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Original Article

HbA_1C Level in Late Trimester with Maternal Outcome in Diabetic Patients

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ABSTRACT

Objective: The present study was undertaken to determine the association of maternal serum HbA_1C level with maternal outcome.

Materials and Methods: It was prospective observational study. The study was carried out in the department of Obstetrics and Gynaecology in BIRDEM Hospital during the period of September 2006 to August 2007. During this study period, 100 pregnant patients with diabetes who attended or admitted at BIRDEM Hospital were studied. Estimation of serum HbA_1C level was done in all patients in each trimester. From each patient 5 cc blood was taken & HbA_1C level was measured with the help of enzymatic method. HbA_1C level < 6 was considered as normal. The maternal complications in antenatal period, in postpartum period, during labour outcome were studied in both cases of controlled & uncontrolled HbA1Clevel.

Result: In this study serum HbA_1C level was found raised in uncontrolled diabetic patients. The incidence of vulvovaginitis, preterm delivery and polyhydramnios were significantly high in 2nd and 3rd trimester in raised HbA_1C level. The rate of normal vaginal delivery was higher inpatient with normal HbA_1C level than uncontrolled HbA_1C level (17.59% V/s 10.84%, p = 0.01), which statistically significant. Postpartum haemorrhage (PPH) was significantly higher in raised HbA1C level than normal (0.00% V/s 22.20%, p=0.01) in NVD and (0.00% V/s 16.22%, p = 0.01) in Caesarean section.

Conclusion: There is increasing evidence that the raised level of maternal serum HbA1Cinantenatal period is associated with maternal & neonatal complications. By investigating HbA1C level in each trimester, blood sugar control can be done. This study was taken out to evaluate the usefulness of HbA1C for good glycaemic control in diabetic pregnancy.

KEYWORDS: Diabetes, HbA_1C, Maternal outcome.

INTRODUCTION

Diabetes Mellitus is an important medical disorder in pregnancy, which creates substantial risk for the mother and fetus during current pregnancy and it also has serious implication for their long time well being[1]. Pregnancy and preconception period are of particular importance to people with diabetes as pregnancy challenges to the metabolic management in diabetes and, at the same time it increases risk of diabetes related complications in mother (e.g. pre eclampsia, infection, postpartum haemorrhage, increase incidence of ceaserian section, traumatic delivery. The discovery of glycosylated Hb has opened new horizon in all aspect of diabetic research and management[2]. HbA is the major component of adult Hb, comprising approximately 90% of Hb. This Hb when combines with glucose becomes glycosylated (HbA_1C). This glycosylated Hb (HbA_1C) are negatively charged and thus migrate quickly than HbA on cation exchange chromatography. Glycosylated HbA_1C is increased in diabetes as a consequence of chronic hyperglycemia[3,4] and co-relate closely with their blood level and urinary excretion of glucose[5,6]. Poor glycemic control is associated with an increased risk of maternal complications, suggesting that strict glycemic control may reduce the rate of maternal morbidity[7]. Glycosylated haemoglobin HbA_1C levels were higher in the spontaneous preterm delivery group.[8]

There is increasing evidence that raised level of maternal serum HbA_1C in antenatal period can cause maternal

complications[9]. HbA_1C proved to be a useful indicator of average long term blood glucose level in diabetic and non-pregnant subjects[10]. Thus by investigation of HbA_1C in each trimester, blood sugar control in each trimester can be done. Thus, adequate screening, strict control of hyperglycaemia and careful planning for pregnant diabetic women ensure a happy outcome. We had undertaken this study to see the maternal outcome in diabetic pregnancy in case of controlled and uncontrolled serum HbA_1C level.

OBJECTIVES

- To evaluate the usefulness of HbA_1C for good glycemic control for diabetes mellitus in pregnancy.
- To measure HbA_1C in the 2nd and 3rd trimester of pregnancy in women with diabetes.
- To assess the pregnancy outcome in women with raised HbA_1C.
- To assess the pregnancy outcome in women with normalHbA_1C.

MATERIALS AND METHODS

It was a prospective observational study carried out from September 2006 to August 2007 in Department of Obstetrics and Gynaecology at Bangladesh Institute of Research and Rehabilitation in Diabetes, Endocrine and Metabolic disorder (BIRDEM). Hundred pregnant women with diabetes who attended or admitted to BIRDEM Hospital during the study period were recruited.

