

Incidence of Postpartum Depression in Obstetrics Disorders of Pregnancy and Fetomaternal Outcome

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ABSTRACT

Introduction: Postpartum depression (PPD) is a major psychological complication of childbirth, particularly in women with high-risk pregnancies. This study aimed to assess the incidence of PPD in patients with obstetric disorders and explore its association with fetomaternal outcomes.

Methodology: A descriptive cross-sectional study was conducted at the Department of Obstetrics and Gynecology, Hayatabad Medical Complex, Peshawar, over 12 months from 18 February 2023 to 18 February 2024. A total of 138 postpartum women with obstetric complications were enrolled using consecutive sampling. The Edinburgh Postnatal Depression Scale (EPDS) was used to assess PPD within six weeks postpartum, with a cut-off score of ≥ 13 . Data on obstetric disorders, neonatal outcomes, and maternal characteristics were collected and analyzed using SPSS version 25. Chi-square and Fisher's exact tests were applied; $p < 0.05$ was considered statistically significant.

Results: The incidence of probable PPD was 47 (34.1%). PPD was significantly more common in women with preeclampsia 18 (51.4%), Caesarean delivery 32 (55.2%), and those whose infants required NICU admission 18 (38.3%) or had low birth weight 20 (42.6%). Advanced maternal age > 30 years 25 (50.0%) and lower education 30 (50.0%) were also significantly associated with PPD ($p < 0.05$).

Conclusion: Obstetric complications and adverse neonatal outcomes substantially increase the risk of postpartum depression. Targeted screening and mental health support are essential in high-risk obstetric populations.

Keywords: Postpartum depression, Obstetric complications, Fetomaternal outcomes, EPDS, NICU, Preeclampsia, Caesarean section

INTRODUCTION

Postpartum depression (PPD) is a major depressive episode that occurs following childbirth, typically within the first four to six weeks though it may present up to a year postpartum [1]. Characterized by persistent low mood, anhedonia, irritability, fatigue, sleep disturbances, and impaired mother-infant bonding, PPD affects not only the well-being of mothers but also the emotional and physical development of their infants [2]. Globally, the incidence of PPD ranges from 10 % to 20 %, but prevalence rates may be significantly higher in low- and middle-income countries (LMICs) like Pakistan because of sociocultural, economic, and healthcare disparities [3].

Several risk factors have been associated with PPD, including a prior history of psychiatric illness, lack of social support, unintended pregnancy, and socioeconomic stressors [4]. However, obstetric complications during pregnancy such as pre-eclampsia, gestational diabetes mellitus (GDM), preterm labor, intrauterine growth restriction (IUGR), and mode of delivery are emerging as significant yet under-investigated contributors to the onset of postpartum depression [5]. These complications can induce prolonged physical stress, hospitalization, fear of maternal or fetal loss, and increased dependency, all of which can exacerbate emotional vulnerability during the perinatal period [6].

Moreover, fetomaternal outcomes such as neonatal-intensive-care admission, low birth weight, stillbirth, or maternal morbidity can have a profound psychological impact on the mother [7]. The anticipation and actual experience of adverse outcomes can instigate guilt, helplessness, and depressive symptoms postpartum [8]. While existing studies have examined the general psychosocial correlates of PPD, few have systematically explored the incidence of PPD in women experiencing specific obstetric disorders and correlated them with fetomaternal outcomes, particularly in South Asian populations [9].

In Pakistan where access to mental-health services remains limited and stigmatization surrounding psychological disorders persists the intersection of physical pregnancy-related

complications and maternal mental health is a critical yet neglected area [10]. Understanding this association is vital for improving maternal care through integrated obstetric and psychiatric screening strategies [11].

Despite increasing awareness of maternal mental health, limited data exist on the incidence of postpartum depression in women with obstetric disorders and its association with fetomaternal outcomes in low-resource settings. This study aims to determine the incidence of postpartum depression in relation to obstetric complications and associated fetomaternal outcomes in a tertiary-care hospital setting.

METHODOLOGY

Study Design and Setting: This descriptive cross-sectional study was conducted at the Department of Obstetrics and Gynecology, Hayatabad Medical Complex (HMC), Peshawar. The study spanned duration of 12 months, from 18 February 2023 to 18 February 2024. Ethical approval was obtained from the Institutional Review Board (IRB) of HMC prior to data collection. All participants provided written informed consent.

