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ORIGINAL RESEARCH

A study to determine the efficacy of fasting blood sugar and glycated haemoglobin in predicting gestational diabetes mellitus at NRCH, New Delhi

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INTRODUCTION

Gestational diabetes mellitus (GDM) is generally defined as a carbohydrate intolerance that results in hyperglycaemia of variable severity which has its onset or diagnosis during pregnancy.Studies have shown that unmanaged GDM was associated with a higher incidence of polyhydramnios, preterm birth, stillbirth, fetal macrosomia, fetal hypoglycaemia, and metabolic abnormalities. Furthermore, it has also been observed that patients suffering from GDM were ata higher risk of developing type II diabetes and cardiovascular diseases later in their life. While the exact pathophysiology of the development of GDM is still being debated, the current consensus is that the condition is related to **a)**dysfunction or delayed response of pancreatic beta-cells to the glycaemic levels, and **b)** marked insulin resistance which is secondary to Human placental lactogen release.

Early screening of gestational diabetes mellitus has been recommended by most of the GDMmanagement guidelines worldwide, including those utilized in India.It has been seen that early screening and identification of GDM among pregnant mothers was associated with a significant reduction in the incidence of several maternal and fetal complications. The most utilized andwell-established screening test for this purpose is the oral glucose tolerance test (OGTT).However, the OGTT test has several demerits and FBS and Hba1c estimations are simpler intestingand haveshown potential as apossible screeningtool in thediagnosis of GDM.

AIMS AND OBJECTIVES

Aim

The aim of the present study was "To determine the efficacy of fasting blood Sugar and glycated haemoglobin in predicting gestational diabetes mellitus".

Primary objective

The primary objective of the present study was to study the predictive value of HbA1c and FBS indiagnosing GDM vis-a-vis with OGTT done between24-28weeks.

Secondary objective

The secondary objective was to determine the prevalence of GDM among the study group.

MATERIALS AND METHODS

The present study was carried out in the Department of Obstetrics and Gynaecology ofNorthern Railways Central Hospital, a tertiary care teaching institute of Delhi, India overa period of 6 months, from Nov 2022 to April 2023. The study was a hospital-based prospective study with an observational descriptive design, conducted among pregnantwomen <28 weeks of gestation. A consecutive sampling technique was utilised to select 80 women, who underwent an interview using a pre-designed, pre-tested, researcher-administered proforma.

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Inclusion Criteria

a. Antenatal mother aged ≥18years presenting to the study institution with singleton pregnancy
b. Antenatal Mothers with gestational age<28 weeks
c. Antenatal Mothers with spontaneous conception and blood pressure of<140/90mmHg during their first visit to the institution.

