

**Effect of Educational Program regarding Hyperemesis Gravidarum on Nurses' Performance and Women's Outcomes**

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**Abstract**

**Background:** Hyperemesis gravidarum refers to prolonged and excessive nausea and vomiting resulting in undesirable maternal and fetal health outcomes, which require hospital admission and extensive medical and nursing care. So, there is an urgent need to increase nurses' performance regarding hyperemesis gravidarum. **Aim:** The present study aimed to determine the effect of educational program regarding hyperemesis gravidarum on nurses' performance and women's outcomes. **Subjects and method: Setting:** This study was conducted at antenatal units of obstetric departments of Tanta University hospital affiliated to Ministry of High Education, El-Menshawy hospital affiliated to Ministry of Health and Population and EL-Mabara hospital affiliated to Health Insurance. **Subjects:** The study included all nurses (48 nurses) who are working in the previously mentioned settings, and 144 pregnant women diagnosed with hyperemesis gravidarum during the first trimester of their pregnancy. The studied pregnant women were divided randomly into 3 groups (48 women in each group) pre, immediately post and three months post implementation of the educational program. **Three tools** were used to collect the data of this study: **Tool I:** Structured interview schedule for nurses and women, **Tool II:** An observational checklist for nurses' practice, and **Tool III:** Women's outcomes assessment sheet. **Results:** The studied nurses' knowledge and practice regarding hyperemesis gravidarum as well as women's outcomes were improved immediately and three months post implementation of the educational program. **Conclusion:** The findings of the present study revealed significant improvement in the nurses' performance immediately and three months post implementation of the educational program regarding hyperemesis gravidarum. **Recommendations:** the study recommended developing continuous educational programs for nurses to enhance and update their performance regarding hyperemesis gravidarum.

**Keywords:** Educational program, Hyperemesis Gravidarum, Nurses' Performance and Women's Outcomes

**Introduction**

Pregnancy and childbirth are associated with physiological and psychological changes that require continuous follow up to prevent any complication <sup>(1)</sup>. Some complications that occur during pregnancy may be potentially life-threatening and require immediate obstetric care such as hyperemesis gravidarum. Hyperemesis gravidarum negatively affects the woman

and her fetus health, which contributes to increased morbidity and mortality rate among them. Hyperemesis gravidarum is characterized by prolonged and excessive or severe nausea and vomiting resulting in dehydration and weight loss that requires hospitalization and extensive medical and nursing care in approximately 1% to 5% of pregnant women with hyperemesis <sup>(2,3)</sup>.

The incidence of hyperemesis gravidarum varies between the different countries, for example in Sweden it is 0.3%, in the United States (1.2%), and in Indonesia (14.8%). Most importantly, the incidence of hyperemesis gravidarum in Egypt is 4.5% which is considered a high incidence<sup>(4-6)</sup>. The exact causes of hyperemesis gravidarum are unknown, but some theories suggest that there are three predisposing factors. These include vitamin B6 deficiency, gastric motility disturbance in early pregnancy, and human chorionic gonadotropin (HCG) elevated levels. It was found that HCG is higher in multiple gestation pregnancies as well as in molar pregnancy where it is reported in 26% of molar pregnancies. Human chorionic gonadotropin stimulates the chemoreceptor trigger zone in the brainstem, which feeds into the vomiting center of the brain<sup>(7)</sup>. Other suggested causes of hyperemesis gravidarum are hormonal causes including thyroid dysfunction, hypo function of the anterior pituitary gland, and abnormalities of the corpus luteum. Additional causes of hyperemesis gravidarum include helicobacter pylori infection, as well as psychological status's disturbance such as anxiety, depression, fear, stress and emotional tension<sup>(8)</sup>.

Clinical presentation of hyperemesis gravidarum includes persistent nausea and intractable vomiting, excessive salivation, weakness, dizziness, headaches, low blood pressure, rapid heart rate, loss of appetite, fatigue, and significant weight loss (greater than 5% of pre-pregnancy weight), which markedly affects the condition of the mother and her fetus<sup>(9)</sup>. Maternal adverse outcomes of hyperemesis gravidarum include Wernicke's encephalopathy, central pontine myelinolysis, renal failure, fluid and electrolyte imbalance, dehydration, and anemia. Wernicke's encephalopathy is a rare neurological disorder due to thiamine deficiency and is

characterized by confusion, ophthalmoplegia, and cerebellar ataxia. [https://en.wikipedia.org/wiki/Hyperemesis\\_gravidarum](https://en.wikipedia.org/wiki/Hyperemesis_gravidarum) - cite note-Emergency-11 Central pontine myelinolysis is a neurological condition involving severe damage to the myelin sheath of nerve cells in the brainstem that caused by rapid sodium correction in hyponatraemia and characterized by seizures, disturbed consciousness, gait changes, and decrease or cessation of respiratory function. On the other hand, fetal perinatal outcomes include low birth weight (<2500 g), small for gestational age, preterm birth, stillbirths, neonatal intensive care unit admission and perinatal mortality<sup>(10)</sup>.

Importantly, the severity of the symptoms and the adverse maternal and neonatal outcomes can be reduced by early, and effective management either at home or at the hospital. Management at home focuses on dietary and lifestyle changes. If this line is ineffective, the woman should be hospitalized. Medical and nursing intervention of hyperemesis gravidarum women include temporary suspension of oral intake, hydration by intravenous fluids, antiemetic if needed and supplementation with vitamins and minerals<sup>(11)</sup>. Maternity nurses have crucial role in identifying problems related to hyperemesis gravidarum and coordinating immediate intervention for such problems to ameliorate physical, emotional and financial costs related to maternal and neonatal morbidity and mortality. Therefore, there is a critical need to inform the nurses and update their knowledge through continuous learning and training, in order to provide comprehensive and holistic nursing intervention for women with hyperemesis gravidarum<sup>(12)</sup>.

