

NAUSEA AND VOMITING OF PREGNANCY AND ITS CONTROL MEASURES AS SEEN IN TWO TERTIARY CARE FACILITIES IN SOUTHWEST NIGERIA

Sonibare OO¹, Ahmed AA², Olajubu TO², Bello IS², Awowole IO³, Caitlin D⁴,
Adekanle DA⁵, Bello SO⁶, Adepoju DA⁷, Anjorin AO², Anjorin AO⁸.

1. Department of Morbid Anatomy and Histopathology, Osun State University Teaching Hospital, Osogbo, Osun State.
2. Department of Family Medicine, Obafemi Awolowo University Teaching Hospitals Complex, Ile Ife, Osun, State, Nigeria.
3. Department of Obstetrics and Gynaecology, College of Health Sciences, Obafemi Awolowo University, Ile Ife, Osun State, Nigeria.
4. Pregnancy Sickness Support, Dunmore Farm, Par, Cornwall, PL24 2TU, United Kingdom.
5. Department of Obstetrics & Gynaecology, College of Health Sciences, Osun State University, Osogbo, Osun State, Nigeria
6. Faculty of Clinical Sciences, College of Health Sciences, Obafemi Awolowo University, Ile Ife, Osun State, Nigeria
7. Department of Health Informatics, Iyiola Hospital, Ile-ife, Osun State
8. Department of Morbid Anatomy, University Osun Teaching Hospital, Osogbo

Corresponding Author

Name: Ahmed Abdulakeem A.

Email: ahmediganna@gmail.com

Department of Family Medicine, Obafemi Awolowo University Teaching Hospitals Complex, Ile Ife, Osun, State, Nigeria.

Abstract

Background: Due to the concerns about the possible harmful effects of medications on fetuses, pregnant women prefer to control the symptoms of Nausea and Vomiting during pregnancy by personal, familial, and traditional measures. The Objective of the study is to identify the control measures that pregnant women use with NVP and determine its impact on their daily lives.

Method: A cross-sectional descriptive survey of pregnant women at two Hospitals in Osun state was conducted. Five hundred pregnant women were recruited, and data was collected using a pre-tested questionnaire to elicit information on socio-demographic characteristics, control measures of NVP and its impact on daily life. Frequencies and proportions were generated for socio-demographic variables, control measures of NVP and its effects on everyday life.

Results: 352 (70.4%) women experienced the symptoms of NVP. The most frequently taken agent for the control of NVP was chewing gum 145 (41.2%). Other interventions include sweets 82 (23.2%), bitter kola 72 (20.5%), prescription and over-the-counter (OTC) drugs 63 (17.9%), bitter leaf 54 (15.3%), ginger 43 (12.2%) and kola nut 29 (8.2%). NVP affected the daily activities of 53.8%, while 81.9% were discouraged from getting pregnant again due to the symptoms. However, 18 (5.1%) have ever considered terminating a pregnancy due to NVP.

Conclusion: There was a high incidence of NVP among the respondents. Most respondents perceived that NVP affected their daily lives with a severe impact on their intent to become pregnant again.

Keywords: Nausea and Vomiting of Pregnancy, Control Measures, Tertiary Care Facilities, Complementary and Alternative Therapy.

Introduction

Nausea and vomiting of pregnancy (NVP) usually start shortly after conception and have become known as one of the indicative symptoms of pregnancy.¹ It is a common symptom that happens early in pregnancy, and its exact aetiology remains elusive and likely to be multifactorial. Recent research has identified GDF 15 appetite and growth factor genes as likely causes.² Severity varies from mild nausea to severe vomiting. Symptoms may be triggered by the sight or odour of some foods and can greatly affect quality of life.³ NVP is an almost inevitable feature of pregnancy, which usually emerges between the 4th and 7th week of gestation, reaches its peak between the 8th and 12th week and usually recedes between the 16th and 20th week,⁴ while 20 to 30% of women may experience these symptoms throughout pregnancy.^{1,5} A meta-analysis of reported prevalence of NVP confirms a mean rate of 70% and a widely varying rate between 35% and 91% across reports.^{4,5,6}

