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Research Article

Maternal and fetal outcome in gestational diabetes mellitus

Ameya R. Dudhwadkar*, Michelle N. Fonseca

Department of Obstetrics and Gynecology, LTMMC and LTMGH, Sion, Mumbai, Maharashtra, India

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***Correspondence:**
Dr. Ameya R. Dudhwadkar,
E-mail: ameya.dud12345@gmail.com

ABSTRACT

Background: Indian women have high prevalence of diabetes and their relative risk of developing gestational diabetes mellitus (GDM) is 11.3 times compared to white women. As such GDM has implications beyond the index pregnancy, identifying two generations (mother and her offspring) at risk of future diabetes. Limited studies in India have compared the outcome and control of GDM.
Methods: Patients attending the antenatal OPD or medicine OPD or were admitted in the medicine or obstetric wards were screened for gestational diabetes according to the ADA criteria. Maternal and fetal outcome was studied.
Results: The incidence of GDM in the population studied was 4.2%. Pre-eclampsia complicating pregnancy was noted in 26% patients. 46% patients delivered vaginally. 2% deliveries were vacuum assisted. In this study 52% patients underwent LSCS. 40% babies were macrosomic at birth. 8% had congenital anomalies while 2% patients had fresh still birth. Maternal diabetes on follow up was seen in 16.2% patients.
Conclusions: Gestational diabetes complicating pregnancy has adverse maternal and fetal outcome. Better identification and treatment of mothers and fetuses at risk may have far-reaching implications for maternal and child health. In conclusion, a short term intensive care gives a long term pay off in the primary prevention of obesity, impaired glucose tolerance and diabetes in the offspring, as preventive medicine starts before birth.

Keywords: Gestational diabetes, Maternal, Fetal, Outcome

INTRODUCTION

Pregnancy induces progressive changes in maternal carbohydrate metabolism. As the pregnancy advances insulin resistance and diabetogenic stress due to placental hormones necessitate compensatory increase in insulin secretion. When this compensation is inadequate, gestational diabetes mellitus (GDM) develops. Indian women have high prevalence of diabetes and their relative risk of developing GDM is 11.3 times compared to white women.[1]

A universal recommendation for the ideal approach for screening and diagnosis of GDM remains elusive. Significant questions remain regarding the implications of GDM diagnosis on the pregnant woman and her family, the effect of diagnosis on obstetric interventions, and whether the early identification and treatment of GDM will improve perinatal, neonatal, and maternal outcomes besides overall health care costs.[2]

Abnormal glucose tolerance during pregnancy is not only associated with pregnancy morbidity but also increases the likelihood of subsequent diabetes in the mother. As such GDM has implications beyond the index pregnancy, identifying two generations (mother and her offspring) at risk of future diabetes. Better identification and treatment of mothers and foetuses at risk may have far-reaching implications for maternal and child health.[3] Thus a short term intensive care not only results in safe motherhood but also gives a long term pay off in the primary prevention of obesity and diabetes in the offspring.

Limited studies in India have compared the outcome and control of GDM.

METHODS

The present study was carried out at Lokmanya Tilak Municipal General Hospital (tertiary teaching institute), Mumbai, India. The data collection was performed over a period of 18 months from January 2013 to June 2014. It was a prospective study which included both outdoor (OPD) and admitted pregnant patients. The patients were either attending antenatal OPD or medicine OPD or were admitted in the medicine or obstetric wards.

All antenatally registered patients were screened for high risk factors for Gestational diabetes like previous abortions, previous intra uterine deaths, previous history of big baby, history of polycystic ovarian syndrome, history of anomalous baby or history of GDM in previous pregnancy. High risk women are screened at first visit and again at 24-28 weeks.

Testing venous blood of all antenatal women for fasting blood glucose (FBS) and 2 hour post lunch blood glucose (PLBS) at 24-28 weeks gestation is the routine practice followed.

If the FBS was >92mg/dl or PLBS was >140mg/dl, these values were considered abnormal for the pregnancy and the patient was evaluated further by oral glucose tolerance test (OGTT) to confirm the diagnosis of GDM. It was done in the format prescribed and endorsed by the American Diabetes Association (ADA). The cut-offs for each glucose level were as follows: FBS >92mg/dl, 1 Hour >180mg/dl and 2 Hour >153mg/dl. If any one of the above 3 values was abnormal the patient was diagnosed as GDM.

