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Complications, Prevalence, Clinical Presentation Of Diabetes Mellitus In Obstetrics Patients Attending A Medical College Hospital

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ABSTRACT:
INTRODUCTION: *Prevalence of the diabetes among pregnant women is increasing, attributable to advance maternal age, multi foetal gestation, increased body mass index, strong family history, sedentary life style, change in the diet, continued immigration. Gestational diabetes has few symptoms, commonly diagnosed by screening during pregnancy.*
MATERIALS AND METHODS*: A descriptive observational study was conducted in the Department of Obstetrics and Gynecology, MGM Medical College, Jamshedpur from January 2017 to December 2017. The pre-existing medical disorders, blood sugar, routine antenatal investigations, type of delivery, ultrasound findings, complications of delivery, foetal outcome etc. were recorded. The participants were advised diet, exercise and pharmacotherapy. The intranatal and postnatal events were recorded. The results were compared with related literature.*
RESULTS: *Gestational diabetes mellitus was diagnosed in 71.9% of the study patients, a past history of diabetes mellitus was recorded in 81.34% of the study patients, and 49.2% of the patients were admitted at 8–12 weeks of gestation for diabetic control. The mean weight gained in pregnancy was significantly higher for control patients (11.52±5.643 versus [vs] 9.90±5.757 kg/m^2;* P*<0.009), and the body mass index of study patients was higher (32.00±6.160 vs 28.20±5.885 kg/m^2;* P*<0.0001). Of the study population, 64.3% of the patients were managed with diet and increased physical activity and 35.7% with insulin, diet, and increased physical activity. The incidences of maternal morbidity in both study and control groups were comparable, and the incidence of preeclampsia was low, at 2.3%. The gestational age at delivery was higher in the control group (39.02±1.834 weeks vs 38.62±1.773 weeks;* P*<0.0001), and the percentage of cesarean deliveries was higher in the study population (44.4% vs 33.3%;* P*=0.046). The Apgar scores of the both groups were comparable and in the normal range, and the incidences of fetal anomaly (1.17%), shoulder dystocia (1.8%), and Erb's palsy (1.8%) were low.*
CONCLUSION: *It is essential to ensure compliance on all three pillars of management of diabetes viz. diet, exercise and insulin during pregnancy. Hence health education for diabetes with special emphasis on obstetric care in pregnancy with diabetes should be promoted.*
KEY WORDS: *diabetes, preeclampsia, Gestational diabetes mellitus*

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I. Introduction:

Gestational Diabetes mellitus (GDM) is defined as pregnant women with any degree of carbohydrate intolerance, which is first recognized during pregnancy only. In October 1979, Dr. Norbert Freinkel (representing the American Diabetes Association) and Dr. John Josimovich (representing the American College of obstetricians and gynaecologists) met in Chicago at the First International Workshop Conference on Gestational Diabetes Mellitus. Between this conference and the reclassifications from the National diabetes data group, gestational diabetes as on official clinical entity was born. It is now defined as, "Carbohydrate intolerance of variable severity with onset or first recognition during the present pregnancy. The definition applies whether insulin is used for treatment or the condition persists after pregnancy but does not exclude the possibility the glucose intolerance may have antedated the pregnancy."[1] The importance of GDM is that 2 generations are at risk of developing diabetes. Women with history of GDM are at increased risk of future diabetes, as are their children.

The pregnancy of diabetic woman carries significantly greater risk for spontaneous abortion, stillbirth, congenital Malformations and perinatal morbidity and mortality.

A foetal and neonatal Mortality rate was as high as 65% before the development of specialized maternal and neonatal care. Over the past three decades, Practitioners have sought to improve the outcome of diabetic pregnancies. So that, the results approach closes to those of non-diabetic Pregnancies.