The incidence of NVP also varies across different countries.⁵ It has been associated with race and ethnicity, and the reason is unknown. Still, it has been proposed that important socioeconomic variables could account for the difference in incidence between ethnic groups.^{7,8} It has also been speculated that genetic factors may explain the difference in incidence and severity among ethnic groups.⁹ The

unpleasant feeling of nausea and vomiting can be the source of considerable distress, discomfort and temporary disability to women, even when the symptoms are not severe.⁴ Women may suffer from physical, social and emotional isolation due to fear of losing control and needing help.¹⁰ They may lose their confidence and may constantly be afraid of getting sick.¹⁰ They may also have difficulty in performing their routine tasks at home or work due to the fear of vomiting in the presence of others.^{1,4,11} The symptoms may cause impatience, irritability, anxiety, sleep disorders and psychological turbulence with altered family, social and occupational functioning.¹²

Despite the significant impact of this condition on the overall well-being of pregnant women, concerns about the possible harmful effect of medications on the fetus may cause many women not to seek treatment.^{13,14} Hence, they prefer to control their symptoms by personal, familial and traditional measures.^{4,10} Various non-pharmacological methods are highly popular among pregnant women because such practices are considered natural and, therefore, harmless.¹¹ The control measures used by women with NVP to alleviate or stop the symptoms include diet, herbal remedies, lifestyle modification, and other alternative therapies and drugs.¹⁵ A study revealed that half of the women with NVP used anti-emetic

herbal remedies such as peppermint, ginger and cannabis to alleviate their symptoms.¹⁶ However, for severe symptoms, there is evidence that using alternative therapies delays access to necessary medical intervention and may have a detrimental psychological effect.¹⁷

Lack of treatment on some occasions may lead to severe consequences warranting hospitalisation with potential emotional, social and financial costs, as well as loss of a wanted pregnancy.^{18,19} There is a clear need to understand better how women manage NVP in this environment, since there is a dearth of this study in Osun state and many other communities in Nigeria. This study aims to determine the impact of NVP on the daily lives of pregnant women, and to identify the control measures used by women with NVP in Osun state, Southwest Nigeria. The information from the study may be helpful as part of a comprehensive management programme for pregnancy care. In addition, the study will provide an estimate of the burden of NVP on women's well-being.

METHODOLOGY

Study Location

This study was conducted in Osun State, Southwestern Nigeria. The state has a population of 3,423,535 by the 2006 census and a land mass of about 14,875 square kilometres. The inhabitants essentially belong to the Yoruba ethnic group, and trading is the main occupation of most of the people. The two tertiary healthcare delivery centres in the State provides comprehensive and specialised services for people of all ages and serves as the highest level of referral for primary and secondary health centres in the state and other states in the Southwest geopolitical zone of Nigeria. The two public health facilities were used for data collection for this study.

Study Population

The study population were pregnant women at the Obstetrics and Gynaecology Department of the two health institutions during the three-month study period.

Study Design

This study was a cross-sectional descriptive survey.

Sample Size

The minimum sample size was calculated using the Leslie Kish formula cited by Araoye:²⁰

$$\text{where, } n = \frac{z^2 pq}{d^2} \quad (1)$$

n= minimum sample size

Z= standard normal deviation set at 1.96, which corresponds to the 95% confidence level

d= degree of accuracy desired (set confidence interval) at 0.05

p = Estimate of the incidence of nausea and vomiting of pregnancy (NVP). An adequate and reliable minimum sample size was determined using the incidence of NVP derived from a study carried out among Nigerian women, which was 60.5%.¹⁵

$$q = 1 - p \quad (2)$$

$$n = \frac{1.96 \times 1.96 \times 0.4 \times (1 - 0.4)}{0.05 \times 0.05} \quad (3)$$

Thus, n= 369

The minimum sample size was 369

However, 500 pregnant women were included in the study to make up for attrition.

Sampling technique

A convenience sampling technique was employed to select respondents for the study until the sample size was attained.

Inclusion Criteria

All consenting pregnant women at the Obstetrics and Gynaecology Department during the study period were recruited.

Exclusion Criteria

All acutely ill pregnant women during the study period were excluded in order to receive urgent care.