Women who had documented evidence of diabetes mellitus prior to pregnancy, irrespective whether on treatment or not, were excluded from the study.

A detailed clinical history was recorded and a thorough physical examination was performed at the time of presentation with specific emphasis on the risk factors of GDM. Symptoms of diabetes and its associated complications were noted. Investigations like complete blood count, liver function tests, kidney function tests, serum electrolytes, fundoscopy, Urine routine microscopy, HbA1c, a congenital anomaly scan at 18 weeks and third trimester ultrasound were done in all patients. In the third trimester weekly visits were advised.

All GDM patients were admitted at 37 completed weeks for safe confinement or before if presenting in labour or if they developed complications. Intensive blood sugar monitoring of the patients was done. Elective LSCS was done at 38 completed weeks for patients with cephalopelvic disproportion, abnormal presentation, previous LSCS and uteroplacental insufficiency. Other patients were induced at 38 weeks with dinoprostone gel.

The birth weight, APGAR score, admission to NICU and other complications including presence of congenital malformations if any were noted by the neonatologist.

After discharge the patients were called after a period of 6 weeks for follow up and for testing Fasting and post prandial blood sugars to look for persistence of raised glucose levels.

RESULTS

During the study period of 18 months 1602 antenatal patients were screened for FBS and PLBS. Out of these patients 18 patients were known type 2 diabetics and were not included in the present study. A total of 90 patients were subjected to OGTT and 68 patients had positive OGTT according to ADA. Thus a total of 68 (4.4%) patients were diagnosed as GDM.

Table 1: Demographic profile.

	Number of cases	Percentage
Age		
21-25	7	14%
26-30	28	56%
>30	15	30%
Gravidity		
Primi	14	36%
Multi	36	72%
Gestational age at diagnosis		
<20 weeks	4	8%
>20 weeks	46	92%

Table 2: Significant past history.

Past history	No of patients	%
Anomalous baby	2	4.0%
Macrosomia	9	18.0%
GDM in prev. preg	3	6.0%
H/o IUFD	4	8.0%
H/o Prev. abortion/s	5	10.0%
Normal	28	56.0%
Total	50	100.0%

Outcomes of 50 patients with GDM till the delivery and short term follow-up till 6 weeks were studied. 18 patients were lost to follow up due to change of residence or because they went to their native place for delivery.

Nearly 56% patients were in the age group 26-30 years while 30% were above 30 years. Maximum patients (72%) were multigravida. Majority i.e. 92% was diagnosed after 20 weeks of gestation while 8% were diagnosed before 20 weeks. 20% patients had positive

family history of diabetes mellitus in first degree relatives.

Table 3: Birth weight at delivery.

Birth weight (Kg)	N	%
< 2	6	12.0%
2-2.5	4	8.0%
2.51-3	8	16.0%
3.1-3.5	12	24.0%
> 3.5	20	40.0%
Total	50	100.0%

Table 4: Sugar levels on follow up at 6 weeks.

	Number of cases (37)	Percentage
FBS		
Normal	25	67.6%
Impaired	7	18.9%
Raised	5	13.5%
PLBS		
Normal	23	62.2%
Impaired	10	27%
Raised	4	10.8%

ANC risk factors were detected in 90% patients. Pre-eclampsia complicating pregnancy was noted in 13 patients (26%). Hypothyroidism was seen in 3 patients (6%). 9 patients (18%) had bad obstetric history. Polyhydramnios was noted in 10 patients (20%). Other high risk factors include previous LSCS, preterm labour, breech presentation, transverse lie and placenta previa.

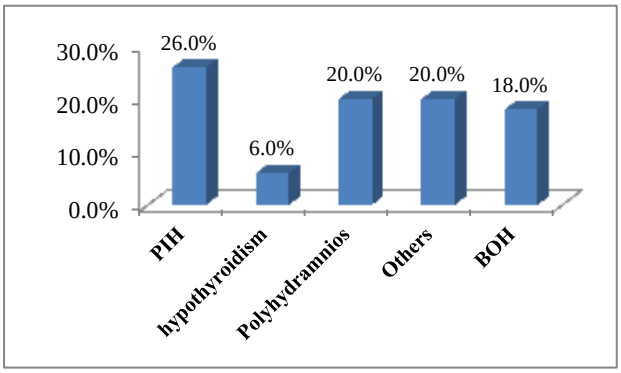

Figure 1: Associated antenatal complications.