#### **Aim of the Study**

The aim of this study was to determine the effect of educational program regarding hyperemesis gravidarum on nurses' performance and women's outcomes.

**Research hypotheses:**

Nurses' performance and women's outcomes are expected to be improved after implementation of the educational program regarding hyperemesis gravidarum.

**Subjects and Method**

**Study Design:**

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

**Setting:**

This study was conducted at the antenatal units of obstetric departments of:

- Tanta University hospital affiliated to Ministry of High Education.
- El-Menshawy hospital affiliated to Ministry of Health and Population.
- EL- Mabara hospital affiliated to Health Insurance.

**Subjects:**

The subjects of this study consisted of:

- All nurses (48 nurses), working at the previously mentioned settings during the time of data collection, and providing nursing care to women diagnosed with hyperemesis gravidarum. They were divided into three groups: 24 nurses from Tanta University hospital, 11 from EL-Menshawy hospital, and 13 from EL-Mabara hospital.
- A total sample of 144 pregnant women diagnosed with hyperemesis gravidarum during the first trimester of their pregnancy was selected from the previously mentioned settings at the time of data collection. They were divided randomly into 3 groups (48 women in each group pre, immediately and three months after implementation of the educational program which divided as 24 women from Tanta University hospital, 11 from EL-Menshawy hospital, and 13 from EL- Mabara hospital) and every nurse was deal with three women pre, immediately post and three months post implementation of the educational program.

**Tools of data collection:**

To achieve the aim of this study the following three tools were used for data collection:

**Tool I: Structured interview schedule for nurses and women:**

It was developed by the researcher after reviewing recent related literature<sup>[13,14]</sup> to collect basic data from nurses and women. It included three parts as follows:

**Part (1): Socio-demographic characteristics of the nurses:** This part included age, residence, level of education, years of experience and previous training regarding nursing care of women with hyperemesis gravidarum.

**Part (2): Socio-demographic characteristics and obstetric history of the women:**

**Socio-demographic characteristics of the women** included age, marital status, years of marriage, residence, level of education, occupation, family income and type of family. **Obstetric history** included gravidity, parity, number of abortion, number of still birth, place of last delivery, number of living children, previous history of hyperemesis gravidarum and current pregnancy history which included (women's last menstrual period, expected date of delivery (EDD), gestational weeks, attendance and number of antenatal care visit and place of antenatal care).

**Part (3): Nurses' knowledge assessment sheet:**

This tool was adapted from Hassan et al. (2019)<sup>(15)</sup> and Jasline (2019)<sup>(16)</sup> and was used by the researcher to collect nurses' knowledge before, immediately and three months after implementation of the educational program. It included two parts:

**Part A: Nurses' knowledge regarding hyperemesis gravidarum:** It included nine questions such as definition of the hyperemesis gravidarum, causes, risk factors, signs and symptoms, comparison between morning sickness and hyperemesis gravidarum, effect of hyperemesis gravidarum on the health of

women and their fetuses, needed investigations, and medical management of women with hyperemesis gravidarum.

**Part B: Nurses' knowledge regarding components of nursing intervention of women with hyperemesis gravidarum:** It included three items and their subitems related to assessment, intervention and educational roles of the nurse as follow:

1. Assessment role that included items such as monitoring vital signs, observe signs and symptoms of hyperemesis gravidarum, observe signs and symptoms of dehydration, and observe signs and symptoms of electrolyte imbalance.
2. Basic nursing intervention role that included items such as collection of blood sample for routine laboratory screening tests, administration of intravenous fluids, promoting comfort and providing emotional support.
3. Educational role that included items such as educate women to modify dietary intake and educate women the alternative measures to control nausea and vomiting.

**Scoring system for knowledge:**

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

**The total score level of knowledge was calculated by (12 questions x 2 = 24).**

**Then, it was categorized as follows:**

- High level of knowledge  $\geq 75\%$  = (18 - 24 marks).
- Moderate level of knowledge 60 % - <75% = (15 - 17 marks).
- Low level of knowledge <60% = (0 - 14 marks).

**Tool II: An observational checklist for nurses' practice:**

It was developed by the researcher after reviewing recent related literature<sup>(14,17,18)</sup> to assess nurses' practice before, immediately

and three months after implementation of the educational program regarding hyperemesis gravidarum. It included three items and their subitems related to assessment, intervention and educational roles of the nurse as follow:

**1. Assessment role:** It included four items that assessed nurses' practice related to vital signs monitoring, observe signs and symptoms of hyperemesis gravidarum, observe signs and symptoms of dehydration, as well as signs and symptoms of electrolyte imbalance.

**2. Basic nursing intervention role:** It included four items that assessed nurses' practice related to: administration of intravenous fluids, collection of blood sample for screening tests, promoting comfort, and providing emotional support.

**3. Educational role:** It included items that assessed nurses' practice related to giving health education to hyperemesis gravidarum women about modifying dietary intake such as maintaining nothing per mouth, introducing oral fluids and foods in small amounts and eating crackers and bread before waking up at morning)

**Scoring system of practice was as the following:**

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

**The total score of practice was calculated by (50 questions x 2 = 100).**

**Then it was categorized as follows:**

- Satisfactory practice  $\geq 75\%$  = (75 - 100 marks)
- Unsatisfactory practice < 75% = (0 - 74 marks)

**Tool III: Women's outcomes assessment sheet:**

It was developed by the researcher after reviewing recent related literature<sup>[19, 20]</sup> to assess hyperemesis women's outcomes before, immediately and three months after implementation of the educational program. It included two parts as follows:

**Part (1): Anthropometric measurements and physical examination of the women's health status: Anthropometric measurements** of the women such as women's Body Mass Index (BMI), height, weight, and vital signs. **Physical examination of the women's health status** before and after educational program such as determine the signs and symptoms of dehydration, rates of hospitalization due to hyperemesis gravidarum as well as women's ability to take multivitamins such as folic acid and calcium.

