Original
ISSN 2413-0516

Association of Vertigo and Nausea and Vomiting of Pregnancy

Yasemin Hamlaci Başkaya[1*], Kevser İlçioğlu[1], Alaattin Ünsal[2]

[1]Sakarya University, Faculty of Health Sciences, Sakarya, Turkey.
[2]Eskisehir Osmangazi University, Medical Faculty, Public Health Department, Eskisehir, Turkey.
*Correspondence to: Yasemin Hamlaci Baskaya (E-mail yhamlaci@sakarya.edu.tr)

(Submitted: 12 September 2022 – Revised version received: 26 October 2022 – Accepted: 14 November 2022 – Published online: 26 February 2023)

Abstract

Objective: To determine the prevalence of vertigo during pregnancy, to review some variables believed to be associated, and to determine the association between vertigo and nausea and vomiting.

Methods: This study is a cross-sectional study conducted on pregnant women between September 3 and November 30, 2020. The study group consisted of 560 pregnant women who agreed to take part in the study. Chi-square test and Logistic Regression Analysis (Stepwise Backward Wald Regression), Mann-Whitney U test and Kruskal-Wallis Analysis were used for analysis. $P \leq 0.05$ was accepted as statistical significance value.

Results: The number of pregnant women with a history of vertigo was found to be 208 (37.1%). The symptoms that were most commonly reported by those with a history of vertigo were nausea and vomiting, headache and stumbling while walking, respectively. It was determined that the level of nausea and vomiting was higher in women with vertigo but there was no difference between the type and severity of vertigo and the level of nausea and vomiting.

Conclusion: Vertigo is one of the important health problems in pregnancy. It was determined that the level of nausea and vomiting was higher in women with vertigo. Nausea and vomiting are the most common symptoms accompanying vertigo.

Keywords: Pregnancy, vertigo, PUQE test

Introduction

Pregnancy is an important period during which the symptoms of disorders and their treatment should be evaluated carefully to avoid possible negative outcomes in maternal and infant health. During this period, important physiological and adaptive changes occur in almost every organ and system, such as cardiovascular, respiratory, hematological, gastrointestinal and endocrine, for the development and delivery of the fetus.[1] These changes cause some symptoms and complaints. Although such symptoms and complaints are transient during pregnancy, they have important repercussions on women's quality of life. These disorders affect the life routine involving family, social and professional environment thus causing deterioration of physical and psychological well-being.[2] The hormonal changes which occur during the menstrual cycle, gestation and menopause can cause changes in the homeostasis of labyrinthine fluids, as they have a direct effect on the enzymatic process and the action of neurotransmitters. These changes can be asymptomatic or present clinically as vestibular symptoms.[3] Vestibular symptoms include vertigo, unbalance, gait instability, feeling of floating and falls. However, during gestation, these same symptoms could be secondary to non-vestibular causes but they could be a consequence of hormonal, anatomical and physiological factors affecting the musculoskeletal system occurring in pregnancy.[2] More than 50% of pregnant women experience dizziness or vertigo frequently in the first two gestational trimesters.[4] Vertigo is a sudden feeling of spinning. It is described as a sensation of movement or of surrounding objects moving when they are not.[5] Patients should be asked to specifically describe their dizziness in their own words. The type of dizziness and vertigo can be identified based on patient's words.[6]

Otological symptoms usually develop with changing levels of progesterone and estrogen during pregnancy. Women's hormonal cycle starts to change after an egg cell is fertilized by a sperm.[7] Hormones during pregnancy are important for the development of the fetus; however, the effects of hormones usually go beyond the uterus and change the physiological activities of the body. Most of the hormonal changes during pregnancy usually produce no harmful effect on the mother or fetus but some of the changes may become pathological and cause restlessness, anxiety and discomfort.[7,8] Most of the otological symptoms are insignificant and transient but the determination of the etiology of these symptoms by clinicians is important to provide pregnant women with treatment and assurance. Pregnant women increase their quality of life by avoiding unwanted drugs and managing these symptoms safely without causing any effect on the fetus.[9]

Hormonal and physical changes during pregnancy may cause not only vertigo but also nausea and vomiting. Nausea and vomiting are very common in the first trimester particularly. The prevalence of nausea and vomiting of pregnancy ranges from 50% to 80%.[10,11] Symptoms range from mild nausea to excessive vomiting to a severe form of nausea-vomiting called hyperemesis gravidarum (HG) with electrolyte imbalances, dehydration and weight loss. Nausea and vomiting may cause discomfort in pregnant women in the mildest form but may become a serious threat to the lives of fetus and pregnant woman in the most severe form. Nausea and vomiting of pregnancy is an important symptom decreasing the quality of life of pregnant women. Etiology of nausea and vomiting in general seems to be multifactorial. Mechanisms behind nausea-vomiting in pregnancy include vestibular, olfactory, gastrointestinal stimuli and hormonal processed in the central nervous system. Accordingly, women may be more prone to nausea-vomiting in various events or diseases. However, this issue has not been thoroughly covered in the literature.[10,11] Considering that hormonal factors are involved in both vertigo and nausea and vomiting, it seems logical to look for an association between these conditions.[12]

