Effect of Prenatal Education on Knowledge, Practices, and Quality of Life among Pregnant Women with Hyperemesis Gravidarum

Amal Roshdi Ahmed[(1)] , Hanaa Elsayed Ahmed Shahin[(2)] , Amal K. Khalil[(2)] , Asmaa Ahmed Abdalah[(3)] &Amany Ali Abd El-Salam[(2)]

(1) Assistant Professor of Maternal and Newborn Health Nursing, Faculty of Nursing, Beni-Suef University, Egypt
Assistant Professor , Faculty of Nursing, Bilad Alrafidain University, 32001, Diyala, Iraq
(2) Assistant Professor of Maternal and Newborn Health Nursing, Faculty of Nursing, Menoufia University, Egypt
(3) *Lecturer of Community and Family Health Nursing Department, Faculty of Nursing Mansoura University, Egypt*

Abstract

Background: Hyperemesis gravidarum is a severe complication of pregnancy characterized by prolonged and intense nausea and vomiting, leading to dehydration, malnutrition, and decreased quality of life for affected women. **Aim:** To assess the effect of prenatal education on knowledge, practices, and quality of life among pregnant women with hyperemesis gravidarum. **Design:** One-group, quasi-experimental pre- and post-test design. **Setting:** The study was carried out at two hospitals: Shebin El-Kom Teaching Hospital and Menoufia University Hospital, in the antenatal outpatient clinics and the department of obstetrics and gynecology (high-risk pregnant unit). **Sample:** A purposeful sample of 110 pregnant women experiencing hyperemesis gravidarum participated in the study. **Tools:** Data were collected using a modified 24-hour pregnancy-unique quantification of emesis (PUQE) questionnaire, a knowledge assessment sheet, a health practices evaluation sheet, a structured questionnaire, and a quality-of-life questionnaire. **Results:** The educational program significantly improved pregnant women's knowledge about hyperemesis gravidarum, with good knowledge scores increasing from 19.1% to 86.4% for concepts of HG, 0% to 70% for causes and risk factors, and 0% to 81.8% for signs and symptoms. The overall practice score for hyperemesis gravidarum before 2.7% and after the educational program was 87.3% of the participants had satisfactory practice. Additionally, there was a significant reduction in the severity of hyperemesis gravidarum symptoms ($p < 0.05$). Participants reported positive impacts on their quality of life following the educational sessions. Conclusion: Prenatal education sessions significantly enhanced pregnant women's knowledge. Participants reported positive impacts on their quality of life following the educational sessions, which promoted healthier practices and mitigated the severity of hyperemesis gravidarum symptoms. These findings underscore the importance of educational interventions for improving outcomes for women with this challenging condition. **Recommendations:** The dissemination of these findings advocates for the implementation of structured prenatal education sessions targeting pregnant women with hyperemesis gravidarum to optimize care and enhance their quality of life.

Keywords: Prenatal education, knowledge, practices, quality of life, pregnant women, hyperemesis gravidarum

Introduction

Hyperemesis gravidarum (HG) is a severe form of nausea and vomiting during pregnancy, affecting approximately 0.5% to 2% of pregnant women. Unlike typical morning sickness, HG can lead to significant dehydration, weight loss, and electrolyte imbalances, often requiring hospitalization. This condition not only impacts the physical health of pregnant women but also adversely affects their psychological well-being and overall quality of life **(Dean et al., 2020).**

Women who have HG during one pregnancy are about 80% more likely to have it during subsequent pregnancies (Dean et al., 2020). The recurrent nature of HG underscores the importance of effective management strategies that extend beyond traditional medical interventions such as antiemetic medications and intravenous fluids, which provide temporary relief but do not address the

underlying causes or prevent recurrence **(Kloter et al., 2019).**

Prenatal education has emerged as a promising approach to augmenting traditional medical management by empowering pregnant women with knowledge, self-care strategies, and emotional support (Nurmi et al., 2020). These educational programs bring together women experiencing similar pregnancy-related challenges to learn about their condition, share experiences, and acquire practical coping mechanisms (**Farg and Hassan, 2019).**

Previous research has indicated that prenatal education can significantly enhance women's understanding of HG, including its causes, symptoms, and available treatment options (Dean et al., 2020). By equipping women with accurate information and evidence-based practices, these sessions aim to improve their ability to manage symptoms effectively and make informed decisions about their healthcare **(Farg and Hassan, 2019).**

Moreover, beyond knowledge acquisition, prenatal education has been shown to positively impact self-care practices among pregnant women with various pregnancy-related conditions, potentially improving overall health outcomes and quality of life (MacGibbon et al., 2021). For women grappling with the debilitating effects of HG, learning practical strategies such as dietary modifications and stress-reduction techniques can be particularly beneficial **(Ali and Abokresha, 2021).**

Despite these promising findings, the specific impact of prenatal education on pregnant women with HG remains underexplored in certain contexts. This study seeks to fill this gap by evaluating the effectiveness of a structured prenatal education program in enhancing knowledge, promoting healthy practices, and potentially alleviating symptoms of HG among participants.

The relationship between prenatal education and the quality of life of women with HG is an area of growing interest. By equipping women with comprehensive knowledge and practical skills, prenatal education programs have the potential to mitigate the debilitating effects of HG. This study aims to explore the impact of prenatal education on the knowledge, practices, and quality of life among pregnant women suffering from HG, providing insights into the effectiveness of these interventions in improving maternal health outcomes.

Significance of the study

Against backdrop of President Abdel Fattah El-Sisi's commitment to improving maternal and fetal health through national initiatives, including the Supporting Maternal and Fetal Health initiative launched in 2020, the urgent need for effective healthcare interventions becomes apparent. Hyperemesis gravidarum (HG) presents a significant clinical challenge during pregnancy, affecting approximately 0.3% to 3.6% of pregnancies globally **(MacGibbon et al., 2021).** This severe condition is characterized by persistent nausea and vomiting, leading to dehydration, electrolyte imbalances, and substantial maternal morbidity. Complications such as Wernicke's encephalopathy and cardiac issues underscore its severity **(Kim et al., 2021),** while infants exposed in utero face neurodevelopmental delays, increased risks of preterm birth, and low birth weight **(Poeran-Bahadoer et al., 2020).**

Traditionally, gynecological management of HG focuses on medication and intravenous fluids, which may not address the complex needs of affected women. Prenatal education is a promising intervention to complement medical management by providing essential information, self-care techniques, and psychological support **(Dean et al., 2020).** This study assesses effect of educational interventions on pregnant women with HG, aiming to improve pregnancy outcomes, reduce complications, and enhance maternal and neonatal health. This evidence is crucial to supporting ongoing efforts to enhance maternal healthcare in Egypt.

