

# MATERNAL AND FETAL OUTCOME OF GESTATIONAL DIABETES MELLITUS

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## ABSTRACT

**Background:** Gestational diabetes mellitus is associated with increased risk of serious perinatal morbidities and mortalities, as well maternal morbidities. The objective of this study was to compare the maternal and fetal outcome of gestational diabetes mellitus with healthy pregnant women.

**Material & Methods:** This study was carried out in the Institute of Chemical Sciences, Peshawar University, Peshawar, Pakistan from February 2012 to December 2012. One hundred and thirty ladies with gestational diabetes mellitus and 97 healthy pregnant woman were registered and followed until delivery to know the maternal and fetal outcome.

**Results:** Regarding maternal complications; Women with gestational diabetes were more prone to pregnancy induced hypertension (22.3% vs 11.3%,  $p < 0.05$ ), pre-eclampsia (16.5% vs 6.2%,  $p = 0.02$ ), premature rupture of membranes (19.4% vs 5.15%,  $P = 0.002$ ), preterm labor (25.2% vs 8.23%,  $p = 0.001$ ) and cesarean delivery (23.3% vs 12.4%,  $p = 0.009$ ) as compared to controls. Regarding neonatal complications; there was increased risk of macrosomia (28.2% vs 10.3%,  $p = 0.001$ ), shoulder dystocia or birth trauma (27.2% vs 6.2%,  $p < 0.001$ ) and jaundice (29.1% vs 10.3%,  $p = 0.001$ ). Congenital anomalies were not significantly higher in women with gestational diabetes.

**KEY WORDS:** Gestational diabetes mellitus, Maternal and fetal outcomes, Pre-eclampsia, Macrosomia.

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## INTRODUCTION

Gestational diabetes mellitus (GDM) is a condition of pregnant woman where glucose intolerance is found during pregnancy.<sup>1</sup> GDM usually develops during pregnancy and ends after pregnancy. GDM is the mild form of diabetes mellitus and can be controlled by exercise and carbohydrate diet having low glycemic index.<sup>2</sup> The majority of women with histories of gestational diabetes are obese; having sedentary life styles and consuming very few vegetables and fruits.<sup>3</sup>

Glucose is not properly regulated in 3-10% of all pregnancies. GDM is the glucose intolerance of variable degree with onset or first recognition during pregnancy. It is affecting 90% of cases of diabetes mellitus during pregnancy. Annually 21 million people of the world (7% of the population) are reported with some form of diagnosed diabetes; another 6 million people are reported with undiagnosed particularly type 2 diabetes among women

of child bearing age. Currently, type 2 diabetes mellitus are affecting 8% of cases of diabetes mellitus in pregnancy, and preexisting diabetes mellitus accounts for 1% of all pregnancies.<sup>4</sup>

The various factors that will predict the pregnant woman to become diabetic in future are: early diagnosis of GDM in pregnancy, need for insulin treatment during pregnancy, high blood glucose levels at diagnosis, preterm delivery, macrosomic babies and an abnormal oral glucose tolerance test after two months of delivery.<sup>5</sup> Recently, it has been reported that GDM has strong association with increased risk of serious perinatal morbidities and mortalities, as well as maternal morbidities.<sup>6</sup>

During GDM pregnancy, the fetus is exposed to high level of glucose which results in excess fetal growth, impaired insulin secretion and decreased insulin sensitivity.<sup>7</sup> The short term complications of excess infant birth weight are shoulder dystocia and infant hypoglycemia. The altered fetal metabolism may result in impaired glucose tolerance during early youth and adolescence.<sup>8</sup> The risks associated with GDM are well established, however its impact on health of mothers and the neonates are less clear. The factors that have already reported to influence the risk of GDM among mothers are previous

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history of GDM, family history of diabetes, obesity, recurrent urinary tract infections, infertility treatment, unexplained neonatal death, macrosomic babies, prematurity, pre-eclampsia and advanced maternal age.<sup>9</sup> Women with GDM are at high risk for impaired glucose intolerance and developing type 2 diabetes in the years following pregnancy.<sup>10</sup> The neonates of mothers with GDM are at the risk of childhood obesity as well as type 2 diabetes mellitus.<sup>11</sup>