Study Protocol

Data Collection Techniques

An interviewer-administered questionnaire was developed based on the authors' study objectives and literature search, assisted by the opinions of other professional colleagues. The questionnaire was translated into Yoruba language and back-translated into English language by a Yoruba linguistic professional to ensure consistency. The investigator recruited and trained five resident doctors on the contents of the questionnaire and data collection. They were adequately supervised during data collection to limit errors. The questionnaires were all checked for completeness and appropriateness of responses. The first section included the demographic data. The second section comprises questions related to the control measures of NVP and its impact on daily life. The questionnaire was validated for ease of comprehension and relevance to the study by pre-testing it among 10 pregnant women, and appropriate corrections were made. After a brief introduction on the purpose of the study, the questionnaire was administered to all eligible pregnant women until the calculated sample size was achieved.

Data analysis

Data was analysed using the IBM Statistical Package for Social Science (IBM SPSS) version 20.0. Summary of statistics were presented using mean, median and standard deviation for continuous variables and frequency/percentages for categorical variables.

Ethical Considerations

Written informed consent was obtained from the respondents, and confidentiality of the information provided was maintained. Ethical clearance was obtained from the Ethics and Research Committees of

the two health institutions. Participation in the study was voluntary, and respondents were informed that they may withdraw from the study at any stage of the project without any consequences.

Research funding

The investigators funded the research.

Results

Socio-demographic characteristics of respondents

A total of 500 pregnant women participated in the study. Most 112 (35.1%) of the women were aged 30-34 years, 73.4% were in their third trimester, and 64.3% were multigravida. The majority 284 (89.0%) were of Yoruba tribe, 68.7% had tertiary education, 75.9% had a monthly family income of $\geq$ ₦30,000:00 while 98.7% were married. (Table 1)

Table 1: Socio-demographic characteristics of the respondents.

Variables	Frequency (n=500)	Percentage (%)
Age (years)		
<25	63	19.7
25- 29	94	29.5
30-34	112	35.1
> 35	50	15.7
Marital Status		
Never Married	4	1.3
Married	315	98.7
Religion		
Christianity	240	75.2
Islam	79	24.8
Tribe		
Hausa	9	2.8
Igbo	12	3.8
Yoruba	284	89.0
Itsekiri	14	4.4
Employment Status		
Employed	291	91.2
Unemployed	28	8.8
Spouse Employment Status		
Employed	306	95.9
Unemployed	13	4.1
Level of Education		
No formal Education	2	0.6
Primary Education	4	1.2
Secondary Education	94	29.5
Tertiary Education	219	68.7
Monthly Family Income (Naira)		
< ₦30,000	77	24.1
$\geq$ ₦30,000	242	75.9
Gravidity		
Primigravida	114	35.7
Multigravida	205	64.3
Trimester		
1 st	14	4.4
2 nd	71	22.3
3 rd	234	73.4

Incidence of nausea and vomiting of pregnancy

Majority 352 (70.4%) of the women experienced nausea, vomiting and excessive salivation during pregnancy. (Table 2)

Table 2: Incidence of nausea and vomiting of pregnancy among respondents

Symptoms	Frequency (n=500)	Percentage (%)
None	148	29.6
Nausea Only	45	9.0
Vomiting Only	67	13.4
Excessive Salivation Only	47	9.4
Nausea and Vomiting	78	15.6
Nausea and Excessive Salivation	20	4.0
Vomiting and Excessive Salivation	33	6.6
Nausea, Vomiting and Excessive Salivation	62	12.4

Control measures for nausea and vomiting of pregnancy.

Among the respondents, 66 (18. 8%) did not take any form of control measures, while others took a wide range of dietary, herbs, complementary and alternative therapies, and drugs. Chewing gum, either taken alone 65 (18.5%) or in combination with other measures 80 (22.7%), was the most frequently taken agent for the control of NVP. Other measures taken include sweets 82 (23.2%), bitter kola 72 (20.5%), drugs 63 (17.9%), bitter leaf 54 (15.3%), ginger 43 (12.2%) and kola nut 29 (8.2%). (Table 3)

