

MANAGEMENT AND OUTCOME OF DIABETIC PREGNANCY

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ABSTRACT

Objectives:

To observe the effects of management of diabetes on pregnancy outcome in terms of maternal morbidity, immediate neonatal morbidity and mortality.

Study design:

It was a descriptive study.

Place and duration of study:

Obstetrics and gynaecology Unit 2, Divisional Headquarter Hospital Punjab, Punjab Medical College, Faisalabad from January 2006 to December 2006.

Methods:

All patients following inclusion and exclusion criteria on the bases of history and clinical examination were selected.

Patients were managed with diet, exercise and insulin therapy for a period of 2 to 7 months. Fetal surveillance was done with cardiotocography and growth scans. Delivery was planned at 38 weeks of gestation according to cervical score, previous obstetrics and complications arising in current pregnancy. Main out come measures recorded and results calculated.

Results:

Sample size comprised 80 gestational and 20 pre gestational diabetics. Hypertensive disorders complicated 21% pregnancies. Hydramnios and pre term labor each was present in 13% of patients. The mode of delivery was abdominal in 56% cases. Three patients suffered from shoulder dystocia. Amongst 10 prenatal deaths 3 were due to congenital malformations, 4 were unexplained still births and 3 babies died in early neonatal period due to metabolic complications like hypoglycemia, jaundice and hypocalcaemia which occurred in 33% neonates.

Conclusion:

Prenatal counseling for established diabetics, screening and diagnosis for all pregnant population, good control from conception till delivery, antepartum fetal surveillance and appropriate neonatal support are the key to successful outcome in diabetic pregnancy.

Keywords: Diabetic pregnancy, management, fetal, maternal, outcome

INTRODUCTION

Diabetes mellitus is a syndrome that occurs as a consequence of insulin deficiency or peripheral resistance to its action leading to hyperglycemia.¹

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It is a common medical disorder which complicates about 3-4% of pregnancies of which 90% are gestational and 10% are pre gestational.²

Diabetes in pregnancy can result in significant long and short term consequences to both mother and fetus. These include hypertensive disorders, pre term labor, hydramnios, birth traumas, late still births and operative delivery.³ The complications effecting the fetus are congenital malformations, respiratory distress syndrome, macrosomia, intrauterine growth restriction and certain metabolic disturbances like hypoglycemia,

hypocalcaemia, hypomagnesaemia, polycythemia and jaundice.⁴ These complications impose a significant health and financial problem on individuals and society at large.⁵ Management of diabetic pregnant women continues to present a challenge to the physician, obstetricians and other persons involved in this care.

The centers that provide pre pregnancy counseling, screening for diabetes, good glycemic control from conception till delivery, close antepartum fetal surveillance and good neonatal care are able to reduce the rate of complications associated with diabetes.⁶

The availability of variety of insulins and improvement in glycemic control has revolutionized the care of diabetic pregnancy.⁷ Euglycemia is necessary to prevent chronic complications regardless of the type of diabetes.

Challenges still exist in caring the patients with pre gestational diabetes because very few of them receive pre pregnancy counseling and good glycemic control at the time of embryogenesis. Controversies still exist in screening, diagnosis and management of gestational diabetes. The goal is to improve pregnancy outcome minimizing fetomaternal risks while observing the optimal management of diabetic pregnancy and to promote healthy lifestyle changes that will help long after pregnancy.⁸

The rationale of the study is to observe the effects of management of diabetes on pregnancy outcome.

The purported significance of the study is that it will highlight the importance of strict glycemic control that will ultimately improve fetomaternal outcome.

METHODOLOGY

The study was conducted from January 2006 to December 2006 at the Obstetrics and Gynaecology Unit, Divisional Headquarter Hospital, Faisalabad.

All patients with pre-gestational diabetes in 1st, 2nd and early third trimester and gestational diabetics diagnosed after 75g oral glucose tolerance test were admitted for the management in antenatal ward after taking informed consent. Patients already having various medical disorders like chronic hypertension, renal disease and irreversible

