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Association between Gestational Diabetes Mellitus and Postpartum Depression among women in Eastern India: A Cohort Study

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Abstract

Background: The purpose of this research was to examine the relationship between Gestational Diabetes Mellitus (GDM) and Postpartum Depression (PPD) in a rural population of Eastern state of India.

Material and Methods: Women in their first trimester of pregnancy were recruited and observed for six weeks after delivery. Gestational Diabetes Mellitus was evaluated using a glucose challenge test with 75 grammes of glucose, and PPD was evaluated six weeks after delivery using the Edinburgh Postnatal Depression Scale. The statistical significance of differences between variables was determined using the Chi-square test, Fischer's exact test, and the unpaired T-test. Using bivariate and multivariate logistic regression, the association between GDM and PPD was estimated after adjusting for covariates.

Results: Out of 218 expectant women recruited, 173 (89.6%) remained in the study. GDM prevalence was 13.1% (95% CI: 10.7–17.3) while PPD prevalence was 9.8% (95% CI: 6.6–12.2). In the GDM group, the incidence of PPD was 14.58% (95% confidence interval [CI]: 4.2–24.9), whereas it was 9.06% (95% CI: 5.76–12.2) in women without GDM. In multivariate logistic regression, however, the association was not significant (Risk Ratio (RR) = 1.56; 95% Confidence Interval (CI): 0.61–6.16; P-value = 0.50).

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Conclusion: This study demonstrated that women with GDM are at a greater risk of developing PPD, suggesting that a "at risk" screening strategy should be implemented.

Keywords: Depressive disorders, diabetes, post-natal, pregnancy

Introduction

Gestational diabetes mellitus (GDM) is defined as diabetes diagnosed in the second or third trimester of pregnancy that was not evident before pregnancy [1]. GDM is associated with an increased risk of birth complications and deleterious long-term health outcomes, such as cardiometabolic conditions, in mothers [2-5]. A growing corpus of research in pregnant and non-pregnant populations suggests a bidirectional association between diabetes and depression [6]. Additionally, GDM has been linked to negative mental health outcomes, particularly depression. In LMICs, GDM subjects with antenatal depression are not only at increased risk for a lower quality of life [7], but also for adverse pregnancy and foetal outcomes.

Women with depression prior to pregnancy are more likely to be diagnosed with GDM, and women with GDM are 1.5 times more likely to be diagnosed with postpartum depression (PPD), according to prior research [8-10]. Pregnancy and postpartum are associated with a spectrum of psychological changes, from mild mood changes to severe psychotic disorders [1, 2]. PPD is one of the most prevalent psychiatric disorders associated with pregnancy and childbirth [3–5]. A recent meta-analysis of 18 studies found that GDM increased the risk of PPD by 1.5-fold [11]. While few studies in the meta-analysis reported a significant positive association between GDM and PPD, others failed to find any. However, the estimated effect magnitude may be confounded due to the lack of adjustment for covariates and the multiple etiological causes of PPD [12, 13]. Numerous of these studies were not prospective and therefore could not account for the impact of preexisting diabetes mellitus or mental illness

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before pregnancy [9-14]. In addition, fourteen of the eighteen studies were limited to the United States and Europe, while none were conducted in Southeast Asia [1-14].

Materials and Methods

This study's sample (n=218) was drawn from the database of the Patna Medical College Hospital in Patna, Bihar. Recruitment was conducted daily from August 2020 to January 2021 at the PMCH outpatient department, and follow-up was concluded by September 2021. Participants' follow-up was ensured by telephone consultations and home visits. Four visits were conducted during the antepartum and postpartum periods to obtain data.

The Edinburgh Postnatal Depression Scale (EPDS) was utilised to measure antepartum and PPD. The Edinburgh Postnatal Depression Scale is an extensively validated screening tool for depression during the antepartum and postpartum periods. It consists of 10 items that are scored on a four-point scale ranging from 0 to 3. Therefore, potential scores range between 0 and 30. Based on previous research, the diagnostic threshold for depression was determined to be a score above 12 [16].

The presence of GDM was an exposure variable, while the presence of PPD was a result variable. As covariates, we considered age, parity, obstetric history, hypothyroidism, anaemia, presence of other comorbidities, socioeconomic status, and gender of infant.

Statistical Analysis

The information was input into Microsoft Excel 2013. All statistical analysis was performed using Stata 17.0. The descriptive analysis results (sociodemographic, antenatal, and risk factor characteristics) were presented as means or proportions. Chi-square test, Fischer's exact test, and unpaired T test were applied to categorical and continuous variables, respectively, to assess statistical differences between variables. Using bivariate logistic regression, the association between PPD and various factors (sociodemographic, antenatal

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characteristics, and risk factors) was determined. In the multivariate logistic regression model, variables deemed significant in a bivariate analysis (P-value 0.25) were included. In multivariate regression, variables with a P-value 0.05 were considered significant.

