Original Article

Pregnancy outcome with controlled gestational diabetes: A single centre experience

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ABSTRACT

Objectives: This study aimed to analyze maternal and neonatal short term outcomes in pregnancies complicated by gestational diabetes mellitus (GDM) and well controlled by management.

Methodology: The data about all singleton pregnancies with diagnosis of GDM was retrospectively retrieved from patients' files from 1st Nov 2007 to 30st April 2008 by the department of endocrinology, Alnoor Specialist Hospital, Makkah, Saudi Arabia. The diagnosis of GDM was made according to O'Sullivan and National Diabetes Data Group (NDDG) criteria. Descriptive analysis of data was done by Microsoft Excel version 7 on personal computer. Discrete and continuous data were expressed as median (range), and categorical data as number (percentage).

Results: Incidence of GDM was 94(6.1%) out of total deliveries but 78 GDM cases were included as study subjects. Maternal and neonatal morbidity was 25(32%) and 23(29.5%). Subjects age was 35years (23-47), while majority were multipara, i.e., 39(50%). Highest BMI was seen in third trimester, i.e., 32.3(28-35.7), and subjects' hemoglobin was 10.7(8.5-12.8). Cesarean section rate was 20(25.6%) while 15(19.2%) developed pregnancy induced hypertension. However, 11(14.1%) neonates were admitted to neonatal ICU followed by neonatal hypoglycemia 19(24.4%). Fifteen (19.2%) neonates suffered from respiratory distress.

Conclusion: Incidence of GDM was 6.1%. Pregnancies with even controlled GDM are associated with adverse maternal and fetal outcomes.

KEY WORDS: Gestational diabetes mellitus, Complications, Pregnancy outcome.

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INTRODUCTION

Gestational diabetes mellitus (GDM) is defined by American Diabetic Association (ADA) as first recognition or any degree of glucose intolerance with onset during pregnancy.[1] As mentioned in the study of Al-Khalifa et al, 8.9% to 12.5% of all pregnancies have been affected by abnormal glycemic control in Saudi Arabia[2] but according to review of Ramos-Lev´ı et al, it has been reported between 1-17.8% in different ethnic populations.[3]

According to a large-scale multinational epidemiologic study, the risk of adverse maternal and perinatal outcomes constantly increased as a function of maternal glycemia at 24-28 weeks of gestation. No threshold for the majority of these complications was found, but prevention and early detection of GDM is a growing worthy health concern.[4]

As explained in the study of Ayaz et al, continuous rise of maternal glucose level during pregnancy cross the placenta and results in fetal hyperinsulinaemia which then causes macrosomia and increases the risk of shoulder dystocia or

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traumatic delivery. Furthermore, hypoglycemia, respiratory distress and neonatal jaundice are the usual threats faced by infant of diabetic mother.[5]

Women with GDM create an important public health problem because of worse pregnancy outcome. These women and their infants become more prone to develop diabetes mellitus and other diabetic related complications later in their life.[6]

We aimed our study to analyze maternal and neonatal short term outcomes in pregnancies complicated by GDM which was controlled by treatment.

METHODOLOGY

Settings: This retrospective descriptive study was carried out from 1st Nov 2007 to 30st April 2008 in the department of endocrinology, Alnoor Specialist Hospital, Makkah, Saudi Arabia, a 550 bedded tertiary care referral teaching hospital, with an average annual delivery rate of 2700.

Inclusion Criteria: Data was retrieved for all singleton pregnant women with positive Oral Glucose Tolerance Test (OGTT) after the first trimester during pregnancy with unknown pre-pregnancy diabetes status. Subjects with positive OGTT in first trimester with negative pre-pregnancy diabetes status were also included.

