ORIGINAL ARTICLE

ASSOCIATED RISK FACTORS DURING 24TH TO 28TH WEEK GESTATIONAL AGE AMONG PREGNANT WOMEN ATTENDING A TERTIARY CARE HOSPITAL

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ABSTRACT

GDM is one of the most common non-communicable diseases globally. Gestational diabetes mellitus (GDM) is a heterogenous group of metabolic disorders, which result in varying degrees of maternal hyperglycemia and pregnancy associated risk. GDM is known to vary widely depending on the region of country, dietary habits, socioeconomic status, parity, family history of diabetes, hypertension and past history of GDM. This study was carried out in the department of biochemistry of BIRDEM general hospital, Dhaka from July 2014 to June 2015 to find out the risk factors of the women attending antenatal care (ANC) clinic at BIRDEM general hospital, Dhaka. This study enrolled pregnant women, with their estimated gestational age between 24th to 28th weeks, attending antenatal care (ANC) clinic at BIRDEM general hospital. A proforma containing general information on demographic characteristics, socio-economic status, parity, family history of diabetes, hypertension and past history of GDM was filled in. A total of 135 women participated in the study and GDM was diagnosed in 41 (30.37%) women and 94 (69.63%) were non-GDM subjects. Risk factors found to be significantly associated with GDM were family history of diabetes, age, educational level, BMI, past history of GDM. In this study, it was observed that highest frequency of GDM was in the age group of more than 30 years. Thirty one (75.6%) patients had family history of DM. So GDM patients had significantly positive family history. Twenty six (63.4%) multigravida mothers were more prone to develop GDM than primigravida pregnant mothers.

Key words: GDM, Risk factors, Primigravida, ANC

Introduction

Gestational diabetes mellitus (GDM) is defined as impaired glucose tolerance with onset or first recognition during pregnancy[1].Women who become pregnant and who are known to have diabetes mellitus before pregnancy do not have gestational diabetes but have diabetes mellitus and pregnancy should be treated accordingly before, during and after pregnancy[2]. GDM rates have been on the rise in all ethnic groups, but most noticeable in Asian countries where the prevalence rate is around 17%[3]. Approximately 1-14% of all pregnancies are complicated by GDM[4,5]. Risk assessment for GDM should be done at the first prenatal visit[6,7]. Women with GDM are at increased risk of developing type 2 diabetes mellitus after pregnancy while their

offsprings are prone to develop childhood obesity with type 2 diabetes in later life[8]. One study has shown that maternal gestational diabetes mellitus increases the offspring's cardio-metabolic risk, and in utero hyperinsulinemia is an independent predictor of abnormal glucose tolerance in childhood[9]. In GDM cord blood leptin levels are significantly higher and a source other than fetal adipocytes appears to contribute to this[10]. There are some risk factors for GDM which include elderly women >30 years, high parity, pre-pregnancy overweight, multiple pregnancy, diabetes in a first degree relative, polycystic ovarian syndrome, history of previous GDM, the baby born from a previous pregnancy with complication, a history of stillbirth or infants with congenital abnormalities, poor obstetric history including recurrent fetal loss, hypertension, eclampsia, hydramnios, glycosuria manifesting during pregnancy[11]. Women diagnosed with GDM who had gestational weight gain above the IOM (Institute of Medicine) guidelines have higher risk of undesirable outcomes, including preterm delivery, having macrosomic neonates, cesarean delivery. Women who gained weight below guidelines are more likely to remain on diet control but have small for gestational age neonates[12]. Another study suggests that moderate maternal leisure time physical exercise during GDM pregnancy may reduce the risk of delivery[13]. Visfatin concentration is decreased in women with gestational diabetes mellitus in the third trimester[14]. DM affects approximately 4% of all pregnant women in the US and represents 90% of all cases of diabetes mellitus diagnosed during pregnancy. In addition of the adverse pregnancy outcomes associated with this complication, a history of GDM predisposes women to the future development of type 2 diabetes mellitus[15]. If GDM is not properly treated, there is an increased risk of adverse maternal complications such as preeclampsia, pregnancy induced hypertension, recurrent vulvo-vaginal infection, increased incidence of operative deliveries, obstructed labor and development of diabetes mellitus later in life. Sometimes maternal response to these changes is found to be abnormal, which without careful management could lead to increased fetal risk[16].

Pregnancy is a complex endocrine metabolic adaptation process. Placental secretion of hormone, such as estrogen, progesterone, human chorionic somatotropin (hcs) or placental lactogen, prolactin and growth hormone are major contributors to the insulin resistant state seen in pregnancy and this insulin resistance, which develops in 2nd trimester, makes pregnancy a diabetogenic codition[17,18].