By investigating the impact of prenatal education on knowledge, practices, and quality of life among women with HG, this study contributes valuable insights into the holistic management of this condition. The findings can inform healthcare policies and programs, fostering a more integrated approach to maternal health that aligns with national priorities and global best practices. Ultimately, this research seeks to empower women with HG through education, leading to better health outcomes for both mothers and their infants.

The aim of the study is:

Assess the effect of prenatal education on

knowledge, practice, and quality of life in pregnant women with hyperemesis gravidarum.

Hypotheses:

H1: Pregnant women with hyperemesis gravidarum who participate in prenatal education sessions will have significantly higher knowledge scores regarding hyperemesis gravidarum compared to before the intervention.

H2: Pregnant women with hyperemesis gravidarum who attend prenatal education sessions will demonstrate higher levels of satisfactory practices related to managing hyperemesis gravidarum compared to before the intervention.

H3: Pregnant women with hyperemesis gravidarum will report a significant decrease in the severity of hyperemesis gravidarum symptoms following participation in prenatal education sessions compared to before the intervention.

H4: Pregnant women with hyperemesis gravidarum who receive prenatal education will report a positive impact on their overall quality of life compared to before the intervention.

Study Design

The study employs a quasi-experimental design with a one-group pretest/post-test approach.

Setting

The research was conducted at the Obstetrics and Gynecology Department (high-risk pregnancy ward) and at antenatal outpatient clinics at two hospitals: Menoufia University Hospital and Shebin El-Kom Teaching Hospital.

Study Sample

Sample Type: A purposive sampling method was used to select participants from the aforementioned settings.

Study Sample

Sample Type: A purposive sampling method was used to select participants from the aforementioned settings.

Sample Size Calculation:

Sample Size Calculation: The sample size was calculated using Daniel's (1999) formula: n=Z2×P(1−P)d2n = \frac{Z^2 \times P(1-P)}{d^2}n=d2Z2×P(1−P) where:

- P is the prevalence of preeclampsia (estimated at 8% based on a previous study in Egypt).
- D is the margin of error (5%).
- Z is the Z-value for a 95% confidence level (1.96).

The calculation is as follows: n=(1.96) 2×0.08(1−0.08)(0.05) 2n = \frac{(1.96)^2 \times 0.08(1-0.08)} {(0.05)^2} n=(0.05) 2(1.96) 2×0.08(1−0.08) Considering an attrition rate of 20%, the total sample size required is 110 participants.

Inclusion Criteria:

- **Age:** women aged 18 years and older.
- **Desire to Participate:** willingness to participate in the research study.
- **Availability:** Participants must be available during the study period.
- **Diagnosis of Hyperemesis Gravidarum (HG):** Participants must meet one or more of the following diagnostic criteria for HG:

o At least three episodes of vomiting every day.
o Loss of weight greater than 5% of pre-pregnancy weight.
o Ketones were found in the urine examination.
o Indices of electrolyte imbalance or dehydration.

Exclusion Criteria:

- **Pregnancy-Induced Hypertension (PIH):** Participants diagnosed with pregnancy-induced hypertension.
- **Psychological Distress:** Participants are experiencing significant psychological distress.
- **Liver or Stomach Disease**: Participants were diagnosed with stomach or liver disease.
- **Hyperemesis Gravidarum History**: Participants who have history of hyperemesis gravidarum during previous pregnancies.

Data collection tools:

Tools I: Questionnaire for Structured Interviewing: This questionnaire was created following analysis and translation into Arabic of pertinent literature **(American Pregnancy Association, 2020; Dinberu et al., 2019; Gabra, 2019). There are four parts to the questionnaire:**

- **Part 1:** Personal characteristics (age, place of residence, income, occupation; degree of education, body mass index, and sources of information).

- **Part 2:** Obstetrical history (prior abortions, gestational age, routine tests, warning signs during the present pregnancy, and gravida).
- **Part 3:** Discussed the detrimental effects of hyperemesis gravidarum on day-to-day functioning (depression, anxiety, guilt, loss of identity, lower life quality, thoughts of elective pregnancy termination, thinking about future pregnancies after HG pregnancy, and overall well-being) as well as the psychosocial burden (social interactions, partnerships, ability to care for children, and capacity for work and study).
- **Tool II: Knowledge Assessment Sheet**.

Design: The researcher created it using pertinent literature as a guide (Smith et al., 2020; Farg & Hassan, 2019; Luqmanasari, 2018). There are 22 multiple-choice questions on it. There is one correct answer, one incorrect answer, and an "I'm not sure" option.

Scoring System: Each correct response scores 1 point, while incorrect or unsure responses score 0 points. Scores are totaled to indicate overall knowledge, with categories for good (≥75%), average (50–<75%), and poor (<50%) understanding.

Tool III: Healthy Practices Assessment Sheet

Design: The researcher constructed it and translated it into Arabic based on pertinent literature (Smith et al., 2020; Havnen et al., 2019; Bej, 2018). There were twenty questions adapted from the literature, assessing the frequency of health practices such as dietary modifications, hydration, and stress management.

Scoring System: Practices are scored based on frequency: always (2 points), occasionally/sometimes (1 point), never (zero points). The range of total scores is zero to 40, categorized as satisfactory (≥60%) or unsatisfactory (<60%) based on the total achieved.

Tool IV: Modified 24-hour Questionnaire for Pregnancy-Unique Quantification of Emesis (PUQE)

Purpose: To measure and classify the degree of hyperemesis gravidarum-related nausea and vomiting within a 24-hour period.

Design: Based on validated measures (Ebrahimi et al., 2009; Koren et al., 2002; Gupta et al., 2020), this scale was modified to include items for the number of vomiting episodes, hours of nausea, and retching episodes.

Scoring: Higher scores denote more severe symptoms. Each item is rated on a five-point scale. Based on overall scores, results are classified as mild, moderate, or severe.

Tool V: Quality of Life Questionnaire

Design: It was taken from Fitzpatrick et al. (2018) to evaluate social functioning, mental health, and physical complaints. There are thirty items in the questionnaire, which are broken down into four categories: social, psychological, environmental, and physical. Rating System: To provide a numerical representation of reported changes in quality of life, responses are scored on a Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Higher total scores correspond to a higher perceived quality of life; the range of scores is 30 to 150.

