Frequency of Impaired Oral Glucose Tolerance Test in High Risk Pregnancies for Gestational Diabetes Mellitus

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ABSTRACT

Objective: To determine the frequency of impaired oral glucose tolerance test in high risk pregnancies for Gestational Diabetes Mellitus (GDM).

Study Design: Cross-sectional study.

Place and Duration of Study: The study was conducted in Obstetric Ward and outpatient department, at Baqai Hospital, Nazimabad and Fatima Hospital, Baqai Medical University, Karachi, from May to October 2005.

Patients and Methods: A total of 50 high risk pregnancies for gestational diabetes mellitus were selected through outpatient department of obstetrics. Data was collected according to certain obstetric and non-obstetric risk factors for GDM as inclusion criteria through a designed proforma i.e. family history of diabetes, macrosomia (i.e, wt > 3.5 kg), abortions, grand multiparity, a sudden increase in weight (>1 kg/wk) during pregnancy, age > 35 years, early neonatal deaths/sudden IUDs, polyhydramnios, urogenital infections (vulvo-vaginal candidiasis and UTI), previous history of GDM, congenital abnormalities (with or without polyhydramnios) and multiple pregnancy. Oral glucose tolerance test was performed and analyzed according to American Diabetic Association criteria, 2004.

Results: The most frequent risk factors were family history of diabetes mellitus in 1st degree relative and large for dates babies in 18 patients. Similarly, high risk factors such as history of abortions and grand multiparity were present in 16 and 14 pregnant women respectively. Least common factors, which contributed for GDM, were polyhydramnios in 4 cases and perinatal mortality (due to congenital anomalies of foetus, intrauterine deaths or neonatal deaths) seen only in 5 cases. Overall impaired oral glucose tolerance test was found in 24%. Most patients had one (17%) or two risk factors commonly (23%). Only 2% had shown five or more risk factors.

Conclusion: Oral glucose tolerance test is a useful diagnostic tool to detect GDM in high risk pregnancies, depending upon the high frequency of number of risk factors in each individual.

Key words: High risk pregnancies. Gestational diabetes mellitus. Oral glucose tolerance test.

INTRODUCTION

Gestational diabetes mellitus (GDM) is defined as any degree of glucose intolerance with onset or first recognition during pregnancy.\(^1\)

Approximately 7% of all pregnancies are complicated by GDM as pregnancy itself is a diabetogenic state.\(^2\) WHO has predicted that between 1995 – 2025, there will be a 35% increase in the worldwide prevalence of diabetes\(^3\) and an additional 1- 6% of women will develop sufficient hyperglycemia during pregnancy to meet the criteria for a diagnosis of GDM.\(^4\)

The gold standard for the diagnosis of GDM is oral glucose tolerance test (OGTT). It should be done as a part of prenatal and early pregnancy screening and repeated between 24 – 28 weeks of gestation,\(^6\) when insulin resistance tends to be maximum. Diabetic pregnancies, especially in high risk group, is associated with increased risk of congenital anomalies of foetus, early miscarriages, hypertension, still birth, fetal macrosomia and obstructed labour.\(^3,7,8\) GDM is also more common in obese women with sedentary life style.\(^9\) OGT can be performed according to three different criteria - “American Diabetes Association Criteria”, “National Diabetic Data Group” and “WHO Criteria”. First two groups recommend 100 gm of oral glucose load after minimum eight-hours of fasting while WHO recommended 75 gm of glucose load.\(^8\) The principal benefit of an OGGT in high risk group is the ability to identify a group of pregnant women who already have had an adverse maternal and foetal outcome in previous pregnancies and are again at risk of developing further complication due to GDM.

The objective of this study was to determine the frequency of an impaired oral glucose tolerance test in high risk pregnancies for GDM.

