ORIGINAL ARTICLE

False positive glucose challenge test and adverse perinatal outcome

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Abstract:
Objective: To compare the proportion of adverse perinatal outcome in Glucose challenge test(GCT) negative and false positive Glucose challenge test groups.
To determine the types of adverse effects in the neonates in both the groups.
Main outcome measures: Fetal outcome, weight of the babies, shoulder dystocia, neonatal intensive care admission and other complications.
Study design: Cross-sectional Analytical study.
Patients and mthods: Patients who were booked at Liaquat National Hospital, had GCT and further confirmatory tests and afterwards delivered here. Every patient had GCT at 24-28 week of gestation. Patients who had positive GCT result (>135mg%) were followed by 100gm 3 hours OGTT and if no or single reading was raised, they were placed in Group 'A'. Patients who had two or more raised readings were diagnosed as gestational diabetics and were excluded from the study. Patients whose GCT was negative, were placed in Group 'B'. Patients in both the groups were followed till delivery. A proforma was filled for the selected patients by the OPD doctor and then sent to labour room for further follow up. Further information was entered at delivery. Babies, who were admitted in nursery, were followed by the doctor in the ward.
Results: Proportion of adverse perinatal outcome is higher in GCT positive patients (group A). Incidence of intrauterine death (IUD), neonatal death (NND), macrosomia and NICU admission are more compared to control group.
Conclusion: GCT positive patients should be identified as high risk population. They should be provided with more intensive perinatal care.

Keywords: Gestational diabetes mellitus, Glucose challenge test, Oral glucose tolerance test and perinatal outcome

Introduction:

Gestational diabetes mellitus (GDM) is the most common metabolic complication that affects the pregnant women. GDM is associated with multiple maternal and fetal risks including pre-eclampsia, fetal macrosomia, caesarian delivery, neonatal hypoglycemia and perinatal death[1]. The frequency of GDM and its associated maternal , perinatal and long term morbidities emphasize the importance of appropriate screening methods, as early diagnosis and prompt treatment of gestational diabetes will improve the pregnancy outcome[2].

The most widely accepted screening test for gestational diabetes, is administering a 50 gm 1 hour glucose challenge test (GCT) to every pregnant female at 24-28 weeks of gestation3, followed by an oral glucose tolerance test (OGTT) in GCT positive females to confirm the diagnosis. GCT has a high sensitivity (79%) and specificity (83%)[2,4]. Based on a gestational diabetes prevalence of 5%, negative and positive predictive value of GCT is estimated to be 11% and 96% respectively[1]. For GDM to be diagnosed 2 or more glucose levels of OGTT should be raised(OGTT +ve). It seems that a significant proportion of OGTT negative

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Pak J Surg 2010; 26(4):325-328

patient will develop fetal macrosomia or be identified as diabetics at a later time[5]. As Asian population has been identified as highly prevalent for diabetes, it is not surprising that certain patients with borderline or negative diagnostic test are at high risk of adverse perinatal outcome[5,6,7]. Studies have been conducted throughout the world but in our population no such data is available. Therefore we conducted a study to find out if there is any association between a false positive 1 hour glucose test (GCT) and the development of adverse perinatal outcome.

This cross-sectional analytical study was conducted to compare the proportion of adverse perinatal outcome in negative glucose challenge test group and false positive glucose challenge test group and to determine the types of adverse effects in the neonates in both groups.

There is a hypothesis that the proportion of Neonate's adverse effects will be high in false positive group than in normal group.

Material and method:

Setting : the study was conducted in Obstetrics and Gynecology department at Liaquat National Hospital from November 2004 to April 2005.

Total number of patients were 60 with 30 patients in each group.

In our study we included the patients who were booked at obstetrics antenatal clinic at Liaquat National Hospital before 24 weeks of gestation, had regular antenatal visits, had GCT at 24-28 weeks of gestation and delivered at the same hospital. Their babies followed in nursery.

We excluded diabetics, diagnosed as having gestational diabetes in the current pregnancy and with multiple gestation.

GCT is offered to every patient attending the antenatal clinic at 24-28 weeks of gestation. Patient were advised to come for GCT without any dietary preparation or fasting. In the laboratory 50 gms of glucose dissolved in 250-300 ml of water, swallowed by the patient. One hour later blood sample drawn from anterior cubital vein. Serum is checked for glucose estimation. We take cut off of 135mg% for further confirmation by OGTT. Patients having positive GCT result (>135mg%) advised diagnostic test to confirm GDM.

These patients are subjected to 100 gms 3 hours OGTT after overnight fasting. Test results of OGTT are interpreted according to modified criteria of O' Sullivan and Mahan presented by Carpenter8 i.e., fasting 95 mg%, one hour 180mg%, two hour 155mg% and three hour 140 mg%. If less than two readings are raised (none or one), then they are selected for group "A". Patients having two or more raised readings are diagnosed as Gestational Diabetes and are excluded from the study. A patient who's GCT is negative is selected in group "B". Patients in both the groups are followed till delivery, a proforma is filled by the OPD doctor and then sent to labour ward for further follow up. Further information was entered at the delivery. Babies who were admitted in nursery, were followed by the doctor in the nursery and details were entered in the proforma.

Relative risk is calculated and Chi square test applied to determine the significance. A p-value of less than 0.05 is taken as significant. Relevant descriptive statistics is reported. All calculations are done by SPSS version 10.0.

Results:

Among the patients in the study the proportion of adverse perinatal outcome is measured by the percentage of intrauterine deaths (IUD), neonatal deaths (NND), shoulder dystocia, weight of babies and number of babies who were admitted in Neonatal intensive care unit (NICU).

26.7% (n=8) babies in the GCT positive group (group A) were macrosomic (weight >=4 kg) as compared to 6.7% (n=2) in GCT negative group (group B) p value=0.038.