Validity of the tools:

Four experts evaluated the instruments for content and internal validity (two from the maternal and newborn health nursing departments and one from the obstetrics and gynecology departments). The panel's decisions about sentence clarity, content appropriateness, item sequence, and accuracy in scoring and recording items were considered when making modifications to the scale.

Reliability of the tools: The researchers used test-retest reliability to evaluate the instruments' internal consistency. It was accomplished by giving the same instruments to the same subjects in comparable circumstances two or more times. Some questions were changed, and test results from multiple administrations were compared.

Administrative Approval: On October 19, 2022, authorization was received from the Menoufia University Faculty of Nursing's Committee on Research and Ethics. To conduct the study, formal letters were obtained from the Menoufia University Faculty of Nursing Dean and given to the director of the obstetric department of the University Hospital and Shebin El-Koom Teaching Hospitals in Menoufia Governorate. The above-mentioned

setting's director granted official approval to conduct the study.

Ethical Considerations:

The director of the obstetric department of the University Hospital and Shebin El-Koom Teaching Hospitals at Menoufia Governorate was granted written clearance by the dean of the nursing faculty at Menoufia University. The study took ethical measures to guarantee informed consent and confidentiality into account. Confidentiality was preserved by using locked sheets with code numbers in place of the women's names. Every woman who participated in the study was told that the data they submitted would be kept private and utilized exclusively for statistical analysis. The results would be given as aggregate data, meaning that no individual participant data would remain. After being briefed about the study, every woman who took part gave their informed consent to participate. All nurses were given the option to voluntarily decline participation in the study and were advised that it was entirely elective for them to do so at any time. They were permitted to inquire about any aspect of the study.

Pilot study:

Pilot research was carried out on 10% of the total sample (11 women) to assess the instrument's applicability, the study's viability, and the amount of time needed to gather data. The results of the pilot study led the researchers to reword several of the questions. Therefore, the study sample did not include the women who were selected for the pilot study.

Study Fieldwork Procedure:

The study was conducted at 7-month period, commencing from the end of October 2022 to the end of May 2023. Data collection took place at two hospitals: Department of Obstetrics and Gynecology at the University Hospital and Shebin El-Koom Teaching Hospitals in the Egyptian Governorate of Menoufia. To help with participant recruitment and data collection, researchers were present three days a week from 9:00 a.m. to 2:00 p.m.

Phases of the Study:

1. **Preliminary Phase:**

- A comprehensive literature review was conducted using local and international textbooks, journals, and electronic databases to inform the development of research instruments. This phase aimed to establish a solid theoretical framework and gather relevant historical and recent data on hyperemesis gravidarum.

2. **Interviewing and Assessment Phase:**

- When recruiting, researchers gave possible volunteers an overview of the study's goals, schedule, and procedures. Before any data was collected, each participant gave their informed written consent.
- A structured interview questionnaire was given to participants to gather information. They were asked about their traits, obstetrical history, risk factors, the detrimental effects of hyperemesis gravidarum (HG), and their quality of life.
- Additionally, participants completed the Maternal Knowledge Questionnaire to evaluate their understanding of HG, the Pregnancy-Unique Quantification of Emesis (PUQE) questionnaire to gauge the intensity of HG symptoms, and the Maternal Healthy Practices Questionnaire to evaluate their self-reported health behaviors related to HG.
- The duration of completing the questionnaires averaged between 35 and 45 minutes per participant, establishing baseline data for subsequent comparisons post-intervention.

3. **Planning Phase:**

- Educational materials, including educational booklet, were developed based on findings of the evaluation stage and a thorough literature analysis. Content of the educational booklet was presented in simple Arabic to ensure accessibility and understanding among participants.
- Goals for the educational sessions were defined, focusing on enhancing participants' knowledge and promoting healthy practices related to managing HG.

4. **Implementation Phase:**

- A small group of 4–6 participants attended educational sessions that were conducted according to the participants' availability and readiness. Each participant attended three sessions, each lasting 45 to 60 minutes, with discussions tailored to their progress, achievements, and feedback.

- Various teaching methods were employed, including lectures, group discussions, demonstrations, critical thinking exercises, and presentations, to enhance engagement and understanding.
- Supportive tools, such as educational booklets and stickers, were provided to reinforce session content and stimulate positive behavioral changes.

- The women's level of physical and mental preparedness determined when the sessions should take place. Three 45- to 60-minute sessions were conducted with each woman.
- During the sessions, they talked about their successes, their development, and their feedback. Each woman was also given the time for the next sessions.
- The following was how the sessions were conducted in the following manner:
- **The first session** focused on educating a small group of 4–6 participants about hyperemesis gravidarum. These sessions were designed to provide comprehensive information on various aspects of the condition. covered the meaning of hyperemesis gravidarum, the distinctions between hyperemesis gravidarum and morning sickness, the times of day when hyperemesis gravidarum usually happens, the gestational age in weeks when it usually manifests, its incidence, risk factors, and causes. Additionally, indicators and symptoms, clinical examination indicators, biochemical alterations, pregnancy-related and non-pregnancy-related reasons were all covered in the sessions. It was encouraged for participants to participate fully in the sessions, to ask questions, and to share their experiences.

The second session consisted of small group teaching sessions led by researchers, focusing on hyperemesis gravidarum. These sessions provided comprehensive information on various topics, including problems that affect the mother and the fetus, the diagnosis, the course of the investigation, the preventative strategies, the healthcare modalities, and the observations made. At the same time, the patient is in the hospital, the best dietary advice, alternate therapies, forbidden foods, and circumstances where hyperemesis gravidarum may necessitate pregnancy termination. The sessions were conducted in small groups of 4–6 participants to promote interaction and discussion. Each session was held once a week, lasting 1 hour over 4 weeks. The content was standardized to ensure consistency across all groups.

The third session offered a thorough explanation of healthy practices designed to alleviate the severity of hyperemesis gravidarum. The emphasis was placed on maintaining proper hydration and nutrition, with recommendations for consuming small, frequent meals that are gentle on the stomach. The session highlighted the importance of avoiding triggers such as strong odors and certain foods and suggested incorporating ginger and vitamin B6 supplements to reduce nausea. Participants were advised on the significance of rest and stress management. The session also underscored the importance of seeking medical advice for severe cases, providing a holistic approach to effectively managing hyperemesis.