II. Materials And Methods:

One hundred eighty patients with diabetes mellitus who had singleton pregnancies were identified as the study population. These patients, admitted for induction of labor between January 2017 to December 2017 were recruited as soon as they were admitted into the labor ward of the medical college hospital Jamshedpur. Another 180 patients with singleton pregnancies and no medical complications who were also admitted into the labor ward of the Maternity Hospital for induction of labor during the same period, immediately after the index study patients, served as the control population. The patients who were admitted with diabetes mellitus in pregnancy were those previously diagnosed antenatally as having pre-gestational diabetes mellitus (type 1 or type 2 diabetes mellitus) or GDM. The diagnosis of GDM was based on the detection of the following: at least two abnormal blood glucose results higher than the normal ranges for our laboratory (subsequent to a 75 g oral glucose tolerance test [OGTT] preceded by a 12 hour overnight fast); this modality of OGTT is based on the World Health Organization recommendations.[26] The normal blood glucose ranges for our laboratory at the time of the study after OGTT were fasting blood glucose levels of 5.3 mmol/L or lower; first hour levels of 10 mmol/L or lower; and second hour levels of 8.6 mmol/L or lower.

The study and control patients were interviewed at admission to the labor ward by two of the authors. Informed consent was obtained from the patients. Official approval was obtained from the Hospital Scientific Committee before the commencement of the study, which was carried out following the principles in the Declaration of Helsinki.

The biodata of the study patients and control patients were documented. Details of antenatal events, including the total weight gained all through pregnancy, the weight profile of the patients, any antenatal complications, the management followed, and the course of the current index pregnancy, and all the events antedating the onset of admission were also extracted from the medical files and recorded. The patients' past gynecological, obstetric, medical, and surgical history, as well as their family and social history, also were obtained from the files by the same two authors, who also performed complete physical examinations on all of the patients. The patients were monitored throughout the labor and puerperium. The intrapartum course of the patients and the gestational age at delivery, any antenatal/intrapartum complications (pregnancy induced hypertension/pre-eclampsia/premature rupture of membranes/pyrexia, etc), mode of delivery, fetal complications in labor, Apgar score, fetal birth weight, and the perinatal outcome were documented. The postpartum course of the patients was followed-up and documented.

III. Statistical Analysis

The information and the data collected from and on the study and control patients were analyzed using SPSS version 19 (IBM Corporation, Armonk, NY, USA). The statistical analyses were performed using the χ^2 test, Fisher's exact test, and Student's *t*-test; *P*-values ≤ 0.05 were regarded as significant.

IV. Results

Event	Study population (180)	Study population (180)
Age (years)	30.82±4.642	29.21±2.678
Parity (ranges)	2.17±1.791	1.45±1.496
Miscarriages	0.32±0.415	0.45±0.367
Mean weight, kg	79.56±15.312	73.45±12.45
Total weight gained, kg	8.80±4.67	10.67±4.752
Body mass index, kg/m^2 (range)	30±5.760	26.30±4.675

Table 1: patient demographic characteristics

Event	Cases(n)	Prcentage
Types of diabetes mellitus		
Gestational diabetes mellitus	123	68.33
Insulin dependent diabetes mellitus	21	11.66
Impaired glucose metabolism	27	15
Treatment offered		
Insulin injection and diet	61	33.88
Dietary control only	110	61.11

Table 2: Type of diabetes mellitus and treatment administered (n=180)

Event	Cases(n)	Percentage
Previous GDM	40	22.22
Previous NIDDM	106	58.88
Previous IDDM	18	10
Previous big babies	17	9.44
Previous SB	4	2.22
Previous NND	2	1.11
History of recurrent moniliasis	10	5.55
History of infertility	15	8.33

Table 3: Significant events in the past obstetric history of the study population (n=180)

Complication	Study (N:180)	Control (N:180)
Premature rupture of membranes	30 (16.66)	16(8.88)
Oligohydramnios	14(7.77)	4(2.22)
Preeclampsia	5(2.77)	391.66)
Polyhydramnios	8(4.44)	1(0.55)
Placenta previa	8(4.44)	0(0)
Intrauterine growth restriction	6(3.33)	0(0)
Threatened miscarriage	4(2.22)	2(1.11)
Urinary tract infection	0(0)	30(16.66)
Postpartum hemorrhage		
Post dates		

Table 4: Antenatal/intrapartum complications: study and control population

V. Discussion

GDM was the most frequently reported clinical type of diabetes mellitus in pregnancy: 71.9% of the patients presenting with diabetes mellitus in pregnancy in this clinical study were classified as GDM, and 12.3% patients had insulin-dependent diabetes mellitus (type 1 diabetes mellitus). The incidence of GDM reported in this study is comparable with the incidence of 90%1,8,11 and much higher than the rate of 34.8% previously reported from the subregion.27 The prevalence of GDM is increasing worldwide and has been linked to ethnicity/race, maternal age, and increasing obesity, which is a modifiable risk factor.1,8,28,29 In the current study, although ethnicity did not play a significant role in the study, the Kuwaiti ethnic group demonstrated the highest incidence of diabetes.

