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Prevalence of hyperemesis gravidarum and associated factors among pregnant women at comprehensive specialized hospitals in northwest Ethiopia: Multicenter cross-sectional study

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Abstract

Background: Hyperemesis gravidarum is one of the problems encountered among pregnant women due to persistent and excessive vomiting starting before the end of the 22nd week of gestation. The current study aimed to assess the prevalence of hyperemesis gravidarum and associated factors among pregnant women at comprehensive specialized hospitals in northwest Ethiopia.

Methods: A multi-facility-based cross-sectional study was conducted at comprehensive specialized hospitals from 1st June 2022 to 30th July 2022. The data were entered using EPI Data Version 4.6 statistical software and analyzed using SPSS Version 26. Descriptive statistics such as frequency, mean, and percentage were calculated. Univariable and multivariable binary logistic regression analyses were carried out to identify the associated factors of hyperemesis gravidarum.

Results: In all, 404 study participants were enrolled. About 16.8% of pregnant women were found to have hyperemesis gravidarum. Age < 20 year (AOR = 3.170; 95% CI: 1.119, 8.980), study participants who cannot read and write (AOR = 5.662; 95% CI: 2.036, 15.7470), grade 1–8 (AOR = 4.679; 95% CI: 1.778, 12.316), and grade 9–10 (AOR = 8.594; 95% CI: 3.017, 24.481), being housewife (AOR = 6.275; 95% CI: 1.052, 37.442), living in urban area (AOR = 2.185; 95% CI: 1.035, 4.609), having previous hyperemesis gravidarum (AOR = 2.463; 95% CI: 1.210, 5.012), having family history of hyperemesis gravidarum (AOR = 2.014; 95% CI: 1.002, 4.047), unplanned pregnancy (AOR = 2.934; 95% CI: 1.030, 8.351), having recent abortion (AOR = 2.750; 95% CI: 1.010, 7.483), and gravidity (AOR = 1.956; 95%CI: 1.023, 3.737) were factors associated with hyperemesis gravidarum.

Conclusion: The prevalence of hyperemesis gravidarum is higher. Low maternal age, lower educational level, being a housewife, being an urban resident, having previous hyperemesis gravidarum, having a family history, having an unplanned pregnancy, and having a recent abortion were significantly associated with hyperemesis gravidarum.

Keywords

Hyperemesis gravidarum, prevalence, associated factors, pregnant women

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Introduction

Hyperemesis gravidarum (HG) is persistent and excessive vomiting starting before the end of the 22nd week of gestation, as defined by the International Statistical Classification of Disease and Related Health Problems, 10th revision.[1] It is the commonest reason for in-hospital admission in the first half of pregnancy, representing a substantial economic burden on the healthcare system.[2] The severe form of HG is characterized by severe nausea and repeated vomiting that prevents oral nutritional intake during pregnancy.[3,4] It is also associated with weight loss[5,6] and may lead to important maternal conditions such as venous thrombosis.[7]

There is a high incidence of nausea and vomiting in early pregnancy (NVP) that affects 50%–90% of pregnant women with HG. In 0.3%–3.6% of cases, clinical intervention is needed.[5,6,8] Even with the high prevalence of NVP and its often self-limiting nature, healthcare providers may tend to give little attention to its impact.[9] Nausea and vomiting are the commonest and earliest gastro-intestinal symptoms observed during pregnancy, with as many as 60% of women getting relief by the end of the first trimester and 90% of pregnant women by the 20th week of gestation, although only one-tenth of women have symptoms that continue throughout pregnancy[4] and close to 5% of women get a solution to these symptoms only after delivery.[10]

The prevalence of HG ranges from as low as 0.3% in Sweden to as high as 10.8% in the Chinese population of pregnant women.[11] For instance, a study done in Malaysia and Eastern Asia reported that the prevalence of HG was 3.6%.[12] A study done in Addis Ababa, Ethiopia, on antenatal care clients of three hospitals reported that the prevalence of HG was 4.4%.[13] In Nigeria, however, a study done in both eastern and northern Nigeria showed a high prevalence of HG of 43.7%, with the eastern (Igbo race) having the highest incidence rate of 53.9% and the northern (Hausa ethnic group) having the least (34.80%).[14] The etiology of HG has been studied, but the causes remain unknown, and it is extremely difficult to predict which clinically important NVP will develop and reoccur in subsequent pregnancies. Multiple pregnancies[15] and a genetic predisposition[16] are all associated risk factors for HG.

