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Maternal and fetal outcome in gestational diabetes – A retrospective study

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Abstract

Introduction: Gestational diabetes is a problem of growing interest that affects both mother and the baby. Since India is also known to be the diabetic capital of the world, the prevalence of gestational diabetes mellitus ranges from 0.2% to 21% depending on the study population [1].

Aim: To assess the fetal and maternal outcome in pregnancies complicated by gestational diabetes mellitus as compared to non-diabetic pregnancies.

Material and methods: It is a retrospective study conducted in a tertiary care hospital from 2014 to 2016.

A total number of 100 cases were taken into consideration with 50 of gestational diabetes mellitus and 50 of non-diabetes pregnancies with matched age and parity. Fetomaternal outcome was compared.

Conclusion: In this study patients with gestational diabetes mellitus faced more complications like pre-eclampsia, preterm labor, polyhydramnios etc. Caesarean section rates were also high. Higher rates of increased stay of babies in neonatal I.C.U. was noted. Hence proper assessment and treatment is required in gestational diabetes to prevent two generations from health hazards.

Keywords: Gestational diabetes, fetal outcome, maternal outcome

1. Introduction

In the earlier times under nutrition was a problem but over the time over nutrition has become a matter of concern especially in the affluent society. With increase in prevalence of diabetes worldwide cases of gestational diabetes has also increased. In India in the last two decades the incidence of gestational diabetes has immensely risen from 2% in 1980, 7% in 1990 to 16.55% in 2000 [2].

Gestational diabetes is defined as any degree of carbohydrate intolerance which originated during pregnancy only. Pregnancy causes changes in maternal carbohydrate mechanism. With increase in gestational age insulin resistance and diabetogenic stress due to placental hormone causes increase in insulin secretion as a compensatory mechanism. When this balance is inadequate gestational diabetes occurs.

Gestational diabetes is a reversible condition and with effective control of glucose levels, good maternal and fetal outcome can be seen. With increase understanding of pathophysiology as well as with effective application of care fetal and maternal mortality has been reduced to 2-5% from nearly 65% before discovery of insulin.

It has been a difficult task for clinicians to diagnose gestational diabetes. Many criteria were suggested from all around the world. To standardize this WHO formulated guidelines in 1999 which were updated in 2003 and then revised in 2013 with a new set of diagnostic criterias [3].

Blood sugar should be routinely checked in antenatal check ups to so as to diagnose gestational diabetes early and prevent morbidities related to it. Maternal complications include increase in asymptomatic bacteriuria, urinary tract infections, pre-eclampsia, polyhydramnios which may lead to preterm labor, abruption placentae, post partum haemorrhage which in turn increases operational delivery.

Fetal outcomes include intrauterine death, respiratory distress syndrome, hypoglycemia, congenital malformations and hyperbilirubinaemia.

2. Material and methods

This is a retrospective study done in 2016 for which data was collected from 2014 to 2016. The fetomaternal outcome in 50 patients with gestational diabetes identified from hospital database was noted and compared with non-diabetic pregnancies with matchable age and parity. The patients were selected on the basis of inclusion and exclusion criteria.

2.1 Inclusion Criteria

- Data of pregnant females with single viable fetus who delivered in our institution and were seen through followup.

2.2 Exclusion Criteria

- diabetes diagnosed prior to pregnancy
- multifetal gestation
- abnormal presentation
- planned corticosteroid therapy
- asthma requiring medication
- planned beta adrenergic therapy
- chronic medical illness such as kidney disease or heart disease etc
- haematological and autoimmune diseases such as haemoglobinopathies, lupus etc

The records consisted of personal identification such as age, parity, previous obstetric history including history of abortions, still births, intrauterine deaths, congenital malformations of the baby, preeclampsia, and history of gestational diabetes in previous pregnancy. Also antenatal complication gestational age at delivery, mode of delivery birth weight of the baby were collected. History of medical disorders like hypothyroidism polycystic ovarian disease etc were taken into account. Measurements such as weight, height and BMI were seen.

Details of routine investigations such as liver function tests, kidney function tests, serology, haemoglobin, urine analysis and fasting blood sugar and blood sugar profile was noted.

Details of neonatal outcome were carefully analysed which included birth weight of the baby, respiratory distress syndrome, hypoglycemia, hyperbilirubinaemia and duration of stay in neonatal ICU was noted.

Patients with gestational diabetes were had blood sugar profile analysed in records. If fasting was <100 mg/dl and post prandial blood sugar was <120 mg/dl it was seen that patients were managed by diet alone. Patients with higher values were treated with subcutaneous injections of insulin. Labor was induced in patients with gestational diabetes at 40 weeks of gestation if spontaneous labor did not occur.