The mean weight at booking and the mean BMI were significantly higher in the study population compared with in the control group (P<0.0001), thereby indicating a higher incidence of obesity in the patients presenting with diabetes mellitus. The mean weight at booking and the BMI of all the three subgroups were also comparable, confirming the occurrence of obesity in all the subgroups of patients presenting with diabetes mellitus in pregnancy. The age and parity of the study patients, as well as of the patients in the subgroups of GDM and type 1 diabetes mellitus, were significantly higher than in the control group. It is common knowledge that the weight of most women of reproductive age increases gradually with increasing age and parity; although these two factors may have played a role in both the study and control patients, leading to the obesity and high BMI reported, they may have had a much greater effect on the study patients, thus contributing to the higher rate of obesity and the higher BMI of the study group. Many authors have emphasized the strong link between GDM and obesity.1,8,30

The incidence of diabetes mellitus (particularly type 2 diabetes) and obesity is increasing in Kuwait, particularly in the Kuwaiti ethnic group (14.5%),24 and this may be contributing directly to the high incidence of GDM in pregnancy reported in this study. It is pertinent to emphasize that in the current study, a past medical history of type 2 diabetes mellitus and GDM was volunteered by 62.6% and 22.8% of the patients, respectively. One could deduce from the information in the past history that many of our patients presenting as GDM were most probably previous cases of type 2 diabetes mellitus who became unmasked by the diagnostic screening in pregnancy. The association between GDM and type 2 diabetes mellitus is further emphasized by previous reports that have stated that 5%–10% of GDM could be previously undetected cases of type 2 diabetes mellitus31 and 10%–15% of women with GDM develop type 2 diabetes within 5 years.32

Patients with diabetes mellitus in pregnancy in this study did not present with classical triad of polyphagia, polydipsia, and polyuria. The symptomatology was vague and the diagnosis was usually confirmed after diagnostic tests (OGTT). Whereas diet supplemented with increased physical activity/blood glucose monitoring is the mainstay of the treatment of GDM,1,4,8,33 insulin injections combined with dietary control and increased physical activity and blood sugar monitoring are very important additional measures in the treatment of diabetes mellitus in pregnancy.1,4,6,8,10,17,23,28 In the current study, 64.3% of the patients were managed on diet and enhanced physical activity, and 35.7% were managed on insulin injections, diet, and increased physical activity.

Although there was no definite information on pre-pregnancy counseling in our patients, it is pertinent to state that 49.2% of the patients were admitted in the first trimester (8–12 weeks) for careful control of diabetes, which usually included blood glucose monitoring and addition of insulin injections as required, a finding that tends to exclude any significant pre-pregnancy counseling/control of blood glucose. In all, 88.5% of the patients were admitted during pregnancy for blood glucose monitoring and diabetic control, including monitoring of glycosylated hemoglobin A_{1c} levels and ensuring that they were maintained in the normal range. The mean weight gained all through the pregnancy was significantly lower in the study population (P<0.009); this trend was also demonstrated in the subgroups of diabetes mellitus (GDM and type 1 diabetes mellitus), as reflected in Table 2, subsequent to further analysis of the study population. This indicates a positive effect of the treatment measures introduced in the care of the patients, which placed great emphasis on the reduction of weight gained in pregnancy.

An increased incidence of maternal complications such as chronic hypertension and preeclampsia have been reported in pregnancies complicated by diabetes mellitus.1,8,28,33 The incidence of preeclampsia in previous studies on GDM has ranged from 4.8%34 to 15%10; the efficacy of glycemic control has also been associated with the incidence of preeclampsia: Whereas a satisfactory fasting blood glucose was associated with 7.8% incidence of preeclampsia, an unsatisfactory fasting blood glucose was associated with a higher incidence of preeclampsia (13.8%).35 In our study, the incidence of preeclampsia (2.3%) was much lower than the incidences reported earlier; this may be a result of the overall adequate glycemic control that was reported in our study. The other maternal complications reported in this study (oligohydramnios, intrauterine growth restriction, placenta previa, and postpartum hemorrhage) were directly related to preexisting morbidities in some of the patients in our study population, such as the higher incidence of repeat cesarean sections in the study populations (diabetic patients and preexisting type 1 diabetes mellitus in some patients).

