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IMPACT OF MATERNAL STRESS AND SOCIOECONOMIC FACTORS ON BIRTH OUTCOMES IN A TERTIARY CARE HOSPITAL

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Keywords

Maternal stress; perceived stress Scale; socioeconomic status; preterm birth; low weight birth; NICU admission

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Abstract

Purpose: *The aim of the study was to determine the cumulative effect of both maternal perceived stress and socioeconomic status (SES) on poor birth outcomes in a tertiary care hospital. Methods: The study was cross-sectional and was done on Benazir Bhutto Hospital, Rawalpindi during six months between January and June 2025. Consecutive sampling was used to enroll pregnant women that had 28-40 gestation (n=148). The measure of maternal stress was the 10 items Perceived Stress Scale (PSS -10) and the 3 indicators of SES (income, education, employment) were collected through structured interview. The outcome measures were preterm birth (less than 37 weeks), low birth weight (LBW; less than 2500 g), 5-minute Apgar, and admission to neonatal intensive care unit (NICU). Findings: 62.2% (92/148) and 45.3% (67/148) had moderate and high perceived stress respectively, with 62.2 and 45.3 respectively, in low-income households. Preterm birth rate was 25.7 (38/148) and LBW rate was 29.1 (43/148). The moderate-to-high stress and low stress among the women were of moderate-to-high stressed and low-stressed respectively with greater preterm birth among moderate-to-high-stressed women (34.8 vs 10.7 p=.02). LBW rates were lower in high-income households (19.8) as compared to low-income households (40.3), p= 0.01. The moderate-to-high stress (AOR 2.1; 95% CI 1.23.6) and low income (AOR 1.9; 95% CI 1.13.4) on multivariate analysis were independent predictors of preterm birth when they predicted LBW. Conclusion: It was determined that there is a positive relationship between perceived maternal stress with socioeconomic disadvantage and preterm birth concerning the low birth weight. The negative perinatal results of the vulnerable population could be reduced with the help of screening of the stress routines and certain social support.*

Introduction

Gestational age at birth and birth weight are the birth outcomes that are important indicators of perinatal health and predictors of neonatal survival and long-term development. In low- and middle-income nations, bad results continue to be disproportionately prevalent and are currently being interpreted in a biopsychosocial framework in which psychological stress as well as social disadvantage intersect to affect pregnancy physiology and health behaviours..[15 16].

Prenatal maternal stress; in most cases according to perceived stress-measurement; was associated with preterm birth and limited fetal development in both observational research and meta-analyses. Activation of the hypothalamic-pituitaryadrenal axis, disturbed placental corticotropin releasing hormone signalling, inflammatory pathways and

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stress related behavioural mediators have been proposed such as poor antenatal care attendance, poor nutrition, and poor sleep..[2 3 9].

Low income, low educational attainment, unstable employment, socioeconomic disadvantage are connected to preterm birth and low birth weight independently, and may also augment exposure to chronic stressors. The reviews of systematic mediation analyses imply that mediates usually measured account for only a portion of the observed SES gradient, suggesting that structural effects exist long term.6

Psychosocial stress screening is perhaps the most recommended intervention in the antenatal care strategy, however it must be implemented based on local prevalence, correlate and clinically meaningful outcome differences to ensure that there is no under-recognition of psychosocial needs especially in high volume public sector services..[12].

Pakistan is a country with a high rate of preterm delivery, growth retardation, and tertiary care facilities are often referred to with women with compound psychosocial and socioeconomic risk. There is a lack of local data relating perceived stress and SES to perinatal outcomes. Thus, the aim of the research was to determine the joint effect of maternal perceived stress and socioeconomic status on birth outcomes in one of the tertiary care hospitals in Rawalpindi.

Methodology

Setting and study design: The study is a cross-sectional study at Benazir Bhutto Hospital in Rawalpindi, Pakistan and a period of six months between January to June 2025.

