



AMERICAN JOURNAL OF PHARMTECH RESEARCH

Journal home page: <http://www.ajptr.com/>

Gestational Diabetes Mellitus and Its Association With Pregnancy Outcomes

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ABSTRACT

Gestational Diabetes Mellitus (GDM) is a common complication of pregnancy resulting from altered glucose tolerance due to β -cell dysfunction and may lead to adverse maternal and perinatal outcomes. This study was aimed at counselling pregnant women with GDM about life-style changes and monitoring their fetomaternal outcomes. This was a prospective observational study carried out in the Obstetrics and Gynaecology department of a tertiary care hospital in Bengaluru. A total of 41 pregnant women attending the study site for antenatal care and had developed GDM from their first trimester were included in the study. Of all the subjects, 63.41% belonged to 26-35 years; 63.41% of pregnant women had parity in the range of 2-5 and 92.68% belonged to the middle and upper socio-economic class of Kuppuswamy scale. About 35 (85.36%) subjects had a new onset of GDM. While the treatment for GDM mainly included oral metformin alone as therapy (26, 63.41%). Lower segment caesarean section (LSCS), preterm births, low birth weight (LBW) and NICU admission were the adverse perinatal outcomes observed. The study concluded that socio-economic status of pregnant women may be a risk factor for GDM and that health education regarding life-style changes (diet and physical activity) for the pregnant women may aid in attaining improved pregnancy outcomes.

Keywords: GDM, Perinatal outcomes, Antenatal care, Pregnancy

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Received 10 May 2020, Accepted 30 May 2020

Please cite this article as: Nekkanti V *et al.*, Gestational Diabetes Mellitus and Its Association With Pregnancy Outcomes. American Journal of PharmTech Research 2020.

INTRODUCTION

Gestational Diabetes Mellitus (GDM) is a gestational hyperglycaemic condition, which develops in a woman without previously diagnosed diabetes. The major risk factors for GDM are overweight, obesity, advanced maternal age and family history of diabetes mellitus. These predisposing risk factors result in chronic insulin resistance, which alters glucose tolerance due to β -cell dysfunction¹. International Diabetes Federation estimates 14% of overall pregnancies to be associated with GDM². Across the world, it affects every 1 in 10 pregnant women³. The prevalence of GDM was found between 1-21% across world, while in Asia, it was found to be 11.5%^{4,5}. However, the prevalence of GDM varied between the urban and rural population and they were found to be between 4.6% to 14% and 1.7% to 13.2% respectively⁶.

GDM is associated with adverse maternal and perinatal outcomes⁷. In mothers, GDM causes adverse outcomes such as preterm birth, preeclampsia, lower segment caesarean section (LSCS), type 2 diabetes in later life and cardiovascular diseases^{8,9,10}. While in new-borns, the adverse outcomes at birth are macrosomia, hypoglycaemia, stillbirths, and in later life, these babies tend to develop obesity, T2DM, cardiovascular disorders and associated metabolic diseases.

The perinatal outcomes of a GDM pregnant woman can be improved through proper antenatal care, which involves educating the pregnant women about the significance of regular physical activity and following a diet plan in controlling blood sugar values. Hence, our study aimed at counselling the pregnant women with GDM about regular physical activity and diet plan and monitoring their foeto-maternal outcomes.

MATERIALS AND METHOD:

A prospective observational study was carried out from January 2017 to January 2019, in the Obstetrics and Gynaecology department of a tertiary care hospital in Bengaluru. The study obtained approval from the institutional ethics committee (IEC) on 12 November 2016 (VIPS/IEC/2016-07) and written consent was obtained from the pregnant women participating in the study. The pregnant women attending the study site from the first trimester, who had developed gestational diabetes between the gestational age of 24 to 28 weeks and pregnant women with previous history of GDM were included in the study. Pregnant women attending the study site for labour, were excluded from the study.

In the current study, Gestational Diabetes Mellitus (GDM) was defined as Impaired Glucose Tolerance (IGT) with onset or first recognition during pregnancy. The NICE & Australian guidelines recommend a risk-based screening with 75gm 2hour Oral Glucose Tolerance Test (OGTT) with fasting blood glucose ≥ 126 mg/dl & 2hr ≥ 140 mg/dl taken as diagnostic for GDM at 24-28 weeks

of gestation¹¹. The details regarding demographics, height, weight, medical, obstetric and medication history, laboratory data such as complete hemogram, HbA1C, vitals and treatment details of the study subjects were recorded in a suitably designed form. Pregnant women who fulfilled the inclusion criteria and presented with increased OGTT were recruited and followed up until delivery through regular antenatal care visits. During the antenatal care visits, recruited subjects were educated about their lifestyle and the importance of physical activity and proper diet plan in controlling the blood sugar values and achieving better perinatal outcomes.

