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## Diabetes mellitus in pregnancy and its outcome in Rangpur Medical College Hospital, Rangpur, Bangladesh

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### Abstract

**Background:** Diabetes mellitus is one of the common medical diseases with pregnancy. Increasing maternal age, overweight, life style change and family history of diabetes are all risk factor for diabetes mellitus.

**Methods:** The objectives of this study are to evaluate the foeto-maternal complications during pregnancy & delivery due to DM/GDM. This prospective study was done in gynae and obstetric dept. of RpmCH during the period of July 2012 to June 2014. The study includes both pre-gestational diabetes & newly diagnosed diabetes as GDM cases admitted through the emergency or OPD with or without labour pain.

**Results:** During the study period total 20302 obstetrics patients were admitted out of them 96(0.47%) were diabetes mellitus with pregnancy. Both age & parity matched study were done between diabetic & control group. Among them 22 (44%) had pre-gestational diabetes mellitus and 28(56%) had gestational diabetes mellitus among the study group 24(48%) were above the age of 30 years, majority were multipara 38(76%) and 24(48%) patients were with the gestational age of 38-40 weeks. Majority patients of diabetic group 28(56%) belongs to average socioeconomic status where as in control group 14(28%) and 20(40%) patients in diabetic group were secondarily educated in comparison to 04(08%) in control group those are statistically highly significant ( $p=0.000$ ). Regarding BMI 40% were overweight in diabetic group compare to 20% in control group that is statistically significant as a whole ( $p=0.006$ ). There was no significant difference in the rates of foetal birth asphyxia but macrosomic baby in diabetic group is 16%. Caesarean section were 44(88%) in diabetic group compare to 15 (30%) in control group that is statistically highly significant ( $p=0.000$ ). Successful vaginal delivery had done in 12% patients in diabetic group under supervision.

**Conclusion:** Hospital delivery mandatory preferably in tertiary care centre to reduce the foeto-maternal complications.

**Keywords:** Diabetes Mellitus, Pregnancy, Outcome, Rangpur, Bangladesh

### Introduction

Diabetes mellitus during pregnancy poses significant risk to the mother and fetus. Before the introduction of insulin in 1922, diabetic patients often died during the course of their pregnancy. Just 20 years ago, delivery of an unexplained stillbirth from a mother with type-diabetes was not uncommon. Today this tragedy is rare, with a reduction in perinatal mortality rate to less than 5%. When diabetic patient receive preconception care, including medical nutrition therapy and insulin therapy as needed to achieve near-normal glycemic goals as well as antepartum fetal surveillance, morbidity and mortality approach that of women with uncomplicated pregnancies. Two decades ago, most diabetic require prolonger hospitalization, but today few require more than a brief hospital stay. This is partly due to the accessibility of self-monitoring of blood glucose level with its concomitant effect on glycemic control <sup>[1]</sup>. Pregnancy affects both the maternal and fetal metabolism and even in non-diabetic women exerts a diabetogenic effect. However, 2 to 17.8% of women develop gestational diabetes. Gestational diabetes represents a very strong predictor for the development of permanent diabetes later in life. Besides gestational diabetes, pregnancy can

also occur in women with preexisting diabetes. Pregestational diabetes, both type 1 and type 2 can cause alterations from fertilization, through all pregnancy period and even after its end. It can predispose the fetus to many alterations in organogenesis, growth restriction and predispose the mother to some diabetes-related complications like retinopathy and nephropathy or accelerate the course of these complications if they are already present. Gestational diabetes generally leads to fetal growth alterations [2]. According to the American diabetes association (ADA), gestation diabetes is defined as any degree of glucose intolerance with onset or first recognition during pregnancy [3]. There are no reliable signs and symptoms allowing clinical identification of patients with gestational diabetes. This condition can be diagnosed only through the systemic screening of pregnant women with a 1-hour 50mg GTT. The high risk gestational diabetic patient should have antepartum surveillance starting at 34 weeks and should be delivered between 38 and 40 weeks [4]. Therefore early diagnosis of GDM is essential to reduce maternal and fetal morbidity and to allow subsequent attempts to prevent or delay the onset of Type-2 diabetes [5]. Cesarean delivery has been successfully employed as an intervention used to reduce complications associated with GDM, particularly shoulder dystocia [6]. The operation itself is associated with several maternal morbidities, particularly wound infection and dehiscence, postpartum infection and bleeding, and deep venous thrombosis, as well as the need for future cesarean section with subsequent pregnancies [7]. Currently, the priorities for diabetes care providers are first to identify and control diabetes prior to conception and second to appropriately screen and treat even mild gestational diabetes during pregnancy [1]. Careful planning and team approach which include endocrinologist along with obstetrician, dietitian, neonatologist and anesthesiologist can ensure a happy outcome and reduction of perinatal & maternal mortality as well as other pregnancy complications in diabetes mellitus.