23 patients (46%) delivered vaginally. 14% were induced with PGE2 gel while 32% had spontaneous vaginal delivery. Vacuum assisted delivery was seen in 2% (n=1) patients. 26 (52%) patients underwent Lower segment caesarean section (LSCS). 34% (n=17) were elective while 18% (n=9) were emergency LSCS of which 7 were for foetal distress and two patients had intrapartum placental abruption.

Intrapartum, shoulder dystocia occured in 2 patients (4%). Postpartum haemorrhage occurred in 3 (6%) patients. Post-partum haemorrhage due to atonic uterus was seen in two cases with polyhydramnios. 3 patients of LSCS had wound sepsis out of which, wound gape occurred in 1 patient who underwent secondary suturing. Thus, wound sepsis was seen in 7% patients.

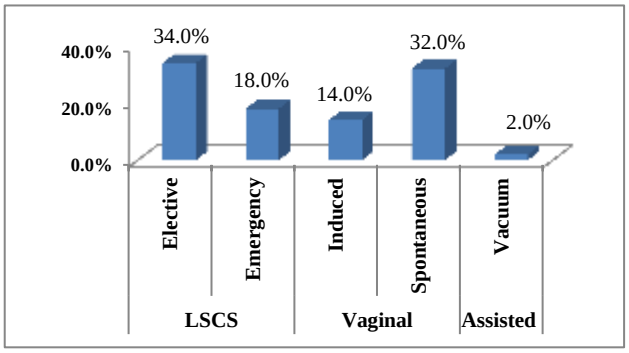

Figure 2: Mode of delivery.

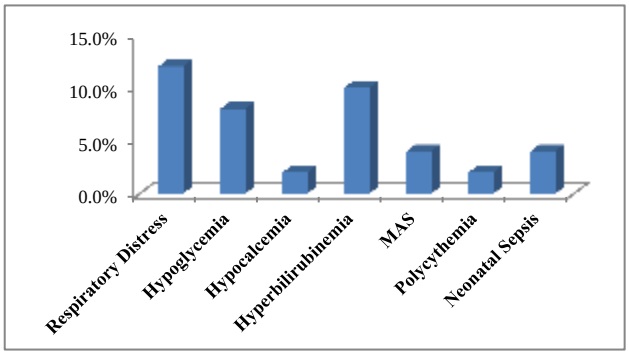

Figure 3: Neonatal complications.

Most of the babies delivered (n=39, 78%) were full term, but 22% (n = 11) were pre term.

Perinatal mortality was seen in 8% (n=4) patients. Out of these, 3 were intra uterine deaths. Two were macerated still births which presented with absent foetal heart sounds. 1 out of intrauterine deaths was a fresh stillbirth which occurred during labour. There was one neonatal death. Thus with four perinatal deaths and two foetuses with anencephaly, 46 mothers (92%) took live babies home.

40% (n=20) babies were >3.5 kg while 24% (n=12) were 3.0 – 3.49kg. Both these groups together constituted 64% of all babies. 6 babies (12%) were <2.0 kg.

A total of 4 babies (8%) had congenital malformations while 46 were normal at birth without any obvious abnormal features. Among the diagnosed congenital anomalies 1 baby had oesophageal atresia which was immediately operated, 1 baby had ventricular septal defect while 2 foetuses had anencephaly.

Neonatal complications occurred in babies of 21 patients. Respiratory distress owing to prematurity was seen in

12% (n=6) patients while 4 babies had hypoglycaemia. Hyperbilirubinemia was seen in 5 babies (10%). Other complications include meconium aspiration (4%), polycythemia (2%), neonatal sepsis (4%) and hypocalcemia (2%).

37 out of 50 patients followed up after 6 weeks. Maternal diabetes on follow up was seen in 6 patients. Impaired fasting glucose was seen in 7 patients while impaired glucose tolerance was observed in 10 patients.

DISCUSSION

The present study was undertaken in a teaching hospital to identify cases of gestational diabetes mellitus, to study their obstetric and fetal outcomes and a short follow-up of these cases post-partum.