Shoulder dystocia is frequent in GCT positive group 13.3% (n=4) as compared to 3.3% (n=1) in GCT negative group. P value=0.161.

In GCT positive group 53.3% (n=16) babies were admitted in NICU whereas in GCT negative group only 26.67% (n=8).

The neonates were admitted with jaundice, hypoglycemia, respiratory distress syndrome, meconium aspiration, polycythemia and hypocalcemia. Most of these neonates found to have more than one complication during their stay in NICU. Proportion of jaundice 20% compared to 6.7%, hypoglycemia 13.3% compared to none, respiratory distress syndrome 10% compared to 6.7%, hypocalcemia 6.7% compared to none and polycythemia 3.3% compared to none are higher in GCT positive group (group A).

Proportion of infections, meconium aspiration and transient tachypnea of newborn were same in both the groups. Two neonates in each group were admitted for observation because of poor APGAR score. Neonates with intrauterine growth restriction are more in GCT negative group (group B).

There was one IUD and one NND 6.7% in GCT positive group compared to none in GCT negative group. P value=0.150.

With increasing age a tendency to be GCT positive was observed. 14 patients (46.6%) in GCT positive group were above 30 years of age compared to 5 patients (16.7%) in GCT negative group.

26.7% (n=8) in GCT positive group were above 75 kg compared to 20% (n=6) in GCT negative group.

More patients in GCT negative group delivered as spontaneous vaginal delivery 60% compared to 36 %. whereas in GCT positive group more patients had instrumental and caesarean delivery 20% and 43.3% Vs 3.4% and 36% respectively.

With increasing gravidity more patients tested GCT positive. There were 33.3% primigravida in GCT positive group Vs 26.6% in GCT negative group, but multigravida (2-4) were higher in GCT negative group 56.6% Vs 40%. Grand multipara (>5) were again more in GCT positive group 26.6% Vs 16.7%.

APGAR score at 1 minute, no baby got an APGAR score of 8-10 in GCT positive group while 26.6% in GCT negative group had good APGAR score. 86.6% (n=26) of GCT negative babies had APGAR of 8-10 compared to 66.67% (n=20) in GCT positive group.

Discussion:

Patients with Pre-gestational and Gestational Diabetes Mellitus are at higher risk of adverse maternal and perinatal outcome.[10] These risk are overcome by early detection and prompt treatment.[1,11] Patients having abnormal GCT but normal OGTT (non-diabetic) are identified as "Glucose intolerant" or "borderline diabetics" by some clinicians[6], where as others maintain that they are not at risk population.[12]

This study has demonstrated an increase proportion of adverse perinatal outcome in GCT positive patients as compared to GCT negative patients.

A significant proportion of newborn develop macrosomia.[12] In our study we saw that in GCT positive (group A) 26.7% babies weighed more than 4 kg compared to 6.7% in GCT negative (group B) p value 0.038. Also shoulder dystocia was seen more in GCT positive group 13.3%compared to 3.3%. Similarly trend of instrumental delivery and caesarian section was more in GCT positive group 20% and 43.3% Vs 3.4% and 36% respectively. These findings were similar to study conducted by Khan et al[4] where they observed that patients in group B had higher incidence of macrosomia in babies and also had high incidence of pre eclampsia (p-value <0.01) leading to higher caesarian rates. Stamilio et al1 also presented similar findings. Another study conducted on Danish females by Jensen et al[6] found significant association between shoulder dystocia, macrosomia and mild degree of carbohydrate intolerance.

We saw more admissions of babies in NICU born to mothers who were GCT positive (53.3%). The different types of adverse effects, jaundice, hypoglycemia, respiratory distress syndrome, hypocalcemia and polycythemia were almost similar as described in other studies.[6,7] The incidence of IUGR was higher in GCT negative group (2 pateints), it was a conflicting observation as inci-

dence of IUGR is higher in diabetic patients.

In our study we found association between GCT positive group and increasing maternal age, gravidity and obesity. Unfortunately we did not measure body mass index (BMI) which is a better indicator. These observations are supported by similar findings in litrature[1,4] A significant number of GCT positive patients were primigravida, which is a conflicting observation as other studies did not support this observation.[1,5,7]

Increasing maternal age and obesity are already known to be associated with adverse perinatal outcome.10 We did not adjust our results for these confounding variables as the sample size is small. A multicentric study would be necessary so that modified results after controlling identified confounding variables can be determined.

There are certain limitations to our study. First as we already discussed that sample size is small. Second, we did not adjust our results for confounding variables. We minimized the potential for selection bias by using predetermined strict definitions and proformas as well as inclusion and exclusion criteria. Another fact which affects our results is that being a tertiary care centre and easy access to NICU more babies are admitted there, which could be managed at mothers side. But on the other hand we better identified the different types of adverse effects which neonates developed for the same reason.

Conclusion:

In conclusion, patients who are GCT positive are at high risk for perinatal complications when compared to GCT negative patients. This includes overall perinatal adversity, shoulder dystocia, macrosomia, caesarian and instrumental deliveries, NICU admissions and perinatal mortality13.

Thus GCT positive patients should be identified as high risk population. They might be benefited from more intensive prenatal care, like nutritional counseling, specialized diet, frequent antenatal visits and antenatal fetal surveillance. Further studies might be needed to see whether treating this population would be beneficial.

Adverse effects were almost the same in our study as described in earlier studies. Few other complications which are frequently seen in neonates of diabetic mothers like IUGR, congenital anomalies, hypertrophic cardiomyopathy, were not observed in this group. This is probably because blood sugar control in diabetic women was not as good as in GCT positive group. Therefore this group should be classed as high-risk group or intermediate category.

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