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Research Article

A study on clinical characteristics of gestational diabetes mellitus associated with intrauterine fetal death

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Abstract

Background and objective: Gestational diabetes is associated with intrauterine fetal death. But causes are unclear. This study aimed to assess the clinical characteristics of gestational diabetes in relation to intrauterine fetal death.
Materials and Methods: Eighty-eight consecutive gestational diabetics enrolled into the study were divided into two groups: Group A (n =77): gestational diabetics with normal fetus; Group B (n=11): gestational diabetics with intrauterine fetal death. The parameters measured in them were age, body mass index, blood pressure, urine total protein, serum urea and serum creatinine.
Results: Among the measured parameters, mean systolic and diastolic blood pressure were significantly higher in group B compared to group A ($p< 0.016$, $p < 0.02$ respectively).
Conclusions: Raised blood pressure is associated with intrauterine fetal death in gestational diabetic mothers.
Keywords: intrauterine fetal death, gestational diabetes, systolic blood pressure, diastolic blood pressure

1. Introduction

Gestational diabetes mellitus (GDM) is defined as any degree of glucose intolerance with onset or first recognition during pregnancy.[1] According to American diabetes Association approximately 7% of all pregnancies are complicated by GDM, resulting in more than 200,000 cases annually.[2] The prevalence may range from 1 to 14% of all pregnancies, depending on the population studied and the diagnostic tests employed.[2] Women with a history of gestational diabetes are at increased risk of cardiovascular and kidney disease, regardless of whether they have gone on to develop overt diabetes, growing evidence suggests. [3] Crowther *et al* and London *et al* have reported fetal death with gestational diabetes.[4,5] However underlying cause of intrauterine death in mothers with gestational diabetes are unclear. Therefore this study was undertaken to compare the clinical characteristics of gestational diabetics with and without intrauterine fetal death.

2. Materials and methods

The present study was a retrospective, descriptive type. It was carried out at the Lady Goschen Hospital, Mangalore. Study was done in singleton mothers with gestational diabetes of whom relevant medical reports were available until they were discharged from the hospital after delivery. This study was carried out after obtaining permission from ethical committee of the institution, overseeing human studies, and consent from the study participants.

88 consecutive singleton mothers with gestational diabetes were enrolled into this study. They were divided into two groups namely, group A (n = 77): Gestational diabetics with normal fetus; and group B (n = 11): Gestational diabetics with intrauterine fetal death.

2.1 Diagnosis of gestational diabetes

Gestational diabetes mellitus was diagnosed at any time in pregnancy if one or more of the following criteria were met: fasting plasma glucose 5.1-6.9 mmol/l (92 -125 mg/dl); 1-hour plasma glucose ≥ 10.0 mmol/l (180 mg/dl) following a 75g oral glucose load; 2-hour plasma glucose 8.5-11.0 mmol/l (153 -199 mg/dl) following a 75g oral glucose load.

2.2 Inclusion criteria

Age >18 years but <30 years; no obesity; first pregnancy; no family history of diabetes; pregnancy of less than16 weeks gestation; singleton pregnancy.

2.3 Exclusion criteria

Pregnancy at >16 weeks gestation at recruitment; multiple pregnancy; known pre-existing diabetes, history of asthma or hypertension; impaired fasting glucose (IFG) or impaired glucose tolerance (IGT); GDM prior to recruitment as diagnosed by early pregnancy glucose testing; taking medications likely to influence glucose metabolism (in particular metformin, glucocorticoids and immunosuppressants); medical conditions associated with altered glucose metabolism (in particular Cushing's syndrome/disease and hepatic cirrhosis); known major fetal abnormality noted on 12 week ultrasound examination; History of previous stillbirth, preterm delivery considered to be likely for either maternal disease or fetal conditions.

2.4 Study procedures

In all the subjects, height and weight were measured and body mass index was calculated using the formula weight in kilogram divided by height in meters square. Systolic and diastolic blood pressure was measured in sitting position. Data on serum protein, serum urea, serum creatinine and random blood sugar were collected from the freshly done lab investigation reports.

Data was analyzed employing unpaired student t test. When data was not uniformly distributed non-parametric method namely Mann-Whitney test was used. p value less than 0.05 was taken as statistically significant.