GDM prevalence has been reported variably from 1.4 to 14% worldwide and differently among racial and ethnic groups.[4] In the present study, GDM comprises of 4.2% of the total patients screened. All patients were from lower socio economic strata. GDM was reported to be 6.7 per cent in rural women of Jammu district.[5] In a study done at a tertiary care hospital in Maharashtra the prevalence of carbohydrate intolerance was found to be 7.7 percent.[6]

In this study, maximum patients (56%) were clustered in the age group of 26-30 years and 30% of patients were over 30 years of age. A study in Jammu also stated that compared with women of normal OGTT, women with GDM were older.[5] Thus GDM affects older women more than younger ones, in concert with the pathophysiology of the disease. It is also imperative that other cardiovascular risk factors may be present in older women and hence primary prevention in these patients would be extremely important to prevent future cardiovascular disease. In the present study, 28% patients were primigravida while 72% patients were multigravida. The study by Rajput et al, showed that higher parity would have a higher rate of GDM.[7]

Positive family history as a risk factor was noted in 20% patients in this study. In the study conducted in UK by Nanda et al, positive family history was found in 23.9% patients.[8]

Polyhydramnios was found in 20% of our patients in this study. The study by Bhat et al, cites a 14.7% incidence of polyhydramnios v/s 2.7% in controls.[9]

Pre-eclampsia can complicate the course of pregnancy and has an adverse effect on the feto-maternal outcome. In this study 26% of GDM patients had associated pre-eclampsia. In the study be Saxena et al, the incidence of pre-eclampsia was 40%.[10] According to Xiong et al, mothers with GDM were at increased risk of presenting with pre-eclampsia.[11] Thus there is an association between pre-eclampsia and GDM and early diagnosis and initiation of treatment should be done to improve the outcome.

Hypothyroidism was noted in 3 patients (6%) in the present study. These patients were previously diagnosed hypothyroid, already on thyroid supplementation in adequate dose. According to Toulis KA et al, a modestly increased risk of GDM might be present in pregnant women with subclinical Hypothyroidism compared to euthyroid pregnant women.[12]

46% patients in this study delivered vaginally. 30% of vaginal deliveries were induced at 38 weeks of gestation while 70% went into spontaneous labour. 2% deliveries were vacuum assisted. In this study 52% patients underwent LSCS. According to Kale et al, the incidence of LSCS in patients with GDM was found to be 60%.[13]

Diabetes causes delayed wound healing. Post operatively, 7% patients had wound sepsis. Surgical site infection is more common in patients with GDM compared to non-diabetic patients.[14]

In the present study, 78% of babies were born at term and 22% were pre-term. In a study by Mahalakshmi MM et al, in South India, 77.5% of babies were term live births while 19% were preterm live birth.[15] Preterm births in present study were attributed to premature preterm rupture of membranes, preterm labour and early induction in cases of severe preeclampsia.

Macrosomia and perinatal mortality are considered as adverse pregnancy outcomes in patients with GDM. 6% babies were intrauterine deaths in the present study similar to 6% intrauterine deaths reported in the study by Saxena et al.[10] The Indian consensus is that a new born weighing >3.5 kg should be considered as macrosomia. In present study, 40% babies were macrosomic at birth which is high compared to other Indian studies were the incidence was 28%. Incidence of low birth weight (weight <2.5 kg) was 20% in present study.

Complications noted in neonates born to GDM mothers include fetal macrosomia, impaired fetal growth, metabolic and electrolyte abnormalities, cardiovascular and CNS anomalies. In the present study 8% of the babies had hypoglycemia whereas 2% had hypocalcemia. In the present study, 8% had congenital anomalies. According to Shefali et al, 1.4% babies had congenital anomalies, while according to Saxena et al, 10% babies had congenital anomalies.[4,10]

In present study 37 patients followed up at 6 weeks with FBS and PLBS. Out of these, 16.2% patients were found to have diabetes on follow-up. 7 patients had impaired fasting glucose levels where as 10 patients had impaired glucose tolerance. According to a study by Mahalakshmi MM et al, half of the patients developed diabetes within 5 years and over 90% within 10 years after delivery.[15] The rates of conversion to type 2 diabetes as high as 50%

found in Latina women in southern California and other high-risk ethnic groups.[16] The proportion of women with previous gestational diabetes mellitus (GDM) receiving postpartum diabetes testing is far less than desired. Even in health care systems with high testing rates, some women remain untested.

