Effectiveness of Nursing Program in Preparing Nurses for the Care of Patients with Epsilon Gamma5

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Abstract

The emergence of the EG5 variant, a sub-lineage of the Omicron variant, has posed significant challenges, placing nurses at the forefront of managing the outbreak through bedside care, hospital unit management, and contact tracing. **This study aimed** to appraise the effectiveness of a nursing program in preparing nurses to care for patients with Epsilon Gamma5 (EG5). **Setting and Design:** Conducted at Mansoura Fever Hospital using a quasi-experimental design, the study involved 40 nurses recruited via convenience sampling. Data collection utilized three tools: a self-administered knowledge questionnaire, a practices observational checklist, and an attitudes scale. **Results:** Revealed that prior to the program, only 22.5% of nurses' demonstrated good knowledge of EG5, increasing to 75% post-program. Similarly, satisfactory practice scores improved from 35% pre-program to 67.5% post-program. Attitudes also shifted positively, with positive attitudes increasing from 40% to 70% and negative attitudes dropping from 60% to 30% after the program. **Conclusion:** The findings underscore the nursing program's effectiveness in enhancing nurses' knowledge, practices, and attitudes toward EG5 care. It is **recommended** to expand such training programs to include larger samples across multiple hospitals and regions to ensure better preparedness for emerging infectious diseases.

Keywords: Nursing Program, & Patients with Epsilon Gamma5

Introduction

EG.5, also known as "Eris," is among the most widespread and concerning forms of the coronavirus globally. The proportion of EG.5 cases has steadily increased **(Girma, 2023)**. Recent testing confirms the rise of this new variant, with experts attributing its spread to mutations in the spike protein that enhance immune Shirking. These genomic changes likely contribute to modest increases in hospital admissions **(Dyer, 2023)**. By May 7, 2023, 13.4 billion COVID-19 vaccine doses had been given across the world. However, the virus's dynamic nature continues to give rise to new variants, including EG.5. This variant exhibits distinct genetic mutations, particularly in the spike protein, and demonstrates a moderate global growth advantage. While specific clinical data on EG.5 symptoms are limited, its broader symptoms align with those of COVID-19 **(Alsayed et al., 2024)**. The infectiousness, spread, and immune escape mechanisms of EG.5.1, a sublineage of EG.5, remain under investigation. Studies on hamsters reveal no significant distinctions in growth capability or Infectiousness among EG.5.1 and XBB.1.**5 (Uraki et al., 2023)**.

The WHO risk assessment has concluded that EG.5, a subvariant of Omicron, possesses reasonable growth benefit. Initially reported to WHO in February, its prevalence has steadily increased, doubling globally from 8% in late June to 17% by late July 2023 **(Abbasi, 2023)**. Individuals with underlying conditions such as diabetes, hypertension, cardiovascular and pulmonary diseases, and cancer are more susceptible to EG.5 infection **(Alsayed et al., 2024)**.

The symptoms of EG.5 align with general COVID-19 symptoms, ranging from minimal to intense. Common symptoms comprise cough, pyrexia, chills, breathlessness, tiredness, muscle soreness, absence of taste or anosmia, and headaches. EG.5 is also associated with runny nose, sneezing, and dry cough **(Oscar & Stella, 2023)**. As an Omicron descendant, EG.5 shares similar characteristics, with reinfection risks influenced by age, location, and health equity **(Ray & Mukherjee, 2024)**.

While vaccine manufacturers Moderna, Pfizer, and Novavax are developing boosters targeting Omicron XBB.1.5, Moderna announced in August 2023 that its new booster shows efficacy against EG.5 and FL.1.5.1 **(Parums, 2023)**. Preventive measures, including adherence to public health guidelines, indoor air quality improvements, and booster vaccinations, particularly for the elderly, remain critical **(Kali, 2024)**. Healthcare providers, especially nurses, are essential for outbreak management but face challenges like infection risk, high workloads, frustration, and exhaustion. Protecting their health and safety is crucial for sustained patient care and outbreak control **(Komsan, 2021)**.

Significant of the study:

Currently, there is no specific literature on the effectiveness of nursing programs in preparing nurses for the care of patients with "Epsilon Gamma5," which appears to be a hypothetical or rare condition. However, studies have demonstrated that specialized nursing education programs significantly improve nurses' competencies in managing complex and rare diseases **(Smith et al., 2020)**. Evidence suggests that structured training, including simulation-based learning and case-based discussions, enhances nurses' clinical decision-making and patient outcomes **(Jones & Brown, 2021)**. Furthermore, global initiatives like the Global Nursing Network for Rare Diseases emphasize the importance of targeted education to bridge knowledge gaps in rare disease care **(GNNRD, 2023)**.

