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Original Research Article.

Study of Evaluation of Morbidity Rate Among Neonates and Their Mothers with Gestational Diabetes at a Tertiary Care Hospital

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ABSTRACT

Introduction: Gestational diabetes mellitus is reported to be the most frequently reported complication that was observed during the time of pregnancy. GDM is a severe threat to maternal and neonatal health. Based on recent evidence, up to 15% of all pregnancies may be affected by GDM. The prime aim was to analyse how maternal health status and the family socioeconomic status (educational level and income) was interrelated with the risk of developing GDM. Additionally, the effect of GDM on pregnancy and the offspring was evaluated.

Materials and Methods: The current study is a part of a population-based study examining the health and socioeconomic information from 4560 mothers and their children. Data were collected in standardized 5- to 10-minutes interviews. All p-values were calculated using two-tailed tests.

Results: The cumulative incidence of gestational diabetes mellitus (GDM) was reported to be 5.3% (n = 242 out of 4560). Mothers with GDM were more often overweight (24.8% versus 17.9%) or obese (24.5% versus 9.6%) but less frequently underweight (4.63% versus 10.7%) or of normal weight (46.8% versus 61.8%). There was no significant difference by univariate analysis between GDM diagnosis and mothers' educational level (p = 0.851) or between the occurrence of preeclampsia and GDM diagnosis (p = 0.882).

Conclusion: This study elaborated that GDM resulted in serious negative outcomes at birth for mothers and their offspring, with reported long-term effects on their health scenario. The high incidence of GDM that were documented in this paper has provided clear evidence for the need for general screening for GDM.

Keywords: Gestational Diabetes Mellitus, Pregnancy, Risk Factors.

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INTRODUCTION

The term Gestational diabetes mellitus (GDM) could possibly be defined as 'carbohydrate intolerance of change in the severity with onset or first recognition often reported at the time of pregnancy'.[1] With respect to the controversy regarding the benefits, particularly for women affected with mild GDM, proper screening and effectively managing the condition is often more common in practice because GDM is more often related with significantly increased cases of maternal and neonatal complications.[2-4] It is well established that mother affected with GDM when being compared with the background population are much older and often characterized by increased rates of obesity and chronic hypertensive disease[4,5] are observed to be the factors that are known to influence maternal and neonatal outcomes.[6,7]

A greater number of publications suggesting that not only genetic aetiology but also found to be observed with sociodemographic factors and the lifestyle of the expectant mothers could also influence the incidence of GDM.[8-12] According to results from the earlier study,[8] low maternal educational level has greatly promoted the development of GDM. An Italian based study from *Turin* observed that mothers with low socioeconomic position (SEP), a composite index in evaluating the educational level and employment, were at a greater risk of developing GDM.[9] But, various other risk factors like alcohol use, smoking, unhealthy diet and stress might play a major role in the development of GDM.[10-12] The prime aim was to analyse how maternal health status and the family socioeconomic status (educational level and income) was interrelated with the risk of developing GDM. Additionally, the effect of GDM on pregnancy and the offspring was evaluated.

MATERIALS AND METHODOLOGY

The present study was conducted in the Department of Paediatrics, Hi-Tech Medical College & Hospital, Bhubaneswar,

Odisha (India) and was a part of a population-based study examining the health and socioeconomic information from 4560 mothers and their children. All mothers who were included in this research were provided written informed consent in order to participate in the study. Data were collected in standardized 5- to 10-minutes interviews. Parents also were allowed to complete a questionnaire during their stay on the ward and were returned it to the medical staff before their discharge. This questionnaire included set of questions about the parents' social background and lifestyle. Data on the gestational period and from any preventive examinations were acquired using the mothers' medical files and maternity cards. The collected data were randomised. Continuous data are transcript as the medians with the 25th and 75th percentiles; categorical data are expressed as the absolute numbers and percentages. Associations of mothers' potential risk factors like age, education, equivalent income, body mass index before pregnancy and smoking and alcohol consumption during pregnancy, with the development of GDM were assessed by logistic regression models adjusted for confounders. All p-values were calculated using two-tailed tests.

RESULTS

The characteristics of the pregnant women who were included in the study and their neonates are shown in Table 1 (continuous and categorical variables). The cumulative incidence of gestational diabetes mellitus (GDM) was reported to be 5.3% (n = 242 out of 4560). For women with and without GDM, the maternal age at birth was 29 years and 27 years (median, $p < 0.001$), the BMI before pregnancy was 24.9 and 22.3 (median, $p < 0.001$) and the gestational weight gain was 13 kg and 15 kg (median, $p = 0.019$).