Although its pathophysiology remains uncertain, as nausea and vomiting are important symptoms of vestibular

diseases, its association with the vestibular system should not be disregarded. There is very limited evidence that explains the effects of hormonal and physical changes during pregnancy on the otolithic organs of the vestibular system and evaluates the association between vertigo and nausea and vomiting.[4] This study was carried out to determine the prevalence of vertigo during pregnancy, to examine some of the variables thought to be related, and to reveal the relationship between vertigo and nausea-vomiting.

Materials and Methods

This is a cross-sectional study conducted on pregnant women who presented to Sakarya Training and Research Hospital in Turkey from 3 September to 30 November 2020.

Approval of the Sakarya University Faculty of Medicine Non-interventional Studies Ethics Committee (resolution number 71522473/050.01.04/29 dated 26/02/2019) was obtained to conduct the study. Permission was obtained from the hospital management for data collection.

By examining the literature, a questionnaire form was prepared to be suitable for the purpose of the study. The prepared questionnaire form included some sociodemographic characteristics of pregnant women, some characteristics related to pregnancy and some diseases, the presence of vertigo, its type and severity and some variables thought to be related, the presence of accompanying symptoms in those with a history of vertigo, and the PUQE test questions. In this study, the minimum number of pregnant women to be reached was calculated as 549 (*P*: 0.35, Comparison *P*: 0.29, alpha: 0.05, power of test: 0.85). During the data collection process, 560 pregnant women who applied to the pregnant follow-up clinic of the hospital and agreed to participate in the study constituted the study group. Interviews with pregnant women were held in the waiting room of the pregnant follow-up outpatient clinic. After informing the pregnant woman about the subject and purpose of the study, verbal consent was obtained from the pregnant women who agreed to participate in the study. The previously prepared questionnaires were filled by the pregnant women under supervision. This process took about 15–20 minutes.

The women who had a history of dizziness during pregnancy were considered to have "vertigo" in this study. Vertigo was identified as "Spinning vertigo" if it feels similar to riding a merry-go-round, "Swaying vertigo" if it feels like being on a small boat, "Orthostatic dizziness" if it causes vision to go black when standing up quickly, and "Unspecific dizziness" if it is identified other than these types. Vertigo severity; it is defined as "mild" if it does not prohibit daily tasks and activities of the pregnant, "moderate" if it causes difficulty in performing daily tasks and activities, and "severe" if it prohibits daily tasks and activities.

The PUQE test was used to determine the level of nausea and vomiting of pregnant women in our study. This test was first developed by Rhodes et al. in 1984 for the assessment of chemotherapy-induced nausea and vomiting but was also used in several studies to rate nausea and vomiting of pregnancy.[13] Prepared by adapting from the Rhodes scoring system, 3-item PUQE test includes questions about the number of nausea attacks, the number of vomiting and the number of retching episodes. The scores to be obtained from the PUQE test ranges from 3 to 15 and higher scores suggest more severe nausea and vomiting.[14,15]

The data were evaluated in the IBM SPSS (version 20.0) Statistical Package Program in computer environment. The Shapiro-Wilk test was used to determine the normal distribution of data. Chi-squared test, Logistic Regression Analysis (Wald's Backward Stepwise Regression), Mann-Whitney U test and Kruskal-Wallis Analysis were used for the analyses. Statistical significance level was accepted as $P \leq 0.05$.

Results

The ages of women in the study group ranged from 17 to 44, with a mean age of 28.41 ± 5.18 years. The number of pregnant women with a history of vertigo was found to be 208 (37.1%) in our study. The distribution of those with and without a history of vertigo in the study group according to some sociodemographic characteristics is given in Table 1.

Of the women in the study group, 183 (32.7%) stated that they did not give birth before, 174 (31.1%) reported that it was their first pregnancy and 401 (71.6%) stated that they had a history of nausea and vomiting of pregnancy. 114 women (29.8%) had a history of vertigo during their previous pregnancies. 160 women (28.6%) in the study group had a history of physician-diagnosed disease that may be associated with dizziness within the last 1 year. It was found that 9 women (1.6%) had a hearing impairment, 281 women (50.2%) had a history of recurring back/neck pain within the last 1 year and 22 women (3.9%) had a history of head trauma within the last 1 year. The distribution of women with or without a history of vertigo in the study group by characteristics related to pregnancy and some diseases is given in Table 2.

