

Comparative Study Between Normal Pregnancy Outcome with Pregnancy with Diabetes Mellitus in Rangpur Medical College & Hospital, Rangpur, Bangladesh

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

Objectives: To evaluate the foeto-maternal outcome in pregnancy and to compare with the patients having no DM/GDM and any medical disease.


Materials and Methods: This is a cross-sectional descriptive study which includes both the booked cases having pregestational diabetes or newly diagnosed GDM cases admitted directly through the emergency or OPD with or without labour pain.

Study period: From February 2015 to August 2015.

Results: During the study period total of 5075 obstetrics patients were admitted out of them 32(0.63%) had diabetes mellitus with pregnancy. Both age & parity-matched studies were done between the diabetic & control groups. Among them, 12 (40%) had pregestational diabetes mellitus and 18(53.33%) were above the age of 30 years, the majority were multipara 15(50%) patients with a gestational age of 38-40 weeks. The majority patients of in diabetic group 18(60%) belong to average socioeconomic status where as in the control group 7(23.33%). 11(36.67%) patients diabetic group were secondarily educated in comparison to 06(20%) in control group those are statistically highly significant ($p=0.008$). Regarding BMI 40% were overweight in the diabetic group compared to 16.67% control group which is statistically significant as a whole ($p=0.007$). There was no significant difference in the rates of foetal birth asphyxia but the macrosomic baby in the diabetic group in 7.4% caesarean sections were 27(90%) in the diabetic group compared to 09(30%) in the control group that is statistically highly significant ($p=0.000$). Successful vaginal delivery had done in 10% of patients in the diabetic group under supervision.

Conclusion: In our country DM is not uncommon and it is often associated with a higher incidence of maternal and perinatal mortality due to a lack of proper antenatal, intranatal and emergency obstetric care.

Keywords: Normal Pregnancy, Outcome Diabetes Mellitus, Birth Asphyxia

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Introduction

Diabetes mellitus during pregnancy poses a significant risk to the mother and fetus. Before the introduction of insulin in 1922, diabetic patients often died during their pregnancy.

Just 20 years ago, delivery of an unexplained stillbirth from a mother with type-I diabetes was not uncommon. Today this tragedy is rare, with a reduction in perinatal mortality rate to less than 5%.

When diabetic patients 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 diabetics required prolonged hospitalization, but today few require more than a brief hospital stay. This is partly due to the accessibility of self-monitoring of blood glucose levels with its concomitant effect on glycemic control.[1]

Type-1 diabetes is rarely diagnosed during pregnancy; in these cases, patients most often present with DKA, or unexpected coma, because early pregnancy may provoke diet and glycemic control instability in patients with occult diabetes.

Type-2, or non-insulin-dependent diabetes, corresponds to the old adult-onset diabetes and is the most common form of diabetes characterized by insulin resistance, obesity and relative insulin deficiency.

It can be difficult to distinguish gestational diabetes mellitus from type-2 diabetes that preceded pregnancy but was unrecognized, or whose onset occurred during pregnancy.

However, the International Association of Diabetes and Pregnancy Study Group now recommend that high-risk women who are found to have diabetes at their initial prenatal visit, according to standard diagnostic criteria, receive a diagnosis of overt diabetes rather than gestational diabetes. [2]

According to the American diabetes association (ADA), gestational diabetes is defined as any degree of glucose intolerance with onset or first recognition during pregnancy.[3]

The ADA clinical practice recommendation advises testing for all high-risk women in early gestation and again between the 24th and 28th week of gestation and for those at medium risk only between the 24th and 28th week of gestation.

For low-risk women no testing is suggested³. Women at high risk of gestational diabetes are those with marked obesity, previous history of GDM, glycosuria or a strong family history of diabetes and age above 25 years.

Women at low risk of gestational diabetes are those at the age below 25 years, without a family history of diabetes or previous history of glucose intolerance and poor outcomes in previous pregnancies. All other women are at medium risk. [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.