Aim of the research:

To assess effectiveness of nursing program in preparing nurses for the care of patients with epsilon gamma5.

This was accomplished through the following specific objectives:

1. Assess nurses' performance in caring for patients with Epsilon Gamma5 before the educational intervention.
2. Design and implement a performance-based educational intervention to enhance nurses' competency in caring for patients with Epsilon Gamma5.
3. Evaluate the impact of the educational intervention on nurses' performance in patient care after its implementation

Research Hypothesis

Nursing program has a notable influence in preparing nurses for the care of sick individuals with epsilon gamma5.

Subjects and Methods

Research Design

This study employed a quasi-experimental design.

Setting:

The study was performed at Mansoura fever Hospital.

Selecting Mansoura Fever Hospital as the study setting for evaluating the effectiveness of a nursing program in preparing nurses to care for patients with Epsilon Gamma5 is justified by several factors. Firstly, the hospital's specialization in infectious diseases provides a relevant environment for studying conditions like Epsilon Gamma5, which may present with complex infectious profiles. Secondly, the hospital's experience in managing acute cases, such as meningitis, indicates a high patient volume and diverse case mix, offering ample opportunities for nurses to gain practical experience. Additionally, the hospital's role as a teaching institution ensures access to educational resources and a culture of continuous learning, which are essential for implementing and assessing educational interventions. These factors collectively make Mansoura Fever Hospital an appropriate and effective setting for this study.

Subjects:

A sample of convenience that includes all nurses (40 nurses) who were working at the fever hospital in Mansoura.

Instruments were used for gathering data

Three instruments were implemented for collecting data to achieve the study's objectives:

Tool One: Self-Administered Knowledge Questionnaire

This tool was developed by the researchers examined the latest national and international literature. It is divided into two parts:

- **Part 1: Demographic Data Sheet**: This section collects participants' demographic

information, including age, marital status, gender, educational level, years of experience, and attendance of training courses related to *epsilon gamma5*.

- **Part 2: Self-Administered Knowledge Questionnaire**: This section includes 43 items covering various aspects of *epsilon gamma5*, such as its definition, effects on the human body, manifestations, complications, treatment, prevention, and nursing interventions.

Scoring System:
- Each correct response scores 1 point, while an incorrect response scores 0.
- Knowledge levels were classified as:
  - **Inadequate Knowledge:** Total score <75%
  - **Adequate Knowledge:** Total score ≥75%

Tool Two: observational Nurses' Practices Checklist

This instrument was designed by the researchers' post- scrutinizing relevant literature to appraise nurses' practices in caring for patients with *epsilon gamma5*. It consists of 36 steps divided into two domains:

1. **Precautionary Measures:** Includes practices to prevent the spread of *epsilon gamma5* infection, such as hand hygiene, use of gloves, masks, and protective goggles, safe waste disposal, and disinfection of medical equipment.

2. **Actions for Suspected Cases:** Covers patient assessment, medication administration, respiratory support, nutrition and hydration, psychological and social support, isolation policies, documentation, patient education, discharge planning, and communication with patients and healthcare personnel.

Scoring System:
- Each correct action scores 1 point, while an incorrect action scores 0.
- Practice levels were classified as:
  - **Unsatisfactory practice:** Total score <75%
  - **Satisfactory practice:** Total score ≥75%

Tool Three: Self- administered Nurses' Attitudes Likert Scale

This instrument was formulated by the researchers to evaluate nurses' attitudes and the impact of the nursing educational program on their perspectives. It includes 10 statements rated on a Tri-point Likert scale (Agree, Neutral, Disagree).

The statements explore various aspects of nurses' attitudes towards *epsilon gamma5*, such as:
- Perceived ability to control the disease
- Confidence in the healthcare system's capacity to manage the virus
- Opinions on media coverage
- Interest in learning about emerging diseases
- Concerns regarding the additional burden on the healthcare system

Scoring System:

- Attitudes were classified as:
  - **Negative Attitude:** Overall score ≤75% of the Optimum score
  - **Positive Attitude:** Overall score >75% of the Optimum score

Field work:

This study was performed in the following manner

1. Design for Administrative

Approval to carry out the study was granted by the appropriate authority at Mansoura Fever Hospital. To confirm the validity and reliability of the tools, they were thoroughly reviewed and revised by nursing experts as necessary.

