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# **Original Research**

### Assessment of glycated hemoglobin and its correlation with the pregnancy outcome

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#### ABSTRACT:

Background: Pregnancy is a period where there will be considerable modifications in the maternal metabolism to adapt for the physical, structural, hormonal and psychological adjustments in the process of welcoming a new guest. The present study was conducted to assess HbA1c value after 24 weeks of pregnancy and its correlation with the pregnancy outcome. Materials & Methods: 85 antenatal mothers between the age group of 18 - 35 years and with gestational period more than or equal to 24 weeks were included. Parameters such as type of delivery, gestational age at the time of delivery, newborn plasma glucose levels estimated. Results: Age group 18-25 years had 40 and 26-35 years had 45 patients. The mean HbA1c was 5.26, term was 70 and pre- term cases were 14, birth weight <2.5 kg was seen in 12 and above 2.5 kg in 72 and newborn glycaemic status was 56.2 mg/dl. The difference was significant (P < 0.05). Conclusion: There was no significant association between the maternal HbA1c levels in non- diabetic mothers and the adverse pregnancy outcome. Key words: Diabetes, Glycaemic status, Pregnancy

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#### **INTRODUCTION**

Pregnancy is a period where there will be considerable modifications the in maternal metabolism to adapt for the physical, structural, hormonal and psychological adjustments in the process of welcoming a new guest.<sup>1</sup> As there is a continuous rise in post-prandial blood sugars during the whole pregnancy and in late pregnancy there will be increased insulin response, normal pregnancy is observed as a diabetogenic state.<sup>2</sup>

GDM usually appears in the second half of pregnancy and it will generally be resolved after delivery. GDM has greater impact on the foetal development and it has got higher risk of the foetus acquiring disorders like diabetes or obesity in the adult life.<sup>3</sup> Likewise, it may lead to adverse outcome in the mother like increased risk of development of gestational hypertension which may lead to pre-eclampsia. GDM itself, along with other associated conditions, is one of the most common causes of operative interventions. In India the rate of prevalence of GDM is reported to be ranging between 3.8% and 41%.<sup>4</sup>

In 2008, the international prospective hyperglycemia and adverse pregnancy outcomes (HAPO) study group demonstrated a continuous association between maternal hyperglycaemia and risk of adverse pregnancy outcomes, as birth weight greater than the 90th percentile, caesarean section, premature birth, birth injury, and preeclampsia.<sup>5</sup> Based on these findings and earlier observational studies, the International Association of Diabetes and Pregnancy Study Group (IADPSG) proposed more stringent diagnostic thresholds for GDM.<sup>6</sup> These new diagnostic criteria (fasting plasma glucose level  $\geq 5.1$ mmol/l and/or 1-h plasma glucose level  $\geq 10.0$  mmol/l and/or 2-h plasma glucose level  $\geq 8.5$  mmol/l) have been adopted by the American Diabetes Association in 2010, the World Health Organization (WHO) in and the International Federation 2013, of Gynaecology and Obstetrics in 2015.<sup>7</sup> The present study was conducted to assess HbA1c value after 24 weeks of pregnancy and its correlation with the pregnancy outcome.

#### **MATERIALS & METHODS**

The present study comprised of 85 antenatal mothers between the age group of 18 - 35 years and with gestational period more than or equal to 24 weeks. All were willing to participate were included in the study after getting proper informed and written consent. All the pregnant women who are obese (with BMI  $\geq$  30), who had history of previous delivery by cesarean section or delivered an anomalous baby were excluded.

Demographic data such as name, age etc. was recorded. General, physical and antenatal

examinations were done. Routine blood investigations and obstetric ultrasonography were done. About five milliliter of blood sample is collected and was given for HbA1c assessment by high performance liquid chromatography which was done on the same day of OGTT. Then the antenatal mothers were followed up till their delivery and parameters such as type of delivery, gestational age at the time of delivery, newborn plasma glucose levels estimated. Results of the study thus obtained was subjected to statistical analysis using Mann Whitney U test. P value less than 0.05 was considered significant.

#### **RESULTS** Table I Age wise distribution

1	-		
	Age group (Years)	Number	P value
	18-25	40	0.90
	26-35	45	

Table I, graph I shows that age group 18-25 years had 40 and 26-35 years had 45 patients.

