

## GESTATIONAL DIABETES AND ITS ASSOCIATION WITH UNPLEASANT OUTCOMES OF PREGNANCY

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### ABSTRACT

**Background:** Diabetes Mellitus account for over 8% of all pregnancies and is associated with increased risk of complications of pregnancy, and prenatal mortality. This study was conducted to determine the disadvantages of gestational diabetes on mother and her baby, in order to prevent neonatal and marital unpleasant outcomes.

**Methodology:** The present historical cohort study includes 420 mothers referred to Shiraz hospitals in 2006. Seventy cases with diabetes and 350 were controls. Data was collected by questionnaire and analyzed by t-test and fisher exact tests in SPSS v.13 software.

**Results:** The recurrence rate of gestational diabetes was 72.4%. There was a significant difference between the two groups in still birth (RR= 8.87), macrosomia (RR= 7.38), respiratory distress (RR= 5.16), hypoglycemia (RR= 13.38), neonatal jaundice (RR= 3.28), need for respiratory support (RR= 3.17), congenital anomalies (RR= 7.28) and cesarean delivery (RR= 1.96) ( $p < 0.05$ ). However it did not show any significant difference in intra uterine growth retardation (IUGR), shoulder dystocia, breech labor, need for insulin, meconium problems, induction of labor, episiotomy and placenta disorders ( $P > 0.05$ ).

**Conclusion:** Stillbirth, macrosomia, respiratory distress, hypoglycemia and neonatal jaundice are more common in women with gestational diabetes. Hence in view of the unfavourable outcome, preventive measures and control of diabetes are essential.

**KEY WORDS:** Unpleasant outcomes, Pregnancy, Gestational diabetes.

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## INTRODUCTION

Gestational Diabetes(GD) occurs in over 8% of all pregnancies<sup>1</sup> and is associated with increased risk of some adverse pregnancy outcomes such as macrosomia, shoulder dystocia, cesarean delivery and prenatal mortality.<sup>2-4</sup> Different studies show high risk of abortion and congenital anomalies with increase in blood glucose.<sup>5-7</sup> Studies have also showed that relative risk of cardiac and nervous anomalies in neonates of type I diabetic mothers is 7.9% higher than non diabetic mothers.<sup>8</sup> It result in 50% of prenatal death in neonates of diabetic women.<sup>9</sup> Acute diabetes increases incidence of macrosomia two fold

and also increases other neonatal anthropometric measures in diabetic mothers in comparison with non-diabetic mothers.<sup>10</sup> Macrosomia increases risk of second stage duration of labor, operative delivery, prenatal trauma and mortality.<sup>11</sup> Diabetes in pregnancy also increases shoulder dystocia 2-6 fold in comparison with non diabetic mothers<sup>12,13</sup> In addition women affected with diabetes in pregnancy experience preterm delivery, three fold higher than other women.<sup>14</sup>

Gestational diabetes is also associated with glucose intolerance disorder which raises risk of appearance of diabetes in subsequent pregnancies and in future without pregnancy.<sup>15-17</sup> Recurrence rate of gestational diabetes is reported 30 to 70 percent<sup>15,18-27</sup> and incidence of overt diabetes in women with gestational diabetes history is reported between 35.2 – 73 percent.<sup>28</sup> So the pregnancies that are affected by diabetes are in high risk of prenatal unpleasant outcomes and development of diabetes type II in future. As such early detection and treatments is essential.<sup>29</sup> However many studies don't show direct relationship between gestational diabetes and these outcomes and there is lot of controversy about gestational diabetes association with unpleasant outcomes such as respiratory distress, congenital anomalies, neonatal jaundice and cesarean delivery.<sup>6,7,12,17</sup> The objective of this study was to identify unpleasant outcomes of gestational diabetes with emphasis on neonates.

## METHODOLOGY

This cohort study was conducted on mothers referred to Shiraz Hospital for delivery in South of Iran. Exposed group (cases) were the mothers that were affected by diabetes during pregnancy. Because of rarity of this disorder, cases were selected by random sampling until adequate number for this group was complete. Unexposed groups (controls) were non diabetic mothers that delivered their newborns at these hospitals and were selected by simple random sampling method from pregnant women. Participants were followed from the beginning to labor department till discharge.