Exclusion Criteria: All GDM women with history of risk factors who had other medical disorders like; anemia, asthma, epilepsy, pre-pregnancy hypertension, thyroid dysfunction, and heart problems, which may have some effects on pregnancy outcome were excluded. The pregnant women known to have diabetes mellitus before pregnancy or who have OGTT positive in first trimester of pregnancy with unknown pre-pregnancy diabetes status were also excluded because diagnosed pregnant women with GDM in the first trimester are considered to have Type 2 DM.[7,8]

Diagnosis of GDM: Data regarding diagnosis of GDM was retrieved from record. Glucose challenge test with a 50g glucose load,[9] was done for every subject with one or more risk factors (family history of diabetes mellitus in first degree relative, age ≥35 years, past history of GDM, repeated miscarriages, unexplained still births and previous macrosomic or congenitally malformed baby), by capillary blood drop using a glucose oxidase kit if positive then (OGTT) was done as per instructions from NDDG.[10] OGTT was repeated in subsequent visits for the woman who had negative OGTT in first visit. OGTT was done by venous plasma blood sample with the help of Chemistry analyzer.

GDM Control: Management of GDM included dietary control that was advised by a registered dietician for all women with GDM. Subjects' total calories/day was calculated according to 30-35 cal/kg of body weight followed by diet charts. Insulin treatment was initiated and adjusted in subjects with failed dietary therapy (>2 weeks) to maintain the fasting whole blood glucose level between 70-100 mg/dl and two hours post-parandial less than 140 mg/dl according to American Diabetes Association criteria.[1]

Obstetrical Management: Obstetrical management included, baseline investigations that were carried out in all patients at the time of enrollment like; hemoglobin, blood group and Rh factor, complete examination of urine, ultrasonography. Liver function tests, serum uric acid and renal function tests were advised based upon indications. At each antenatal visit, glucose home monitoring (fasting and 2 hours post prandial) record was noticed, maternal as well as fetal health were assessed and patient was readmitted and managed accordingly in case of any complication. Ultrasonography (USG) was carried out early in pregnancy for fetal anomalies and was repeated if indicated. Elective caesarean section was reserved for diabetics with fetal macrosomia and emergency caesarean section for obstetrical indications.

Euglycaemia was achieved during labor and prior to elective caesarean section, by intravenous insulin via an infusion pump together with intravenous dextrose at a rate of 10 g/h, using 10% solution. Maternal plasma glucose levels were monitored hourly and insulin dose adjusted to maintain the blood glucose concentration between 70-110 mg/dl.[11] A pediatrician always assessed all newborn babies immediately after birth.

Operational definitions: Gestational age was estimated by ultrasound biometry (via CRL measurements in the first trimester of pregnancy) in cases where there was more than 3 days difference from that obtained from the last menstrual period (LMP).[12]

Pregnancy-induced hypertension (PIH): A blood pressure ≥140/90mmHg presenting at gestational age of >20 weeks or the first week after delivery, confirmed as of 6 hour later in a woman without a previous diagnosis of hypertension, or previous hypertension worsening during pregnancy and requiring additional treatment. *Perinatal mortality:* any fetal or neonatal death occurring from pregnancy of 22 weeks through the first 4 weeks after birth.[13] Neonatal hypoglycemia was declared after fulfilling the Cornblath and Reisner's criteria.[14]

Neonatal jaundice: hyperbilirubinemia requiring treatment.[15] All types of respiratory distress, including transient tachypnea, were considered. *Preterm birth:* a birth before 37 complete gestational weeks. Macrosomia was defined as a birthweight of >4000 g. *LGA newborns:* with a birth weight of >90th percentile for the corresponding sex and gestational age.[16]

Ethical Issues: The ethical approval was taken from institutional review board. I declare that I have no financial or personal relationship(s) which may have inappropriately influenced me in writing this paper

Data was analysed by using Microsoft Excel version 7 on personal computer and subjected to descriptive analysis. Discrete and continuous data were expressed as median (range), and categorical data as number (percentage).

RESULTS

During study period a total of 1550 deliveries took place. Total confirmed cases of GDM were 94(6.1%) out of total deliveries but 78 GDM cases were included as study subjects. Sixteen females were excluded from study because three had poor glycemic control while 10 did not have regular follow up and remaining had one or more medical disorders which may directly or indirectly affect outcome of pregnancy.

Maternal and neonatal morbidity was 25(32%) and 23(29.5%). Subjects' age (range) was 35 years (23-47), while majority were multipara, i.e., 39(50%). Highest body mass index (BMI) was seen in third trimester, i.e., 32.3(28-35.7), and subjects' hemoglobin was 10.7(8.5-12.8). (Table-I)

Table-I: Maternal Characteristics (n=78).

