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A Study Of Hba1c Estimation In 1st Trimester And Its Relationship With The Risk For Gestational Diabetes Mellitus

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Abstract

Gestational diabetes, often referred to as GDM, is a prevalent pregnancy complication that is linked to detrimental consequences for both the mother and the baby. Specifically, mothers with GDM face an elevated risk of developing type 2 diabetes and cardiovascular diseases later in life, while their offspring are at an increased risk of macrosomia and obesity. Nearly 90% of pregnant women in Diabetes Mellitus are diagnosed with GDM. The prevalence of GDM varies in different regions based on factors such as ethnicity, race, and lifestyle. In India, the prevalence of GDM ranges from 3.8% to 20%. The use of glycosylated haemoglobin (HbA1c) is primarily intended for diagnosing and managing type 2 diabetes mellitus. Compared to FBS and PP tests, HbA1c measures the average glucose concentration from the previous two to three months. This test does not require fasting and has lower intra-individual variability, making it a more suitable option for patients.

Keywords

Gestational Diabetes; Lifestyle disorder; Pregnancy; HbA1c

Introduction

Gestational diabetes, often referred to as GDM, is a prevalent pregnancy complication that is linked to detrimental consequences for both the mother and the baby. Specifically, mothers with GDM face an elevated risk of developing type 2 diabetes and cardiovascular diseases later in life, while their offspring are at an increased risk of macrosomia and obesity. [1,2,3]

Nearly 90% of pregnant women in Diabetes Mellitus are diagnosed with GDM. The prevalence of GDM varies in different regions based on factors such as ethnicity, race, and lifestyle. In India, the prevalence of GDM ranges from 3.8% to 20%. It is more common in urban areas compared to rural areas. Given the significant impact of diabetes during pregnancy on future generations and the increasing ability to prevent or delay diabetes after GDM, the public health importance of diabetes in pregnancy has been emphasized. GDM occurs when the woman's beta cell function cannot overcome the negative effects of the anti-insulin hormones of pregnancy and the increased

energy needs of the growing fetus.[4,5,6]

According to recent research, fetal overgrowth associated with gestational diabetes mellitus (GDM) begins early in pregnancy, prior to the diagnosis of GDM, highlighting the importance of identifying cases of glucose intolerance earlier on. Measuring glycated hemoglobin, or HbA1c, which act as a sign of blood glucose control over the previous 3-4 months, may be a means of identifying women at risk for GDM sooner. As reported by Seshiah et al, 1st trimester HbA1c levels between 5.3% and 6% are linked with a higher likelihood of developing GDM, while levels above 6.5% indicate overt diabetes. Thus, the pregestational diabetes in pregnancy could be detected early and treated.[7]

The oral glucose tolerance test (OGTT) is commonly used to diagnose gestational diabetes mellitus (GDM) in pregnant women. Despite its widespread use, the OGTT has several limitations. Firstly, it requires the patient to fast for at least eight hours before the test, which can be challenging for some individuals. Secondly, the test involves obtaining at least two blood samples, which can be uncomfortable and may cause discomfort. Additionally, some patients may experience vomiting during the test, which can affect the accuracy of the results. Finally, the test is known to have high variability, which can lead to false positives or false negatives. As a result, approximately 10% of pregnant women are unable to complete the OGTT process. The use of glycosylated hemoglobin (HbA1c) is primarily intended for diagnosing and managing type 2 diabetes mellitus. Compared to FBS and OGTT tests, HbA1c measures the average glucose concentration from the previous two to three months. This test does not require fasting and has lower intra-individual variability, making it a more suitable option for patients.[8]

Although HbA1c is presently utilized among women having high-risk during their first prenatal visit to identify those with overt type 2 diabetes, it is not employed to screen for gestational diabetes mellitus (GDM). Therefore, screening for GDM is of greater importance during the first trimester to reduce maternal and fetal morbidity and mortality.

