

The study of gestational diabetes outcomes on mother and infant in Iran

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Abstract: Gestational diabetes mellitus (GDM) is defined as glucose intolerance of variant severity first recognized during pregnancy. Gestational diabetes is a metabolic disorder which leads to serious problems for both mother and fetus if it is not diagnosed in time. This retrospective cohort study consisted of 112 pregnant women with GDM and 112 pregnant women with normal glucose tolerance test sampled from rural areas of Hamedan city. These groups were compared in terms of maternal and neonatal complications outcomes world Health organization (WHO) recommended methods were used to diagnose GDM. Data on maternal and neonatal outcome were collected from health records and analyzed using conditional logistic regression with version of 11. Results showed mothers with GDM were at higher risk of presenting with resection. Infants born to mothers with GDM were at higher risk of being macrozomia and jaundice. The results of study concluded that gestational diabetes as a risk factor is causing adverse outcome for mothers and infants of concern.

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1.Introduction

Intolerance of carbohydrates with variable degrees which is recognized in pregnancy period for the first time is called gestational diabetes(1-3).This disease is the most common medical in pregnancy period in a way that it occurs in 2 to 5% of the total pregnancies (4). Suffering from gestational diabetes in 70 percent of cases is without any symptoms and is recognizable only by screening test during pregnancy period. In other cases loss, dizziness and vision disorders are observed (4). This disease is due to the background of resistance to insulin and hyperinsulinemia in some pregnancies caused by placental diabetogenic hormones and reduction in maternal activities and increase in the consumption of calories during pregnancy. Resistance against insulin increases progressively until labor and in most cases it disappears immediately after labor. Gestational diabetes like diabetes type II is accompanied by resistance against insulin and insufficient secretion of insulin(5). Ultimately, 30 to 70 percent of women suffering from gestational diabetes are affected by diabetes type II (6). The prevalence rate of gestational diabetes in America and Europe was reported 1.4 to 14% (7). In Iran, a limited study was conducted on gestational diabetes (GDM¹) and various statistics were reported too, that varied from 1.75% in Bushehr and 4.5% in Tehran to 8.9% in Bandar Abbas(8-11). The risk factors of the disease consist of obesity, family history, record of birth weight with 4kg or

greater, dead birth, age over 30, at least twice abortion with no certain reason, and diabetes record in previous pregnancies (4, 12). Although midwifery care improvement and better treatment of diabetes has caused a reduction in maternal negative effects, studies have shown in the case of lack of control, the risk of polyhydramniou, pylonephritis, gestational blood pressure, preeclampsia and labor through cesarean risk. And explicit hyperglycemia during the first three month of pregnancy causes an increase in the congenital deficiency risk and death during labor (7.13). Inverse effects of gestational diabetes on fetus consist of increase in macrosomia risk, neonatal hyperglycemia, hyper bilirobinemia, cardiac hypertrophy, infant obesity and giving birth to dead infant (2,3). Gestational diabetes diagnosis during pregnancy is necessary for the maternal and fetal health. However, progress in midwifery and medical cares have improved pregnancy outcomes; in general, both mother and fetus remain at risk of some of the inverse effects. Present study aims at studying the inverse effects of pregnancy diabetes and labor on mother and infant and comparing it with pregnant women group with no record of gestational diabetes.

2.Material and Methods

Present study is of retrospective cohort group type. At first the statistics related to the cases of gestational diabetes occurred in rural areas of Hamedan province was extracted from hygienic assistance in 2010. After emitting migration to out of the province, the death cases and subjects with diabetes record, 112 women with gestational diabetes

