

## The Relationship of Nausea and Vomiting during Pregnancy with Pregnancy Complications

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ARTICLE INFO	ABSTRACT
<p><i>Article type:</i> Original article</p>	<p><b>Background &amp; aim:</b> Nausea and vomiting are among the most common complaints during pregnancy observed in patients with severe pregnancy outcomes. The purpose of this study was to investigate the relationship of nausea and vomiting during pregnancy (NVP) with some pregnancy complications.</p> <p><b>Methods:</b> This cross-sectional study was conducted on 778 mothers within the age range of 18-35 years who were experiencing their first to third pregnancy and had single fetuses born from April to September 2017 in Shahroud Teaching Hospital, Shahroud, Iran. The study population was selected using the census method. The data were collected using a questionnaire included demographic characteristics as well as pregnancy complications. A visual analogue scale (VAS) was also used to assess nausea and vomiting. The data were analyzed in SPSS software (version 18) using the Chi-square test and Spearman correlation coefficient.</p> <p><b>Results:</b> In this study, 72.75% of the mothers reported to have some degrees of nausea and vomiting. In this regard, based on the VAS, the mean score of NVP was obtained as 4.29±3.41. As the results indicated, NVP had a significant relationship with preterm labor (P=0.002), hypertension (P=0.003), anemia (P=0.002), and cesarean section (P=0.009). However, there was no association between nausea and vomiting with the medical illnesses during pregnancy, gestational diabetes, hypothyroidism, (P=0.12), and bleeding/ spotting.</p> <p><b>Conclusion:</b> According to the results, NVP was associated with pregnancy complications including preterm delivery, hypertension, anemia, and cesarean section.</p>
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### Introduction

During a normal pregnancy, almost all body organs undergo anatomical and functional changes. These changes are the cause of many pregnancy discomforts and disorders. Nausea and vomiting during pregnancy (NVP) is an unpleasant condition that is also called morning sickness. Approximately 90-95% of the women experience varying degrees of NVP (1). This

disorder usually starts from the second to the fifth week of pregnancy and ends after 14-20 weeks of pregnancy. According to the literature, the frequency of NVP is 69.7% in Iran (2, 3). This problem is seen in early pregnancy in about 80% of the women and continues until the end of the pregnancy in 20% of the cases (4, 5).

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Hyperemesis gravidarum is a severe form of NVP that is seen in 0.3-3% of pregnancies (6). In this case, vomiting is so severe that it leads to weight loss, dehydration, ketosis, alkalosis (due to hydrochloric acid excretion), hypokalemia, acidosis, and transient liver dysfunction. This condition is highly different from and more severe than the usual nausea and morning vomiting in pregnant women (4). It is caused by the increased levels of human chorionic gonadotropin, estrogen, progesterone, leptin, placental growth hormone, prolactin, thyroxine, and adrenocorticotrophic, ghrelin, nesfatin, and PYY-3.

The occurrence of this type of nausea and vomiting is also affected by race, family, previous history, and psychological, metabolic, and toxic factors. Other causes of hyperemesis gravidarum may include twin or multiple pregnancies, some fetal anomalies (e.g., trisomy 21 and *hydrops fetalis*), and trophoblastic diseases producing high levels of placental gonadotropin hormone. Pregnant women with such a condition should be usually hospitalized for hydration and electrolyte balance (7-9).

Treatment of NVP, depending on the severity of symptoms, can include a change in the lifestyle, hydration, and medication regimens. In the more severe cases, hospitalization, intravenous hydration, intravenous medications, or even complete intravenous nutrition may be required (10). A review of the evidence-based care of NVP suggests that this condition affects maternal health and quality of life during pregnancy. It also imposes financial burdens on the mothers and the society (10, 11). The NVP can cause discomfort in the pregnant mother and her family and lead to disabilities in performing maternal duties and reduction of daily functioning (9, 10, 12). Although NVP is prevalent in pregnant women, few studies have been conducted to investigate the relationship between this variable and pregnancy complications (9).