**Part (2): Modified Pregnancy Unique Quantification of Emesis (PUQE):** The PUQE scale was adapted from Koren and Cohen (2021)<sup>(21)</sup> to assess severity of nausea and vomiting among hyperemesis gravidarum women before and after implementation of the educational program. The PUQE scale consisted of three questions represented by 3 lines of 5 points Likert Scale: the number of hours of nausea, the number of episodes of retching and the number of episodes of vomiting within the last 24 hours.

**The total score was calculated as follow:**

- Mild nausea and vomiting: between 3-6 points,
- Moderate nausea and vomiting: between 7-12 points,
- Severe nausea and vomiting: 13 points or higher.

#### **Method**

1. Official letter clarifying the purpose of the study was obtained from the Faculty of Nursing, Tanta University and submitted to the responsible authorities of the selected setting, to obtain their approval and cooperation for carrying out the study.

2. Ethical consideration was well thought-out all over the study as the following:
  - a) Approval of the ethical committee of Faculty of Nursing, Tanta University was assured.
  - b) The researcher introduced herself to the participants in this study.
  - c) A full explanation of the aim and method of the study was done to obtain the participants' acceptance and cooperation, as well as their informed consent.
  - d) Right of the nurses and women to abstain from the study or terminate participation at any time was respected.
  - e) The nature of the study didn't cause any harm or pain for the entire sample.
  - f) Privacy and confidentiality of the collected data was insured.
  - g) The collected data was used only for the purpose of the present study.
3. The study tools I (part 1 and part 2), II and III) were developed by the researcher after reviewing recent related literature and tools I (part 3) were adapted<sup>(13-21)</sup>. Then, they were translated into Arabic language and tested for content and construct validity by 5 experts in the obstetric and gynecological nursing field before conducting the study.
4. A pilot study was carried out before the actual data collection on 10% of the sample (5 nurses and 15 women) from the previously mentioned settings to test the feasibility and applicability of the tools.
5. The study tool's reliability was tested using Cronbach's Alpha test. The reliability of tool I part (3) which assess nurses' knowledge regarding hyperemesis gravidarum was 0.826, the reliability of tool II which assess nurses' practice was 0.815 and reliability of tool III which assess hyperemesis gravidarum women's

outcomes was 0.787 indicating strong reliability of the study tools. Tools I (part 1 and part 3) and II were applied for nurses, while tool I part 2 and tool III were applied for women three times, pre, immediately post, and three months post implementation of the educational program.

6. The educational program was conducted through four phases (assessment, planning, implantation and evaluation) as follows:

**A) Assessment phase:**

- This phase was done before giving sessions. Subjects were asked to participate in the study after explaining the purpose of the study. A pre-test structured questionnaire schedule was distributed for each nurse and each woman at the beginning of the educational program sessions through an interview lasted from 10-15 minutes for each subject.
- The researcher used: **Tool (I)** structured interview schedule for nurses and women: **part (1)** socio-demographic characteristics of the nurses, **part (2)** socio-demographic characteristics and obstetric history of the women and **part (3):** nurses' knowledge assessment sheet was used to assess nurses' knowledge regarding hyperemesis gravidarum before, immediately and three months post implementation of the educational program.
- **Tool II:** An observational checklist for nurses' practice was used to assess nurses' practice regarding hyperemesis gravidarum before, immediately and three months post implementation of the educational program.
- **Tool III** was used to assess women's outcomes before, immediately and three months post implementation of the educational program.

**B) Planning phase:**

- a- Preparation of the educational program sessions:**

The education program was developed by the researcher based on the data from the assessment phase and related literature. The education program included 3 sessions for each group and it was carried out in the previously mentioned settings. The total number of nurses was 48 nurses; they were divided into 12 groups. Each group included 3-5 nurses according to the number in each setting; the content of the education program was presented by the researcher at three sessions, three days per week. The duration of each session ranged from 30 minute to 45 minute including periods of discussion. The education program was conducted on morning and afternoon shifts.

**b- Setting the goals and objectives of the program:**

**The goal of the program was to:**

- Enhance nurses' performance regarding hyperemesis gravidarum.
- Improve women's outcomes regarding hyperemesis gravidarum.

**Objectives of the program:**

Determine the effect of educational program regarding hyperemesis gravidarum on nurses' performance and women's outcomes.

**c- Preparation of the content of the program:**

An educational colored booklet was developed by the researcher and distributed to all nurses to increase their awareness about hyperemesis gravidarum and the needed nursing care for hyperemesis gravidarum women. The researcher prepared different methods of teaching as lectures, group discussion, demonstration and re-demonstration for nurses, as well as prepared instructional materials as videos, pictures and power point presentation to be used in the sessions.

**C) Implementation phase:**

The educational program was conducted for the nurses at the previously mentioned settings. It included 3 main separate

sessions, given jointly with the predesigned instructional booklet. The content was presented and divided into the three sessions as follows:

**- The first session:**

The aim of this session was to provide the nurses with knowledge about definition of hyperemesis gravidarum, causes, risk factor, signs and symptoms, complications, medical and nursing management and differential diagnosis between morning sickness and hyperemesis gravidarum.

**- The second session:**

The aim of this session was to enhance nurse's skills of assessment and care of women with hyperemesis gravidarum which included monitor vital signs, observe signs and symptoms of hyperemesis gravidarum, observe signs and symptoms of dehydration. It also included basic nursing intervention such as administration of intravenous fluid and collection of samples for routine laboratory screening tests.

**- The third session:**

The aim of this session was to continue enhance nurse's awareness of their educational, as well as supportive roles of women with hyperemesis gravidarum. This included modify dietary intake, administration of electrolyte replacement therapy, promotion of comfort, and provide emotional support.