Participants: Pregnant women at the 28-40 gestation period seeking antenatal care or delivery were included in the study through consecutive sampling (n=148). Women who had more than one gestating or significant fetal anomalies were filtered out.

Exposure assessment: The perceived stress was assessed with the 10-item Perceived Stress Scale (PSS-10).1 The scoring of the PSS-10 adopted in the research was used to evaluate the perceived stress by comparing low stress and moderate-to-high stress. There were socioeconomic variables such as household income (low vs higher) which were measured by maternal education and employment status taken by structured interview.

Outcome measures: Primary outcomes were preterm birth (<37 completed weeks) and low birth weight (LBW; <2500 g). Secondary outcomes included 5-minute Apgar score and NICU admission.

Statistical analysis: Chi-square test of categorical variables was used to analyse data. Preterm birth and LBW multivariate logistic regression models adjusted by the clinically applicable covariates (maternal age, parity, and antenatal care attendance) were developed. The adjusted odds ratios (AOR) and 95 percent confidence interval (CI) were reported. A p-value of below 0.05 was deemed to be significant.

Ethical considerations: The ethical approval was obtained by the institutional review board. All participants were informed through a written consent.

Results

One hundred and forty eight (148) women were recruited. The moderate to high perceived stress levels were found in 62.2 (92/148), 45.3 (67/148) in moderate and low-income households respectively. The preterm birth was observed in 25.7% (38/148) and the low birth weight was observed in 29.1% (43/148).

Table 1: Distribution of the essential exposure variables and birth outcomes (n=148).

Variable	n	%
Moderate-to-high perceived stress	92/148	62.2
Low perceived stress	56/148	37.8
Low-income household	67/148	45.3
Higher-income household	81/148	54.7

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Preterm birth (<37 weeks)	38/148	25.7
Low birth weight (<2500 g)	43/148	29.1

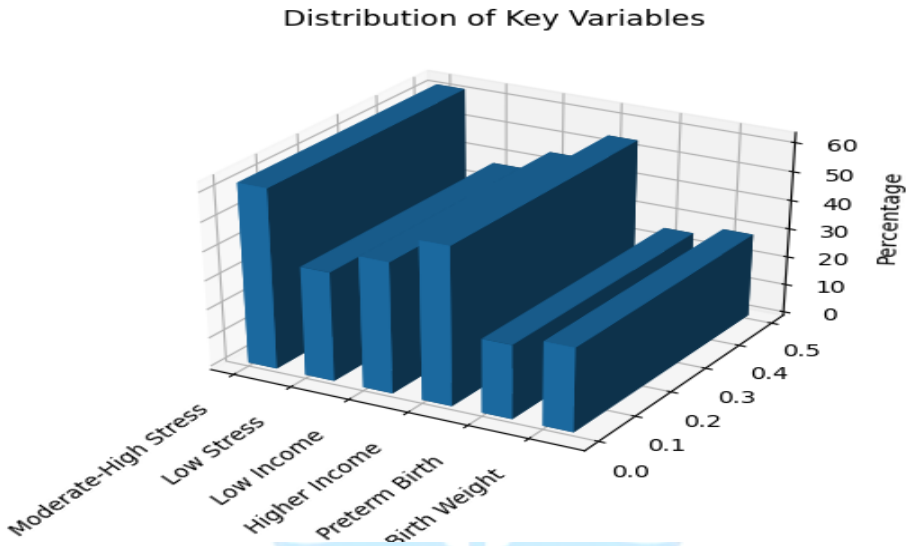


Figure 1: Distribution of the major variables of exposures and birth outcomes (n=148).

Table 2: Association between maternal perceived stress and preterm birth.