CONCLUSION

Women with a history of GDM as well as offspring exposed to maternal diabetes in utero should be a major area of focus for preventive medicine. Preventive measures against type 2 diabetes mellitus should start during intrauterine period and continue throughout life from early childhood. Since the only expenditure involved is a simple screening blood test, it is recommended that all patients be universally screened for GDM. In conclusion, a short term intensive care gives a long term pay off in the primary prevention of impaired glucose tolerance, diabetes and obesity in the offspring, as preventive medicine starts before birth. The maternal health and fetal outcome depends upon the care by the committed team of diabetologists, obstetricians and neonatologists.

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REFERENCES

1. Dornhost A, Paterson CM, Nicholls JS, Wadsworth J, Chiu DC, Elkeles RS, et al. High prevalence of GDM in women from ethnic minority groups. Diabetic Med. 1992;9:820-2.
2. American college of obstetricians and gynecologists committee on practice bulletins obstetrics. ACOG practice bulletin, authors. clinical management guidelines for obstetrician-gynecologists. Gestational Diab Obstet Gynecol. 2001;98:525-38.
3. Barbour LA. Unresolved controversies in gestational diabetes: implications on maternal and infant health. Curr Opin Endocrinol Diabetes Obes. 2014;21(4):264-70.
4. Shefali AK. Pregnancy outcomes in pre-gestational and gestational diabetic women in comparison to non-diabetic women-a prospective study in asian indian mothers. J Assoc Physicians India. 2006;54:613-8.
5. Wahi P, Dogra V, Jandial K, Bhagat R, Gupta R, Gupta S, et al. Prevalence of gestational diabetes mellitus (GDM) and its outcomes in Jammu region. J Assoc Physicians India. 2011;59:227-30.
6. Swami SR, Mehetre R, Shivane V, Bandgar TR, Menon PS, Shah NS. Prevalence of carbohydrate intolerance of varying degrees in pregnant females in western India (Maharashtra) a hospital-based study. J Indian Med Assoc. 2008;106:712-4.
7. Rajput R, Yadav Y, Nanda S, Rajput M. Prevalence of GDM In Haryana. Indian J Med Res. 2013;137:728-33.
8. Nanda S, Savvidou M, Syngelaki A, Akolekar R, Kypros H. Prediction of gestational diabetes mellitus by maternal factors and biomarkers at 11 to 13 weeks. Prenat Diagn. 2011:10.1002/pd.2636.
9. Bhat M, Sarma SP, Menon S. Determinants of gestational diabetes mellitus: a case control study in a district tertiary care hospital in south India. Int J Diabetes Dev Ctries. 2010;30(2):91-6.
10. Saxena P, Tyagi S, Prakash A, Nigam A. Pregnancy outcome of women with gestational diabetes in a tertiary level hospital of north India. Indian J Community Med. 2011;36(2):120-3.
11. Xiong X, Saunders LD, Wang FL, Demianczuk NN. Gestational diabetes mellitus: prevalence, risk factors, maternal and infant outcomes. Int J Gynaecol Obstet. 2001;75:221-8.
12. Toulis KA, Stagnaro GA, Negro R. Maternal subclinical hypothyroidsm and gestational diabetes mellitus: a meta-analysis. Endocr Pract. 2014;20(7):703-14.
13. Yajnik CS, Kale SD, Kulkarni SR, Meenakumari K, Joglekar AA, Khorsand N et al. High risk of diabetes and metabolic syndrome in Indian women with gestational diabetes mellitus. Diabetes Medicine 2004;21:1257-9.
14. Tran S, Jamulitrat S, Chongsuvivatwong V, Geater A. Risk factors for postcaesarean surgical site infection. Obstet Gynecol. 2000;95(3):367-71.
15. Mahalakshmi MM. Clinical profile, outcomes, and progression to type 2 diabetes among Indian women with gestational diabetes mellitus seen at a diabetes center in south India. Indian J Endocrinol Metab. 2014;18(3):400-6.
16. Buchanan TA, Xiang AH, Peters RK. Preservation of pancreatic beta-cell function and prevention of type 2 diabetes by pharmacological treatment of insulin resistance in high-risk hispanic women. Diabetes. 2002;51:2796-803.

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