In normal pregnant woman there is a continued demand by the foetus for glucose as an energy substrate, and it crosses the placenta by facilitated diffusion. During fasting (e.g overnight) maternal glucose may fall significantly, but in diabetes glucose levels are usually maintained and may be high without adequate insulin therapy. Foetal glucose concentration closely follows that of mother and if hyperglycemia occurs it stimulates hypertrophy of foetal pancreatic islet cells, resulting in insulin release particularly towards the end of pregnancy. The growth and development of the foetus take place within the metabolism provided by the mother, where circulating maternal fuels (glucose, amino acids, lipids) provide the building blocks for foetal development. According to Freinkel's hypothesis, the abnormal maternal mixture of access to the developing foetus in utero, modifying the phenotypic gene expression in newly forming cells which in turn may lead to short and long range effects in the offspring[19]. The foetal tissues most likely to be affected are neural cells, adipocytes, muscle cells and pancreatic beta-cells.

GDM carries risk to both mother and child. This risk is largely related to high blood glucose levels and its consequences. The risk increases with higher blood glucose levels. Treatment resulting in better control of these levels can reduce some of the risks of GDM considerably. The two main risks of GDM which may be imposed on the baby are growth abnormalities and chemical imbalances after birth, which may require admission to a neonatal intensive care unit. Infants born to mothers with GDM are at risk of being both large for gestational age (macrosomic) and small for gestational age[20,21]. Macrosomia in turn increases the risk of instrumental deliveries (e.g. forceps, ventouse and caesarean section) or problems during vaginal delivery (such as shoulder dystocia). Macrosomia may affect 12% of normal women compared to 20% of patients with GDM. However, the evidence for each of these complications is not equally strong; in the hyperglycemia and adverse pregnancy outcome (HAPO) study, for example, there was an increased risk for babies to be large but not small for gestational age. Research into complications for GDM is difficult because of the many confounding factors, such as obesity. Labelling a woman as having GDM may in itself increase the risk of having a caesarean section[22,23]. Neonates are also at an increased risk of low blood glucose (hypoglycemia), jaundice, high red blood cell mass (polycythemia) and low blood calcium (hypocalcaemia) and magnesium (hypomagnesaemia). GDM also interferes with maturation, causing immature babies prone to respiratory distress syndrome due to incomplete lung maturation and impaired surfactant synthesis[24].

Materials and Methods

This cross sectional study was conducted in the Department of Biochemistry, BIRDEM General Hospital, Dhaka during the period of July 2014 to June 2015. Total 135 subjects were selected by purposive sampling procedure. Protocol of this study was approved by Institutional Ethics Committee (IEC) of BIRDEM. Informed written consent was taken from the patients. According to inclusion criteria patients were invited to participate in the study in the outpatient department of the BIRDEM General Hospital and taken information according to the study protocol. A structured questionnaire was filled in for each patient to collect data about age, gestational age, family history of diabetes, obstetrical history, personal history, geographical location, socioeconomic factor, educational history, occupational history, physical activity. The gestational age of onset and duration of GDM was recorded. Laboratory parameters including fasting blood glucose, OGTT, HbA1c were estimated. Collected data were checked, edited and then processed with the help of software statistical package for social science (SPSS) and analyzed. Mean and standard deviation (SD) were determined for quantitative data. Student t-test was done to determine the significance of observed difference between the means of clinical parameters of pregnant women. Chi-square tests were used to see the clinical variables. All statistical tests were considered significant at the level of $p < 0.05$.

Results

A total number of 135 subjects were selected for the study. Among them 41 (30.37%) were GDM subjects (Group A) and 94 (69.63%) were non -GDM subjects (Group B).

Fig 1 shows the distribution of GDM non-GDM subjects according to maternal age at screening. In the study, the mean maternal age (29.85 ± 6.22 years) was significantly higher in the GDM group than in non-GDM pregnant women (26.52 ± 4.6 years). It was observed that highest frequency of GDM was in the age group of more than 30 years.