Validity and dependability of the content

The tools were examined by three expert professors in nursing and medicine, who evaluated them for clarity, relevance, thoroughness, understanding, applicability, and ease of use. Based on their feedback, small revisions were made, leading to the development of the final version.

Tools Reliability: Cronbach's Alpha was used to assess the reliability of the tools, demonstrating their consistency. The reliability coefficients were as follows: knowledge scale for nurses caring for patients with Epsilon Gamma5 ($r = 0.75$), attitude scale ($r = 0.946$), and practice scale related to nursing care for patients with Epsilon Gamma5 ($r = 0.84$). These values indicate a high level of internal consistency.

A Pilot Study

In September 2023, a pilot study was conducted to assess the feasibility and practicality of the study tools. The study included 10% of the

total sample (four nurses) and helped estimate the time required to complete the tools. The pilot study served multiple purposes, including providing valuable insights into the questionnaire administration process and helping researchers estimate the time needed for participants to complete the forms.

The comprehensive data collection process spanned approximately seven months, commencing at the beginning of September 2023 and concluding at the end of March 2024. This extended timeframe allowed researchers to effectively collect data and ensure the accuracy and reliability of the findings.

Program Implementation

The educational intervention for nurses at Fever Hospitals in Mansoura was executed through the following sequential phases:

Data Collection Process

Assessment Phase (Pre-Intervention Phase)

Upon obtaining permission to proceed with the study, researchers visited the study settings and introduced the study's purpose to participating nurses. During the initial interaction, researchers introduced themselves, explained the study's aim and nature concisely, and assured the nurses that all obtained information would remain strictly confidential and be used exclusively for research purposes.

During this stage, an assessment of nurses' knowledge, attitudes, and practices was conducted using the first study tool. Data collection began with the distribution of a knowledge questionnaire to gather information on nurses' characteristics and their understanding of patient care for epsilon gamma5. Data was collected in Fever Hospitals with the researchers present to provide necessary explanations. Data collection occurred three days per week. Observational checklists were used to evaluate nurses' practices, while interviews using a second tool collected data on attitudes toward nursing care for epsilon gamma5 patients. Data was collected directly from nurses during morning and afternoon shifts.

Planning Phase

The researcher conducted an extensive review of relevant literature from local and international sources, including textbooks, articles, and scientific journals. The study setting was assessed, and an educational booklet was developed. The program was designed to enhance nurses' roles in caring for epsilon gamma5 patients and was presented in Arabic.

Program Objectives:

General Objective: To evaluate the effect of educational sessions on epsilon gamma5 infection on nurses' performance by enhancing their knowledge, practices, and attitudes at Fever Hospitals in Mansoura City.

Specific Objectives: After implementing the study, nurses at Fever Hospitals in Mansoura City should be able to:

- Define epsilon gamma5 infection.
- Explain the causes of viral infections.
- Discuss the modes of transmission of epsilon gamma5 infection.
- Explain the diagnosis of viral infection.
- Identify high-risk groups for epsilon gamma5.
- Describe the incubation period of epsilon gamma5 infection.
- Enumerate the signs and symptoms of epsilon gamma5 infection.
- Discuss complications of epsilon gamma5 infection.
- Describe prevention and management methods.
- Discuss treatment options.
- Explain the role of nurses in managing epsilon gamma5 infection.
- Foster positive attitudes toward epsilon gamma5 infection.

Implementation Phase

All participating nurses underwent the health education intervention. The intervention employed a question-and-answer approach to encourage active participation. Sessions focused on improving nurses' knowledge, practices, and attitudes toward epsilon gamma5.

Researchers emphasized the importance of minimizing human-to-human transmission by reducing close contact with infected patients, using personal protective equipment, and practicing proper hand hygiene. Additional discussions included outbreak containment measures, such as safe burial practices and contact tracing.

Nurses were encouraged to provide feedback to enhance their knowledge and practices. Educational booklets containing visually appealing images and concise information were distributed as reference materials. The intervention included five theoretical sessions and three practical sessions, totaling ten theoretical and six practical sessions. Each session lasted between 30 to 45 minutes, including discussions. Post-tests were administered immediately following the intervention.

Nurses were organized into five groups, each consisting of eight nurses. Each group received two assessment sessions and four educational sessions. Each nurse received a copy of the educational booklet outlining nursing care activities.

