



WOLKITE UNIVERSITY

**COLLEGE OF MEDICINE AND HEALTH SCIENCE DEPARTEMENT
OF NURSING**

**HYPEREMESIS GRAVIDARUM AND ITS ASSOCIATED FACTORS
AMONG PREGNANT WOMEN ADMITTED TO OBSTETRIC AND
GYNAECOLOGIC CENTER AT WORABE COMPREHENSIVE
SPECIALIZED HOSPITAL, SILTE ZONE, JUNE 2022, ETHIOPIA.**

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**A RESEARCH RESULT TO BE SUBMITTED TO WOLKITE
UNIVERSITY COLLEGE OF MEDICINE AND HEALTH SCIENCE
DEPARTEMENT OF NURSING AS THE PARTIAL FULLFILMENT OF
BACHELOR OF DEGREE SCIENCE IN NURSING**

June 2022,

Worabe, Ethiopia.

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This is to witness the research prepared by "Wakuma Miresa, Musema Dilgeba, and Semerya Chekin" on the research entitled by 'Hyperemesis gravidarum and its associated factors among pregnant women admitted to obstetric and gynecologic center at Worabe Comprehensive Specialized Hospital' Worabe, Ethiopia, June 2022. Facility based cross-sectional study from April 11 to May 11 was conducted as a partial fulfillment of Bachelor Degree in Nursing. Instructions with regulations of the university are met and the accepted standards are achieved. The advisor's recognition on this paper is announced.

Board of Approval

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Acknowledgment

Firstly we would like to express our grateful appreciation to our God who is the base of our knowledge and strength in different circumstances. Special thanks to our advisors Mr. Ayana B. (BScN, MSc in MHN) and Mr. Bisrat Z. (BscN, MscN) for sharing such experience and their initiation for us to do this study. And also we would like to express our deepest gratitude to Wolkite University College of Medicine and health science for giving us this golden chance and letting us experience this study.

Contents

Acknowledgment	III
Acronyms	VI
List of tables.....	VII
List of figure	VIII
Abstract.....	IX
CHAPTER ONE.....	1
1 INTRODUCTION.....	1
1.1 Background of Study.....	1
1.2 Statement problem.....	2
1.3 Significance of study.....	3
CHAPTER TWO	4
2 LITERATURE REVIEW	4
2.1 Epidemiology hyperemesis gravidarum.....	4
2.2 Burdens of Hyperemesis Gravidarum.....	4
2.3 Factors affecting of Hyperemesis Gravidarum (HEG)	5
2.3.1 Socio-demographic factors	5
2.3.2 Obstetrics and gynecology related factors	6
2.3.3 The medical and psychological related factors.....	6
2.3.4 Physiologic factors (Hormonal Aspects)	7
2.3.5 Conceptual framework of factors associated with Hyperemesis Gravidarum.....	8
CHAPTER THREE	9
3 OBJECTIVES OF TH STUDY.....	9
3.1 General objectives	9
3.2 Specific objectives.....	9
CHAPTER FOUR.....	10
4 METHODOLOGY	10
4.1 The Study Area and Period	10
4.2 Study Design	10
4.3 Population.....	10
4.3.1 Source Population	10

4.3.2	Study Unit	10
4.4	Inclusion criteria and Exclusion criteria.....	10
4.4.1	Inclusion criteria	10
4.4.2	Exclusion criteria	11
4.5	Sample size determination	11
4.6	Sampling technique	12
4.7	Data collection tools and procedures	12
4.8	Study Variables	12
4.8.1	Dependent variable	12
4.8.2	Independent variables	12
4.9	Data quality assurance.....	13
4.10	Data processing and analysis.....	14
4.11	Operational Definitions	14
4.12	Ethical consideration	14
CHAPTER FIVE	15
5	RESULTS.....	15
5.1	Socio-demographic characteristics of the respondents	15
5.2	Obstetrics and gynecological characteristics of respondents	15
5.3	Medical and psychological characteristics of respondents	18
5.4	Prevalence of hyperemesis gravidarum.....	18
5.5	Factors associated with hyperemesis gravidarum	19
5.6	Discussion	21
5.7	Conclusion and Recommendation.....	22
5.8	Limitation of the study	23
References	24
Appendix I: Tools of Data Collection	27

Acronyms

CI	Confidence interval
DM	Diabetic Mellitus
ETB	Ethiopian Birr
HCG	Human chorionic gonadotropin hormone
HEERF	Hyperemesis Education and Research Foundation
HEG	Hyperemesis gravidarum
IJWH	International Journals of Women's Health
NGO	Non-Governmental Organization
NIS	New Israel's Shekel
NVP	Nausea vomiting during pregnancy
PUQE	Pregnancy-Unique Quantification of Emesis and Nausea
SNNPE	Southern Nation Nationality of Ethiopia
SPSS	Statistical Package for the Social Sciences
USD	United states dollar
UTI	Urinary tract infection
WCSH	Worabe Comprehensive Specialized Hospital

List of tables

Table 1: Socio-demographic characteristics of the pregnant women admitted to obstetric and gynecologic center at Worabe Comprehensive Hospital, Southern Ethiopia, 2022 16

Table 2: Obstetrics and gynecologic characteristics of the pregnant women admitted to obstetric and gynecologic center at Worabe Comprehensive Hospital, Southern Ethiopia, 2022 17

Table 3: Medical and psychological characteristics of pregnant women admitted to obstetric and gynecologic center at Worabe Comprehensive Hospital, Southern Ethiopia, 2022 18

Table 4. Multivariable logistics regressions results for factors affecting HEG among pregnant women at Worabe Comprehensive Specialized Hospital, Southern Ethiopia, 2022. 20

List of figure

Figure 1: Conceptual framework adapted after reviewing different of literatures	8
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Abstract

Background: Hyperemesis gravidarum is defined as a severe form of nausea and vomiting that occurs during pregnancy and characterized by dehydration, considerable weight loss of 3 kg or 5% or more from pre-conception, and ketonuria. In Ethiopia, especially in Silte Zone, a limited study has been conducted on the assessment of HEG and its determinants. Thus, this study is aimed to determine the prevalence and associated factors for HEG among pregnant women admitted to the obstetric and gynecologic center at Worabe Comprehensive Specialized Hospital.

Objective: To assess the prevalence and associated factors for hyperemesis gravidarum among pregnant women admitted to the obstetric and gynecologic center at Worabe Comprehensive Specialized Hospital from April 11 to May 11, in 2022, Ethiopia.

Methods: Facility-based cross-sectional study design was employed among 254 pregnant women admitted to the obstetric and gynecologic center at Worabe Comprehensive Specialized Hospital from April 11 to May 11 in 2022. PUQE (pregnancy-unique quantification of emesis and nausea) was used to identify severe NVP or HEG. Data was summarized using descriptive statistics, and p-value and adjusted odds ratio (AOR) were used to measure the significance of the association between dependent and independent variables.

Results: In this study, the prevalence of HEG among pregnant women attending at Worabe comprehensive specialized hospital was 5.1% (95% CI; 2.4, 8.1). The result showed that being primigravida (AOR = 9.881; 95% CI: 2.678-36.454), having multiple gestations (AOR=5.548; 95% CI: 1.148-26.806), and having a family history of hyperemesis gravidarum (AOR= 4.982; CI 95%:1.453-17.077) were associated with HEG.