The results of the Logistic Regression Analysis, which were determined to be associated with vertigo in our study such as level of education, working status, number of pregnancy, history of nausea and vomiting of pregnancy, history of vertigo in previous pregnancies, history of vertigo within 3 months before pregnancy, history of physician-diagnosed disease associated with vertigo within the last 1 year, hearing impairment, presence of back-neck pain within the last 1 year, history of head trauma within the last 1 year and history of a depressing event within the last 1 year are given in Table 3.

Of the pregnant women with a history of vertigo in the study group, 35 women (16.8%) had spinning vertigo, 36 women (17.3%) had swaying vertigo, 128 women (61.5%) had orthostatic dizziness and 9 women (4.3%) had unspecific dizziness. Of the pregnant women with a history of vertigo, 130 women (62.5%) had mild, 55 women (26.4%) had moderate and 23 women (11.1%) had severe vertigo. The scores obtained from the PUQE test by the pregnant women ranged from 3 to 13 with a mean score of 4.31 ± 1.84 (median: 3.0). The distribution of scores obtained by the pregnant women from the PUQE test by the presence, type and severity of vertigo is given in Table 4.

The symptoms that were most commonly reported by those with a history of vertigo were nausea and vomiting (25.1%), headache (18.6%) and stumbling while walking (13.4%), respectively. The distribution of accompanying complaints in those with a history of vertigo in the study group is given in Table 5.

Table 1. **The distribution of those with and without a history of vertigo in the study group by some socio-demographic characteristics**

Socio-demographic Characteristics	History of vertigo			Statistical analysis X^2; p
	No *n* (%)*	Yes *n* (%)*	Total *n* (%)**	
Age group				
≤24	81 (60.0)	54 (40.0)	135 (24.1)	0.799, 0.850
25–29	130 (63.4)	75 (36.6)	205 (36.6)	
30–34	93 (65.09)	50 (35.0)	143 (25.5)	
≥35	48 (62.3)	29 (37.7)	77 (13.8)	
Level of education				
Primary school and lower	80 (60.2)	53 (39.8)	133 (23.8)	**10.812; 0.013**
Secondary school	102 (64.6)	56 (35.4)	158 (28.2)	
High school	90 (55.6)	72 (44.4)	162 (28.9)	
University	80 (74.8)	27 (25.2)	107 (19.1)	
Working status				
Not working	273 (60.7)	177 (39.3)	450 (80.4)	**4.708, 0.030**
Working	79 (71.8)	31 (28.2)	110 (19.6)	
Family income status				
Low	17 (68.0)	8 (32.0)	25 (4.5)	0.317; 0.853
Middle	246 (62.4)	148 (37.6)	394 (70.4)	
High	89 (63.1)	52 (36.9)	141 (25.2)	
Smoking				
Non-smoker	307 (62.4)	185 (37.6)	492 (87.9)	0.365, 0.546
Smoker	45 (66.2)	23 (33.8)	68 (12.1)	
Alcohol consumption				
No	350 (62.9)	206 (37.1)	556 (99.3)	Fisher; 0.630
Yes	2 (50.0)	2 (50.0)	4 (0.7)	
Total	352 (62.9)	208 (37.1)	560 (100.0)	

*:Percentages were calculated based on the line total. **:Percentages were calculated based on the column total.

Table 2. **The distribution of women with or without a history of vertigo in the study group by characteristics related to pregnancy and some diseases**

Characteristics related to pregnancy and some diseases	History of vertigo			Statistical analysis X^2; p
	No *n* (%)*	Yes *n* (%)*	Total *n* (%)**	
Number of childbirths				
0	124 (67.8)	59 (32.2)	183 (32.7)	3.784; 0.151
1	125 (62.8)	74 (37.2)	199 (35.5)	
2 and above	103 (57.9)	75 (42.1)	178 (31.8)	
Number of pregnancies				
First	119 (68.4)	55 (31.6)	174 (31.1)	**8.921; 0.012**
Second	115 (66.9)	57 (33.1)	172 (30.7)	
Third and above	118 (55.1)	96 (44.9)	214 (38.2)	
Gestational week				
35 and below	173 (63.4)	100 (36.6)	273 (48.8)	0.060; 0.806
36 and above	179 (62.4)	108 (37.6)	287 (51.2)	

(*Continued*)

Table 2. **The distribution of women with or without a history of vertigo in the study group by characteristics related to pregnancy and some diseases—(Continued)**

