

Unmasking a Hidden Threat: Prenatal Stress and its Link to Maternal and Fetal Health: A Cross-Sectional Study in Tertiary Care Hospital

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Abstract

Background: Physical discomforts and other changes in everyday life can cause stress during pregnancy. Some types of stress may cause serious health problems, like high blood pressure, and lead to problems like preterm birth.

Objective: To determine the frequency of maternal stress during pregnancy in urban population. To find out the relationship of stress with maternal and fetal outcomes.

Study type, settings & duration: This cross-sectional study was conducted at Tertiary Care Hospital of Rawalpindi from April to December 2021.

Methodology: The 324 pregnant women were included in the study who visited a tertiary care hospital of Rawalpindi. Data was collected using consecutive sampling, 1st contact at Gestational age ≥ 24 weeks and same participants were followed up on 2nd contact after maternity (within few hrs-4 days) The maternal stress was measured through modified Urdu version of 30 items A-Z Stress Scale. Three groups of women were identified on basis of exposure. Internal comparisons were made. 5 maternal parameters & 3 neonatal outcomes were assessed. Maternal and Fetal outcome data was obtained from hospital record. risk ratios (95% CI) were calculated using SPSS version 26.

Results: Results showed significant relationship between stressors and maternal outcomes such as Pregnancy induced hypertension ($p=0.000$, OR 4.150 95% CI 1.815 – 9.491), C-Section ($p=0.008$, OR 1.95095% CI 1.201 – 3.164) and Postpartum Hemorrhage ($p=0.025$, OR 3.376 95% CI 1.151 – 9.899). Furthermore, the study showed no significant relationship between maternal stress and fetal outcomes among newborns except low Birth Weight $<2.5\text{Kg}$ ($p=0.04$ OR 3.46 95% CI 1.031-11.870).

Conclusion: Maternal stress is associated with adverse maternal outcomes. However, no adverse fetal outcomes were reported except low birth weight.

Key words: Foetal outcomes, maternal outcomes, maternal stress.

Introduction

Antenatal stress is a foremost concern in low and middle-income countries (LMIC), with a

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Authors Contribution

IS conceptualized the project. FFJ did the data collection. IS & HM did the literature search. SR & MA performed the statistical analysis. Drafting, revision & writing of manuscript were done by SB.

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prevalence of 29–60%, due to an increased risk of social, emotional, and physical difficulties.¹ Perinatal anxiety is linked with gruesome consequences for mothers and their babies.² For the offsprings, adverse outcomes include premature birth, low birth weight and intrauterine growth restriction due to stress among mothers.³ Research suggests that risk for complications such as respiratory, gastrointestinal, nervous system, and immune-related problems may be reported among infants born premature.^{4,5} Research also shows that pregnant ladies facing stress during antenatal period may also have high rates of developing anxiety and postnatal depression.⁶

In developed nations, maternal depression is linked with continuing cognitive and behavioural problems in children, and the effect is worse where

the depressive episode is severe or prolonged.⁷ Few studies have examined antenatal depression in developing countries, despite World Health Organization (WHO) approximations that depressive disorders will be the second leading source of the world-wide disease burden by 2020, whereas in Pakistan a study reported that the heavy household work and pregnancy symptoms were significantly associated with total depression scores.⁸ Likewise depression was explored in rural Pakistani women, depicting prevalence of 25% during pregnancy and 28% in the postnatal period.⁹ The concept of a psychosocial stress also includes the problems related to job, housing, domestic violence and worries about pregnancy itself.³

Despite the clear evidence of the effect of maternal stress on women and children, the prevention and treatment of these is highly neglected in MCH programs in Pakistan.¹⁰ Stress during pregnancy is a recognized risk factor for negative outcomes for both mothers and babies.⁸ However, research specific to Pakistan is scarce. By understanding the link between stress and pregnancy outcomes in the Pakistani context, we can develop targeted interventions to reduce stress and improve health for both mothers and babies. This could lead to a decrease in complications like preterm birth, low birth weight, and postpartum depression. It can also pave way to design culturally tailored solutions & stress management programs for the desired community.

Methodology

The study was of descriptive observational design to collect data of the participants of the study. Participants of the study include pregnant women who visited Department of Gynaecology and Obstetrics, Benazir Bhutto Hospital, Rawalpindi. The sample was calculated through WHO sample size calculator 30 (10%) for non-response so sample size comes to 324 and researcher employed consecutive sampling technique. Inclusion Criteria: Pregnant ladies age 18-47 years, 1st contact Gestational age ≥ 24 weeks by last menstrual period and 2nd contact after delivery (within few hrs-4 days).

