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Original Research Article

A comparison study of maternal and perinatal outcomes with gestational diabetes mellitus, impaired glucose tolerance, and normal glucose tolerance

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ABSTRACT

Background: Gestational diabetes mellitus (GDM) and impaired glucose tolerance (IGT), which are growing health concerns globally, are the most common metabolic and endocrine perinatal issues. It is a contentious entity with competing policies and procedures. Most physicians in the United States employ a two-step procedure, starting with a 50-g non-fasting oral glucose challenge test at 24 to 28 weeks and moving on to a 100-g fasting test for women who receive a positive screening result. Instead, doctors use the Diabetes in Pregnancy Study Group India (DIPSI) technique and conduct just a 75-g, two-hour fasting oral glucose tolerance test.

Materials and Methods: The prospective observational study was approved by the hospital's institutional ethics committee and was conducted from April 2020 to September 2021 at the department of obstetrics and gynecology at Stanley Medical College Hospital in Chennai, Tamil Nadu, India. The patients were chosen in accordance with the inclusion criteria, which called for first-trimester pregnant women without diabetes mellitus. Both oral and written consent were also obtained. DIPSI performed the screening. The WHO standards have been updated to be a one-step process with a single glycemic value.

Results: According to the results of this study, GDM is linked to harmful consequences that might affect both the mother and the foetus.

Conclusion: The short- and long-term consequences in both the mother and the newborn can be greatly reduced with early detection and timely therapy of this illness. In this study, birth weights ranging from 2.5 to 3.5 kg were the same for GDM and IGT moms. IGT mothers should also be followed up on, and we should be more watchful at birth, even though we monitor GDM mothers.

1. Introduction

Gestational diabetes mellitus (GDM) is a considerably bigger issue in India than it is elsewhere, which has long been renowned as the "diabetic capital" of the globe. It is widely acknowledged that diabetic women, particularly those who are pregnant or breastfeeding, are among the most vulnerable.[1] With 16% of the world's population, India is the most populous democratic nation. India, sadly, has the highest maternal mortality rate in the world, with 45,000 maternal fatalities recorded in 2015. It is one of the six nations that account for half of all maternal

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deaths worldwide.[2] The frequency of GDM is substantially higher in the Indian population than it is in other Asian countries.[3–5] In India, the prevalence of diabetes ranges from 13.2% in rural areas to 14% in urban areas, making it a serious public health issue. Type 2 diabetes (T2DM) is thought to affect 62 million people in India, and by 2025, it's predicted that figure would increase to 79.4 million. The fact that GDM incidence and diabetes prevalence are both rising simultaneously[6] is not surprising. In 2013, GDM accounted for 90% of the diagnoses of hyperglycemia in India, which affected 6 million pregnant women. When screened for routinely during pregnancy, GDM, which is typically asymptomatic, is most frequently identified. The International Association of Diabetes and Pregnancy Study Group's (IADPSG) recommendations were put into practice in 2010 and have now attained widespread acceptance. Other research, however, indicates that it might increase the risk of GDM.[7] Every year, GDM affects roughly 5 million women in India. According to the literature, approximately six million babies in India alone are affected by pre-diabetes and diabetes, with GDM accounting for 90% of cases.[8,9]

Impaired fasting glucose (IFT) and/or impaired glucose tolerance (IGT) during pregnancy increase the chance of developing diabetes mellitus as well as unfavorable cardiovascular (CV) events (myocardial infarction, stroke, and CV death) later in life. Subjects with IGT/IFG have the greatest expression of the underlying pathophysiologic abnormalities (insulin resistance and reduced -cell function) that lead to the onset of type 2 diabetes. All of the CV risk factors that put people with type 2 diabetes at high risk for macro and micro vascular complications are present in these people with so-called prediabetes, including dysglycemia, dyslipidemia, hypertension, obesity, physical inactivity, insulin resistance, procoagulant state, endothelial dysfunction, and inflammation.[10]

At the initial antenatal appointment, women at risk of preexisting diabetes should be assessed using the American Diabetes Association's diagnostic criteria for non-pregnant persons. Early screening is recommended if your BMI is 25 kg per m2 or more, and you have another risk factor.[11] The United States Preventive Services Task Force amended its 2008 statement in 2014, recommending that asymptomatic pregnant women be tested for GDM after 24 weeks of pregnancy. Most physicians in the US use a two-step approach, first with a 50-g non-fasting oral glucose challenge test at 24 to 28 weeks and subsequently a 100-g fasting test for women who have a positive screening result.[12] Instead, doctors use the Diabetes in Pregnancy Study Group India (DIPSI) approach and conduct just a 75-g, two-hour fasting oral glucose tolerance test.[13–15] The DIPSI method of antenatal GDM screening has proven to be simple, affordable, simple to use, patient-friendly, and convenient. The results of DIPSI exhibit great specificity and acceptable sensitivity when measured against the gold standard of the International Association of Diabetes and Pregnancy Study Group (IADPSG).[16] This study was conducted to evaluate the maternal and perinatal outcome in GDM, impaired glucose tolerance and normal glucose tolerance with DIPSI criteria.