Table 3: Control measures of nausea and vomiting of pregnancy of respondents

Measures	Frequency (n=352)	Percentage (%)
None because I felt it was normal	66	18.8
Chewing gum	65	18.5
Drugs	32	9.1
Chewing gum, Sweets	27	7.6
Bitter kola	25	7.1
Sweets	17	4.8
Bitter kola, Bitter leaf, Chewing gum, Ginger, Sweets, Kola nut, Drugs, *Others	16	4.5
Bitter leaf	12	3.4
Ginger	7	2.0
Bitter kola, Chewing gum, Ginger, Sweets	7	2.0
Bitter kola, Sweets	6	1.7
Chewing gum, Drugs	6	1.7
Kola nut	3	0.8
Bitter leaf, Chewing gum, Drugs	3	0.8
Bitter kola, Kola nut	3	0.8
Bitter leaf, Sweets	3	0.8
Bitter kola, Bitter leaf, Kola nut	3	0.8
Bitter leaf, Chewing gum	3	0.8
Bitter leaf, *Others	2	0.6
Bitter kola, Bitter leaf	2	0.6
Bitter kola, Chewing gum, Drugs	2	0.6
Chewing gum, Sweets, Drugs	2	0.6
Bitter kola, Chewing gum, Ginger, Drugs	2	0.6
Chewing gum, Ginger	2	0.6
Bitter kola, Bitter leaf, Chewing gum, Ginger	2	0.6
Bitter leaf, Chewing gum, Ginger, Sweets	2	0.6
Bitter leaf, Chewing gum, Kola nut	2	0.6
Bitter kola, Bitter leaf, Chewing gum, Kola nut	2	0.6
Bitter kola, Bitter leaf, Chewing gum, Sweets	2	0.6
Avoid eating food	2	0.6
*Others	24	6.8

*Others (Fruits, rest, lemon drink, biscuit, fluid intake)

Impact of nausea and vomiting of pregnancy

Among the respondents, 30.5% presented in the hospital for care of NVP while 6.8% were admitted for its' care. Fifty-eight percent of the respondent felt NVP prevented them from performing their home chores and 53.4% said it affected their daily activities. About 40.1% of the respondent said NVP caused them to stay away from work, 29.8% felt they had lost weight due to NVP while 34.8% said it affected their quality of life. Among the respondents, 81.8% were discouraged from getting pregnant again due to the symptom of NVP and 5.1% have ever considered terminating a pregnancy due to NVP. (Table 4)

Table 4: Impact of Nausea and Vomiting on the daily lives of the respondents

Variables	Response n (%)	
	Yes	No
Did you present in the hospital for treatment?	139 (30.5)	213 (60.5)
If yes, were you admitted to the hospital for NVP?	24 (6.8)	328 (93.2)
Does the symptoms of NVP cause you to stay away from work?	141 (40.1)	211 (59.9)
Does the symptom of NVP stop you from performing home chores such as cooking, cleaning and family care?	204 (58.0)	148(42.0)
Are you discouraged from getting pregnant again due to the symptoms of NVP?	288 (81.8)	64 (18.2)
During this pregnancy, have you lost weight at any time as a result of NVP?	105 (29.8)	247 (70.2)
Do the symptoms of NVP affect your daily activities?	188 (53.4)	164 (46.6)
Do the symptoms of NVP affect your quality of life?	126 (35.8)	226 (64.2)
Have you ever considered terminating a pregnancy due to NVP?	18 (5.1)	334 (94.9)

Discussion

This study aimed to determine the control measures of nausea and vomiting of pregnancy (NVP) and its burden on the lives of the women studied. A high incidence of 70.4% of NVP was observed among the women. Similarly, a high incidence of NVP was also reported in some studies done among Chinese populations: 71.8%²¹, 84.1%²² and 90.9%.²³ However, a low incidence of 49.2% was found in another study done in Nigeria.⁷ The differences in the incidence rates could be due to differences in the samples of the studies.

Among the respondents, 18.8% took no measures to relieve NVP because it was considered normal and self-limiting, even though it affected their daily lives. Among the various measures taken to control NVP by the respondents, chewing gum (flavoured with mints) was the striking measure used by 41.2% of the respondents; it was either taken alone or in combination with other agents. Conversely, only 4.7% of respondents in a study done in Nigeria used chewing gum as a control measure for NVP.¹⁵ Chewing gum has previously been shown to improve recovery of gastrointestinal function after abdominal surgery, with a shorter time to flatus, reduced post-operative ileus and early feeding.²⁴ In one pilot trial, it was shown that chewing gum was not inferior to ondansetron for the treatment of postoperative nausea and vomiting (PONV) after general anaesthesia for laparoscopic and breast surgery in female patients.²⁵ The patients reported a high degree of satisfaction due to its effects on promoting saliva secretion and freshening breath after a period of fasting. Chewing gum has also been linked to lower cortisol concentration, improved stress and anxiety, and more