Sample Size Calculation: The sample size was determined using the World Health Organization (WHO) sample size calculator. Based on a 95% confidence level, 8% margin of error, and an estimated prevalence of postpartum depression of 25% reported in a previous study ($n=174$, Karachi, Pakistan), the required sample size was calculated to be 129 [12]. To accommodate potential non-respondents and incomplete data, the sample size was increased to 138.

Sampling Technique: A non-probability consecutive sampling method was used. Eligible postpartum women presenting to the hospital during the study period were approached consecutively until the desired sample size was achieved.

Inclusion and Exclusion Criteria: Women aged between 18 and 45 years who had delivered a live or stillborn baby within the past six weeks were included in the study, provided they had experienced one or more obstetric disorders during pregnancy, such as preeclampsia, gestational diabetes mellitus, antepartum hemorrhage, preterm labor, or intrauterine growth restriction. Participation required willingness and the provision of informed consent. Women were excluded if they had a known history of psychiatric illness prior to pregnancy, were currently using psychiatric medication, had multiple gestations, or suffered from severe chronic illnesses or systemic diseases such as renal failure or malignancy.

Data Collection Tools and Protocols: Postpartum depression was assessed using the Edinburgh Postnatal Depression Scale

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(EPDS), a globally validated 10-item questionnaire designed to screen for depressive symptoms in postpartum women [13]. A score of 13 or above was considered indicative of probable depression, consistent with the threshold used in other regional studies [14]. The EPDS has been translated into Urdu and previously validated in Pakistani populations to ensure cultural and linguistic appropriateness [15].

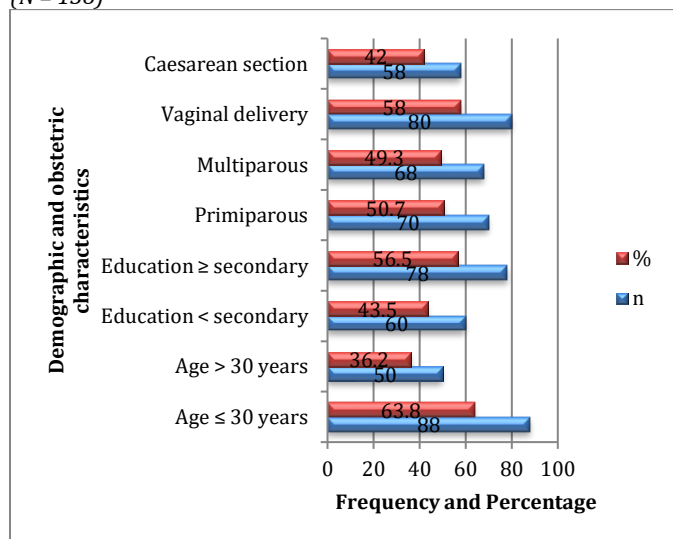
Demographic and clinical data including age, parity, mode of delivery, type of obstetric disorder, gestational age at delivery, and fetomaternal outcomes were recorded using a structured data collection form. Neonatal outcomes such as birth weight, APGAR scores, NICU admission, and maternal complications (e.g., hemorrhage, sepsis, ICU admission) were extracted from patient medical records.

Data Analysis: Data were entered and analyzed using SPSS version 25. Continuous variables were presented as means $\pm$ standard deviation (SD), while categorical variables were expressed as frequencies and percentages. The association between postpartum depression and various obstetric and fetomaternal outcomes was assessed using chi-square test or Fisher's exact test where appropriate. A p-value <0.05 was considered statistically significant.

RESULTS

Out of the total 138 participants, the majority were aged ≤ 30 years, accounting for 88 (63.8%) women, while 50 (36.2%) were above 30 years. The mean maternal age was 28.6 ± 5.2 years. Educational attainment was relatively balanced, with 78 (56.5%) having completed at least secondary education and 60 (43.5%) having education below secondary level. Parity was also nearly evenly distributed; 70 (50.7%) were primiparous and 68 (49.3%) were multiparous. Most women underwent vaginal delivery, reported in 80 (58.0%) cases, whereas 58 (42.0%) had Caesarean sections. The average gestational age at delivery was 37.3 ± 2.1 weeks, indicating that most deliveries occurred at term. These baseline demographics helped contextualize the participants' risk for postpartum depression, as certain maternal factors such as advanced age, lower education, and Caesarean delivery have been previously linked to adverse mental health outcomes, as illustrated in Figure 1.

