Association between Postpartum Depression and Premenstrual Dysphoric Disorder in Primigravida after Elective Caesarean Section: A Prospective Cohort Study

SHYAMAL DASGUPTA[1], ARCHI GHANTI[2], CHIRANJIT GHOSH[3], JHUMA BISWAS[4], HETAL PATEL[5], AVIJIT BISWAS[6], SWARNAKAMAL MONDAL[7], DIVYANGANA MITRA[8]

(cc) BY-NC-ND

ABSTRACT

Introduction: The determinants of Postpartum Depression (PPD), such as Premenstrual Dysphoric Disorder (PMDD) are not properly focused specially in the developing countries like India. But, it may help in proper screening, early diagnosis and management of such cases with improved prognosis.

Aim: To determine the association between PPD and PMDD in primigravida undergoing elective caesarean section.

Materials and Methods: This prospective cohort study included 78 primigravida undergoing elective caesarean section conducted in a tertiary centre from February 2019 to January 2020. PPD was screened by Edinburgh Postnatal Depression Scale (EPDS) and the severity assessed by Beck's Depression Inventory (BDI) on day 7,14,42 postpartum. Primarily, the association of PPD with PMDD was assessed by Diagnostic and Statistical Manual of Mental Disorders (DSM-5). The socio-demographic determinants of PPD were the secondary outcome measurement of this study. Unpaired Student's t-test and Chi-square test were used to

determine the association. Numerical variables were analysed by Unpaired Student's t-test and categorical variables were analysed by Chi-square test.

Results: Total 78 primipara females undergoing elective caesarean section participated, out of which six females were lost to follow-up, hence 72 were the study subjects. Total 22 participants (30.55%) developed PPD. The prevalence of PMDD was n=26 (36.11%) in study population (81.81% in depression group, 16% in non depression group). So, a greater prevalence of PMDD was noted in patients with PPD (p-value <0.0001). In the present study, marital satisfaction, planned pregnancy and family without any history of psychiatric disorders were found to be associated with lower prevalence of PPD.

Conclusion: This study with a small sample size gives a direction to assess the determinant of PPD for timely intervention with better prognosis.

INTRODUCTION

The Postpartum Depression (PPD) is a mood disorder affecting almost 10-15% of mothers after delivery yearly [1]. Previously, it was believed that women from western countries only suffered from PPD [2]. However, similar problem have also been found in other countries, wherein women from Asia and South Africa were identified to be at higher risk [3]. An Indian systemic review and meta-analysis showed high prevalence of PPD in Indian women [4]. On the other hand, Premenstrual Dysphoric Disorder (PMDD) which is defined as some physical and mainly mood disorder having symptoms of depression, irritability, anxiety, palpitation occurred in premenstrual period. It is assumed to be due to hormonal fluctuation with deficiency of neurotransmitters [5]. However, till date in Indian sub continental perspective the knowledge of such association is deficient.

PPD is an under diagnosed health problem which not only increases maternal morbidity and social problem, but it also negatively affects child development leading to infant growth problem, behavioural changes, under nutrition, even poor survival [6]. PPD has become a global problem with a prevalence rate being increased by 18.4% in the year from 2005 to 2015 [7]. The cause of PPD is multifactorial and one of the reasons being fluctuations in circulating oestrogen and progesterone levels that may influence the neurochemical pathway of depression [8,9]. This also happens after reproductive events like premenstrual period and menopause [10]. The primary

objective of this study was to identify the association between PPD and PMDD. Authors also aimed to identify the socio-demographic risk factors for the development of PPD as secondary objective.

MATERIALS AND METHODS

This was a prospective cohort study conducted from February 2019 to January 2020 in the Department of Obstetrics and Gynaecology of RG Kar Medical College and Hospital, Kolkata, West Bengal, India after being approved by Institutional Ethics Committee. An informed consent was obtained from every participant.

