Gestational Diabetes and its Risk Factors for Pregnant Women in Tehran

[1]Fatemeh Momenzadeh, [1]Seyedeh Samira Mokhlesi, [2]Siamak Mohebbi and
[3]Lida Moghaddam Banaem
[1]Department of Midwifery, Faculty of Medicine,
Qom Branch Islamic Azad University, Qom, Iran
[2]Health Promotion and Policy Research Centre, Faculty of Medical Sciences,
Qom Branch Islamic Azad University, Qom, Iran
[3]Department of Midwifery and Reproductive Health, Faculty of Medical Sciences,
Tarbiat Modarres University, Tehran, Iran

Abstract: Gestational diabetes or carbohydrate metabolism disorder is first determined and started during pregnancy. Regarding the significance of this disease and frequency difference and risky factors in different areas, the purpose of this sectional study is to determine frequency of gestational diabetes and its risk factors for pregnant women visiting Tehran medical care centers. Such sectional study is done on 2033 pregnant mothers in Tehran prenatal clinics by a futuristic view. At the beginning of start to study samples, we applied the questionnaires and took blood samples for necessary tests. These mothers have been followed up from the entrance to study till after the pregnancy. In this study, GCT has been done for screening gestational diabetes within 24-28 weeks of pregnancy that this test have been done by consuming 50 g blood glucose 1 h after lunch and $130 \geq$ GTT or NDDG test have been done by 200 g edible glucose. SPSS26 software, independent t-test and K^2 have been utilized for data analysis. Total 72 mothers (7%) out of 2033 pregnant mothers are suffering from gestational diabetes. There is a significant relation between the age of samples and gestational diabetes. There were no any significant relation among number of birth, number of pregnancy, BMI, weight before birth, gestational diabetes background, experience of diabetes among first-degree relatives, prenatal death experience and fetal abnormalities background. Gestational diabetes distribution is average in Tehran. Due to high probability of inappropriate consequences of gestational diabetes, attention to the age of pregnant mothers in screening for preventing circumstances and disease control is highly necessary. Regarding the results of present study, it is also recommended that general screening is better than screening based on risk factors.

Key words: Diabetes, gestational diabetes, diabetes' risk factors, carbohydrate, frequency

INTRODUCTION

Gestational diabetes is lack of tolerance transient carbohydrates with different severities which are started or determined for the first time during pregnancy (Cunningham *et al.*, 1999a) Although, gestational diabetes is the most common metabolic disorder of pregnancy, its actual distribution is an issue requiring discussion. This disease complicates 5% of pregnant mothers in US (Gibbs *et al.*, 2008), gestational diabetes spread is reported 2-24% in different parts of the world (Manafi *et al.*, 2003) in some studies, gestational diabetes in Iran is reported 2.3-8.9% (Khoshniat *et al.*, 2008). The difference of gestational diabetes spread within different countries, in addition to the race of studied populations is relating to criteria and utilized tests in screening and

determination (ADA, 2003). Gestational diabetes causes probability increase of some side-effects for mother and fetus during pregnancy and after that the most important side effects of gestational diabetes for mothers is higher risk of pre-eclampsia and eclampsia, channel injuries of pregnancy from Macrosomia and after that the injuries during giving birth, shoulder dystocia, hypoglycemia, hyperbilirubinemia and respiratory distress syndrome. Gestational diabetes is having long-term side effects, more than half of patients will suffer from diabetes during 20 future years. Increasing evidences on causing long-term side-effects including fatness and diabetes for children of such women (Goli *et al.*, 2015b) The most important risk factor of gestational diabetes is age, high BMI, gestational diabetes background, positive experience among close relatives and the experience of

Corresponding Author: Fatemeh Momenzadeh, Department of Midwifery, Faculty of Medicine,
Qom Branch Islamic Azad University, Qom, Iran

undetermined intrauterine death (Cunningham *et al.*, 1999b). In Mirfeizi *et al.* (2014) study, in Karaj, gestational diabetes frequency was 28.6% and the most important risk factors of macrosomia background, diabetes background among close relatives was age. In other study, gestational diabetes spread was reported 5.2% that there were significant relation among BMI, age, gestational diabetes background, family diabetes background with gestational diabetes (Hedayati *et al.*, 2013). Also, in a study in Isfahan, gestational diabetes spread is observed 3.8% and gestational diabetes had significant relation with age, BMI, number of pregnancy, family diabetes background, stillbirth and giving birth to abnormal infant (Goli *et al.*, 2015a). Iran is a developing country with limited economic resources and youth population that the share of women who can become pregnant is 22 million which are facing with the risk of such disease, therefore, regarding the significance of gestational diabetes and its side-effects and also the role of risky factors of screening, determination, treatment and the availability of limited studies in this field in Iran, present study is done in focus of determining gestational diabetes frequency and risk factors for pregnant women visiting to Tehran medical centers.