complications in pregnancy like intrauterine demise and polyhydramnios were excluded from study. Detailed history was recorded. Baseline investigation like blood group and Rh factor, random blood sugar, complete examination of urine, viral markers and specific investigations like serum urea, creatinine, HbA_{1c} and ophthalmoscopy were carried out to assess the status of end organs. Pre-gestational diabetics were managed with diet, exercise and insulin intake. Insulin was given in two doses, morning and evening. Two third of total dose was given in the morning and one third at night. Morning dose included two third of the intermediate acting insulin and one third plain insulin. Evening dose had half of both intermediate and regular short acting insulin. Efficacy of control was checked by estimating blood sugar levels four times a day that is fasting, pre-lunch, pre-dinner and at bedtime. Gestational diabetics received insulin if they failed to achieve euglycemia with diet and exercise with the same regimen as described for pre gestational diabetes. Ultrasonography at 18-20 weeks was done to rule out congenital anomalies. Patients were monitored both at home and hospital. Monitoring for hypertensive disease was also part of optimal management. Need for admission was decided on individual bases depending upon complications during pregnancy, inability to achieve euglycemia at home and previous obstetric history. Fetal surveillance was started from 28-32 weeks and tests included non stress test and biophysical profile twice weekly, growth scan 2-4 weekly for biometry and amniotic fluid volume. All patients were admitted at 36 weeks and close monitoring was carried out till delivery. The frequency and timing of surveillance was dependent upon severity of disease and degree of glycemic control. Delivery was decided at 38 weeks according to obstetrical history, fetomaternal complications and Bishop score. Detailed neonatal examination was done by neonatologist for respiratory distress, congenital anomalies like cardiac and neural tube defects and metabolic abnormalities like jaundice and hypoglycaemia. Observations regarding maternal outcome was recorded in terms of hypertensive disorders, pre-term labor, hydramnias and operative delivery. Immediate neonatal morbidity and mortality was recorded on attached proforma in terms of still births, congenital anomalies and

metabolic abnormalities like jaundice, hypocalcaemia and early neonatal death. The mother and newborn were followed for at least one week after delivery.

The case records of these patients were maintained on predesigned Proforma having demographic details and other outcome measures like neonatal and maternal complications.

Data analysis was computer-based using SPSS Version 10. The frequency and percentages of hypertensive disorders, pre-term labor, hydramnios, operative delivery, congenital malformations, still birth, early neonatal death, dystocias and metabolic disorders like hypoglycemia, hypocalcaemia and jaundice were calculated. The comparison of our findings was done with other studies by using Chi square test.

Table 1. Distribution of abnormal glucose patterns

Type of diabetes	No. of cases	Percentage
Pre-gestational	20	20.00
Gestational	80	80.00

Table 2. Maternal age distribution in 100 cases

Age in years	No. of cases	Percentage
18-25	34	34.00
26-30	45	45.00
Above 31 years	21	2.00

Table 3. Gestational age at the time of diagnosis in 100 cases

Gestational age	No. of cases	Percentage
Before 20 weeks	9	9.00
28-30 weeks	71	71.00
After 30 weeks	20	21.00

Table 4. Maternal complications in 100 cases

Maternal complication	No. of cases	Frequency	%age	P. value
Hypertensive disorder	21	21	21.00	.000
Pre-term labour	13	13	13.00	.000
Hydramnios	13	13	13.00	.000
Operative delivery	56	56	56.00	.239

Chi-square value
 Hypertensive disorder = 33.640
 Preterm labour = 54.8
 Hydramnios = 54.8
 Operative delivery = 1

Table 5. Distribution of various maternal complication

Maternal complications	No. of cases	%age
Hypertension		
Pregnancy induced hypertensive	15	71.00
Pre-eclampsia	6	29.00
Hydramnios		
Mild	6	46.00
Moderate	7	54.00
Severe	0	00.00
Pre term labour		
Spontaneous	10	77.00
Introgenic	3	23.00
Mode of delivery		
Caesarean section	56	56.00
Vaginal delivery	44	44.00

Table 6. Indications of caesarean section in 56 patients

Indications of caesarean section	No. of cases	%age
Diabetes + cephalo pelvic disproportion	15	27.00
Diabetes previous one caesarean	14	25.00
Fetal distress	12	21.00
Malpresentation	6	11.00
Placenta previa	5	9.00
Multiple previous caesarean birth	4	7.00

Table 7. Causes of perinatal mortality in 10 babies

Causes	No. of cases	%age
Malformation	3	30.00
Un-explained	4	40.00
Early neonatal death	3	30.00

Table 8. Neonatal complications in 33 babies

Neonatal complications	No. of cases	%age
Hypoglycemia	33	100.00
Hypocalcemia	10	30.00
Jaundice	9	27.00

Table 9. Fetal complications in 100 diabetic mothers

Fetal complications	No. of cases	Percentage
Malformation	3	3.00
Still birth	4	4.00
Shoulder dystocia	3	3.00
Metabolic complication	33	33.00
Early neonatal death	3	3.00

- Chi-square value
- Malformation = 81.000
- Still birth = 83.5
- Shoulder dystocia = 83.36
- Metabolic = 11.560
- Early neonatal death. = 88.36

RESULTS

In this prospective and descriptive study of management and outcome of diabetic pregnancy conducted in Divisional Headquarter Hospital Faisalabad, 100 patients were included in 1 year period.