PATIENTS AND METHODS

The study was conducted at the obstetric outpatient
Fifty high risk pregnant women, between 24-28 weeks of gestation, were selected from antenatal clinic and subjected to an OGTT. It included both booked as well as non-booked cases. The data was collected on the basis of especially designed proforma that included risk factors associated with GDM i.e. family history of diabetes, macrosomia (>3.5 kg), abortions, grand multiparity, excessive weight gain during pregnancy (>1kg per week), maternal age (>35 years), intrauterine foetal demise or early neonatal deaths, polyhydramnios, vulvo-vaginal candidiasis and recurrent urinary tract infections (UTI), congenital abnormalities of foetus and multiple gestation. All patients with associated risk factors, either in recent or in the previous pregnancies, were subjected to an OGTT. All pregnancies with healthy obstetric outcome in previous pregnancies, known diabetics as well as diagnosed cases of GDM and without any family history of diabetes, especially in first degree relatives, were excluded from this study.

All selected pregnant women were advised especially not to have any dietary or physical restriction for at least 3 days prior to glucose tolerance test. OGTT was performed after 8 hours of fasting. Four blood samples were drawn and checked for the abnormal results of an OGTT, according to “American Diabetes Association” criteria, 2004 (i.e. fasting blood sugar (FBS) >5.3 mmol/l, 1 hour value >10 mmol/l, 2 hours value > 8.6 mmol/l and 3 hours value > 7.8 mmol/l).

During OGTT, absolute dietary restrictions were recommended. If any two values were found above the criteria, OGTT was considered to be impaired. The data was finally analyzed using SPSS version-10.

RESULTS

Among fifty high risk pregnancies, overall impaired oral glucose tolerance tests was 24%. Most of those pregnant women had either one or two risk factors, but the pregnancies complicated by four or five risk factors had shown 100% impairment of an OGTT (Table I).

The most frequent risk factors associated with GDM were family history of gestational diabetes in 1st degree relative and fetal macrosomia i.e. (18 cases of individual risk factors). The impaired results were detected in 7 and 6 cases. Another very important risk factor like abortions was observed in 16 cases, out of which 6 patient were proved as diabetic. Grand multigravidas were 14 in this study. Three of them had an abnormal OGTT.

The less commonly observed risk factors such as; sudden weight gain during pregnancy and maternal age > 35 years observed in 7 and 6 cases respectively. Only 2 cases of both risk factors had impaired OGTT. Out of 5 cases of sudden intrauterine deaths, 2 cases had an impaired OGTT. With the history of neural tube defects as a part of congenital abnormalities associated with GDM, there were only 2 patients with the normal OGTT. There were 4 pregnancies with or without polyhydramnios and only 1 patient was having an impaired OGTT. There were only 2 patients at 24 weeks of gestation who had previous history of GDM but only one patient had shown an impaired OGTT. Lastly, there were 4 cases of urogenital infections but only one case had an impaired OGTT (Table – II).

DISCUSSION

Pregnancy itself is an insulin resistance state and there is a rapid increase in insulin requirement particularly between 24 – 28 weeks of gestation. Risk factors contributing for GDM are similar to the risk factors which are responsible for possible type-II diabetes in women with GDM. It is shown in this study that one of the frequent risk factors for GDM is fetal macrosomia. It reflects increased maternal hyperglycemia during pregnancy causing fetal hyperinsulinemia, which definitely increases the intrauterine fetal weight. The risk of complication is directly related to the degree of maternal hyperglycemia. In order to prove the response of maternal hyperglycemia upon fetal macrosomia, a cohort study of 3637 women was conducted in 1995 at
Toronto Tri Hospital, where women who tested ‘negative’ for GDM at 28 weeks of gestation, were followed throughout pregnancy. Even in those women without GDM, increasing carbohydrate intolerance was associated with a significant increased incidence of macrosomia, followed by increase rate of C-section and neonatal complications.9 Recent studies have suggested that 20 - 30% of women who were undiagnosed as GDM, give birth to infants heavier than 4000 gm.10 That is why it is important, however, to consider that diagnosing GDM by an OGTT, significantly changes the perinatal outcome, especially in women who had previous history of macrosomia.11,12 Similarly, any 1st degree relative with type-II diabetes mellitus significantly contributes in making pregnancy high risk for GDM. It is because GDM is often associated with strong genetic predisposition of type-II diabetes mellitus rather than autoimmune form of type-I diabetes mellitus. However, the genetics of type-II DM is complex and not very clearly defined.13