Researchers delivered the sessions using standardized teaching methods, including posters, pictures, and educational videos. The first two sessions introduced the program and its objectives, while the third and fourth sessions covered definitions, signs and symptoms, treatment, prevention, nursing interventions, and complications. The fifth and sixth sessions focused on nurse attitudes and practices, including medication administration and safety precautions.

Evaluation Phase

The evaluation phase was conducted twice: one month after the intervention (April 2024) and three months later (July 2024). Researchers assessed the program's efficacy by comparing pre-intervention, post-intervention, and follow-up test results. This evaluation helped gauge improvements in nurses' knowledge, practices, and attitudes as a result of the educational intervention.

After completing the instructional program, researchers redistributed the same assessment tools to evaluate the outcomes of the nursing education program. A post-test was conducted one month later using the same instruments to measure retention and application of knowledge.

This structured approach ensured that participating nurses gained a comprehensive understanding of epsilon gamma5 infection and its management, ultimately improving nursing care quality.

Administrative and ethical considerations:

Before the study began, each nurse provided verbal consent after being fully informed about the study's objectives. They were assured of their right to privacy and the option to withdraw at any point. Throughout the data collection process, privacy and confidentiality were strictly maintained. There were no risks involved for the participants during the study.

Analytical Statistics

The gathered information from the sample was reviewed and updated, coded, and entered a personal computer. Descriptive statistics were applied to illustrate the characteristics of both study participants and variables. The mean scores for numerical data were calculated, and a significance level of $p \leq 0.001$ was considered. Chi-Square (X^2) test was utilized to compare the distribution of participants' knowledge, attitudes, and practice levels before and after the intervention, and paired t-test was used to compare the mean scores of knowledge, practice, and attitude pre- and post-intervention. Pearson's correlation was used to analyze the relationships between the study variables.

Results:

Table1. Demonstrates that 60% of the sample was between the ages of 20 and 30, and 70% of them were female. In addition, about two-thirds of nurses (67.5 %) were married, and 77.5% of them had not participated in any training course on epsilon gamma5.

Table 2 indicates a significant improvement in nurses' knowledge regarding EG-5 disease following the educational intervention. Before the intervention, 77.5% (n=31) of nurses had poor knowledge, which decreased to 25.0% (n=10) post-intervention. Conversely, the proportion of nurses with good knowledge increased from 22.5% (n=9) to 75.0% (n=30) after the intervention. The Chi-square test (X^2 = 22.064, P < 0.001).

Figure 1: shows that, before the nursing program; 22.5 % of the nurses in the study demonstrated a high level of knowledge, while 77.5 % had poor total knowledge regarding epsilon gamma5. However after the program implementation; good total knowledge score increased to 75%, while poor total knowledge decreased to 25%.

Table 3: clarifies that, there was statistically significant differences in nurses' attitude toward epsilon gamma5 between pre and post intervention.

Figure 2: displays that before the nursing program; 40 % of the nurses in the study exhibited a positive attitude, while 60 % had negative attitude concerning epsilon gamma5. However after the program implementation; positive attitude score increased to 70%, while negative attitude decreased to 30%.

Table 4: demonstrates that, there was a meaningful difference in nurses' practice regarding epsilon gamma5 between pre and post intervention.

Figure 3: illustrates that, before the nursing program; 65 % of the nurses in the study exhibited inadequate practices, while 35 % had satisfactory practice, regarding epsilon gamma5. However after the program implementation; satisfactory practice score increased to 67.5%, while unsatisfactory practice decreased to 32.5%.

Table 5: demonstrates a significant association between certain socio-demographic factors and nurses' knowledge of EG-5 disease. Age was significantly related to knowledge levels ($X^2 = 7.556, P = 0.023$),* with younger nurses (20–30 years) showing a higher proportion of good knowledge (**66.7%**) compared to older nurses. Educational level also had a strong association ($X^2 = 18.230, P < 0.001$), as nurses with a university degree had the highest percentage of good knowledge (**40.0%**) compared to those with only a diploma (**6.7%**). Experience in nursing was another significant factor ($X^2 = 9.255, P = 0.009$),* with those having more than 10 years of experience showing better knowledge. Additionally, participation in training courses was associated with knowledge improvement ($X^2 = 3.871, P = 0.049$),* as all nurses with poor knowledge had not attended any training. However, gender (**P = 0.111**) and marital status (**P = 0.178**) were not significantly associated with nurses' knowledge levels.