4Cesarean delivery has been successfully employed as an intervention used to reduce complications associated with GDM, particularly shoulder dystocia. [5]

Currently, the priorities for diabetes care providers are first to identify and control diabetes before conception and second to appropriately screen and treat even mild gestational diabetes during pregnancy.

Careful planning and a team approach which include endocrinologists along with obstetricians, dietitians, neonatologists and anesthesiologists 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 descriptive type of study.

Place of study: Antenatal and labour ward, Rangpur Medical College and Hospital, Rangpur, Bangladesh.

Study period: 06 months (February 2015 to August 2015).

Study population: Patients diagnosed with pregestational or gestational diabetes mellitus during an antenatal checkup and admitted through.

The emergency department with labour pain or throughout the patient department without labour pain as elective cases in the antenatal ward of RpmCH.

Sample size: To determine the sample size the following formula was followed:

$$n=(z^2 pq)/d^2$$

According to this formula, the targeted sample was 384. The current study duration is six months. So the targeted sample size cannot be collected during this study duration, therefore 30 women with diabetes will be taken in this study.

Inclusion criteria:

I) Patient with diabetes mellitus in pregnancy (Type-1, Type-2 & GDM) admitted for delivery in the department of Gynaecology & Obstetrics during this study.

Ii) For the control group 30 cases will be collected having no medical diseases GDM/DM & pre-existing diseases.

Exclusion criteria:

I) Any medical complications e.g. Chronic HTN, Heart disease (Grade III & IV). SLE, chronic systemic disease, chronic metabolic disease etc.

I) Patient, who will not give consent to participate in the study procedure.

Information will be collected from all patients by using a questionnaire made for recording all relevant parameters under study, after proper counselling and obtaining written consent from the patient or her legal guardian. The duration of data collection will be 06 months.

Method of data processing: A structured questionnaire will be filled up at the time of admission after obtaining informed written consent from the patient and her legal guardian. A structured follow-up sheet will be used during the period of hospitalization.

Data analysis: Data will be analyzed by SPSS version 16 Qualitative data will be analyzed as rate. Proportion, percentage. Quantitative data will be analyzed as mean, and standard deviation. The chi-square test will be used.

Statistical analysis: The data obtained from the present study were compiled and analyzed by simple statistical methods.

Results

Table 1 shows that a total of 5075 obstetric patients were admitted to the Gynae& Obstetrics department of Rangpur Medical College Hospital, Rangpur during a month of study.

Out of which 32 (0.63%) patients had DM. Results have been expressed in number (no) and percentage (%).

Table 1: Incidence of DM patients among the total obstetric patients admitted during the study period.

Duration	Total number of obstetric patients admitted	Total no. of patients with DM admitted	Percentage (%)
July 2012 to June 2014	5075	32	0.63

Table- 2: Distribution of study subjects according to age and parity

Variables	Diabetic group (n=30)	Control group (n=30)	Mean±SD	Percentage	P- value
Age group (years)					
≤20	0	0		0	0.00
21-25	06	06		20	
26-30	10	10		33.33	
31-35	10	10	29.75±1.041	33.33	
>35	04	04		13.33	
Parity					
Primi	10	10		33.33	
Multi	20	20		66.67	

Y =age in years, n=number of patient

Table-2 shows that no patients was ≤20 years, 12 patients (20%) were between 21-25 years (33.33%) were 20 patients (33.33%) were primigravidae, 40 patients (66.67%) were multigravida in both diabetic & control group.

Table 3 shows that in the diabetic group, 60% were from average, 6.67% from below average 33.33% an above average whereas in the control group 23.33% from average, 73.33% from below average and 3.33% from above average was statistically significant Chi-square test was employed to analyse the data. 11 patients (36.67%) in the diabetic group were SSC passed, whereas 13 patients (43.33%) in the control group were primarily educated.