Several studies have reported a relationship between NVP and a reduced risk of miscarriage (10, 13). According to these studies, this condition leads to the improvement of maternal nutrition and social and occupational support. Hence, NVP can have a protective effect on the fetus (14). However, some studies suggest that

NVP can result in preterm labor and low birth weight (10, 14-16)

There are contradictory results on the association of NVP with pregnancy complications, such as preeclampsia, diabetes, hypertension, and proteinuria. Moreover, some reports have rejected the role of nausea and vomiting in preterm labor and fetal weight (10, 12, 15-18). The high importance of this subject and presence of different reports on NVP complications, in addition to the lack of such studies in Shahroud, especially in the birth center of this city, underscore the need for performing a study addressing this domain. Regarding this, the present study was conducted to evaluate the relationship of NVP with some pregnancy complications.

## Materials and Methods

This cross-sectional study was conducted on all pregnant mothers who referred to Shahroud Bahar Hospital in Shahroud, Iran, from April to the end of September of 2016. A total of 1,014 cases were subjected to sampling using the census method. The inclusion criteria were: 1) age of 18-35 years, 2) first to third pregnancy, and 3) singleton pregnancy. On the other hand, the exclusion criteria included: 1) multiple pregnancy, 2) experience of hyperemesis gravidarum during pregnancy due to the increased risk of pregnancy and labor, 3) no history of high blood pressure (i.e., a blood pressure of 140/90), and 4) unwillingness to cooperate with the researcher to complete the questionnaire (which was based on the patient's own statements).

Finally, 778 people participated in the study. The data collection tool included a researcher-made checklist designed based on the objective of the study. It consisted of three sections related to demographic data (including age, occupation, level of education, place of residence, and drug addiction), pregnancy complications (including personal history or any medical illness before or during pregnancy [e.g., diabetes, hypertension, hypothyroidism, anemia, bleeding, and spotting], and date and type of labor), and visual analogue scale, assessing maternal nausea and vomiting. The pregnant mothers were asked about NVP when they were admitted to the hospital for delivery

until discharge. Information was collected based on the arrival of pregnant mothers and no specific timing was considered.

To assess the degree of nausea and vomiting in early pregnancy, all mothers were trained to score the severity of nausea and vomiting on a visual analogue scale (VAS). This tool is a 10-cm ruler (range between 0 and 10), in which the zero score represents the lack of nausea and vomiting, while scores of 1-3, 4-6, 7-9, and 10 signify mild, moderate, severe, and very severe nausea and vomiting, respectively. The calculation of reliability was not required for the first two parts of the checklist. However, the reliability of the third part was confirmed in a previous study (19). The demographic information was collected based on the measurement scale to determine the extent of NVP and some of the postpartum and pre-delivery complications.

The patients were monitored from the moment of admission up to childbirth. The

validity and reliability of the tool measuring nausea and vomiting have been confirmed in several studies (20, 21). After coding the collected data, they were analyzed in SPSS software (version 18). Frequency distribution, mean, and standard deviation were used to describe the data. In addition, the relationship between pregnancy complications and NVP was investigated using the one way ANOVA, Chi-square test (or Fisher's exact test), and Spearman correlation coefficient at a p-value of <0.05.

## Results

Out of the 1,014 pregnant mothers, 778 cases met the inclusion criteria (i.e., age of 18-35 years, first to third pregnancy, and singleton pregnancy) and were included in the study. The majority of the mothers were housewives and were living in the city without any drug addiction (Table 1).