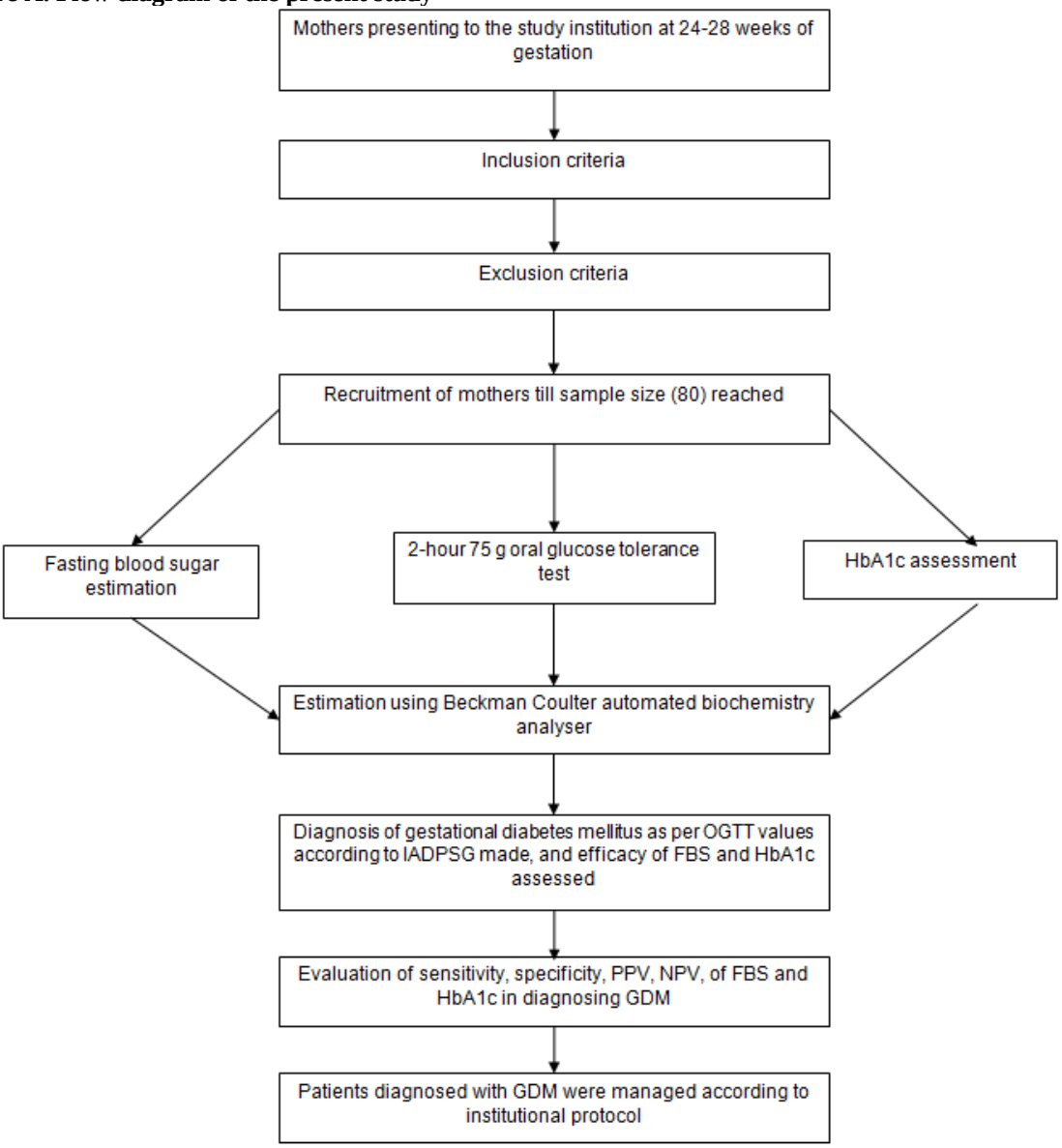
Exclusion criteria

a. Antenatal Mothers who were unwilling to provide written informed consent for the study.
b. Antenatal Mothers with current overt diabetes
c. Antenatal Mothers with multiplegestations,hypertension,on drugs such as anti-retroviral therapy
d. ART conception
e. Antenatal mother with metabolic abnormalities
f. Antenatal mother with a history of tobacco or alcohol consumption
g. Antenatal mother with haematological conditions such as anaemia Or hemoglobinopathies which affect HbA1c measurement.

METHODOLOGY

The study was conducted after receiving written informed consent from all of the patients and after ethical clearance.All antenatal mothers underwent estimation of fasting blood sugar at 1st antenatal visit and OGTT and HbA1c between(24-28weeks) gestation using Beckman Coulter automated biochemistry analyser. After 1 and 2 hours of ingestion of glucose, 2 ml venous blood was drawn and plasma glucose level was estimated using BECKMANCOULTER fully automated random access biochemistry analyser using reagent and diluent.Each of the patients also underwent HbA1c assay during this time using the Beckman Coulter fully automated random access biochemistry analyser using 2 ml of venous blood obtained from the patient.

Figure A. Flow diagram of the present study



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STATISTICAL ANALYSIS

All the data were entered into Microsoft excel data sheet and were analysed using IBM SPSS version 25. Data were expressed as mean ± SD or percentage. Appropriate statistical tests wereperformed to assess differences between the groups. Chi-square test was performed for categorical data, and t-test was used for continuous data. A p-value of < 0.05 was considered statistically significant. To predict cut off values, a receiver operating characteristics curve analysis (ROC) was performed.

RESULT

It was observed that the incidence of GDM was significantly associated with older age and higher socio-economic status. Regarding the risk factors, it was seen that a positive history of previous abortion, Intrauterine fetal death /stillbirth/neonatal death, GDM in a previous pregnancy, and positive family history of Type II diabetes mellitus in both the parent's side were significantly associated with GDM in the women. It was seen that the fasting blood sugar levels as well as HbA1c were significantly higher in the GDM group of participants as compared to the non-GDM participants during measurements. ROC curve analyses showed that at a cut-off value of 81.5, FBS at first visit had a sensitivity of 92.9% and a specificity of 56.1%; at a cut-off value of 83.5, FBS at 24-28 weeks of gestational age had a sensitivity of 85.7% and a specificity of 60.6%; and at a cut-off value of 5.7, HbA1c at 24-28 weeks of gestational age had a sensitivity of 100% and a specificity of 93.9% in predicting gestational diabetes mellitus (AUC 0.997). Prevalence of GDM in study population was 17.5 percent.

CONCLUSIONS

All Antenatal mother with HBA1C value <5.7% were non -diabetic as per OGTT criteria. Cut -off<5.7% rules out GDM, which constitutes 77.5%of study population.HBA1c >5.7% were seen among 22.5%of study population, among them 17.5% were GDM and 5% were non GDM as per OGTT criteria. So among 5% of cases HBA1C cutoff didn't match with OGTT and among them HBA1C were between 5.7-5.8.Among 95%of study population HBA1c cut off were matching with OGTT criteria. Among 77.5%of study population HBA1c had 100%negative predictive value, so in these patients HBA1c can be utilised as screening tool and cumbersome OGTT can be avoided .Since the study was done on small population so larger study population is required to consider it as diagnostic test andto replace OGTT.

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