Characteristics related to pregnancy and some diseases	History of vertigo			Statistical Analysis X^2; p
	No *n* (%)*	Yes *n* (%)*	Total *n* (%)**	
History of nausea and vomiting of pregnancy				
No	122 (76.7)	37 (23.3)	159 (28.4)	18.303; 0.000
Yes	230 (57.4)	171 (42.6)	401 (71.6)	
History of dizziness within 3 months before pregnancy				
No	337 (70.6)	140 (29.4)	477 (85.2)	83.711; 0.000
Yes	15 (18.1)	68 (81.9)	83 (14.8)	
History of dizziness in previous pregnancies				
No	205 (76.2)	64 (23.8)	269 (70.23)	92.492; 0.000
Yes	27 (23.7)	87 (76.3)	114 (29.8)	
Obesity before pregnancy				
No	284 (63.5)	163 (36.5)	447 (79.8)	0.436; 0.509
Yes	68 (60.2)	45 (39.8)	113 (20.2)	
Anemia				
No	143 (59.8)	96 (40.2)	239 (42.7)	1.634; 0.201
Yes	209 (65.1)	112 (34.9)	321 (57.3)	
Hypertension				
No	343 (62.8)	203 (37.2)	546 (97.5)	0.000; 1.000
Yes	9 (64.3)	5 (35.7)	14 (2.5)	
History of physician-diagnosed disease that may be associated with dizziness within the last 1 year				
No	112 (70.0)	48 (30.0)	160 (28.6)	12.787; 0.012
Flu/common cold	204 (61.8)	126 (38.2)	330 (58.9)	
Otitis media	4 (28.6)	10 (71.4)	14 (2.5)	
Sinusitis	22 (62.9)	13 (37.1)	35 (6.2)	
Tonsillitis	10 (47.6)	11 (52.4)	21 (3.8)	
Hearing impairment				
No	343 (62.3)	208 (37.7)	551 (98.4)	Fisher; 0.030
Yes	9 (100.0)	0 (0.0)	9 (1.6)	
History of recurring back/neck pain within the last 1 year				
No	197 (70.6)	82 (29.4)	279 (49.8)	14.312; 0.000
Yes	155 (55.2)	126 (44.8)	281 (50.2)	
Motion sickness during travel				
No	240 (64.7)	131 (35.3)	371 (66.2)	1.582; 0.209
Yes	112 (59.3)	77 (40.7)	189 (33.8)	
History of a head trauma within the last 1 year				
No	343 (63.8)	195 (36.2)	538 (96.1)	3.797; 0.050
Yes	9 (40.9)	13 (59.1)	22 (3.9)	
History of a depressing event within the last 1 year				
No	274 (70.8)	113 (29.2)	387 (69.1)	33.860; 0.000
Yes	78 (45.1)	95 (54.99)	173 (30.9)	
Total	352 (62.9)	208 (37.1)	560 (100.0)	

*: Percentages were calculated based on the line total. **: Percentages were calculated based on the column total.

Table 3. **The results of the Logistic Regression Model created with the variables determined to be associated with vertigo in the study group (last digit: 7)**

Variables	ß	SE[a]	*P*	OR[b]	95% CI[c]
Having a revenue-generating work (reference: working)					
Not working	0.623	0.378	0.099	1.865	0.889–3.912
History of vertigo in previous pregnancies (reference: no)					
Yes	2.111	0.303	0.000	8.257	4.558–14.958
History of vertigo within 3 months before pregnancy (reference: no)					
Yes	2.416	0.443	0.000	11.198	4.695–26.704
History of a depressing event within the last 1 year (reference: no)					
Yes	1.272	0.288	0.000	3.567	2.027–6.278
History of physician-diagnosed disease that may be associated with vertigo within the last 1 year (reference: no)					
Sinusitis	0.770	0.561	0.170	2.159	0.719–6.484
Flu/common cold	0.163	0.318	0.608	1.178	0.631–2.197
Tonsillitis	1.499	0.693	0.031	4.478	1.151–17.425
Otitis media	0.232	0.882	0.793	1.261	0.224–7.100
Constant	–2.641	0.457	0.000	–	–

SE[a]: Standard error, OR[b]: Odd's ratio, CI[c]: Confidence interval.