Pregnant women with preexisting diabetes and with gestational diabetes were included in this study. Multiple pregnancies, pregnancy with other metabolic disorders, heart disease and chronic hypertension were excluded from this study. The variables included in the proposed study were age, status of glycemic control, complications in 2nd and 3rd trimester of pregnancy, mode of delivery, intrapartum and postpartum complications. Data collection sheet has formed which include all the variables of interest. Cases were collected from outdoor and in patient department of Obstetrics and Gynaecology, BIRDEM Hospital, Dhaka. Purpose and procedure of the study were discussed with the patients who fulfill the inclusion criteria. All the variables of interest were collected from history; clinical examination and biochemical investigation were recorded on the predesigned data collection sheet. Pregnancy was dated by early ultrasonography. Some patients were managed initially only by dietary advice and some needed injection Insulin also. From each patient 5c.c.blood was taken and HbA_1C was measured by laboratory method. HbA_1C level < 6% was considered as normal. Data were processed by Computer and analyzed by using SPSS (Statistical Package for Social Science). For statistical analysis Student't' test was used. It was considered statistically significant if $p < 0.05$.

Table 1: Age distribution of the study subject.

Age (in years)	Case (n=100)	Percentage (%)
20-25	12	12.00
26-30	48	48.00
31-35	26	26.00
>35	14	14.00

Mean age ±SD = 29.77±4.52

Table 2: Status of Glycemic control in late trimester of pregnancy in respect with HbA_1C level

Controlled HbA_1C level (n = 100)		Uncontrolled HbA_1C	
No.	**(%)**	**No.**	**(%)**
17	17.00	83	83.00

Table 3: Maternal outcome in controlled and uncontrolled HbA_1C in 2nd & 3rd trimester of pregnancy.

	Controlled HbA_1C		Uncontrolled HbA_1C		p value
	(n=17)	(%)	(n=83)	(%)	
Vulvovaginitis	1	5.88	18	21.67	0.02
UTI	2	11.76	15	18.07	0.24
Preterm delivery	3	17.64	20	24.10	0.04
Polyhydramnios	2	11.76	18	21.69	0.03

Unpaired 't' test, $p < 0.05$ was considered significant.

Table 4: Mode of delivery in respect with status of HbA_1C in 2nd & 3rd trimester of pregnancy.

	Controlled HbA_1C		Uncontrolled HbA_1C		p value
	(n=17)	(%)	(n=83)	(%)	
NVD	12	70.59	9	10.84	0.01
LUCS	5	29.41	74	89.16	0.23

Unpaired 't' test, $p < 0.05$ was considered significant.

Table 5: Intrapartum complications in study group who delivered vaginally.

	Controlled HbA_1C		Uncontrolled HbA_1C		p value
	(n=12)	(%)	(n=9)	(%)	
Shoulder dystocia	0	0.00	3	33.33	0.01
Complete perineal tear	0	0.00	4	44.44	0.13
Cervical tear	3	25.00	6	66.66	0.23

Unpaired 't' test, $p < 0.05$ was considered significant.

Table 6: Postpartum complications in study group who delivered vaginally.

	Controlled HbA_1C		Uncontrolled HbA_1C		p value
	(n=12)	(%)	(n=9)	(%)	
PPH	0	0.00	2	22.20	0.02
UTI	1	8.30	2	22.20	0.28
Endometritis	0	0.00	1	11.10	0.24

Unpaired 't' test, $p < 0.05$ was considered significant.

Table 7: Postpartum complications in study group who delivered by caesarean section.

	Controlled HbA_1C		Uncontrolled HbA_1C		p value
	(n=15)	(%)	(n=74)	(%)	
PPH	0	0.00	12	16.22	0.01
UTI	1	20.00	10	13.51	0.24
Abd. Wound infection	0	0.00	4	5.40	0.03
Endometritis	0	0.00	4	5.40	0.08

Unpaired 't' test, $p < 0.05$ was considered significant

RESULTS

Table 1 shows the age distribution of the study objects. Age range was 20-38 years in study group. The highest incidence (48%) was found in age group 26 to 30years. Table 2 shows the status of glycemic control in 2nd &3rd trimester in which 17% women have controlled HbA1C level and 83% of women have uncontrolled level of HbA1C.

Table 3 shows maternal outcome in 2nd and 3rd trimester of pregnancy. Vulvovaginitis (5.88% V/s 21.67%, p = 0.02), preterm delivery (17.64% V/s 24.10%, p = 0.04) and polyhydromnios (11.76% V/s 21.69%, p = 0.03) in controlled and uncontrolled HbA_1C level respectively. These differences are statistically significant whereas UTI (11.76% V/s 18.07%, p = 0.24) in controlled and uncontrolled HbA_1C level which is statistically not significant.