MATERIALS AND METHODS

This study is a futuristic viewpoint research monitored pregnant women visiting Tehran prenatal, governmental medical care centers during 2022. The criteria for entering to this study includes ages between 28-35, pregnancy period of ≤ 20 weeks, number of pregnancy ≤ 2 times, one pregnancy, not smoking, alcohol and drugs and Iranina citizenship. Sampling in this study was clustering-ranking that 2033 pregnant mothers have applied the questionnaires within 24-20 weeks of pregnancy. They have entered for study, the criteria for exiting from the study were lack of their tendency, the demographic features of samples like age, BMI, weight before pregnancy, number of pregnancy, experience of stillbirth, experience of fetal abnormalities, gestational diabetes background and family diabetes background have been reviewed and in the same age of pregnancy, blood samples of the under-studied people for reviewing their glucose have been taken. All the under-studied units have been followed up during pregnancy and 24 h after their childbirth. In this study, in order to screen gestational diabetes during 24-28 weeks of pregnancy GCT has been done, this test is done by consuming 50 g blood glucose one hour after consumption to the level of $130 \geq GTT$ or NDDG with 200 g edible glucose has been done GTT is considered, respectively 95, 280, 255, 240

based on criteria of carpenter and Costan fasting glucose and 1-3 h and based on NDDG for fasting glucose and 2 and 2 and 3 h such amounts were 205, 290, 265, 245, respectively. In order to consider ethics in this research, sampling done by coordination with medical centers and also samples were completely aware of research purposes and they were present with written consent. Moreover, all the laboratory costs for samples were free. Then SPSS 28, independent t-test and K^2 at significant level of <0.05 have analyzed data.

RESULTS AND DISCUSSION

In this study, among 2033 samples, 72 pregnant mothers (7%) were suffering from gestational diabetes and 962 pregnant mothers (93%) were not suffering from gestational diabetes, the personal information of pregnant mothers are indicated in Table 1 in two groups. Gestational diabetes spread is having significant relation with the age of samples ($p \leq 0.002$) but there was no significant difference among BMI, number of pregnancy, number of giving birth and weight before pregnancy.

Also in Table 2, it is indicated that there is no any significant relation among gestation diabetes and gestational diabetes background, family diabetes background, experience of stillbirth and fetal abnormalities.

In present study, gestational diabetes frequency among population o f pregnant women in Tehran was 7%. By reviewing different studies, different reports have been concluded for gestational diabetes spread in different populations. The results of different studies in Iran have estimated the spread of such disease between 2.3-8.9% (Khoshniat *et al.*, 2008) in a study done in Shahrood in 2004, in Tehran 2006 in Bandar Abbas 2004 (Mirfeizi *et al.*, 2014) Isfahan in 2007 (Tabatabaei *et al.*, 2007) Birjand in 2022 (Hedayati *et al.*, 2013) in Isfahan 2024 (Goli *et al.*, 2015a), gestational diabetes spread were 4.7, 4.8, 8.9, 6.3, 5.2 and 3.8%, respectively the obtained results in present study is similar to these previous studies. Also, in the study by Khoshniyyat *et al.* (2008),

Table 1: Mean±SD of two groups of pregnant mothers with and without gestational diabetes

Parameters	Independent t-test	Without gestational diabetes M±SD	With gestational diabetes M±SD
Age	0.002	26.92±4.320	25.05±4.530
Body mass index	0.240	25.42±4.520	26.06±4.520
No. of pregnancies	0.070	2.69±0.960	2.52±0.800
No. of birth	0.060	0.45±0.620	0.33±0.500
Pre-pregnancy weight	0.570	63.50±22.94	64.27±22.22