Stress category	Preterm birth, n (%)	Term birth, n (%)	Total	p-value
Moderate-to-high	32 (34.8)	60 (65.2)	92	0.02
Low	6 (10.7)	50 (89.3)	56	

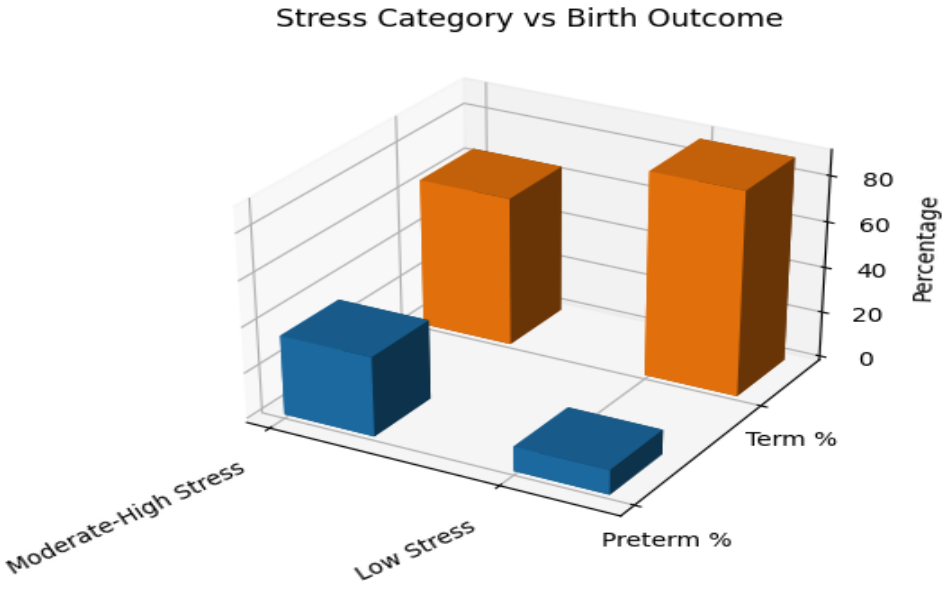


Figure 2: Association between maternal perceived stress and preterm birth.

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Table 3: Multivariable logistic regression for adverse birth outcomes (adjusted for maternal age, parity, and antenatal care attendance).

Predictor	Outcome	AOR (95% CI)	p-value
Moderate-to-high stress	Preterm birth	2.1 (1.2–3.6)	<0.05
Low income	Low birth weight	1.9 (1.1–3.4)	<0.05