5. **Evaluation Phase:**

- Four weeks after completing the educational sessions, participants were re-assessed using the same tools (Instruments II, III, IV, and VI) to evaluate changes in knowledge, healthy practices, severity of HG symptoms, and quality of life.
- Follow-up was conducted via telephone to monitor participants'
- progress and gather additional feedback on the intervention's impact.

Results

Table 1 shows the personal characteristics of the studied sample. It was clear that the majority of the sample fell within the age group of 28–37 years, with a mean age of 29.87 (6.79) years. A significant proportion of the participants (63.6%) resided in urban areas, while 53.6% had attained secondary education. Regarding socioeconomic status, 70% of the sample reported a moderate socioeconomic level. In terms of occupation, less than half (41.8%) were housewives. The mean (SD) BMI was 25.13 (1.28). Additionally, 79.1% of the participants reported having no prior information about hyperemesis gravidarum. Of those who had some information, 20% cited family or close kin as their source, while only 3.6% obtained their information from

health professionals. Social media was also a source for 10% of the informed participants.

Table 2 reveals that the mean gestational age of the analyzed sample was 15.60 (5.14) weeks and that 61.8% of the participants were primigravida.. A notable 72.7% reported a family history of hyperemesis gravidarum, with 59.1% indicating it was present in a previous generation of the family tree and 61.8% indicating it was among siblings. The majority of the participants (89.1%) Carrying out standard pregnancy investigations. Additionally, 17.3% suffered from other cautionary indicators present throughout the current pregnancy, with severe headache (1.8%), blurred vision (1.8%), and abdominal pain (0.9%) being the most reported warning signs.

Table 3 demonstrates the level of knowledge bout hyperemesis gravidarum among pregnant women studied both before and after the implementation of an educational program.

Significant improvements were observed in all knowledge categories post-program compared to pre-program assessments ($p \leq 0.001$ for all items). The proportion of participants with poor knowledge decreased dramatically or became non-existent, While those with good knowledge substantially increased. The educational intervention's effectiveness in enhancing understanding of hyperemesis gravidarum among pregnant women was demonstrated by a marked increase in mean scores across all categories.

Table 4 illustrates the level of knowledge that the pregnant women under study had about hyperemesis gravidarum both before and after an educational program implementation. Significant improvements were observed in all knowledge categories post-program compared to pre-program assessments ($p \leq 0.001$ for all items). The proportion of participants with poor knowledge decreased significantly or became nonexistent, while those with good knowledge substantially increased. Mean scores also showed a marked increase across all categories.

Table 5 shows the overall practice score for hyperemesis gravidarum both before and after the educational program was put into place. It demonstrates that 2.7% of the women under study had satisfactory practice with hyperemesis gravidarum before the program's implementation, and 87.3% of the participants had satisfactory practice following it. Furthermore, concerning all items examined and the sample's healthy practices regarding hyperemesis gravidarum, there was a highly statistically significant difference ($p \leq 0.001$) between the results of the after-implementation phase compared to the before-implementation phase in favor of post-implementation.

Figure (1) shows the Pregnancy-Unique Quantification of Emesis (PUQE) index severity scores for hyperemesis gravidarum among the examined pregnant women before and after the educational program. A significant reduction in PUQE scores was observed following the intervention, as indicated by a *P* value of less than 0.05. The paired t-test (t) results highlight a meaningful decrease in symptom severity, and the Cohen's D (d) value demonstrates a notable effect size of the educational program. These findings suggest that the intervention was effective in reducing the severity of hyperemesis gravidarum symptoms, leading to an improvement in the pregnant women's condition..

Table (6): indicates that there was a statistically significant difference ($P \leq 0.001$) in all domains of pregnant women's quality of life after the educational program compared to before. These findings suggest that the educational program was effective in improving various aspects of quality of life among pregnant women, as evidenced by the significant increases in scores across all measured domains.

Table (1): The studied pregnant women personal characteristics (n=110).

Personal characteristics	Categories	No.	%
Age	18-<28	46	41.8
	28-<38	57	51.8
	≥38	7	6.7
	Mean (SD)	29.87(6.79)	
Residence	Rural	40	36.4
	Urban	70	63.6
Educational level	Preparatory	9	8.2
	Secondary	59	53.6
	Bachelor	42	38.2
Socioeconomic level	Low	13	11.8
	Moderate	77	70
	High	20	18.2
Occupation	Housewife	46	41.8
	Governmental work	28	/25.5
	Free work	36	32.7
Do you have any information about hyperemesis gravidarum?	No	87	79.1
	Yes	23	20.9
If yes, Specify source of information (n=23) *	Family	22	20
	Health professionals	4	3.6
	Social media	11	10

Table (2): The studied pregnant women obstetrical history (n=110).

Obstetrical history	Categories	No.	%
Gravidity	Primigravida	68	61.8
	2-3 times	31	28.2
	≥4 times	11	10
Current gestational age (weeks)	**Mean (SD)**	15.60(5.14)	
Family History of hyperemesis gravidarum	No	30	27.3
	Yes	80	72.7
Family History of hyperemesis gravidarum (n=89) *	Previous Family History of hyperemesis gravidarum	65	59.1
	Mother	11	10
	Sister	68	61.8
Carrying out standard pregnancy investigations	No	12	10.9
	Yes	98	89.1
Presence of other warning signs during current pregnancy	No	105	95.5
	Yes	5	4.5
If yes, forms of warning signs (n=5) *	Severe headache	2	1.8
	Blurred vision	2	1.8
	Abdominal pain	1	0.9

Table (3): The studied pregnant women's knowledge scores in several categories of hyperemesis gravidarum both before and after an educational program implementation (n=110).