positive mood in a research setting.^{26,27}

Contrariwise, another study found no significant difference in the rates of postoperative nausea and vomiting (PONV) 24 hours after lower segment caesarean section (LSCS) under spinal anaesthesia between patients receiving standard care and patients receiving supplementary chewing gum postoperatively.²⁸ The inconsistent findings in these studies might be due to other factors. Peppermints (*Mentha piperita*), known to impart sensations of coolness and freshness, has been shown to have effects on gastric emptying. However, the literature showed evidence of both increasing and decreasing gastric motility.^{29,30} In this study, the choice of chewing gum (flavoured with mint) might be due to being self-administered with a sweet and minty taste, readily accessible, relatively cheap, familiar and without storage considerations. Another frequently used measure in this study was bitter kola (*Garcinia kola*), which was taken alone or combined with other agents by 20.5% of the respondents. Similarly, 22.9% of respondents in another study done in Nigeria used bitter kola (*Garcinia kola*) as a control measure for NVP.¹⁵ This could be because bitter kola (*Garcinia kola*) is one of the common herbs used in these environments.

Treatment for NVP usually begins with non-pharmacological agents, and those commonly consumed include ginger, peppermint, chamomile, raspberry, cranberry, valerian, garlic and fenugreek.³¹⁻³³ Ginger is the single non-pharmacological intervention recommended by the American College of Obstetrics and Gynaecology,³⁴ but only 7.6% of the respondents in this study used it for the treatment of NVP. This could be because the use of ginger as an alternative medicine to control NVP was unknown to most respondents.

Drug was taken alone or in combination with other measures by 17.9% of the respondents. Similarly, in a study done in Nigeria, the use of drugs was observed in about 3% of the respondents.¹⁵ Contrariwise, in a study done in Canada, over 60% of the respondents took pharmacologic agents for the treatment of NVP.³⁵ The differences in the study findings might be due to a persistent fear of teratogenic risk with the use of drugs among respondents. In this study, most respondents reported that NVP affected an important part of their daily lives, as shown by their inability to perform domestic chores and family care, with discouragement in their willingness to become pregnant again. This is similar to the findings of other studies.³⁶⁻³⁸ Despite the negative effects of NVP on the respondent's quality of life, the majority did not consider termination of pregnancy (TOP). This aligns with a Canadian study which showed that though TOP occurred among its study population due to the burden of NVP, over 80% of them never considered TOP.³⁹

Limitation of Study

Self-reported data may reflect the desirability of responses, and this may subject the study to response bias. This was minimised by using an interviewer-administered data collection method. The

generalizability of the findings is limited as the results may be in the context of the culture and environment of the study area; however, the study could be helpful as part of a comprehensive management programme for pregnancy care.

Conclusion

There was a high incidence of NVP among the respondents, and chewing gum was the most commonly used agent for its control. Other measures used were sweets, bitter kola, drugs, bitter leaf, ginger, and kola nut, among others. Most respondents perceived that NVP affected their daily lives with a severe impact on their intent to become pregnant again.