**Table 1.** Demographic characteristics of the research population according to the visual analogue scale criteria

Variable		Nausea and vomiting				
		No nausea and vomiting (score: 0)	Mild nausea and vomiting (score: 1-3)	Moderate nausea and vomiting (score: 4-6)	Severe nausea and vomiting (score: 7-9)	Very severe nausea and vomiting (score: 10)
		N (%)	N (%)	N (%)	N (%)	N (%)
<b>Job</b>	<b>Housewife</b>	200(94.3)	105(92.9)	201(92.9)	164(94.8)	54(90.3)
	<b>Easy work</b>	8(3.7)	7(6.2)	11(5)	6(3.5)	4(6.5)
	<b>Hard work</b>	4(2)	1(0.9)	6(2.1)	3(1.7)	2(3.2)
<b>Place of residence</b>	<b>City</b>	132(62.3)	78(69)	136(62.4)	110(63.6)	36(58.1)
	<b>Village</b>	80(37.7)	35(31)	82(37.6)	63(36.4)	26(41.9)
<b>Drug addiction</b>	<b>Yes</b>	1(0.5)	0(0)	1(0.5)	1(0.6)	2(3.2)
	<b>No</b>	211(99.5)	113(100)	217(99.5)	172(99.4)	60(96.8)

The mean age of the mothers was 27.46±4.37 years. With regard to the level of education, 432 (42.6 %) mothers had a diploma.

Among all mothers, 212 (27.24%) cases had no symptoms of NVP in the first trimester. However, 113 (14.52%), 218 (28.02%), 173 (22.23%), and 60 (7.99%) cases had mild, moderate, severe, and very severe NVP, respectively (Table 2).

**Table 2.** Frequency distribution of pregnancy complications according to visual analogue scale criteria

Variable	Nausea and vomiting					Sum of all mothers	P-value (ANOVA)
	No nausea and vomiting (score: 0)	Mild nausea and vomiting (score: 1-3)	Moderate nausea and vomiting (score: 4-6)	Severe nausea and vomiting (score: 7-9)	Very severe nausea and vomiting (score: 10)		
	N (%)	N (%)	N (%)	N (%)	N (%)		
No problem or disease during pregnancy	128(26.01)	87(17.68)	136(27.64)	101(20.52)	40(8.15)	492	0.16
Hypertension	27(35.06)	10(12.98)	18(23.37)	16(20.77)	6(7.82)	77	0.03
Gestational diabetes	15(25.86)	2(3.44)	21(36.20)	14(24.13)	6(10.37)	58	0.05
Hypothyroidism	24(33.80)	7(9.85)	22(30.98)	16(22.53)	2(2.84)	71	0.12
Anemia	2(12.5)	1(6.25)	5(31.25)	6(37.5)	2(12.5)	16	0.02
Bleeding and spotting	16(25)	2(3.12)	16(25)	20(31.25)	10(15.63)	64	0.46
Total	212(100)	113(100)	218(100)	173(100)	66(100)	778	

The overall mean score of NVP was obtained as 4.29±3.41. The results also revealed the

probable role of NVP in increasing the chance of anemia and hypertension.

**Table 3.** Frequency distribution of mothers in terms of pregnancy complications based on visual analogue scale criteria

Variable	Nausea and vomiting					Total number of mothers with nausea and vomiting	P-value	
	No nausea and vomiting (score: 0)	Mild nausea and vomiting (score: 1-3)	Moderate nausea and vomiting (score: 4-6)	Severe nausea and vomiting (score: 7-9)	Very severe nausea and vomiting (score: 10)			
	N (%)	N (%)	N (%)	N (%)	N (%)			
Route of delivery	Normal	75(35.4)	52(46.02)	90(41.29)	66(38.15)	19(30.64)	227(40.11)	0.12
	Cesarean section	137(64.6)	61(53.98)	128(58.71)	107(61.85)	43(69.36)	339(59.89)	0.009
Number of pregnancies	First	81(38.2)	37(32.8)	86(39.4)	75(43.4)	26(41.9)	224(39.89)	0.09
	Second	82(38.7)	50(44.2)	85(39)	64(37)	22(35.5)	221(39.04)	
	Third	49(23.1)	26(23)	47(21.6)	34(19.6)	14(22.6)	121(21.37)	
Length of pregnancy	Preterm	26(12.3)	8(7.1)	13(6)	19(11)	7(11.3)	47(8.3)	0.023
	Term	175(82.5)	99(87.6)	195(89.4)	144(83.2)	50(80.6)	488(86.23)	0.09
	Post-term	11(5.2)	6(5.3)	10(4.6)	10(5.8)	5(8.1)	31(5.47)	0.7
1-minute Apgar score of < 7		6(2.9)	3(2.7)	3(1.4)	11(6.4)	1(8.1)	18(3.18)	0.51
5-minute Apgar of < 7		2(1)	0(0)	1(0.5)	2(1.2)	0(0)	3(0.53)	0.08
Neonatal intensive care unit admission		24(11.3)	10(8.8)	32(14.7)	26(15)	5(8.1)	73(12.89)	0.67