Items	Pre-Test n=110		Post-test n=110		Significance tests
	No.	%	No.	%	
Concepts of hyperemesis gravidarum score= (4)					
Poor	27	24.5	00	00	χ^2=116.13, * p ≤ 0.001
Average	62	56.4	15	13.6	
Good	21	19.1	95	86.4	
Mean (SD)	1.92(1.19)		3.57(0.65)		t=12.39, * p ≤ 0.001
Causes and risk factors *of hyperemesis gravidarum score= (8)*					
Poor	77	70	00	00	χ^2=154.00, * p ≤ 0.001
Average	33	30	33	30	
Good	00	00	77	70	
Mean (SD)	2.80(1.25)		6.10(1.14)		t=22.19, * p ≤ 0.001
Signs and symptoms of hyperemesis gravidarum score= (8)					
Poor	68	61.8	00	00	χ^2=165.80, * p ≤ 0.001
Average	42	38.2	20	18.2	
Good	00	00	90	81.8	
Mean (SD)	3.01(1.36)		6.21(0.86)		t=19.18, * p ≤ 0.001
Complications of hyperemesis gravidarum for the fetus score= (6)					
Poor	88	80	00	00	χ^2=168.52, * p ≤ 0.001
Average	22	20	31	28.2	
Good	00	00	79	71.8	
Mean (SD)	1.60(0.92)		4.73(0.98)		t=45.50, * p ≤ 0.001
Complications of hyperemesis gravidarum for the mother score= (10)					
Poor	101	91.8	00	00	χ^2=194.12, * p ≤ 0.001
Average	9	8.2	23	20.9	
Good	00	00	87	79.1	
Mean (SD)	2.55(1.16)		8.19(0.88)		t=40.22, * p ≤ 0.001

χ2: Chi square test, t: Paired t-test, *P<0.05 significant.

Table (4): The studied pregnant women's score level of knowledge' categories regarding the hyperemesis gravidarum before and after the educational program implementation, Cont (n=110).

Items	Pre-Test n=110		Post-test n=110		Significance tests
	No.	%	No.	%	
Diagnosis and investigation of hyperemesis gravidarum score= (5)					
Poor	103	93.6	9	8.2	χ^2=164.33, * p ≤ 0.001
Average	7	6.4	29	26.4	
Good	00	00	72	65.5	
Mean (SD)	1.33(0.74)		3.80(1.13)		t=21.23, * p ≤ 0.001
The difference between normal morning sickness and hyperemesis gravidarum					
Poor	84	76.4	00	00	χ^2=170.08, * p ≤ 0.001
Average	26	23.6	24	21.8	
Good	00	00	86	78.2	
Mean (SD)	0.23(0.42)		1.78(0.41)		t=28.49, * p ≤ 0.001
Prevention methods of hyperemesis gravidarum score= (3)					
Poor	110	100	00	00	χ^2=220.00, * p ≤ 0.001
Average	00	00	22	20	
Good	00	00	88	80	
Mean (SD)	0.37(0.48)		2.80(0.40)		t=36.53, * p ≤ 0.001
Management of hyperemesis gravidarum score= (4)					
Poor	67	60.9	00	00	χ^2=180.07, * p ≤ 0.001
Average	43	39.1	13	11.8	
Good	00	00	97	88.2	
Mean (SD)	1.15(0.78)		3.46(0.69)		t=23.32, * p ≤ 0.001
Total knowledge score= (50)					
Poor	108	98.2	00	00	χ^2=213.14, * p ≤ 0.001
Average	2	1.8	12	10.9	
Good	00	00	98	89.1	
Mean (SD)	15.00(3.50)		40.66(2.30)		t=70.11, * p ≤ 0.001

Table (5): The studied pregnant women's score level of practice' categories regarding the hyperemesis gravidarum before and after the educational program implementation (n=110).

Items	Pre-Test n=110		Post-test n=110		Significance tests
	No.	%	No.	%	
Dietary interventions score= (8)					
Unsatisfactory	101	91.8	21	19.1	χ^2=117.76, * p ≤ 0.001
Satisfactory	9	8.2	89	80.9	
Mean (SD)	2.79(1.06)		6.09(1.48)		t=19.06, * p ≤ 0.001
Pharm logical interventions score= (2)					
Unsatisfactory	110	100	34	30.9	χ^2=120.59, * p ≤ 0.001
Satisfactory	00	00	76	69.1	
Mean (SD)	0.70(0.46)		1.66(0.52)		t=13.63, * p ≤ 0.001
Non-pharm logical interventions score= (3)					
Unsatisfactory	75	68.2	14	12.7	χ^2=70.21, * p ≤ 0.001
Satisfactory	35	31.8	96	87.3	
Mean (SD)	1.11(0.71)		2.30(0.73)		t=12.10, * p ≤ 0.001
Following healthy daily habits score= (7)					
Unsatisfactory	102	92.7	25	22.7	χ^2=110.43, * p ≤ 0.001
Satisfactory	8	7.3	85	77.3	
Mean (SD)	2.72(1.01)		5.90(1.41)		t=18.96, * p ≤ 0.001
Psychological and behavioral interventions score= (3)					
Unsatisfactory	91	82.7	22	20	χ^2=86.62, * p ≤ 0.001
Satisfactory	19	17.3	88	80	
Mean (SD)	0.97(0.61)		2.16(0.78)		t=13.10, * p ≤ 0.001
Total practice score= (23)					
Unsatisfactory	107	97.3	14	12.7	χ^2=158.84, * p ≤ 0.001
Satisfactory	3	2.7	96	87.3	
Mean (SD)	8.30(2.32)		18.11(3.92)		t=22.11, * p ≤ 0.001

χ2: Chi square test, t: Paired t-test, d: Cohen's D (effect size of t test),*P<0.05 significant.

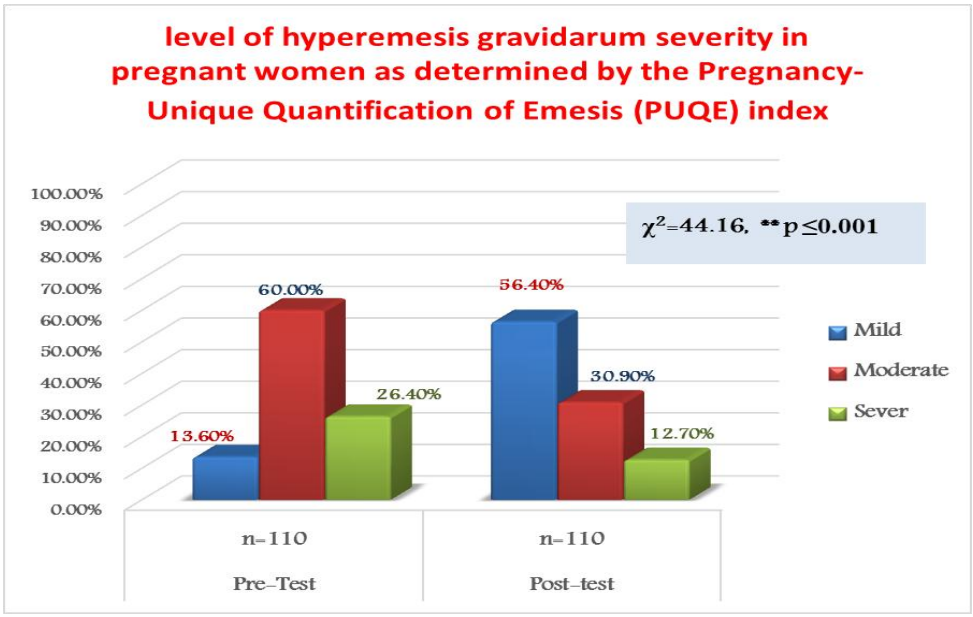

Figure (1): The Pregnancy-Unique Quantification of Emesis (PUQE) index severity score of hyperemesis gravidarum in the examined pregnant women (n = 110) before and after the educational program was implemented.

