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THE EFFECT OF NAUSEA AND VOMITING ON PREGNANCY AND NEONATAL OUTCOMES AMONGST PAKISTANI WOMEN

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Abstract

OBJECTIVE: *This study aims to elucidate the association between the phenomena of nausea and vomiting during gestation and their potential impact on unfavorable maternal and neonatal outcomes specifically in the population of Pakistani women.*

METHODOLOGY: *A longitudinal cohort investigation was undertaken over a duration of 24 months at a tertiary care facility in Karachi, involving the enrolment of 400 pregnant women in the first trimester exhibiting viable pregnancies. Participants were stratified according to their Pregnancy-Unique Quantification of Emesis (PUQE) scores into cohorts categorized as exposed (NVP) and unexposed. The detailed recording and analysis of the health results for mothers and their babies were done using SPSS version 26.0, where a p-value ≤ 0.05 was considered as statistically significant.*

RESULTS: *A thorough examination involving 400 participants revealed that the exposed group (n=200) had a notably younger average age (28.82 ± 4.65 years against 29.89 ± 4.31 years), a decreased body mass index (26.71 ± 4.52 compared with 27.28 ± 4.47), and elevated PUQE scores (9.25 ± 2.05 in contrast to 4.45 ± 1.34). No statistically significant discrepancies were observed in the prevalence of preterm labor (9.0% versus 8.0%; relative risk: 1.065; p=0.720), cesarean section births (39.0% compared to 42.0%; p=0.541), or admissions to the Neonatal Intensive Care Unit (NICU) (8.5% versus 8.0%; p=0.856). The incidence of fetal growth restriction was found to be more pronounced in the exposed subgroup (11.5% v/s 6.5%; p=0.778).*

CONCLUSION: *This research elucidates that NVP, although correlated with diminished maternal age and elevated PUQE scores, did not reveal statistically significant association with detrimental maternal outcomes such as preterm labor, antepartum hemorrhage, or delivery method. Similarly, neonatal outcomes including growth restriction, NICU admission, Apgar scores, and birth weight showed no difference among the groups. These results imply that moderate NVP may not serve as an independent predictor of adverse pregnancy or neonatal outcomes.*

INTRODUCTION

The quality of life experienced by a woman may be negatively influenced by nausea and vomiting of pregnancy (NVP) as well as hyperemesis gravidarum (HG). NVP is experienced by up to 80% of expecting women [1] and is one of the greatest contributors of hospital admission lasting 3–4 days [2-4]

A severe form of such symptoms is hyperemesis gravidarum (HG) which is characterized by excessive and prolonged nausea and vomiting resulting in dehydration, imbalance of electrolytes, weight loss and subsequent hospitalization [5]. It affects up to 0.3–3.6% of women. HG can have adverse effects on maternal and neonatal health. It is associated with low birth weight among neonates [6], small for gestational age infants [7], extreme weight loss during pregnancy [8] and preterm birth [9].

Although no clear cause for HG exists, studies have suggested that multiple factors such as genetics, increased levels of Human chorionic gonadotropin (HCG) and Helicobacter pylori (H. pylori) are associated with the development of HG [10–11]. Multiple studies have found the incidence of hyperemesis gravidarum (HG) to be higher among Asian women as compared to women of other ethnicities [12-13]. One study comparing Norwegian and Pakistani women for pregnancy complications found that Pakistani women were significantly more likely to experience adverse outcomes. Specifically, they had over five times higher odds of developing gestational diabetes, nearly four times higher odds of hyperemesis gravidarum, and were also at markedly increased risk of intrauterine growth restriction and anemia. The frequency of congenital malformations was also significantly elevated in this group (p=0.048) [14]. In Pakistan, a cross-sectional hospital-based study reported the frequency of HG to be 14.4% and 6.19% in Peshawar and Mardan, respectively, with corresponding figures of 14.68% and 11.43% in 2016 [15]. These findings are consistent with broader literature, which demonstrates that hyperemesis gravidarum is associated with poor fetal growth, increased risk of low birth weight, and higher rates of neonatal complications such as NICU admissions [16-17].However, no study has been conducted to assess any adverse outcomes HG might have on neonatal or maternal outcomes in the pregnant female population of Pakistan. Hence, it is imperative to assess the adverse effects of HG on pregnancy and neonatal outcomes in Pakistani women.