## Materials and Methods

**Study design:** Cross-sectional comparative type of descriptive study.

**Period and place of study:** The study was carried out in the department of Gynaecology & Obstetrics, Rangpur Medical College, Rangpur and neonatal unit, department of Pediatrics, Rangpur Medical College Hospital, Rangpur, during the period of July 2012 - June 2014.

**Study population:** Patient diagnosed as pre-gestational or gestational diabetes mellitus during ante natal check-up and admitted through emergency department with labour pain or throughout patient department without labour pain as elective cases in antenatal ward of the department of Gynaecology &

Obstetrics, Rangpur Medical College were taken as study population, which is 50 in no. & control 50 cases.

## Inclusion criteria

1. Women with diabetes mellitus in pregnancy (Type-1, Type-2 & GDM) admitted for delivery in the department of Gynaecology & Obstetrics during this study period (Study group).
2. Women with neither pre-existing DM nor GDM (Control group).

## Exclusion criteria

1. Any medical complications e.g. Chronic HTN, Heart disease (Grade-III & IV), SLE, chronic systemic disease, chronic metabolic disease etc. due to aggravate the further pregnancy outcome.
2. Patient, who did not give consent to participate in study procedure.

## Methods of data collection

After proper counseling and informed written consent, history was taken in a preformed written questionnaire and diabetes mellitus in pregnancy was confirmed by previous history, relevant investigation, (FBS, Blood sugar 2hrs AFB, HbA, c, Ultra sonogram and renal function test) among the admitted patients of obstetrics indoor department. After delivery. Maternal complications like

1. Obstructed labour due to macrosomia, shoulder dystocia, congenital malformation etc.
2. Post-partum hemorrhage due to retained placenta, genital tract injury etc.
3. Neonatal complication like birth asphyxia, birth trauma, low birth weight, neonatal death was recorded.
4. Maternal and perinatal mortality.

Only patients with diabetes mellitus without other obstetric complications who was admitted with labour pain or for confinement or for elective caesarean section was select for data collection. After collection of data, master sheet was prepared for analysis. 50 cases were collected as control that was age & parity matched.

## Statistical analysis

The collected data was compiled and findings were presented in the form of tables and figures. Appropriate statistical analysis of the data was done using statistical package for social science (SPSS) with student f-test (Paired), chi-square test and others where applicable.

## Results

Total 20302 obstetric patients were admitted in Gynae & Obstetrics department of Rangpur Medical College Hospital, Rangpur during one year period of study. Out of which 96 (0.47%) patients had DM.

**Table 1:** Distribution of study subjects according to the age group

Variables	Diabetic Group (n-50)	Control Group (n-50)	Mean $\pm$ SD	Percentage (%)	P-value
<b>Age group (Years)</b>					
$\leq 20$	0	0	28.84 $\pm$ 2.64	0	0.00
21-25	12	12		24	
26-30	14	14		28	
31-35	16	16		32	
>35	08	08		16	
<b>Parity</b>					
Primi	12	12		24	
Multi	38	38		76	

Y age in years, n=number of patient

Table-1 shows that no patients was  $\leq 20$  years, 12 patients (24%) were between 21-25 years, 14 patients (28%) were between 26-30 years 16 patients (32%) were between 31-35 years & 08 patients were  $> 35$  years. The mean age was

$28.84 \pm 2.64$ . 12 patients (24%) were primigravidae, 38 patients (76%) were multigravida in both diabetic & control group.

**Table 2:** Socio-demographic profile in Diabetic group & Control group

Variables	Diabetic group (n=50)		Control group (n=50)		X <sup>2</sup>	p-value
	Number	Percentage	Number	Percentage		
<b>Socio-economic status (Per family/year)</b>						
Average (50000- 100000 tk)	28	56	14	28		
BelowAverage (<50000 tk)	02	04	35	70	51.29	0.00 <sup>s</sup>
Aboveaverage (>100000 tk)	20	40	01	02		
<b>Level of education</b>						
Illiterate	04	08	10	20	51.05	0.001 <sup>s</sup>
Primary	06	12	35	70		
SSC	20	40	04	08		
HSC	12	24	01	02		
Graduate	06	12	00	00		
Post-Graduate	02	04	00	00		
<b>Antenatal care</b>						
Yes	48	96	35	70	11.97	0.001 <sup>s</sup>
No	02	04	15	30		
<b>BMI</b>						
20-25	26	52	40	80	10.30	0.006 <sup>s</sup>
26-30	20	40	10	20		
30	04	08	00	00		