Results

49 (22.48%) of the 218 expectant women recruited for the study were unable to complete the assessment for either GDM or PPD. In every respect, the baseline characteristics of the 347 women who remained in the study were identical to those of the women who were lost to follow-up. The mean (± SD) age of the participants in the study was 23.9 (± 3.7) years. Participants ranged in age from 15 to 36 years old. The mean (± SD) number of years of completed education among study participants was 8.6 (± 3.2). At the time of recruitment, 4.8% of women reported a preexisting chronic condition, while 28% were underweight and 47.7% were anaemic. 31.4% of women were diagnosed with hypothyroidism while pregnant. 7.8% (95% CI: 5.3-20.3) of the participants were diagnosed with antepartum depression at the time of recruitment. About 13.0% (95% CI: 10.7–13.0%) of the participants were determined to have GDM. [Table 1] Approximately 9.8% (95% CI: 6.6-22.9) of the participants were diagnosed with PPD using the Edinburgh Postnatal Depression scale.

Table 1: Association of GDM and PPD (n=173)

Characteristics	Number	Estimate	C.I.
Gestational Diabetes Mellitus	24	13.9	10.7-17.3
Overall	17	9.8	6.6-12.9
In women with GDM (*n*=24)	5	14.6	4.2-24.9
In women without GDM (*n*=149)	12	9.1	5.76-12.3

ISSN: 0975-3583,0976-2833 VOL14, ISSUE 09, 2023

14.58% (95% CI: 14.4–14.59) of women with GDM had PPD, compared to 9.06% (95% CI: 5.76–12.3) of women without GDM. It was discovered that participants with GDM were 1.6 times more likely to develop PPD. The association, however, was not statistically significant (RR: 1.61, 95% CI: 0.74–3.49, P-value: 0.20). However, the association between antepartum depression and postpartum depression was not statistically significant. (RR = 1.95, 95% CI: 0.63–6.09, P=0.25).

In bivariate logistic regression, the presence of any chronic disease, anaemia, and ante natal depression were found to have P-values less than 0.25 and were therefore included in the multivariate model. However, multivariate logistic regression revealed no significant association between these variables and PPD. In a multivariate logistic regression model, women with GDM had a higher risk of PPD, but the association was not statistically significant after adjusting for covariates (RR = 1.56, 95% C.I.: 0.61–6.16; P-value = 0.45).

Discussion

This prospective cohort study was conducted to investigate the relationship between GDM and PPD. In an effort to establish temporality, we recruited expectant women during the antenatal period and followed them through the postpartum period. Twenty percent of the participants in this study were lost to follow-up. Due to a high rate of loss to follow-up, it was not possible to contact the majority of postpartum mothers via telephone during the follow-up visits. The literature suggests that a loss to follow-up rate of >20% may introduce bias into the study results [15]. However, our study revealed that there were no statistically significant differences between participants who were lost to follow-up and those who were not. The mean age of expectant women in our study was 23.9 years which was almost similar to other studies done on pregnant women for the estimation of GDM [16, 17]. 13.9% (95% CI: 10.7–

ISSN: 0975-3583,0976-2833 VOL14, ISSUE 09, 2023

17.3) of the participants in this study were diagnosed with GDM using the 75 g glucose challenge test. According to a meta-analysis, the prevalence of GDM in Asia was 11.5% (95% CI: 10.9–12.0%). The difference may be attributable to the different diagnostic criteria, study settings, and screening procedures used in the included meta-analysis studies [18].

A meta-analysis found that women with GDM had a greater risk of developing antepartum depression [19]. In addition, the American College of Obstetricians and Gynaecologists recommends screening all expectant women for depression at least once during pregnancy or the postpartum period [20]. In the present study, 7.8% (95% CI: 5.3–10.3) of the participants were diagnosed with antepartum depression at the time of recruitment, and 9.8% (95% CI: 6.6–12.9) were diagnosed with PPD six weeks after delivery using the Edinburgh Postnatal Depression scale. PPD was not significantly associated with any of the selected variables in our study. According to a meta-analysis, the prevalence of PPD in India was estimated to be 19% (95% CI: 17–22) [6]. In meta-analysis, various time periods ranging from two weeks to one year of pregnancy, urban and rural study settings, and different scales of assessment were used, which may account for the greater difference in prevalence observed in our study.

Women with higher glucose levels during pregnancy are more likely to develop PPD, according to a cohort study. EPDS scores were also considerably higher at one month and three months postpartum, according to the study [21]. Consequently, healthcare providers can be instructed to screen GDM patients for PPD during early postpartum visits. As part of a home-based newborn care programme, frontline healthcare workers can evaluate the risk for postpartum depression after receiving the appropriate training [22]. Women with GDM can be counselled about the significance of adherence to treatment for GDM and also about the warning signs and symptoms of PPD. They can be educated on the need to seek medical attention at the first evidence of any symptoms. This multifaceted provider- and client-based

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approach, coupled with the collaboration of frontline healthcare workers, can help to identify those at risk for PPD and provide timely interventions to those in need.

Conclusion

This cohort study revealed that women with GDM had an increased risk of developing PPD. Therefore, a "at risk" approach can be implemented in routine prenatal care, and all expectant women with GDM can be screened for PPD. To establish the definitive association between GDM and PPD and its influencing factors in the Indian population, additional research employing in-depth analyses at multiple sites and a larger sample size is necessary.

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ISSN: 0975-3583,0976-2833 VOL14, ISSUE 09, 2023

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ISSN: 0975-3583,0976-2833 VOL14, ISSUE 09, 2023

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