Conclusions and recommendation: The prevalence of hyperemesis gravidarum was determined to be 5.1% (95% CI: 2.4, 8.1). First gestations, twin pregnancies, and having family history of HEG are significant risk factors for HEG. Thus, special consideration including early identification of those mothers during first ANC visiting, counseling for being visited at early stage of nausea and/vomiting is recommended. Furthermore, additional researches are needed on triggering factors, and negative effects associated with hyperemesis gravidarum are needed.

Keywords: Hyperemesis Gravidarum, Pregnant Women, Ethiopia

CHAPTER ONE

1 INTRODUCTION

1.1 Background of Study

Nausea and vomiting of pregnancy (NVP), sometimes known as morning sickness, is one of the most common mild diseases of pregnancy. It normally goes away by the end of the first trimester, but it can sometimes last until birth. During the first trimester, the majority of pregnant women (about 70%–80%) experience some form of NVP. However, hyperemesis gravidarum (HEG) is a pregnancy-related illness characterized by prolonged and excessive NVP, which has a negative impact on the mother's health and renders her unable to do daily tasks [1].

Hyperemesis gravidarum is thus defined as a severe form of nausea and vomiting that occurs during pregnancy and is characterized by dehydration, considerable weight loss of 3 kg or 5% or more from pre-conception, and ketonuria [1, 2]. This could affect the pregnant woman's physical and emotional health, as well as her family's, social, and occupational functioning. It also has an impact on the stages of maternal role development, as well as outcomes for the unborn child such as low birth weight, fluid and electrolyte imbalance, and mothers' nutritional health [3, 4].

Moreover, hyperemesis gravidarum will result in possible severe consequences including nutritional deficiencies such as thiamine and vitamin B1, Mallory-Weiss syndrome, Wernicke's encephalopathy, hypokalemia, and thyroid dysfunction [2]. Furthermore, an increased risk of comorbidity, especially with feelings of depression, anxiety and heartburn, and re-flux problems, also significantly burden women [3, 5]. Similarly, the fetus is also at increased risk of future psychiatric disorders mainly anxiety, depression, and bipolar disorder [4].

Generally, due to its aggressiveness and potentiality of lethal consequence, it needs extensive medical care and hospital admission [6]. Therefore, an extensive and deep study is needed to assess its prevalence as well as its associated risk factors to minimize such morbidities and mortalities.

1.2 Statement problem

Hyperemesis gravidarum is one of the health problems during pregnancy and it affects women's daily lives and is found to have adverse effects on daily life functioning. Worldwide, the prevalence of HEG was found to be between 0.3 and 3.6% with an average of 1.95% [7]. The estimation of HEG varies across countries 0.3%–1.5% in high-income countries and 4.5%–10.8% in low-income countries [8].

In Africa, a study conducted in Nigeria (2019) has shown that the observed prevalence of hyperemesis gravidarum among pregnant women was 44.9% [9]. In Ethiopia, according to the study conducted in Addis Ababa (2013), HEG was prevalent at about 4.4% [10]. Another study conducted in Arba Minch General Hospital (2018) indicated that the prevalence of HEG was 8.2% [11].

The exact or definitive cause and etiologic factor for hyperemesis gravidarum are unknown yet; but multi factorial conditions were identified including genetic, physiological, behavioral, dietary, social, and psychological perception [12]. A research conducted in Public Hospitals of Mekelle City (2019), showed that being a housewife, unplanned pregnancy, family history of hyperemesis gravidarum, H. pylori infection, high perceived stress, and being in the 1st and 2nd trimester of pregnancy were found to be the determinants of hyperemesis gravidarum [13].

Although there were overwhelming studies had been undertaken in different areas of Ethiopia, there is still a gap on the assessment of HEG and its determinants in Silte Zone. Therefore, this study focused on investigating the prevalence of HEG and its associated risk factors among pregnant women attending the obstetric and gynecologic center at Worabe Comprehensive Specialized Hospital (WCSH).

1.3 Significance of study

This study is expected to give insight for health professionals, researchers, government bodies, and Non-Government Organizations (NGOs) about the severity and associated risk factors of HEG in Silte Zone. And also it helps health care providers by adding a bit of awareness on associated risk factors of hyperemesis gravidarum to minimize the adverse outcomes of HEG on mothers and fetus through prevention and early initiation of intervention. In addition all affected and risked mothers might be benefited as the time and costs for hospitalization become minimized. Furthermore, it will provide up-to dated information for other academicians for further studies to be carried out.

CHAPTER TWO

2 LITERATURE REVIEW

2.1 Epidemiology hyperemesis gravidarum

According to recent literature, Globally, the prevalence of HEG is approximately 0.3–3.6% of pregnancies and varies on account of different diagnostic criteria and ethnic variation in study populations[8].The study reported on a Chinese population showed that women of Asian and Middle Eastern ethnicities have been reported to have higher rates of prevalence, even as high as approximately 10% [14]. As it was indicated by a systematic review and meta-analysis in 2019, in low-income countries the prevalence of HEG in pregnancy ranges from 0.3% to 10.8%[8].However, it is important to note that, there are no uniform diagnostic criteria. In Africa, as it was shown in Nigeria (2020), the prevalence of HEG among pregnant women was 44.9% [9].When we review the status of HEG in Ethiopia, as it was stated by research conducted in Addis Ababa (2013) which was 4.4%, and in ArbaMinchi (2018) which was about 8.2% [10, 11].

2.2 Burdens of Hyperemesis Gravidarum

As it was shown by the Hyperemesis Education and Research Foundation (HEERF), HEG can cost estimation of a minimum of \$200 million annually in in-house hospitalizations in the United States[15]. According to a study conducted in Israel, in 2016, the total national economic burden due to HEG was estimated to be 20 million NIS (approximately 5.2 million USD)[16].

The other burden of HEG is maternal and fetal poor health outcomes that necessitate hospital admission like severe nutritional deficiencies, and also the increased risk of co morbidity, especially with feelings of depression, anxiety and heartburn, and reflux problems also pose a significant burden on women. Similarly, the fetus is also at increased risk of future psychiatric disorders mainly anxiety, depression, and bipolar disorder [8].

Generally, as it was concluded by a review of 38 studies, HEG leads to poor quality of life and negatively affects the social, occupational, and domestic life functioning [17]. In addition, a

recent study in Norway shows that about 25% of women with HEG consider terminating the pregnancy and 75% of them lost the willingness to get pregnant again[18]. Moreover recent research in Nigeria (2020), has explained that over one-fourth of the women with HEG considered terminating the pregnancy, and three in four considered not getting pregnant again [9].

2.3 Factors affecting of Hyperemesis Gravidarum (HEG)

There is no clearly identified cause of HEG still even if enormous studies have been done. But different studies agreed on the presence multi factorial causes of HEG. These factors would be socio-demographic, obstetrics, medical & psychological, and physiological contributing factors[4].