Table 4. **The distribution of scores obtained by the pregnant women from the PUQE test by the presence, type and severity of vertigo**

Presence, type and severity of vertigo	*n*	PUQE test score Median (min-max)	Test value z/KW; *P*
Vertigo			
No	352	3.0 (3.0–13.0)	**4.853; 0.000**
Yes	208	5.0 (3.0–13.0)	
Type of vertigo			
Spinning vertigo	35	3.0 (3.0–13.0)	3.728; 0.292
Swaying vertigo	36	5.0 (3.0–11.0)	
Orthostatic dizziness	128	5.0 (3.0–9.0)	
Unspecific dizziness	9	3.0 (3.0–7.0)	
Severity of vertigo			
Mild	130	4.0 (3.0–13.0)	2.850; 0.241
Moderate	55	5.0 (3.0–9.0)	
Severe	23	6.0 (3.0–10.0)	
Total	208	3.0 (3.0–13.0)	

Table 5. **Accompanying complaints in those with a history of vertigo in the study group**

Symptoms	*n*	%
Headache	78	18.6
Nausea and vomiting	105	25.1
Hearing loss	5	1.2
Ringing in the ears/tinnitus	42	10.0
Ear pressure	7	1.7
Sensation loss/numbness in limbs	37	8.8
Stumbling while walking	56	13.4
Double vision	16	3.8
Light sensitivity/intolerance of light	28	6.7
Irritation, stinging and redness in eyes	12	2.9
Excessive sweating	33	7.8
Total	419	100.0

*Numbers are based on the symptoms reported.

Discussion

Women are more inclined to have dizziness/vertigo due to hormonal changes and metabolic disorders. Many studies reported a correlation between vertigo and hormonal changes and sex.[16,17] Some symptoms may increase as the release of neurotransmitters during pregnancy may change the biochemical control of the inner ear. The prevalence of dizziness/vertigo was reported to be 10–52% in the studies conducted on pregnancy.[3,18] In the study of Scmith et al. on 82 pregnant women, vertigo was reported for more than half the pregnant women (52%).[3] Agampodi et al. (2013) found that 24% of 466 pregnant women experienced dizziness.[19] In our study, the number of pregnant women with a history of vertigo was found to be 208 (37.1%). It can be assumed that a possible vestibular change associated with a hormonal change during pregnancy may cause vertigo.

Considering the factors that may affect vertigo, although there are studies showing that the prevalence of vertigo is increasing with age,[20,21] there was no study reviewing the association between the vertigo of pregnancy and age in the literature. In our study, there was no difference between the age groups of pregnant women in terms of vertigo. Considering the association between level of education and vertigo, there were fewer pregnant women with a history of vertigo among pregnant women with a university degree. In their study on 150 adults, Rashid and Abed (2021) found that vertigo was not associated with the level of education and working status.[22] Although our study showed that the prevalence of vertigo was higher in those without a revenue-generating job, the logistic

regression analysis indicated that unemployment was not a risk factor for vertigo. Li et al. (2020) reported in their meta-analysis that there was no association between vertigo and daily life habits such as smoking and alcohol consumption.[23] The meta-analysis of Chen et al. (2020) showed that there was no association between the Benign Paroxysmal Positional Vertigo (BPPV) and smoking and alcohol consumption. In our study, there was no difference between the lifestyles of pregnant women (obesity, alcohol consumption, smoking) in terms of the prevalence of vertigo.[20]

The studies on pregnancy and vertigo are heterogeneous, few in number and of low quality. Retrospective studies of Wu et al. (2019) and Swain et al. (2020) reviewed pregnant women who had problems due to various vestibular disorders.[9,24] These studies reported that case-controlled studies or studies with a large sample size are needed to consider pregnancy a risk factor for the development of vertigo and vestibular disorders.[25] The variables such as pregnancy, number of childbirths, history of vertigo or nausea and vomiting before pregnancy were not evaluated in many studies. In our study, there was no association between the prevalence of vertigo and the number of childbirths but the prevalence of vertigo was higher in women who had three or more pregnancies. A case series study conducted in Taiwan determined that pregnant women of advanced maternal age (34 years or older) and primipara women in the third trimester of pregnancy are inclined to develop vertigo.[26]

The levels of estrogen and progesterone vary during pregnancy. The effect of hormones on vertigo during pregnancy remains uncertain. In their study on 80 pregnant women, Mgbe et al. (2017) reported that six women (7.5%) had mild vertigo attacks during the first trimester.[27] In their presentation of 3 cases, Coban et al. (2017) reported that all cases were diagnosed with vertigo during the late trimesters, when estrogen levels are relatively low and progesterone levels are high.[18] Schmidt et al. (2010) found that the most common vestibular symptom in pregnant women was vertigo (22.72%) in the first trimester.[3] There was no association between the gestational week and vertigo in our study.