2. Materials and Methods

2.1. Participates

The prospective observational study, which was carried out from April 2020 to September 2021 in the department of Obstetrics and gynecology at Stanley Medical College Hospital in Chennai, Tamil Nadu, India, was authorised by the hospital's institutional ethical council.

2.2. Inclusion criteria

All antenatal patients from first trimester of pregnancy, Singleton pregnancy.

2.3. Exclusion criteria

Pre gestational diabetes mellitus, Patients was lost follow up for DIPSI test during second trimester, Antenatal patients was on long term steroids for medical disorder.

2.4. Methods

Oral and written agreement was obtained, and the patients were chosen in accordance with the inclusion criteria, which called for prenatal patients in the first trimester who were free of diabetes mellitus. 'DIPSI' performed the screening One-step, single-glycemic-value procedures are a modified version of WHO guidelines. No matter how she is feeding or when her last meal was, a pregnant woman in the antenatal clinic receives a 75gm oral glucose load following a preliminary clinical examination. To estimate plasma glucose, a venous blood sample is taken at the 2-hour mark. According to blood sugar value we categories into three groups. GDM is diagnosed if 2 hrs plasma glucose value greater than or equal to 140mg/dl. Impaired gestational glucose tolerance if blood sugar value between 121 to 139 mg/dl. Normal group if blood sugar less than or equal to 120 mg/dl. Normal glucose tolerance pregnant mothers during first trimester GTT was submitted for Glucose Tolerance Test as per the DIPSI protocol during second trimester and classified according to the second hour post glucose blood sugar value as per standard of care. Those who have Normal glucose tolerance during second trimester submitted again for Glucose Tolerance Test as per the DIPSI protocol during third trimester and classified according to the second hour post glucose blood sugar value as per standard of care. Follow up all these groups up to 6wks postpartum to see maternal & perinatal outcome.

2.5. Statistical analysis

The independent t-test, Analysis of variance (ANOVA), and Turkey's multiple comparison tests were used in the statistical analysis of the data using SPSS software version 21.0. Statistical significance was defined as a probability level of 0.05 (p 0.05).

3. Results

The Parity (Primi and Multi) and blood glucose level were calculated for this study. The comparison between Parity vs blood glucose level are shown in Figure 1. In this study, there was no major difference was observed between blood glucose level vs Parity primi and multi Parity. Probability value were calculated; p-value is 0.466 > 0.05 statistically not significant.

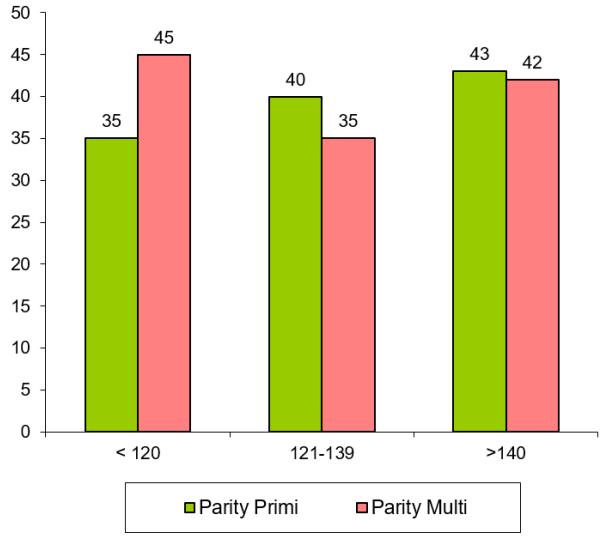

Figure 1: Comparison between Parity vs blood glucose level

The high risk factors and blood glucose level were calculated and given. The comparison between risk factors and blood glucose level are graphically represented Figure 2 clearly showing, there is major difference were observed between risk factors and blood glucose level.

The mode of delivery and blood glucose level were calculated and graphically represented in Figure 3. The NVD patients having higher blood glucose level followed by LSCS patients. Similarly, stillborn, vacuum, outlet, expulsion and IUD patients having very low blood glucose level. The probability value was calculated; p-value is 0.205 > 0.05 statistically not significant.

Mean birth weight and blood glucose level were calculated and graphically represented in Figure 4. The blood glucose level 121-139 having high mean birth weight followed by >140; similarly, blood glucose level < 121 having low mean birth weight.