Several studies have demonstrated the great impact of HG on health-related quality of life and the increased risk of comorbidity.[17–19] A study done in Batman, Turkey, reported that anxiety, stress, depressive mood, and motor retardation were found to be higher.[20] The risks presented by HG to the fetus included intrauterine growth restriction, premature birth, lower birth weight, small gestational age, and intrauterine fetal death.[21] The other study also showed that HG increased the risk of neural tube defects.[22]

Several factors associated with HG were reported in the previous studies. Fiaschi et al.[23] mentioned that young age, lower socioeconomic status, multiple pregnancies, and history of HG in a previous pregnancy were associated factors for HG. Okuyan et al.[24] found that increased thyroid gland volume in HG pregnant women was significantly associated with lower thyroid-stimulating hormone levels and lower health eating index scores. In a large database analysis from the Wisconsin School of Medicine, early gestational age was associated with an increased risk of HG.[25] On the other hand, Kamalak et al.[26] reported that women with HG had a higher history of previous abortions than the control group. Being unmarried was also associated with HG in Addis Ababa.[13]

As there were no local studies that investigated the prevalence of HG and there were inconsistent associated factors for HG in the previous studies, the current study aimed to assess the prevalence of HG and associated factors among women at comprehensive specialized hospitals (CSH) in northwest Ethiopia.

Method

Study design, setting, and period

A multi-facility-based cross-sectional study was conducted in northwest Ethiopia's CSHs, namely Gondar University CSH at Gondar City, Felege Hiwot CSH at Bahir Dar City, and Debre Markos CSH at Debre Markos Town. The University of Gondar is located in the historical town of Gondar, located 750 km northwest of Addis Ababa in the North Gondar zone of the Amhara National Regional State, and the hospital serves more than 7 million people in the region. Bahir Dar, the capital of the region, is 565 km from Addis Ababa, and the hospital serves the surrounding population, which accounts for about 5 million. Debre Markos is located 300 km from Addis Ababa, and the hospital provides services for an estimated population of 5 million found in the zone and nearby border areas. The study was conducted from 1 June to 30 August 2022.

Source population

All pregnant women who were admitted to the inpatient gynecology and obstetrics wards of compressive specialized hospitals in northwest Ethiopia were the source of the population.

Study population

All pregnant women who were admitted to the inpatient gynecology and obstetrics wards of compressive specialized hospitals during the study period and who met the inclusion criteria were the study population.

Inclusion and exclusion criteria

All pregnant women who were 18 years of age and older, admitted to impatient gynecology and obstetrics wards, and voluntarily participated were included. Those pregnant women with psychiatric problems were excluded.

Sample size and sampling procedure

The sample size was computed using the single population proportion formula ($n=[(Z\alpha/2)2\times P\ (1-P)]/D2$) with the assumption of a 95% level of confidence and a 5% margin of error, taking the prevalence of HG as 44.9% in the Nigerian study,[14] and adding a 5% non-response rate. Based on these assumptions, the final sample size was 404. The total samples were proportionally allocated to the three referral hospitals.

The three CSHs—Gondar University CSH, Felege Hiwot CSH, and Debre Markos CSH—were selected using a lottery method from a total of eight CSHs. All pregnant women admitted during the study period constituted the sample size of the population (Figure 1).

Data collection tool and procedure

A structured questionnaire was used from previous similar studies.[4,27,28] The questionnaire was first developed in English and translated to Amharic, the local language, and then back-translated to the English language. After obtaining written informed consent, a face-to-face interview technique was conducted by the three data collectors. Important data were also obtained by reviewing respondents' medical records or documents.

Statistical analysis

Data were entered using EPI Data Version 3.1 statistical software and analyzed using SPSS (Statistical Package for the Social Sciences) version 26. Descriptive statistics such as frequency, mean, and percentage were calculated. Binary logistic regression analysis was carried out to identify candidate variables for multiple logistic regression ($p<0.2$). Multiple logistic regression analysis was used to identify the associated factors with HG ($p<0.05$).

Data quality control

The questionnaires were checked for consistency, completeness, clarity, and accuracy. Training was given for half a day to the data collectors about the purpose of the study and ethical issues. A test was done among 20 pregnant women in the study area. Minor modifications were made based on the findings of the pretest.