Vestibular symptoms such as nausea, vomiting, gait instability, dizziness and vertigo usually develop together. Increased feeling of dizziness or vertigo in women having nausea of pregnancy may cause vomiting. Vertigo and nausea and vomiting trigger each other affecting the quality of life negatively. [28] In a study on pre-pregnancy and post-pregnancy issues in women with hyperemesis gravidarum, conditions in 449 women with hyperemesis gravidarum (case group) were compared to 459 unaffected women (controls). While dizziness (4.68%), nausea (4.01%) and vertigo (3.34%) were observed in the pre-pregnancy case group, their rates were 1.31%, 0.22% and 0.65%, respectively, in the control group. The rates of dizziness, nausea and vertigo were 12.5%, 4.23% and 2.67% in the post-pregnancy case group and 1.09%, 0.0% and 0.22% in the control group, respectively.[29] In our study, the prevalence of vertigo was higher in those with a history of nausea and vomiting of pregnancy.

The conditions developed before pregnancy are expected to aggravate during pregnancy. Many studies have proven that health condition and symptoms of women before pregnancy affect their health during pregnancy.[29-33] Consistently, the presence of a history of dizziness within 3 months before pregnancy is one of the important risk factors for vertigo in our study (OR: 11.198; *P*: 0.000). Furthermore, it was determined that the prevalence of vertigo was 8.257 times higher in women with a history of dizziness in previous pregnancies than those without a history of dizziness in previous pregnancies.

In their meta-analysis of 60 studies and 24 risk factors, Li et al. (2020) identified that the risk factors for vertigo included female gender, advanced age, hyperlipidemia, diabetes, hypertension, head trauma, otitis media, and long use of computers.[23] In their meta-analysis of 19 studies including 2,618 patients, Chen et al. (2020) also identified that head trauma is a risk factor for vertigo (OR = 3.42; 95% CI, 1.21–9.70; P = 0.02).[20] In a qualitative study on 31 pregnant women with anemia, Chatterjee et al. (2014) reported that 11 pregnant women had dizziness in addition to anemia.[34] In our study, the prevalence of vertigo was 4.478 times higher in those with a history of physician-diagnosed tonsillitis within last 1 year. It was also found that the prevalence of vertigo was lower in those with a hearing impairment but higher in those with a history of recurring back/neck pain within the last 1 year, with a history of a head trauma within the last 1 year and with a history of a depressing event within the last 1 year (OR: 3.567, *P*: 0.000) ($P < 0.05$ for each). To the contrary of some studies, there was no difference between the prevalence of vertigo and the presence of obesity, anemia and hypertension before pregnancy ($P > 0.05$ for each).[35-37]

Nausea and vomiting of pregnancy affects approximately 75–80% of pregnant women.[10] Agampodi et al. reported that 325 (69.7%) out of 466 pregnant women experienced nausea and vomiting of pregnancy.[19] There is a common ground between nausea and vomiting of pregnancy and vertigo that is a vestibular disorder. Women reporting dizziness or vertigo usually suffer from hyperemesis gravidarum. Avoiding activity alleviates the symptoms of both disorders. There are limited studies on the role of vestibular system on nausea and vomiting.[38] It is usually difficult to distinguish vertigo attacks and episodes of nausea and vomiting that are very common in the first trimester of the pregnancy. It was determined that the level of nausea and vomiting was higher in women with a history of vertigo in our study. There was no difference between the type and severity of vertigo and the level of nausea and vomiting ($P > 0.05$ for each).

Vertigo may be accompanied by various symptoms in addition to nausea and vomiting. In their study on 140 pregnant women, Robbins et al. (2015) found that 9.3% of women with vertigo had also headache.[39] In our study, the symptoms that were most commonly reported by those with a history of vertigo were nausea and vomiting (25.1%), headache (18.6%) and stumbling while walking (13.4%), respectively.

Limitations and Strengths

The limitations of the study are that it was a cross-sectional study, no scale or laboratory method was used for vertigo, and that it was conducted only on pregnant women who applied to a hospital. The strength of this study is the presence of a few studies reviewing various factors that can be associated with vertigo in pregnant women.

Conclusion

Vertigo is one of the important health problems in pregnancy. History of vertigo in previous pregnancies, a history of vertigo

within the last 3 months before pregnancy, a history of a depressing event within the last 1 year and a history of physician-diagnosed tonsillitis within the last 1 year are important risk factors for vertigo. It was determined that the level of nausea and vomiting was higher in women with a history of vertigo. The symptoms that were most commonly reported by those with a history of vertigo were nausea and vomiting, headache and stumbling while walking, respectively. Studies in the literature and our results indicate that vertigo during pregnancy needs to be examined carefully. The association between vertigo and pregnancy remains uncertain and there is very limited data in this matter. Unfortunately, pregnant women usually underestimate the symptoms and disregard vertigo. Obstetricians and midwives should be careful about pregnant women with vertigo. The factors that may be associated with vertigo should be reviewed and measures should be taken against the risk factors to improve the quality of life of pregnant women and avoid vertigo-related unwanted situations that may put maternal and fetal health at risk. Furthermore, more extensive studies are required to determine the causes of vertigo during pregnancy, provide solutions for it and establish the association between vertigo and nausea and vomiting.