**D) Evaluation phase:**

- The nurses' knowledge and practice regarding hyperemesis gravidarum were evaluated using **Tool I part (3) and Tool II**, before, immediately and three months post implementation of the educational program.
- Women's outcomes regarding hyperemesis gravidarum were assessed using **Tool III**, before, immediately and three months post implementation of the educational program.
- Comparison was done in relation to nurses' knowledge and practice as well as hyperemesis gravidarum women's

outcomes before, immediately and three months post implementation of the educational program to identify the effect of educational program regarding hyperemesis gravidarum on nurses' performance and women's outcomes.

7. Data collection was carried out in the period from the beginning of October 2020 to the end of October 2021. The researcher attended 3 days per week in each of the selected setting in morning and afternoon shifts, until the predetermined sample size was collected.

**Results**

**Table (1):** Displays that nearly one half of the studied nurses (47.9%) aged from 30- <45 years with a mean age  $\pm$  SD = 37.65 $\pm$ 8.25 years, more than three quarters of them (77.1%) were urban residences, more than three fifths (62.5%) had secondary technical nursing diploma, and 47.9% had 20 years of experience or more with a mean years of experience  $\pm$  SD= 12.79  $\pm$  8.43 years. The table also shows that 91.7% of the studied nurses didn't have any previous training regarding hyperemesis gravidarum and reported that the hospital had not a system of lectures or periodic courses that help them to improve their performance.

**Figure (1):** Shows that 14.6% of the studied nurses had high level of knowledge regarding hyperemesis gravidarum pre-program, compared to 93.8% immediately and 79.2% three months after implementation of the educational program.

**Table (2):** Demonstrates that there is a significant positive relationship between the studied nurses' knowledge and their age, level of education, as well as years of experience pre-implementation of the educational program. The difference was statistically significant  $X^2=$  (16.955, 22.871, and 54.634) and  $p=$  (0.002\*, <0.001\*, and <0.001\*) respectively. It is also noticed that there is no a significant relationship between the studied nurses'

knowledge regarding hyperemesis gravidarum and their residence pre, immediately and three months post implementation of the educational program  $X^2=$  (0.364, 3.467, and 4.351) and  $p=$  (0.834, 0.063, and 0.114) respectively.

**Figure (2):** Reveals that 16.7% of the studied nurses had satisfactory level of practice for women with hyperemesis gravidarum pre-implementation of the program, increased to 95.8% immediately post program, and 81.3% three months after implementation of the educational program.

**Table (3):** Demonstrates that there is a significant positive correlation between the studied nurses' total score level of knowledge and the following sub items: nurses' observation of the women with hyperemesis gravidarum, administration of IV fluids, teaching to modify dietary lifestyle, and promotion of comfort pre, immediately and three months post implementation of the educational program. The table also reveals that there is a significant positive correlation between total score level of knowledge and studied nurses' collection of samples for laboratory screening and provision of emotional support immediately and three months after implementation of the educational program.

**Table (4):** Displays that there is a significant positive relationship between the studied nurses' practice regarding

hyperemesis gravidarum and their age ( $X^2=$  7.406 and  $P=$  0.025\*), level of education ( $X^2=$  21.000 and  $p=<0.001^*$ ), as well as years of experience ( $X^2=$  34.924 and  $p=<0.001^*$ ) pre-implementation of educational program. It is also declared that there is no a significant positive relationship between nurses' practice and their residence pre, immediately and three months post implementation of the educational program  $X^2=$  (0.590, 0.620, and 0.680) and  $p=$  (0.443, 0.431, and 0.409) respectively.

**Figure (3):** Demonstrates that 8.3% of the studied pregnant women had mild level of Pregnancy-Unique Quantification of Emesis and Nausea (PUQE) pre-implementation of program, compared to 89.6% immediately post program and 68.8% three months post implementation of the educational program for the nurses.

**Table (5):** Displays that there is a significant negative correlation between the studied pregnant women' total Pregnancy-Unique Quantification of Emesis and Nausea (PUQE) and the total score level of nurses' knowledge  $r =$  (-0.806, -0.394, and -0.332) and  $p=$  ( $<0.001^*$ ,  $<0.001^*$ , and  $0.004^*$ ) as well as between total score level of practice  $r=$  (-0.347, -0.745, and -0.500) and  $p=$  ( $0.007^*$ ,  $<0.001^*$ , and  $0.001^*$ ) respectively pre, immediately and three months post implementation of the educational program.

**Table (1): Distribution of the studied nurses according to their socio-demographic characteristics (n= 48)**

Socio- demographic characteristics of the studied nurses.	Nurses	
	No	%
<b>Age</b>		
<30	15	31.3
30- <45	23	47.9
45 or more	10	20.8
<b>Mean±SD</b>	<b>37.65±8.25</b>	
<b>Residence</b>		
Urban	37	77.1
Rural	11	22.9
<b>Level of education</b>		
Secondary technical nursing diploma	30	62.5
Institute of nursing	15	31.3
Bachelor of nursing	3	6.2
<b>Years of experience</b>		
<10	8	16.7
10- <20	17	35.4
20 or more	23	47.9
<b>Mean±SD</b>	<b>12.79±8.43</b>	
<b>Previous training regarding nursing care of women with hyperemesis gravidarum</b>		
Yes	4	8.3
No	44	91.7
<b>The hospital had a system of lectures or periodic courses that help you as a nurse to improve the performance.</b>		
Yes	4	8.3
No	44	91.7
<b>Did you get benefit from this educational program regarding hyperemesis gravidarum.</b>		
Yes	48	100.0
No	0	0.0

Figure (1): Distribution of the studied nurses according to their total score level of knowledge regarding hyperemesis gravidarum pre, immediately and three months post implementation of the educational program (n= 48)

