Background: Postpartum depression (PPD) is one of the most common puerperal psychiatric illnesses impairing quality of life and mental health of the mother and also the child. Aim: The aim is to study the prevalence and risk factors of PPD. Materials and Methods: This cross-sectional observational study was done on a sample of 295 mothers who delivered and were followed up at a tertiary care hospital. The mothers were administered Edinburgh Postnatal Depression Scale, and demographic, psychosocial, and clinical data were collected. Results: The age of the participant mothers ranged from 18 to 35 years and age at marriage ranged from 21 to 24 years. In most of the mothers, the parity was 2 and they had institutional vaginal delivery. The prevalence of PPD in this population of mothers was 30.84%. The factors that had a statistically significant association with PPD included: lower educational status of mother, lower family income, rural place of residence, higher parity, preterm delivery, and adverse events in newborn. Conclusion: PPD is a common mental health problem in the postpartum period. Sociodemographic factors such as low educational status of mothers, rural population, and low monthly family income were found to be associated with PPD. Primipara status, preterm delivery, and adverse events in newborn were also significantly associated.

Keywords: Edinburgh Postnatal Depression Scale, postpartum depression, risk factors

Postpartum depression (PPD) is a complex mix of physical, emotional, and behavioral changes that happen in some women after delivery. Hippocrates hypothesized that postpartum symptoms were due to suppressed puerperal discharge or a direction of milk from breast to the brain or influx of the blood to the breast. Subsequent literature divided psychiatric disorders of mothers in the reproductive age group into “insanity of pregnancy,” “puerperal insanity,” and “insanity of lactation.” The increased risk of mental illness in newly delivered mothers has been recognized since Esquirol description of postpartum psychosis in 1845. In India, social and cultural beliefs about the postpartum period are often based on Ayurveda and other age-old traditions. Mental health stigma and social norms in India often prevent mothers from reaching out for professional help. Many of the cases go unreported because the focus shifts from the mother to the baby after delivery. Hence, even when mothers face physical exhaustion, weakness, and an overall lack of physical and mental well-being, it tends to go unnoticed not only by the family members but even by the mothers themselves. Mental disorders are said to be of postpartum onset if the onset is within 6 weeks of delivery, according to the International Classification of Disease-10, Classification of Mental and Behavioral Disorders-Research and Diagnostic Criteria. Diagnostic
MATERIALS AND METHODS

This was a hospital-based, cross-sectional, observational study conducted in a tertiary care hospital on mothers in the age group of 18–35 years who had delivered either at labor room or operation theater, had reported to obstetrics and gynecology or pediatric outpatient departments (OPDs), and were willing to participate in the study. The study obtained permission from the institutional ethical committee. All subjects gave informed consent.

Exclusion criteria
1. Patients with a diagnosis of intellectual disability, substance use disorders, central nervous system disorders, psychosis, bipolar disorders, preexisting depression
2. Critically ill patients.

A total of 295 women who had delivered between December 1, 2018, and September 30, 2020, were included. The biographical, sociodemographic, medical, and obstetric data of the consenting mothers were recorded on a specially designed pro forma. Any uneducated subjects were helped by researcher in filling the pro forma and questionnaires. Psychosocial stressors, addiction in husband, and domestic violence during the past 1 year were assessed by means of a brief interview.

The women were reviewed in their postpartum phase in the postnatal ward/child immunization clinic after delivery. Those who fulfilled the inclusion criteria were taken up for study. They were screened by using Edinburgh Postnatal Depression Scale (EPDS). EPDS is a self-reporting questionnaire which was designed to detect depression among women in the postpartum period. Another meta-analysis of 84 studies revealed that the important significant predictors of postpartum depression are the presence of depression before or during pregnancy, life events, marital relationship, and socioeconomic status. PPD has been conceptualized in a biopsychosocial framework with hypothalamic–pituitary–adrenal axis dysregulation, inflammatory process, and genetic vulnerabilities as biological factors, as well as stressful life events, quality of relationship, and social support among significant psychosocial factors. Despite the growing number of empirical studies in regional communities on PPD in India, there is a lack of hospital-based study of heterogeneous population, using a valid screening tool that looks not only at the overall burden of PPD but also at its associated risk factors. The aim of this study is to estimate the prevalence and to describe the risk factors of PPD.
Risk factors related to postpartum depression

Place of residence

In this study, 95 (32%) were from rural background of whom 40 (42%) were depressed \((P \leq 0.05)\). Meit et al. reported that mothers from rural areas were at greater risk for the development of PPD.\(^{14}\) An integrative review of 11 articles also reported higher prevalence of PPD in rural areas.\(^{15}\) On the other hand, a study of 6126 postpartum mothers of Canada found the prevalence of PPD to be higher among women living in urban areas than among those living in rural, semirural, or semiurban areas.\(^{16}\) Community-based studies of PPD in India, in agreement with our findings, revealed that the prevalence of PPD was higher among the rural population.\(^{17,18}\) This association may be consequence of many factors such as differences in socioeconomic status, education, lower awareness, and stigma of mental illness.