¹- Gestational diabetes mellitus

were identified. According to the sanctioned law of the diabetes scientific committee of the country, if 24 to 28 pregnancy (or in pregnant women with risk factors in the first visit), GCT² with 50gr glucose in non-fasting condition an hour after glucose consumption, is equal to 140 mg/dl or great. The individual is consider doubtful and glucose tolerance test until 3 hours with 100gr glucose is conducted again(OGTT³). In this condition the patient must consume 150-200gr glucose per day at least 3 days before the test and he/she must be in fast since the midnight before the test. The normal amount of plasma sugar after consuming 100gr glucose (baled on kustan and carpener 'criteria) in pregnant women is as follows: plasma sugar in non-fasting condition lower than 95mg/dl, plasma sugar an hour after OGTT lower than 180ml/dl, plasma sugar two hours after OGTT lower than 155mg/dl and plasma sugar an hour after OGTT less than 140mg/dl. If the amount of glucose is equal to those of above or greeter, glucose tolerance test is deranged and if OGTT is deranged, the individual is affected by diabetes. If only one sample out of four samples measured above is abnormal, 3 hour OGTT is repeated with 100gr glucose in the weeks 32-36 of pregnancy and if two or more than four samples of above test are deranged, the individual is diagnosed with gestational diabetes. It is necessary to explain that if during the day hours, the plasma sugar and if it is equal to 105-126, GCT must be conducted(4). For each sample with gestational diabetes in related town in 2010, a case of pregnant women without diabetes was selected as a control group. The subjects in two groups were homogenous regarding residence place pregnancy period cares, number of pregnancy and age. Age homogenization for ease in finding control group was conducted as caliper matching and variance range of ± 3 years was considered for age. The checklist was completed through referring to their pregnancy record. T-test was used to determine the significance level of mean difference of head circumference and birth weight in infants in test and control groups. In the end, the data of this study were analyzed using conditional logistic regression model with confidence level of 95% for determine the significance relations between variables in two group.

3.Results

One hundred subjects (89.3%) from both groups residing the main village and 12 subjects (10.7%) were residing in the related village. Sixty four subjects (57.1%) of both groups were at age group 30-39 years old only 5 of them were under 20 years

old.BMI⁴ prior to pregnancy in experimental group was found, that is, women affected by gestational diabetes in over 26% at case were and obesity range grade one and two. While, in control group 12% of cases was at this range and most of them were at normal BMI range(43.75% of cases)and overweight (40.2% of cases). In women with gestational diabetes in 59 subjects(53.65%)labor was conducted by cesarean, whereas, in the group without gestational diabette,43 subjects(38.4%) had cesarean. Given the point that from the viewpoint of parity number, groups were similar, the most parity number, was third pregnancy (37.5%) (Table1).

Table 1: Anthropological and clinical characteristics of twogroups

Variable		Case group (N (%))
Age	10-19	5(4.46)
	20-29	31(27.7)
	30-39	64(57.1)
	40-49	12(10.7)
Location	Related village	12(10.7)
	Main village	100(89.3)
BMI	Low weight	3(2.7)
	Normal range	35(31.25)
	Over weight	44(39.3)
	Obesity (grade 1)	25(22.3)
Delivery mode	Obesity (grade 2)	5(4.46)
	NVD	51(46.35)
Parity	Cesarean	53(59.65)
	1	38(16.9)
	2	62(27.7)
	3	84(37.5)
	4	18(8.04)
	5 or more	22(9.83)

Chart-1 shows history of prior pregnancies in two groups.

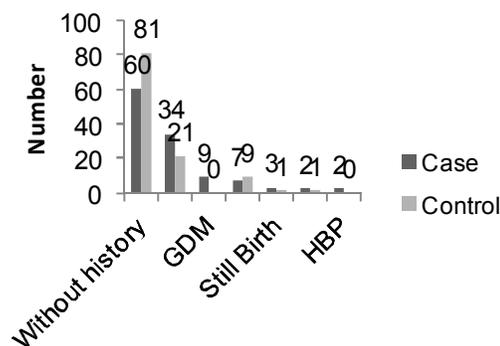


Chart 1: Pregnancy history in 2 groups

²-Glucose Challenge Test

³-Oral Glucose Tolerance test

⁴-Body Mass Index

The T- test used to compare the mean weight and head circumference, showed that the average weight of infants in the control group is 3219.9 g and in the exposed group is equal to 3262.1 gram. Despite the increase in the weight average of exposed group, the mean weight of the two groups was not

statistically significant. Exposure group head circumference mean was 34.93 cm and in the control group, it was 34.53 cm. In this case there was no significant difference between the two groups (table 2).