We have taken five controls per one case in this study. Minimum necessary sample number was calculated by cohort studies formula. We needed 46 cases and 230 controls in 80% power; finally we investigated 70 cases and 350 controls.

Data gathering was carried out with structured questionnaire which was validated by epidemiologist, gynecologist, endocrinologists and nutrition experts. It included age, height, blood pressure, BMI as mother variables, gestational age, weight, apgar score, macrosomia, respiratory distress, hypoglycemia, neonatal jaundice and anomalies, need for respiratory rehabilitation, intrauterine growth retardation (IUGR), shoulder dystocia, breach labor, need for insulin, meconium problems as newborn variables and induction of labor, cesarean delivery, episiotomy and placenta disorders as delivery variables. In order to reduce information bias in data collection, educated midwife from each hospital was included. After data had been collected, it was analyzed by fisher exact test and t-test by SPSS v.13 software.

## RESULTS

From 420 pregnant women that were selected for this study, 350 persons (83.3%) were non diabetic and 70(16.7%) of them were diabetic that acquired the disease during pregnancy and developed gestational diabetes. Twenty eight (.08%) of participants had history of gestational diabetes while Twenty women (72.4%) developed gestational diabetes during current pregnancy. Mothers in exposed group (cases) showed significant difference by age, systolic and diastolic blood pressure, BMI and gestational age variables with non-exposed group ( $P < 0.05$ ). However, there wasn't any difference considering the height between two groups ( $P > 0.05$ ).

Table-I shows that the mean of all study variables except of gestational age in exposed group is greater than unexposed group. This didn't show a significant statistical difference between neonates of groups from point of view of birth weight, apgar score at the birth and five minute after birth ( $P > 0.05$ ).

Table-I: Association between demographic variables in participants and their neonates exposure to gestational diabetes.

Variables	Cases group(n= 70)	Control group(n= 350)	P value
Age (year)	31.20± 6.04	26.32± 5.03	<0.001
Height (cm)	159.96±5.98	160.74±6.85	0.335
Systolic blood pressure (mm Hg)	123.19±12.78	116.47±12.59	<0.001
Diastolic blood pressure (mm Hg)	79.57±8.98	74.29±9.85	<0.001
BMI	29.14±5.15	26±3.82	<0.001
Gestational age (day)	262±23	272±12	0.002
Neonatal weight (gr)	3324±978	3099±558	0.072
Prenatal apgar	8.52±1.16	8.77±0.73	0.088
Apgar after 5 minute	9.69±0.74	9.70±0.56	0.856

Table-II shows outcomes of gestational diabetes in newborn. There were a significant difference regarding still birth (RR= 8.87), macrosomia (RR = 7.38), respiratory distress (RR = 5.16), hypoglycemia (RR = 13.38), neonatal jaundice (RR = 3.28), need for respiratory rehabilitation (RR = 3.17), anomalies (RR = 7.28), hence all mentioned variables in case group were greater than control group (P<0.05), However other outcomes such as IUGR, shoulder dystocia, breech labor, need for insulin, meconium problems don't show significant difference between the two groups (P>0.05).

This study looked at the association between gestational diabetes with some prenatal outcomes in participants. It showed that mothers with gestational diabetes completed their pregnancy with cesarean delivery in comparison

with non diabetic mothers (RR =1.96), (P<0.05). However, it did not show significant difference in induction of labor, episiotomy and placenta disorders (P>0.05). (Table-III)

### DISCUSSION

In this study, the exposed group with gestational diabetes had nine fold greater stillbirth, similar to the one reported by Keshavarz study (OR= 17.1),<sup>30</sup> but in Victoria study<sup>31</sup> there wasn't significant difference. Results of this study also showed that exposure to gestational diabetes increases odds of macrosomic birth (grater than 4000gr) seven fold, in newborns, which is similar to studies by Victoria (OR=2),<sup>31</sup> Ray JG (OR=3.5) in Canada<sup>32</sup> and Keshavarz (OR=3.2).<sup>30</sup>

Neonates of exposed group showed respiratory distress five fold in comparison with

Table-II: Association between exposure to gestational diabetes in participants and their neonatal unpleasant outcomes.