Table 3: Comparison of Socio-demographic status and risk factors, Past history, and Complications during pregnancy in both groups.

Variables	Diabetic group(n=30)		Control group(n=30)		X2	p-value
	Number	Percentage	Number	Percentage		
Socioeconomic status (per capita/year)					87.4	0.000
Average (18000-36000 tk)	18	60	07	23.33	83	
Below Average(<18000 tk)	02	6.67	22	73.33		
Above average(>36000 tk)	10	33.33	01	3.33		
Level of education						
Illiterate	03	10	10	33.33	15.4	0.008
Primary	06	20	13	43.33	85	
SSC	11	36.67	06	20		
HSC	05	16.67	01	3.33		
Graduate	04	13.33	00	00		
Post-Graduate	01	3.33	00	00		
Antenatal care						
Yes	30	100	26	86.67	4.28	0.038
No	00	00	04	13.33	6	
BMI						
20-25	14	46.67	25	83.33	9.98	0.007
26-30	12	40	05	16.67	5	
>30	04	13.33	00	00		
Risk factors						
Family history of diabetes	10	33.33	02	6.67	6.75	0.0034
Obesity	04	13.33	00	00	6	
Maternal age 30 or above	16	53.33	16	53.33		
History						
History of perinatal loss	01	3.33	02	6.67	3.51	0.172
History of delivery of macrosomic baby	04	13.33	00	00	5	
Abortion	14	46.67	08	26.67		
Complication during pregnancy						
PIH	03	10	02	6.67	13.7	0.088
Pre-eclampsia	03	10	04	13.33	80	
UTI	03	10	01	3.33		
Vulvovaginitis	02	6.67	00	00		
Polyhydramnions	03	10	00	00		
Congenital anomaly	00	00	00	00		
Others	00	00	00	00		

P Value < 0.05 is significant

X² = chi square charts = significant, NS=not significant

Here P-value was significant, so the level of education was higher in the diabetic group than control group.

100% of patients in the diabetic group had antenatal care before delivery, while only 86.67% had antenatal care in the statistically significant control group.

The BMI of 14 patients (46.67%) in the diabetic group, whereas 25 patients (83.33%) in the control group were between 20 and 25, here P-value was significant, so the BMI was higher in the diabetic group than control group 33.33% had a positive family history of diabetes, 13.33% had obesity while in control group 6.67% 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 the diabetic group than control group.

History of perinatal loss, delivery of macrosomic baby & abortion were more in the diabetic group than control group but that was not statistically significant.

Polyhydramnios and vulvovaginitis were present in the diabetic group but absent in the control group but that was not statistically significant.

Table 4: Investigations & treatment modality among the diabetic women

Variables	Number of patients	Percentage(%)
Blood Sugar (FBS & 2 hrs ABF with CUS)		
120-160 mg/dl	24	80
>160 mg/dl	06	20
HbA1c		
<6 mg %	24	80
>6 mg%	06	20
Treatment during pregnancy		
Without drug	08	26.67
With drug	22	73.33

Table 4 shows that among 30 DM patients, 24 (80%) had controlled blood sugar during their pregnancy. 24 (80%) had <6 mg % HbA1c during their pregnancy. 22 (73.33%) patients were treated without drug whereas 08 (26.67%) patients were treated with drug only.

Table 5: Distribution of Gestational age, Mode of delivery, Indication of CIS & Complications between both group

Variables	Diabetic group(n=30)		Control group(n=30)		X ²	p-value
	Number	Percentage	Number	Percentage		
Gestational age(wks)						
32-34	04	13.33	03	10		
35-37	11	36.67	05	16.67		
38-40	15	50	20	66.67	2.431	0.297
>40	00	00	02	6.67		
Mode of delivery						
Vaginal delivery	03	10	21	70	22.54	0.000
Caesarean section	27	90	09	30	3	
Indication of C/S						
H/O previous C/S	14	46.67	03	10		
Fetal distress	04	13.33	05	16.67		
Pre-eclampsia	03	10	04	13.33	5.991	0.424
BOH	02	6.67	01	3.33		
Complications						
Postpartum haemorrhage	01	3.33	03	10		
Urinary tract infection	03	10	01	3.33	7.264	0.297
Puerperal sepsis	04	13.33	02	6.67		