Adverse events in newborn

It has been reported that depression during postpartum period was significantly associated with adverse events in newborn.\(^{19,20}\) A meta-analysis among 12,810 postpartum mothers revealed sickness or death of newborn associated with increased prevalence of PPD.\(^{21}\) Similarly, the present study also observed a significant association between maternal PPD and live birth with complications. Complications in the child or death are associated with stress response, triggering depressive symptoms.

Preterm delivery

In this study, 18.3% of mothers had preterm deliveries out of which 59% developed PPD. A systematic review and meta-analysis revealed preterm birth to be a risk factor for PPD.\(^{22}\) A prospective cohort study also found a significant association between duration of pregnancy and PPD.\(^{23}\) This may be related to biological vulnerability of the mother to unexpected hormonal and homeostatic changes during preterm deliveries.

Educational status of mother

Our study found a statistically significant association between lower level of education and PPD, which is in

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**Table 2: Sociodemographic characteristics**

| Sociodemographic characteristics | Number of participant mothers, \(n\) (%) |
|----------------------------------|------------------------------------------|
| Maternal age (years)             |                                          |
| \(<25\)                          | 94 (31.9)                                |
| \(26-29\)                        | 116 (39.3)                               |
| \(\geq30\)                       | 85 (28.8)                                |
| Age at marriage (years)          |                                          |
| \(<21\)                          | 73 (24.4)                                |
| \(21-24\)                        | 134 (45.4)                               |
| \(25-29\)                        | 69 (23.4)                                |
| \(\geq30\)                       | 19 (6.4)                                 |
| Parity                           |                                          |
| 1                                | 23 (7.8)                                 |
| 2                                | 249 (84.4)                               |
| 3                                | 23 (7.8)                                 |
| Monthly family income (Rs.)      |                                          |
| \(<20,000\)                      | 43 (14.6)                                |
| \(20,000-50,000\)                | 234 (72.5)                               |
| \(\geq50,000\)                   | 38 (12.9)                                |
| Education status                 |                                          |
| No formal education              | 34 (11.5)                                |
| Primary                          | 15 (8.5)                                 |
| High school                      | 87 (29.5)                                |
| Graduate and above               | 149 (50.5)                               |
| Place of residence               |                                          |
| Rural                            | 95 (32.2)                                |
| Urban                            | 200 (67.8)                               |

**Table 3: Clinical characteristics**

| Clinical characteristics                  | Number of participant mothers, \(n\) (%) |
|-------------------------------------------|------------------------------------------|
| Mode of delivery                          |                                          |
| Vaginal                                   | 177 (60.0)                               |
| LSCS                                      | 118 (40.0)                               |
| Duration of pregnancy                     |                                          |
| Preterm                                   | 54 (18.3)                                |
| Term                                      | 219 (74.2)                               |
| Postterm                                  | 22 (7.5)                                 |
| Adverse events in newborn                 |                                          |
| Live birth without neonatal complications | 239 (81.0)                               |
| Live birth with neonatal complications    | 50 (16.9)                                |
| Still birth                               | 4 (1.4)                                  |
| Deceased                                  | 2 (0.7)                                  |
| Presence of selected medical complications during pregnancy |                      |
| No                                        | 230 (78.0)                               |
| Gestational diabetes                      | 27 (9.2)                                 |
| UTI                                       | 20 (6.8)                                 |

LSCS – Lower segment cesarean section; UTI – Urinary tract infection
agreement with the findings of earlier studies. It is hypothesized that low education is related to reduced awareness about postpartum care and good child-rearing practices.

**Family income**

Our study further found that the prevalence of PPD falls with rise in monthly family income. Our results are in consonance with the results of an earlier study. Financial constraints possibly lower the spending on health and well-being of the mother.

**Parity**

Primiparous mothers had significantly higher prevalence of PPD in the present study. Similarly, in a study of 1503 primiparous and 1487 multiparous mothers, parity was significantly associated with PPD. Primipara mothers have more discomfort and problems in the puerperium, compared to multipara mothers. The multiparous mothers have more satisfaction and experience acquired with previous children. These were possibly the reason for lower reports of PPD.

**Age of mother and age at marriage**

This study did not reveal any significant association between maternal age and PPD. Similar findings were also reported by other studies where no significant association was found between maternal age and PPD. Further, no statistically significant association was found between age at marriage and PPD which is in agreement with earlier studies.