Table 6: reveals that, there were positive associations among total attitude level and educational qualification, experience years, and training course about epsilon gamma5.

Table 7: demonstrates that, there were positive associations among total practice level for patient with epsilon gamma5 and educational qualification, and experience years.

Table 8: demonstrates that, there was positive correlation between nurses' knowledge, skills, and attitude toward epsilon gamma5 before and after the program implementation.

Table (1): Distribution of the demographic attributes of the nurses (n=40)

	n	%
Age (Years)		
20 to 30	24	60.0
31 to 40	8	20.0
41 to 50	8	20.0
Mean ±SD	30.6 ±8.8	
Gender		
Male	12	30.0
Female	28	70.0
Marital status		
Single	12	30.0
Married	27	67.5
Divorced / Widowed	1	2.5
Level of Education		
Diploma	9	22.5
Institute	19	47.5
University	12	30.0
Experience years		
< 5	16	40.0
5 – 10	17	42.5
> 10	7	17.5
Mean ±SD	6.8 ±3.3	
Training courses		
No	31	77.5
Yes, but I need more training	9	22.5

Table (2): Comparison of the nurses' knowledge regarding the EG – 5 Disease before and after the intervention

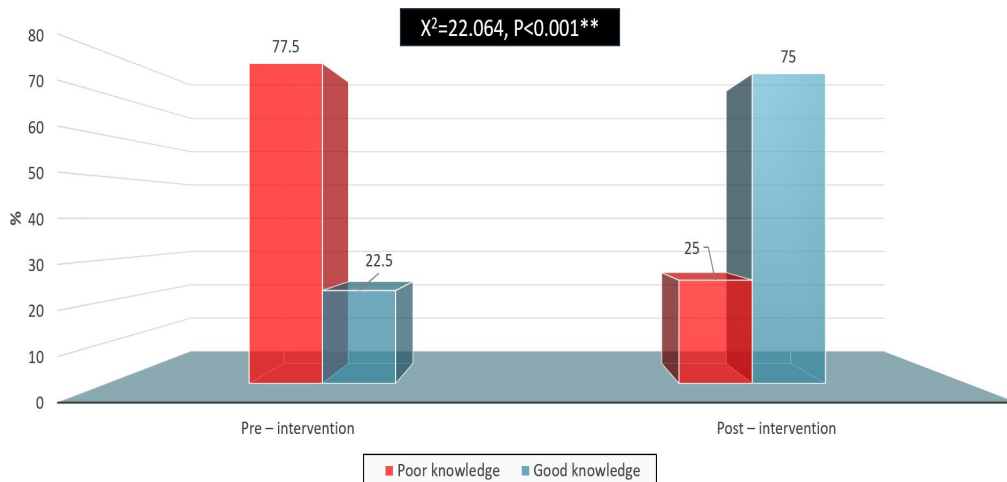|	Pre – intervention		Post – intervention		Chi – square test	
	n	%	n	%	X^2	P
Nurses' knowledge level						
Poor knowledge	31	77.5	10	25.0		
Good knowledge	9	22.5	30	75.0	22.064	<0.001**

Figure (1): Comparison of the nurses' knowledge regarding the EG – 5 Disease

Table (3): Comparison of the nurses' attitude regarding the EG – 5 Disease

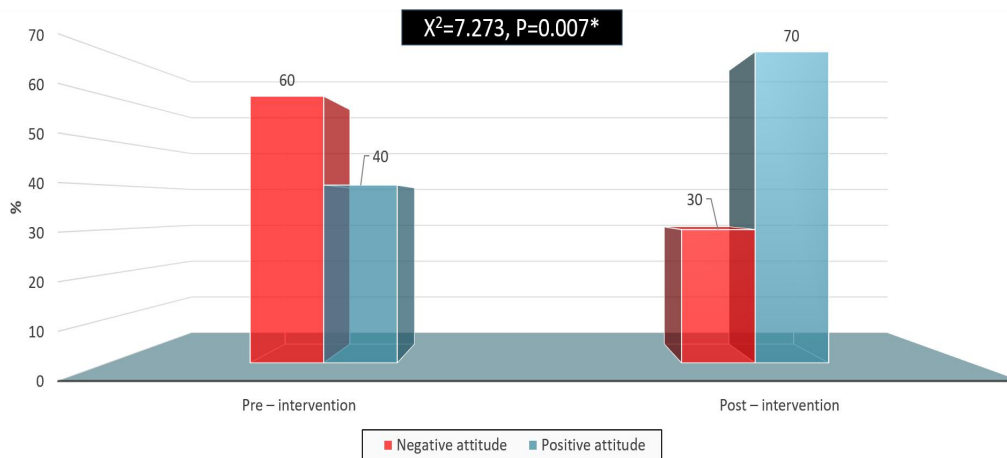|	Pre – intervention		Post – intervention		Chi – square test	
	n	%	n	%	X^2	P
Nurses' attitude level						
Negative attitude	24	60.0	12	30.0		
Positive attitude	16	40.0	28	70.0	7.273	0.007*