P value<0.05 is significant

X<sup>2</sup>=chi square chart's = significant, NS= not significant

Table-2 shows that in diabetic group, 56% were from average, 04% from below average 40% from above average where in control group 28% from average, 70% from below average and 02% from above average that was statistically significant Chi-square test was employed to analyse the data. 20 patients (40%) in diabetic group were SSC passed, where 35 patients (70%) in control group were primarily educated. Here P-value was significant, so level of education was

higher in diabetic group than control group. 96% patients in diabetic group had ante-natal care before delivery, while only 70% had antenatal care in control group that was statistically significant. BMI of 26 patients (52%) in diabetic group, where 40 patients (80%) in control group were between 20-25, here P-value was significant, so BMI was higher in diabetic group than control group.

**Table 3:** Comparison of Risk factors, past history, Complication during pregnancy in both group

Variables	Diabetic group (n=50)		Control group (n=50)		X <sup>2</sup>	p-value
	Number	Percentage	Number	Percentage		
<b>Risk factors</b>						
Family history of diabetes	12	24	02	04	14.53	0.001 <sup>s</sup>
Obesity	04	08	00	00		
Maternal age 30 or above	24	48	24	48		
<b>Past history</b>						
History of perinatal loss	01	02	02	04		
History of delivery of macrosomic baby	08	16	00	00		
Abortion	14	28	10	20		
<b>Complication during pregnancy</b>						
PIH	06	12	04	08	9.021	0.061 <sup>ns</sup>
Pre-eclampsia	06	12	08	16		
UTI	06	12	02	04		
Vulvovaginitis	04	08	00	00		
Polyhydramnions	06	12	00	00		
Congenital anomaly	00	00	00	00		
Others	00	00	00	00		

P value<0.05 is significant

X<sup>2</sup>=chi square chart's = significant, NS= not significant

Table-3 shows that in diabetic group 24% had positive family history of diabetes, 08% had obesity while in control group 04% had positive family history of diabetes, none has obesity in control group. Here P-value was significant so family history & obesity were more common in diabetic group than control group.

Past history of perinatal loss, delivery of macrosomic baby & abortion were more in diabetic group than control group but that was not statistically significant. Polyhydramnions, Vulvovaginitis were present in diabetic group but absent in control group but that was not statistically significant.

**Table 4:** Investigations & Treatment modality among the diabetic women

Variables	Number of patients	Percentage (%)
<b>Blood Sugar (FBS &amp; 2 hrs ABF with CUS)</b>		
120-160 mg/dl	38	76
>160 mg/dl	12	24
<b>HbA<sub>1c</sub></b>		
<6 mg %	42	84
>6 mg%	08	16
<b>Treatment during pregnancy</b>		
Without drug	10	20
With drug	40	80

Table -4 shows that among 50 DM patients, 38 (76%) had controlled blood sugar during their pregnancy. 42 (84%) had <6 mg % HbA<sub>1c</sub> during their pregnancy. 40 (80%) patients

treated without drug whereas 10 (20%) patients were treated with drug only.

**Table 5:** Distribution of Gestational age, Mode of delivery, Indication of C/S & Complications between both groups.

Variables	Diabetic group (n=50)		Control group (n=50)		X <sup>2</sup>	p-value
	Number	Percentage	Number	Percentage		
<b>Gestational age (wks)</b>						
32-34	04	08	06	12	9.567	0.023 <sup>s</sup>
35-37	22	44	10	20		
38-40	24	48	30	60		
>40	00	00	04	08		
<b>Mode of delivery</b>						
Vaginal delivery	06	12	35	70	34.766	0.000 <sup>s</sup>
Caesarean section	44	88	15	30		
<b>Indication of C/S</b>						
H/O previous C/S	28	56	05	10	13.844	0.003 <sup>s</sup>
Fetal distress	04	08	06	12		
Pre-eclampsia	04	08	08	16		
BOH	02	04	01	02		
<b>Complications</b>						
Postpartum haemorrhage	02	04	06	12	4.861	0.088 <sup>ns</sup>
Urinary tract infection	06	12	02	04		
Puerperal sepsis	08	16	04	08		

P value<0.05 is significant

X<sup>2</sup>=chi square chart's = significant, NS= not significant

Table-5 shows that gestational age of delivery of 24 patients (48%) in diabetic group, and 30 patients (60%) in control group were between 38-40, that was significant. 44 patients (88%) in diabetic group had done Caesarean section. Where's only 15 patients (30%) in control group had done Caesarean section that was highly significant. 56% patients in diabetic

group had H/O previous C/S while only 10% patients in control group had H/O previous C/S that was statistically significant. 12% patients in diabetic group had UTI as post-partum complication while 04% patients in control group had UTI as post-partum complication that was statistically not significant.