Out of 100 patients 80 (80%) were gestational diabetics diagnosed for the very first time in pregnancy after 75g oral glucose tolerance test and 20 (20%) were pre gestational diabetics. Sample size comprised 79 (79%) patients below the age of 30 years and 21 (21%) above the age of 30 years.

Seventy one patients (71%) were admitted between gestation of 28-30 weeks while 20 (20%) after 30 weeks and 9 (9%) before 20 weeks.

Hypertensive disorders complicated 21 (21%) diabetic pregnancies. Amongst these 15 patients (71%) encountered proteinuric hypertension that is pre eclampsia and the rest of women (29%) suffered from non proteinuric hypertension.

Preterm labour occurred in 13 (13%) of patients. Amongst these 77% (n=10) were spontaneous pre term labors and 23% (n=3) were iatrogenic due to certain other medical disorders like pre eclampsia.

Hydramnios was present in 13 patients (13%). Six of them (46%) were having mild hydramnios while 7 (54%) were suffering from severe hydramnios.

The mode of delivery was abdominal in 56% (n=56) patients. The most common indication of caesarean section in diabetic pregnancies was previous caesarean section and relative cephalopelvic disproportion (27%). Followed

in decreasing frequency by diabetes and previous 1 caesarean section 25% and fetal distress 21%. Abnormal fetal presentations, placenta previa, and previous multiple caesarean births contributed 11, 9 and 7% respectively.

Forty four patients (44%) were delivered vaginally. Of these 46% (n=20) had spontaneous delivery and remaining 54% had equal contribution of 27% (n=12) from forceps and vacuum extraction.

Three percent (n=3) ended up in terminations of pregnancies due to congenitally malformed babies.

Out of total No. of 7 still births (7%), 43% (n=3) were contributed by malformations and the rest 4 (57%) were unexplained deaths. Three patients (3%) had traumatic delivery in the form of shoulder dystocia.

Metabolic complications were present in 33 (33%) of neonates. Hypoglycemia in all 33 (100%) neonates, hypocalcemia in 10 (30%) and 9 (27%) babies suffered from neonatal jaundice.

Three neonates died in early neonatal period due to various metabolic complications mentioned above.

DISCUSSION

This descriptive study of observing the effects of management of diabetes on fetal and maternal outcome comprised both gestational and pre-gestational diabetics.

The study conducted had major interest in maternal morbidity, perinatal mortality and morbidity. These parameters have always been an index for the prevailing obstetric care in a certain community reflecting the need of better health care facilities.

In the present study, maternal complications effecting the diabetic mothers included hypertensive disorders, pre term labor, hydramnios, and operative delivery.

Hypertensive disorders developed in 21% of cases of the study population. The results are comparable to the local statistics that is the study conducted in Lady Willington Hospital, Lahore by Khadija Asif.⁹ The figure quoted by study conducted in the same institution in 2001 is higher which shows the improvement in antenatal care of the diabetic pregnancies in this hospital now a days.¹⁰ The results are also supported by B.C. Ozyuva¹¹ and Savona-

Ventura, A. Ellul and colleagues in St. Luke's Teaching Hospital.¹²

Higher incidence of pre-eclampsia in diabetic women is practically not related to glycemic control. It is the reflection of greater number of women with type 2 diabetes being missed during normal scrutiny of obstetric population. Higher incidence of pre eclampsia and non proteinuric hypertension in diabetic pregnancy is also highlighted in the study of Leguizamón GF and Zeff NP.¹³

Pre term labor and polyhydramnios, both were present in 13% of cases. The results are very much similar to study conducted by Sumera Tahir and Khadija Asif.^{9,10} The results correlates with the study performed by Zitian Fan that showed the incidence of pre term labor to be 8% in well controlled glycemia and 17% in poorly controlled group.¹⁴

Both these parameters are associated with poor diabetic control and complications of diabetic pregnancy. Intense actions should be under taken to reduce the risk of these complications focusing on strict euglycemia through out pregnancy and appropriate measures to prevent and treat pre term labor. These include administration of steroids with additional insulin requirement and use of tocolytics that are safe in diabetic pregnancies.¹⁵ In our under resourced settings, where neonatal intensive care facilities are not optimal, these 2 variables need to be improved a lot.