P Value < 0.05 is significant

X²= chi square charts = significant, NS=not significant

Table 5 shows that the gestational age of 15 patients (50%) in the diabetic group, and 20 patients (66.67%) in the control group were between 38-40 which was significant. 27 patients (90%) in the diabetic group had done Caesarean section. Where's only 09 patients (30%) in the control group had done a Caesarean section which was highly significant. 46.67% of patients in the diabetic group had H/O previous C/S while only 10% of patients in the control group had H/O previous C/S which was statistically significant. 10% of patients in the diabetic group had UTI as a post-partum complication while 3.33% of patients in the control group had UTI as a post-partum complication that was statistically not significant.

Table 6 shows that 85.18% of patients in the diabetic group had a healthy baby while 88.88% of patients in the control group had a healthy baby which was statistically not significant.

Table 6: Comparison of Neonatal outcome of Caesarean section between the groups

Variables	Diabetic group(n=27)		Control group(n=09)	
	Number	Percentage	Number	Percentage
Neonatal outcome				
Healthy baby	23	85.18	08	88.88
Refd. To neonatal ward	03	11.11	01	11.11
Perinatal death	01	3.70	00	00
Prematurity	10	37.03	08	22.22
Respiratory distress syndrome	01	3.70	00	00
Birth asphyxia	02	7.40	01	11.11
Macrosomia	02	7.40	00	00

7.40% of patients in the diabetic group had macrosomic babies but no patients in the control group had macrosomic babies. Birth asphyxia was present in 7.40% baby in diabetic mothers and 11.11% in the control group but that was statistically not significant.

Table 7: Comparison of different neonatal parameters between two group

Variables	Diabetic group(n=30)		Control group(n=30)		X ²	p-value
	Number	Percentage	Number	Percentage		
Birth weight in Kg						
1.5-2.5	01	3.33	21	70		
2.6-3.5	25	83.33	09	30	30.04	0.000
3.6-4.5	04	13.33	00	00	1	
Appgar score						
At 1st minute						
0-6	04	13.33	02	6.67	23.14	0.001
7-10	26	86.67	28	93.33	1	
At 5th minute						
0-6	03	10	01	3.33	63.25	0.000
7-10	27	90	29	96.67	8	

Table 7 shows that 83.33% baby in the diabetic group had birth weights of 2.6-3.5 kg while 30% of patients in the control group had birth weights of 2.6-3.5 kg which was statistically highly significant. At 1st minute 13.33% baby in the diabetic group had APGAR score 0-6 and 6.67% baby in control group had APGAR score 0-6 but At 5th minute only 10% baby in diabetic mother and 3.33% patients in control group mother had APGAR score 0-6 but that was statistically significant.

Discussion

Diabetes in pregnancy may pose some challenges for both mother and baby. Despite achieving near normoglycaemia, poor maternal and fetal outcome remains a real risk among pregnant diabetic women. Diabetes is associated 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.

Management of the pregnant diabetic woman is a complex task that ideally begins before conception. Postpartum complications include obesity and impaired glucose tolerance in the offspring and diabetes and cardiovascular disease in the mothers. Management strategies increasingly emphasize optimal management of fetal growth and weight. Monitoring of glucose, fetal stress, and fetal weight through ultrasound combined with maternal medical nutritional therapy, physical activity, and weight management, pharmacotherapy can decrease comorbidities associated with DM. This study aimed to assess Diabetes Mellitus in Pregnancy and its outcome in Rangpur Medical College Hospital, Rangpur. This study was carried out in the Department of Obstetrics and Gynaecology at Rangpur Medical College Hospital.

