

A STUDY TO INVESTIGATE THE ASSOCIATION BETWEEN MATERNAL ANAEMIA AND GESTATIONAL DIABETES WITH POSTPARTUM DEPRESSION IN URBAN MOTHERS**Dr. Maitreyee Banerjee (Mukherjee)¹, Kuntal Gupta², Dr. Sanjoy Kr. Bhattacharyya³ and Papri Biswas⁴**¹Assistant Professor, Dept. of Physiology, Krishnagar Govt. College, Krishnagar, Nadia.²Assistant Professor, Dept. of Physiology, Hooghly Mohsin College, Chinsurah, Hooghly.³Assistant Professor, Dept. of Obstetrics and Gynaecology, R.G. Kar Medical College and Hospital.⁴Ex- PG Student, Dept. of Physiology, Hooghly Mohsin College, Chinsurah, Hooghly.***Corresponding Author: Kuntal Gupta**

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ABSTRACT

Postpartum depression (PPD) is a mood disorder that can affect women after childbirth. Women at higher risk include inner city women, mothers of pre-term infants and adolescent mothers. Children of mothers with peripartum depression are at increased risk for developmental delays and behavioural problems. Factors associated with postpartum depression are psychological factors, biological factors, lifestyle, social factors. With all these so many interplaying factors in the development of PPD among the mothers of new born babies, the present study was undertaken in a Govt. Hospital in Kolkata to find the maternal factors correlated and associated with the occurrence of PPD. Women who delivered between the month of June and August 2018 and are willing to participate in the study were included as the subject. Anthropometric and socioeconomic data were recorded, haematological data were collected from the hospital records. PPD was measured using the Edinburgh postpartum depression scale (EPDS). Blood haemoglobin and glucose level and resting metabolism of the mothers were found to significantly correlated with occurrence of PPD. Difficulty in breast feeding, Hb level, glucose level and Resting Metabolism (Kcal) were identified as the predictors for the EPDS score. Thus, it can be concluded from the present study that maternal conditions such as anaemia and diabetes mellitus should be taken care of during the early postnatal period as a preventive measure against PPD.

KEYWORDS Postpartum Depression, Anaemia, Diabetes Mellitus, Breastfeeding, Metabolic rate.**INTRODUCTION**

Postpartum depression (PPD) is a mood disorder that can affect women after childbirth. Mother with postpartum depression experience feelings of extreme sadness, anxiety and exhaustion. Constant sleep deprivation can lead to physical discomfort and exhaustion that causes anxiety, anger, suffering from physical aches and pains including frequent headaches, stomach pain and muscle pain. Women at higher risk include inner city women (50% - 60%), mothers of pre-term infants and adolescents mothers.

The American Psychiatric Association in the 2013 diagnostic and statistical manual of mental disorder (DSM-V), amended the name of this condition to peripartum depression and stipulates that the onset of mood disturbance can occur in pregnancy or within four weeks of childbirth.

Children of mothers with peripartum depression are at increased risk for developmental delays and behavioural

problem^[1] Peripartum depression is a disorder that has been in existence for longer than most people care to admit. It is only within the past 10 or so years that it has been diagnosed and received attention. It has particular relevance given the release of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5).

The idea that PPD is a special form of depression is implicit in the development of the Edinburgh Postpartum Depression Scale (EPDS)^[2] This scale deliberately does not rate selected symptoms such as changes in weight and difficulty of sleeping that are viewed as routinely present in pregnancy and in the postpartum period. However, the general content of the remaining items is highly similar to that found in depression scales designed for the general population. Evaluate symptom features of postpartum patients diagnosed with depression and a control group of age-matched females who were neither pregnant nor had recently given birth.