First trimester as well as second trimester abortions are observed more frequently in diabetic women as compared to non-diabetics, due to increased maternal hyperglycemic response causing free radical injury of the tissues. In the present study, 16 cases were picked up for the evaluation of GDM by OGTT; 6 cases had an impaired tolerance test. It is comparable with the international recognized prospective “Diabetic Control and Complication Trials,” that timely diagnosis of GDM by an OGTT is associated with reduced rate of spontaneous abortions.14 Those patients who had normal OGTT might have other reasons for the abortions, not related with maternal hyperglycemia.

Pathophysiologically, it can be explained that repeated pregnancies or grand multigravida have more potential risk for an impaired OGTT. It is because of repeated and frequent exposure to insulin resistance in consecutive pregnancies and sustained hyperglycemic response by the body. Same phenomenon occur when there is abnormal increase in weight during pregnancy (i.e. > 1 kg/week) or in between two successive pregnancies. Obesity in pregnancy enhances dyslipidemia and it triggers some degree of insulin resistance, thus favouring the potential for GDM. Unfortunately, this study had a small number of grand multigravidae and an impaired OGTT to prove its clinical significance for GDM. That could be one of the reasons that the presence of single high risk factor not always contributing the risk for GDM.

Neural tube defects and cardiac malformations are more common in diabetic women than in non-diabetics. Abnormalities arises as a consequences of poor glycemic control during the embryogenesis. Among those 50 high risk women, very few (2 cases) had past history of neural tube defects. But fortunately none of them had an impaired OGTT. Still, a large group of patient associated with fetal anomalies needs to be studied to detect GDM in order to compare the WHO reported incidence of 3-8% congenital anomalies in neonates of diabetic mothers and overall 20-50% perinatal deaths associated with GDM.18-23 Polyhydramnios is also one of the complications of diabetes and related with higher incidence of congenital abnormalities due to high maternal glucose concentration causing increase osmotic pressure in amniotic fluid. Four cases were clinically diagnosed and confirmed on the basis of ultrasound for polyhydramnios and single patient was found to be diabetic by OGTT, but it did not match with the international incidence of 1%, that was found after the review of all cases of polyhydramnios from a data base of over 40,000 women.25 Though polyhydramnios had a strong correlation with maternal hyperglycemia, yet it does not necessarily indicate that the pregnancy is always at risk for GDM.

Increased susceptibility to recurrent infections during pregnancy (like recurrent UTI or vulvo-vaginal candidiasis) actually indicates the importance of an OGTT for the evaluation of GDM. In this sample of 50 high risk women, very few of them had that complication and one of them ultimately was proved as diabetic.

Multiple pregnancies itself are considered “high risk pregnancy” as it can be associated with so many antenatal complications, so the risk of GDM can be twice in multiple pregnancies. In the random selection of women with certain risk factors, only one case of multiple (twin) pregnancy, which was associated with other risk factors for GDM as well, was seen. So she was diagnosed as a case of GDM by an OGTT at 24 weeks of gestation. But a large group of multiple pregnancies needs to be evaluated and each case need to be individualized according to the frequency of further risk factors. Previous history of GDM itself is a strong indicator for an OGTT, so it should not only be done at 24 – 28 weeks of pregnancy but it is also advocated preconceptionally and postnatally to exclude type-II diabetes mellitus.

Hence, the significance of an OGTT is more likely related to the number of risk factors reflecting clinical manifestation of insulin resistance during pregnancy. A larger sample size is indeed regarding the individual risk factor in order to make recommendations as a direct diagnostics approach in high risk pregnancies for GDM.

CONCLUSION

The presence of certain risk factors make the pregnancy high risk for GDM. Oral glucose tolerance test is not only a useful diagnostic tool but it is a direct “one step approach” to detect GDM, depending upon the presence of multiple obstetrical and non-obstetrical risk factors in each individuals.
REFERENCES