Gestational diabetes mellitus (GDM) can lead to significant obstetric complications that affect both the mother and her baby. For instance, it increases the risk of preeclampsia and the need for a cesarean section, and can result in fetal growth abnormalities, macrosomia, prematurity, neonatal hypoglycemia, and even mother and foetal complications. These are some common examples of the potential consequences of GDM.[9]

MATERIALS & METHODS

This was prospective Cohort Study conducted over the duration of 2 year. Estimated sample size was calculated as 140 pregnant women using stratified sampling technique. Pregnant women of gestational age 8-13 weeks attending antenatal clinics, women aged > 18 years, women with singleton pregnancy and women previously undiagnosed with diabetes, in present pregnancy or previous pregnancy were included in the study. Women diagnosed with diabetes in present or previous pregnancy, women suffering from any comorbid conditions such as PIH, Thyroid & Heart dysfunction, women with multiple gestations and women with Hb < 8 gm/dl were excluded from the study. Data collection was done using the pre structured proforma. Informed consent was taken from all patients. Data analysis was done using SPSS (statistical package for social studies) software and appropriate statistical test was use. P value < 0.05 was used as the level of significance.

OBJECTIVES:

- To profile the physiological variation in HbA1C across gestation and examine for the difference in women with and without GDM.
- To prospectively evaluate the association between HbA1C levels measured in the 1st trimester and subsequent risk of GDM diagnosis.

Result:

Table 1: Age profile of the study participants

Age group	Frequency	Percent
19-22 years	34	24.3
23- 26 years	59	42.1
27- 32 years	47	33.6
Total	140	100.0

Figure 1: Age profile of the study participants

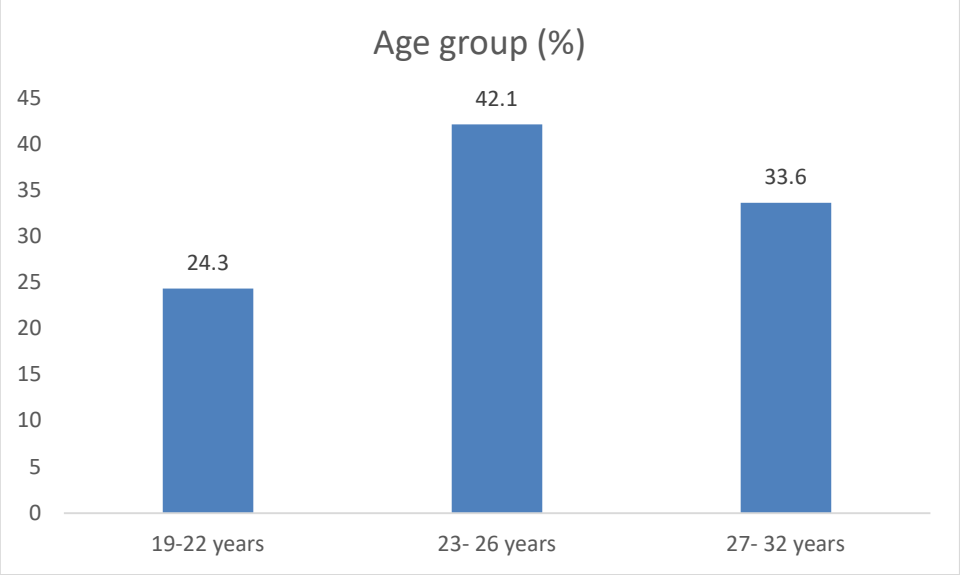

Table 1 and figure 1 shows age profile of the study participants. Result shows that 42.1% of the study participants were in the age group of 23-26 years, followed by 33.6% were in 27-32 years of age and 24.3% were in 19-22 years.