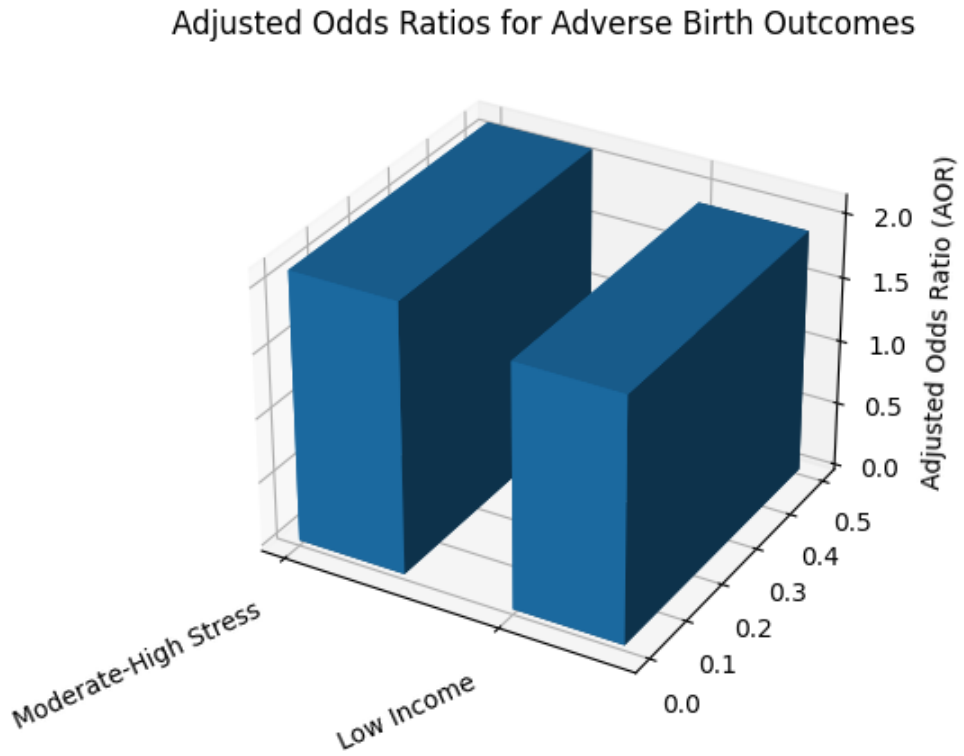


Figure 3: Multivariable logistic regression for adverse birth outcomes

Discussion

The paper has shown that there is a relationship between perceived maternal stress and socioeconomic disadvantage and adverse birth outcomes in a tertiary care environment. Moderate-to-high perceived stress was associated with a higher proportion of preterm birth in women and low income in relation to high prevalence of low birth weight. Such results confirm the hypothesis that there is a parallel or even synergistic effect of psychological and social determinants on gestational length and fetal development..[12 14].

We also find that our results are in line with the current evidence that maternal stress is associated with preterm birth. Higher perceived stress among a large cohort of pregnancies was predictive of preterm birth with clinical factors adjusting this risk..[2]. A more recent eco -evo -devo review also emphasizes how adversity in chronic form can be used to determine developmental plasticity and may predispose to spontaneous preterm birth especially in situations where social inequities and cumulative exposures tend to be prevalent..[9].

In a meta-analysis on the topic of fetal growth, it was found out that chronic stress is associated with

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low birth weight, though with variable effect sizes, depending on the population and levels of stress.t.3. Complementary evidence can be offered by physiologic measures, like cortisol which has been shown to increase the risk of preterm birth and may be related to placental signalling that can affect the time of parturition and fetal development..[4 5].

The socioeconomic disadvantage was a significant predictor of the low birth weight in our cohort. The evidence on the international level indicates that the indicators of deprivation at the area level and at the level of an individual SES are related to gestational age and birthweight, and it remains so even in the context of the high accessibility to prenatal healthcare..[15]. Indeed, mediation reviews indicate that downstream behaviours and comorbidities contribute to explaining only some portion of the SES gradient, which implies that there are more structural and psychosocial pathways.[6].

New evidence that is Pakistan-specific is being developed. Low socioeconomic status and low use of antenatal care were consistently found to be common correlates of low birth weight in a study in Faisalabad and a case-control study in Karachi found prenatal depression/anxiety/stress to be a common correlate of low birth weight - again supporting the importance of combined psychosocial and socioeconomic risk in local populations..[11 13].

Additionally, evidence on intervention is also encouragingly increasing in low-resource settings. A scalable intervention in perinatal cognitive behavioural therapy proved to be better in addressing anxiety and other outcomes as a randomised trial in Pakistan showed that this intervention is suitable in integrating mental health screening and stepped-care interventions into antenatal services..[10].

The positive aspects of this research are the simultaneous evaluation of perceived stress and SES and multivariate analysis. Such constraints are the cross-sectional design (reducing causal inference), single centre location, possible residual confounding (e.g., nutrition, domestic violence, smoking, infection), and use of self-report stress. Future investigations must include prospective designs including repeated stress measures and as possible combined self-report and biomarker measures to enhance risk stratification.[17].

Conclusion

This tertiary care cohort had moderate-to-high perceived stress and low socioeconomic status that were linked with higher risks of preterm birth and low birth weight. Stress screening and enhancement of social support pathways in antenatal care service can serve in an effort to minimize poor birth outcomes.

Recommendations

- Introduce the concept of stress screening on an acute basis (e.g., PSS-10) as a part of the routine antenatal care, as well as explicit referral routes to counselling and psychosocial support.
- The underprivileged women who are socioeconomically disadvantaged should be given special attention through offering the antenatal care and nutrition/transport assistance where possible.
- Establish perinatal mental health services and interventions which can be extended to tertiary hospitals and referral networks.

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