Obstetrics & Gynaecology

STUDY OF PREVALENCE OF GESTATIONAL DIABETES USING ORAL GLUCOSE CHALLENGE TEST AS A SCREENING TOOL AND ASSESSMENT OF VARIOUS ASSOCIATED FACTORS AND PERINATAL OUTCOME

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ABSTRACT **Aims and objectives:** To study the role of Oral Glucose Challenge test as a screening test in pregnant women with no high risk factors, to evaluate prevalence of gestational diabetes in the population and perinatal outcome of the pregnancy according to OGCT. **Materials and method:** Prospective study conducted for One year at a tertiary care hospital. 500 pregnant women between 24-36 weeks were selected and given 50g – glucose after antenatal check-up. Venous blood was withdrawn after 60 minutes for glucose estimation. If plasma glucose level was more than 140mg/dl, the test was followed by a 3 hr Glucose Tolerance Test with exception of those with 1 hr screening test value greater than 200mg/dl. **Results and analysis:** Out of 500 patients 40 patients (8%) were found to have GDM. 50g GCT is found to be feasible, acceptable screening test for gestational diabetes mellitus. The rate of induction of labour was found to be high in GDM patient. The incidence of LSCS rate was found to be high in GDM group. Perinatal outcome for diabetic women who were well controlled during pregnancy was similar to the rest of the women with normal glucose challenge test. **Summary and Conclusion:** The 50g glucose challenge test is a useful screening test in pregnant women with no risk factor. With a threshold value of GCT at 140 mg/dl with a smaller number of women required 100g GTT which may be more acceptable. The increase perinatal morbidity in GDM is preventable by meticulous antenatal care. All pregnant women should be screened for GDM at least once during pregnancy and all detected GDM patients should be closely monitored for strict glycaemic control for good maternal and neonatal outcome.

KEYWORDS : Glucose challenge test, gestational diabetes.

Introducton

Gestational diabetes mellitus (GDM) defined as carbohydrate intolerance of variable severity with onset or first recognition during current pregnancy and with glucose tolerance reverting back to normal after the puerperium. GDM represent a high risk factor in pregnancy. Diabetes is estimate to complicate 2-5% of all pregnancies of which 90% of those detected during pregnancy i.e. gestational diabetes mellitus and rest are overt pre-gestational either Type I or Type II. According to ADA approximately 7% of all pregnancy are complicated by Gestational diabetes mellitus resulting in more than 2 lakh cases annually.[1,2,3]

Women with gestational diabetes are individuals with genetic or metabolic predisposition towards diabetes who are incapable of adequately compensating for the diabetogenic effect of pregnancy. All complications associated with GDM are potentially preventable with early recognition of GDM, intense monitoring and proper treatment. Moreover, in view of high prevalence of diabetes mellitus and its early onset among Indians, all pregnant women should be screened for GDM.

An increased risk of various maternal and foetal adverse outcomes have now been well documented, although the benefits of treatment have remained controversial. Major recent research in gestational diabetes has focused on redefining glucose threshold for diagnosis and treatment targets, as well as more flexible approaches to treatment based on foetal parameters and treatment option available.

It is important to find a cheap, easily available option to screen GDM in pregnant population. Easy and early diagnosis would help us to be more meticulous in the treatment and improvement of outcome.

Aims & objectives:

Evaluation of 50gm oral glucose challenge test as screening tool in gestational diabetes mellitus in pregnant women with no risk factors. Determination of prevalence of gestational diabetes mellitus in the study population and assessment of various associated factors and perinatal outcome of pregnancy.

Materials and methods

This Prospective study was conducted for one year at a tertiary care center and 500 pregnant women between 24 to 36 weeks of gestation were assessed after obtaining well informed consent for the study. The females with no previous and present features suggestive of GDM were enrolled for the study. Hence, women with risk, signs and history of diabetes mellitus i.e.,maternal BMI > 28 at time of booking, bad obstetric history, a previous unexplained intrauterine death, Macrosomia, Polyhydramnios were excluded. The cases selected underwent OGCT (oral glucose challenge test) between 24-36 weeks of gestation. Women with value more than 140 mg/dl were subjected to undergo 3-hr OGTT (Oral glucose tolerance test), and those with value < 140 mg/dl no further test required. Women undergoing 3-hr OGTT if they had 2 or more values abnormal, were diagnosed as GDM. Patient found to be GDM will be referred to dietician and to be managed by High Risk Pregnancy Centre with multispecialty faculty. Pregnancy to be followed till term. They were put on diabetic diet and started on insulin when indicated. For those women whose sugar level were well controlled on diet, pregnancy was allowed to progress to spontaneous labour, while for those who required insulin therapy, pregnancy was terminated at 38 weeks of gestation, and when fetal compromise was detected.