**Table 6:** Comparison of Neonatal outcome of Caesarean section between both group

Variables	Diabetic group (n=50)		Control group (n=50)	
	Number	Percentage	Number	Percentage
<b>Neonatal outcome</b>				
Healthy baby	34	68	40	80
Refd. To neonatal ward	10	20	06	12
Perinatal death	01	02	00	00
Prematurity	26	52	16	32
Respiratory distress syndrome	02	04	01	02
Birth asphyxia	04	08	02	04
Macrosomia	02	04	00	00

Table-6 shows that 68% patients in diabetic group had healthy baby while 80% patients in control group had healthy baby that was statistically not significant. 16% patients in diabetic group had macrosomic baby but no patients in control group had macrosomic baby. Birth asphyxia was present in 08% baby in diabetic mother and 04% present in control group but that was statistically not significant.

### Discussion

Diabetes in pregnancy may pose some challenges for both mother and baby. Diabetes is sociated with maternal and perinatal morbidity and mortality. The number of pregnant women with pre-existing diabetes is increasing, mainly from an increase in type 2 diabetes, but also an increase in type 1 diabetes. Overall, type 1 diabetes accounts for approximately

5% to 10% of all diabetes outside of pregnancy, and in pregnancy put together with type 2 accounts for 10% of diabetic pregnancies. In this study, total 20302 obstetrics patients were admitted in Obstetrics and Gynaecology department out of which 96 (0.47%) patients had DM. Nirmala Kampan *et al.* [8], over five years study shows that 5.3% women were diabetic which is higher than this study because period was longer and study sample is more (400). All India institute of medical science, over seven years study had showed the incidence 0.52% which is approximately similar to this study [9]. In present study, shows that among 50 patients majority were between 21-30 years age group which is 26 in no. The second highest group belonged to >30 years, 24 in no. The mean age was 28.84± 2.64 which is approximately similar to the study performed by Emmanuel O where age range for mothers with diabetes was 18-39 years with the mean age 28.6 years. It may be explained by this way that both country are developing country where marital age is closely similar and this age group is risk for getting GDM. In socio-demographic characteristics in both group (Table-3) shows, in diabetic group 56% women were from average, 04% from below average 40% from above average where's in control group 28% from average, 70% from below average and 02% from above average It may be explained by this way that economical affluency might be a risk factor for DM probably due to sedentary habit (P-value 0.00). In level of education (Table-3) shows that, 20 patients (40%) in diabetic group were SSC passed, 12% were primarily educated, whereas 35 patients (70%) in control group were primarily educated and 08% were SSC passed. Level of education of the patients had significant relation with incidence of DM (P=0.001). Educated person are at risk for getting GOM which is approximately similar to the study performed by Emmanuel O [10] where 36.7% were secondarily educated in comparison to control where 30% were secondarily educated. Among the study subjects (n=50), 96% patients had regular ante-natal care (Table-3) while only 70% in control group regular ante-natal care (p<0.001). Majority received regular antenatal checkup probably due to higher education, more affluency and awareness about diabetes mellitus and its complication. In present study (Table-4) shows that in diabetic group 24% had positive family history of diabetes, 08% had obesity 48% were above 30 years while in control group 04% had positive family history of diabetes and none has obesity (p<0.001) as compare to Ahia Garshasbi [11], where 18.6% had positive family history of diabetes (p<0.001), 7.9% had greater weight gain (P=0.008) and 37% were above 30 years which is approximately similar to this study. In present study among the study subjects (Table-4) shows, in past obstetric history where 8(16%) patients had history of delivery of macrosomic baby, 4(8%) patients had history of perinatal loss, and 18 patients had abortion. But in present pregnancy as because they (96%) received regular antenatal care and diagnose as GDM & DM and treated accordingly, there is only one perinatal loss (due to uncontrolled Hba<sub>1c</sub>). In Farhana J [12] study of 88 DM, 30 patients had family history of diabetes, 10 patients had history of perinatal loss, 10 patients had history of abortion and 10 patients had history of delivery of macrosomic baby which is approximately similar to this study. The treatment modality of present study (Table-5) shows, during antenatal period 40 (80%) patients were treated with insulin and 10 (20%) patients were treated with diet only and in all cases blood sugar I was controlled the result of which is consistent with