In general, 302 (38%) women had normal vaginal labor, while 626 (47%) cases had

cesarean sections. Out of 778 mothers, 73 (9.3%) subjects had preterm delivery, and

others had term birth. The NVP was found to directly associate with the chance of cesarean delivery ( $P=0.009$ ) and preterm delivery ( $P=0.023$ ). However, this variable was not correlated with neonatal Apgar score (Table 3).

## Discussion

The results of this study revealed that 72.75% of the women had varying degrees of NVP, and the rest of them did not show any symptoms. Based on the VAS, the mean score of NVP in mothers was  $4.29\pm 3.41$ , which is inconsistent with the results of the research conducted by Shafati et al. (11) and Timing et al. (10). This high rate, compared to those reported in similar studies, maybe due to the low tolerance of mothers to nausea and lack of appropriate planning to prevent NVP. This underscores the need for the provision of training on lifestyle changes and the cares required to prevent vomiting.

In the present study, there was a positive and significant relationship between NVP and preterm birth, which is in line with the results of the studies performed by Yazdani et al. (20), Timing et al. (10), Jenabi et al. (22), and McParlin et al. (15). However, inconsistent with our results, Mate Sida et al. (23) and Patil et al. found no association between NVP and an increased risk of preterm labor (24). It seems that the reason for the association between NVP and lower risk of preterm delivery is the implementation of an appropriate treatment to reduce the complications of NVP and increase social and family support in these women.

The results of the present study also revealed a positive and significant relationship between NVP score and hypertension. In this regard, the rate of hypertension increased with the elevation of NVP score. This result is inconsistent with those of a study conducted by Yazdani et al. (20) but consistent with the results of the studies performed by Chortatos et al. (14), Mennella et al. (25), and Vikanes et al. (17). This may be due to the lack of proper training and planning to deal with vomiting and nausea

A direct and significant relationship was also found between NVP and cesarean section. This result is in disagreement with those obtained by Timing et al. (10), Chortatos et al. (14), Dodoes et al. (26), and Yazdani et al. This discrepancy

may be due to the maternal inability to perform normal vaginal delivery, which eventually leads to cesarean delivery to receive appropriate support. However, different reasons account for cesarean delivery. Therefore, NVP is just one of the influencing factors in this regard as reported in different studies (27-29).

The 5-minute Apgar score of the mothers with a history of NVP was less than 7, which is inconsistent with the values reported by Yazdani et al. (20) and Green et al. (30). This discrepancy might be due to the conditions of research setting that requires proper planning to deal with such effects. The results also revealed a significant relationship between NVP and anemia, which is in disagreement with the findings obtained by similar research (20). This difference might be due to the appropriate treatment of this disease during pregnancy.

One of the limitations of this study was its retrospective design using a single hospital setting. Furthermore, the present study was targeted toward the evaluation of a few complications as more complications were likely to occur. However, the strength of this study was the examination of the difference in the degree of NVP, whereas most of the previous studies focused on the presence of nausea and vomiting and the failure to determine the cause of preterm birth.

Further prospective, large-population studies are recommended to be conducted considering contradictory information regarding the association of NVP with adverse pregnancy outcomes. It is also suggested to perform studies with the aim of training mothers who experience nausea and vomiting in early pregnancy and addressing some of the complications of pregnancy and ways to reduce them.

## Conclusion

The results of the present study revealed a direct relationship between NVP and cesarean delivery, preterm delivery, 5-min Apgar score of  $< 7$ , anemia, and high blood pressure.

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### Conflicts of interest

Authors declared no conflicts of interest.

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