Data of blood sugar of babies measured after 30 minutes of birth were noted and babies were treated by IV infusion of glucose and breastfeeding if they were hypoglycaemic.

Statistical analysis

Data analysis was done using SPSS software version 17 for window. p value less than 0.05 was considered as significant.

3. Observation and results

During the study period from 2014 to 2016 data was collected for 100 patients out of which 50 were cases complicated by GDM and 50 non diabetic pregnant females.

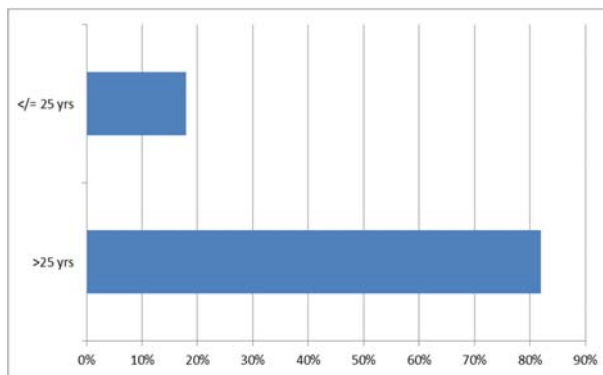


Fig 1

Age ≤ 25 yrs = 9 cases (18%) and 41 (82%) cases having age >25 yrs in GDM group. Mean age was found to be 29.

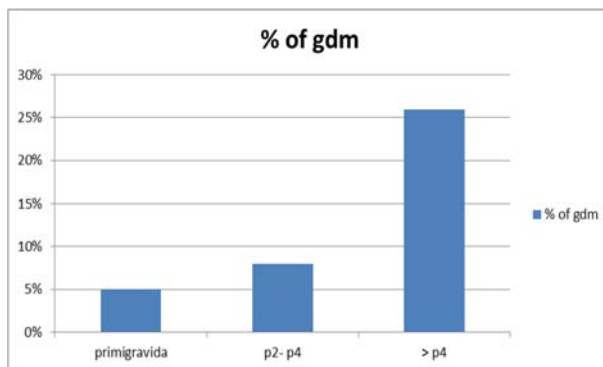


Fig 2

Parity: Primigravida=5%, p2-p4=8%, p4 & above=26% in GDM group

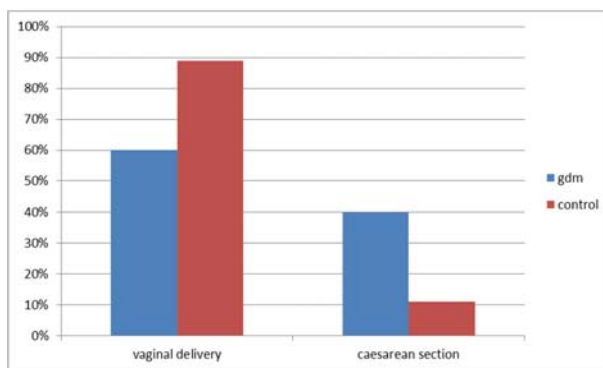


Fig 3

Rate of cesarean section was more in patients with GDM as compared to the control group. P value < 0.05 hence statistically significant.

Table 1: GA and complication between GDM and control group

Parameter		GDM (n=50)	Control (n=50)	P Value
GA	≥ 37 wks	44 (88%)	48 (96%)	>0.05
Complication	Pregnancy induced Hypertension	18 (36%)	6 (12%)	<0.05
	Polyhydramnios	8 (16%)	2 (4%)	<0.05
	Preterm labour	12 (24%)	4 (8%)	<0.05
	Intrauterine death	4 (8%)	2 (4%)	>0.05
	Congenital Anomaly	1 (2%)	2 (4%)	>0.05

Table 2: Maternal characteristics between GDM and control group

Parameter	GDM (n=50)	Control (n=50)	P Value
Age (Yrs)	20.4	20.4	1
Mean GA at delivery (Wks)	38.6	39.4	<0.01
Family H/O Diabetes	8 (16%)	4 (8%)	>0.05
GDM in previous pregnancy	2 (4%)	0	>0.05
H/O Macrosomic baby	4 (8%)	1 (2%)	>0.05
Previous SB child	1 (2%)	0	>0.05
Hypertensive disorders	9 (18%)	3 (6%)	>0.05
Preterm delivery	6 (12%)	2 (4%)	>0.05
Polyhydramnios	4 (8%)	1 (2%)	>0.05
Induction of labour	13 (26%)	9 (18%)	>0.05
Caesarean section	20 (40%)	11 (22%)	<0.05