Table 2: Group profile of the study profile

Groups	Frequency	Percent
High risk group	73	52.1
Low risk group	67	47.9
Total	140	100.0

Figure 2: Group profile of the study profile

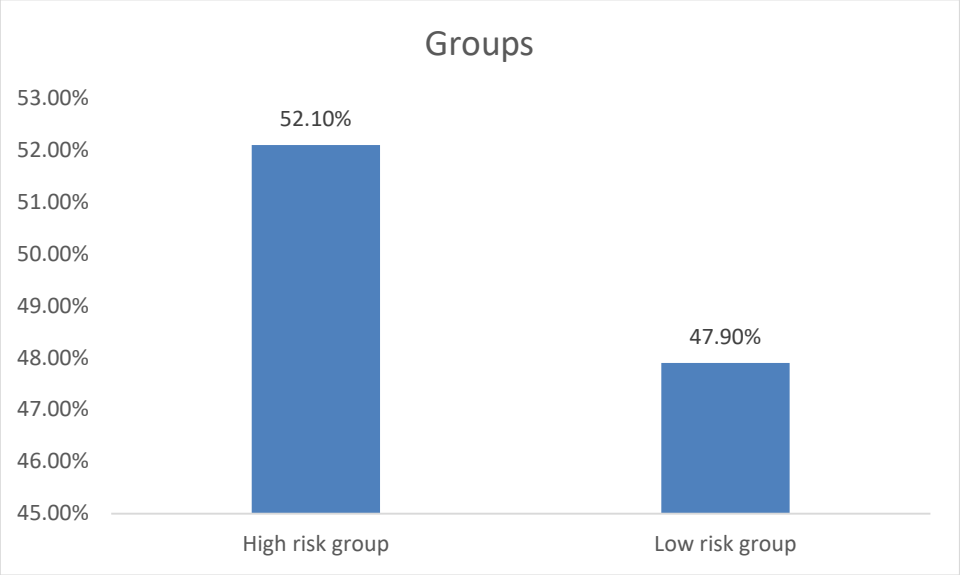

Table 2 and figure 2 shows group profile of the study profile. Result shows that high risk group had 51.1% of the study participants and low risk group had 47.9% of the study participants.

Table 3: Hba1c use among the study groups

Hba1c	High risk group	Low risk group	Total	P value
Normal	61 83.6%	53 79.1%	114 81.4%	0.282
5.7-6% (Pre gestational diabetic)	10 13.7%	8 11.9%	18 12.9%	
>6.5% (Diabetic)	2 2.7%	6 9.0%	8 5.7%	
Total	73 100.0%	67 100.0%	140 100.0%	