Operational definition

Pregnant women with HG are defined as pregnant women admitted with a diagnosis of HG by a physician.[29]

Pregnant women without HG are defined as pregnant women admitted with a diagnosis of a pregnancy-related problem other than HG by a physician.

Results

Sociodemographic characteristics of study participants

This study comprised 404 women, with a mean age of 27 years, ranging from 18 to 43 years. The majority of participants (216, or 53.5%) fell within the age group of 20–35 years, and over 90% were married. A higher proportion of participants (151, or 37.4%) had a lower educational status. Most participants (312, or 77.2%) resided in urban areas. In addition, the majority (135, or 33.4%) were merchants, with 199 (49.3%) reporting an income greater than 2000 birr (Table 1).

Prevalence of HG

About 68 (16.8%, 95% CI: 13.1, 20.5) pregnant women were found to have HG (Figure 2).

Gynecology history of study participants

The majority (273, or 67.6%) of study participants reported a family history of HG. In addition, 87 (21.5%) pregnancies were unplanned, and nearly one-fourth (94, or 23.3%) of participants had a history of recent abortions. More than half (212, or 52.5%) of pregnant women with HG were primigravidarum. Regarding hospitalization duration, approximately 24 (35.3%) women stayed for 1–3 days, while another 24 (35.3%) stayed for 4–7 days after admission (Table 2).

Factors associated with HG

Age, educational status, occupation, residence, family history, previous HG, unplanned pregnancy, recent abortion, and gravidity were candidate variables (p-value <0.2) for multiple logistic regressions. Finally, younger pregnant women from the age of 18–19 years (AOR = 3.170; 95% CI: 1.119, 8.980), being housewife (AOR = 6.275; 95% CI: 1.052, 37.442), study participants who cannot read and write (AOR = 5.662; 95% CI: 2.036, 15.7470), grade 1–8 (AOR = 4.679; 95% CI: 1.778, 12.316), and grade 9–10 (AOR = 8.594; 95% CI: 3.017, 24.481), respectively, living in an urban area (AOR = 2.185; 95% CI: 1.035, 4.609), having previous HG (AOR = 2.463; 95% CI: 1.210, 5.012), having family history of HG (AOR = 2.014; 95% CI: 1.002, 4.047), unplanned pregnancy (AOR = 2.934; 95% CI: 1.030, 8.351), having recent abortion (AOR = 2.750; 95% CI: 1.010, 7.483), and gravidity (AOR = 1.956; 95% CI: 1.023, 3.737) were significantly associated with HG (Table 3).

Discussion

In this study, we aimed to investigate the prevalence and identify associated risk factors for HG among pregnant