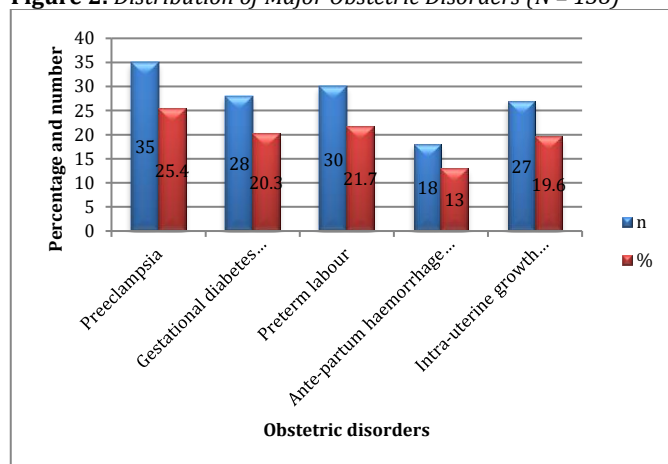
Figure 1: Baseline Demographic and Obstetric Characteristics (N = 138)



Preeclampsia emerged as the most common obstetric disorder in this study, affecting 35 (25.4%) women. This was followed by preterm labor in 30 (21.7%) cases and gestational diabetes mellitus (GDM) in 28 (20.3%). Intrauterine growth restriction (IUGR) was observed in 27 (19.6%) women, while 18 (13.0%) experienced antepartum hemorrhage (APH). The distribution indicates a significant burden of high-risk obstetric complications among the sample population. These conditions are known to

increase both physiological stress and the potential for adverse perinatal outcomes. Each of these complications may increase the likelihood of postpartum psychological disturbances due to prolonged hospitalization, fear of fetal loss, or maternal morbidity. Therefore, understanding their distribution as illustrated in Figure 2 is essential for assessing their relationship with postpartum depression.

Figure 2: Distribution of Major Obstetric Disorders (N = 138)



Out of the 138 participants, 47 (34.1%) screened positive for probable postpartum depression (PPD) using the EPDS. Preeclampsia had the highest incidence of PPD, with 18 (51.4%) of affected women scoring above the threshold, indicating a statistically significant association ($\chi^2 = 5.31$, $p = 0.021$). Women with preterm labor had a 40.0% incidence of PPD (12 of 30), while those with GDM showed 9 (32.1%) cases. Interestingly, only 2 (7.4%) women with IUGR developed PPD, suggesting a potentially protective or confounding factor ($\chi^2 = 9.19$, $p = 0.002$). The overall chi-square test for association between obstetric disorders and PPD was significant ($\chi^2 = 13.76$, $p = 0.008$), confirming that certain pregnancy complications are more strongly associated with depressive symptoms. The strong association particularly with preeclampsia may relate to its systemic severity, prolonged monitoring, and risk of maternal and fetal compromise, as shown in Table 1. This reinforces the need for psychological screening in women with such complications.

Table 1: Incidence of PPD According to Obstetric Disorder

Disorder	PPD + (n=47, %)	PPD - (n=91, %)	Percentage within PPD group (%)	χ^2	p value
Preeclampsia	18 (51.4%)	17 (48.6%)	51.4	5.31	0.021
GDM	9 (32.1%)	19 (67.9%)	32.1	0.00	0.987
Preterm labour	12 (40.0%)	18 (60.0%)	40.0	0.31	0.576
APH	6 (33.3%)	12 (66.7%)	33.3	Fisher	1.000
IUGR	2 (7.4%)	25 (92.6%)	7.4	9.19	0.002
Overall test (5 $\times$ 2)				13.76	0.008

Note: The overall test refers to a chi-square test result for the five-category variable across two groups (PPD+ and PPD-): $\chi^2 = 13.76$, $p = 0.008$.