After delivery, all infants of diabetic mothers were assessed for congenital malformations, hypoglycaemia, and other electrolyte imbalance and respiratory disorders. The outcome of pregnancy was assessed by the gestation and mode of delivery and neonatal outcome in term of birth weight, APGAR score, congenital malformation and NICU admission for hypoglycaemia, hyperbilirubinaemia or respiratory distress syndrome.

Statistical method:

All the parameters were tested for significance in the differences between the study groups by the chi-square test or the kruskal-wallis one-way anova test.

Observation and results:

All 500 cases were classified into 3 groups according to OGCT and OGTT results:

Groups	Screening Tests performed	Number (%)
GROUP A	OGCT < 140 mg/dl (7.8 mmol) no further 3-hr OGTT required	325 (65.00%)
GROUP B	OGCT > 140 mg/dl (7.8mmol/l), followed by normal 3hr OGTT with 1 value abnormal	135 (27%)
GROUP C	OGCT >140 mg/dl and abnormal 3 hr OGTT- two or more values abnormal suggestive of GDM	40 (8%)

On analysing the parity, age and BMI in the three groups, it was found that primi gravid were more in all the 3 study groups,with percentage of 60% in group A, 53.7% in group B and 68.8% in group C. The mean age of women in all three groups was around 27-28 years, with 27.49

yrs in group A, 28.32 yrs in group B and 27.13 yrs in group C. The mean BMI of women in all 3 groups is around 23-24 with 23.51 in group A, 23.16 in group B and 23.84 in group C. There was no statistical difference in Gravid status, age and BMI in either of the groups.

Among GDM group only three patients required insulin, others were managed by diabetic diet. Patient with no high risk factors also developed GDM which required insulin, so as to maintain euglycaemic state for a better maternal and perinatal outcome.

Spontaneous labour was more in comparison to induced labour in all 3 groups, with maximum in group A (92.31%) i.e. normal GCT group. Whereas induce labour was more in group C (31.3%) i.e. GDM group, which was statistically significant. (P= 0.015)

Normal vaginal delivery rates were higher in group A 74.6%, Assisted vaginal delivery were higher in group B (vacuum or forceps) 25.9% , LSCS rate more in group C with 25%, which showed significant difference on analysis. (p value 0.017).

LSCS rate was high in group C (25%), with indication of nonprogress of labour and CPD. In group B LSCS rate is 20.4% with most common indication NPOL. LSCS in group A was mostly due to CPD. LSCS rate was statistically significant in the GDM group, other indications of LSCS being CPD, breech and foetal distress. Instrumental delivery was mostly due to occipito-posterior position, followed by foetal bradycardia and decrease maternal efforts. With maximum number of term deliveries in all the 3 groups, preterm delivery in group A was found to be 4.6% and 6.3% in group C. The mean birth weight in all 3 groups was 2.9 - 3 kg.

On analysing the neonatal outcome, the mean APGAR score in the all 3 group was same. The reasons for NICU admission in all the 3 groups were similar. The NICU admission was for hypoglycaemia, neonatal jaundice and CRP positive, low birth weight, MSAFP, hypocalcaemia, none of them had macrosomia and congenital anomaly. Neonate with hypoglycaemia were more in GDM group compare to other group, and neonate with hyperbilirubinemia were more in group B, but this difference was not statistically significant. Table no 1 shows the indications for NICU admission in our study.

Table No 1 : Indications Of NICU Admissions

Indications	Group A n (%)325	Group B n (%)135	Group C n (%) 40
Hyperbilirubinemia	10 (3%)	13 (9.6%)	3
Hypocalcemia	3	3	0
Hypoglycaemia	7	5	5
Meconium aspiration syndrome	5	5	0
Sepsis	18	0	0
Very low birth weight	3	0	0

All the babies admitted to the NICU recovered well and were discharged home in good health.

Discussion:
GDM is a well established risk factor in pregnancy and there are clear benefits to the pregnant patient and the fetus by effective screening and treatment.

The prevalence of GDM in this study was found to be 8%. In year 2001 prevalence of GDM in Mumbai was 3%[4], whereas in 2008 prevalence of GDM in Mumbai was 7.7%.[5] Increase in the prevalence of GDM, pose a severe threat to the urban population in the near future.

Lots of controversies exist, inspite of the 4th international workshop conference for GDM which tried to standardised the screening methods and cut off values.[6] But these does not suit all the population types due to ethnicity, environmental, genetics and life style. Also more number of people are entering the high risk group due to change in the age at conception, food consumed and sedentary work. All these factors favour towards the cause for GDM. Therefore to prevent and protect the mother and foetus from complications it is important to screen women at the earliest.

The 50-g OGCT is a simple, cheap and convenient test. It does not require the patient to be fasted and can be easily organised after the consultation. Apart from the occasional nausea, it does not bother the patient much. Most of our patient did not object to the test when the protocol was explained.