Acknowledgments

The authors would like to thank all the pregnant women who participated in the study.

Conflict of Interest

The authors declare that there is no conflict of interest. ■

References

1. Tan EK, Tan EL. Alterations in physiology and anatomy during pregnancy. Best practice & research Clinical obstetrics & gynaecology. 2013;27(6):791–802.
2. Salvati A, Apa R, Loperfido A, Scarano E, Paludetti G, Tropea A, et al. Management of vertigo in pregnancy. Italian Journal of Gynaecology and Obstetrics. 2020;32(1):49–55.
3. Schmidt PM, Flores F, Rossi AG, Silveira AF. Hearing and vestibular complaints during pregnancy. Brazilian Journal of Otorhinolaryngology. 2010;76(1):29–33.
4. Bhavana G, Kumar K, Anupriya E. Assessment of otolith function using vestibular evoked myogenic potential in women during pregnancy. Brazilian Journal of Otorhinolaryngology. 2020.
5. Kara İ, Yıldız MG, Gümüştakım RŞ, Doğaner A, Sağıroğlu S, Bilal N, et al. Evalution of Family Physician's Awareness of Vertigo: A Cross-sectional Study. Turkish Journal of Family Practice. 2021;25(2):59–65.
6. Wipperman J. Dizziness and vertigo. Primary Care: Clinics in Office Practice. 2014;41(1):115–31.
7. Murthy VA, Krishna K. Hearing loss in pregnancy. Indian Journal of Otolaryngology & Head and Neck Surgery. 2013;65(1):1–2.
8. Liang Y-X, Liu L, Jin Z-Y, Liang X-H, Fu Y-S, Gu X-W, et al. The high concentration of progesterone is harmful for endometrial receptivity and decidualization. Scientific Reports. 2018;8(712):1–12.
9. Swain SK, Pati BK, Mohanty JN. Otological manifestations in pregnant women-A study at a tertiary care hospital of eastern India. Journal of Otology. 2020;15(3):103–6.
10. Laitinen L, Nurmi M, Ellilä P, Rautava P, Koivisto M, Polo-Kantola P. Nausea and vomiting of pregnancy: associations with personal history of nausea and affected relatives. Archives of Gynecology and Obstetrics. 2020;302(4):947–55.
11. Şimşek Y, Şimşek G, Bayar Muluk N, Arıkan OK. Olfactory dysfunction and oxidative stress in pregnant women with hyperemesis gravidarum. Archives of Gynecology and Obstetrics. 2021;304(3):657–61.
12. Black FO. Maternal susceptibility to nausea and vomiting of pregnancy: is the vestibular system involved? American journal of obstetrics and gynecology. 2002;186(5):204–9.
13. Koren G, Piwko C, Ahn E, Boskovic R, Maltepe C, Einarson A, et al. Validation studies of the Pregnancy Unique-Quantification of Emesis (PUQE) scores. Journal of Obstetrics and Gynaecology. 2005;25(3):241–4.
14. King TL, Murphy PA. Evidence-based approaches to managing nausea and vomiting in early pregnancy. Journal of midwifery & women's health. 2009;54(6):430–44.
15. Sucu M, Büyükkurt S, Evrüke İ, Demir S, Özgünen F, Kadayıfçı O. The role of PUQE (Pregnancy-Unique Quantification of Emesis and Nausea) in evaluation of the indications for inpatient therapy in pregnants with nausea and vomiting. Turkiye Klinikleri J Gynecol Obst. 2009;19(6):317–21.
16. Jeong S-H. Benign paroxysmal positional vertigo risk factors unique to perimenopausal women. Frontiers in Neurology. 2020;11(589605):1–6.
17. Lindell E, Karlsson T, Kollén L, Johansson M, Finizia C. Benign paroxysmal positional vertigo and vestibular impairment among older adults with dizziness. Laryngoscope Investigative Otolaryngology. 2021;6(3):488–95.
18. Çoban K, Yiğit N, Aydın E. Benign paroxysmal positional vertigo in pregnancy. Turkish archives of otorhinolaryngology. 2017;55(2):83.
19. Agampodi SB, Wickramasinghe ND, Horton J, Agampodi TC. Minor ailments in pregnancy are not a minor concern for pregnant women: a morbidity assessment survey in rural Sri Lanka. PloS one. 2013;8(5):e64214.
20. Chen J, Zhao W, Yue X, Zhang P. Risk factors for the occurrence of benign paroxysmal positional vertigo: a systematic review and meta-analysis. Frontiers in neurology. 2020;11:506.