Factors associated with postpartum depression are psychological factors, biological factors, lifestyle, social factors. Previous history of depression and anxiety is among the factors are associated with a higher risk of postpartum depression. The relationship between postpartum depression and prior onset of depression has been reported in many studies which has been referred to as powerful factors in postpartum depression.^[3-6] The occurrence of mental health disorders such as depression during pregnancy is a powerful factor in predicting postpartum depression.^[7]

There is evidence in explaining these relationship suggesting that women with a positive history of depression are more susceptible to hormonal changes.^[8] In support of this finding, it has reported that a history of moderate to severe premenstrual syndrome (PMS) is a factor affecting the onset of postpartum depression.^[9] In women with severe PMS, the serotonin transport system will change while the serotonin transporter polymorphism area is associated with major depression.^[10] High serotonin polymorphism may lead to tryptophan depletion and induction of postpartum major depression.^[11] Across cultures, women are more likely than man to report somatoform disorder(SD), depression and anxiety.^[12] Young age during pregnancy increases the risk of depression. The highest level of depression has been reported in mothers aged 13-19 years.^[13] while the lowest rate has been in women with the age range of 31-35-year-old.^[14] In a study it was found that women at 2-12 weeks after giving birth increasing maternal age and maternal self-efficacy are associated with a reduced risk of postpartum depression.^[15]

Depression was associated with anaemia in women before and after birth. Multiple study also revealed that women with anaemia were more likely to be admitted to hospital for depression than those without. Finding of the studies also reveals that treating or preventing anaemia may help to prevent postnatal depression.^[16]

In a nutritional epidemiological study of Africa, it was demonstrated that there is a strong relation between iron status and depression, stress and cognitive functioning in poor mother during the postpartum period. Haemoglobin (Hb) concentration was significantly related to postpartum depression and fatigue in mothers despite the fact that they were of high socioeconomic status.^[17] Behavioural symptoms associated with anaemia in adults include changes in cognition, emotions, irritability apathy, fatigue, depressive symptoms and hypoactivity.^[18]

Studies show that glucose metabolism disorders during pregnancy are also as predisposing factors for postpartum depression so that it has been observed that women with higher blood glucose levels after an hour after performing the glucose challenge test with 50g of glucose were more at risk of postpartum depression than others.^[19] The inverse association between breastfeeding

and postpartum depression shows that breastfeeding is associated with a reduction in the rate of postpartum depression. It has been reported that women exclusively breastfeed their infants in the first 3 months after childbirth show lower values of Edinburgh Postpartum Depression Scale.^[20] In a study conducted by Hamdan and Tamim, it was found that breastfeeding during the first 4 months after delivery reduces the risk of PPD.^[21] Although no causal relationship has been established for the relationship between breastfeeding and PPD, breastfeeding increases the interaction between mother and baby and thereby may affect the health of the mother.^[22]

Social support also plays a major role in the development of PPD. It refers to emotional support, financial support, intelligence support, and empathy relations.^[23] The role of social support in reducing PPD has been demonstrated.^[25] Reducing social support is the most important environmental factors in the onset of depression and anxiety disorders.^[25] At the International Conference on Population and Development of the year, decision-making power at home and increased support of the partner have been considered as the most important solution to promote women's reproductive health.^[26] The spouse sexual violence and other forms of domestic violence during pregnancy are seen as factors contributing to the incidence of PPD.^[27] Behaviours such as smoking during prenatal period, is of social factors associated with increased incidence of PPD as 1.5 times.^[28] The simultaneous relationship between smoking and socioeconomic level and the relationship between socioeconomic level with depression complicate the association between smoking and PPD. However, the physiological changes of the pregnancy may seem as a stressful event for some mothers and lead to the onset of depression symptoms and start of smoking.^[29]

With all these so many interplaying factors in the development of PPD among the mothers of new born babies, the present study was undertaken in a Govt. Hospital in Kolkata with the following objectives:

1. To estimate the anthropometric and some haematological parameters of the subjects.
2. To evaluate the post-natal depression of the subjects using Edinburgh Postpartum Depression Scale^[2] (EPDS).
3. To determine the correlation between post-natal depression and other maternal factors.
4. To identify the influencing factors of the post-natal depression of the mother.

MATERIALS AND METHODS

Subjects

The present study was conducted during the months of June to August 2018 in the Dept. of Obstetrics and Gynaecology, R.G. Kar Medical College and Hospital. 120 Mothers of new born babies admitted in the maternity ward of the hospital were included as the subjects in the present study. The required permission from the Institutional Ethical Committee was obtained

prior to the study. The purpose of the study was explained to the participants in their mother tongue with the assurance that the identity of the participants will not be disclosed. Only interested participants with no gynaecological complications and babies without any congenital abnormalities were included, while unwilling mothers and those with clinical complications and sick new born babies were excluded from the study.