2.3.1 Socio-demographic factors

A study conducted in Nigeria implies that the majority (81.4%) of HEG women were between the age of 21 and 35 years [9]. According to current perspectives of the International Journal of Women's Health (IJWH), women with HEG are more likely to be younger, persons of color (more in blacks), and less likely to drink alcohol while body mass index, smoking, and socioeconomic status do not appear to differ significantly between women with HEG and those without [19]. In contrast to this, a study conducted on Norwegian mothers showed that both underweight and obesity were associated with HEG, but only among non-smokers. Maternal pre-pregnant smoking reduced the risk of hyperemesis, whereas the partner's smoking habits had no effect [20].

The study conducted in Bale Zone Hospitals, Southeast Ethiopia has shown that maternal residence, occupational status, and perceived stress illness were associated with HEG during pregnancy [21]. The current study conducted on determinants of HEG among pregnant women in public hospitals of Mekelle City showed that being a housewife was significantly associated with the development of HEG as compared to employed women [13].

2.3.2 Obstetrics and gynecology related factors

According to a study conducted in Addis Ababa, Primigravidity, nulliparity, being unmarried, loss of work and affected relationships were significantly associated with HEG during pregnancy [10]. The study done in public hospitals of Mekelle City has shown that unplanned pregnancy was significantly associated with HEG as compared to a planned pregnancy. The study had also shown that women in the first and second trimesters of pregnancy were more significant to be affected by HEG than those women who were in the third trimester of pregnancy [13].

Another study conducted in Nigeria investigated that previous past history of HEG, has been associated with recurrence of HEG [9]. Another study in Egypt has shown that multiple gestation was significantly associated with HEG. International Journal of Women's Health also reported that multiple gestation and molar pregnancy were risk factors for hyperemesis gravidarum. The study done in Finland showed that the female sex of the fetus was also associated with higher recurrence. However, the recurrence of HEG becomes minimized from prim gravid to multi gravid mothers [22-24].

2.3.3 The medical and psychological related factors

Studies in the Netherlands had shown that *H. pylori*, has also involved in the pathogenesis of HEG; but, only studies of the association are available. Mean that, the association between *H.pylori* and the severity of NVP (not specifically hyperemesis) has been identified [12].Regarding psychiatric history, a Norwegian study published in 2017, determined the association between depression and HEG and noted that a life history of depression was associated with a higher odds ratio (OR) for developing HEG [3].

However, the current studies are targeted at evaluating the development of depression, anxiety, posttraumatic stress disorder, and other psychiatric disorders as an effect of HEG, rather than a cause. One of the important theories on the etiology of HEG which was evaluated in California by Fejzo et al (2019) is the significance of family history in the development of the HEG [25].

2.3.4 Physiologic factors (Hormonal Aspects)

There have been a lot of investigations on the serum levels of human chorionic gonadotropin (hCG), estrogen, and progesterone hormones in relation to HEG, but no conclusive causal relationship has been established yet [12].

A meta-analysis of published studies found a link between rising serum levels of hCG and HEG between 1966 and 2005, noting that 11 of the 18 studies found a positive relationship, although none of them confirmed a probable mechanism or causative relationship. Estrogen has been also connected to HEG mostly because of the link between hyperemesis and illnesses known to have high estrogen levels, such as obesity. Symptoms of nausea and vomiting in women who use oral contraceptives and have high estrogen levels support this etiological explanation[26].

Another research has investigated a possible link between progesterone and the onset of HEG, based on the theory that progesterone, alone or in combination with estrogen, might induce stomach dysrhythmias by lowering the contractility of gastric smooth muscles [27].

Therefore this study is focused to assess the prevalence of HEG and its associated factors among pregnant women admitted to the obstetric and gynecologic centers of Worabe Comprehensive Specialized Hospital.

2.3.5 Conceptual framework of factors associated with Hyperemesis Gravidarum

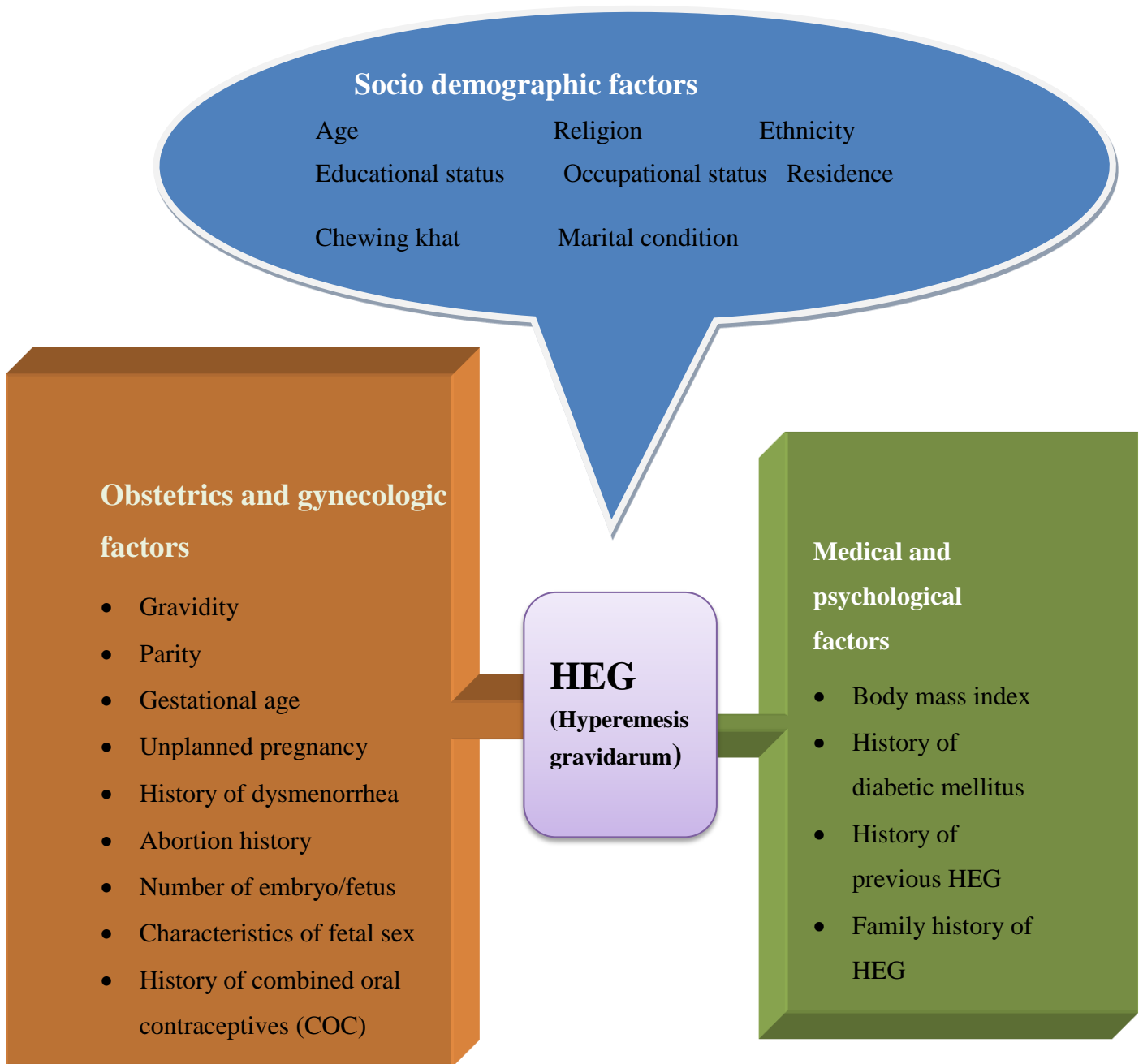


Figure 1: Conceptual framework adapted after reviewing different of literatures (9,10,12, 13,19-25)

CHAPTER THREE

3 OBJECTIVES OF TH STUDY

3.1 General objectives

- ✓ To assess the prevalence of HEG and associated factors among pregnant women admitted to obstetric and gynecologic ward of Worabe Comprehensive Specialized Hospital from April 11 to May 11, in 2022, Ethiopia.