METHODOLOGY

This prospective longitudinal cohort study was conducted within the Department of Obstetrics and Gynecology at Aga Khan University Hospital, located in Karachi, Pakistan, over a 24-month duration spanning from December 16, 2022, to December 15, 2024, subsequent to the acquisition of ethical approval. The study included pregnant women presenting in their first trimester (up to 13 weeks of gestation) with viable pregnancies. Participants were divided into two groups based on the presence or absence of nausea and vomiting of pregnancy (NVP). The exposed group was defined as women experiencing NVP with a PUQE score greater than 7, indicating moderate to severe symptoms, while the unexposed group included women without any symptoms of NVP and a PUQE score of 6 or less. Women were excluded if they had non-viable pregnancies, declined participation, or had alternative causes of nausea and vomiting such as peptic ulcers, cholecystitis, gastroenteritis, hepatitis, pancreatitis, pyelonephritis, metabolic or neurological disorders, or drug-induced symptoms. A total of 400 participants were enrolled through non-probability consecutive sampling, with 200 women in the exposed group and 200 in the unexposed group. Data were collected using a pre-structured questionnaire and review of medical records, and participants were followed until delivery. Documented maternal and neonatal outcomes included preterm labor, defined as the onset of labor before 36 weeks and 6 days of gestation; type of labor, categorized as spontaneous (initiated without medical intervention) or induced (initiated pharmacologically or mechanically); the mode of delivery is documented as either spontaneous vaginal delivery or cesarean section; furthermore, antepartum hemorrhage is delineated as vaginal bleeding occurring subsequent to 24 weeks of gestation. Neonatal outcomes recorded were birth weight measured in kilograms; Apgar assessments conducted at both 1 and 5 minutes post-delivery, wherein a score of 7 or higher is deemed indicative of normal

physiological status; intrauterine growth restriction (IUGR), characterized as fetal development falling below the 5th percentile as determined by serial biometric evaluations and Doppler ultrasonography; small for gestational age (SGA), defined as an infant's birth weight being below the 10th percentile in relation to gestational age and NICU admission will be documented. Data underwent rigorous analysis through the application of SPSS version 26.0; quantitative variables were expressed as means in conjunction with standard deviations, while categorical variables were illustrated via frequencies and percentages. The relationship between exposure and outcomes was assessed utilizing Chi-square tests, with a significance established at $p \leq 0.05$ considered to be statistically significant.

RESULTS

The total sample of 400 participants engaged in the investigation, who were equally divided into exposed (n=200) and unexposed (n=200) groups, the mean age was slightly lower in the exposed group (28.82 ± 4.65 years) when juxtaposed with the unexposed group (29.89 ± 4.31 years). In a similar vein, the mean values for weight and height demonstrated a significant decrement within the exposed cohort (65.49 ± 11.90 kg and 156.48 ± 5.96 cm, respectively) when contrasted with those of the unexposed cohort (68.01 ± 12.38 kg and 157.80 ± 5.99 cm). Furthermore, the average Body Mass Index (BMI) was also observed to be slightly diminished among the exposed individuals (26.71 ± 4.52 kg/m²) in comparison to their unexposed equivalents (27.28 ± 4.47 kg/m²). In the context of weight alterations observed during the initial trimester, the exposed cohort exhibited a lower mean weight (65.24 ± 11.86 kg) in comparison to the unexposed cohort (67.84 ± 12.41 kg). The mean gestational age at which delivery occurred was found to be statistically comparable between the two groups (37.72 ± 1.04 weeks versus 37.68 ± 1.09 weeks). Importantly, the Pregnancy-Unique Quantification of Emesis (PUQE) score, which serves as a metric for the severity of nausea and vomiting, was significantly elevated in the exposed group (9.25 ± 2.05) relative to the unexposed group (4.45 ± 1.34). In terms of obstetric history, a significantly higher incidence of primigravida women was identified within the exposed cohort (36.5%) in contrast to the unexposed cohort (27.5%), whereas multigravidas represented 63.5% and 72.5% of the exposed and unexposed cohorts, respectively. Singleton pregnancies were overwhelmingly prevalent in both cohorts (99.5%), with merely one instance of multiple pregnancies recorded in each. A considerable disparity was noted concerning the history of hyperemesis gravidarum (HG), which was documented in 18.0% of participants in the exposed group, in comparison to a mere 1.5% within the unexposed group (TABLE I).