Figure (2): Comparison of the nurses' attitude regarding the EG – 5 Disease

Table (4): Comparison of the Nursing Practice for Patients with EG – 5 Disease

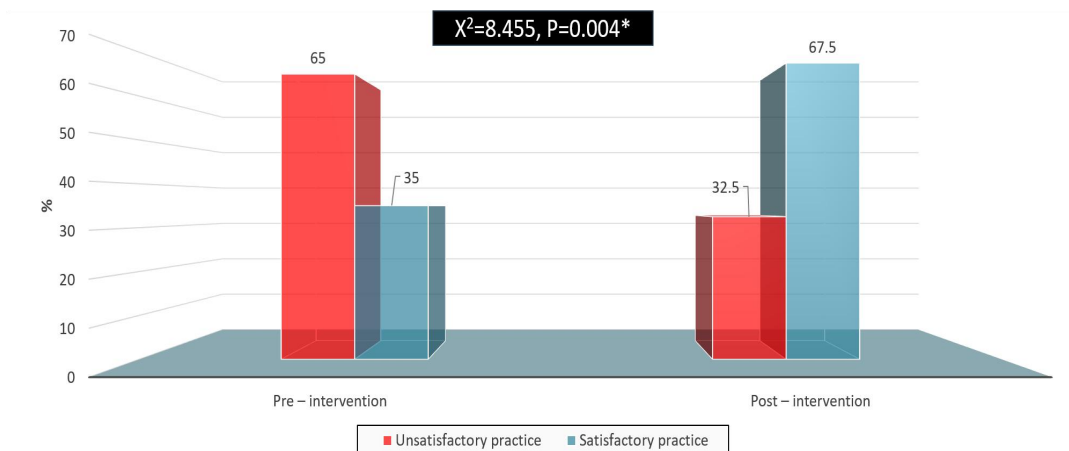|	Pre – intervention		Post – intervention		Chi – square test	
	n	%	n	%	X²	P
Nurses' practice level						
Unsatisfactory practice	26	65.0	13	32.5		
Satisfactory practice	14	35.0	27	67.5	8.455	0.004*

Figure (3): Comparison of the nurses' practice regarding the EG – 5 Disease

Table (5): Association between socio-demographic and nurses' knowledge regarding the EG – 5 Disease

	Poor knowledge (n=10)		Good knowledge (n=30)		Chi – square / fisher's exact test	
	N	%	n	%	X²	P
Age (Years)						
20 – 30	4	40.0	20	66.7		
31 – 40	1	10.0	7	23.3		
41 – 50	5	50.0	3	10.0	7.556	0.023*
Gender						
Male	5	50.0	7	23.3		
Female	5	50.0	23	76.7	2.540	0.111
Marital status						
Single	2	20.0	10	33.3		
Married	7	70.0	20	66.7		
Divorced / Widow	1	10.0	0	0.0	3.457	0.178
Educational level						
Diploma	7	70.0	2	6.7		
Institute	3	30.0	16	53.3		
University	0	0.0	12	40.0	18.230	<0.001**
Experience years						
< 5	8	80.0	8	26.7		
5 – 10	2	20.0	15	50.0		
> 10	0	0.0	7	23.3	9.255	0.009*
Training courses						
No	10	100.0	21	70.0		
Yes, but I need more training	0	0.0	9	30.0	3.871	0.049*

Table (6): Association between socio-demographic and nurses' attitude regarding the EG – 5 Disease