3. Result

Data is presented as mean ± SD. Comparison of data on baseline characteristics of mothers with gestational diabetes with intrauterine fetal death and gestational diabetics with normal fetus are presented in table 1. Data on renal function parameters and random blood sugar in these two groups are presented in table 2.

The mean systolic and diastolic blood pressure of mothers with gestational diabetes and intrauterine fetal death was significantly higher compared to gestational diabetics with normal fetus ($p < 0.016$ and $p < 0.02$ respectively, table 1). Mean age and body mass index of the mothers with gestational diabetes and intrauterine fetal death did not differ significantly compared to gestational diabetics with normal fetus (table 1).

Mean random blood sugar of mothers with gestational diabetes and intrauterine fetal death did not differ significantly compared to gestational diabetics with normal fetus (table 2).

All the measured renal function parameters namely serum urea, serum creatinine and total renal protein did not differ significantly between gestational diabetics with normal fetus and gestational diabetics with intrauterine fetal death (table 2).

Table 1 Baseline characteristics of gestational diabetic mothers with and without intrauterine fetal death

Variables	Gestational diabetics with normal fetus (n= 77)	Gestational diabetics with intrauterine fetal death (n = 11)	t/u value	P value
Age (years)	28.14 ± 3.93	30.27 ± 5.81	348	0.34
Body Mass index (kg/m2)	25.71 ± 2.73	26.99 ± 2.86	1.44	0.15
Systolic blood pressure (mmHg)	133.89 ± 20.46	150 ± 20	2.44	0.016
Diastolic blood pressure (mmHg)	85.71 ± 13.80	96.36 ± 15.01	2.36	0.02

(Values are mean ± SD)

Table 2 Random blood sugar and renal function parameters in gestational diabetic mothers with and without intrauterine fetal death

Variables	Gestational diabetics without complications (n= 77)	Gestational diabetics with intrauterine fetal death (n = 11)	t/u value	P value
Random blood sugar (mg %)	134.41 ± 23.26	119.81 ± 30.71	308	0.14
Total urine protein	5.72 ± 1.31	5.54 ± 0.52	369.50	0.49
Serum Urea (mg %)	14.90 ± 9.19	13.45 ± 10.74	0.48	0.63
Serum Creatinine (mg %)	0.61 ± 0.20	0.61 ± 0.12	400.5	0.776

(Values are mean ±SD)

4. Discussion

Gestational diabetes mellitus (GDM) is a metabolic disorder defined as glucose intolerance with the onset or first recognition during pregnancy. Women with GDM are at increased risk for adverse obstetric and perinatal outcome. Gestational diabetes may be associated with an increased risk of macrosomia, congenital malformations, birth trauma and neonatal metabolic abnormalities[6,7] and still births.[8] Similarly, in the present study intrauterine death was observed in 12.5 % of the gestational diabetics. Further in this study we compared the baseline characteristics and renal parameters between gestational diabetics with normal fetus and gestational diabetics with intrauterine fetal death.

The hypertensive disorders during pregnancy affect up to 8.0% of all pregnancies.[9] Priyanka *et al* have observed hypertension complication in mothers with gestational diabetes.[10] Certain studies too have reported higher risk of pre-eclampsia in mothers with gestational diabetes.[11] Hypertensive disorders remain a major cause of maternal and neonatal mortality and morbidity worldwide.[12,13] Accordingly in the present study, both systolic and diastolic blood pressure was significantly higher in gestational diabetics with intrauterine fetal death compared to gestational diabetics with normal fetus.

Tahir *et al*[14] have observed higher incidence of fetal death in gestational diabetic mothers compared to mothers without gestational diabetes. However in the present study random blood sugar did not differ significantly between gestational diabetics with normal fetus and gestational diabetics with intrauterine fetal death.

Tamrakar *et al*[8] have observed strong positive association between body mass index and still birth. However in the present study body mass index of gestational diabetics with intrauterine fetal death did not differ significantly compared to gestational diabetics with normal fetus.

5. Conclusion

Based on our study findings it could be concluded that intrauterine fetal death is mainly associated with raised blood pressure in mothers with gestational diabetes mellitus.

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