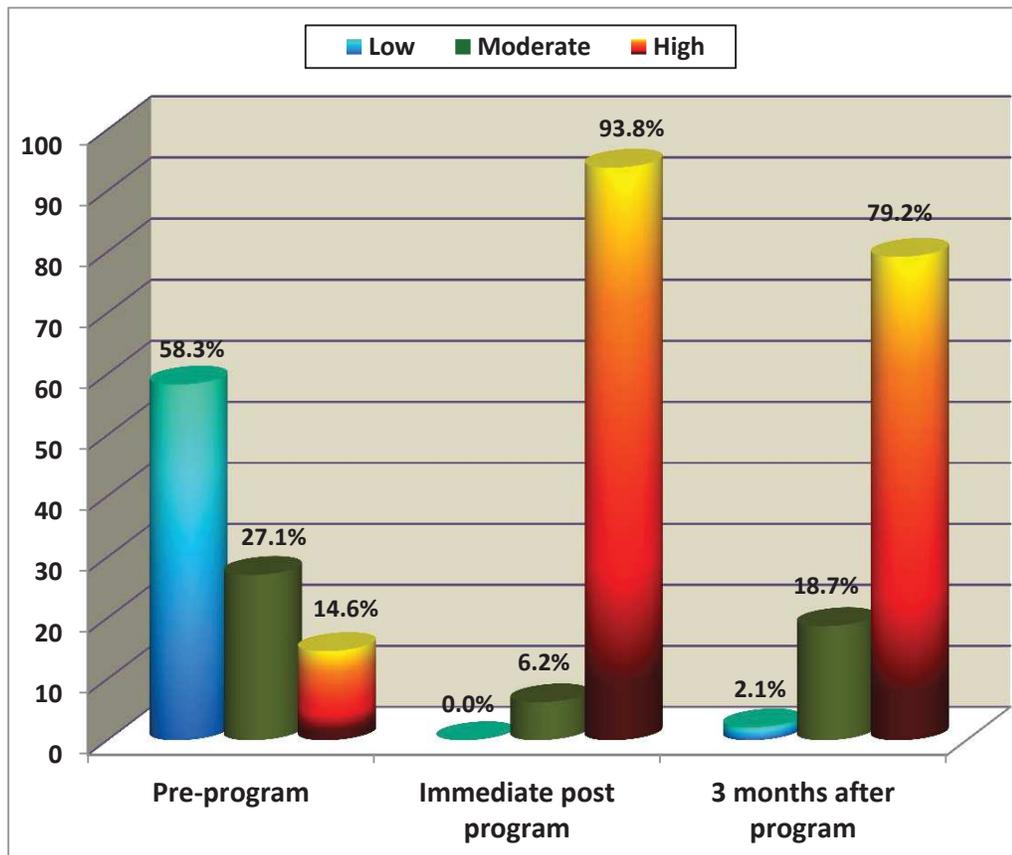


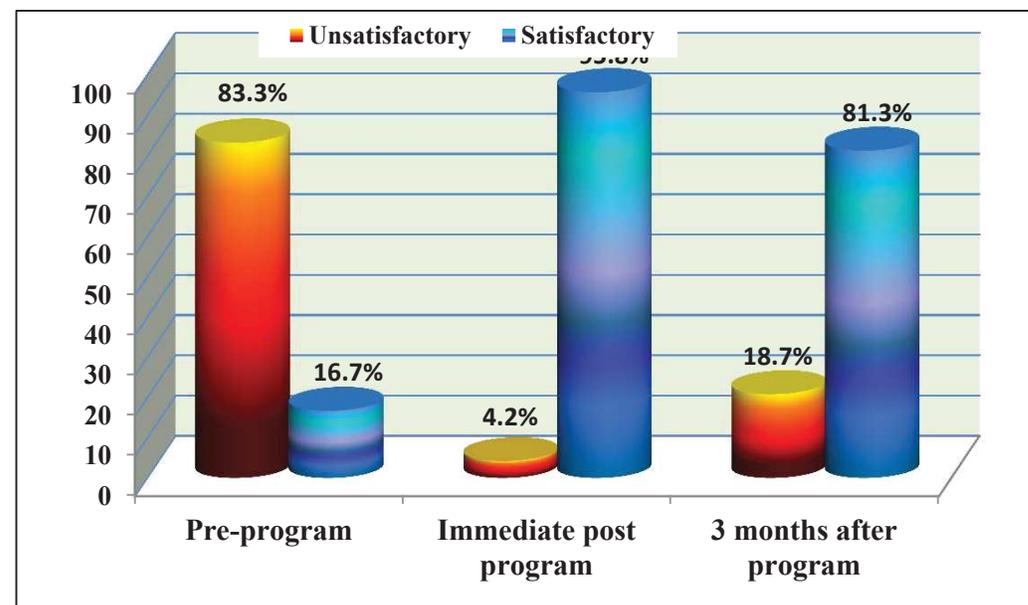
Table (2): Relation between the studied nurses’ total score level of knowledge regarding hyperemesis gravidarum and their socio-demographic characteristics pre, immediately and three months post implementation of the educational program (n= 48)