**Strengths**

A structured, reliable, and widely accepted instrument, the EPDS was used in this study. Participant mothers were from a heterogeneous geographical origin of the armed forces population, representing the diversity of the Indian population. It improved the external validity of the study. A large number of variables (maternal age, age at marriage, parity, family income, duration of pregnancy, medical complications during pregnancy, etc.,) were evaluated for detailed analysis of risk factors of PPD.

**Limitations**

This was a cross-sectional study design without a control group. The study was carried out among both inpatients and outpatients. Hence, the possibility of recall bias among outpatients exists. The study was conducted in a tertiary care hospital in a metropolitan city. The sample was not truly representative of the population as more complicated cases are referred there. Therefore, the results may not be generalized to the community.

**CONCLUSION**

PPD is a common mental health problem in the puerperal period. Sociodemographic factors such as lower

| Table 4: Correlation of postpartum depression with sociodemographic factors |
|---|
| Factors | Postpartum depression | P |
| | Present, n (%) | Absent, n (%) |
| Maternal age (years) | | |
| <25 | 35 (37.2) | 59 (62.8) | 0.067 |
| 26-29 | 27 (33.3) | 89 (67.7) |
| >30 | 29 (34.1) | 56 (66.8) |
| Age at marriage | | |
| <21 | 25 (34.2) | 48 (65.7) | 0.769 |
| 21-24 | 38 (28.3) | 96 (71.6) |
| 25-29 | 23 (33.3) | 46 (66.6) |
| ≥30 | 5 (26) | 14 (73.6) |
| Education status | | |
| No formal education | 24 (70.5) | 10 (29.4) | 0.001* |
| Primary | 9 (36) | 16 (64) |
| High school | 21 (24.1) | 66 (75.9) |
| Graduate | 37 (24.9) | 112 (75.1) |
| Monthly family income (Rs.) | | |
| <20,000 | 25 (58.1) | 18 (41.9) | 0.001* |
| 20,000-50,000 | 58 (27.1) | 156 (72.9) |
| >50,000 | 8 (21) | 30 (79) |
| Place of residence | | |
| Rural | 40 (42.1) | 55 (57.9) | 0.005* |
| Urban | 51 (25.5) | 149 (74.5) |
| Parity | | |
| 1 | 13 (56.5) | 10 (43.5) | 0.021* |
| 2 | 72 (28.9) | 177 (71.1) |
| 3 | 6 (26) | 17 (74) |

P>0.05 (not significant) Chi-square test used

| Table 5: Correlation of postpartum depression with clinical factors |
|---|
| Factors | Postpartum depression | P |
| | Present, n (%) | Absent, n (%) |
| Modes of delivery | | |
| Vaginal | 48 (27.1) | 129 (72.9) | 0.096 |
| LSCS | 43 (36.4) | 75 (63.5) |
| Duration of pregnancy | | |
| Preterm | 32 (59.2) | 22 (40.8) | 0.001* |
| Term | 49 (22.3) | 170 (77.7) |
| Postterm | 10 (45.5) | 12 (54.5) |
| Gestational problem | | |
| Yes | 25 | 40 | 0.132 |
| No | 66 | 164 |
| Adverse events in newborn | | |
| Live birth without complications | 60 (25.1) | 179 (74.9) | 0.001* |
| Live birth with complications | 26 (52) | 24 (48) |
| Still birth | 3 (75) | 1 (25) |
| Deceased | 2 (100) | 0 |
educational status of mothers, rural population, and lower family income were associated with PPD. Primipara status, preterm delivery, and adverse events in newborn were also significantly associated.

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Conflicts of interest
There are no conflicts of interest.