There was a significantly higher incidence of cesarean section (P=0.046) and ventouse delivery (P=0.047) in the study population compared with in the control population (the control patients were admitted for induction of labor, an event usually associated with increased rates of operative delivery, such as cesarean sections and instrumental deliveries), in spite of the gestational age at delivery being significantly higher in the control population (P<0.0001) and there being no significant difference in the birth weight of the babies (P=0.139). The incidences of operative delivery were also higher in the three subgroups of diabetes mellitus when compared with the control group. Some studies on GDM have reported a reduction in the incidence of cesarean section19 or no change in the incidence of cesarean section,10 whereas some other reports have linked an increased incidence of cesarean section with GDM,6,28 especially where fetal macrosomia is present, as was observed in this study. It is pertinent to emphasize here again that there was no significantly increased incidence of fetal macrosomia in the study (the incidences of fetal macrosomia in the study and control populations were not significantly different; P=0.512). A number of other factors, apart from the diagnosis of diabetes mellitus in our study population, may have contributed to the higher incidence of cesarean sections reported in the study population. These include the higher BMI, age, and parity of the study population compared with the control patients.

The Apgar scores of the study and control patients were comparable and satisfactory. However, significantly higher incidences of newborn admissions to the Special Care Baby Unit and Neonatal Intensive Care Unit were reported in the study population. These admissions may have been more readily encouraged because the attending neonatologists were aware of the diagnosis of diabetes mellitus in the mothers and they were taking extra measures to ensure adequate care and monitoring for these newborns, especially in the light of the fact that hypoglycemia is a well-documented risk in babies of diabetic mothers. The incidence of hypoglycemia in neonates of diabetic mothers has been quoted as 15%–25%.36,37 No major adverse effects were reported in these newborn babies. The incidence of shoulder dystocia (1.8%) and Erb's palsy (1.8%) was quite low and comparable to data from previous reports.6,10 There were no perinatal deaths reported in the study.

GDM was the most predominant type of diabetes mellitus in pregnancy seen in the current study and has been associated with adverse fetal and maternal outcomes.4,6,8,10,19,28 Such outcomes will be particularly increased in the absence of treatment or adequate control of blood glucose in GDM.23 In our study, adequate glycemic control was generally attained, which would have played a role in the lower maternal and perinatal morbidity reported, and thus a less adverse fetal and maternal outcome. In the absence of adequate or effective pre-pregnancy counseling, most patients with type 2 diabetes mellitus will present in pregnancy as GDM.28,30,32 In our study, there was quite a high incidence of previous history of type 2 diabetes mellitus. Hence, one could deduce that the majority of our cases of GDM were probably cases of type 2 diabetes mellitus unmasked by the increased screening for diabetes in pregnancy, especially in the absence of significant pre-pregnancy counseling/care in our center, as alluded to earlier.

The main weakness of our study was the fact that the study was conducted on patients presenting in the labor ward, which was the final phase of the obstetric history of these patients in the index pregnancy under

review, and this may have affected some of the antenatal data collected on these patients, as these antenatal data were collected retrospectively from the patients and from their case records. The monitoring of the patients in labor has contributed positively to our ability to document very accurately the intrapartum and postpartum events. This opportunity, which could be seen as the major strength of this study, has enabled us to document the acute events of labor and the puerperium in the diabetic patients who were studied. A longitudinal study on diabetes mellitus in pregnancy, commencing prenatally where possible and extending through the antenatal, intrapartum periods, and ending in the puerperium is planned for the future.

GDM is the main clinical type of presentation of diabetes in pregnancy in our department, and the clinical triad of polyphagia, polydipsia, and polyuria, the main hallmark of the presentation of clinical diabetes mellitus, was not reported in this study. Emphasis on effective glycemic control and close monitoring of our patients has contributed positively and had a positive effect on the favorable maternal and perinatal outcome reported in this study. The high incidence of cesarean section calls for greater drive to identify areas of weakness in the overall care of our patients.

VI. Conclusion

It is essential to ensure compliance on all three pillars of management of diabetes viz. diet, exercise and insulin during pregnancy. Hence health education for diabetes with special emphasis on obstetric care in pregnancy with diabetes should be promoted.

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