Inclusion and Exclusion criteria: Since, both parity and mode of delivery might affect the mental health; authors included only primipara females undergoing elective caesarean sections in order to exclude these confounding factors [11,12]. Pregnant females with history of psychiatric or neurological disorders, under medications that might precipitate depression were excluded during initial screening procedure.

Socio-demographic characteristics including age, Body Mass Index (BMI), education, economic condition, addiction (smoking/alcohol/or any drugs) etc., were recorded to optimise the comparison between depression and non depression group. The marital satisfaction was assessed by simple question which included the relation with husband and other family members and categorised in low, medium and high [13]. The socio-economic status was classified as per Kuppuswamy classification (no upper and upper middle class

mother was found in this govt. hospital) so, thus categorised as lower, upper lower and middle class [14].

Scales Used

1. **Edinburgh Postnatal Depression Scale (EPDS):** The participants were screened on day 7 after delivery using EPDS. This includes ten questionnaires in relation to the mental status for past seven days postpartum. Each question having four answers with scoring from 0 to 3, either top to bottom or in reverse. Total scoring was 30 and possible depression was assumed if the score was 10 or above.

2. **Beck's Depression Inventory (BDI):** These screened individuals were further assessed for its severity using BDI on day 7, 14 and 42 postpartum. BDI is a self-scoring system having 21 criteria (like feeling of sadness etc.,), each having four answers with scoring from 0 to 3. The interpretation of normal, mild mood disturbances, borderline disturbances, moderate, severe and extreme disturbance are done with the total score computed [15,16].

3. **Diagnostic and Statistical Manual of mental disorder (DSM-5):** The detection of PMDD was mainly relied on patients recall of her menstrual events before conception because the time of onset of menses after delivery was variable, if history was suggestive, it was confirmed by DSM-5 [17] for PMDD. It includes:

    a. Time specification of symptoms in relation to menstrual cycle.

    b. One or more of four symptoms includes:

        i) Marked depression

        ii) Marked anxiety

        iii) Marked affective lability

        iv) Marked irritability

    c. May includes some additional symptoms like decrease interest, subjective difficulties (SAMHSA-Substance Abuse and Mental Health Services Administration).

STATISTICAL ANALYSIS

Data were entered into a Microsoft Excel spreadsheet and then analysed by Statistical Package for the Social Sciences (SPSS) version 24.0. Data was summarised as mean and standard deviation for numerical variables and frequency and percentages for categorical variables. Numerical variables were analysed by Unpaired student's t-test. Categorical variables were analysed by Chi-square test; p-value <0.05 was considered statistically significant.

RESULTS

Total 78 primipara females undergoing elective caesarean section participated, out of which six females were lost to follow-up. A 22 participants (30.55%) developed PPD and 50 (69.44%) did not have depression. Socio-demographic and obstetric characteristics of the depression and non-depression groups were assessed and no statistical difference was found [Table/Fig-1].

Parameters	Depression (n=22) Mean±SD	Non depression (n=50) Mean±SD	p-value
Age (years)	24.36±3.49	22.84±2.36	0.072
BMI (Kg/m^2)	25.00±3.92	25.39±4.61	0.358
Education			
Undergraduate	20 (90.9%)	44 (88%)	0.720
Graduate	2 (9.1%)	6 (12%)	
Socio-economic status			
Lower	12 (54.5%)	34 (68%)	
Upper-lower	8 (36.4%)	12 (24%)	0.524
Middle	2 (9.1%)	4 (8%)	

Addiction history			
Yes	8 (36.4%)	16 (32%)	
1.Smoking	4 (18.8%)	7 (14%)	
2. Alcohol	3 (13.63%)	5 (10%)	0.716
3. Other Drugs	1 (4.54%)	4 (8%)	
No	14 (63.6%)	34 (68%)	
Gestational age at delivery			
Term	18 (81.82%)	40 (80%)	0.856
Preterm	4 (18.18%)	10 (20%)	

[Table/Fig-1]: Demographic and clinical characteristics of participants.
p-value for numerical variables like age and BMI was analysed by Unpaired Student's t-test and p-value for categorical variables was analysed by Chi-square test, p-value <0.05 was considered statistically significant

Lower marital satisfaction, unplanned pregnancy, lack of breast feeding, family history of psychiatric disease was associated with higher prevalence of PPD [Table/Fig-2].