Instruments

1. Anthropometric rod: For Height
2. Omron® HBF 375 Karada Scan Complete Digital Body Composition Monitor For weight, fat, subcutaneous fat, skeletal fat, visceral fat resting metabolic rate
3. For haematological parameters: Haemoglobin, Blood glucose, TSH (from Hospital data)
4. Physiological parameters: Age, Height, Weight, BMI, Mid arm circumference, Waist Hip Ratio, Date

of birth of baby, Birth weight of baby, Number of family members, Previous baby, Education of mother and father, Occupation of father, Total monthly family income, Number of pregnancies, Gestation period, Difficulty in breast feeding.

5. Psychological parameter: Used Edinburgh postpartum depression scale (EPDS).^[2]
6. Statistical Software used: Minitab® Statistical Software (v 14.0)

RESULTS

The anthropometric, and biochemical parameter of the mother and baby were obtained from the hospital records, descriptive statistics such as mean, SD and SEM are presented in table 1. The mean age, height, weight, MAC were found to be 21yrs, 158 Cm, 51.6 kg and 24.1 cm respectively. The mean birth weight of the babies was found to be 2.43 Kg, the mean gestation period were 37 weeks.

Table 1 Descriptive Statistics of the Anthropometric and Other Variables.

Parameters	Mean	SE Mean	SD
Age (yr.)	21.919	0.748	4.548
H (cm)	158.61	8.22	50.02
W (kg)	51.68	1.71	10.43
MAC (cm)	24.122	0.543	3.303
BW of baby (kg)	2.4348	0.0885	0.5383
Gestation period (Weeks)	37.216	0.418	2.54
Haemoglobin (g %)	11.225	0.216	1.316
Blood Glucose (mg/dl)	91.53	2.12	12.87
Resting Metabolism (Kcal)	1147.7	25.4	154.3

The maternal factors related to post-natal depression were estimated using Pearson's correlation coefficients (Table 2). Maternal hemoglobin level, glucose level and

resting metabolism are found to be significantly correlated to postnatal maternal depression among other factors.

Table 2: Pearson Correlation among various maternal factors and Post-natal depression of mothers.

	Hb (gm%)	Glucose (mg/dl)	Resting Metabolism (Kcal)
Post-natal Depression	0.809	0.956	-0.932
P-Value	< 0.001	< 0.001	< 0.001

The relationship between EPDS score, hemoglobin level and resting metabolism are expressed as scatterplot in figure 1 and figure 2

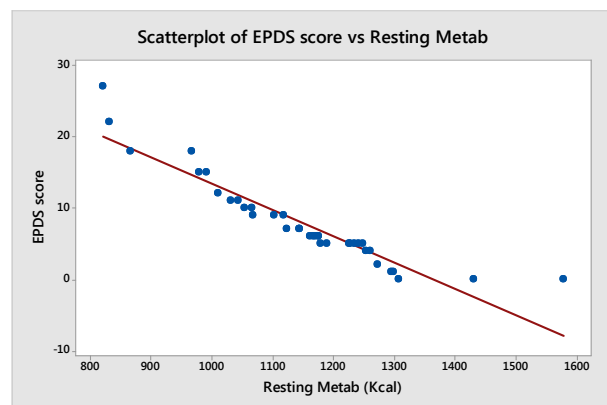


Fig. 1: Scatterplot of EPDS score versus Resting Metabolism (Kcal).

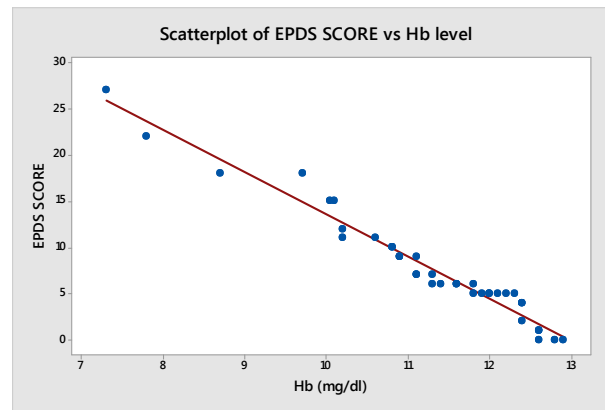


Fig. 2: Scatterplot of EPDS score versus Hb level.