The pioneering studies of O'Sullivan and Mahan first started in 1964. O'Sullivan reported a sensitivity of 79% and specificity of 87% using a threshold value of 130mg/dl whole blood (or 7.1 mmol/l). Based on his study, OGTT done for positive historical or obstetrical risk factor yielded poor result with a sensitivity of 63% and specificity of 56%.[7]

When 130 mg/dl is used as the threshold, the test has sensitivity of 90%, which decrease to 80% when threshold is 140 mg/dl. However, the lower threshold implies testing of 20-25% of overall obstetrical population while the upper threshold limits the testing to 14-18%. Since the incidence of gestational diabetes is on average 2-5% the number of false positive will be high with 130mg/dl threshold. Hence in this study 140 mg/dl is used as threshold for OGCT.[8]

In the present study the mean age in years in all three groups is 27-28, similar to that observed by L Wong et al (2001)[7], the average age in GDM group was 29 years.

In the present study the mean BMI in all three group is 23-24, with no significant difference among the three groups. The reason of this could be because the study group excluded female with high risk factors which included BMI >27. L wong et al[7] showed average BMI in non GDM group of 25.8 and in the GDM group, 25.8.
The Australian Carbohydrate Intolerance Study[9] in pregnant women found induction of labour was found to be more in interventional group. (39% vs 29%) In our study, spontaneous labour was observed in 92.31% in group A, 87.04% in group B and 68.8% in group C. There was significant difference between rate of induction of labour in the three groups, highest being 31.3% in group C.

As per Godwin et al[10] the presence of gestational diabetes was associated with increase in likelihood of assisted vaginal delivery. Assisted vaginal delivery rates were higher in group B 25.9% as compare to group C 18.8% and 8.5% in group A. LSCS rates higher in group C 25%, as compare to 20.4% in group B and 16.9% in groupA. Above finding is statistically significant with p value 0.017, the most common cause of LSCS was NPOL followed by CPD. Jindal et al[11] there was 44% delivery by caesarean section in GDM group as compare to control 13.3%
As per study done in Agrawal et al[12], the incidence of LSCS was found to be two times more in positive screened group than in negative screened group (p=0.0002) and three times higher in GDM group than those with normal GTT. (p=0.001)

As per Hossein N et al[13] study LSCS rate were found to be higher in GDM group as compare to non GDM.

On analysing the neonatal outcome, it was found that the average weight was 3 kg which may be due to early diagnosis, vigilant glucose monitoring and treatment, thus preventing macrosomia as a complication. In our study it was found that mean APGAR score at 1 minute and 5 minute of 9 in all group.

NICU admission was near about equal in all three groups with 18.8% in group C, 18.5% in group B and 15.4% in group A. Statistically not significant.

NICU admission in group A was mostly due to CRP positive, whereas in group B it was due to hyperbilirubinaemia and in group C was due to hypoglycaemia and hyperbilirubinaemia. As per GODWIN et al[10] no association found with APGAR score, rate of congenital anomaly or neonatal death rate while neonatal born to women with GDM were seven times more likely to have hypoglycaemia and three times more likely to have hypocalcaemia and three times with hyperbilirubinaemia.

As per Jindal[11] et al, increase in incidence of neonatal complication including metabolic such as hypoglycaemia, hyperbilirubinaemia, hypocalcaemia, meconium aspiration, polycythaemia was observed in GDM group as compared to control group.

As per Agrawal et al[12] study, comparision was done among the various aspect of foetal outcome between GDM and control group statistically significant association was found in term of hypoglycaemia, hyperbilirubinaemia, hypocalcaemia, meconium aspiration, polycythaemia was observed in GDM group as compared to control group

As per Landon et al[14], women with GDM were designed to investigate role of treatment with mild GDM found no difference in primary outcome of study as perinatal hypoglycaemia, hyperbilirubinaemia or birth trauma but significant improvement seen with mean birth weight (3.2kg vs 3.4kg), shoulder dystocia (1.5 vs 4%), caesarean section (26.9 vs 33.8%) and LGA. Thus treatment of gestational diabetes has been shown to reduce the risk of serious perinatal outcome.

As per Hossein N et al[15] women with GDM had higher rate of neonatal hypoglycaemia, neonatal hypocalcaemia and still birth, thus to prevent perinatal morbidity and mortality, screening, early diagnosis, vigiliant monitoring and treatment is necessary.

As per Deveer R et al[16] women with GDM on diabetic diet had lesser incidence of macrosomia, LSCS rate, and poor perinatal outcome as compare to women with GDM not on diet. Hence it was found that in the management of patients with positive 50 g GCT and negative 100 g OGTT, patients who were prescribed medical nutrition therapy by a dietitian experienced in GDM management had better perinatal outcomes.

To conclude, 50g GCT is accepted as screening test in pregnant women with no high risk factor. Today, the strict blood glucose control and close antenatal supervision have resulted in obstetric and perinatal outcome to be similar to that of general population. Thus the prime emphasis in the management of GDM should be focused on the early detection of GDM maintaining euglycaemic state and good perinatal outcome.

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