The perinatal outcomes such as lower segment caesarean section (LSCS) delivery, gestational age at delivery, preterm birth, low birth weight, macrosomia, neonatal intensive care unit (NICU) admission were recorded.

The statistical analysis was carried out using Microsoft excel and descriptive statistics was performed on the obtained data. Continuous variables were expressed as mean \pm standard deviation.

RESULTS AND DISCUSSION

During the study period, a total of 63 subjects had increased OGTT value between 24-28 weeks of gestation, of which, 51 subjects had developed GDM in their current pregnancy and 12 subjects were found to be pre-diabetic, who were recommended for life-style modification. Out of 51 GDM subjects, 10 subjects were lost for follow-up due to change of hospital for delivery. Hence the final analysis included details of 41 subjects.

During the study period, 41 subjects attending our study site for antenatal care from the first trimester developed GDM in their current pregnancy. Among these subjects, 34.14% belonged to the age group of 18-25 years, 63.41% belonged to 26-35 years and 2.43% of subjects were over the age of 35 years. Most of them belonged to middle (39.02%) and upper (53.65%) socio economic strata (SES) as per Kuppuswamy scale.¹² Table 1, depicts that 63.41% of pregnant women had parity in the range of 2-5.

About 35 (85.36%) subjects had a new onset of GDM, while 3 (7.31%) had a history of GDM in their previous pregnancies and 3 (7.31%) had a history of diabetes. In addition, 19 (46.34%) subjects had a past medical history of hypothyroidism (8, 42.10%), infertility (2, 10.52%), polycystic ovary disease (1, 5.26%) and epilepsy (1, 5.26%). In addition to GDM, the study subjects also developed preeclampsia (8, 19.51%) and Anaemia (6, 14.63%) in the current pregnancy.

As a part of regular antenatal care, all the study subjects received folic acid, iron and calcium supplementation and tetanus toxoid injection. The treatment for GDM mainly included oral metformin alone therapy (26, 63.41%), subcutaneous insulin alone therapy (9, 21.95%) and combination of oral metformin and subcutaneous insulin therapy (6, 14.63%). In addition, the study

subjects were also educated about the importance of modification of diet and physical activity, in controlling the blood sugar levels. About 19 (46.34%) subjects were involved in regular walk. The mean birth weight of the new-borns was 2775.73±629.60grams. The adverse perinatal outcomes observed in the present study are mentioned in Figure 1 and were Lower Segment Caesarean Section (LSCS), preterm births, low birth weight (LBW) and NICU admission and their prevalence was found to be 26 (63.41%), 14 (34.14%), 6 (14.63%) and 24 (58.53%) respectively.

Table 1: Socio-Demographic characteristics of the study participants.

Characteristics	No. of subjects (%)
Maternal age	
18-25 years	14 (34.14%)
26-35 years	26 (63.41%)
> 36years	1 (2.43%)
Parity	
Primigravida	15 (36.58%)
Multigravida	26 (63.41%)
Socio-economic status	
Low	3 (7.31%)
Middle	16 (39.02%)
Upper	22 (53.65%)
Body Mass Index (BMI)	
Underweight	1(2.43%)
Normal	9 (21.95%)
Overweight	22 (53.65%)
Obese	9 (21.95%)
Diet	
Vegetarian	3 (7.31%)
Mixed	38 (92.68%)
Obstetric history of GDM	
Yes	3 (7.31%)
No	38 (92.68%)
Physical Activity	
Yes	19 (46.34%)
No	22 (53.65%)