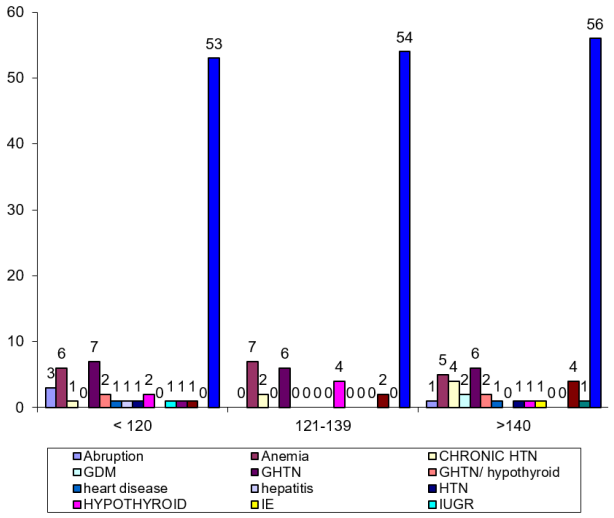

Figure 2: Comparison between blood glucose level vs high risk

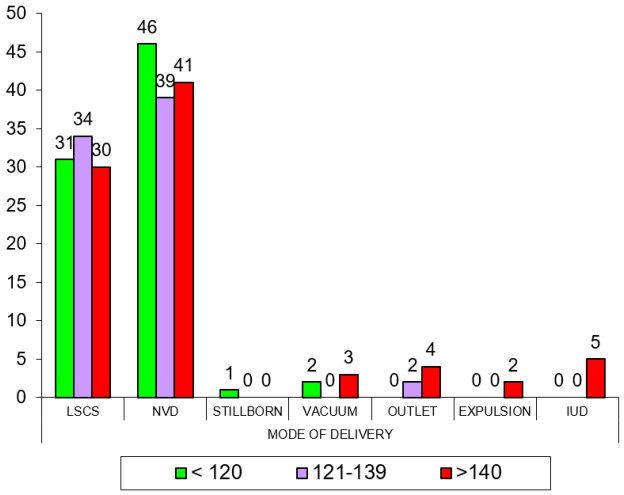

Figure 3: Comparison between blood glucose level vs mode of delivery

The mean OGTT/F wt and their standard deviation were calculated and graphically represented in Figure 5. No major difference was found in this study (almost equal). Probability values were calculated; p-value is 0.479 statistically not significant.

The PPH, PP fever, Macrosomia, Shoulder dystocia, anomalies, RDS and Neonatal Hypoglycemia were calculated in this study and graphically represented in Figure 6. Comparisons graph clearly showing the variation about the blood glucose level.

4. Discussion

In this study, pregnant women who met the "DIPSI" criteria for impaired glucose tolerance, normal glucose