Obstetrical outcome showed increased rate of caesarean section in diabetic pregnancies. Overall 56% patients were delivered by caesarean section P value = (0.230) which is statistically insignificant. Similar patterns of results were also observed by Gulfshan Haque in Lyari General Hospital, Karachi¹⁶ and supported by the study of Savona-Ventura A. Ellul.¹² Reviewing the causes of caesarean sections it was observed that most important predictor of operative delivery was diabetes in current pregnancy along with previous caesarean section and cephalopelvic disproportion in many mothers due to good size babies. A review of the study of management and outcome of diabetic pregnancy shows that pregnancy outcome depends upon maternal glycemic control before conception and throughout pregnancy. Very few patients in our under resourced country get pre pregnancy care.

Diabetic pregnancy is an important cause of perinatal morbidity and mortality. More than half of perinatal deaths are contributed by South East Asia.¹⁷ Owing to this figure, it is extremely important to re evaluate the pitfall in our obstetric care and eliminate the salient causes of perinatal mortality. Diabetes is definitely one of the causes. Because of the high prevalence in this region, it has always been a difficult task to achieve.

The rate of congenital malformations, first contributor of perinatal mortality was 3%, which compares favorably with the results of a multicenter Italian study by Annunziata Lapolla and colleagues.¹⁸ According to the St Vincent's Declaration on outcome of diabetic pregnancies, the rate of congenital malformations is high as compared to the back ground population which also support my study.¹⁹

Local statistics by Nabeela Waheed in Holy Family Hospital Rawalpindi Medical College²⁰ and study of Sumera Tahir.¹⁰ The fact that if congenital malformations are removed from the figures of perinatal mortality, the statistics would essentially be the same as in non diabetic population, emphasizes the effects of improved obstetric and diabetic care. The malformations are preventable only by strategies introduced prior to pregnancy.

Our series of patients which comprised both gestational and pre gestational diabetics shows a perinatal mortality rate of 100/1000 total births with almost equal contribution of malformations, unexplained still births and early neonatal deaths.

The exact perinatal mortality rate in Pakistan is hard to define. Various studies quote the figure of 47/1000 to even 400/1000.²¹

The incidence of still birth is higher in established diabetes despite being subjected to intensive supervision even in advanced set ups.²² Still birth rate in study conducted in Civil Hospital Karachi also reported same results.¹⁶ We use methods of fetal surveillance which are definitely less superior due to our financial issues. Therefore our figure is justified. International reviews and audits give better results as compared to Pakistan, but the outcome of pregnancies in women with pre gestational diabetes in an ethnically mixed population studied at Obstetric and Gynaecology Department, Bradford Royal Infirmary declared that poor obstetrical outcome was seen in Pakistani immigrants.²³

Gillian C Penny, D Kernaghan, R Lee also highlighted similar facts.²⁴

Metabolic complications are major contributors of early neonatal deaths including hypoglycemia, hypocalcaemia and neonatal jaundice.²⁵

In my study 33% neonate suffered from these complications and most common was neonatal hypoglycemia with decreasing frequency of hypocalcemia and neonatal jaundice. This shows that risk of metabolic disorders is high in both GDM and established diabetes.

The Dutch study revealed that more than 40% of neonates encountered hypoglycemia²⁶ in 17% of the infants of Newcastle and 8% from Austria. Gonzalez-Quintero VH also reported poor neonatal outcome in neonates of mothers with poor diabetic control.²⁷

Literature evidence is fairly clear that neonatal hypoglycemia is most closely linked to the diabetic control during labour and delivery. Best methods have yet to be achieved to overcome this problem.

The incidence of shoulder dystocia was 3%. All the cases were reported in patients who discontinued antenatal care despite early booking.

Thus outcome of diabetic pregnancy in this tertiary care hospital although not ideal but was better when the under resourced settings of the developing world is considered. The organization of care, the monitoring during pregnancy and labor does not match well with national and international guidelines.

In the context of Pakistani population with significant prevalence of diabetes, screening of all obstetric population is recommended rather than focusing only high risk groups. The dream of provision of pre pregnancy care is yet to come true. Meticulous diabetic control from conception, embryogenesis and throughout pregnancy is vital for a successful outcome.²⁸ Presence of well equipped and well staffed obstetric and neonatal units will go a long way to reduce the rate of perinatal morbidity and mortality.

CONCLUSION

Management of diabetic pregnancy is not to be feared as key to good outcome are simply preconception counseling, universal screening for diabetes, good glycemic control from conception to delivery, adequate antepartum fetal surveillance and neonatal support.

In my study results of various maternal and fetal complications of diabetic pregnancy although could not be equalized to background population but they are still better than many centers in under developed world.

Improvements may be gained by improving literacy rate and awareness of complications of diabetic pregnancy among masses. Pre pregnancy care, early screening, appropriate management, planned delivery should be offered to all patients with diabetic pregnancy to further minimize the risk of fatal complications.

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