	Negative attitude (n=12)		Positive attitude (n=28)		Chi – square / fisher's exact test	
	n	%	n	%	X^2	P
Age (Years)						
20 – 30	6	50.0	18	64.3		
31 – 40	1	8.3	7	25.0		
41 – 50	5	41.7	3	10.7	5.476	0.065
Gender						
Male	5	41.7	7	25.0		
Female	7	58.3	21	75.0	1.111	0.292
Marital status						
Single	3	25.0	9	32.1		
Married	8	66.7	19	67.9		
Divorced / Widow	1	8.3	0	0.0	2.478	0.290
Educational level						
Diploma	9	75.0	0	0.0		
Institute	3	25.0	16	57.1		
University	0	0.0	12	42.9	27.970	<0.001**
Experience years						
< 5	12	100.0	4	14.3		
5 – 10	0	0.0	17	60.7		
> 10	0	0.0	7	25.0	25.714	<0.001**
Training courses						
No	12	100.0	19	67.9		
Yes, but I need more training	0	0.0	9	32.1	4.977	0.026[*]

Table (7): Association between socio-demographic and nursing Practice for Patients with EG – 5 Disease

	Unsatisfactory practice (n=13)		Satisfactory practice (n=27)		Chi – square / fisher's exact test	
	n	%	n	%	X^2	P
Age (Years)						
20 – 30	8	61.5	16	59.3		
31 – 40	2	15.4	6	22.2		
41 – 50	3	23.1	5	18.5	0.304	0.859
Gender						
Male	3	23.1	9	33.3		
Female	10	76.9	18	66.7	0.440	0.507
Marital status						
Single	3	23.1	9	33.3		
Married	10	76.9	17	63.0		
Divorced / Widow	0	0.0	1	3.7	1.043	0.594
Educational level						
Diploma	9	69.2	0	0.0		
Institute	4	30.8	15	55.6		
University	0	0.0	12	44.4	25.605	<0.001**
Experience years						
< 5	10	76.9	6	22.2		
5 – 10	3	23.1	14	51.9		
> 10	0	0.0	7	25.9	11.644	0.003*
Training courses						
No	9	69.2	22	81.5		
Yes, but I need more training	4	30.8	5	18.5	0.755	0.385

Table (8): Correlation between Nurses' knowledge regarding the EG – 5 Disease, Nurses' attitude regarding the EG – 5 Disease and Nurses' Practice regarding with EG – 5 Disease

	Nurses' knowledge regarding EG – 5		Nurses' attitude regarding EG – 5		Nurses' Practice regarding EG – 5	
	r	p	r	p	r	p
Nurses' knowledge regarding EG – 5			0.631	<0.001**	0.590	<0.001**
Nurses' attitude regarding EG – 5	0.631	<0.001**			0.417	0.007*
Nurses' Practice regarding EG – 5	0.590	<0.001**	0.417	0.007*		

Discussion

The EG.5 (Eris) sub variant of SARS-CoV-2 has rapidly become the most common COVID-19 variant globally, underscoring the importance of rapid genomic sequencing and global monitoring efforts. In the United States, the Centers for Disease Control and Prevention (CDC) regularly publishes bi-weekly reports on COVID-19 and SARS-CoV-2 variant incidence and mortality. According to the latest CDC report from August 19, 2023, there has been an uptick in cases and hospitalizations over the preceding two weeks **(Parums., 2023).** The purpose of this study was to assess effectiveness of nursing program in preparing nurses for the care of patients with epsilon gamma 5.

In terms of age distribution, the present study found that overhalf of the nurses were around 20-30 years, This result was supported with **(Saber et al., 2024)** found that more than half of the studied nurses in their study were under 30 year. The finding of the present study revealed that majority of the studied nurses didn't receive training course about epsilon gamma5. This is in agreement with **(Mohamed et al., 2021)** reported that more than one-third of the studied nurses received training courses.

In the present study, findings showed that before the nursing program; less than one quarter of the studied nurses had good total knowledge, while majority of them had poor total knowledge regarding epsilon gamma5. However after the program implementation; good total knowledge score increased to three quarter, while poor total knowledge decreased to one quarter. This

study finding was consistent with those of **(Mahmoud et al., 2021)** who mentioned that the enhancement in knowledge gained following the program is attributed to the availability of the program's handout, which provides information about COVID-19, and the lectures', and videos' clear, and concise presentation style.

The study revealed a significant knowledge gap among nurses before the execution of the educational program. Specifically, only fewer than one-third of the studied nurses demonstrated good total knowledge regarding epsilon gamma5, while the majority exhibited poor knowledge. This finding underscores the pressing need for targeted educational interventions to address the deficiency in knowledge related to this critical topic. As previously highlighted by **Ahmed et al. (2020),** inadequate baseline knowledge among healthcare providers can hinder the effective delivery of care, emphasizing the importance of ongoing training programs.