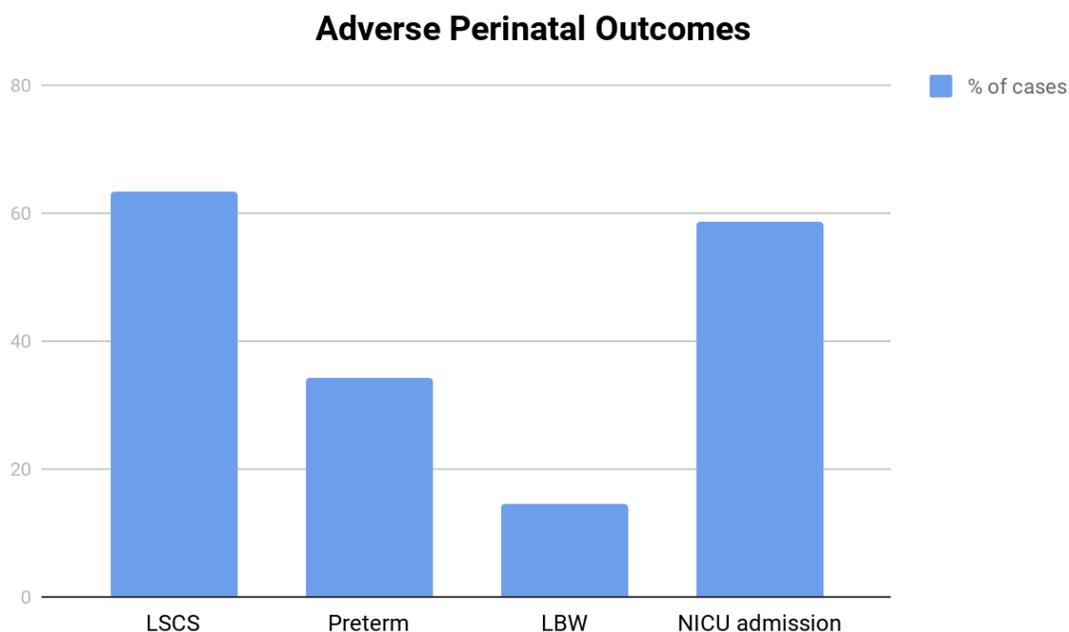


Figure 1: Adverse perinatal outcomes of the study

DISCUSSION:

In India, about 4 million pregnant women are affected by GDM at any given point of time¹³. The risk factors for GDM may be attributed to advanced maternal age at conception, high maternal body mass index, socio-economic status and pre-existing endocrine disorders.

In the current study, majority of study subjects, who developed GDM belonged to an age group of 26-35 years, indicating that an advanced maternal age at conception is a risk factor for GDM. This outcome is consistent with the results of Groof Z et al study, where majority (59.13%) of GDM study subjects belonged to an age group of 25-34 years¹⁴.

In the current study, most of the study subjects (92.68%) belonged to the middle and upper socio-economic class of Kuppuswamy scale. This shows that SES of pregnant women may be a risk factor for GDM. However, previous studies suggested no correlation between the socio-economic status of pregnant women with that of GDM occurrence^{15,16}. On the other hand, several studies showed that high pre-pregnancy BMI, multi parity and hypothyroidism are the possible risk factors for GDM, similar outcomes were observed in the present study with high first trimester BMI (75.60%), multi parity (63.41%) and past medical history of hypothyroidism (19.51%)^{14,16,17,18}.

A similar study showed that maternal GDM was associated with the development of high blood pressure during pregnancy, while in the current study 19.51% subjects developed high blood pressure^{19,20}. In addition, GDM was also associated with adverse perinatal outcomes such as LSCS (26, 63.41%), preterm births (14, 34.14%) and new born NICU admission (24, 58.53%), similar

results were demonstrated by studies conducted by Prakash GT et al and Bashir M et. al.^{21,22}. The major reasons for NICU admission were preterm management (6,25%), clinical jaundice (5,20.8%), respiratory distress (4,16.6%), sepsis (4,16.6%), fever (2,8.3%) and inadequate GRBS monitoring (3,12.5%).

Several studies showed that health education intervention among GDM pregnant women have showed improved pregnancy outcomes^{23,24}. The adverse pregnancy outcomes reported in this study was higher, when compared to other studies, however this may be due to a relatively small sample size and conclusion cannot be drawn from the study outcomes^{21, 22}.

CONCLUSION:

In conclusion, the risk factors for GDM are a maternal age more than 26 years at conception, high BMI, multi parity and hypothyroidism. GDM is associated with adverse perinatal outcomes such as LSCS, preterm births, NICU admission. Optimum control of blood glucose levels in women with GDM, may aid in attaining improved pregnancy outcomes. This can be achieved by educating the pregnant women with GDM about the significance of life-style changes in controlling blood glucose levels.

ACKNOWLEDGEMENT:

We would sincerely thank the teaching and non-teaching staff of Visveswarapura Institute of Pharmaceutical Sciences, Bengaluru for their immense support in the conduct of the study.

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