Parameters	Depression	Non depression	p-value
Marital satisfaction			
Low	16 (72.7%)	10 (20%)	
Medium	4 (18.2%)	26 (52%)	<0.0001
High	2 (9.1%)	14 (28%)	
Planned pregnancy			
Yes	6 (27.3%)	38 (76%)	<0.0001
No	16 (72.7%)	12 (24%)	
Breast feeding status			
Yes	8 (36.4%)	44 (88%)	<0.0001
No	14 (63.6%)	6 (12%)	
Family history of psychiatric disease			
Yes	16 (72.7%)	10 (20%)	<0.0001
No	6 (27.3%)	40 (80%)	

[Table/Fig-2]: Factors influencing the chance of post partum depression.
p-value was measured by Chi-square test, p-value <0.05 was considered statistically significant

In depression group, 18 out of 22 subjects had PMDD, thus a prevalence of 81.81% was noted. The chance of developing PPD was significantly higher among those having history of PMDD; p-value <0.0001 [Table/Fig-3].

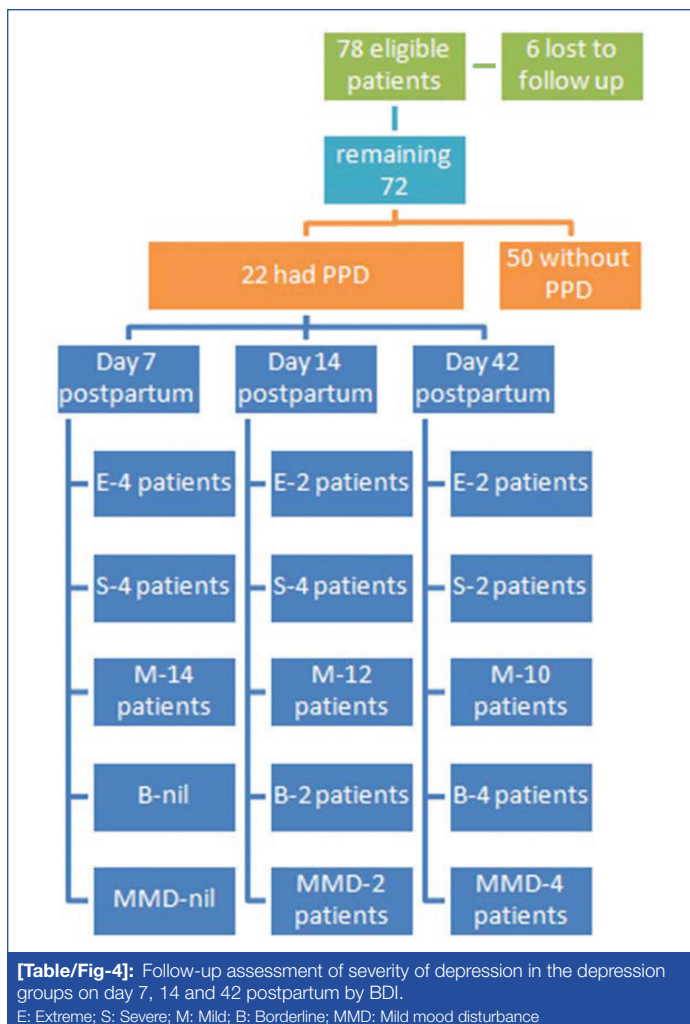| PMDD	Depression (n=22)	Non depression (n=50)	p-value
Yes	18 (81.81%)	8 (16%)	<0.0001
No	4 (18.18%)	42 (84%)	

[Table/Fig-3]: Association of Premenstrual Dysphoric Disorder (PMDD) in depression and non depression group.
p-value was measured by Chi-square test, p-value <0.05 was considered statistically significant

Severity of the disease was found to be gradually decreased with time during follow-up period. On day 42, extreme depression in 2, severe depression in 2, moderate depression in 2 subjects were found while borderline depression and mild mood disturbance each still persisted among 4 postnatal mothers [Table/Fig-4].