#### Graph I Age wise distribution



#### **Table II Assessment of parameters**

Parameters	Variables	Mean	P value
HbA1c		5.26	-
Birth	Term	70	0.01
	Pre-term	14	
Birth weight (Kg)	<2.5	12	0.01
	>2.5	72	
Newborn Glycaemic status (mg/dl)		56.2	-

Table II shows that mean HbA1c was 5.26, term was 70 and pre- term cases were 14, birth weight <2.5 kg was seen in 12 and above 2.5 kg in 72 and newborn glycaemic status was 56.2 mg/dl. The difference was significant (P< 0.05).

#### DISCUSSION

For pregnant women with poor diabetic control, the risk for a baby to be born with birth defects is about 6-10%; which is twice the rate when the mother's diabetes is well controlled.<sup>8</sup> Some of the associated

birth defects include spinal cord defects (spina bifida), heart defects, skeletal defects, and defects in the urinary, reproductive, and digestive systems.<sup>9</sup> Also, babies born to women with diabetes have an increased chance of having breathing difficulties, low blood

sugar (hypoglycemia) and jaundice (yellowish skin) at birth.<sup>10</sup> The complications associated with GDM are macrosomia and stillbirth.<sup>2</sup> But both of these complications are preventable as they are related to the degree of maternal glycaemic control. There is also a higher chance of pre-eclampsia (edema), preterm delivery and polyhydramnios. Mothers with GDM are more likely to have large babies with higher birth weight. This increases the number of deliveries by cesarean section rather than vaginal delivery in order to reduce the risk of injury to the mother and baby.<sup>11</sup> But again, the chances of these complications are lower when women have good glycemic control. Another aspect of the outcome of GDM pregnancy relates to the babies born to these women. Although not all babies born to these women will have birth defects, there is a high probability of birth defects, if there has been no control of glucose level during pregnancy. Neonates born to women with gestational diabetes mellitus have a perinatal mortality rate similar to that of the control population, but with an increased rate of macrosomia and morbidity in terms of neonatal asphyxia, birth trauma, hypoglycemia, hypocalcaemia, hyperbilirubinemia and respiratory distress, among others.<sup>12</sup> The present study was conducted to assess HbA1c value after 24 weeks of pregnancy and its correlation with the pregnancy outcome.

In present study, age group 18-25 years had 40 and 26-35 years had 45 patients. Nielsen et al<sup>13</sup> conducted a study to assess the association between firsttrimester HbA1c (A1C) and the risk of adverse pregnancy outcomes in type 1 diabetic pregnancies. Results showed that of 573 pregnancies, 165 (29%) terminated with adverse outcomes. The prevalence of adverse outcomes varied sixfold from 12% (95% CI 7.2-17) in the lowest to 79% (60-91) in the highest quintile of A1C exposure. From A1C levels >7%, we found an almost linear association between A1C and risk of adverse outcome, whereby a 1% increase in A1C corresponded to 5.5% (3.8-7.3) increased risk of adverse outcome. Authors concluded that starting from a first-trimester A1C level slightly <7%, there is a dose-dependent association between A1C and the risk of adverse pregnancy outcome without indication of a plateau, below which the association no longer exits. A1C, however, seems to be of limited value in predicting outcome in the individual pregnancy.

We found that mean HbA1c was 5.26, term was 70 and pre- term cases were 14, birth weight <2.5 kg was seen in 12 and above 2.5 kg in 72 and new born glycaemic status was 56.2 mg/dl. Goedegebure et al<sup>14</sup> conducted a retrospective study involving singleton GDM pregnancies in two regions, between 2011 and 2016. Women were diagnosed according to the WHO-2013 criteria in the Deventer region (WHO-2013cohort) and according to the WHO-1999 criteria in the Groningen region (WHO-1999-cohort). After GDM diagnosis, all women were treated equally based on the national guideline. Maternal characteristics and pregnancy outcomes were compared between the two groups. In total 1386 women with GDM were included in the study. Women in the WHO-2013cohort were older and had a higher pre-gestational body mass index. They were diagnosed earlier (24.9 [IQR 23.3-29.0] versus 27.7 [IQR 25.9-30.7] weeks,  $p = \langle 0.001 \rangle$  and less women were treated with additional insulin therapy (15.6% versus 43. 4%, p = < 0.001). Rate of spontaneous delivery was higher in the WHO-2013-cohort (73.1% versus 67.4%, p = 0.032). The percentage large-for-gestational-age (LGA) neonates (birth weight > 90th percentile, corrected for sex, ethnicity, parity, and gestational age) was lower in the WHO-2013- cohort, but not statistical significant (16.5% versus 18.5%, p = (0.379). There were no differences between the cohorts regarding stillbirth, birth trauma, low Apgar score, and preeclampsia.