Pregnant females with multiple pregnancy, previous C-section, previous history of psychiatric illness or taking any psychiatric medication, current history of Diabetes, Hypertension and Anemia.

During research confidentiality and anonymity of the participants were maintained. The participants were ensured that they will not have psychological stress or harm during the study.

Informed consent was obtained from the participants to conduct the study.

Primary data related to maternal stress was collected through 30 items A-Z Stress Scale.¹¹ Stress was categorized at three levels that included (i) Mild Maternal Stress (ranging from 1 positive stressors to 10 positive stressors), (ii) Moderate Maternal Stress (ranging from 11 positive stressors to 19 positive stressors) and (iii) Severe Maternal Stress (ranging from 20 & above positive stressors). The questionnaire was filled by researcher, data about all socio-demographic details, obstetrical history Last Menstrual Period, Expected Date of Delivery and stress data was collected on first contact (gestational age ≥ 24 wks). Secondary data related to five maternal and three foetal outcome was collected from hospital record on 2nd contact (few hrs-4 days) after delivery. The data was analysed with IBM Statistical Package of Social Sciences (SPSS) version 26.

In the line of objectives of this research, to examine the relationship of maternal stressors (socio-environmental & pregnancy and health related stressors) on maternal and fetal outcomes Pearson's Chi-Square Test of Association was applied. The degree of association measured separately in women reported with mild, moderate and severe stress. Internal comparison was made based on exposure to independent variable i.e. stress.

The ethical approval was obtained from the Ethical Review Committee of Armed Forces Postgraduate Medical Institute, Rawalpindi vide letter no. 212-AAA-ERC-AFPGMI.

Results

The mean score age of participants was 28.17 ± 6.34 years ranging from 19 to 46 years. Among 324 mothers 96 were primigravida while rest were multigravida. Regarding the education status of participants 101 (31%) participants were uneducated, 55 (17%) held primary education, 115 (35%) held secondary school education while 53 (16%) women held higher education. It was also found that 208 (64%) participants have family income of Rs. 10,000–30,000 per month while monthly income of only 8 (2%) families was above Rs. 50,000 per month. Most of the participants reported moderate stress (Figure).

In Table-1 internal comparison were made based on exposure to independent variable i.e. stress. Women with mild stress were considered as non-exposed while women with moderate and severe stress were considered as exposed. Cross

tabulation was done to calculate risk of developing disease among exposed and non-exposed.

In Table-2 relationship of maternal stress with foetal complications like low birth weight, preterm delivery & low APGAR score was assessed showing significant relationship with low birth weight of baby ($p=0.041$).

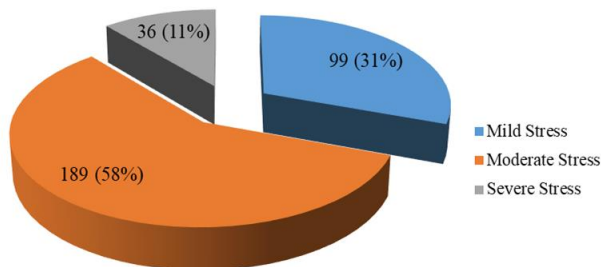


Figure: Category Wise Stress Responses of participants.

Discussion

The current study examined the relationship of maternal stress with five selected maternal outcomes i.e., Pregnancy Induced Hypertension (PIH), Gestational Diabetes, Spontaneous Vaginal Delivery (SVD), C-Section and Postpartum Haemorrhage (PPH). This study reported significant relationship of maternal stress with four maternal outcome such as PIH ($p=0.000$, OR 4.150 95%CI 1.815–9.491), C-Section ($p=0.00$, OR1.95 95% CI

1.202–3.164) and Postpartum haemorrhage ($p=0.025$, OR3.376 95% CI 1.151–9.899) except gestational diabetes ($p=0.275$, OR1.683 95% CI 0.740–3.826).

Pregnancy induced hypertension is one of the most common medical problems affecting 10% of pregnancies, trends are even higher in developing countries.¹² Hypertension has multiple underlying risk factors, stress is one of them. Prenatal stress has been correlated with increased risk of pregnancy complications, including preterm birth & preeclampsia. These complications have lasting consequences, as hypertensive disorders of pregnancy is associated with enhanced chance of hypertension and cardiovascular disease in mothers.² Some of the studies conducted in South Asian context^{13,14} reported that hypertension not only affects the wellbeing of the mother, but it also negatively affects the health of infant due to decreased placental perfusion and intrauterine growth restriction which may result in low birth weight.

The current study reported gestational diabetes in 9% of the women with mild stress and in 13% of the women with moderate and severe stress. However no significant relationship between maternal stressors and Gestational Diabetes was found. Findings of current study are consistent with previous studies that psychosocial and

Table 1: Association of maternal stress and maternal outcomes.