DISCUSSION

The PPD has come in focus presently because of its association with poor quality of life and long-term intellectual, cognitive and emotional development of the children born to the mothers having PPD is affected [18-20]. However, the etiopathogenesis of PPD is poorly understood yet.

Authors tried to identify the socio-demographic risk factors for the development of PPD. In this study marital satisfaction, planned pregnancy and absent family history of psychiatric disorder were found to be associated with lower prevalence of PPD. Similar findings were observed in a Korean study conducted by Young L et al., where low level of marital satisfaction is related to likelihood

[Table/Fig-4]: Follow-up assessment of severity of depression in the depression groups on day 7, 14 and 42 postpartum by BDI.
E: Extreme; S: Severe; M: Mild; B: Borderline; MMD: Mild mood disturbance

six weeks after delivery when all these affected postnatal mothers were referred to the Department of Psychiatry of this hospital for Psychological counselling and antidepressant medication if required.

Study	Year	Result
Sylven SM et al., [31]	2012	p<0.001
Buttner MM et al., [30]	2013	p<0.001
Jae LY et al., [21]	2015	p<0.01
Pataky EA and Ehlert U [32]	2020	p<0.05
Present study	2021	p<0.001

[Table/Fig-5]: Different studies showing association between PMDD and PPD.

Limitation(s)

Small sample size and short duration was the main limitation in this study. The study was based on subjective scoring systems for assessment of PMDD and PPD. Hence, multicentric studies with larger sample size where subjective scoring system and hormonal assays both to be used for better understanding of the etio-pathogenesis of PPD are required.

CONCLUSION(S)

With a quality maternal care, there is a decreasing trend of maternal mortality throughout India. Now, it is high time to consider the mental health of the pregnant females which is often ignored, through an integrated healthcare delivery system. The study shows a positive effect of PMDD and PPD that should be cared from early antenatal period. This study also gives a direction for further assessment of association of risk factors of PPD which will help the clinician for timely interference and management.

of development of PPD [21]. Mazahari MA et al., identified an association between unplanned pregnancy and occurrence of PPD [22]. Two meta-analyses of Beck CT and Gable RK and Robertson E et al., mentioned risk factors for development of PPD including personal and family history of depression, low social support and poor marital relationship [23,24].

Family history of psychiatric illness might be a risk factor for developing PPD due to inheritance of serotonin transporter gene polymorphism [25]. Properly established breast feeding has a positive impact on mental health of women after delivery, not only by improving the emotional bondage between mother and baby but it also increases the oxytocin level that stimulates the serotonin receptors in the brain to counteract the effects of stress [26].

Lokuge S et al., discussed about the window of vulnerability hypothesis where effects of oestrogen fluctuation on serotonin transmission has been described. According to this, a common biological mechanism may be responsible for such window of vulnerability in women suffering from PMDD and PPD [27]. PMDD may partly be explained as a condition, characterised by steroids and neurosteroids withdrawal specially in the late luteal phase when progesterone and neurosteroids rapidly decrease [28]. Postpartum is also regarded as a period of steroid and neurosteroids withdrawal because of their rapid decline following parturition [29]. Buttner M et al., showed an independent effect of PMDD on the development of PPD [30]. Similar correlation was found in the study by Jae LY et al., [21]. In a large population based study in Sweden by Sylvn SM et al., a positive association was observed between history of premenstrual syndrome/PMDD and self-reported PPD [31]. Different studies showing association between PMDD and PPD is shown in [Table/Fig-5]. In current study, authors too found significant association between PMDD and PPD (p-value <0.0001). Present study was unique for assessing the severity of PPD over a period of