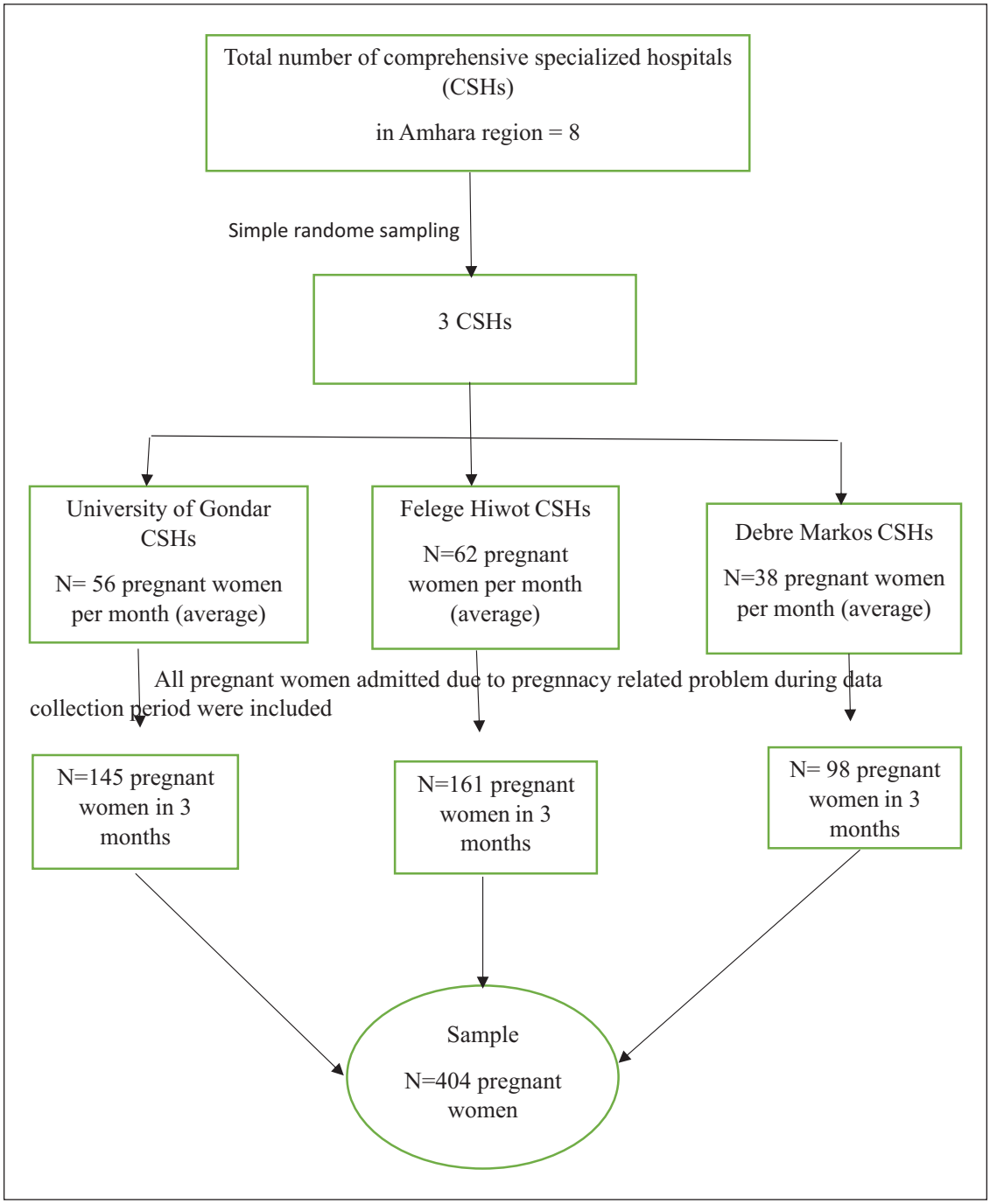

Figure 1. Sampling procedure for Prevalence of HG among pregnant women at comprehensive specialized hospitals in Northwest Ethiopia, 2022 ($n = 404$).

women at CSHs in northwest Ethiopia. HG, characterized by severe nausea and vomiting during pregnancy, often leads to hospital admissions and significantly impacts women's physical, psychological, social, and economic well-being. Early recognition of HG risk factors is crucial for mitigating maternal and perinatal adverse outcomes. Our findings revealed a prevalence of 16.8% for HG in our study population, underscoring the importance of healthcare providers' vigilance in initiating timely interventions to alleviate the burden of this condition on affected individuals and their families. This is lower than the previous study done at the tertiary teaching hospital in Nigeria (44.9%),[14] and the current finding is higher than the previous studies done at Akesta General Hospital, Northeast Ethiopia (11.3%),[30] in Arba Minch General Hospital, Gamo Gofa Zone, Southern Ethiopia (8.2%),[31] at Jimma University

Table 1. Sociodemographic characteristics of study participants at comprehensive specialized hospitals in northwest Ethiopia, 2022 ($n = 404$).

Variable	Category	Frequency (percent)
Age	18–19	68 (16.8)
	20–35	216 (53.5)
	>35	120 (29.7)
Marital status	Married	367 (90.8)
	Single	37 (9.2)
Religion	Orthodox	304 (75.2)
	Muslim	100 (24.8)
Residence	Urban	312 (77.2)
	Rural	92 (22.8)
Educational status	Can't read and write	98 (24.3)
	Less than grade 8	151 (37.4)
	Grade 9–10	113 (28.0)
	Diploma and above	42 (10.4)
Residence	Urban	312 (77.2)
	Rural	92 (22.8)
Occupation	House wife	122 (30.2)
	Farmer	82 (20.3)
	Merchant	135 (33.4)
	Civil servant	65 (16.1)
Income	<1000	129 (31.9)
	1000–2000	76 (18.8)
	>2000	199 (49.3)