Table (6): The comparison of mean and standard deviation (SD) per domains of pregnant women's quality of life before, and after the educational program implementation (n=110).

Quality of life domains	Pre-Test N =110		Post-test N=110		**Mean difference (95% CI)**	**Significance test between mean scores**
	Mean	**SD**	**Mean**	**SD**		
Physical health	11.7	0.90	12.51	0.99	0.81(1.09-0.54)	t=5.87 P≤0.001
Psychological health	12.50	1.20	13.57	2.00	1.07(1.41-0.58)	t=4.75 P≤0.001
Social relationships	14.92	1.88	15.52	2.02	0.60(1.05-0.14)	t=2.62 P≤0.001
Environment health	12.61	1.27	13.33	1.80	0.71(1.14-0.28)	t=3.31 P≤0.001

The higher score represents a better condition (scores range from 4 to 20), t: Paired t-test, *P<0.05 significant.

Discussion

Concerning the personal characteristics of the women under investigation, the current study found that, the mean age 29.87 (6.79) years, over half of the sample fell within the 28–37 age range. Less than half identified as housewives, and less than two-thirds lived in metropolitan regions. In terms of education, little over one-third had finished secondary school, and fewer than two-thirds belonged to a moderate socioeconomic group.

These findings align with previous research by MacGibbon (2020) and Jenabi et al. (2019), which reported similar demographic distributions among women affected by

hyperemesis gravidarum. MacGibbon's study, "Hyperemesis Gravidarum Strategies to Improve Outcomes," and Jenabi et al.'s meta-analysis on "The Association between Maternal Smoking and Hyperemesis Gravidarum," similarly observed predominant age ranges, residential distributions, and educational backgrounds among their study populations.

From the researchers' perspective, the relatively young age and average educational attainment of the women in our study may contribute to gaps in awareness and suboptimal coping mechanisms for hyperemesis gravidarum. Notably, most participants gathered information primarily from family members and healthcare professionals. This underscores the influential role of family members in shaping pregnant women's knowledge and practices, which can either positively or negatively impact their understanding and management of hyperemesis gravidarum.

Regarding women's knowledge related to hyperemesis gravidarum

The current study shows that, after the intervention, participants' understanding of HG significantly improved. In the pre-intervention phase, only ten percent of women showed good knowledge; this is in stark contrast to the post-intervention data, where around two-thirds of women attained this level. On the other hand, insufficient knowledge levels dropped from more than seventy-five precent pre-intervention to roughly five precent post-intervention, indicating a highly significant change ($p < 0.001$) between pre- and post-educational intervention knowledge levels.

These results align with the findings of Havnen et al. (2019) who emphasize the significance of comprehensive knowledge among healthcare professionals to improve care for women with HG. Similarly, educational interventions dramatically raised knowledge scores among HG-affected women, according to Farg and Hassan's (2019) supporting the beneficial effects of focused education initiatives.

Moreover, studies by Jones et al. (2017) and Brown et al. (2016) demonstrate similar outcomes in maternal health knowledge following educational interventions in different contexts, underscoring the effectiveness of such strategies in improving health literacy among pregnant women.

Additionally, providing an instruction booklet, as noted by Luqmanasari (2018), complements these efforts by addressing gaps in understanding about HG causes and prevention. This integrated approach aligns with the recommendation that healthcare professionals should enhance their counseling efforts, particularly during the first trimester, to ensure comprehensive understanding among pregnant women.

From a researcher's perspective, these significant improvements in knowledge were probably caused by the beneficial effects of the customized education program in addition to the lively and well-run sessions. The study's focus on a vital and sensitive topic garnered high participant interest and satisfaction, highlighting the importance of integrating educational initiatives into prenatal care to optimize maternal well-being and health outcomes.

Regarding women's health practices related to hyperemesis gravidarum

The current research demonstrated a highly statistically significant improvement in healthy practices post-intervention compared to pre-intervention ($p \leq 0.001$). Initially, about one-third of the sample practiced healthy behaviors satisfactorily, which increased to approximately four-fifths after the intervention. Conversely, more than two-thirds had unsatisfactory practices pre-intervention, decreasing to less than one-fifth post-intervention.

These findings resonate with Kamali et al. (2018), who observed significant improvements in health practices following training sessions ($P = 0.001$). Their study highlighted the role of active participation, hands-on training, and effective communication in fostering positive outcomes, similar to the findings in your research.

Moreover, Smith et al. (2020) emphasized the critical role of education in enabling pregnant women with HG to manage symptoms effectively and maintain a reasonable quality of life. This underscores the importance of empowering women with practical knowledge and skills beyond medical treatment alone.

From a researcher's perspective, the notable improvement in health practices among participants likely stems from the structured

and interactive nature of the educational sessions. Engaging discussions and effective communication fostered an environment conducive to learning, while the provision of an educational booklet served as a practical reference tool for ongoing support These elements collectively enhanced participants' understanding and implementation of healthy practices related to hyperemesis gravidarum, emphasizing the effectiveness of comprehensive educational approaches in improving maternal health outcomes.

Regarding women's severity levels of hyperemesis gravidarum

The current study found that, when compared to pre-intervention, there was a statistically significant improvement in HG severity post-intervention ($p < 0.05$). After the intervention, the percentage of participants with mild HG climbed from a minority at the beginning to over one-third. On the other hand, there was a positive change in the intensity of the symptoms as severe HG dropped from less than one-third prior to the intervention to fewer than one-fifth after it.

These gains can be ascribed to the beneficial outcomes of the educational booklet and the personalized education program, which increased women's information acquisition, adoption of healthy practices, and awareness of HG, thus reducing the severity of HG.

