses had a low knowledge regarding collaboration at pre-test.

Regarding head nurses' collaborative behaviors:

Preprogram, over half of head nurses rated themselves as low level of collaborative behaviors. This is due to all head nurses didn't attend any training program or workshops about communication, coordination, conflict management, shared process, decision making and professionalism. These results similar with the result of **Saleh & Ali, (2023)** reported that two third of participants had a low level of intra professional collaboration preprogram. **Çelik Durmuş & Gezer, (2022)** found that the nurses' collaboration was low which similar with the results of the present study preprogram. The present study result is inconsistent with **Ali, Ebrahim, & Ali, (2024)** revealed that a small percentage of nurses exhibited a high level of collaborative behavior before the implementation of program.

In contrast with this study result preprogram, **AbdEl-Monem, Elsaïad, & Hasanin, (2024)** showed that high percent of studied nurses had

a high perception toward inter-professional collaboration. Also, **Avci & Yilmaz, (2022)**; **Hatip & Seren, (2021)** who reported collaboration among nurses was above average.

Regarding nurses' errors:

Preprogram, majority of nurses had a low level in overall and in medication and documentation errors. This may be due nearly two third of nurses were novice nurses ranged from twenty five to thirty five years old, who are often in peak physical and cognitive condition, enabling them to better handling demands of multi-tasking, time pressure. Their psychomotor efficiency contributes to fewer error rate. Also, data collected by self-administered questionnaire that keep nurses may under report their errors due to fear of punishment or legal consequences and damage of their professional reputation.

The present study confirmed with **Demir & Karadag, (2024)** found low nurses tendency to commit medical errors. While, a study done by **Abd El Aziz, Ahmed, & Abolwafa, (2021)** revealed that nurses had average practice toward errors. On the other hand, these results contradicted with **García, Serrano, & Garrido, (2019)** who reported that nurses committed a greater number of medication errors. Also, **Ragheb, El.Sayed, El.Sayed, & Metwally, (2016)** who found that total errors was high in preprogram.

II) Immediate post educational program

There was a noteworthy improvement in head nurses' collaborative behaviors knowledge as, all of them had a high level immediately post program. Also, that there was highly

statistically significant improvement in head nurses' collaborative behaviors practice directly post program from head nurses' viewpoint as, the majority of them had a high level of collaborative behaviors immediately post program. This improvement may result from applying new teaching approaches that simplify the learning process. Also, this shows that the present study educational program had a positive effect to improve head nurses' knowledge and practice regarding collaborative behaviors by enabling them to deep understanding of how effectively work with each other to achieve common goals through day to day work, promoting effective communication and fostering a culture of teamwork. Furthermore, knowledge acquired through educational program assists head nurses to expand their collaborative behaviors practice. They understood the concept of collaborative behaviors that permits them to execute their collaborative behaviors effectively and efficiently. Thus, educational program enables head nurses to be at a good level of collaborative behaviors, therefore enhancing their knowledge and practice.

Along with study, **Wu, Li, Huang, & Jiang, (2024)** found that training program can improve the participant's skill levels, knowledge about team cooperation scores as, the total team cooperation, communication and over all decision making scores of the trainees were significantly higher after than before the training. Also, this study agreed with **Ahn & Lee, (2021)** who found that training program

increases nurses' capabilities in terms of knowledge, attitude, skills and behaviors.

Buljac-Samardzic, Doekhie, & Wijngaarden, (2020) found an enhancement of knowledge after nurses attended a specially prepared educational program. Also, **Ibraheem et al., (2020)** revealed that there was an improvement post program in the level of knowledge and skills.

Also, this study finding agrees with **Pasyar, Rambod, & Gholamzadeh, (2018)** who recommended that holding workshops and training courses promoting the collaborative behaviors of head nurses. **Ali et al., (2024)** revealed that the majority demonstrated a high level of collaborative behavior immediately post program. The current study finding is similar to a study by **Saleh & Ali, (2023)** who revealed that the level of intra professional collaboration improved post program than preprogram as, sixty one percent of sample had a moderate level and one quarter had a high level of intra professional collaboration at post program.

Furthermore, **Avci&Yilmaz, (2022)** reported that receiving training on collaboration positively affect the nurses' level of collaboration which is similar with the results of the present study.

After program, there was a significant decreased in levels of nurses' errors both at medication and documentation. This improvement can be attributed to the program effectiveness which likely enhanced nurses' knowledge, awareness about importance of verifying patient's identity, giving medication in the right

time, following the documentation principles as documentation accuracy, completeness, timeliness and legibility, documenting patient feedback, documenting routine care that provided by other health care providers and adherence to standard procedures leading to better clinical performance and reduced errors rates. The results similar to the study by **AlThubaity & Shalby, (2023)** concluded that documentation errors improved after intervention which confirmed in the present study result post program implementation. Also, the present study result was consistent with **Ahmed & Nimer, (2022)** who found that the nursing documentation error improved post training program than pretest. **Zakria & Mohamed, (2017)** found decreased errors post interference than before intervention. These results contradicted with **Ahn & Lee, (2021)** who conducted a study which revealed that there was an insignificant pretest and posttest variance in surgical nursing error between the two groups within a four week.

III) Three months after educational program

A significant improvement in head nurses' knowledge about collaborative behaviors; but slightly decreased than immediately post educational program implementation. Also, there was a significant improvement in head nurses' collaborative behaviors practice from head nurses' view of point; more than pre educational program; but slightly decreased than immediately post educational program implementation, as the majority of head nurses had a high

level of knowledge about collaborative behaviors 3th months post program.

This decline in the finding may be due to time factor, the fact that some theoretical knowledge that not used in regular practice is likely to be reduced, diminished and even missing with passage of time. This showed the importance of continuous follow up after program implementation. Giving periodical enforcement for educational program for head nurses is very important.

Furthermore, the present study shows that overall level of errors and medication and documentation errors 3th months post program slightly decreased than preprogram, this may be due the positive influence of educational program on nurses' knowledge and practice regarding to errors.

Abo El-Naga et al., (2024) and Ali et al., (2024) concluded that majority of nurses had a high level of collaboration 3th months after program implementation. Similar results confirmed with a study by **Sedaghati Kesbakhi, Hosseini Tabaghdehi, Arab, & Rohani, (2024)** stated that the educational program has positive effect on skills of undergraduate nursing students and the mean total scores increased 2nd after intervention than before intervention. **Ibraheem et al., (2020)** conducted a study which supported our result and found slightly decline in their knowledge, skills, performance at follow up as compared to posttest. This result supported by **Ragheb et al., (2016)** who revealed that total errors decrease to nearly one quarter in three months

later phase. Also, reported that training program had a positive effect on nurses' knowledge and performance, as regard to medication errors, the percent of total high errors was decreased in comparing to preprogram implementation.

Conclusion

There is an important improvement of head nurses' knowledge and their collaborative behaviors post program. The majority of nurses had a low level of medication and documentation errors preprogram that can be improved immediately and 3th months post program.

Recommendations:

For Hospital Administration:

- Design and implement periodical in-service training program about collaboration to offer head nurses with adequate knowledge about collaboration enhancing their collaborative behaviors knowledge and practice.
- Include collaborative behavior expectations in job description for nurse leaders and head nurses to emphasize its importance in work process.

For Head Nurses:

- Conduct periodical workshops about communication, coordination, shared process, professionalism and decision making.

For Nursing Education:

- Nurse educators need to provide a comprehensive training program about collaborative behaviors to students.

For Future Research:

- Assess the impact of collaborative behavior on nurses' job

satisfaction, stress levels and overall work place morale and how these factors mediate errors rates.

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