3.2 Specific objectives

- ✓ To assess the prevalence HEG among pregnant women admitted to obstetric and gynecologic ward at Worabe Comprehensive Specialized Hospital from April 11 to May 11, in 2022, Ethiopia.
- ✓ To identify factors associated with HEG among pregnant women admitted to obstetric and gynecologic ward at Worabe Comprehensive Specialized Hospital from April 11 to May 11, in 2022, Ethiopia.

CHAPTER FOUR

4 METHODOLOGY

4.1 The Study Area and Period

Worabe town was established in 1996 E.C in Silte zone SNNP, southern Ethiopia. The town was located 172 km from Addis Ababa to the south direction, 202 km from regional state city Hawassa, and 60 km from Hosanna. Currently, the town had Nine kebeles and Worabe comprehensive specialized hospital is found at 02 kebele. The hospital offers a full range of obstetric, gynecologic, and focused antenatal care services, and has a high volume of maternity patients. During the study period, there were 811 pregnant women who were being visited at WCSH. The data collection was from April 11 to May 11 in 2022.

4.2 Study Design

Facility based cross-sectional study design was employed.

4.3 Population

4.3.1 Source Population

The source population was all pregnant women who have been visited at least one at ANC clinic of obstetric and gynecologic center at WCSH during the study period regardless of gestational age.

4.3.2 Study Unit

Pregnant women who were admitted to obstetrics and gynecologic ward during the study.

4.4 Inclusion criteria and Exclusion criteria

4.4.1 Inclusion criteria

Pregnant women who were admitted to obstetric and gynecologic ward regardless of gestational age and given consent to participate in the study were included in the study.

4.4.2 Exclusion criteria

Pregnant women who were unconscious, who had psychiatric disorders and women who did not give consent for the study were excluded from the study.

4.5 Sample size determination

The sample size was calculated using the single population proportion formula by using the following assumption; prevalence of HEG was assumed to be 8.2% from study conducted in Arba Minch General Hospital, the margin of error of 3% and 95% confidence interval.

$$n = Z^2 p (1-p) / d^2$$

Where n= a minimum sample size, Z= standardized normal distribution curve/value for the 95% confidence interval (1.96), P= proportional prevalence of HEG from study conducted in Arba Minch General Hospital, 2016 [11], and d= the margin of error taken (0.03),

$$n = (1.96)^2 * 0.082 * (1 - 0.082) / (0.03)^2 = 321$$

The total numbers pregnant women during study period were 811. Since the source population was <10,000, using population correction formula the adjusted minimum sample size become:

$$nf = \frac{n}{1 + \frac{n}{N}}$$

Where, N= total pregnant women who attend at WCSH during study period, nf = minimum final sample size.

$$nf = \frac{321}{1 + \frac{321}{811}} = 231$$

Considering 10% non-response rate, 10% of sample size became 23.

$$nf = \frac{10 \times 231}{100} = 23$$

$$\begin{aligned} \text{The final sample size become } & 231 + 23 \\ & = 254 \end{aligned}$$

4.6 Sampling technique

Consecutive sampling technique was used to select the needed number pregnant women with daily monitoring of all new admissions until the sample size was fulfilled.

4.7 Data collection tools and procedures

In this study, a semi-structured questionnaire contained closed-ended questions concerning socio-demographic, obstetrics, medical & psychological, and physiological contributing factors. And also Pregnancy-Unique Quantification of Emesis and Nausea (PUQE) questionnaire was used to identify HEG patients from respondents [28].

All consecutive pregnant women who were hospitalized to obstetric and gynecologic ward and fulfill inclusive criteria were interviewed or studied from April 11 to May 11 in 2022 until the needed sample size was reached. For data collection, 3 midwifery nurses from WCSH were recruited as data collectors and 2 people from principal investigators were assigned as supervisors.

Data was collected after the letter of permission was taken from Wolkite University College of medicine and health science by interviewing admitted pregnant women using the semi-structured questionnaire written in English and also translated to Amharic language for those who cannot understand English language.

4.8 Study Variables

4.8.1 Dependent variable

Hyperemesis Gravidarum.

4.8.2 Independent variables

- **Socio demographic variables:**

- ✓ Age
- ✓ Residence
- ✓ Ethnicity
- ✓ Marital status
- ✓ Religion
- ✓ Educational status
- ✓ Occupational status
- ✓ Chewing habit

▪ **Obstetrics and gynecology related variables:**

- ✓ Gravidity
- ✓ Parity
- ✓ Gestational age
- ✓ Unplanned pregnancy
- ✓ History of dysmenorrhea
- ✓ Abortion history
- ✓ Number of embryo/fetus
- ✓ Characteristics of fetal sex
- ✓ History of combined oral contraceptives (COC)

▪ **The medical and psychological related variable**

- ✓ History of diabetic Mellitus
- ✓ History of hyperemesis gravidarum
- ✓ Family history of hyperemesis gravidarum
- ✓ Body mass index

4.9 Data quality assurance

To control the quality of data, before data collection, training was given for data collectors by principal investigators concerning the objectives of the study and data collection procedures. The pre-test was conducted on 5% of the sample size among pregnant women admitted to obstetric and gynecologic center at Worabe Comprehensive Hospital; then possible modifications were made based on the result of the pre-test. In addition, close supervision was conducted by supervisors.

Finally, a filled questionnaire was checked for completeness and consistency of the data by the principal investigator on a daily basis.

4.10 Data processing and analysis

The data was entered to SPSS-v22 (Statistical Package for the Social Sciences version 22) to be cleaned, coded, and verified. Analyzed data was then represented in frequency and percentages. And also P-value, X²-test, and adjusted odds ratio were used to measure the strength of associations between the selected independent with the dependent variable HEG.

4.11 Operational Definitions

Hyperemesis gravidarum: is NVP which is severe-persistent and manifested with weight loss by more than 3Kg (5%) from pre-pregnancy, dehydration (dryness of tongue and oral mucosa, reduced skin turgor, sunken eyeball), ketonuria (presence of ketone bodies in the urine) and electrolyte imbalance particularly hypocalcemia (when serum potassium level is less than 3.5mmol/L) [4].