These findings align with those of with those of Heitmann et al. (2020), who observed similar distributions of NVP severity using the PUQE index, affirming the consistency of severity outcomes across studies.

Moreover, Farg and Hassan (2019) demonstrated improved symptom scores following their educational program, reinforcing the positive impact of educational interventions on HG severity. Similarly, Gonzalez et al. (2020) reported significant reductions in anxiety and improvements in quality of life among pregnant women following educational interventions, which indirectly support improved HG severity outcomes through enhanced overall well-being.

From a researcher's perspective, the significant improvement in HG severity post-intervention can be attributed to several factors. The tailored education program effectively addressed specific needs, provided crucial information, and empowered women with practical management strategies. The educational booklet complemented these efforts by serving as a continuous reference tool. Furthermore, the interactive sessions fostered open dialogue and effective communication, enhancing participant engagement and support. This comprehensive approach not only improved HG severity but also contributed to overall maternal well-being, underscoring the holistic benefits of integrating educational interventions into prenatal care.

Regarding the quality of life of hyperemesis gravidarum

The current study shows that prenatal education significantly improves pregnant women's overall quality of life. All quality-of-life domains showed a statistically significant difference after the execution of the educational program compared to before ($P < 0.001$), with improvements in social, emotional, and physical well-being being most noteworthy. These results are consistent with those of Havnen et al. (2019), who highlighted the significant psychological load and impact on day-to-day activities that women with hyperemesis gravidarum (HG)endure.Their study underscored the need for educational sessions to educate both pregnant women and their families on managing this health issue effectively.

Similarly, Gabra (2019) highlighted the maternal and fetal consequences of HG and its significant psychosocial burden on affected women. This underscores the broader impact of HG on quality of life, aligning with the findings of your study regarding improvements post-education. Moreover, Heitmann et al. (2020) reported high levels of distress and considerations of pregnancy termination among women with severe nausea and vomiting in pregnancy (NVP), highlighting the profound impact on global quality of life. These findings underscore the critical need for interventions, such as educational programs, to alleviate these burdens.

Smith et al. (2019) and Lee et al. (2018) similarly demonstrated that prenatal education significantly enhances overall quality of life in pregnant women across various contexts, including management of gestational conditions and emotional well-being. These studies reinforce the positive impact of

educational interventions on enhancing maternal health outcomes.

Additionally, Gonzalez et al. (2020) reported significant reductions in anxiety and improvements in quality of life among pregnant women following educational interventions, further supporting the comprehensive benefits of such programs.

From a research perspective, the improvements observed in quality-of-life post-education can be attributed to the tailored nature of these educational interventions, which equip women and their families with essential knowledge and coping strategies. The interactive and supportive environment fostered during these sessions likely contributed to empowering participants to manage HG-related challenges effectively.

Conclusion

Based on the findings of the current study evaluating how prenatal education affects pregnant women with hyperemesis gravidarum's knowledge, behaviors, and quality of life, it can be concluded that prenatal education sessions significantly improved participants' understanding of hyperemesis gravidarum. Facilitated by healthcare professionals, these sessions provided crucial insights into the definition of HG, its risk factors, and clinical symptoms, thereby confirming the first study hypothesis. Moreover, participants reported adopting enhanced healthy practices, including effective self-management strategies, dietary adjustments, and alternative treatments, supporting the second study hypothesis. Importantly, the study observed a significant reduction in the severity of HG symptoms, highlighting the clinical relevance of educational interventions in alleviating both physiological and psychological burdens during pregnancy, thus affirming the third study hypothesis. Additionally, the study demonstrated a positive impact on the overall quality of life among pregnant women with HG, confirming the fourth study hypothesis. These findings underscore the effectiveness of prenatal education in empowering pregnant women to manage HG more effectively, thereby improving their pregnancy experience and outcomes.

Recommendations:

Based on the findings of the current study, the following recommendations can be suggested:

1. **Expand Access to Prenatal Education Programs:** Implement and expand prenatal education sessions specifically tailored for women diagnosed with hyperemesis gravidarum. These sessions should be integrated into routine antenatal care settings to ensure accessibility for all pregnant women experiencing severe nausea and vomiting.
2. **Enhance Content and Delivery of Educational Materials:** Continuously update and refine educational content to reflect current evidence-based practices and guidelines. Ensure that materials are culturally sensitive and presented in clear, accessible language to accommodate diverse populations of pregnant women.
3. **Advocate for Policy Changes:** Advocate for policy initiatives that prioritize the integration of prenatal education into standard maternity care practices. Work with healthcare policymakers to allocate resources and funding to support the implementation of evidence-based educational programs nationwide.
4. **Evaluate Program Effectiveness:** Continuously monitor and evaluate the effectiveness of prenatal education programs through rigorous outcome assessments and participant feedback. Use validated tools and metrics to measure improvements in knowledge, healthy practices, symptom severity, and quality of life among program participants.
5. **Empower Women as Active Participants:** Empower pregnant women to actively engage in their care by promoting shared decision-making and informed choices regarding treatment options, symptom management strategies, and healthcare preferences.
6. **Offer Ongoing Support and Follow-Up:** Provide ongoing support and follow-up care to pregnant women following completion of prenatal education sessions. Ensure access to resources, counseling services, and healthcare professionals to address evolving needs throughout the pregnancy and postpartum period.
7. **Educate Healthcare Providers:** Provide education and training for healthcare providers on the diagnosis, management, and

psychosocial aspects of hyperemes gravidarum. Equip providers with t knowledge and skills to deliver compassiona evidence-based care to women experienci severe nausea and vomiting during pregnancy.

Further Research:

1. **Encourage Multidisciplinary Collaboration:** Foster collaboration between healthcare professionals specializing in obstetrics, nutrition, and mental health to provide comprehensive support during prenatal education sessions. Incorporate input from dietitians, psychologists, and pharmacists to address holistic aspects of hyperemesis gravidarum management.
2. **Promote Peer Support and Community Engagement:** Facilitate peer support groups and online forums where pregnant women can share experiences, exchange tips, and provide emotional support. Encouraging community engagement can alleviate feelings of isolation and empower women to navigate the challenges of hyperemesis gravidarum together.
3. **Conduct longitudinal studies** to assess the long-term impact of prenatal education on maternal and neonatal outcomes among women with hyperemesis gravidarum. Investigate the sustainability of knowledge retention and adherence to healthy practices beyond the immediate post-intervention period.