Nurses' socio-demographic characteristics			Total Knowledge						Chi-square	
			Low		Moderate		High			
			No	%	No	%	No	%	X <sup>2</sup>	P-value
Age	Pre-program	<30	15	31.3	2	4.2	0	0.0	16.955	0.002*
		30- <45	12	25.0	6	12.5	3	6.2		
		45 or more	1	2.1	5	10.4	4	8.3		
	Immediate post program	<30	0	0.0	1	2.1	15	31.3	1.628	0.443
		30- <45	1	2.1	1	2.1	20	41.6		
		45 or more	0	0.0	0	0.0	10	20.8		
	3 months after program	<30	1	2.1	2	4.2	14	29.2	2.607	0.626
		30- <45	0	0.0	5	10.4	16	33.3		
		45 or more	0	0.0	2	4.2	8	16.6		
Residence	Pre-program	Urban	21	43.7	10	20.8	6	12.5	0.364	0.834
		Rural	7	14.6	3	6.3	1	2.1		
	Immediate	Urban	17	35.4	1	2.1	8	16.6	3.467	0.063

	post program	Rural	11	22.9	2	4.2	9	18.8	4.351	0.114
	3 months after program	Urban	0	0.0	6	12.5	31	64.5		
Level of education	Pre-program	Diplome	16	33.3	9	18.8	0	0.0	22.871	<0.001*
		Institute of nursing	12	25.0	4	8.3	4	8.3		
		Bachelor of nursing	0	0.0	0	0.0	3	6.3		
	Immediate post program	Diplome	1	2.1	2	4.2	14	29.1	0.384	0.825
		Institute of nursing	0	0.0	5	10.4	16	33.3		
		Bachelor of nursing	0	0.0	2	4.2	8	16.7		
	3 months after program	Diplome	1	2.1	6	12.5	18	37.5	2.413	0.660
		Institute of nursing	0	0.0	3	6.25	17	35.4		
		Bachelor of nursing	0	0.0	0	0.0	3	6.25		
Years of experience	Pre-program	<10	21	43.7	2	4.2	0	0.0	54.634	<0.001*
		10- <20	7	14.6	10	20.8	0	0.0		
		20 or more	0	0.0	1	2.1	7	14.6		
	Immediate post program	<10	1	2.1	2	4.2	13	27.1	0.772	0.680
		10- <20	1	2.1	5	10.4	16	33.3		
		20 or more	0	0.0	2	4.2	8	16.6		
	3 months after program	<10	1	2.1	2	4.2	20	41.6	5.671	0.225
		10- <20	0	0.0	6	12.5	11	22.9		
		20 or more	0	0.0	1	2.1	7	14.6		

\*Statistically significant (P<0.05)

Figure (2): Distribution of the studied nurses according to their total scores level of practice for women with hyperemesis gravidarum pre, immediately and three months post implementation of the educational program (n= 48)



**Table (3): Correlation between the studied nurses’ total score level of knowledge and their total score level of practice regarding hyperemesis gravidarum pre, immediately and three months post implementation of the educational program (n= 48)**

Total practice	Total knowledge					
	Pre-program		Immediate post program		3 months post program	
	r	P-value	r	P-value	r	P-value
Observing the women with hyperemesis gravidarum.	0.427	<0.001*	0.372	<0.001*	0.356	<0.001*
Administration of IV fluids to replace fluid losses.	0.384	<0.001*	0.425	<0.001*	0.332	<0.001*
Collection of samples for laboratory screening test.	0.382	0.723	0.429	<0.001*	0.345	<0.001*
Educate women to modify dietary lifestyle to decrease nausea and vomiting.	0.198	0.035*	0.169	0.015*	0.230	0.004*
Promotion of comfort.	0.284	<0.001*	0.395	<0.001*	0.323	<0.001*
Provision of emotional support.	0.129	0.201	0.234	0.003*	0.337	<0.001*
<b>Total practice</b>	<b>0.298</b>	<b>&lt;0.001*</b>	<b>0.401</b>	<b>&lt;0.001*</b>	<b>0.278</b>	<b>&lt;0.001*</b>

\*Statistically significant (P<0.05)

**Table (4): Relation between the studied nurses’ total score level of practice regarding hyperemesis gravidarum and their socio-demographic characteristics pre, immediately and three months post implementation of the educational program (n= 48)**

Nurses’ socio-demographic characteristics			Total Practice					
			Satisfactory		Unsatisfactory		Chi-square	
			No	%	No	%	X <sup>2</sup>	P-value
Age	Pre-program	<30	0	0.0	17	35.4	7.406	0.025*
		30- <45	4	8.3	17	35.4		
		45 or more	3	6.3	7	14.6		
	Immediate post program	<30	15	31.3	2	4.2	3.806	0.149
		30- <45	21	43.7	0	0.0		
		45 or more	10	20.8	0	0.0		
	3 months after program	<30	14	29.2	3	6.2	0.869	0.648
		30- <45	16	33.3	5	10.4		
		45 or more	9	18.8	1	2.1		
Residence	Pre-program	Urban	7	14.6	30	62.5	0.590	0.443
		Rural	1	2.1	10	20.8		
	Immediate post program	Urban	35	72.9	2	4.2	0.620	0.431
		Rural	11	22.9	0	0.0		
	3 months after program	Urban	31	64.5	6	12.5	0.680	0.409
		Rural	8	16.7	3	6.3		

Level of education	Pre-program	Diplome	0	0.0	25	52.1	21.00 0	<0.001*
		Institute of nursing	5	10.4	15	31.3		
		Bachelor of nursing	3	6.2	0	0.0		
	Immediate post program	Diplome	24	50.0	1	2.1	0.167	0.920
		Institute of nursing	19	39.6	1	2.1		
		Bachelor of nursing	3	6.2	0	0.0		
	3 months after program	Diplome	18	37.5	7	14.6	3.102	0.212
		Institute of nursing	18	37.5	2	4.2		
		Bachelor of nursing	3	6.2	0	0.0		
Years of experience	Pre-program	<10	0	0.0	23	47.9	34.92 4	<0.001*
		10- <20	1	2.1	16	33.3		
		20 or more	7	14.6	1	2.1		
	Immediate post program	<10	21	43.7	2	4.2	2.268	0.322
		10- <20	17	35.4	0	0.0		
		20 or more	8	16.7	0	0.0		
	3 months after program	<10	19	39.6	4	8.3	0.488	0.784
		10- <20	13	27.1	4	8.3		
		20 or more	7	14.6	1	2.1		