Rangpur. This is a tertiary academic hospital and deals mainly with referred cases. In this study, a total of 5075 obstetrics patients were admitted to Obstetrics and Gynaecology department out of which 32 (0.63%) patients had DM. Nirmala Kampan et al, [6] over a year's study shows that 5.3% of women were diabetic which is higher than this study. All India Institute of Medical Science, over seven years study had shown the incidence 0.52% [7] which is approximately similar to this study. In the present study, shows that among 30 patients majority (n 16, 53.33%) were between the 26 and 30 years of age group. The second highest group belonged to >30 (n 14, 46.67%) which is approximately similar to the study performed by Emmanuel O[8] shows that the age range for mothers with diabetes was 18-39 years with a mean age of 28.6 years.

It may be explained in this way that increasing maternal age might be a risk factor for DM. Hayfaa A Wahabi [9] shows that compared to non-diabetic women those with PDM were significantly older, and of higher parity which is approximately similar to this study. In socio-economic study (n = 18, 60%) women were from average, (n = 02, 6.67%) from below average (n = 10, 33.33%) from above average whereas in control group (n 07, 23.33%) from average, (n = 22, 73.33%) from below average and (n = 01, 3.33%) from above average. It may be explained by this way that advance higher socio-economic status might be a risk factor for DM. 11 patients (36.67%) in the diabetic group were SSC passed, 06 (20%) were primarily educated, whereas 13 patients (43.33%) in control group were primarily educated and 06 (20%) were SSC passed. The level of education of the patients had a significant relation with incidence of DM. 100% of patients in the diabetic group had ante-natal care before delivery, while only 86.67% of patients in the control group had ante-natal care regularly.

Because the majority had regular antenatal checkups, so outcome is good in the present study in respect of both maternal and perinatal due to early diagnosis and timely intervention. 14 (46.67%) patients had average BMI, 12 (40%) patients were overweight and 04 (13.33%) patients were obese. Whereas in the control group, 25 (83.33%) had normal BMI 05 (16.67%) were overweight which is approximately similar to this study. Nirmala Kampan et al. [6] In 1995, Moses et al [10] study shows that 12.3% of the women had body mass index of 30 kg/ m² which is almost similar to this study. This study shows that in the diabetic group, 33.33% had a positive family history of diabetes, 13.33% had obesity 53.33% were above 30 years while in the control group, 6.67% had a positive family history of diabetes and none had obesity as compare to Ahia Garshasbi,[11] where 18.3% had a positive family history of diabetes.

In present study shows in past obstetric history where 04 (13.33%) patients had a history of delivery of macrosomic baby, 01 (3.33%) patient had a history of perinatal loss, and 14 (46.67%) patients had an abortion among 30 patients. But in the present pregnancy because they (96%) had antenatal care regularly and were diagnosed with GDM & DM and treated there is only one perinatal loss.

In Farhana J [12] study of 88 DM, 30 patients had a family history of diabetes, 10 patients had a history of perinatal loss, 10 patients had a history of abortion and 10 patients had a history of delivery of macrosomic baby. The treatment modality was during an antenatal period where 20 (73.33%) patients were treated with drugs and 08 (26.67%) patients were treated with diet only. In both groups, blood sugar levels were controlled which is consistent with Syed Habeebullah [13] where 90% achieved glycemic control with insulin only after 35 weeks of gestation. In table shows certain complications that occurred during pregnancy among this study group. Pre-eclampsia developed in 03 (10%) cases in a diabetic to 04 (13.33%) in control.