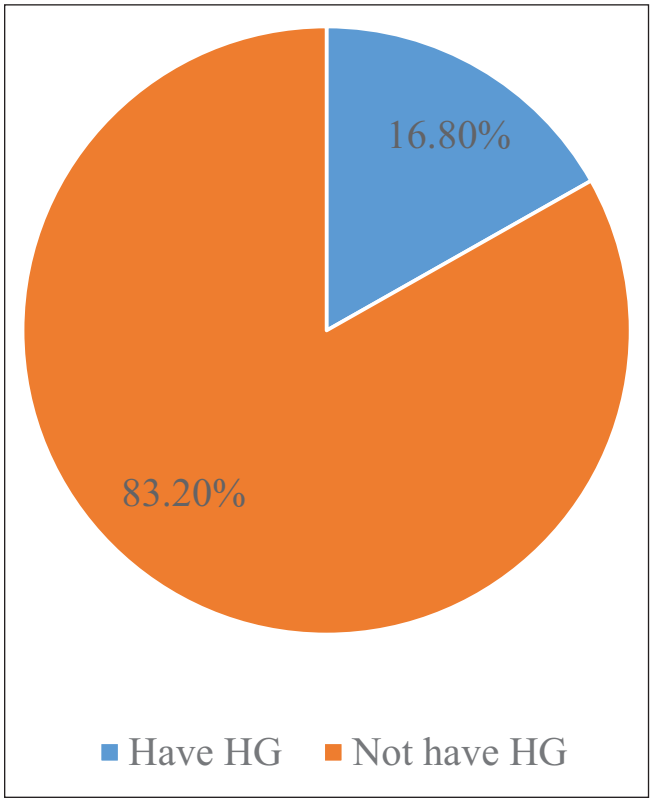

Figure 2. Prevalence of HG among pregnant women at comprehensive specialized hospitals in Northwest Ethiopia, 2022 ($n = 404$).

Medical Center (4.8%),[4] at the three hospitals for antenatal clients in Addis Ababa (4.4%),[13] and in tertiary institutions in Egypt (4.5%).[11] The difference might be due to a wide variation in the natural response to hormonal changes in pregnancy among the different study populations,[32] the difference in methodology, the study period, and the health administration system, as well as environmental conditions and poor socioeconomic status that exposed pregnant women to stress.

Most pregnant women (91.2%) with HG were in the first trimester, and only 8.8% were in the second trimester. This is consistent with other studies that reported that 81.4% and 18.6% of pregnant women with HG were admitted in the first and second trimesters, respectively.[4]

This study stated that more than half (52.5%) of pregnant women were primigravida, which was in contrast to other studies that revealed that less than half of pregnant women (47.1%)[4] and about 36.2%[11] of those pregnant women were primigravida.

In the current study, younger pregnant women with an age range of 18–19 years were three times more likely to develop HG than pregnant women with an age range of more than 35 years. This is in line with another study.[23] This might be due to the fact that younger women had lower endurance to symptoms of HG than older women.

Pregnant women with an educational status of grade ⩽10 were more likely to develop HG than pregnant women with an educational status of having a diploma and above. This is in line with a study done in Norwegian.[33]

Primigravidity was found to be significantly associated with HG. Prigravidarum women were about two times more likely to develop HG than Multigravidarum women. This is consistent with other studies done at Jimma University Medical Center, southwest Ethiopia,[4] in Bahir Dar, Ethiopia[34] that reported that primigravidity was found to be significantly associated with HG, and the other study also showed that nulliparous women had a higher risk of admission for HG compared with parous women.[23] This may be due to exposure to the increasing circulating levels of human chorionic gonadotrophins and other stress hormones of pregnancy, all occurring for the first time. Contrary to this, other studies found that multigravidas with a high percentage of the population were significant risk factors for HG.[14]

In this study, about 45.8% of pregnant women had a history of HG. A pregnant woman with a history of HG was two and a half times more likely to develop HG than a pregnant woman without a history of HG. This is similar to other studies done in Turkish,[26] at Akesta General Hospital, Northeast Ethiopia,[30] and in public hospitals in Guji, West Guji, and Borana zones, Oromia, Ethiopia,[29] which reported that all of the women who experienced HG in a previous gestation also had HG in the present pregnancy. This reason might be due

Table 2. Gynecology history of study participants at comprehensive specialized hospitals in northwest Ethiopia, 2022 ($n = 404$).