21. Wassermann A, Finn S, Axer H. Age-associated characteristics of patients with chronic dizziness and vertigo. Journal of geriatric psychiatry and neurology. 2021:1–6.
22. Rashid ZS, Abed BJ. Relationship between the Effect of Severity Vertigo and Demographic Characteristic for Iraqi Patients. Indian Journal of Forensic Medicine & Toxicology. 2021;15(3):785–90.
23. Li S, Wang Z, Liu Y, Cao J, Zheng H, Jing Y, et al. Risk factors for the recurrence of benign paroxysmal positional vertigo: a systematic review and meta-analysis. Ear, Nose & Throat Journal. 2020:1–23.
24. Wu PH, Cheng PW, Young YH. Inner ear disorders in 68 pregnant women: a 20-year experience. Clinical Otolaryngology. 2017;42(4):844–6.
25. Frosolini A, Marioni G, Gallo C, de Filippis C, Lovato A. Audio-vestibular disorders and pregnancy: A systematic review. American Journal of Otolaryngology. 2021;42(5):103136.
26. Chen J-J, Chang H-F, Chen D-L. Vestibular Migraine in a Female With Unexpected Pregnancy. Archives of Neuroscience. 2016;3(1):e22924.
27. Mgbe RB, Umana AN, Adekanye AG, Offiong ME. Ear nose and throat changes observed in pregnancy in Calabar Nigeria. Global Journal of Pure and Applied Sciences. 2017;23(2):355–9.
28. Lagadec N, Steinecker M, Kapassi A, Magnier AM, Chastang J, Robert S, et al. Factors influencing the quality of life of pregnant women: a systematic review. BMC pregnancy and childbirth. 2018;18(455):1–14.
29. Tian R, MacGibbon K, Martin B, Mullin P, Fejzo M. Analysis of pre-and post-pregnancy issues in women with hyperemesis gravidarum. Autonomic Neuroscience. 2017;202:73–8.
30. Lewandowska M, Więckowska B, Sajdak S. Pre-pregnancy obesity, excessive gestational weight gain, and the risk of pregnancy-induced hypertension and gestational diabetes mellitus. Journal of clinical medicine. 2020;9(6):1980.
31. Wang Y-X, Wang S, Mitsunami M, Manson JE, Rich-Edwards JW, Wang L, et al. Pre-pregnancy menstrual cycle regularity and length and the risk of gestational diabetes mellitus: prospective cohort study. Diabetologia. 2021;64(11):2415–24.
32. Wei Y-M, Yang H-X, Zhu W-W, Liu X-Y, Meng W-Y, Wang Y-Q, et al. Risk of adverse pregnancy outcomes stratified for pre-pregnancy body mass index. The Journal of Maternal-Fetal & Neonatal Medicine. 2016;29(13):2205–9.
33. Wesołowska E, Jankowska A, Trafalska E, Kałużny P, Grzesiak M, Dominowska J, et al. Sociodemographic, lifestyle, environmental and pregnancy-related determinants of dietary patterns during pregnancy. International journal of environmental research and public health. 2019;16(5):754.
34. Chatterjee N, Fernandes G. 'This is normal during pregnancy': a qualitative study of anaemia-related perceptions and practices among pregnant women in Mumbai, India. Midwifery. 2014;30(3):e56–e63.

35. Ding J, Liu L, Kong W-K, Chen X-B, Liu X. Serum levels of 25-hydroxy vitamin D correlate with idiopathic benign paroxysmal positional vertigo. Bioscience reports. 2019;39(4).
36. Han W, Fan Z, Zhou M, Guo X, Yan W, Lu X, et al. Low 25-hydroxyvitamin D levels in postmenopausal female patients with benign paroxysmal positional vertigo. Acta oto-laryngologica. 2018;138(5):443–6.
37. Yang H, Gu H, Sun W, Li Y, Wu H, Burnee M, et al. Estradiol deficiency is a risk factor for idiopathic benign paroxysmal positional vertigo in postmenopausal female patients. The Laryngoscope. 2018;128(4):948–53.
38. Tulmaç ÖB, Kılıç R, Yaman S, Aktulum F, Şimşek G, Erdinç S. Evaluation of the vestibular system with video head impulse test in pregnant women with hyperemesis gravidarum. Journal of Obstetrics and Gynaecology Research. 2021;47(1):96–102.
39. Robbins MS, Farmakidis C, Dayal AK, Lipton RB. Acute headache diagnosis in pregnant women: a hospital-based study. Neurology. 2015;85(12):1024–30.