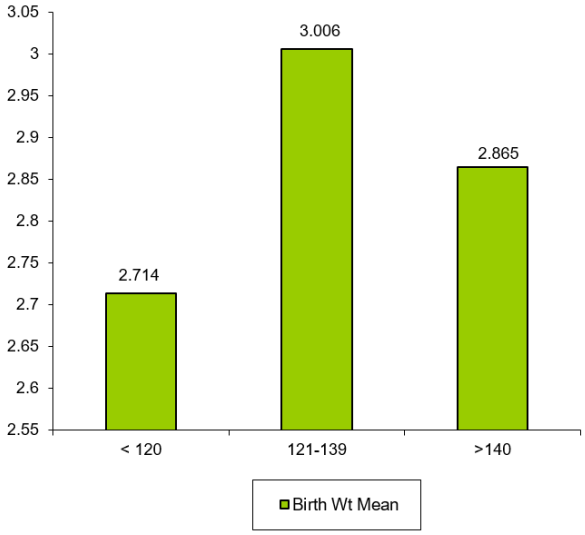

Figure 4: Comparison of Mean Birth Weight vs blood glucose level

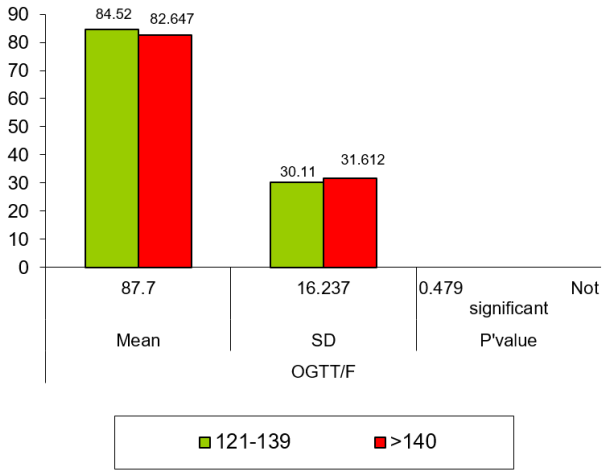

Figure 5: Comparison between OGTT/F wt vs blood glucose leve

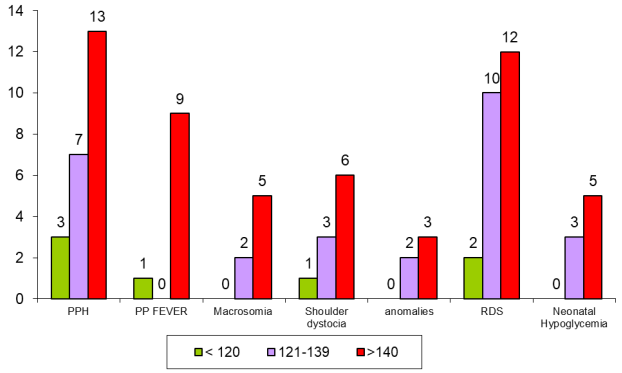

Figure 6: Comparisons between PPH, PP fever, Macrosomia, shoulder dystocia, anomalies, RDS and Neonatal Hypoglycemia vs blood glucose level

tolerance, and gestational diabetes mellitus were compared for their maternal and perinatal outcomes. Comparison between normal (< 120), Impaired (121-139) and GDM (>14); huge amount of patients having GDM (>140). Comparison between both age groups; 26-30 age group patients having high blood glucose level of 12% (GDM) and 18% (IGT),18% (NGT). So from this study age group from 26 -30 IGT patients. Similar to this, a study by Rajput R et al.[16] revealed that the prevalence rate was higher in women aged 26-30 and >30 year (11.57% and 34.8%, respectively) compared to women aged 16-20 and 21-25 year (4.54% and 4.53%, respectively).

The gestational age greater than 35 having high amount of blood glucose level -29% (IGT), 32% (GDM), 31% (NGT); similarly, gestational age below 25 having very low amount of blood glucose level (3%). In this study gestational age >35 have more incidence of GDM. In this study, there was no major difference was observed between blood glucose level vs Parity primi and multi Parity. There is no major difference were observed between risk factors and blood glucose level. In this study, the incidence of caesarean section was higher when compared to labour natural. On comparison of blood glucose level and mode of delivery, the NVD patients having higher blood glucose level followed by LSCS patients. In this study in NVD 17% were GDM and 16% were IGT, 19% were NGT whereas in LSCS 12% were GDM and 14% IGT, 12% in NGT. Mutummatou Leidi et al.[17] studied that caesarean section rates were higher in women with GDM (52%).

In this study both GDM and IGT baby have birth weight of 2.5 to 3.5 kg of about 22% and this states that IGT mothers should also have close monitoring and The blood glucose level 121-139 having high mean birth weight followed by >140; similarly, blood glucose level < 121 having low mean birth weight. Out of 240 cases, 0.2% of GDM were macrosomic and in IGT 0.085 were macrosomic. According to Hansen et al. (2014),[18] the proportion of newborns that were large for gestational age (LGA), which is defined as birth weight >2 SDs above the mean for gestation and sex, was strongly and independently correlated with IGT during pregnancy.

According to a study by Ameya R et al.[19] on the feto maternal outcomes in GDM, 26% of GDM mothers developed preclampsia, which complicated pregnancy. 6% of the GDM participants in this study also stated that their condition had complicated pregnancy. Moms with gestational diabetes mellitus had a four times greater chance of developing hypertension (GDM). In a research conducted at Milango Hospital in Europe, close to 50% of pregnant women with gestational diabetes had a body mass index of greater than 30. This study confirms past findings from other

studies that obese women are more likely to experience gestational diabetes mellitus during pregnancy. In this study macrosomia occurs 0.08% in IGT and 0.2% in GDM, shoulder dystocia occurs 0.12% in IGT and 0.25% in GDM, Respiratory distress occurs 0.4% in IGT and 0.5% in GDM.

5. Conclusion

This investigation looked at how patients with GDM, impaired glucose tolerance, and normal glucose tolerance fared during pregnancy. According to the results of this study, GDM is linked to harmful consequences that might affect both the mother and the foetus. The short- and long-term consequences in both the mother and the newborn can be greatly reduced with early detection and timely therapy of this illness. In this study, birth weights ranging from 2.5 to 3.5 kg were the same for GDM and IGT moms. IGT mothers should also be followed up on, and we should be more watchful at birth, even though we monitor GDM mothers. The thyroid function of the developing foetus may be suppressed by maternal hyperglycemia, even in milder forms of glucose intolerance. Both of these variables may increase the likelihood that foetal anthropometry will change and result in a large infant. In order to develop prompt management methods, it is advised to assess the thyroid function of the mother and the developing baby. The patient should receive appropriate counselling about having her blood sugars checked during the postpartum period after she is discharged from hospital.

6. Source of Funding

None.

7. Conflict of Interest

The authors declare no conflict of interest.

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