Table II summarizes the statistical comparison of maternal and neonatal outcomes between women exposed (n=200) and unexposed (n=200) to nausea and vomiting during pregnancy (NVP). Preterm labour occurred in 9.0% of the exposed group and 8.0% of the unexposed group (RR: 1.065, 95% CI: 0.763–1.486; p = 0.720). Antepartum hemorrhage was reported in 2.0% vs. 1.5% (RR: 1.146, 95% CI: 0.599–2.193; p = 0.500). Induced and spontaneous labour were equally distributed in both groups (42.5% and 57.5%, respectively; p = 0.999). The mode of delivery showed similar proportions of spontaneous vaginal delivery (61.0% vs. 58.0%) and cesarean section (39.0% vs. 42.0%) with no statistical significance (RR: 1.065, 95% CI: 0.870–1.303; p = 0.541). Among neonatal outcomes, male births accounted for 50.0% in the exposed group and 53.5% in the unexposed (RR: 0.932, 95% CI: 0.767–1.134; p = 0.484).Fetal growth restriction was more prevalent in the group subjected to exposure (11.5% compared to 6.5%; RR: 1.314, 95% CI: 1.006–1.717; p = 0.778), whereas the incidence of small for gestational age infants was documented at 2.0% versus 1.0% (RR: 1.340, 95% CI: 0.755–2.380; p = 0.343). The prevalence of atypical Doppler results was documented at 6.5% within the exposed cohort, in contrast to 4.0% within the non-exposed cohort (RR: 1.255, 95% CI: 0.884–1.782; p = 0.262), while admissions to the neonatal intensive care unit were noted in 8.5% compared to 8.0% of neonates (RR: 1.033, 95% CI: 0.731–1.461; p = 0.856). The mean birth weight was consistent across both cohorts (2.90 ± 0.41 kg; p = 0.939), while Apgar scores at 1 minute (7.94 ± 0.47 versus 8.01 ± 0.25; p = 0.090) and at 5 minutes (8.94 ± 0.36 versus 8.96 ± 0.22; p = 0.405) demonstrated minimal differences that were not statistically significant.

DISCUSSION

This investigation and vomiting during pregnancy NVP and detrimental maternal and neonatal outcomes within a cohort of Pakistani women. The participants were categorized based on the validated PUQE scoring system, wherein a score exceeding 7 signified moderate to severe symptoms, while a score of 6 or below denoted the absence of NVP [16]. This objective clinical tool allowed for consistent classification and minimized recall or reporting bias.

The findings demonstrated that most maternal and neonatal outcomes were not significantly different between women exposed and unexposed to NVP. Regarding maternal outcomes, preterm labour was observed in 9.0% of the exposed group compared to 8.0% in the unexposed, with RR of 1.065 (95% CI: 0.763–1.486; p = 0.720), indicating no significant association. Similarly, the incidence of antepartum hemorrhage was 2.0% in the exposed group versus 1.5% in the unexposed (RR: 1.146; p = 0.500). The distribution of induced and spontaneous labour was identical in both groups (42.5% and 57.5%, respectively; p = 0.999), while spontaneous vaginal delivery was slightly more common in the exposed group (61.0% vs. 58.0%; p = 0.541), though the difference was not statistically significant (RR: 1.065, 95% CI: 0.870–1.303).

These findings contrast with prior studies such as De Bonis M et al., who reported higher rates of hypertensive disorders, labour induction, and cesarean delivery in women with NVP or hyperemesis gravidarum (HG) [18]. The differences may be attributed to the moderate severity of symptoms in our cohort or differences in population, nutritional status, and management practices.

In terms of neonatal outcomes, fetal growth restriction (FGR) was noted more frequently in the NVP group (11.5% vs. 6.5%), with a relative risk of 1.314 (95% CI: 1.006–1.717). Although this indicates a possible 31% increased risk, the p-value of 0.778 suggests the difference was not statistically significant. Small for gestational age (SGA) was observed in 2.0% of the exposed group versus 1.0% in the unexposed group (RR: 1.340; p = 0.343), and abnormal Doppler findings were noted in 6.5% and 4.0% of the groups respectively (RR: 1.255; p = 0.262). NICU admissions were comparable (8.5% vs. 8.0%; RR: 1.033; p = 0.856), and no significant differences were found in birthweight (2.90 ± 0.41 kg in both groups; p = 0.939). These results partially diverge from earlier literature, including findings by Bailit JL [6] and Veenendaal MV et al. [7], which linked HG to increased risk of fetal growth restriction, low birth weight, and other neonatal complications. It is possible that such outcomes are more pronounced in cases of severe HG, whereas our study focused on a broader spectrum of NVP severity, excluding severe and hospitalized cases. Apgar scores at 1 and 5 minutes were comparable between groups (7.94 ± 0.47 vs. 8.01 ± 0.25 and 8.94 ± 0.36 vs. 8.96 ± 0.22, respectively), showing no statistically significant differences (p = 0.090 and p = 0.405). These findings are consistent with studies by Dodds L et al. [9] and Vangen S et al. [14], both of which reported no significant impact of HG on immediate neonatal adaptation.

A major strength of this study is its prospective design and use of a standardized PUQE scoring system for defining and categorizing NVP severity [16]. The relatively large sample size and inclusion of both maternal and neonatal outcomes offer a comprehensive assessment. Furthermore, this study contributes novel data from Pakistan, where prior studies have shown increased susceptibility to HG and related complications in pregnant women compared to other ethnicities [14, 15].