References

1. Ali, S. A., & Abokresha, S. A. (2021). Prenatal education: A strategy to improve maternal and fetal outcomes among pregnant women with hyperemesis gravidarum. *Journal of Obstetric, Gynecologic & Neonatal Nursing, 50*(4), 385-392. https://doi.org/10.1016/j.jogn.2021.03.002
2. **American pregnancy Association (2020).** Hyperemesis Gravidarum. Available at: https://americanpregnancy.org/pregnancy-complications/hyperemesis-gravidarum-880 Accessed on January 8. 2019. at 9 PM.
3. Brown, A., & Jones, S. (2016). The role of education in improving health literacy in pregnant women: A systematic review. *Journal of Health Education Research & Development, 34*(2), 233-240.
4. Dean, C. R., Bannigan, K., & Marsden, J. (2020). Understanding the experience of hyperemesis gravidarum: A grounded theory study. *Midwifery, 86*, 102698. https://doi.org/10.1016/j.midw.2020.102698
5. **Ebrahimi N., Maltepe C., Bournissen FG., and Koren G. (2009).** using the 24-hour Pregnancy-Unique Quantification of Emesis (PUQE-24) scale. J Obstet Gynaecol Can. 31: 803-807.
6. Farg, R., & Hassan, M. (2019). Effect of health educational program on knowledge and self-care practices among pregnant women with hyperemesis gravidarum. *American Journal of Nursing Research, 7*(6), 708-716. https://doi.org/10.12691/ajnr-7-6-3
7. **Farg D.S. and Hassan H.E. (2019).** Study Hyperemesis Graviderum Requiring Hospital Admission during Pregnancy: Effect of Nursing Implication on Its Progress. American Journal of Nursing Research. 7(3).328-341. https://doi.org/10.5430/jnep.v9n5p75
8. **Gabra A., (2019).** Complications of Hyperemesis Gravidarum; A Disease of Both Mother and Fetus, Review Article. Critical Care Obstetrics and Gynecology. iMedPub Journals. 5(1):1-5
9. **Gupta M., Potdar N. and Owen P. (2020).** Thomson AJ. The Management of Nausea and Vomiting of Pregnancy and Hyperemesis Gravidarum. Royal College of Obstetricians RCOG Green-top Guideline. 69. 11-27 ..
10. Gonzalez, M. G., Castro, R. A., & Ferreira, S. C. (2020). Impact of educational interventions on anxiety and quality of life in pregnant women with hyperemesis gravidarum. *International Journal of Gynecology & Obstetrics, 148*(3), 394-399.
11. Havnen, G. C., Truong, M. B., Do, M. L. H., Heitmann, K., Holst, L., & Nordeng, H. (2019). Women's perspectives on the management and consequences of hyperemesis gravidarum - a descriptive interview study. *Scandinavian Journal of Primary Health Care, 37*(1), 30-40.
12. Heitmann, K., Svendsen, E., Sporsheim, I. H., & Holst, L. (2020). Nausea in pregnancy: Prevalence, severity and relation to psychosocial health. *BMJ Open, 10*(7), e037671.

https://doi.org/10.1136/bmjopen-2020-037671

13. Jenabi, E., Bashirian, S., Khazaei, S., & Basirinia, S. (2019). The association between maternal smoking and hyperemesis gravidarum: A meta-analysis. *Journal of Maternal-Fetal & Neonatal Medicine, 32*(14), 2407-2412.
14. Kamali, M., Oskouie, F., Navipour, H., & Vahabi, M. (2018). The effect of education on health practices of pregnant women: An experimental study. *Journal of Education and Health Promotion, 7*(1), 123-130.
15. Kim, D. R., Einarson, A., & Koren, G. (2021). Hyperemesis gravidarum and Wernicke's encephalopathy. *Journal of Obstetrics and Gynaecology Canada, 43*(2), 154-160. https://doi.org/10.1016/j.jogc.2020.05.008
16. Kloter, C., Bruderer Enzler, H., & Gross, M. M. (2019). The effect of acupuncture on hyperemesis gravidarum: A randomized controlled trial. *Journal of Complementary and Integrative Medicine, 16*(2). https://doi.org/10.1515/jcim-2018-0178
17. **Koren G, Boskovic R, Hard M, Maltepe C, Navioz Y, Einarson A. (2002).** PUQE (pregnancy unique quantification of emesis) scoring system for nausea and vomiting of pregnancy. American journal of obstetrics and gynecology.186(5). 228-31.
18. Lee, S., Kim, J., & Lee, K. (2018). Prenatal education and maternal well-being: A systematic review. *BMC Pregnancy and Childbirth, 18*(1), 123-130.
19. Luqmanasari, A. (2018). The effect of providing an educational booklet on the knowledge of pregnant women about hyperemesis gravidarum in Indonesia. *Journal of Midwifery and Reproductive Health, 6*(2), 123-130. https://doi.org/10.22038/jmrh.2018.12289
20. MacGibbon, C. (2020). Hyperemesis Gravidarum Strategies to Improve Outcomes.
21. MacGibbon, K. W., Stronach, S., & Warren, S. L. (2021). Prenatal education and its impact on maternal health outcomes: A systematic review. *Journal of Women's Health, 30*(5), 646-653. https://doi.org/10.1089/jwh.2020.8834
22. Nurmi, M., Rautava, P., & Gissler, M. (2020). Association between prenatal education and pregnancy outcomes: A population-based study. *Scandinavian Journal of Public Health, 48*(4), 398-404. https://doi.org/10.1177/1403494819832938
23. Poeran-Bahadoer, S., Wijntjes, S., & van der Post, J. A. M. (2020). Maternal and neonatal outcomes after exposure to hyperemesis gravidarum: A cohort study. *American Journal of Obstetrics and Gynecology, 222*(3), 283.e1-283.e10. https://doi.org/10.1016/j.ajog.2019.10.106
24. Smith, J. A., White, P., & Wolke, D. (2019). Improving quality of life in pregnant women: The role of prenatal education. *Journal of Pregnancy and Child Health, 66*(1), 104-112.
25. **Smith J.A., Fox K.A. and Clark S.M. (2020).** Patient education: Nausea and vomiting of pregnancy (Beyond the Basics). Available at: https://www. Up-to-date. Com / contents/nausea-and-vomiting-of-pregnancy-beyond-the-basics/print