PUQE (pregnancy-unique quantification of emesis and nausea): is the questionnaire developed by Koren et al in 2002 which incorporates three questions concerning nausea and vomiting during pregnancy. These questions include how long the patient was felt nauseated or sick to the stomach, how many times the patient vomited, and how many times the patient had retched without bringing anything up. Following that, the patient's replies were split into five categories and rated on scale of one to five depending on the severity the patients' manifestation. After the sum of the PUQE category scores was determined, NVP could be categorized as mild meant that PUQE score of 3-6 points, moderate 7-12, and severe 13 or more points [28].

4.12 Ethical consideration

Ethical approval was first obtained from the Wolkite University College of medicine and health science prior to data collection. Data collectors obtained informed verbal and written consent from individual participants about the purpose and benefit of the study along with their right to refuse the participation. An ethical research design was that which respect autonomy of the subjects and cause no harm and maximal benefit (beneficence) for research activities. Concerning the ethical and moral issues the following issues were addressed in this study:

- ✓ The purpose, procedures and risk of study were explained to participants,
- ✓ Research data was confidential and all participants are anonymous.

CHAPTER FIVE

5 RESULTS

5.1 Socio-demographic characteristics of the respondents

The age of study participants ranged from 18-37 years and majority of the respondents were the age group between 19-24 which accounts about 44.1%. The majority of the women included in this study belongs to Silte ethnic group (75.6%), rural residence (59.4%), farmer (41.3%), primary level of education (43.7%), Muslim followers (84.6%), partnered (98.0%), and no history of chewing (74.4%). ([Table 1](#))

5.2 Obstetrics and gynecological characteristics of respondents

Of 254 pregnant women enrolled in the study majority of them were multigravida (77.2%), multiparous (73.6%), planned pregnancy (92.1%), no history of abortion (91.3%), no history of dysmenorrhea (90.9%), and no history of previous neonatal death (97.2%). The mean gestational age of the respondents was 16 weeks and three days when the majority of them were in the third trimesters which account for about 43.7%. The majority of the pregnancy was singleton (90.9%), undetected fetal sex (49.2%), and not used combined oral contraceptives (96.9%). ([Table 2](#))

Table 1: Socio-demographic characteristics of the pregnant women admitted to obstetric and gynecologic center at Worabe Comprehensive Hospital, Southern Ethiopia, 2022. (n=254)

Characteristics	Category	Frequency	Percentage(%)
Age of the respondents	</=18	2	0.8
	19-24	112	44.1
	25-34	108	42.5
	>/=35	32	12.6
Place of residence	Rural	151	59.4
	Urban	103	40.6
Occupational status	Farmer	105	41.3
	Housewife	60	23.6
	Government employee	37	14.6
	Merchant	47	18.5
	Student	5	2.0
Educational status	Illiterate	61	24.0
	Primary	111	43.7
	Secondary	45	17.7
	High level education	37	14.6
Ethnicity	Silte	192	75.6
	Other	62	24.4
Religion	Muslim	215	84.6
	Orthodox	25	9.8
	Protestant	13	5.1
	Others	1	0.4
Marital condition	Married and live together	249	98.0
	Divorced	5	2.0
History of chewing khat	Yes	65	25.6
	No	189	74.4

Table 2: Obstetrics and gynecologic characteristics of the pregnant women admitted to obstetric and gynecologic center at Worabe Comprehensive Hospital, Southern Ethiopia, 2022 (n=254)

Characteristics	Category	Frequency	Percent(%)
Gravidity	Primigravida	58	22.8
	Multigravida	196	77.2
Parity	Nulliparous	67	26.4
	Multiparous	187	73.6
Unplanned pregnancy	Yes	20	7.9
	No	234	92.1
Abortion history /pregnancy loss before 28 weeks	Yes	22	8.7
	No	232	91.3
History of dysmenorrheal (abnormal menstrual period)	Yes	23	9.1
	No	231	90.9
History of previous neonatal death	Yes	7	2.8
	No	247	97.2
Gestational age	First trimester	62	24.4
	Second trimester	81	31.9
	Third trimester	111	43.7
Number of embryo/fetus	Singleton	231	90.9
	Multiple	23	9.1
Fetal sex	Male	59	23.2
	Female	70	27.6
	Not detected	125	49.2
History of using Combined oral contraceptives (COC)	Yes	8	3.1
	No	246	96.9

5.3 Medical and psychological characteristics of respondents

Majority of the respondents (81.1%) were with body mass index ranges between 18.5-24.5 kg/m², had no history of previous HEG (92.5%), had no family history of hyperemesis gravidarum (74.0 %), and 97.2% had no history of Diabetic Mellitus (Table 3).

Table 3: Medical and psychological characteristics of pregnant women admitted to obstetric and gynecologic center at Worabe Comprehensive Hospital, Southern Ethiopia, 2022 (n=254)

Characteristics	Category	Frequency	Percent (%)
Body mass index of respondents by Kg/m ²	</=18.5	16	6.3
	18.5-24.5	206	81.1
	>/=24.5	32	12.6
	Total	254	100
History of previous hyperemesis gravidarum	Yes	20	7.9
	No	234	92.1
Family history of hyperemesis gravidarum	Yes	66	26.0
	No	188	74.0
History of Diabetic mellitus	Yes	7	2.8
	No	247	97.2

5.4 Prevalence of hyperemesis gravidarum

From 254 pregnant women included in the study, observed prevalence of hyperemesis gravidarum was 5.1% (95% CI: 2.4, 8.1). While 17(6.7%) of the respondents were presented with nausea and vomiting, 237(93.3%) were admitted due to other causes. After being analyzed by Pregnancy-Unique Quantification of Emesis and Nausea (PUQE) among respondents complained with NVP, 2(0.8%) of them became mild, 2(0.8%) were moderate whereas 13(5.1%) of the respondents were identified as severe form of NVP which is also called hyperemesis gravidarum.

5.5 Factors associated with hyperemesis gravidarum

Bivariate logistic regression between independent variables and dependent variables (HEG) was used to select candidate variables for multivariable logistic regression to find associated factors of hyperemesis gravidarum. Body mass index, educational status, ethnicity, number of gravida, number of parity, gestational age, number of fetus, and family history of hyperemesis gravidarum had association on bivariate analysis. Those variables with a P-value of <0.25 in the bivariate analysis were entered to multivariable logistic regression model. By multivariate analysis number of gravida, number of fetus, and family history of hyperemesis gravidarum had association with P-value of < 0.05 .

The result showed that the odds of developing hyperemesis gravidarum was 9.881 (AOR = 9.881; 95% CI: 2.678-36.454) times higher among primigravida compared to multigravida. The odds of developing HEG were 5.548 (AOR=5.548; 95% CI: 1.148-26.806) times higher among mothers having multiple embryos in their uterus compared to women with single pregnancies. The odds of developing hyperemesis gravidarum among pregnant women who had a family history of hyperemesis gravidarum was 4.982 (AOR=4.982; CI 95%:1.453-17.077) times higher as compared to pregnant women who had no family history of hyperemesis gravidarum (Table 4).