Syed Habeebullah [13] where 90% were euglycaemic after treatment with metformin, 10% required an increment in dose and an addition of small dose of insulin only after 35 weeks of gestation. Certain complications occurred during pregnancy, among the study group (Table-06) shows pre-eclampsia developed in 6 (12%) cases in diabetic in comparison to control group where 16% develop pre-eclampsia which is much higher to Nirmala Kampan *et al.*, [8] The incidence of vulvovaginitis 04(08%) in diabetic in comparison to none in control group Which is nearly similar to Emmanuel O [10] where 20% develop vulvovaginitis in diabetic in comparison to 3.3% in control group. Majority of the study subjects (Table-06) delivered at 38-40 completed weeks, 22 (44%) patients delivered at 35-37 completed weeks and 04 (08%) at 32-34 completed weeks where as in control group 30(60%) delivered at 38-40 weeks, 10 (20%) patients delivered at 35-37 completed weeks and 06 (12%) at 32-34 completed weeks. The incidence of preterm delivery was much higher in this study as compared to Nirmala Kampan *et al.*, [8] where 16.3% had preterm labour. The higher incidence of preterm labour was mostly due to PROM, fetal distress, severe pre-eclampsia, previous CS with scar tenderness and some of the patients had uncontrolled HbA<sub>1c</sub>. In present study (Table-06) shows, in diabetic group 06 (12%) patients had vaginal delivery and a large number of patients 44 (88%) had C/S as compare to 35 (70%) had vaginal delivery & 15 (30%) had under gone C/S in control group (p<0.05). C/S was higher in this study which is similar to Nirmala Kampan *et al.* [8] where Caesarean section rate was 10 times higher among diabetic women than healthy women. The higher incidence of caesarean section mainly due to previous caesarean section, fetal distress, severe pre-eclampsia, BOH, lack of patience on the part of patients and relatives because of previous peri-natal loss and abortion and to avoid unexplained fetal death which mostly occurs after 37 completed weeks. In this study (Table - 07), perinatal mortality was found in one case due to uncontrolled Hba<sub>1c</sub>, perinatal morbidity was found in 12% cases. Prematurity was found in 52% which was within the gestational age of 32-37 weeks, birth asphyxia 08%, respiratory distress syndrome 04% and macrosomia 04% cases which is similar to Nirmala Kampan *et al.* [8] where 4.5% babies of women with diabetes were macrosomic. The lower incidence of macrosomia and respiratory distress syndrome in this study are probably due to good glycemic control. To get proper result and to avoid complication womens empowerment and education must be considered. Regular ANC and PNC should be available.

### Limitation

- Sample size is small and also duration is short and not multicentric.
- Follow-up could not be ensured usually in those patients who delivered vaginally due to short duration of staying at hospital and no PNC at all for both study and control group.
- The rate of C/S is Increasing because it is a tertiary care Centre and mostly deal with referred cases those are admitted with different complication and also for proper management.

### Conclusion

Pregnancy should be planned in women with preexisting diabetes, which includes a strict metabolic control with near or near-normal glucose levels, reached through lifestyle a

healthy diet, and an exercise planning program with the supplementation of modifications, folic acid that is advocated to prevent malformations and miscarriages. Future research is warranted in this field and two areas must be addressed. First, there are the social issues related to diabetes in pregnancy, in women with preexisting diabetes and in those with gestational diabetes. There is a need to increase knowledge on reproductive health of these women and to understand what are the reasons for them failing to attend for pre-pregnancy care, to change their lifestyle, to allow the development of more appropriate facilities and methods which should improve uptake and the final results. Another social issue is trying to address the obesity epidemic which is directly related to the occurrence of gestational diabetes and may increase the risk of malformations, and may also make their antenatal detection and diagnosis more difficult. The second area is for emphasizing the importance of basic research into the mechanisms causing adverse fetal and maternal outcomes, which in turn may lead to more efficient strategies for their prevention.

### Recommendations

After completing the study, following recommendations are made.

1. Large group, longer duration and multicentric study is recommended throughout the whole country ie nationwide.
2. For further research work co-operation of government and as well as different NGO's should be ensured.
3. Labour room facilities with modern equipments as for example Ultrasonography, NST, CTG and colour Doppler should be available. Besides these others support which are beneficial for the mother and as well as for foetus to reduce the rate of C/S and also to reduce the complications that may arise during vaginal delivery should make available.

### Conflict of Interest

Not available

### Financial Support

Not available

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