Table 2: Frequency distribution of gestational diabetes background, family diabetes background, stillbirth experience and fetal abnormalities in both groups of suffering and non-suffering from gestational diabetes

Parameters	Conditions	Percentage	Total number	Without gestational diabetes		With gestational diabetes		Chi-square test
				Percentage	Number	Percentage	Number	
Gestational diabetes history	Yes	2.1	2.1	1.10	11	4.1	1	85P = 0.0
	No	8.98	1021.0	9.98	950	6.98	71	
Family history of diabetes	Yes	1.14	146.0	14.00	135	3.15	11	77P = 0.0
	No	9.85	887.0	86.00	826	7.84	61	
History of stillbirth	Yes	7.0	7.0	7.00	7	0.00	0	46P = 0.0
	No	3.99	1026.0	3.99	954	100.00	72	
History of fetal anomaly	Yes	7.0	7.0	6.00	6	4.10	1	44P = 0.0
	No	3.99	1026.0	4.99	955	6.98	71	

it is stated that gestational diabetes spread in studies of Tehran province by different criteria is between 2.3-6.9% (Khoshiyyat *et al.*, 2008) of course, we shall consider the differences relating to race, nutrition status and lifestyle and also utilization of different criteria. In fact, race beside factors like screening and diagnosis method are having important role in determination of diabetes spread, all the studies in the world are insisting on the impact of race and ethnicity. In present study, there is no any significant relation among gestational diabetes with risk factors like; weight before pregnancy, BMI, number of pregnancy, number of birth-giving, family diabetes background, gestational diabetes background, stillbirth, fetal abnormalities. Regarding, in this study, the age average of suffering group from gestational diabetes was 5.53±25.05 and there is a significant relation between age and gestational diabetes and in addition, in Iran, gestational diabetes is more than average, it is necessary to adjust screening criteria based on age risk factors and decrease the condition of being under 25 for low-risk group to <20 year of age of course, it requires a comprehensive study in this field. In study of Goli *et al.* (2015b) in Isfahan in 2022, gestational diabetes had significant relation with risk factors like age, BMI, family diabetes background but it didn't have relation with number of birth-giving, stillbirth and fetal abnormalities, about three last variables the result of the present study is also similar to it. Also, in study by Fekrat *et al.* (2004) in Tehran, there was no relation between the numbers of previous birth-giving with gestational diabetes. In study by Tabatabaei *et al.* (2007) in Isfahan, there was no direct relation between close family diabetes backgrounds with gestational diabetes. Study by Hadaegh in Bandar Abbas, Karimi in Bushehr, Kayen in US and Siribadana in Sri Lanka also didn't indicate significant difference in terms of close family diabetes background and two groups of suffering and not-suffering from gestational diabetes which confirms the result of this study. It seems that the issue of lack of significant relation between gestational diabetes and family diabetes background, due to high spread of diabetes type II in under-studied society and present population are available. The results of

Tabatabaei *et al.* (2007) study in Isfahan indicated that there is a significant relation among gestational diabetes with age, BMI, number of pregnancy Kamali *et al.* (2003) in Zanjan found out that there is a significant relation between number of pregnancy, fetal abnormalities with gestational diabetes. In present study, all the pregnant women participating in study were passing their first or second pregnancy; therefore, these mothers were having no experience or only once; therefore, it seems the lack of significant relation among number of pregnancy, number of birth-giving, still birth experience and fetal abnormalities background with gestational diabetes is relating to this issue. Identifying risk factors of gestational diabetes in addition to in-time diagnosis and better control of disease can be effective on appropriate screening solution with social and economic model (Hossein and Larigani, 2003) in a study in Spain by James, from 2574 patients which has done screening by GCT, totally 25% of them were having positive test. In that study, even the patients who did not have any risk factors, were having positive spread test of 22%. Also, in study by Khoshniyyat *et al.* (2008) in Tehran, gestational diabetes spread in women who didn't have risk factors were 4.4%, it is expected gestational diabetes spread in women who didn't have any risk factors is less than normal population.

CONCLUSION

Regarding mentioned content, we can understand the high significant being of general screening and screening even in non-risk factor groups, regarding the findings of present study, general screening is better than screening only for high-risk patients and probably it improves pregnancy consequences.

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