References

- Gadsby R, Ivanova D, Trevelyan E, Hutton J, Johnson S. The onset of nausea and vomiting of pregnancy: a prospective cohort study. *BMC Pregnancy Childbirth* 2021;**21**(1):10.
- Fejzo MS, MacGibbon KW, First O, Quan C, Mullin PM. Whole-exome sequencing uncovers new variants in GDF15 associated with Hyperemesis gravidarum. *BJOG* 2022. <http://doi.org/10.1111/1471-0528.17129>. Accessed 27th November, 2023.
- Heitmann K, Nordeng H, Havnen GC, Solheimsnes A, Holst L. The burden of nausea and vomiting during pregnancy: Severe impacts on quality of life, daily life functioning and willingness to become pregnant again – results from a cross-sectional study. *BMC Pregnancy Childbirth* 2017;**17**(1):75.
- Khresheh R. How women manage nausea and vomiting during pregnancy: a Jordanian study. *Midwifery* 2011;**27**:42-5. <http://doi.org/10.1016/j.midw.2009.12.002>. Accessed 27th November, 2023.
- Einarson TR, Piwko C, Koren G. Quantifying the global rates of nausea and vomiting of pregnancy: a meta-analysis. *J Pop Ther Clinl Pharm (Journal de la Therapeutique des Populations et de la Pharmacologie Clinique)* 2012;**20**(2):e171-83.
- Matthews A, Haas DM, O'Mathuna DP, Dowswell T, Doyle M. Interventions for nausea and vomiting in early pregnancy. *Cochrane Database Syst Rev* 2014;**3**:CD007575.
- Wodi C, Danborn B, Sunday AS, Eze UA. Incidence of nausea and vomiting of pregnancy among Nigerian women. *Sch J App Med Sci* 2014;**2**(ID):413-21.
- Louik C, Hernandez-Diaz S, Werler MM, Mitchell AA. Nausea and vomiting in pregnancy: maternal characteristics and risk factors. *Paediatr Peri Epi* 2006;**20**:270-78.
- Vikanen A, Skjaerven R, Grjibovski AM, Gunnes N, Vangen S, Magnus P. Recurrence of hyperemesis across generations: population-based cohort study. *BMJ* 2010;**340**:c2050.

10. Shakiba M, Parsi H, Pahlavani SZ, Navidian A. The effect of Psycho-Education intervention based on relaxation methods and guided imagery on nausea and vomiting of pregnant women. *J Fam Reprod Health* 2019;13(1):47-55.
11. Isbir GG, Mete S. The effect of counseling on nausea and vomiting in pregnancy in Turkey. *Sex Reprod Health* 2016;7:38-45.
12. Nikibakhsh A, Neisani samani L, Keshavarz M, Hoseini F. Incidence and severity of nausea and vomiting during pregnancy and its association with anxiety and depression in pregnant women. *Iran J Nurs* 2016;29:1-11.
13. Madjunkova S, Maltepe C, Koren G. The leading concerns of American women with Nausea and Vomiting of Pregnancy calling Motherisk NVP Helpline. *Obstet Gynaecol* 2013;5:752980. <http://doi.org/10.1155/2013/752980>. Accessed 26th November, 2023
14. Mazzotta P, Magee LA, Maltepe C, Lifshitz A, Navioz Y, Koren G. The perception of teratogenic risk by women with nausea and vomiting of pregnancy. *Reprod Toxicol*. 1999;13(4):313-319. [http://doi.org/10.1016/s0890-6238\(99\)00018-0](http://doi.org/10.1016/s0890-6238(99)00018-0). Accessed 26th November, 2023
15. Ahwinahwi US, Odili VU, Esirorie O. Incidence and self-care of nausea and vomiting among pregnant women attending a maternal clinic. *UK J Pharm & Biosci* 2016;4(4):12-8. <https://www.ukjpb.com>. Accessed 21st April, 2022.
16. Westfall RE. Use of anti-emetic herbs in pregnancy: women's choices, and the question of safety and efficacy. *Complement Ther Nurs midwifery* 2004;10(1):30-6.
17. Dean CR, O'Hara ME. Ginger is ineffective for Hyperemesis gravidarum, and causes harm: an internet based survey of sufferers. *MIDIRS Midwifery Digest* 2015;25(4):449-55.
18. Dean C, Murphy C. I could not survive another day: Improving treatment and tackling stigma: lessons from women's experiences of abortion for severe pregnancy sickness. London: Pregnancy Sickness Support and BPAS; 2015.
19. Nana M, Tyderman F, Bevan G, Boulding H, Kavanagh K, Dean C, Williamson C. Termination of wanted pregnancy and suicidal ideation in Hyperemesis gravidarum: A mixed methods study. *Obstet Med* 2021.
20. Araoye MO. Research Methodology with statistics for health and social sciences. Ilorin: Nathadex publishers; 2004. p. 118-9.
21. Gu L, MO M, Si S, Luo W, Shao B, Xin X et al. Association of nausea and vomiting of pregnancy with infant growth in the first 24 months of life. *Arch. Gynecol. Obstet.* 2021;304:429-38.
22. Zhu S, Zhao A, Lan H, Li P, Mao S, Szeto LM-Y et al. Nausea and Vomiting during early pregnancy among Chinese women and its association with nutritional intakes. *Nutrients* 2023;15:933. <http://doi.org/10.3390/nu15040933>. Accessed 25th November, 2023.
23. Chan OK, Sahota DS, Leung TY, Chan LW, Fung TY, Lau TK et al. Nausea and vomiting in health related quality of life among Chinese pregnant women. *Aust. N. Z. J. Obstet. Gynaecol.* 2010;50:512-18.
24. Short V, Herbert G, Perry R. Chewing gum for postoperative recovery of gastrointestinal function. *Cochrane Database Syst Rev.* 2015;2:CD006506. <https://doi.org/10.1002/14651858.cd006506.pub3>. Accessed 25th May, 2023.
25. Darvall JN, Handscombe M, Leslie K. Chewing gum for the treatment of postoperative nausea and vomiting: a pilot randomized controlled trial. *Br J Anaesth.* 2017;118(1):83-9. <http://doi.org/10.1093/bja/aew375>. Accessed 25th May, 2023.
26. Scholey A, Haskell C, Robertson B, Kennedy D, Milne A, Wetherell M. Chewing gum alleviates negative mood and reduces cortisol during acute laboratory psychological stress. *Physiol Behav.* 2009;97:304-12.
27. Smith A. Effects of chewing gum on cognitive function, mood and physiology in stressed and non-stressed volunteers. *Nutr Neurosci* 2010;13:7-16.
28. Bowe R, Irwin R, Browne G, Harbison M, Gallen S, Yore PJ. Chewing gum for prevention of nausea and vomiting after elective caesarean section: a pilot randomized controlled trial. *SN Compr Clin Med.* 2022;4:257. <https://doi.org/10.1007/s42399-022-01332-9>. Accessed 25th May, 2023.
29. Inamori M, Akiyama T, Akinmoto K. Early effects of peppermint oil on gastric emptying a crossover study using a continuous real-time ¹³C breath test (BreathID system). *J Gastroenterol.* 2007;42:539-42.
30. Hiki N, Kurosaka H, Tatsutomi Y. Peppermint oil reduces gastric spasm during upper endoscopy: a randomized, double-blind, double-dummy controlled trial. *Gastrointest Endosc.* 2003;57:475-82.
31. Lisha J, Shantakumar N. Herbal medicines use during pregnancy: A review from the Middle East. *Oman Med J.* 2015;30(4):229-36.
32. Mekuria A, Erku D, Gebresillassie B, Birru E, Tizazu A, Ahmedin A. Prevalence and associated factors of herbal medicine use among pregnant women on antenatal care follow-up at University of Gondar Referral and Teaching Hospital, Ethiopia: A cross-sectional study. *BMC Complement Altern Med.* 2017;17:86. <http://doi.org/10.1186/s12906-017-1608-4>. Accessed 25th November, 2023.
33. Laelago T, Yohannes T, Lemango F. Prevalence of herbal medicine use and associated factor among women attending antenatal care in public health facilities of Hossana Town. *Arch Public Health.* 2016;173:1-8.