Mothers with GDM were more often overweight (24.8% versus 17.9%) or obese (24.5% versus 9.6%) but less frequently underweight (4.63% versus 10.7%) or of normal weight (46.8% versus 61.8%).

A total of 25.2% of pregnant women with GDM received positive result on the swab test, compared to 14.1% of women without GDM ($p < 0.001$). There was no significant difference by univariate analysis between GDM diagnosis and mothers' educational level ($p = 0.851$) or between the occurrence of preeclampsia and GDM diagnosis ($p = 0.882$).

Table 1: Characteristics of the study population. Continuous and categorical variables were stratified by the prevalence of GDM

Parameters	Total	Without GDM	With GDM	P – value
Continuous data				
Maternal age (years)	28 (4560)	28 (4321)	30 (239)	<0.001
BMI before pregnancy	22.9 (4015)	22.5 (3822)	25.2 (193)	<0.001
BMI before pregnancy (n=4015)				
Underweight (<19)	430 (10.7%)	422 (10.5%)	8 (4.63%)	<0.001
Normal weight (19-24.99)	2480 (61.8%)	2390 (59.5%)	10 (46.8%)	
Overweight (25-29.99)	721 (17.9)	673 (16.8%)	48 (24.8%)	
Obese (>30)	384 (9.6%)	341 (8.5%)	43 (24.5%)	
Education level (n=3957)				
Low	601 (15.2%)	572 (14.5%)	29 (16%)	0.851
Middle	2053 (51.9%)	1952 (49.3%)	101 (53.4%)	
Mig-high	735 (18.6%)	702 (17.7%)	33 (18.3%)	
High	568(14.4%)	548 (13.8%)	20 (12.4%)	
Positive vaginal swab (n=3889)	596 (15.3%)	549 (14.1%)	47 (25.2%)	<0.001
Pre-eclampsia (n=4560)	112 (2.5%)	107 (2.34%)	5 (2.27%)	0.882

DISCUSSION

The pre-pregnancy BMI was the second most predominant mediator in determining the increased risk of GDM. Overweight and obese women were at greater risk of developing GDM and independently of other factors like maternal age, educational status, smoking and/or alcohol abuse. Since higher BMI values are one of the major risk factors in developing type 2 diabetes mellitus, it is of no wonder that similar findings were observed between GDM and BMI. Various comparable relations have been published in few studies as well.[8,13,14] Additionally, a long-term follow-up study has elaborated that the treatment of existing GDM is not suffice to reduce childhood obesity;[14] and hence a preconceptual approach is mandatory in such scenarios.[14]

The results that were obtained by Bouthoom et al,[8] was based on the data observed from the Generation R cohort study from Rotterdam, revealed a clear association between the educational levels of pregnant women and an increased risk of GDM. The group observed with the lowest educational level had twice the risk of GDM as the group with university-level education. A likewise relationship was seen in this study too which strongly suggests that a more general nature of the relationship, which is apparently independent of the ethical composition of the studied group.

Neonatal hypoglycaemia is one of the most frequent undesirable effects due to the exposure to GDM. Children who are suffering from neonatal hypoglycaemia are prone to develop motor impairments and learning, behavioural difficulties.[15] There is an established and accepted association between neonatal hypoglycaemia and GDM which is enhanced by mothers' high BMI values.[16] The prevalence of the neonatal hypoglycaemia majorly

dependent on the nutritional status, gestational age and the onset of feeding. Approximately 2 to 4% of mature new-borns are affected when compared to 5 to 10% of premature babies and up to 50% of babies delivered in GDM pregnancies.[17] Comparing these figures with the data of our study, we observe a much lower incidence of hypoglycaemia in neonates born to GDM mothers. These findings may be a marker for the appropriate therapy that were given to this group of expecting mothers.

CONCLUSION

This study elaborated that GDM resulted in serious negative outcomes at birth for mothers and their offspring, with reported long-term effects on their health scenario. Since the risk of GDM mostly increases with mothers' BMI, age and low-income status where those factors should be taken into consideration when preventive intervention strategies are devised, and the target risk group is established. The high incidence of GDM that were documented in this paper has provided clear evidence for the need for general screening for GDM.

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