Figure 3: Hba1c use among the study groups

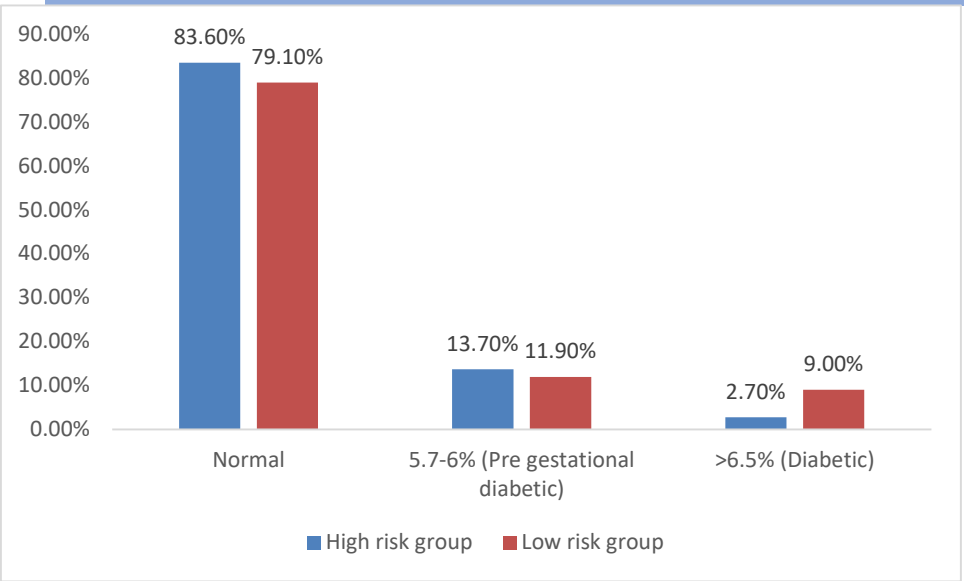

Table 3 and Figure 3 shows Hba1c use among the study groups. Result shows that in high risk group 13.7% were pre-gestational diabetic and 2.7% were diabetic . In low risk group 11.9 % were pre-gestational diabetic and 9.7% were diabetic. There was no statistically significant difference across two group (p value = 0.28).

Discussion

Present study was conducted to predict early risk for GDM during 1st trimester of pregnancy which may offer a unique opportunity for earlier interventions. Our study was conducted over 2 years among 140 pregnant women. Result shows that 42.1% of the study participants were in the age group of 23-26 years, followed by 33.6% were in 27-32 years of age and 24.3% were in 19-22 years. Mean age of the study participant in low risk group was 23.85±2.6 years and in high risk group mean age of the study participant was 25.68± 3.04 years. In a study conducted by Valadan M et al[10], result showed that women with GDM had significantly older age compared to the non-GDM pregnant women. Similarly Punnose J et al[11] found that age was significantly higher in the GDM group. In a study conducted by Rupala T etal[12], mean age of participants in our study was 32.9±4.5 years.

Association between FBS in 2nd trimester and Hba1c in high risk group and low risk group. Result shows that in low risk group study participants who had FBS within 95mg/dl, 12% of the study participants had hba1c within 5.7-6% and 9% had hba1c >6.5%. In high risk group study participants who had FBS within 95mg/dl, 13.7% of the study participants had hba1c within 5.7-6% and 2.7% had hba1c >6.5%.

According to the subgroup analysis of all studies, LGA, pre-eclampsia, and labour induction were associated with elevated HbA1c levels only in studies using an HbA1c threshold >39 mmol/mol (5.7%). The association between HbA1c levels and premature birth was statistically significant in studies using both higher and lower HbA1c thresholds. In a study conducted by Tripathy S etal[13], suggested that measurement of HbA1c can be used as a screening tool for GDM.

Association between PP in 2nd trimester and Hba1c in high risk group and low risk group. Result shows that in low risk group study participants who had PP within 120 mg/dl, 12.9% of the study participants had hba1c within 5.7-6% and 9% had hba1c >6.5%. In high risk group study participants who had PP within 120 mg/dl, 13.7% of the study participants had hba1c within 5.7-6% and 2.7% had hba1c >6.5%.

Summary

This prospective Cohort study was conducted to predict early risk for GDM during 1st trimester of pregnancy which may

offer a unique opportunity for earlier interventions. Study was conducted among 140 pregnant women over the study duration of 2 years.

- In our study 42.1% of the study participants were in the age group of 23-26 years, followed by 33.6% were in 27-32 years of age and 24.3% were in 19-22 years.
- Result shows that high risk group had 51.1% of the study participants and low risk group had 47.9% of the study participants.
- Result shows that in low risk group study participants who had FBS within 95mg/dl, 12% of the study participants had hba1c within 5.7-6% and 9% had hba1c >6.5%.
- In high risk group study participants who had FBS within 95mg/dl, 13.7% of the study participants had hba1c within 5.7-6% and 2.7% had hba1c >6.5%.
- Result shows that in low risk group study participants who had PP within 120 mg/dl, 12.9% of the study participants had hba1c within 5.7-6% and 9% had hba1c >6.5%. In high risk group study participants who had PP within 120 mg/dl, 13.7% of the study participants had hba1c within 5.7-6% and 2.7% had hba1c >6.5%.

CONCLUSION:

In summary, our extensive findings indicate that measuring HbA1c in the first trimester of pregnancy could have significant clinical value, even for low-risk women.

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