34. American College of Obstetricians and Gynaecologists. ACOG practice bulletin. Clinical management guidelines for obstetrician-gynecologists: nausea and vomiting of pregnancy. *Obstet Gynecol.* 2004;103:803-11.
35. Baggley A, Navioz Y, Maltepe C, Koren G, Einarson A. Determinants of women's decision making on whether to treat nausea and vomiting of pregnancy pharmacologically. *J Midwifery Womens Health.* 2004;49(4):350-54.
36. Heitmann K, Holst L, Maltepe C, Lupattelli A, Nordeng H. Treatment of nausea during pregnancy - results from a multinational, cross-sectional, internet-based study. *Res Soc Adm Pharm.* 2016;10:e57-8.
37. Clark S, Hughes B, McDonald SS. The impact of nausea and vomiting of pregnancy on quality of life: Report of a national consumer survey and recommendations for improving care. *Obstet Gynecol Surv.* 2013;68(9SUPPL. 1):S1-S10.
38. O'Brien B, Zhou Q. Variables related to nausea and vomiting during pregnancy. *Birth.* 2015;22(2):93-100.
39. Mazzota P, Stewart DE, Koren G, Magee LA. Factors associated with elective termination of pregnancy among Canadian and American women with nausea and vomiting of pregnancy. *J Psychosom Obstet Gynaecol.* 2001;22(1):7-12.