Variables	*(n=78)*	
Age	35(23-47)	
Parity	0	15(19.2)
	1	24(30.8)
	>1	39(50)
BMI (kg/m2)	Ist Tri	26.4(24-32.6)
	2nd Tri	28.7(25.2-33.2)
	3rd Tri	32.3(28-35.7)
Hemoglobin	10.7(8.5-12.8)	
‡OGTT (mg/dl)	Fasting	122(105-139)
	1 hour	216(199-339)
	2 hour	194(174-327)
	3 hour	147(144-257)

Results are expressed in median (range) or number (%)
Tri: Trimester.

Cesarean sections were performed in 20(25.6%) cases while 15(19.2%) developed pregnancy induced hypertension. On the other hand, 11(14.1%) neonates were admitted to neonatal ICU followed by neonatal hypoglycemia 19(24.4%). Fifteen (19.2%) neonates suffered from respiratory distress. (Table-II)

DISCUSSION

In this study, the incidence of GDM was 6.1%, while its prevalence in Qatar was reported as 16.3%, in United Arab Emirates as 20.6%, and in Behrain as 5.4%.[17-19]

The study of Gasim in Saudi Arabia was comparable to current study. Pregnancy outcome in women with GDM showed significantly raised incidences of hypertensive disorders, cesarean sections, LGA babies, macrosomia and NICU admissions compared with the non-diabetic mothers.[20] There was a strong evidence that the aggressive treatment of GDM can reduce the complications.[21]

The study of Al Khalifa compared the neonatal outcome of controlled GDM with normal pregnancies and found adverse outcome in GDM cases. This is comparable to our study and the study of Gasim.[2] The incidence of GDM was found to be 8.6% in one study of King Khalid University Hospital, Riyadh. Cesarean section rate was 21.6% while maternal morbidity was found to be 1.2%. The incidence of neonatal intensive care admission was 4.9% less than half from our results.[22]

The study of Napola A in Italy found results of pregnancy outcome by comparing the controlled GDM group with normal pregnant general

Table-II: Maternal and Neonatal Outcome (n=78).

Maternal Outcome (n=78)	
Cesarean section	20(25.6)
Pregnancy induced hypertension	15(19.2)
Pre-term delivery	14(17.9)
Prolonged rupture of membrane	12(15.4)
Ante partum hemorrhage	9(11.5)
Neonatal Outcome (n=78)	
5 minute APGAR score<7	6(7.7)
Large for gestational age	11(14.1)
Macrosomia	9(11.5)
Perinatal mortality	3(3.8)
Neonatal Hypoglycemia	19(24.4)
Hyperbilirubinemia	11(14.1)
Respiratory distress	15(19.2)
Neonatal ICU admission	11(14.1)
Congenital malformations	3(3.8)

Results are expressed in number (%)
Subjects have mixed complications

population. The rate of cesarean section and macrosomia was 34.9% vs. 33.2% and 8.7% vs. 7.4%, between controlled GDM group and general normal population, respectively. The stillbirth and neonatal mortality rates were also not different between the groups, i.e., 0.34% vs. 0.30%, p=0.176 and 0.29% vs. 0.32%, p=0.748, but the controlled GDM group had double the congenitally malformed newborns (2.05% vs. 0.89%, p<0.01). These results were contrary to our findings.[23]

The study in Qatar revealed that GDM had increased risk of developing PIH, pre-eclampsia, antepartum hemorrhage (APH), PROM, and C-section rate. Neonates of GDM mothers were not only more likely to be macrosomic but also congenital anomalies and birth injuries were considerably higher in them.[17]

CONCLUSION

Pregnancies with even controlled GDM are associated with adverse maternal and fetal outcomes. Incidence of GDM was 6.1%. High rates of cesarean section and neonatal hypoglycemia was most frequent among the complications. This study suggests that the reduction of complications can be significantly achieved either by strategies towards GDM prevention or early detection of complication with timely appropriate management.

RECOMMENDATIONS

A multi-centered study comparing the controlled GDM versus uncontrolled GDM of long duration or huge number of subjects should be carried out to make the final conclusion about the burden due to GDM morbidity that can ultimately help in decision making for Ministry of Health, Saudi Arabia to develop the necessary strategies towards its prompt prevention and aggressive management.

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