Table 3: Fetal outcome between GDM and control group

Parameter	GDM (n=50)	Control (n=50)	P Value
Birth weight <2.5kgs	9 (18%)	23 (46%)	<0.001
Macrosomia	7 (14%)	1 (2%)	<0.05
LGA	3 (6%)	1 (2%)	>0.05
NICU admission >24hrs	8 (16%)	5 (10%)	>0.05
Hypoglycemia at birth	3 (6%)	1 (2%)	>0.05
RDS	1 (2%)	1 (2%)	>0.05
Phototherapy received	5 (10%)	13 (26%)	<0.05
Congenital anomalies	1 (2%)	1 (2%)	>0.05
Perinatal deaths	3 (6%)	1 (2%)	>0.05

4. Discussion

This is a retrospective study of fetomaternal outcome in gestational diabetes studied from institutional data base of 100 patients out of which 50 were known case of gestational diabetes and 50 were non diabetic pregnant women which formed the control group.

According to our study [figure 1] about 82% (41) cases of gestational diabetes were above 25 years of age and only about 18% (9) were below the age of 25 years. The mean age of gestational diabetes was found to be 29 years. Farooq MU *et al.* [4] study, 44 (88%) patients were above 25 years of age. According to a study conducted by Kumari SS, Rani BS, Usha P, *et al* the most common age group was between 25 to 30 years with 42 cases (50%). The number of cases below 25 years were (19.04%) and (30.95%) were above 30 years of age [5]. In a study by Emmanuel Odar *et al.* [6] the age range for mothers with gestational diabetes was 18-39 years with the mean age of 28.6 years. Ritu Joy *et al.* [7] the average age of GDM women was 28.72±4.57 years. Similarly, Ismail NA *et al.*, reported the mean maternal age of GDM in their study to be 27.9 years [8]. Zargar *et al.* also found that GDM prevalence increased steadily with increasing age (from 1.7% in women below 25 years to 18% in women 35 years or older) [9].

In present study [figure 2] the incidence of gestational diabetes increased with parity such as in primi it was 5%, from 2nd gravida to 4th gravida was 8% and 26% in 4th gravida. With increasing number of pregnancies, the stress on Beta cells increase so does the insulin resistance, hence the incidence of GDM rises with parity. Similar observations were made by Garshasbi *et al.* (10.45% versus 4%), Hoseini *et al.* (30% Versus 9%) in multipara Versus primi respectively [10, 11] Kumari SS, Rani BS, Usha P, *et al* cited that the prevalence of GDM was higher in multigravida with 63.09% and the prevalence in primi was 36.90% [5]. The study by Rajput *et al.*, showed that higher parity would have a higher rate of GDM [12].

In our study [figure 3] 60% of patients having GDM were delivered by normal delivery as compared to 89% in control

group. 40% of patients with GDM underwent caesarean section as compared to only 11% in control group. Mothers with gestational diabetes were two times more likely to have caesarean section because of big babies and obstructed labour than the controls in the study by Emmanuel Odar *et al.* [6] In their study, 14 (40%) GDM females underwent caesarean section compared to 58 (15%) in the control group. Many studies have found high caesarean delivery rates in GDM patients despite good maternal blood glucose control during pregnancy [13, 14]. Farooq MU *et al.* [4] caesarean section was done in 29 (58%) patients. Ritu Joy *et al.* [7] 83.78% of women underwent caesarean delivery, only 16.22% had normal delivery. Robin Varghese *et al.* [7] 92.80% of women underwent caesarean delivery, only 7.20% had normal delivery. According to Kale *et al.*, the incidence of caesarean section in patients with GDM was found to be 60% [15]. Jensen DM *et al.* Bener AB *et al.* and Saxena P *et al.*, who observed CS rate as 33%, 27.9%, 42% respectively in GDM patients [13, 16, 17].