Hakeem et al<sup>15</sup> found that the incidence of gestational diabetes mellitus was found to be 8.6% (95% C.I: 8.1, 9.3). There were 511 (74.6%) spontaneous vertex deliveries, and 148 (21.6%) were delivered by lower segment cesarean section. Maternal morbidity in these women was 1.2%. A total of 697 babies were delivered by these 685 women, out of whom 675 were singleton pregnancies, 9 sets of twins and one set of quadruplets. Six-hundred-eighty-seven babies were born alive, 7 babies died in utero and 3 died in the neonatal period. The incidence of neonatal intensive care admission was 4.9%. The mean length of stay in the NICU was 16 days. The commonest cause of neonatal NICU admission was hyperbilirubinemia (41.2%). The risk factors for NICU admission were delivery by non SVD procedure (RR: 4.6, 95% C.I:2.8, 7.7), preterm deliveries, (RR: 4.6, 95%) C.I.:2.7, 7.7), and induction of labor (RR: 2.5, 95% C.I: 1.4, 4.5).

#### CONCLUSION

Authors found that there was no significant association between the maternal HbA1c levels in non-diabetic mothers and the adverse pregnancy outcome.

#### REFERENCES

- 1. Ryan EA, Imes S, Liu D. Defects in insulin secretion and action in women with a history of gestational diabetes. Diabetes. 1995;44:506–12.
- Renz PB, Cavagnolli G, Weinert LS, Silveiro SP, Camargo JL. HbA1c Test as a Tool in the Diagnosis of Gestational Diabetes Mellitus. PLOS ONE. 2015;10(8).
- 3. Aekplakorn W, Tantayotai V, Numsangkul S, Sripho W, Tatsato N, Burapasiriwat T, et al. Detecting Prediabetes and Diabetes: Agreement between Fasting Plasma Glucose and Oral Glucose Tolerance Test in Thai Adults. J Diabetes Res. 2015;2015:1–7.
- 4. American Diabetes Association. Classification and diagnosis of Diabetes. Diabetes Care. 2015;38:8–s16.
- 5. WHO Guidelines Approved by the Guidelines Review Committee. Use of glycated haemoglobin (HbA1c) in the diagnosis of diabetes mellitus: abbreviated report of

a WHO Consultation. Geneva: World Health Organization; 2011.

- Cavagnolli G, Comerlato J, Comerlato C, Renz PB, Gross JL, Camargo JL. HbA1cmeasurement for the diagnosis of diabetes: is it enough? Diabetic Med. 2011;28(1):31–5.
- Kramer CK, Araneta MR, Barrett-Connor E. HbA1c and diabetes diagnosis: The Rancho Bernardo Study. Diabetes Care. 2010;33:101–3.
- Carson AP, Reynolds K, Fonseca VA, Muntner P. Comparison of A1C and Fasting Glucose Criteria to Diagnose Diabetes Among U.S. Adults. Diabetes Care. 2010;33(1):95–7.
- Shobha P, Mathen S, Abraham J. Glycosylated hemoglobin values in nondiabetic pregnant women in the third trimester and adverse fetal outcomes: An observational study. J Fam Med Prim Care. 2016;5(3):646.
- Gunter HH, Ritter C, Reinhardt W, Strahl B, Niesert S, Mitzkat HJ. Influence of non diabetic pregnancy on fructosamine and HbA1c concentration. Z Geburtshilfe Neonatol. 1995;4:199.

- 11. Radder JK, Roosmalen J. HbA1c in healthy, pregnant women . Neth J Med. 2005;63(7):256–9.
- 12. Mañé L, Roux JFL, Benaiges D, Rodríguez M, Marcelo I, Chillarón JJ, et al. Role of first trimester HbA1c as a predictor of adverse obstetric outcomes in a multi-ethnic cohort. J Clin Endocrinol Metab. 2016;102(2):390–7.
- 13. Nielsen GL. HbA1c in Early Diabetic Pregnancy and Pregnancy Outcomes. Diabetes Care 2006 Dec; 29(12): 2612-2616.
- 14. Goedegebure EA, Koning SH, Hoogenberg K, Korteweg FJ, Lutgers HL, Diekman MJ, Stekkinger E, van den Berg PP, Zwart JJ. Pregnancy outcomes in women with gestational diabetes mellitus diagnosed according to the WHO-2013 and WHO-1999 diagnostic criteria: a multicentre retrospective cohort study. BMC pregnancy and childbirth. 2018 Dec;18(1):1-9.
- Al-Hakeem MM. Pregnancy outcome of gestational diabetic mothers: Experience in a tertiary center. Journal of family & community medicine. 2006 May;13(2):55.