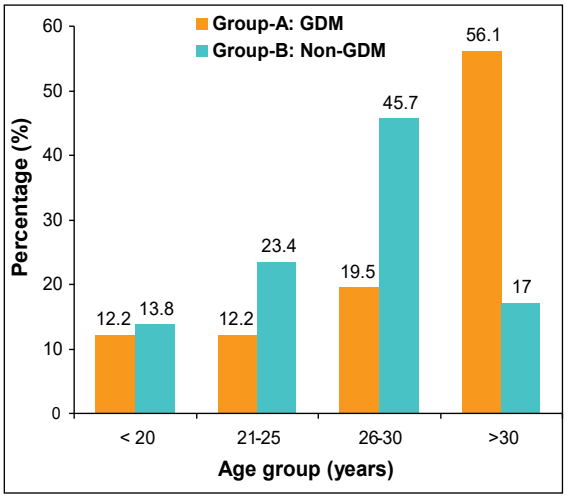

Fig 1. Distribution of the study subjects according to age

In group A out of 41 GDM patients, 31 (75.6%) patients had family history of DM. In case of group B, out of 94 non-GDM pregnant women 29 (30.9%) women had family history of DM. So GDM patients had significantly positive family history (Table I).

Table I: Distribution of subjects according to family history, parity and previous history of GDM.

	GDM group (n=41)		Non-GDM group (n=94)	
	Number	Percentage	Number	Percentage
Family history				
Positive	31	76	29	31
Negative	10	24	65	69
Parity				
Primi	15	37	63	67
Multi	26	63	31	33
Previous history of GDM (among multi)	(n=26)		(n=31)	
Positive	16	62	07	23
Negative	10	34	24	77

In group A, out of 41 GDM patients 15 (36.6%) were primigravida and 26(63.4%) were multigravida mothers. In case of group B, out of 94 non-GDM subjects 63 (67.0%) were primigravida and 31 (33.2%) were multigravida mothers. So it was observed that multigravida pregnant mothers were more prone to develop GDM than that of primigravida pregnant mothers.

In group A out of 26 multigravida pregnant mothers 16 (61.5%) had previous positive history of GDM and 10 (38.5%) had no history of GDM. In case of group B out of 31 multigravida pregnant mothers 7 (22.6%) had previous positive history of GDM and 24 (77.4%) had no history of GDM. It shows that previous history of GDM was higher in GDM patients than that of in non-GDM pregnant women.

Discussion

GDM is an important type of diabetes mellitus as it involves the expecting mother and thus two lives are involved. Approximately 1-14% of all pregnancies are complicated by GDM[4,5].

If GDM is not properly treated, there is an increased risk of maternal complications such as pre-eclampsia, pregnancy induced hypertension, recurrent vulvo-vaginal infections, increased incidence of operative deliveries, obstructed labour and development of diabetes mellitus later in life. Among the fetal complications there are macrosomia, polyhydramnios, preterm labor, respiratory distress, unexplained intrauterine fetal death, traumatic delivery and also neonatal complications and hypoglycemia, tetany, hypocalcemic jaundice, polycythemia, hypomagnesaemia.

GDM showed an association with increasing age, higher parity, higher pre-pregnancy BMI, diabetes in first degree relatives, past history of gestational diabetes in various studies[25-28].

In the present study, the mean maternal age 29.85±6.22 years is significantly higher in the GDM group ($p<0.001$) than in the non-GDM

group (26.52±4.6 years). It was observed that highest frequency of GDM was in the age group more than 30 years. This is supported by other studies[11,29].

In this study higher parity was found to be associated with higher incidence of GDM. Multiparity was 63.4% and primi was 36.6%, which is statistically significant. This result is similar to the findings of another study[30].

Family history of diabetes mellitus has been reported to be associated with higher chances of developing GDM. In this study, a significantly higher percent of women with GDM had positive family history of diabetes mellitus -75.6% in GDM group against 30.9% in non-GDM group. The result of present study was similar to the findings of Seshiah et al[27] which showed relation of GDM with family history of diabetes mellitus.

In this study it was found that 61.5% GDM cases had GDM in previous pregnancy whereas in non-GDM cases it was 22.6%. This is consistent with the findings of another study[31]. This means that development of GDM is associated with the history of GDM in previous pregnancies.

Conclusion

The study showed that out of 135 subjects, 41 were subjects of GDM and 94 were non GDM pregnant women. So, in the present study incidence of GDM is found 30.37%. Some associated risk factors of GDM such as age, BMI, residence, educational level, occupation, physical exercise, family history of DM, parity, history of previous GDM were observed in this study. The diagnosis of gestational diabetes mellitus in this study was based on the WHO, 2015 criteria, fasting plasma glucose ≥5.1-6.9 mmol/L and 2-hr post 75 g oral glucose load 8.5-11.0 mmol/L. It is very necessary to provide screening for GDM as well as initiating early treatment. Early treatment of gestational diabetes mellitus will help us to avoid complications and reduce morbidity and mortality of both mother and fetus.

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