Poorly controlled GDM consequences are evident, but still no proper consensus exists on either diagnostic criteria or metabolic aims in controlling GDM. Traditionally GDM is taken as a disorder of carbohydrate metabolism; thus, blood glucose levels have become the main key player for controlling and directing treatment during pregnancy.<sup>12</sup> GDM mothers should be examined and diagnosed during early pregnancy and they should have regular postpartum check up for recognition and management of any other complications. GDM is a disorder which can be effectively controlled by decreasing the associated high risk factors and thus leading to healthy infant delivery. Thus accurate monitoring and proper management of GDM women will result in improved maternal and neonatal consequences.<sup>13</sup>

## MATERIAL AND METHODS

The study was carried in the Institute of Chemical Sciences, Peshawar University, Peshawar, Pakistan from February 2012 to December 2012. GDM and HPW for comparison were registered in Khyber Teaching Hospital (KTH), Peshawar. Information was collected from the registered women on well designed questionnaire. Those GDM and HPW were selected who were at the gestational age of e"28 weeks and were not having previous history of medi-

cal illness like hypertension, cardiac and renal diseases.

During the study women were screened for GDM by determining both fasting and random blood glucose level. If the fasting blood glucose level was > 105mg/dL and random blood glucose level was > 140mg/dL, the pregnant women were identified for GDM. The identified GDM women then underwent for 75g two hour oral glucose tolerance test for the confirmation of GDM. Both GDM and HPW were followed until delivery for reporting maternal and neonatal complications. Based on the selection criteria, one hundred and ten gestational diabetic women and one hundred healthy pregnant women were registered for the study. The healthy pregnant women were used for comparison. Both the GDM and HPW were at gestational age of 28 weeks or more. The GDM were the admitted patients of Gynea Ward of Khyber Teaching Hospital, Peshawar, Pakistan. HPW who were not having any medical problem and were at the gestational age of 28 weeks or more were also registered. Consents from the registered pregnant women were obtained. Seven GDM patients and 3 HPW dropped from the study and the remaining 103 GDM patients and 97 HPW completed the study.

Statistical analysis was done by using SPSS computer software version 10. Chi-square test was performed to test for differences in the proportions of categorical variables between two or more groups. Student *t*-test (two tailed) was used to determine the significance. The level  $P < 0.05$  was taken as the cut off value for significance.

## RESULTS

Table-1 indicates comparison of maternal complications between GDM and HPW. GDM women were more prone to pregnancy induced hyperten-

**Table-1: Comparison of maternal outcomes in GDM and HPW.**

Variables	GDM	HPW	p-value
Pregnancy Induced Hypertension	23 (22.3%)	11 (11.3%)	0.029
Preclampsia	17 (16.5%)	6 (6.2%)	0.027
Urinary Tract Infections	31 (30.1%)	37 (38.1%)	0.237
Antepartum Hemorage	24 (23.3%)	15(15.5%)	0.211
Premature raptures of membranes	20 (19.4%)	5 (5.15%)	0.002
Preterm Labour	26 (25.2%)	8 (8.23%)	0.001
Mode of deliveries	43 (41.7%)	61 (62.9%)	0.009
NVD	24 (23.3%)	12 (12.4%)	
C/sectionInstrumental	36 (35.0%)	35 (24.7%)	

GDM = Gestational Diabetes Mellitus and HPW = Healthy Pregnant Women.

Table-2: Comparison of fetal outcomes in GDM and HPW.