Table 4. Multivariable logistics regressions results for factors affecting HEG among pregnant women at Worabe Comprehensive Specialized Hospital, Southern Ethiopia, 2022 (n=254)

Variables	Category	Hyperemesis gravidarum			COR (95%CI)	AOR (95%CI)
		YesN(%)	No N(%)	Total N(%)		
Body mass index	≤18.5	2(15.4)	14(5.8)	16(6.3)	1	1
	18.5-24.5	10(76.9)	196(81.3)	206(81.1)	0.226 (0.019-2.702)	2.078 (0.323-13.348)
	≥24.5	1(7.7)	31(12.6)	32(12.6)	0.632 (0.78-5.113)	1.911 (0.112-32.543)
Education al status	Illiterate	6(46.2)	55(22.8)	61(24.0)	2.918 (0.790-10.775)	2.503 (0.590- 10.617)
	Primary	4(30.6)	107(44.4)	111(43.7)	2.345 (0.451-12.204)	1.559 (0.262-9.274)
	Secondary	2(15.4)	43(17.8)	45(17.7)	3.927 (0.454-33.99)	1.416 (0.137-14.64)
	High level	1(7.7)	36(14.9)	37(14.6)	1	1
Ethnicity	Silte	12(92.3)	180(74.7)	192(75.6)	4.067 (0.518-31.92)	3.214 (0.38-27.185)
	Others	1(7.7)	61(25.3)	62(24.4)	1	1
Gravidity	Primimigra vida	9(69.2)	49(20.3)	58(22.8)	8.816 (2.606-29.828)**	9.881 (2.678-36.454)**
	Multigravi da	4(30.8)	192(79.7)	196(77.2)	1	1
Parity	Nullipara	9(69.2)	58(24.1)	67(26.4)	7.099 (2.18-23.9)*	0.00(0.00-_)
	Multipara	4(30.8)	183(75.9)	187(73.6)	1	
Gestationa l age	First trimester	7(53.8)	55(22.8)	62(24.4)	5.027 (1.006-25.118)*	1.705 (0.273-10.658)
	Second trimester	2(15.4)	79(32.8)	81(31.9)	3.405(0.955-12.133)	1.259(0.269-5.899)
	Third trimester	4(30.8)	107(44.4)	111(43.7)	1	1
Number of fetus	Single	10(76.9)	221(91.7)	231(90.9)	1	1
	Multiple	3(23.1)	20(8.3)	23(9.1)	3.315 (0.843-13.032)	5.548 (1.148-26.806)*
Family history of HEG	Yes	8(61.5)	58(24.1)	66(26.0)	5.048 (1.589-16.035)*	4.982(1.453-17.077)*
	No	5(38.5)	183(75.9)	188(74.0)	1	1

1=reference, *p<0.05, **p<0.001

5.6 Discussion

In this study the prevalence of hyperemesis gravidarum was found to be 5.1% (95% CI: 2.4, 8.1) which is similar with study conducted in Addis Ababa which was 4.4% and 4.8% in Jimma; but less than that of Arba Minch which was 8.2%. In relation to other country in Africa's, study conducted in Nigeria has shown that observed prevalence of hyperemesis gravidarum to be 44.9% which was higher than our study [9,10, 29].

In Norway high prevalence of hyperemesis gravidarum accounting 47% was recorded while lower prevalence of hyperemesis gravidarum, 1.48% was also reported from a large population study in England. This broad difference may be due to a wide variation in the natural response to hormonal changes in pregnancy among the different study populations, in addition the time span in the studies vary. Generally, the result of our study is within the range of the prevalence of hyperemesis gravidarum in low-income countries which ranges from 0.3% to 10.8% [8, 20, 31].

The finding of this study showed that being primigravida, having multiple fetus/embryo, and presence family history of hyperemesis gravidarum were identified as the commonest risk factors of hyperemesis gravidarum.

The result also indicated that the odds of developing hyperemesis gravidarum among primigravida were nine times higher as compared to multigravida. This result is supported by the study conducted in Addis Ababa which stated that becoming first pregnancy was found to be significantly associated with HEG. This may be due to stress and exposure to high levels of HCG for the first time and elevation other stress hormones [10]. In contrast to this, a study conducted in Nijeria showed that there was quite a significant percentage of HEG in those women who were multigravidas than primigravida [9] . The reason behind may be due to the difference in the study area and sample size.

This study also showed that the odds of developing HEG were five times higher among mothers having multiple gestations as compared to women with a single pregnancy. Similar to this study conducted in Japan showed that compared to a singleton pregnancy, pregnancies with multiple fetuses was significantly associated with of hyperemesis. As well as similar ideas was reported

from Egyptians which support this result. These conditions may be due to excessively elevation of HCG hormone released from placenta [24, 30].

The odds of developing hyperemesis gravidarum among pregnant women who had a family history of hyperemesis gravidarum were four times higher as compared to pregnant women who had no family history of hyperemesis gravidarum. In confirmatory to this study conducted in Maqelle public hospitals showed that a family history of hyperemesis gravidarum was found to have a significant association with HEG [13]. This finding contradicts a study conducted in Bale zone, south Ethiopia in which no association was seen between HEG and family history of hyperemesis gravidarum [21]. The possible reason for the difference may be that the family history of hyperemesis gravidarum was based on self-report, which may lead to misclassification. However, this finding is supported by a study conducted in Nijeria which shows that a family history of HEG was found to be a reasonable risk for a pregnant woman to have HEG [9].

5.7 Conclusion and Recommendation

In this study, the prevalence of hyperemesis gravidarum was determined to be 5.1%, which is consistent with other studies in Ethiopia. Prim gravidity, multiple gestations, and having family history of hyperemesis gravidarum have been identified as significant risk factors for occurrence of hyperemesis gravidarum. Generally, the findings of this study have concluded that pregnant women with first gestation, multiple fetus/embryo, and have family history of hyperemesis gravidarum are highly regarded as risks for HEG.

Therefore it is recommended that health care practitioners should give special consideration including early identification of those women with higher risk groups during first ANC visiting. This is the fruitful way to decrease the progression of nausea and vomiting during pregnancy to the complicated hyperemesis gravidarum. Addressing family history of hyperemesis gravidarum should be essential component of history taking during ANC visiting so that adverse outcome of hyperemesis gravidarum can be prevented and controlled as soon as nausea and/vomiting become viable.

This study also suggests that healthcare providers should be aware of the occurrence of hyperemesis gravidarum in women who are carrying multiple fetuses. Additionally, it is important to deliver health education and counseling incorporating the early symptoms of HEG, and the importance of being visited at a health care facility as early as nausea and/vomiting onset. Furthermore, additional researches are needed to assess triggering factors of hyperemesis gravidarum, as well as the negative effects associated with hyperemesis gravidarum are needed.

5.8 Limitation of the study

Some potential risk factors, such as H.pylori infection and a history of molar pregnancy, could not be assessed using this data. Because of the majority of the respondents were in advanced pregnancy and seriously ill at the time of the interview, there was a possibility of information (recall) bias.