Variable	Category	Frequency (percent)
Trimester	First	62 (91.2%)
	Second	8 (8.8 %)
Family history of HG	Yes	273 (67.6)
	No	131 (32.4)
Previous history of HG	Yes	185 (45.8)
	No	219 (54.2)
Unplanned pregnancy	Yes	87 (21.5)
	No	317 (78.5)
Recent abortion	Yes	94 (23.3)
	No	310 (76.7)
Gravidity	Prigravidarum	212 (52.5)
	Multigravida rum	192 (47.5)
Number of children	1	15 (29.4%)
	2	11 (21.6%)
	3	12 (23.5%)
	⩾4	13 (25.5%)
Frequency of admission	First	64 (94.1%)
	Repeat	4 (5, 9%)
Duration of stay	1–3 days	24 (35.3%)
	4–7 days	24 (35.3)
	>7 days	20 (29.4%)

to stress for fear of previous HG and the presence of recurrent risk factors, as well as a genetic predisposition to HG, possibly involving maternal, paternal, and fetal genes.

Those with a family history of HG were two times more likely to develop HG than pregnant women without a family history of HG. This is consistent with the other studies done in Nigeria,[14] in Mekelle,[28] in public hospitals in Guji, West Guji, and Borana zones, in Oromia, Ethiopia,[29] and in Bahir Dar, Ethiopia.[34] This is due to the fact that pregnant women with an HG familial mother or sibling are at increased risk of intractable nausea and vomiting in their pregnancies. Moreover, family-based studies provide evidence that female relatives of patients with a sister with HG are 17 times more likely to develop HG.[35] This finding contradicts a study conducted in the Bale Zone, south Ethiopia, in which no association was seen between HG and family history of HG.[27] The possible reason for the difference might be due to either shared environmental determinants among families or the inheritance of some factors that can contribute to the development of HG.

Being a housewife is six times more likely to be a risk factor for the development of HG than being a civil servant. This is similar to another study done in Bale Zone Hospital, south-east Ethiopia, which found that being employed in either government or private was a low-risk factor for the development of HG,[27] with a study done in Mekelle that reported that employed pregnant women were less likely to suffer from HG compared to housewives[28] and Roseboom et al.[15] reporting that being housewives increased the risk of HG. The possible explanation might be that housewives might be more exposed to vomiting triggers at home. In contrast to this study, other studies done in Turkish found that being employed had no effect on the development of HG.[26] A study carried out in Turkey reported that there was no significant difference among pregnant women in terms of employment.[36]

Residing in an urban area is twice as likely to develop HG as living in a rural area. This is in line with studies done in Bale Zone Hospital, south-east Ethiopia,[27] in public hospitals in southern Ethiopia,[37] and in Bahir Dar, Ethiopia.[34] This might be due to the differences in daily activities and environments between rural and urban areas, where urban dwellers are more exposed to trigger factors than rural dwellers. This finding contradicts a study done in Turkey.

Pregnant women with a recent history of abortion are nearly three times more likely to develop HG than pregnant women with no history of recent abortion. This is similar to another study done in Turkey, which found that pregnant women with a history of previous abortions had a higher incidence of HG.[26] This might be due to stress-induced HG associated with the previous abortion.

Women with unplanned pregnancies were nearly three times more likely to develop HG as compared to women with planned pregnancies. This is similar to other studies done in Mekelle.[28] The possible explanation might be due to the stress and tension of an unplanned pregnancy on their job, education, income, or relationship with their partner. However, this finding contradicts a study done in southern Ethiopia in which no association was seen between HG and unplanned pregnancy.[27]

Limitations of the study

The study's limitations include its inability to establish a cause-and-effect relationship due to its cross-sectional design. In addition, incomplete registration book records limited the inclusion of all parameters used to assess risk factors associated with HG. Moreover, recall bias may have influenced participant responses, potentially affecting the accuracy of the collected data.

Another limitation is the potential for selection bias, as the study only included pregnant women admitted to CSHs. This may have excluded those who sought care elsewhere or did not seek care at all for HG. Furthermore, the study did not assess certain potential confounding factors, such as dietary habits, which could have influenced the prevalence and associated factors of HG.

In addition, there is the potential for information bias, as the data collected from hospital records may not accurately reflect the true prevalence of HG among pregnant women in the community.

Conclusion

The prevalence of HG is higher in the current study. Low maternal age, lower educational level, being a housewife,

Table 3. Univariable and multivariable binary logistic regression of associated factors of hyperemesis Gravidarum among pregnant women at comprehensive specialized hospitals in the northwest, Ethiopia, 2022 ($n = 404$).