Variables	GDM	HPW	p-value
<b>Birth weight (kg)</b>			
< 4	74 (71.8%)	87 (89.7%)	0.001
> 4 (Macrosomia)	29 (28.2 %)	10 (10.3 %)	
<b>Birth condition</b>			
Still birth	09 (8.1%)	00	0.003
Alive Birth	94 (92.3%)	97 (97%)	
<b>Birth trauma</b>			
Yes	28 (27.2 %)	06 (6.2 %)	<0.001
No	75 (72.8 %)	91 (93.8 %)	
<b>Jaundice</b>			
Yes	30 (29.1 %)	10 (10.3 %)	0.001
No	73 (70.9 %)	87 (89.7 %)	
<b>Congenital anomalies</b>			
Yes	12 (11.7 %)	07 (7.2 %)	0.340
No	91 (88.3 %)	90 (92.8 %)	

GDM = Gestational Diabetes Mellitus and HPW = Healthy Pregnant Women.

sion (22.3% vs 11.3%,  $P < 0.05$ ), pre-eclampsia (16.5% vs 6.2%), premature ruptures of membranes (19.4% vs 5.15%,  $P = 0.002$ ), preterm labor (25.2% vs 8.23%,  $P = 0.001$ ) and cesarean delivery (23.3% vs 12.4%,  $P = 0.009$ ) as compared to HPW.

Table-2 shows neonatal complications in GDM women in comparison to HPW. Babies born to GDM women were at the increased risk of macrosomia (28.2% vs 10.3%,  $P = 0.001$ ), shoulder dystocia or birth trauma (27.2% vs 6.2%,  $P < 0.001$ ) and jaundice (29.1% vs 10.3%,  $P = 0.001$ ). Congenital anomalies were not significantly higher in GDM women as compared to HPW.

## DISCUSSION

This study is important in providing information about the maternal and neonatal outcomes of gestational diabetes. By proper monitoring and good control of gestational diabetes during the antenatal period in consultation of the obstetricians, not only the increase prevalence of GDM can be decreased but also the adverse maternal and neonatal complications of GDM can also be reduced.

Data in table 1 indicated that the maternal complications were higher in GDM women as compared to normal pregnant women. Women with GDM in comparison to HPW were at increased risk of pregnancy induced hypertension, pre-eclampsia, antepartum hemorrhage, premature rupture of membranes, preterm labors, caesarean sections and

instrumental deliveries. Cesarean delivery is a successful intervention used to decrease complications associated with gestational diabetes such as elevated fetal weight and shoulder dystocia. Cesarean deliveries are common among women with and without GDM. The greater risk of cesarean sections is particularly due to elevated fetal weight. In Toronto Tri-Hospital Study, it was reported that women with treated gestational diabetes had low rate of macrosomia, while untreated gestational diabetes had two-fold increased risk of cesarean delivery.<sup>14</sup> Montoro et al have demonstrated GDM as a risk factor for hypertension, type 2 diabetes and maternal complications like preterm labors and cesarean sections.<sup>15</sup> Hong et al have also reported increase prevalence of pregnancy induced hypertension, preterm labors and cesarean sections in GDM women.<sup>16</sup>

Data in table 2 indicated that the risk of macrosomia (28.2%), still birth (8.1%), jaundice (29.1%) and birth trauma (27.2%) were more common in neonates of GDM women as compared to HPW. This study was in correspondence to the previous study of Schneider S et al who reported macrosomia, shoulder dystocia and still births as the most serious neonatal complications of gestational diabetes.<sup>17</sup> Thus prevention of macrosomia and still birth should be the primary objective in the treatment of GDM women. Dumont et al reported that annually 1.3% of women are affected by shoulder dystocia, thus it is considered as one of the least common

pregnancy outcome. Shoulder dystocia increases risk of birth trauma to the infant. Brachial plexus palsy occurs in 4-13% of shoulder dystocia deliveries and is often resolved in early infancy.<sup>18</sup> Macrosomia remains an important morbidity because it is associated with increased risk for traumatic birth injury, obesity, and diabetes in later life.<sup>19</sup> Although some of the variation in incidence may be related to definition, most authors agree that macrosomia is in part related to maternal glucose control.

Both maternal and neonatal complications of GDM can be reduced by dietary and lifestyle advice during pregnancy. Moreover treatment of gestational diabetes by dietary advice and oral hypoglycemics including insulin by obstetricians is also helpful in the control of the adverse outcomes.

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### CONFLICT OF INTEREST

Authors declare no conflict of interest.

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None declared.