\*Statistically significant (P<0.05)

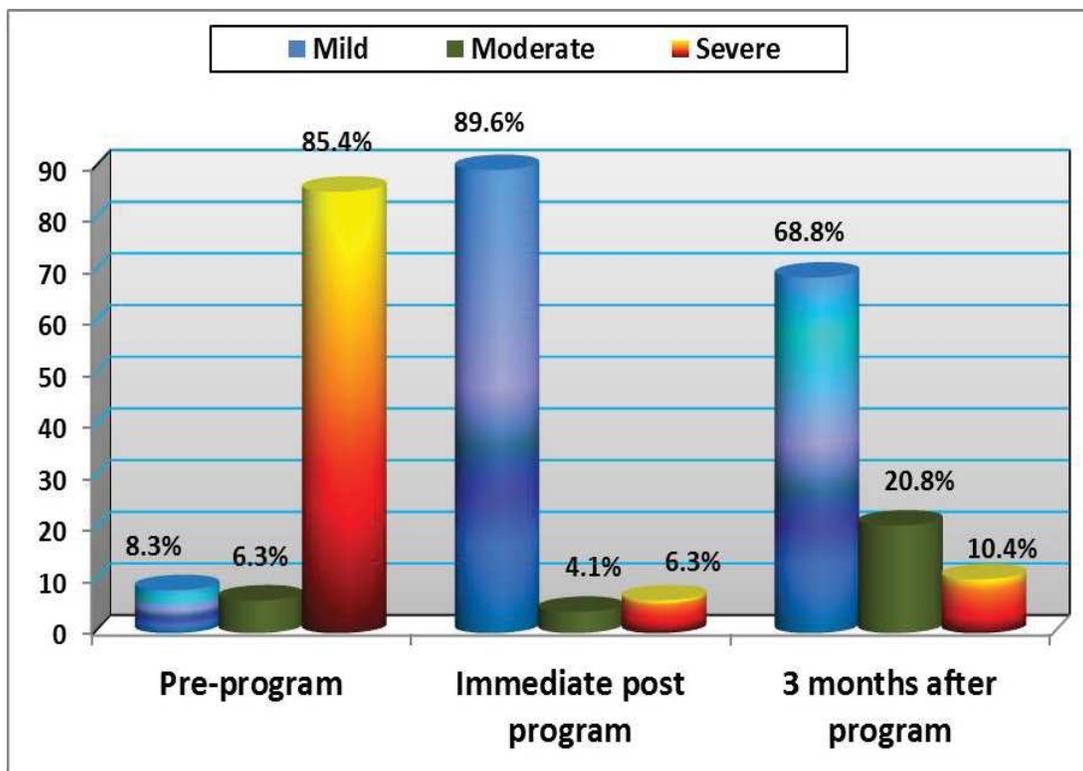


Figure (3): Distribution of the studied pregnant women according to their total score level of Pregnancy-Unique Quantification of Emesis and Nausea (PUQE) pre, immediately and three months post implementation of the educational program for the nurses (n=144 divided into 48 in each group).

**Table (5): Correlation between the studied pregnant women’ total Pregnancy-Unique Quantification of Emesis and Nausea (PUQE) and the total score level of nurses’ knowledge and total score level of practice pre, immediately and three months after implementation of the educational program.**

Variable	Total Pregnancy-Unique Quantification of Emesis and Nausea (PUQE)					
	Pre -implementation of the program		Immediately post program		3 months post implementation of the educational program	
	r	P-value	r	P-value	r	P-value
Total knowledge	-0.806	<0.001*	-0.394	<0.001**	-0.332	0.004*
Total practice	-0.347	0.007*	-0.745	<0.001*	-0.500	<0.001*

\*Statistically significant (P<0.05)

## Discussion

Unfortunately, scarce research exists regarding effect of educational program on nurses' performance regarding hyperemesis gravidarum. Thus, the aim of this study was to determine the effect of educational program regarding hyperemesis gravidarum on nurses' performance and women's outcomes. Concerning socio-demographic characteristics of the studied nurses, nearly one half of them aged 30->40 years old, with a mean age  $\pm$ SD (37.65 $\pm$ 8.25) years, more than three quarters were urban residences, more than three fifths had secondary technical nursing diplom education, and the vast majority of them had no previous training regarding hyperemesis gravidarum. This finding is strongly agreed with **Belal et al. (2016)** <sup>(22)</sup> who assessed the educational needs among obstetrical and gynecological nurses at El-Gharbia Governorate, Tanta, Egypt. They revealed that almost half of the studied nurses aged 30-45 years, nearly three fifths were from urban areas, nearly three quarters had secondary technical nursing Diploma, and the vast majority of them didn't attend any training courses in obstetric and gynecological nursing. The similarity between both studies may stem from that both studies were conducted at the same health care settings.

As regards to the studied nurses' total score level of knowledge regarding hyperemesis gravidarum pre, immediately and three months post implementation of the educational program, the finding of the present study demonstrated that nearly one sixth of the studied nurses had high level of knowledge regarding hyperemesis gravidarum pre-program, increased to the majority of them after implementation of the educational program. The finding of the present study is in harmony with **Badr et al. (2021)** <sup>(23)</sup> who studied the nursing management regarding malnutrition for pregnant women with hyperemesis gravidarum in Helwan general hospital,

Egypt. They portrayed that minority of the studied subject had good level of knowledge pre-program compared to the majority of them after implementation of the health education program.

Low level of knowledge regarding hyperemesis gravidarum pre-program may attribute to the fact that the majority of the studied nurses had finished secondary technical nursing Diploma education many years ago and had no previous training regarding hyperemesis gravidarum. On the other hand, the improvements of knowledge level after implementation of the educational program may be related to the majority of them were excited to learn. This finding shows that the educational program had a good impact on improving the studied nurses' knowledge.