Variables	Category	Hyperemesis, gravidarum, *N* (%)		COR (95% CI)	AOR (95% CI)	*p*-Value
		Yes	No			
Age	18–19	8 (11.8)	60 (17.9)	1.778 (0.748, 4.230)	3.170 (1.119, 8.980)	**0.030**
	20–35	37 (54.4)	179 (53.3)	1.147 (0.645,2.041)	1.782 (0.859, 3.697)	0.121
	>35	23 (33.8)	97 (28.9)	1	1	
Educational status	Can't read and write	14 (20.6)	84 (25.0)	4.080 (1.768, 9.418)	5.662 (2.036, 15.7470)	**0.001**
	Grade 1_8	24 (35.3)	127 (37.8)	3.598 (1.691, 7.655)	4.679 (1.778, 12.316)	**0.002**
	Grade 9–10	13 (19.1)	100 (29.8)	5.231 (2.248, 12.174)	8.594 (3.017, 24.481)	**0.000**
	Diploma and above	17 (25.0)	25 (7.4)	1	1	
Occupation	Housewife	13 (19.1)	109 (32.4)	2.515 (1.114, 5.681)	6.275 (1.052, 37.442)	**0.012**
	Farmer	17 (25.0)	65 (19.3)	1.147 (0.523, 2.518)	1.227 (0.239, 6.287)	0.226
	Businessman	23 (33.8)	112 (33.3)	1.461 (0.703, 3.034)	0.413 (0.075, 2.275)	0.291
	Civil servant	15 (22.1)	50 (14.9)	1	1	
Residence	Urban	37 (54.4)	275 (81.8)	3.777 (2.175, 6.560)	2.185 (1.035, 4.609)	**0.040**
	Rural	31 (45.6)	61 (18.2)	1	1	
Family history	Yes	29 (42.6)	244 (72.6)	3.567 (2.085, 6.103)	2.014 (1.002, 4.047)	**0.049**
	No	39 (57.4)	92 (27.4)	1	1	
Previous HG	Yes	19 (27.9)	166 (49.4)	2.518 (1.422, 4.459)	2.463 (1.210, 5.012)	**0.013**
	No	49 (72.1)	170 (50.6)	1	1	
Unplanned pregnancy	Yes	5 (7.4)	82 (24.4)	4.068 (1.583, 10.456)	2.934 (1.030, 8.351)	**0.044**
	No	63 (92.6)	254 (75.6)	1	1	
Recent abortion	Yes	5 (7.4)	89 (26.5)	4.540 (1.769, 11.650)	2.750 (1.010, 7.483)	**0.048**
	No	63 (92.6)	247 (73.5)	1	1	
Gravidity	Prigravidarum	24 (35.3)	188 (56.0)	2.329 (1.354, 4.004)	1.956 (1.023. 3.737)	**0.042**
	Multigravida rum	44 (64.7)	148 (44.0)	1	1	

being an urban resident, having previous HG, having a family history, having an unplanned pregnancy, and having a recent abortion were significantly associated with HG. Therefore, healthcare providers should take HG into account at the first ANC visit. They also should look at modifiable risk factors that might aggravate HG symptoms to decrease maternal and fetal complications associated with HG by providing information on how to minimize these factors. Patients hospitalized with HG need appropriate and urgent management of HG to prevent compilations.

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Authors' contributions

WS and AMS Conception design the work. WS, AMS, AFB, FDS, LWL, and WA develop questionnaire. AMS, MLM, YKA, EAM, and MCW collected the data. DTG, WA, TAT, and MLM analysis the data. WS, AMS, WA, LWL, GKB, and DTG drafted the work. WS, GK, AFB, FDS, YKA AMS, TAT, and DTG substantively revised the work. All authors reviewed the manuscript and agreed on the journal selected for publication.

Availability of data and materials

The dataset is accessible to the corresponding author upon reasonable request.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Ethics approval and consent to participate

The study was carried out after the proposal had been approved by the School of Pharmacy ethical review committee of the University with reference number SOP/2013. Written informed consent was obtained from all participants included in the study (for illiterate participants, consent was obtained by reading it and putting their sign with their fingerprint). All methods were carried out in accordance with the Declaration of Helsinki.

Consent for publication

Not applicable.

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Supplemental material

Supplemental material for this article is available online.

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