[Table 1] In current study in patients with GDM had complications like pregnancy induced hypertension (18%), polyhydramnios(8%) and preterm labour(12%) which were statistically significant {p value< 0.05}. Complications like intrauterine death (4%) and congenital anomaly (1%) in GDM patients were non significant as compared to (2%) in intrauterine death and (2%) congenital anomaly. Several studies indicate a positive correlation between GDM and development of pre-eclampsia (44% versus 6%). Polyhydramnios was noted in 47% GDM cases. However, in the findings reported by Ismail NA *et al* and Gaisim T *et al.*, the association was 2.65% and 3.2 respectively [8, 18] Krishna dahiya *et al* reported that women with GDM have higher proportion of obstetric complications including polyhydroamnios (11.2 times), recurrent vaginal infections (4.85 times), intrauterine growth retardation (3.86 times), intrauterine death (1.4 times) preterm labour (1.62 times), preeclampsia (1.91 times) and GCMF (1.86 times) [19]. Similar findings were found by Ganguly *et al.*, Turki G. and Odar *et al.* in their respective studies [20, 18, 6]. The study by

Bhat *et al*, cites a 14.7% incidence of polyhydramnios v/s 2.7% in controls [21]. Mohan makwana *et al*. cited that the incidence of polyhydramnios in GDM group was 21.05% which was far higher than the 3.88% in non GDM group [22] In the study by Saxena *et al*, the incidence of pre-eclampsia was 40% and 6% intrauterine deaths were reported [17].

[Table 2] In the present study in GDM patients mean gestational age was 38.6 years, family history of diabetes mellitus was found in 16%, GDM in previous pregnancy was 4%, history of macrosomic baby was found in 4 patients, previous still birth in 1 patient, and induction of labor had to be done in 13 patients. All these characteristics were statistically non significant. Fareed P *et al*. [23] reported that positive family history was a risk factor associated with GDM and was 64% which was comparatively higher to findings of Serirat S *et al* (23.1%) and Wahi P *et al*, (24.19%). [24, 25] Garashasbi *et al* reported that positive family history in GDM patients was found in 18.6% as compared to 15% in control group [7].

[Table 3] In our study among fetal outcomes compared between GDM patients and non diabetic pregnancies statistically significant $\{p < 0.05\}$ outcomes included fetal complications like hyperbilirubinaemia, birth weight of baby less than 2.5 kg and macrosomia. Emmanuel Odar *et al* [6] documented that babies born to mothers with gestational diabetes were more likely to be macrosomic, stillborn and have shoulder dystocia than those of normal women ($p < 0.0001$). Complications of hypoglycaemia, trauma to the baby, congenital abnormality of the baby and cot death were infrequent in their study. Krishna Dahiya *et al*. [19] in their study, the foetal outcome was significantly poor in the GDM positive mothers. The incidence of macrosomia was higher in GDM group. Hypoglycaemia was seen in 5.7%, hyperbilirubinaemia in 11.4%, respiratory distress syndrome in 5.7% babies. The rate of large for gestational age babies in study by Akhlaghi and Hamed [26] was 14.3% and 16% in Ray *et al* study [27]. In a study by Dudhwadkar *et al*, 8% of the babies had hypoglycemia whereas 2% had hypocalcemia and 8% had congenital anomalies [28]. According to Shefali *et al*, 1.4% babies had congenital anomalies [29]. Makwana M *et al*. reported neonatal hyperbilirubinemia rate in GDM Versus non GDM group was 13.16% Versus 2.97% [22] These findings corresponded to those of Silva *et al* (12.6% Versus 6.2%) [30]. Due to complications GDM neonates have to be admitted to neonatal ICU. The incidence on NICU admissions in study by Makwana M, in GDM Versus non GDM group was 31.58% Versus 12.33%. [22] These observations were in conformity to those of Crowther *et al* (16.5% Versus 3%). [31] Makwana M. also reported that among infants of diabetic mother's, the 3 (7.89%) baby's Birth Weight was < 2.5 Kgs, 30 (78.95%) weighed between 2.5-4 Kgs and 5 (13.16%) babies had birth weight > 4 Kgs. [22] Fetal Macrosomia (30%-40%) Probably results from: (a) maternal hyperglycaemia → hypertrophy and hyperplasia of the fetal islets of Langerhans → increased secretion of fetal insulin → stimulates carbohydrate utilisation and accumulation of fat. Insulin like growth factors (IGF-I and II) are also involved in fetal growth and adiposity. With good diabetic control, incidence of macrosomia is markedly reduced. (b) Elevation of maternal free fatty acid (FFA) in diabetes leads to its increased transfer to the fetus → acceleration of triglyceride synthesis → adiposity. Rabinder

D *et al* and Patterson G *et al*, showed frequency of NICU admission to be 3.4% and 3% respectively. [32]

5. Conclusion

The conclusion of this study was that many risk factors such as family history of diabetes, increased maternal age etc were involved in giving rise to GDM. Maternal and fetal complications increased in the patients with GDM. Gestational diabetes is on a rise in Indian population hence proper measure need to taken to prevent it and treat it. Since a simple screening test is required to detect it, it must be included in routine antenatal check ups.

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