Variables	Cases group(n= 70)	Control group(n= 350)	RR <sup>1</sup> (CI <sup>2</sup> )	P value
Still Birth	5(7.1%)	3(0.9%)	8.87(2.07-38.04)	0.004
Macrosomia	17(25%)	15(4.3%)	7.38(3.47-15.69)	<0.001
Respiratory distress	15(22.1%)	18(5.2%)	5.16(2.45-10.85)	<0.001
Hypoglycemia	19(28.4%)	10(2.9%)	13.38(5.87-30.48)	<0.001
Neonatal jundic	15(22.4%)	28(8.1%)	3.28(1.64-6.55)	0.001
Need for respiratory rehabilitation	12(17.6%)	22(6.3%)	3.17(1.48-6.76)	0.004
Congenital anomalies	4(6%)	3(0.9%)	7.28(1.59-33.32)	0.015
IUGR	2(2.9%)	10(2.9%)	N.S <sup>3</sup>	0.614
Shoulder Dystocia	1(1.5%)	4(1.2%)	N.S	0.594
Breech Labor	6(8.8%)	13(3.7%)	N.S	0.072
Need for Insulin	1(1.5%)	1(0.3%)	N.S	0.298
Maconiom problems	3(4.5%)	11(3.2%)	N.S	0.401

1 - RR= relative risk

2 - CI= confidence interval

3 - N.S = Non significant

Table-III: Association between exposure to gestational diabetes in participants and prenatal unpleasant outcomes

Variables	Cases group (n= 70)	Control group (n= 350)	RR (CI)	P value
Induction of labor	14(20.3%)	105(30%)	N.S	0.066
Episiotomy	14(20.3%)	92(26.7%)	N.S	0.170
Cesarean delivery	55(78.6%)	224(65.1%)	1.96(1.07-3.62)	0.018
Placental disorders	2(2.9%)	13(3.8%)	N.S	0.541

unexposed group and three fold of control group which needed respiratory rehabilitation after delivery. This outcome is again similar to result reported by Keshavarz (OR=7.5)<sup>30</sup> and Victoria (OR=1.6).<sup>31</sup>

Result of this study shows that there wasn't significant statistical difference between two group as regards IUGR and shoulder dystocia, that was similar to other studies.<sup>30,31,33</sup> but was in contrast to studies by Ray in Canada<sup>32</sup> and Kamali in Tehran.<sup>33</sup> These discrepancies might be due to difference in sample size, study design and data analysis by univariate and multivariate methods. Incidence of congenital anomalies in exposed group was seven fold greater than unexposed group. This is similar to Keshavarz study but contrary to some other studies.<sup>30,31,33</sup> The recurrence rate of gestational diabetes was 72.4% which is similar to result of other studies.<sup>15,18-26</sup> Exposure to gestational diabetes increases the cesarean delivery two fold. Similar results have been observed in Canada, Victoria, Turkish and Iran studies.<sup>30-32,33</sup>

Need for induction of labor and episiotomy in delivery didn't show a significant difference between diabetic and non diabetic mothers, but a reverse result was observed in Victoria<sup>31</sup> study (OR=3). Based on results of the present study the majority of mothers with gestational diabetes delivered by cesarean method and they have cesarean history, so these causes lead to repetition of cesarean delivery.

### CONCLUSION

Multiple studies and research has proved beyond doubt the risk to the mother and baby of gestational diabetes as well as overt diabetes in pregnancy. A well controlled near normoglycemic blood sugar during pregnancy

provides near normal conditions for the pregnant women and the fetus. Hence early detection of glycaemic status of pregnant women and management of pregnancy with due regards to time and mode of delivery under medical supervision is mandatory.

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