Analysis of Variances was analyzed to identify the maternal parameters that affect the occurrence of postpartum depression. The result shown in Table 3

identified that Haemoglobin level, glucose level and resting metabolic rate of the mother as factors affecting the occurrence of postpartum depression in mothers.

Table 3: ANOVA of components affecting post-natal depression of mothers.

Components	df	Adj SS	Adj MS	F value	P value
Difficulty in breast feeding	1	6.84	6.842	3.16	0.085
Hb level	1	12.78	12.776	5.90	0.021
Glucose level	1	67.77	67.769	31.31	0.000
Resting metabolism	1	12.26	12.260	5.67	0.023

Multivariate Regression Analysis were performed using EPDS score as the response and difficulty in breast

feeding, Hb level, glucose level, Resting Metabolism (Kcal) as the predictors (Table 4).

Table 4: Regression Model Summary.

S	R sq	R sq (Adjusted)	R Sq (Predicted)
1.4711	94.85%	94.20%	89.94%

The regression equation obtained from the regression analysis is presented below

Regression Equation

EPDS score = 9.0 - 1.648 difficulty in breast feeding - 1.516 Hb level + 0.4206 glucose level - 0.01866 resting metabolism (kcal)

DISCUSSION

There is a large body of literature on postpartum depression and its risk factors but these did not focus on physiological factors such as anaemia and gestational diabetes to the desired extent. Our study suggests that mothers with low haemoglobin level are at high risk of development of postpartum depression. This corroborates with an earlier study with an urban sample of pregnant women in Iran.^[18] The most probable cause underlying development of depression with low haemoglobin includes alteration in neurotransmitter synthesis and function, reduction in synthesis of cytokines such as interleukin 2 etc. Status of resting metabolism also affects depression of newly mothers.

Gestational diabetes mellitus (GDM) refers to impaired glucose metabolism during pregnancy. Often, mothers with GDM have too high blood glucose levels, and this increases the risk of various adverse effects on the fetus.

Mothers diagnosed with gestational diabetes mellitus (GDM) have an elevated risk of developing postpartum depression symptoms, according to a new Finnish study.^[19] Postpartum depression symptoms were observed in 16 per cent of mothers diagnosed with GDM, and in approximately nine per cent of mothers without GDM in this study. The present study also corroborates with their finding. During pregnancy due to physiological stress the impact of cortisol on insulin leads to insulin resistance and increased body weight which later develops gestational diabetes. However, in another study, GDM was found to be cross-sectionally associated with higher risk of prenatal depressive symptoms, but not with postpartum depressive symptoms.^[32] Complication of diabetes affect tissues throughout the body, including the central nervous system therefore cause depression, and cognitive development. In diabetes hypothalamic nervous display an array of metabolic abnormality. Moreover, research suggests that loss of insulin signalling in astrocytes impairs tyrosine phosphorylation which results in decrease purinergic signalling on dopaminergic neurones. This altered astrocyte - insulin signalling aggravation the situation.^[32]

In a study in Japan it was found that postpartum anemia was significantly associated with increased PPD risk

whereas anemia in the second and third trimesters was not^[31] Similar result was observed in the present study where anaemia after the delivery of the baby was associated with the incidence of PPD. In a review it was found that Eight out of ten studies found higher risk for PPD in anaemic women. Low ferritin in the postpartum period but not during pregnancy was associated with increased risk of PPD. Iron supplementation in the postpartum period decreased risk of PPD in four out of five studies, whereas it did not protect from PPD if given during pregnancy. These findings also agree with the current study.^[32]

Lifestyle changes including a minimum physical activity and self-monitoring of blood suggest was the only intervention that showed possible health improvement for women and her babies.

CONCLUSION

Postpartum depression is a debilitating mental disorder with a prevalence between 5% and 60 % worldwide. Biological factors and social factors create intertwined rings that each makes women prone to postpartum depression by affecting each other. The present study suggests a strong correlation between Postpartum depression with both maternal anaemia and gestational diabetic conditions. Therefore, postpartum depression prevention programs need to focus on individuals with these complications and special care is needed to be taken so that conditions such as anaemia and diabetes mellitus may be taken care of early enough as a preventive measure against PPD.

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