Nevertheless, the research is accompanied by specific constraints. It was performed at a singular tertiary care institution, which may limit the broader applicability of the results. While the PUQE score effectively captured moderate to severe symptoms, the study did not separately evaluate cases of clinically diagnosed HG, which may have resulted in an underestimation of risks associated with severe forms. Additionally, important variables such as maternal nutritional status, antiemetic treatment, and psychosocial stressors were not assessed, though prior studies have demonstrated their influence on both maternal and fetal outcomes [5, 10, 11].

Current study found that moderate NVP, as classified by PUQE scores, was not significantly associated with adverse maternal or neonatal outcomes in a Pakistani cohort. While there was an observed increase in relative risk for fetal growth restriction, this did not reach statistical significance. These findings underscore the importance of distinguishing between

mild-to-moderate NVP and severe HG, and suggest that routine cases of NVP, when appropriately monitored, may not pose significant clinical risks. Future research should aim to evaluate outcomes in severe HG cases, with inclusion of nutritional, pharmacological, and psychosocial factors to better stratify risk and inform clinical management.

CONCLUSION

This research elucidates that NVP, although correlated with diminished maternal age and elevated PUQE scores, did not reveal statistically significant association with detrimental maternal outcomes such as preterm labor, antepartum hemorrhage, or delivery method. Similarly, neonatal outcomes including growth restriction, NICU admission, Apgar scores, and birth weight showed no difference among the groups. These results imply that moderate NVP may not serve as an independent predictor of adverse pregnancy or neonatal outcomes.

Table I: Demography & Clinical Characteristics of Study Participants (n=400)

Demography & Clinical Characteristics		Groups	
		Exposed (n=200)	**Unexposed** (n=200)
Age in years, Mean ± SD		28.82 ± 4.65	29.89 ± 4.31
Weight in kg, Mean ± SD		65.49 ± 11.90	68.01 ± 12.38
Height in cm, Mean ± SD		156.48 ± 5.96	157.80 ± 5.99
BMI in kg/m^2, Mean ± SD		26.71 ± 4.52	27.28 ± 4.47
Weight Change in 1st Trimester in kg, Mean ± SD		65.24 ± 11.86	67.84 ± 12.41
Gestational Age at Delivery in weeks, Mean ± SD		37.72 ± 1.04	37.68 ± 1.09
PUQE Score, Mean ± SD		9.25 ± 2.05	4.45 ± 1.34
Gravida, *n* (%)	Primigravida	73 (36.5)	55 (27.5)
	Multigravida	127 (63.5)	145 (72.5)
Type of Pregnancy, *n* (%)	Singleton	199 (99.5)	199 (99.5)
	Multiple	1 (0.5)	1 (0.5)
History of HG, *n* (%)	Yes	36 (18.0)	3 (1.5)
	No	164 (82.0)	197 (98.5)

Table II: Comparison of Maternal and Neonatal Outcomes Between Groups (n=400)

Maternal Outcomes		Groups			P-Value
		Exposed (n=200)	**Unexposed** (n=200)	**Relative Risk 95% C. I**	
Preterm Labour, *n* (%)		18 (9.0)	16 (8.0)	1.065 0.763–1.486	0.720
Presence of APH, *n* (%)		4 (2.0)	3 (1.5)	1.146 0.599–2.193	0.500
Type of Labour, *n* (%)	Induced	85 (42.5)	85 (42.5)	1.000 0.820–1.219	0.999
	Spontaneous	115 (57.5)	115 (57.5)		
	SVD	122 (61.0)	116 (58.0)	1.065	0.541

Mode of Delivery, *n* (%)	LSCS	78 (39.0)	84 (42.0)	0.870–1.303	
Neonatal Outcomes					
Gender of Baby, *n* (%)	Male	100 (50.0)	107 (53.5)	0.932 0.767–1.134	0.484
	Female	100 (50.0)	93 (46.5)		
Fetal Growth Restriction, *n* (%)		23 (11.5)	13 (6.5)	1.314 1.006–1.717	0.778
Small For Gestational Age, *n* (%)		4 (2.0)	2 (1.0)	1.340 0.755–2.380	0.343
Presence of Abnormal Dopplers, *n* (%)		13 (6.5)	8 (4.0)	1.255 0.884–1.782	0.262
NICU Admission, *n* (%)		17 (8.5)	16 (8.0)	1.033 0.731–1.461	0.856
Birthweight in kg, Mean ± SD		2.90 ± 0.41	2.90 ± 0.37	N/A -0.046–0.216	0.939
Apgar at birth 1 min, Mean ± SD		7.94 ± 0.47	8.01 ± 0.25	N/A -0.046–0.216	0.090
Apgar at birth 5 min, Mean ± SD		8.94 ± 0.36	8.96 ± 0.22	N/A -0.216–0.006	0.405

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