Table 2: Comparison of weight and head Circumference of infant in two groups based on T-test

Variable	Number		Mean	Standard Division	Confidence interval (95%)	P- Value
Weigh (gram)	Case	109	3262.1	458.8	(3175-3349.2)	0.46
	Control	112	3219.9	388.7	(3147.1-3292.7)	
Head circumference	Case	109	34.93	1.9	(34.57-35.3)	0.43
	Control	112	34.55	4.75	(33.66-35.44)	

Results of conditional adjusted logistic regression models according to age, pregnancy order and location showed that in the exposed group compared to the control group, risk of Premature Rupture of Membranes was 3.5 times, preeclampsia 4 times, and birth weight over 4 kg was 3.5 times. Probability of abnormal Head in the exposure group was 0.12 percent higher than other group and the risk of cesarean delivery in them was 0.67 % higher. In this group, infants were 0.66 percent more likely to develop jaundice chances of live birth in them was 0.81 percent more than control group chances. However, this difference was not statistically significant. It is noteworthy that the interaction between these variables was not significant and there was no interaction between variables; therefore, bringing interaction effects are ignored (table 3).

Table 3: Determining the chance ratio for pregnancy outcomes using conditional logistic regressing model compared based on age, mace of residence and parity number in two groups.

Variable	Odds ratio	Confidence interval (95%)	confidence interval
Neonatal hyper billirubinemia	1.66	0.226	(0.72-16.8)
PROM	3.5	0.118	(0.72-16.8)
Preeclampsia	4	0.08	(0.85-18.8)
Cesarean	1.67	0.038	(1-3)
Alive infant birth	0.81	0.177	(-0.36- 1.97)
Neonatal weight more than 4 kg	3.5	0.118	(0.72-16.8)
Abnormal Head	1.12	0.8	(0.43-2.9)

4. Discussions

In this study in the group of women with gestational diabetes, most patients were in the age of 30 to 39 years. Since the age of 30 year is one of the risk factors for gestational diabetes, our results also confirmed this theorem. This is because of several reasons. One of them is increased rates of obesity with increasing age and degradation of the vascular endothelial cells. Sayda et al in 2005 found a significant association between increasing age and gestational diabetes (14). More than 39% of the patients were overweight and 25% were obese, while in control group 12% were obese. Xiong study in 2001 showed that obese women are more likely to develop gestational diabetes (12). Vijee et al also found that obese women are 16 times more likely to develop gestational diabetes (15). In this study, the incidence of preeclampsia in women with GDM was 7.15% versus 1.8% in the control group. Keshavarz study showed the frequency of preeclampsia in abnormal GCT group was 10 patients (4.4%) and in normal GCT group it was 4 patients (1.8%). According to Basirat et al

research, the frequency of preeclampsia in abnormal GCT group was 10 patients (4.4%) and in normal GCT group it was 4 patients (1.8%) so our results are in agreement with it. Insulin resistance may be involved in the development of preeclampsia and gestational hypertension which can explain a high incidence of this disorder, despite of improved glycemic control (18). In both groups (53.6% in the exposed group and 38.4% in the control group), 46% of cesarean delivery had occurred, the difference was also significant ($p=0.023$). In Basirat's research, similar results were obtained in this way that the frequency of premature rupture of membrane in abnormal GCT group was 40 patients (17.8%) and in normal GCT group it was 20 patients (8.9%) (17). In the present study in women with gestational diabetes 3.6% of delivery cases were not resulted in live birth while in control group all deliveries were led to a live birth. According to the studies of Keshavarz et al, Stillbirths in control group was 0.4% and for GDM women it was 6.5% (16). Average weight of infants in the control group was 3219.9 g and in exposed group it was 3262.1 g and no

significant difference was found between them. According to Basirat, the average weight of infants in an abnormal GCT group 3.5 ± 0.5 kg and in normal GCT group it was 3.3 ± 0.4 kg(17). Neonatal jaundice in women with gestational diabetes was more than jaundice in women in the control group (OR = 1.66) In the Victoria's study, OR = 1.44 which was consistent with the result of this study(20). Based on the results of this study, stillbirth, preeclampsia, and premature rupture are higher in women with gestational diabetes, which is consistent with studies of Keshavarz and Basirat (16).

5. Conclusion

The results of this study showed that complications such as stillbirth, preeclampsia, cesarean delivery, neonatal jaundice, and premature rupture are more in women with gestational diabetes. Although in this study most of relationships were not significant due to small sample size, It is advisable that all pregnant women should be checked for gestational diabetes at its appointed time and More importantly, in Continued pregnancy, their blood glucose levels should be controlled, regularly. Also, women with a history of gestational diabetes should be encouraged to use preventive behaviors such as increasing physical activity, proper diet and normal weight maintenance. It is hoped the results could be helpful for better implementation of the policies and programs of health care for women with gestational diabetes.

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