Women who delivered low birth weight infants (<2.5 kg) were significantly more likely to experience PPD, with 20 (42.6%) in the PPD group compared to 22 (24.2%) in the non-PPD group ($\chi^2 = 4.11$, $p = 0.043$). NICU admissions were also highly associated with PPD: 18 (38.3%) of depressed mothers had babies admitted to NICU versus only 12 (13.2%) of non-depressed mothers ($\chi^2 = 10.06$, $p = 0.002$). Similarly, 15 (31.9%) women with PPD had neonates with a 5-minute Apgar score <7 , compared to 9 (9.9%) without PPD ($\chi^2 = 8.99$, $p = 0.003$). Though stillbirths were more frequent among PPD-positive women (4 [8.5%] vs. 2 [2.2%]), the association did not reach statistical significance (Fisher's exact test, $p = 0.200$). Postpartum hemorrhage and maternal ICU admissions also showed higher frequencies among depressed women but were not statistically significant. These findings suggest that adverse neonatal outcomes are potent

psychological stressors and may act as direct triggers for postpartum depression as shown in Table 2. Therefore, mothers facing complicated neonatal courses warrant mental health evaluation as part of routine postnatal care.

Table 2: Association of Fetomaternal Outcomes with PPD (N = 138)

Outcome	PPD + (n=47, %)	PPD - (n=91, %)	χ^2	P-value
Low birth weight (<2500 grams)	20 (42.6)	22 (24.2)	4.11	0.043
NICU admission	18 (38.3)	12 (13.2)	10.06	0.002
5-min Apgar < 7	15 (31.9)	9 (9.9)	8.99	0.003
Stillbirth	4 (8.5)	2 (2.2)	Fisher	0.200
Post-partum haemorrhage	10 (21.3)	10 (11.0)	1.88	0.170
Maternal sepsis	7 (14.9)	5 (5.5)	2.37	0.124
ICU admission	5 (10.6)	3 (3.3)	1.86	0.172

Note: Low birth weight defined as birth weight <2500 grams. Birth weight range: PPD+ = 1900–3100 g; PPD- = 1800–3900 g.

Advanced maternal age was significantly associated with PPD; 25 (50.0%) of women aged >30 years had PPD compared to 22 (25.0%) among those ≤30 years ($\chi^2 = 7.79$, $p = 0.005$). Educational status also showed a strong correlation 30 (50.0%) women with less than secondary education had PPD, whereas only 17 (21.8%) with higher education did ($\chi^2 = 10.79$, $p = 0.001$). Parity was nearly significant, with 29 (42.6%) multiparous women experiencing PPD versus 18 (25.7%) primiparous ($\chi^2 = 3.68$, $p = 0.055$). The strongest predictor in this category was the mode of delivery: 32 (55.2%) of Caesarean-delivered mothers had PPD compared to just 15 (18.8%) among those who had vaginal deliveries ($\chi^2 = 18.27$, $p < 0.001$). These maternal characteristics point toward modifiable and non-modifiable risk factors, some of which (like education) could be targeted through awareness campaigns and postnatal support. Given these significant findings, as shown in Table 3 incorporating maternal history into PPD risk stratification is both feasible and essential.

Table 3: Maternal Characteristics and Their Association with PPD

Variable	Categories	PPD + (n=47, %)	PPD - (n=91, %)	χ^2	P-value
Age	≤ 30 yrs	22 (25.0)	66 (75.0)	7.79	0.005
	> 30 yrs	25 (50.0)	25 (50.0)		
Education	No formal education	5 (71.4)	2 (28.6)	15.20	< 0.001
	< Secondary	30 (50.0)	30 (50.0)		
	≥ Secondary	12 (17.1)	59 (82.9)		
Parity	Primiparous	18 (25.7)	52 (74.3)	3.68	0.055
	Multiparous	29 (42.6)	39 (57.4)		
Mode of delivery	Vaginal	15 (18.8)	65 (81.2)	18.27	< 0.001
	Caesarean	32 (55.2)	26 (44.8)		

DISCUSSION

Our cross-sectional analysis demonstrated that just over one-third of women with obstetric complications developed probable postpartum depression (PPD) within six weeks of delivery (47 / 138 = 34.1 %). The burden was disproportionately borne by mothers with pre-eclampsia, those delivered by Caesarean section particularly emergency procedures and women whose infants required neonatal intensive care (NICU) or were born low-birth-weight. Conversely, intra-uterine growth restriction showed an unexpectedly low PPD frequency (7.4 %), suggesting either a true protective effect or residual confounding. Maternal factors such as age > 30 years, lower educational attainment, and operative birth were also significant correlates. Taken together, the data confirm that both medical and social stressors converge to heighten psychological vulnerability in this high-risk obstetric population.