Maternal Outcome		Stress Reported		OR 95% CI	p-Value
		Mod +Severe (n=225)	Mild (n=99)		
Pregnancy induced hypertension	Yes	54 (24%)	7 (8%)	4.150 (1.815–9.491)	0.000*
	No	171 (76%)	92 (92%)		
Gestational diabetes	Yes	29 (13%)	8 (9%)	1.683 (0.740 – 3.826)	0.275
	No	196 (87%)	91 (91%)		
Spontaneous vaginal delivery	Yes	104 (46%)	62 (69%)	0.513 (0.316 – 0.832)	0.008*
	No	121 (53%)	37 (31%)		
Caesarean-section	Yes	121 (53%)	37 (31%)	1.590 (1.201 – 3.164)	0.008*
	No	104 (46%)	62 (69%)		
Post-Partum Haemorrhage	Yes	28 (12%)	4 (4%)	3.376 (1.151 – 9.899)	0.025*
	No	197 (88%)	95 (96%)		

*p value <0.05 is considered significant

Table 2: maternal stress and foetal outcomes. (N=324)

Foetal Outcomes		Stress Reported		OR 95% CI	p-Value
		Mod+Severe (n=225)	Mild (n=99)		
Low Birth Weight	Yes	22 (9%)	3 (3%)	3.468 (1.013 – 11.87)	0.041*
	No	203 (91%)	96 (97%)		
Preterm Delivery	Yes	50 (22%)	19 (19%)	1.203 (0.666 – 2.172)	0.659
	No	175 (78%)	80 (81%)		
Low APGAR	Yes	60 (27%)	22 (22%)	1.273 (0.728 – 2.22)	0.488
	No	165 (73%)	77 (78%)		

*p value <0.05 is considered significant

environmental stressors are less likely to increase any risk of insulin resistance among pregnant women.^{15,16}

Findings of this study revealed significant relationship between stressors and mode of delivery. Out of 89 women with mild stress, 62 (69%) delivered by spontaneous vaginal delivery (SVD). While out of 225 patients with moderate and severe stress, 104 (46%) women were delivered by SVD and 121 (53%) delivered through caesarean section. As level of stress increased the chances of surgical intervention i.e. caesarean section also increased ($p = 0.008$, OR 1.950 95% CI 1.20-3.16). Results were consistent with previous studies which reported that some psychosocial, environmental as well as health related stressors may increase rate of caesarean section among pregnant women.^{17,18}

Current study reported that there is a significant relationship between stressors and Post-Partum Haemorrhage (PPH) among women. The PPH was more in women who had severe stress with other health/pregnancy related issues such PIH and prolonged labour which may further worsen the situation.¹²

Current study examined association of maternal stress with three foetal outcomes i.e. low birth weight, preterm birth and low Apgar score. Results reported no significant relationship of maternal stress and foetal outcomes among infants of pregnant women except low birth weight ($>2500\text{gm}$) ($p = 0.014$, OR 3.461 95% CI 1.013–11.870). It has been reported previously that severe maternal stress may cause Low Birth Weight (LBW) which may result in high neonatal, infant and childhood morbidity, mortality, neurodevelopment impairments and disabilities.^{1,19-21} Stress with other underlying maternal health problems like malnutrition, chronic maternal illness, PIH may further worsen the situation.^{13,14} However, some studies contradict our findings which reported no significant impact of maternal stressors on birth weight. These studies further reported that only in certain acute cases, stress effect is transmitted to the infant.²²

This study reported no significant relationship between maternal stress and preterm birth. These findings are consistent with the findings of other studies which also reported that except in certain sudden psychological shocks, maternal stressors may hardly result in premature delivery.²² These studies assert that stressors affect mother instead of the foetus.²³

While examining the relationship of maternal stress and low APGAR score of infants, the study reported no significant relationship between the two ($p = 0.630 > 0.05$). Some of studies

reported relationship of stress with low Apgar score.¹⁹ while others reported that maternal stress is hardly transmitted to the infant as this is only detrimental to the mother's health.²²

Conclusion

This investigation explored stress solely among expectant mothers attending a public hospital's obstetrics and gynecology outpatient department (OPD) during their prenatal period till few days of delivery, potentially excluding the experiences of the broader pregnant population within the community. The findings echo prior research, suggesting that a significant portion of this population experiences stress. A critical concern emerges – the current antenatal care system may not be effectively equipped to identify mothers grappling with stress. This is particularly concerning given the growing body of evidence that links prenatal stress to adverse pregnancy outcomes for both mothers and their babies. The study proposes incorporating a stress measurement tool into antenatal care.

Conflict of interest: None declared.

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