REFERENCES

[1] Beck CT, Records K, Rice M. Further development of the postpartum depression predictors inventory-revised. J Obstet Gynecol Neonatal Nurs. 2006;35(6):735-45.
[2] Bina R. The impact of cultural factors on postpartum depression: A literature review. Health Care Women Int. 2008;29(6):568-92.
[3] Affonso DD, De AK, Horowitz JA, Mayberry LJ. An international study exploring levels of postpartum depressive symptomatology. J Psychosom Res. 2000;49(3):207-16.
[4] Upadhyay RP, Chowdhury R, Kumar A. Post partum depression in India: A systematic review and meta-analysis; Bulletin of World Health Organisation. 2017:9S(10):706-17.
[5] Hantsoo L, Epperson CN. Premenstrual Dysphoric Disorder: Epidemiology and Treatment. Curr Psychiatry Rep. 2015;17(11):87.
[6] Dadi AF, Akalu TY, Baraki AG, Wolde HF. Epidemiology of postnatal depression and its associated factors in Africa: A systematic review and meta analysis. PLoS One. 2020;15(4):e0231940.
[7] Global, regional, and national incidence, prevalence, and years lived with disability for 310 diseases and injuries, 1990-2015: A systematic analysis for the Global Burden of Disease Study 2015. Lancet. (London, England). 2016;388(10053):1545-602.
[8] Schmidt PJ, Nieman LK, Danaceau MA, Adams LF, Rubinow DR. Differential behavioural effects of gonadal steroids in women with and in those without premenstrual syndrome. N Engl J Med. 1998;338:209-16.
[9] Bloch M, Schmidt PJ, Danaceau M, Murphy J, Nieman L, Rubinow DR. Effects of gonadal steroids in women with a history of postpartum depression. Am J Psychiatry. 2000;157:924-30.
[10] Soares CN, Zitek B. Reproductive hormone sensitivity and risk for depression across the female life cycle: a continuum of vulnerability? J Psychiatry Neurosci. 2008;33:331-43.
[11] Nakamura Y, Okada T, Morikawa M, Yamauchi A, Sato M, Ando M, et al. Perinatal depression and anxiety of primipara is higher than that of multipara in Japanese women. Nature.com/Scientific Reports. 2020;10:17060.
[12] Sadat Z, Taebi M, Saberi F, Kalarhoudi MA. The relationship between mode of delivery and post partum physical and mental health related quality of life. Iran J Nurs Midwifery Res. 2013;18(6):499-504.
[13] Hendrick SS. A generic measure of relationship satisfaction. Journal of Marriage and Family. 1988;50:93-98.
[14] Saleem SM. Modified Kuppuswamy socioeconomic scale updated for the year 2020. Indian J Forensic Community Med. 2020;7(1):01-03.
[15] Cox JL, Holden JM, Sagovsky R. Detection of postnatal depression. Development of the 10-item Edinburgh Postnatal Depression Scale. Br J Psychiatry. 1987;150:782-86.
[16] Beck AT, Ward CH, Mendelson M, Mock J, Erbaugh J. An inventory for measuring depression. Arch Gen Psychiatry. 1961;4:561-71.
[17] Diagnostic and Statistical Manual of Mental Disorders (5th edition). American Psychiatric Association. Code: 625.4(N94.3).

[18] Murray L, Sinclair D, Cooper P, Ducournau P, Turner P, Stein A. The socioemotional development of 5-year-old children of postnatally depressed mothers. J Child Psychol Psychiatry. 1999;40:1259-71.

[19] Sharp D, Hay DF, Pawlby S, Schmücker G, Allen H, Kumar R. The impact of postnatal depression on boys' intellectual development. J Child Psychol Psychiatry. 1995;36:1315-36.

[20] Kurtsjens S, Wolke D. Impact of maternal postnatal depressionon cognitive development of young children. J Child Psychol Psychiatry. 2001;42:623-36.

[21] Lee YJ, Yi SW, Ju DH, Lee SS, Sohn WS, Kim IJ. Correlation between postpartum depression and premenstrual dysphoric disorder: Single Centre study. Obstet Gynecol Sci. 2015;58(5):353-58.