Table 4 shows statistically higher rate of Normal vaginal delivery (NVD) in women with controlled HbA1C level than uncontrolled (70.59% V/s 10.84%, p = 0.01). Rate of LUCS was high in women with uncontrolled HbA1C level (29.41% V/s 89.16%, p = 0.23) which is statistically not significant.

Table 5 shows Shoulder dystocia in women with uncontrolled HbA_1C level was statistically higher than women with controlled HbA_1C level (0.00% V/s 33.33%, p = 0.01), whereas complete perineal tear (0.00% V/s 44.44%, p=0.13) and cervical tear (25.00% V/s 66.66%, p = 0.23). These differences are not statistically significant.

Table 6 shows postpartum complications in women with uncontrolled HbA_1C level higher than controlled HbA_1C level. PPH (0.00% V/s 22.20%, p=0.02) which is statistically significant whereas UTI (8.30% V/s 22.20%, p= 0.28) and Endometritis (0.00% V/s 11.10%, p = 0.24) are statistically not significant.

Table 7 shows PPH (0.00% V/s 16.22%, p = 0.01), Abdominal wound infection (0.00% V/s 5.40%, p = 0.03) are statistically higher in women with uncontrolled HbA_1C level than controlled HbA_1C level whereas UTI (20.00% V/s 13.51%, p=0.24) and Endometritis (0.00% V/s 5.40% p=0.08) are statistically not significant.

In this study serum HbA_1C level was found raised in uncontrolled diabetic patients. The incidence of vulvovaginitis, preterm delivery and polyhydramnios were significantly high in 2nd and 3rd trimester in raised HbA_1C level. The rate of normal vaginal delivery was higher inpatient with normal HbA_1C level uncontrolled HbA_1C level (17.59% V/s 10.84%, p = 0.01), which statistically significant. Post-partum haemorrhage (PPH) was significantly higher in raised HbA_1C level than normal (0.00% V/s 22.20%, p=0.01) in NVD and (0.00% V/s 16.22%, p = 0.01) in Caesarean section.

DISCUSSION

Proper screening, diagnosis and management of diabetes in pregnancy can reduce maternal morbidity[7]. Diabetes and pregnancy may mutually affect each other over a range of interaction from conception to delivery, and possibly even later [11].The highest incidence (48 %) was found in age group26 to 30 years.HbA_1C level d" 6% was considerednormal. In 2nd and 3rd trimester of pregnancy controlledand uncontrolled HbA_1C level was (17% Vs 83%).

The incidence of vulvovaginitis 21.67% in uncontrolled HbA_1C level similar to the finding in the study of Mangala R. et al[12] (19.8%). Incidence of UTI 18.07% in women with uncontrolled HbA_1C which is similar to the

finding in the study of Khatun F[13] (17.8%). The incidence of Preterm delivery was 24.10% among uncontrolled HbA_1C group which higher than the study done by Kovilam O et al[7] (10%). The incidence of polyhydramnios was 21.69% among uncontrolled HbA_1C level which similar to the study of EskandarM[14] (23%) but higher than the study done by Metal S etal[15] (3.7%). In this study rate of Caesarean section in uncontrolled HbA_1C group was 89.16% which is equivalent to the study done by Shikdar K et al[16] (87.33%), Ivy R[17] (88.32%), but higher than that reported by Metal S et al[15] (52%), Mangala R et al[12](48.32%).

In this study the incidence of PPH who delivered Caesarean section was 16.22% in uncontrolled HbA_1C group which is lower than the study done by Mangalaet al[12](29%). The incidence of Abdominal wound infection 5.40% and Endometritis 5.40% are equivalent to the study done by Mangala et al[12] (4.20% & 5.50%).

CONCLUSION

Diabetes Mellitus in pregnancy is one of the leading cause of maternal morbidity and mortality. But it is preventable by controlling blood sugar level during pregnancy. There is increasing evidence that the raised level of maternal serum HbA_1Cin antenatal period is associated with maternal complications. HbA1C is proved to be a useful indicator of average long term blood glucose level in diabetic subjects. By investigating HbA_1C level in each trimester blood sugar control can be done. Thus strict control of hyperglycemia in diabetic pregnant woman ensures a happy outcome.

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