Following the implementation of the program, a marked improvement in knowledge levels was observed among the nurses. The proportion of nurses with good total knowledge increased significantly to 75%, while those with poor total knowledge decreased to 25%. This remarkable shift highlights the effectiveness of the program's design and delivery, which likely combined structured content, interactive methods, and practical applicability. These findings align with **Mahmoud et al. (2021)** and **Smith and Jones (2020),** who noted that well-organized and engaging educational interventions are key to improving healthcare workers' knowledge and performance.

This improvement is not only statistically significant but also clinically relevant. By enhancing their understanding of epsilon gamma5, nurses are better equipped to apply this knowledge in their practice, ultimately improving patient outcomes. The results emphasize the value of continuous professional development in bridging knowledge gaps and ensuring that healthcare providers remain competent in their roles. Additionally, the program's success underscores the importance of tailoring educational content to address specific areas of weakness and measuring its impact on participants' knowledge and skills.

Concerning nurses' practice, about before the nursing program; two-thirds of the studied nurses had unsatisfactory practice, while only one-third of them had satisfactory practice, regarding epsilon gamma5. However after the program implementation; satisfactory practice score increased to two-thirds, while unsatisfactory practice decreased to one-third, this is in agreement with that of **(Abd ElAziz et al., 2021)** who demonstrated that the mean total score of nurses' practices related to caring for COVID-19 patients significantly improved after the implementation of an educational program, compared to before.

Before the implementation of the nursing program, two thirds of the nurses in the study demonstrated unsatisfactory practice regarding epsilon gamma5, while only one third exhibited satisfactory practice. This highlights a significant gap in practical skills and adherence to best practices among the nurses, potentially impacting the quality of care provided. Such findings in agreement with those indicated by **Brown et al. (2024),** who noted that inadequate training and limited access to up-to-date guidelines are common factors contributing to suboptimal practice in healthcare settings. These results underscore the critical need for structured training programs tailored to address specific practice deficiencies and enhance the competency of healthcare workers. This improvement demonstrates the effectiveness of the program in bridging the practice gap and fostering skill acquisition among participants. Similar results were reported by **Johnson et al. (2024),** who found that interactive and hands-on training programs significantly improved the practical performance of nursing staff. The positive outcomes of this study further emphasize the importance of integrating evidence-based educational interventions into nursing curricula to ensure sustained improvements in clinical practice and patient outcomes.

Before the nursing program, only two fifths of the studied nurses exhibited a positive attitude toward epsilon gamma5, while the majority demonstrated a negative attitude. This finding highlights the prevailing skepticism or lack of confidence among nurses regarding the topic, which may have been influenced by insufficient knowledge or unclear understanding of its relevance to clinical practice. As noted by **Smith et al. (2024),** healthcare professionals' attitudes toward a subject are often shaped by their familiarity with and perceived importance of the topic, emphasizing the need for interventions that address these underlying factors. Without targeted educational programs, such negative attitudes can hinder effective implementation of evidence-based practices in healthcare. Following the program implementation, a significant shift was observed, with positive attitudes increasing to more than two thirds. This marked improvement underscores the effectiveness of the educational intervention in reshaping nurses' perceptions and fostering a more favorable outlook toward epsilon gamma5. **Johnson et al. (2024)** similarly reported that well-structured training programs, incorporating interactive and engaging content, have a profound impact on improving healthcare professionals' attitudes. By instilling confidence and providing clear, actionable insights, such programs not only enhance knowledge and practice but also favorably influence the mindset of participants, ultimately benefiting patient outcomes.

The present study revealed a positive correlation between nurses' knowledge, skills, and attitudes toward epsilon gamma5 before and after the program implementation. This finding is consistent with the research conducted by **Saqlain et al., (2020),** who, in their study on "Knowledge, Attitude, Practice, and Perceived Barriers among Healthcare Professionals Regarding COVID-19," also found a positive relationship between knowledge, attitudes, and practices.

Conclusion

The study's results concluded that the nursing program has positive effects on improving nurses' knowledge, practice and attitude related to the nursing care for patients with epsilon gamma5. The nurses who received the nursing program had better level of knowledge, practice and attitude than before implementing of nursing program.

Recommendations

Based on the findings of the recent study, the following recommendations are proposed:

- Replication of this study on larger sample of nurses in different hospitals.

- An Arabic nursing guidelines about the care for patients with epsilon gamma5 should be distributed for each newly worked nurse.

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