[22] Mazaheri MA, Rabiei L, Masoudi R, Hamidizadeh S, Nooshabadi MR, Najimi A. Understanding the factors affecting the postpartum depression in the mothers of Isfahan city. J Educ Health Promot. 2014;3:65.

[23] Beck CT, Gable RK. Further validation of the Postpartum Depression Screening Scale. Nurs Res. 2001;50:155-64.

[24] Robertson E, Grace S, Wallington T, Stewart DE. Antenatal risk factors for postpartum depression: A synthesis of recent literature. Gen Hosp Psychiatry. 2004;26:289-95.

[25] Zinga D, Phillips SD, Born L. Postpartum depression: We know the risks, can it be prevented? Braz J Psychiatry. 2005;27(2):56-64.

[26] Blom EA, Jansen PW, Verhulst FC, Hofman A. Perinatal complications increase the risk of postpartum depression. The generation R study. BJOG. 2010;117(11):1390-98.

[27] Lokuge S, Frey BN, Foster JA, Soares CN, Steiner M. Depression in women: Windows of vulnerability and new insights into the link between estrogen and serotonin. J Clin Psychiatry. 2011;72(11):1563-69.

[28] Sundström-Poromaa I, Smith S, Gulinello M. GABA receptors, progesterone and premenstrual dysphoric disorder. Arch Womens Ment Health. 2003;6:23-41.

[29] Bloch M, Schmidt PJ, Danaceau M, Murphy J, Nieman L, Rubinow DR. Effects of gonadal steroids in women with a history of postpartum depression. Am J Psychiatry. 2000;157:924-30.

[30] Buttner MM, Mott SL, Pearlstein T, Stuart S, Zlotnick C, O'Hara MW. Examination of premenstrual symptoms as a risk factor for depression in postpartum women. Arch Womens Ment Health. 2013;16(3):219-25.

[31] Sylvén SM, Ekselius L, Sundström-Poromaa I, Skalkidou A. Premenstrual syndrome and dysphoric disorder as risk factors for postpartum depression. Acta Obstet Gynecol Scand. 2013;92:178-84.

[32] Pataky EA, Ehlert U. Longitudinal assessment of symptoms of postpartum mood disorder in women with and without a history of depression. Arch Womens Ment Health. 2020;23(3):391-99.

PARTICULARS OF CONTRIBUTORS:
1.   Associate Professor, Department of Obstetrics and Gynaecology, R.G. Kar Medical College and Hospital, Kolkata, West Bengal, India.
2.   Junior Resident, Department of Obstetrics and Gynaecology, R.G. Kar Medical College and Hospital, Kolkata, West Bengal, India.
3.   Clinical Tutor, Department of Obstetrics and Gynaecology, R.G. Kar Medical College and Hospital, Kolkata, West Bengal, India.
4.   Associate Professor, Department of Obstetrics and Gynaecology, Calcutta National Medical College and Hospital, Kolkata, West Bengal, India.
5.   Junior Resident, Department of Obstetrics and Gynaecology, R.G. Kar Medical College and Hospital, Kolkata, West Bengal, India.
6.   Junior Resident, Department of Obstetrics and Gynaecology, R.G. Kar Medical College and Hospital, Kolkata, West Bengal, India.
7.   Junior Resident, Department of Obstetrics and Gynaecology, Calcutta National Medical College and Hospital, Kolkata, West Bengal, India.
8.   Junior Resident, Department of Obstetrics and Gynaecology, Calcutta National Medical College and Hospital, Kolkata, West Bengal, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:
Dr. Jhuma Biswas,
15P, Roypur Mandal Para Road, Gangulibagan, Kolkata, West Bengal, India.
E-mail: drjhumabiswas78@gmail.com

AUTHOR DECLARATION:
• Financial or Other Competing Interests: None
• Was Ethics Committee Approval obtained for this study?   Yes
• Was informed consent obtained from the subjects involved in the study?   Yes
• For any images presented appropriate consent has been obtained from the subjects.   NA