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Appendix I: Tools of Data Collection

WOLKITE UNIVERSITY
COLLEGE OF MEDICINE AND HEALTH SCIENCE
DEPARTEMENT OF NURSING

ASSESSMENT OF HYPEREMESIS GRAVIDARUM (HEG) AND ITS ASSOCIATED FACTORS AMONG PREGNANT WOMEN ATTENDING AT OBSTETRIC AND GYNECOLOGIC CENTER OF WORABE COMPREHENSIVE SPECIALIZED HOSPITAL (WCSH), SILTE ZONE, SOUTHERN ETHIOPIA

Information sheet

Hello! My name is _____ I am the member of researchers teams of Wolkite University College of Medicine and Health Science Department of Nursing. Now I am going to conduct a research on the Assessment of Hyperemesis Gravidarum (HEG) and associated factors among pregnant women attending at Worabe Comprehensive Specialized Hospital (WCSH), Silte Zone, SNNP, Ethiopia. You have been invited to participate in this. If you are willing to participate, I will ask you some question concerning Hyperemesis Gravidarum (HEG) or [excessive vomiting during pregnancy] and its associated factors. The interview will last no more than 30 minutes.

Your participation is completely voluntary and there is no associated risk with your contribution. Your name, address and other identification is not mentioned. Are you agree to participate in this study? A. YES B.NO

If your answer is YES, please sign your signature in the space provided below.

Respondents' Signature _____ Date of data collection _____

Data collectors' Name _____ Signature _____

If you want additional information, you can contact the researchers by the following address.

1. Wakuma M. Phone: +251938548789 , Email: wakomiresa5@gmail.com
2. Musema D. Phone: +251929149083
3. Semerya C. Phone: +251916295728

A. Questionnaires

Part I: Socio-demographic characteristics

Please explain your response by encircling on the numbers provided under the remark column.

No	Information	Characteristics	Remark
01	Age in year	≤ 18	1
		19-24	2
		25-34	3
		≥35	4
02	Place of residence	Rural	1
		Urban	2
03	Occupation	Farmer	1
		Housewife	2
		Government employee	3
		Merchant	4
		Student	5
		Others	6
04	Educational status	Illiterate	1
		Primary	2
		Secondary	3
		High level education	4
05	Ethnicity	Silte	1
		Gurage	2
		Others	3
06	Religion	Muslim	1
		Orthodox	2

		Protestant	3
		Others	4
07	Marital condition	Married and Live together	1
		Married but Not live together	2
		Unmarried	3
08	History of chewing khat	Yes	1
		No	2

Part II: Obstetrics and gynecological characteristics of respondents

No	Characteristics		Remark
01	Gravidity	Primigravida	1
		Multigravida	2
02	Parity	Nulliparous	1
		Para one and above	2
03	Unplanned pregnancy	Yes	1
		No	2
04	Abortion history /pregnancy loss before 28 weeks	Yes	1
		No	2
05	History of dysmenorrheal (abnormal menstrual period or cycle)	Yes	1
		No	2
06	History of previous neonatal death	Yes	1
		No	2
07	Gestational age	First trimester	1
		Second trimester	2
		Third trimester	3

08	Number of embryo/fetus	Singleton	1
		Multiple	2
09	Fetal sex	Male	1
		Female	2
		Unknown	3
10	History of using Combined oral contraceptives (COC)	Yes	
		No	

Part III: Medical and psychological characteristics of respondents

No	Characteristics		Remark
1	History of hyperemesis gravidarum	Yes	1
		No	2
2	Family history of hyperemesis gravidarum	Yes	1
		No	2
3	Body mass index	≤ 18.5	1
		18.5-24.5	2
		≥ 24.5	3
4	History of Diabetic mellitus	Yes	1
		No	2

Part IV: Questionnaires to assess HEG condition of respondents.

Please encircle the answer that suit the best your situation for the last 24 hrs.

a. Chief complaint of the patient

No	Question	Remark
Q1	What is the most problem that makes you to seek a care?	1. Nausea and /vomiting
		2. Other complains.
Note! If your answer is '2', leave the next questions. But if your answer is '1'PASS TO THE NEXT QUESTIONS BELOW!		

b. Pregnancy-Unique Quantification of Emesis and Nausea (PUQE) Questionnaires

From total score (15), mild if the score is between 3–6 points, moderate if 7–12 points, severe (HEG) if ≥ 13 points.

No	Questions	Score				
		1	2	3	4	5
Q1	On average in day, for how long do you feel nauseated or sick to your stomach?	Not at all	< 1 hour	1 to 3 hours	3 to 6 hours	> 6 hours
Q2	On average in day, how many times do you vomit or throw up?	Never	1 to 2	3 to 4	5 to 6	≥ 7
Q3	On average in day, how many times have you had retching or dry heaves without bringing anything up?	Never	1 to 2	3 to 4	5 to 6	≥ 7

Modified Pregnancy-Unique Quantification of Emesis and Nausea (PUQE) scoring system from Koen G, Boskovic R, Hard M, MaltepeC, NaviozY, Einarson A, Motherisk- PUQE (Pregnancy-Unique Quantification of Emesis and Nausea) of scoring NVP.

የወልቂጤ ዩኒቨርሲቲ ህክምና እና የጤና ሳይንስ ኮሌጅ የነርቲንግ ዲፓርትመንት

የሃይፐርሜሲስ ግራቪዳረም ስርጭት እና ተያያዥነት ባላቸው ነፍሰ ጡር እናቶች መካከል የፅንሰ እና ማህፀን ህክምና ማእከል በወራሪ ኦሪታላይ ልዩ ሆስፒታል ግምገማ፣ ሲልቴ ዞን ፣ ደቡብ ኢትዮጵያ ሚያዚያ 2014።

የመረጃ መሰብሰቢያ መሳሪያዎች

እኔ የወልቂጤ ዩኒቨርሲቲ ህክምና እና ጤና ሳይንስ የነርቲንግ ትምህርት ክፍል ተመራማሪዎች ቡድን አባል ነኝ። አሁን በወራሪ ኦሪታላይ ስፔሻላይዥድ ሆስፒታል ነፍሰ ጡር እናቶች ላይ ስለ ሃይፐርሜሲስ ግራቪዳረም ግምገማ እና ተያያዥ ጉዳዮች ላይ ጥናት ላካሂድ ነው። በዚህ ጥናት እንድትሳተፉ ተጋብዘዋል። ለመሳተፍ ፍቃደኛ ከሆናችሁ ሃይፐርሜሲስ ግራቪዳረም እና ተያያዥ ምክንያቶችን በተመለከተ አንዳንድ ጥያቄዎችን እጠይቃችኋለሁ። ቃለ-መጠይቁ ከ 30 ደቂቃዎች በላይ አይቆይም. የእርስዎ ተሳትፎ ሙሉ በሙሉ በፈቃደኝነት ነው እና ከእርስዎ አስተዋፅዖ ጋር ምንም ተያያዥነት ያለው አይጋ የለም ። የእርስዎ ስም፣ አድራሻ እና ሌላ መታወቂያ አልተጠቀሰም ። በዚህ ጥናት ለመሳተፍ ተስማምተኛል?