REFERENCES

1. Boyd DA Jr., Brown DW. Electric convulsive therapy in mental disorders associated with childbirth. Mo Med 1948;45:573-9.
2. Deshpande SS. Postpartum depression: Risk factors and their management. Ann Indian Psychiatry 2018;2:41.
3. Harsha GT, Acharya MS. Trajectory of perinatal mental health in India. Indian J Soc Psychiatry 2019;35:47.
4. World Health Organization. The ICD-10 Classification of Mental and Behavioural Disorders: Diagnostic Criteria for Research. Geneva: World Health Organization; 1993.
5. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders (DSM-5®). Washington, DC: American Psychiatric Pub; 2013.
6. Fisher J, Cabral de Mello M, Patel V, Rahman A, Tran T, Holton S, et al. Prevalence and determinants of common perinatal mental disorders in women in low- and lower-middle-income countries: A systematic review. Bull World Health Organ 2012;90:139G-149G.
7. Upadhyay RP, Chowdhury R, Salehi A, Sarkar K, Singh SK, Sinha B, et al. Postpartum depression in India: A systematic review and meta-analysis. Bull World Health Organ 2017;95:708-717C.
8. Beck CT. Predictors of postpartum depression: An update. Nurs Res 2001;50:275-85.
9. Yim IS, Tanner Stapleton LR, Guardino CM, Hahn-Holbrook J, Dunkel Schetter C. Biological and psychosocial predictors of postpartum depression: Systematic review and call for integration. Annu Rev Clin Psychol 2015;11:99-137.
10. Cox JL, Holden JM, Sagovsky R. Detection of postnatal depression. Development of the 10-item Edinburgh postnatal depression scale. Br J Psychiatry 1987;150:782-6.
11. Smith-Nielsen J, Matthey S, Lange T, Væver MS. Validation of the Edinburgh Postnatal Depression Scale against both DSM-5 and ICD-10 diagnostic criteria for depression. BMC Psychiatry 2018;18:393. https://doi.org/10.1186/s12888-018-1965-7.
12. Inandi T, Elci OC, Ozturk A, Egri M, Polat A, Sahin TK. Risk factors for depression in postnatal first year, in eastern Turkey. Int J Epimeniol 2002;31:1201-7.
13. Affonso DD, De AK, Horowitz JA, Mayberry LJ. An international study exploring levels of postpartum depressive symptomatology. J Psychosom Res 2000;49:207-16.
14. Meit M, Knudson A, Gilbert T, Yu AT, Tanenbaum E, Ormson E, et al. The 2014 Update of the Rural-Urban Chartbook. Bethesda, MD: Rural Health Reform Policy Research Center; 2014.
15. Molland E, Hudson DB, Ford A, Pullen C. An integrative review of postpartum depression in rural U.S. Communities. Arch Psychiatr Nurs 2016;30:418-24.
16. Vigod SN, Tarasoff LA, Bryja B, Dennis CL, Yudin MH, Ross LE. Relation between place of residence and postpartum depression. CMAJ 2013;185:1129-35.
17. Prost A, Lakshminarayana R, Nair N, Tripathy P, Copas A, Mahapatra R, et al. Predictors of maternal psychological distress in rural India: A cross-sectional community-based study. J Affect Disord 2012;138:277-86.
18. Shriaram V, Shah PB, Rani MA, Sathiavasekaran BW. A community-based study of postpartum depression in rural Southern India. Indian J Soc Psychiatry 2019;35:64.
19. Stone SL, Diop H, Declercq E, Cabral HJ, Fox MP, Wise LA. Stressful events during pregnancy and postpartum depressive symptoms. J Womens Health (Larchmt) 2015;24:384-93.
20. Kettunen P, Koistinen E, Hintikka J. The connections of pregnancy-, delivery-, and infant-related risk factors and negative life events on postpartum depression and their role in first and recurrent depression. Depress Res Treat 2016;2016:2514317.
21. O'hara MW, Swain AM. Rates and risk of postpartum depression – A meta-analysis. Int Rev Psychiatry 1996;8:37-54.
22. de Paula Eduardo JA, de Rezende MG, Menezes PR, Del-Ben CM. Preterm birth as a risk factor for postpartum depression: A systematic review and meta-analysis. J Affect Disord 2019;259:392-403.
23. Saldanha D, Rathi N, Bal H, Chaudhari B. Incidence and evaluation of factors contributing towards postpartum depression. Med J Dr. DY Patil Univ 2014;7:309.
24. Matsumura K, Hamazaki K, Tsuchida A, Kasamatsu H, Inadera H; Japan Environment and Children’s Study (JECS) Group. Education level and risk of postpartum depression: Results from the Japan Environment and Children’s Study (JECS). BMC Psychiatry 2019;19:419.
25. Patel V. Mental health in low- and middle-income countries. Br Med Bull 2007;81‑82:81-96.
26. Patel V, Rodrigues M, DeSouza N. Gender, poverty, and postnatal depression: A study of mothers in Goa, India. Am J Psychiatry 2002;159:43-7.
27. Martínez-Galiano JM, de Paula Eduardo JA, de Rezende MG, Menezes PR, Del-Ben CM. Preterm birth as a risk factor for postpartum depression: A systematic review and meta-analysis. J Affect Disord 2019;259:392-403.
28. Smithson S, Mirocha J, Kilpatrick S, Horgan R, Graebe R, Massaro S, et al. 1225: Grand multiparity is protective against risk for postpartum depression. Am J Obstet Gynecol 2020;222:S753.
29. Shitu S, Geda B, Dheresa M. Postpartum depression and associated factors among mothers who gave birth in the last twelve months in Ankesha district, Awi zone, North West Ethiopia. BMC Pregnancy Childbirth 2019;19:435.