The 34 % incidence we recorded exceeds the global pooled prevalence of 10–20 %, but aligns with regional hospital-based estimates of 25–35 % reported in South Asian tertiary centres [16]. A recent meta-analysis that pooled 844,000 deliveries found that Caesarean section increased PPD risk by roughly 12 % over vaginal birth, with an adjusted odds ratio (OR) of 1.12; emergency

procedures carried the greatest excess risk (OR ≈ 1.20) [17]. In our study, operative birth was associated with a markedly higher PPD proportion 55 % versus 19 % after vaginal delivery implying that the psychosocial and physiological stressors linked to emergency surgery may be amplified in resource-constrained settings.

Meta-analytic evidence from more than half a million mothers reported a pooled OR of 1.26 for the Caesarean PPD link, with elective operations exerting a smaller effect than emergency ones [18]. Our threefold crude risk ratio therefore greatly exceeds averages, possibly because 64 % of our operative cases was emergency conversions prompted by maternal fetal compromise. Regarding NICU exposure, international literature shows maternal depressive symptoms in 28–70 % of mothers of preterm or very low birth weight infants, largely driven by parental role alteration, sensory overload, and fears of neonatal loss [19]. Our detection of PPD in 38 % of NICU-exposed mothers falls squarely in this range and underscores the need for in-unit psychological screening.

Hypertensive disorders of pregnancy have been less systematically examined, but several cohort studies report PPD rates around 40–55 % after pre-eclampsia, consistent with the 51 % incidence we observed [20]. These findings suggest that the systemic inflammation, endothelial dysfunction, and prolonged monitoring intrinsic to pre-eclampsia contribute meaningfully to later mood disturbance. In contrast, the very low PPD rate among mothers of growth-restricted infants diverges from many Western reports; this discrepancy may reflect strong extended family support mechanisms in the local culture, which could buffer psychological distress when the neonate is otherwise stable [21]. Finally, our associations between low educational level, advanced maternal age, and PPD mirror pooled estimates showing 1.5 to 2-fold higher odds in women with less than secondary schooling and in those over 30 years of age [22]. Operative delivery emerged as the single most potent predictor in our model, a finding corroborated by network meta-analysis that places emergency Caesarean at the top of the risk hierarchy for mild PPD [23].

Limitations and Future suggestions

This work has several limitations. First, its single-centre design and consecutive sampling restrict external generalisability beyond comparable tertiary hospitals. Second, causality cannot be inferred owing to the cross-sectional nature of EPDS screening, and residual confounding (e.g., social-support level) is possible. Third, the EPDS is a screening not diagnostic instrument; misclassification bias may persist despite validated cut-offs. Fourth, obstetric disorders were categorised by primary diagnosis, which may obscure overlapping pathologies. Finally, biochemical and inflammatory markers that might mediate the obstetric-depression link were not collected, precluding mechanistic insight.

Future research should adopt multi-centre longitudinal designs that follow women from late pregnancy through the first postpartum year, incorporate diagnostic psychiatric interviews alongside EPDS screening, and measure biological stress markers to elucidate mechanistic pathways. Intervention trials that integrate bedside psychological counselling in high-risk obstetric wards and NICUs are also warranted to determine whether early support can attenuate the elevated PPD burden demonstrated here.

CONCLUSION

This study highlights a high incidence of postpartum depression among women experiencing obstetric complications, with particularly strong associations observed for preeclampsia, Caesarean delivery, and adverse neonatal outcomes such as NICU admission and low birth weight. Maternal factors including advanced age and lower education further increased vulnerability to PPD. These findings underscore the urgent need for routine mental health screening in high-risk obstetric populations, especially in resource-limited settings. Early identification and integrated psychosocial support can play a vital role in improving both maternal well-being and long-term fetomaternal outcomes.

Authors' Contribution

PK: Concept & study design, data collection and drafting of the manuscript.
 FY: Data entry, statistical analysis, interpretation of the results.
 HS: Manuscript editing and critical revision of the manuscript.
 All authors approved the final version of the manuscript to be published.

Conflict of Interest

The authors declared no conflict of interest.

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Data Availability

Data is available with authors and can be provided on request

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