ሀ. አዎ ለ. አይ

መልስዎ አዎ ከሆነ፣ እባክዎን ፊርማዎን ከዚህ በታች ባለው ክፍት ቦታ ላይ ይፈረሙ።

የመላሾች ፊርማ _____ መረጃ የሚሰበሰብበት ቀን _____

የመረጃ ሰብሰቢው ስም _____ ፊርማ _____

ተጨማሪ መረጃ ከፈለጉ ተመራማሪዎችን በሚከተለው አድራሻ ማግኘት ይችላሉ።

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ክፍል አንድ፡- ማህበረ-ሕዝብ ባህሪያት

እባክዎ በአስተያየት አምድ ስር በተሰጡት ቁጥሮች ላይ በመክበብ ምላሽዎን ያብራሩ።

ቁጥር	ጥያቄዎች	ባህሪያት	መልስ
01	ዕድሜ በዓመት	≤ 18	1
		19-24	2
		25-34	3
		≥35	5
02	ቦዲማስ እንዴክስ	≤18.5	1
		18.5-24.5	2
		≥24.5	3
03	የመኖሪያ ቦታ	ገጠር	1
		የከተማ	2
04	ሥራ	ገበሬ	1
		የቤት እመቤት	2
		የመንግስት ሰራተኛ	3
		ነጋዴ	4
		ተማሪ	5
		ሌሎች	6
05	የትምህርት ደረጃ	ያልተማረ	1
		የመጀመሪያ ደረጃ	2
		ሁለተኛ ደረጃ	3
		ከፍተኛ ደረጃ	4

06	ብሄር	ስልጤ	1
		ሌሎች	3
07	ሃይማኖት	ሙስሊም	1
		ኦርቶዶክስ	2
		ፕሮቴስታንት	3
		ሌሎች	4
08	የጋብቻ ሁኔታ	ያገባች እና አብረዋል ያሉ	1
		ያገባች ግን አብረው የማይኖሩ	2
		ያገባች	3
09	የማጩስ ልማድ ታሪክ	አዎ	1
		አይ	2
10	ጫት የመቃም ታሪክ	አዎ	1
		አይ	2

ክፍል II: ምላሽ ሰጪዎች የፅንሰ እና ማህፀን ህክምና ባህሪያት

ቁጥር	ባህሪያት	መልስ	
01	የእርግዝና ብዛት	የመጀመሪያ እርግዝና	1
		ሁለተኛ ወይም ከዚያ በላይ	2
02	በ 28 ሳምንታት ወይም ከዚያ በላይ የእርግዝና ዕድሜ ያለው ፅንሰ የወለዱበት ጊዜ ብዛት	ምንም	1
		አንድ ወይም ከዚያ በላይ	2
03	ያልታቀደ እርግዝና	አዎ	1
		አይ	2
04	የፅንሰ መጨነቅ ታሪክ	አዎ	1

		አይ	2
05	ያልተለመደ የወር አበባ ዑደት	አዎ	1
		አይ	2
06	የቀድሞ አራስ ሞት ታሪክ	አዎ	1
		አይ	2
07	የእርግዝና ጊዜ	የመጀመሪያ ሶስት ወር (1-3 ወር)	1
		ሁለተኛ አጋማሽ (4-6)	2
		ሦስተኛው ሦስት ወር (7-9 ወር)	3
08	የፅንሰ ገዛት	ነጠላ	1
		ሁለት ወይም ሶስት	2
09	የጉሮሮ እርግዝና ታሪክ (ሞላር)	አዎ	1
		አይ	2
10	የፅንሰ ጳታ	ወንድ	1
		ሴት	2
			3
11	የተዋሃዱ የአፍ ውስጥ የእርግዝና መከላከያዎችን የመጠቀም ታሪክ	አዎ	1
		አይ	2

ክፍል III: የመላሸች የሕክምና እና የስነ-ልቦና ባህሪያት

ቁጥር	ባህሪያት	መልስ	
1	በእርግዝና ወቅት የሃይፐርሜሲስ ግራቪዳም ወይም ከባድ ማቅለሽለሽ እና ማስታወክ ታሪክ	አዎ	1
		አይ	2
2	በእርግዝና ወቅት ከባድ እና ቀጣይ የማቅለሽለሽ እና የማስታወክ የቤተሰብ ታሪክ	አዎ	1
		አይ	2
3	የሚታወቅ የጭንቀት ሁኔታ	ዝቅተኛ ውጥረት	1
		መጠነኛ ውጥረት	2
		ከፍተኛ የተገነዘበ ውጥረት	3
4	የመንፈስ ጭንቀት ታሪክ	አዎ	1
		አይ	2
5	ኤች.ፒሎሪ ኢሚውኖግሎቡሊን አዎንታዊ የምርመራ ውጤት	አዎ	1
		አይ	2
6	የስኳር በሽታ ታሪክ	አዎ	1
		አይ	2

ክፍል IV: የተጠያቂዎችን የሃይፐርሜሲስ ግራቪዳም (ሄግ) ሁኔታ ለመገምገም መጠይቆች

እባክትን ላለፉት 24 ሰዓታት ሁኔታዎ የሚስማማውን መልስ ክበቡ።

1. የታካሚው ዋና ምክኒያት

ቁጥር	ጥያቄ	መልስ	
1	ሀክምና እንዲፈልጉ የሚያደርገው በጣም ችግር ምንድነው?	ማቅለሽለሽ እና / ማስታወክ	1
		ሌሎች ቅሬታዎች	2
ማስታወሻ! መልስዎ '2' ከሆነ፣ የሚቀጥሉትን ጥያቄዎች ይተው። ነገር ግን መልስዎ '1' ከሆነ ለቀጣይ ጥያቄዎች ከዚህ በታች ዳፍ!			

**2. Pregnancy-Unique Quantification of Emesis and Nausea (PUQE) Questionnaires
(እርግዝና - ልዩ የማስታወክ እና የማቅለሽለሽ መጠይቆች)።**

ከጠቅላላ ነጥብ (15)፣ ውጤቱ ከ3-6 ነጥብ ከሆነ መለስተኛ፣ መካከለኛ ከሆነ 7-12 ነጥብ፣ ከባድ (HEG) ከ ≥ 13 ነጥብ።

ቁጥር	ጥያቄ	ነጥብ				
		1	2	3	4	5
Q1	በቀን ውስጥ በአማካይ ለምን ያህል ጊዜ የማቅለሽለሽ ወይም የሆድ ህመም ይሰማዎታል?	በፍፁም	< 1 ሰአት	1 to 3 ሰአት	3 to 6 ሰአት	> 6 ሰአት
Q2	በቀን ውስጥ በአማካይ ስንት ጊዜ ያስታውክሻል?	በጭራሽ	1 to 2	3 to 4	5 to 6	≥ 7
Q3	በቀን ውስጥ በአማካይ፣ ምንም ሳታስታውክ ነገር ግን ማቅለሽለሽ ነበረ?	በጭራሽ	1 to 2	3 to 4	5 to 6	≥ 7

Modified Pregnancy-Unique Quantification of Emesis and Nausea (PUQE) scoring system from Koen G, Boskovic R, Hard M, MaltepeC, NaviozY, Einarson A, Motherisk- PUQE (Pregnancy-Unique Quantification of Emesis and Nausea) of scoring NVP.