The group which is much higher than Nirmala Kampan et al, The incidence of vulva vaginitis 04(08%) in diabetic to none in the control group Which is much lower to Nirmala Kampan et al, [6] In present study shows 15 (50%) patients delivered between 38-40 completed weeks, 11 (36.67%) patients delivered between 35-37 completed weeks and 04 (13.33%) between 32-34 completed weeks where in control group 20 (66.67%) delivered between 38-40 weeks 05 (16.67%) patients delivered between 35-37 completed weeks and 03 (10%) between 32-34 completed weeks. The incidence of preterm delivery was similar in this study as compared to Nirmala Kampan et al, [6] due to preterm labour, PROM, fetal distress, uncontrolled GDM, severe pre-eclampsia and previous CS with scar tenderness and some of the patients had uncontrolled HbA1C. Our study shows diabetic group 03 (10%) patients had a vaginal delivery and a large number of patients, 27 (90%) had C/S as compared to 21 (70%) had vaginal delivery & 09 (30%) had undergone C/S in the control group. C/S was higher in this study which is similar to Nirmala Kampan et al. [6] Our study shows that the higher incidence of caesarean section was 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 perinatal loss and abortion and to avoid unexplained fetal death which mostly occurs in later part of pregnancy which is similar to Nirmala Kampan et al. [6] The long-term postpartum complications could not be assessed patients who delivered vaginally because most of them were discharged within 7 days and none of them came for postnatal checkup.

Among 27 patients who were delivered by C/S. 22 patients did not have any complications. Among 05 patients, 01 patient developed post-partum haemorrhage which coincides with the result given by Arias F in his book. [14] The higher incidence of PPH is due to polyhydramnios macrosomia and large placenta. The incidences of infections (UTI) were 10% which is similar to Nirmala Kampanet al. [6] this study shows that perinatal morbidity was found in 16.67% of cases. Prematurity was found in 50% which was within the gestational age of 32-37 weeks. Fetal macrosomia was observed in 32% of GDM women as compared to 6.8% in control similar to Nirmala Kampan et al, [6] the lower incidence of macrosomia and respiratory distress syndrome in this study is due to good glycemic control. This study shows that in the diabetic group birth weight of neonates was 3.6-4 kg in 04 (13.33%), 2.6 - 3.5 kg in 25 (83.33%), 1.5-2.5 kg in 01 (3.33%) as compared to (0%), 09 (30%) and 21 (70%) in control group respectively.

There were only 02 (6.67%) cases of fetal macrosomia (an estimated fetal weight equal to or larger than 4000 gm) found in this study. In a study by Nirmala Kampan et al, [6] it is similar to the mean birth weight of the baby of the diabetic mother which is higher than the control group. NICU admission was 05 (16.67%) in the diabetic group, and 03 (10%) in the control group which is similar to Nirmala Kampan et al, [6] If recent recommendations for diagnosis are adopted, DM is considered to become one of the most common comorbidities of pregnancy. Close attention to fetal growth and stress in conjunction with maternal glucose and weight monitoring during pregnancy, appears to minimize adverse outcomes. Further studies in the prenatal period are needed to establish the optimal glucose and weight targets to minimize adverse outcomes and the timing and dose of pharmacotherapy. Further studies in the postpartum period are also needed to establish the intervals and assays for postpartum screening and the effectiveness of interventions for diabetes prevention in the mother and off spring.

Limitation

- The short duration of the study and small sample size.
- The long-term postpartum complications could not be assessed in patients who delivered vaginally because most of them were discharged after 24 - 48 hrs of delivery.

- As the patients were hospital admitted and it was a tertiary level hospital, the rate of C/S was increased.

Conclusion

In this study, details of patient presentation, management, complication and the mode of delivery in patients with DM have been studied and compared with other studies. Incidence of DM is directly proportional to a positive family history and BMI more than average. Caesarean section deliveries were significantly higher and may be due to referral hospital and other complications such for example, H/O previous C/S fetal distress, pre-eclampsia, BOH and obesity.

What does the study add to existing Knowledge: A study with a large number of study subjects may be undertaken. Labour room facilities with modern equipment for example Ultrasonography, NST, CTG and colour Doppler will be more informative, beneficial and will be helpful for vaginal delivery and hence C/S rate may be reduced.

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Yes

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