Concerning the relation between the studied nurses' total score level of knowledge regarding hyperemesis gravidarum and their socio-demographic characteristics. The finding of the present study declared that there was a significant positive relationship between nurses' total score level of knowledge and their age, level of education and years of experience. The finding of the present study is in agreement with study done by **Bello et al. (2022)** <sup>(24)</sup> who assessed the management of nausea and vomiting of pregnancy by primary care providers in Nigerian primary care settings. They stated that there was a significant positive relationship between the studied subject's knowledge and their years of experience. From the researcher point of view, socio-demographic characteristics play important role on the nurses' ability to learn.

Concerning studied nurses' total score level of practice regarding hyperemesis gravidarum pre, immediately and three months post implementation of the educational program, the present study portrayed that slightly more than one sixth of the studied nurses had satisfactory level of practice pre-implementation of the

program, increased to the majority of them after implementation of the educational program. Unsatisfactory practice of the studied nurses pre-program in the present study may be due to poor level of nurses' knowledge regarding hyperemesis gravidarum and lack of updating in-service education. On the other hand, the significant improvement of the nurses' practice after implementation of the educational program may be due to frequent demonstration and re-demonstration.

The finding of the present study is in harmony with **El-Sharkawy et al. (2020)**<sup>(25)</sup> studied the effectiveness of self-instructional module on knowledge and remedial practices regarding selected minor ailments in Benha, Egypt. They clarified that three fifths of the studied subjects had a good level of practice post the teaching program.

Concerning the correlation between the studied nurses' total score level of knowledge and their total score level of practice regarding hyperemesis gravidarum pre, immediately and three months post implementation of the educational program. The finding of the present study demonstrated that there was a significant positive correlation between the studied nurses' total score level of knowledge and their total score level of practice pre, immediately and three months after implementation of the educational program. The finding of the present study is supported by **Sobh et al. (2022)**<sup>(26)</sup> who assessed the knowledge and practices of pregnant women regarding hyperemesis gravidarum in Benha University, Egypt. They reported that there was a high positive a statistical correlation between the studied subjects' total score level of knowledge and their total score level of practice regarding hyperemesis gravidarum.

Regarding the relation between the studied nurses' total score level of practice

regarding hyperemesis gravidarum and their socio-demographic characteristics pre, immediately and three months post implementation of the educational program. The finding of the present study displayed that there was a significant positive relationship between the studied nurses' practice regarding hyperemesis gravidarum and their age, level of education, as well as years of experience. The finding of the present study is in contradiction with a study done by **Hashem et al. (2020)**<sup>(27)</sup> about the effectiveness of teaching program on awareness regarding the minor discomfort problems among pregnant women in Minia University, Egypt. They emphasized that there was not a statistically significant relation between the studied subjects' practice and their age as well as educational level.

Regarding Pregnancy Unique Quantification of Emesis and Nausea (PUQE) score of the studied women. The finding of the present study showed that minority of the studied women had mild level of PUQE pre-implementation of program, compared to majority of them after implementation of the educational program. The finding of the present study is matched with **Thakur et al. (2019)**<sup>(28)</sup> who studied severity of hyperemesis gravidarum and associated maternal factors among women at Nepalese, India. They stated that most of the studied women had moderate to severe degree of hyperemesis gravidarum at time of admission. Furthermore, a study done by **Witari and Dewianti (2020)**<sup>(29)</sup> about effectiveness of providing self-management education to deal with hyperemesis gravidarum on decreasing nausea and vomiting of pregnancy at private practice midwives Puskesmas IV Denpasar Selatan work area, in Indonesia. They stated that there was a decrease in Pregnancy-Unique Quantification of Emesis and Nausea

(PUQE) score after providing the education program.

Regarding correlation between the studied nurses' total score level of knowledge regarding hyperemesis gravidarum and the total score level of Pregnancy-Unique Quantification of Emesis and Nausea (PUQE) pre, immediately and three months post implementation of the educational program. The finding of the present study demonstrated that there was a significant negative correlation between nurses' total score level of knowledge regarding hyperemesis gravidarum and the total score level of PUQE. The finding of the present study is supported by **Kamali et al. (2018)**<sup>(30)</sup> who evaluated the effect of small group teaching on quality of life in pregnant women with nausea and vomiting: A clinical trial in Iran. They stated that the education sessions had a significant effect on reducing the severity of nausea and vomiting and increasing the quality of life of pregnant women.

The present study also revealed that there was a significant negative correlation between the total score level of practice regarding hyperemesis gravidarum and the total score level of PUQE pre, immediately and three months after implementation of the educational program. The finding of the present study is in agreement with **Shakiba et al. (2019)**<sup>(31)</sup> who evaluated the effect of psycho-education intervention based on relaxation methods and guided imagery on nausea and vomiting of pregnant women in Zahedan, Iran. They reported that there was a significant correlation between psycho-education intervention and level of PUQE after implementation of the educational intervention.

### **Conclusion**

The findings of the present study revealed that significant improvement was observed in the nurses' knowledge and practice immediately and three months after

implementation of the educational program regarding hyperemesis gravidarum which in turn reflect positive effect on women' outcomes.

### **Recommendations**

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

- Planning and developing in-service training programs for all nurses in order to improve, update and refresh their knowledge and qualify their practices dependent on recent evidence-based practices in obstetric area.
- Holding weekly or monthly meetings for nurses with their supervisors to exchange ideas and discuss the difficulties which face them.
- Increase number of the nursing staff with new graduated nurses in order to provide high quality personilized care for women with hyperemesis gravidarum.
- Reactivating the role of the head nurse in supervising, guiding and evaluating the nursing care given to hyperemesis gravidarum women, in order to identify weak points and manage them.
- Reapplication of the study under different circumstances including (large sampling, and other settings) in Egypt to ensure generalization of the study findings.

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