

**Full Length Research Paper**

# Evaluating High HbA1c Level as an Optimal Detector of Diabetes and as a Predictor of Adverse Pregnancy Outcome

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**Article history**

Received: 25-07-2017

Revised: 05-08-2017

Accepted: 10-08-2017

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**Abstract**

Gestational diabetes mellitus (GDM) is an impaired glucose tolerance with onset or first recognition during pregnancy. Women with GDM are at high risk for pregnancy and delivery complications including infant macrosomia, neonatal hypoglycemia, pre-eclampsia, preterm labor and cesarean delivery. The objective of this study was to evaluate high HbA1c Level as ad detector of Diabetes. 100 women were offered an HbA1c with their first antenatal bloods. HbA1c test results are confirmed by OGTT. Assessment of pregnancy outcome was done and reported. HBA1c was measured in first trimester(6-6.4%) then confirmed by OGTT and it show high statistically significant difference with mean HbA1C  $6.14\% \pm 0.13$  in women who develop GDM. there was high statistically significant difference between mean women with an HbA1c value have higher risk subgroup of women with GDM and these women had significantly increased risk of adverse pregnancy outcome.

**Key words:** DM, HbA1c, GTT, pregnancy outcome.

**Introduction**

Diabetes is a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both. The chronic hyperglycemia of diabetes is associated with long-term damage, dysfunction, and failure of different organs, especially the eyes, kidneys, nerves, heart, and blood vessels (ADA 2014). Diabetes in pregnancy is becoming an increasingly growing concern as the prevalence of diabetes continues to rise. Women with diabetes who become pregnant have an increased risk of pregnancy complications, including serious perinatal outcomes such as stillbirth, perinatal mortality, and major congenital malformations (Feig DS et al 2014).

The current recommendations from the American Diabetes Association are to conduct a risk assessment for all pregnant women at the first prenatal visit. Women who are at very high risk should undergo testing as soon as possible (ADA 2013). To improve the adverse pregnancy outcomes in pregnant women with DM, to strictly control the blood glucose is necessary. Measurement of blood glucose may not actually reflect the mean blood glucose. Thus, HbA1c as an important parameter in the detection of blood glucose is appropriate to serve as an adjunctive parameter reflecting the blood glucose in pregnancy (Haiyan YU et al 2014).

**Materials and methods**

*Patients and methods:*

The present prospective cohort study was conducted on 100 women coming for their first antenatal visit at Damietta specialized hospital during the period from first of January 2016 to last of December 2016. All Cases are suffering from secondary infertility were enrolled in this study including complications of operation. Also, time of fertility, postoperative contraceptive methods and previous fertility investigations. All patient are subjected to, detailed history including personal history: age, parity, duration of marriage, frequency of intercourse/week, menstrual history. Complete clinical examination: included general and full gynecological examination. Investigations: Semen analysis for exclusion of male factor, hormonal profile, Pelvic ultrasound and diagnostic laparoscopy.

Statistical analysis was performed by using statistical software SPSS version "21" categorical variations were compared using mean, standard deviation (SD) and student t-test. Statistical significance was defined as P value < 0.05. Random blood glucose level assay, HbA1c level assay. Adverse fetal outcome: Still birth, congenital malformations ,birth injury, macrosomia and perinatal mortality.

**Results**

The present study was prospective study included 100 pregnant women attended Damietta specialized hospital; 8 of them missed (not came again for measurement of OGTT) and 92 of them continued in this study.

**Table 1:** OGTT of the study group.

OGTTF	92	75 – 100	91.83 ± 6.96
OGTThr1	92	159 – 196	181.35 ± 10.65
OGTThr2	92	129 – 164	151.61 ± 10.18

In the present work, the mean of HbA1c in negative GDM was  $6.1 \pm 0.13$  and in positive  $6.17 \pm 0.12$  with statistical significant difference (table 1).

**Table 2:** Relation between HbA1c and past history of GDM

HbA1c	History GDM		t	P
	Negative(N=69)	GDM(N=28)		
	$6.1 \pm 0.13$	$6.17 \pm 0.12$	2.386	0.019*

\* Significant  $P < 0.05$

In the present work, the mean of HbA1c in patient with GDM was  $6.03 \pm 0.11$  and in positive  $6.14 \pm 0.13$  with statistical significant difference (table2). In the present work, the mean of HbA1c in patient treated with insulin was  $6.17 \pm 0.14$  and treated with diet was  $6.08 \pm 0.1$  with statistical significant difference (table3).

**Table3:** Relation between HbA1c and management of GDM

HbA1c	Management of GDM		t	P
	insulin (N=50)	diet (N=26)		
	$6.17 \pm 0.14$	$6.08 \pm 0.1$	3.487	0.001*

\* Significant  $P < 0.05$

In the present work, the mean of HbA1c in patient with normal delivery was  $6.08 \pm 0.13$  and with cesarean section was  $6.13 \pm 0.14$  with non-statistical significant difference, no instrumental delivery was done (table3).

## Discussion

Gestational diabetes mellitus (GDM) is associated with an increased risk of complications for both mother and baby during pregnancy as well as in the postpartum period. Screening and identifying these high-risk women is important to improve short- and long-term maternal and fetal outcomes. However, there is a lack of international uniformity in the approach to the screening and diagnosis of GDM (Yashdeep Gupta et al 2015). Hughes RC et al (2014) report in a similar study that there is high statistically significant difference between HbA1c and age, BMI. This result agrees with Rowan JA et al. (2015) who reported that there is significant difference between mean HbA1c, higher BMI and smoking, Renz PB et al (2015) also reported that there is significant difference according to age, BMI, history of GDM. On the other side Amylidi S et al (2015) found that there is no significant difference in BMI between women who developed GDM and who did not develop. It may be due to average BMI in both groups ( $25.3 \pm 4.56$ ,  $23.1 \pm 4.96$ ). In the current study, HbA1c test results confirmed by OGTT (based on the ADA criteria (75 gm, 2hrs or one step strategy) and it show high statistically significant difference with mean HbA1c  $6.14 \pm 0.13$  in women who develop GDM and mean HbA1c  $6.03 \pm 0.11$  in women who did not develop GDM. A ROC analysis found that cutoff point was HbA1c value of 6.05%, this cutoff point presented sensitivity and specificity rates of 88.2% and 83.3%, positive predictive value and negative predictive value of 92.8% and 71.4%, accuracy of the test was 87%. Hughes RC et al (2014) ROC analysis show that HbA1c  $\geq 5.9\%$  had sensitivity and specificity of 100% and 97.4%, with positive predictive value and negative predictive value of 18.8% and 100%. Hughes RC et al (2014) found that early pregnancy HbA1c measurement of 5.9-6.4% was associated with an increased risk of adverse pregnancy outcomes, including major congenital anomalies, pre-eclampsia, preterm labor, macrosomia, shoulder dystocia and perinatal death. Amylidi S et al (2015) show statistically significant difference between HbA1c and birth weight of fetus, but it shows no difference with hypertensive complication of pregnancy which may be due to low BMI in the study cases ( $25.3 \pm 4.56$ ).

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