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Original Article

Gestational diabetes; worrisome prevalence

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ABSTRACT

Background & Aim: Gestational diabetes mellitus (GDM) is the most common metabolic disorder in pregnancy which is caused due to insulin resistance and carries several risks for the mother and neonate. So, an updated data from its prevalence in different geographical areas is important.

Methods & Materials: This cross-sectional analytic study was performed on pregnant women referring health centers in Qom city from June 2013 to September 2014 for prenatal care. In week 10 of pregnancy, fasting blood sugar (FBS) was checked for all participants and those who had FBS >126mg/dL for 2 times were excluded from the study and all participants who remained in the study underwent oral glucose tolerance test with 75 gr glucose at 24-28weeks of gestation. Gestational diabetes was diagnosed on the basis of at least one abnormal responses of glucose≥92mg/dL, 1-hour glucose ≥180 mg/dL or 2-hour glucose ≥153mg/dL.

Results: A total of 4988 pregnant women enrolled the study. Based on 75g oral glucose tolerance (OGT) test results at 24-28 weeks of gestation, 1036 women (20.76%) had gestational diabetes. Gestational diabetes was significantly associated with maternal age, body mass index, history of gestational diabetes, a family history of type II diabetes in first-degree relatives, history of preterm labor, known hypothyroidism before pregnancy and history of macrosomia.

Conclusion: Gestational diabetes has a high prevalence in Qom city, and it seems that new studies are needed to determine its prevalence in other regions.

Introduction

Diabetes mellitus is a chronic disease affecting approximately 5-10% of the world population and is considered as one of the most important metabolic dysfunctions (1,2). Insulin resistance and increased insulin secretion are features of pregnancy; so, there some women may be susceptible to diabetes. When the pancreas function is insufficient, gestational diabetes occurs (3).

One of the main forms of diabetes is gestational diabetes mellitus (GDM) defined as glucose intolerance that occurs for the first time or is first identified during pregnancy (4). It is the most common metabolic disorder during pregnancy which can cause several fetal and maternal complications before and after the delivery (3). For

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many years, GDM has been defined as a metabolic disorder with glucose intolerance occurs for the first time or first identified during pregnancy (1). American college of obstetricians and gynecologists (ACOG) still uses this terminology (5) but international association of diabetes and pregnancy study group (IADPSG) in 2010 decided to change the terminology (6) and American diabetes association (ADA) confirmed this decision in 2011. In this definition, the diabetes diagnosed during pregnancy is divided into two types of overt diabetes and gestational diabetes (7).

Criteria for the diagnosis of overt diabetes are HbA1c ≥6.5% or fasting plasma glucose (FPG) ≥126 mg/dL (7 mmol/L) or a random plasma glucose ≥200 mg/dL (11.1 mmol/L). The diagnosis of GDM is made by FPG ≥92 mg/dL (5.1 mmol/L) or 1 h plasma glucose ≥180 mg/dL (10 mmol/L) or 2 h plasma glucose ≥153 mg/dL (8.5 mmol/L) in a 75-g OGTT performed at 24-28 weeks of gestation in women not previously diagnosed with overt diabetes. Also, FPG ≥92 mg/dL and ≤126 mg/dL at any gestational age confirms GDM (8).

The prevalence of GDM is different around the world and among different racial and ethnic groups. In the United States, the prevalence in African American, Hispanic-American, Native American and Asian women is higher than white women (9). However, the incidence is related to the diagnostic method. It is said that in America by IADPSG diagnostic criteria for the diagnosis of GDM, it is confirmed in about 18% of women (6). In our country, before 2015, the prevalence of GDM ranges from 0.7 to 18.6% in various cities (10). Given the relatively high prevalence and significant morbidity, it stimely diagnose is of particular importance. Therefore, it is recommended that GDM universal screening tests should be performed in all pregnant women (11).

It is also recommended that in the first visit for pregnancy, if the pregnant women is high risk for undiagnosed type II diabetes (eg, obesity, previous history of GDM, glycosuria, and family history of diabetes), primary screening test for diabetic diagnosis should be performed and if the test does not confirm GDM or overt diabetes, screening test for gestational diabetes should be performed between 24-28weeks of gestation. Other pregnant women are screened at 24-28 weeks of gestation (7).

GDM screening can be accomplished with either of two strategies: a two-step approach with a 1-h 50-g (nonfasting) screen followed by a 3-h 100-g OGTT for those who screen positive (8). This approach has been widely used to identify pregnant women with diabetes in the United States and is recommended by ACOG (12). And the "one-step" 2-h 75-g oral glucose tolerance test (OGTT) recommended by IADPSG consensus meeting which was approved by the ADA but ACOG did not confirm it (7). This simple and practical diagnostic test is used for the diagnosis of gestational diabetes (13). Screening with a 50-g GLT does not require fasting and is therefore easier to accomplish for many women. Treatment of higher threshold maternal hyperglycemia, as identified by the two-step approach, reduces rates of neonatal macrosomia, large-for-gestational-age and shoulder dystocia, without increasing small-for-gestational-age births (14).

Based on the result of 75-g OGTT with at least one abnormal response, gestational diabetes is diagnosed and replaced GTT that requires two high values for the diagnosis. Of course, no standard approach for screening and diagnosis of GDM exists round the world. The two-step method was used for screening diabetes in Iran for a long time but from June 2013, the national instruction for screening and diagnosis of gestational diabetes was published and one-step approach was recommended for screening. Few studies investigated the prevalence of GDM based on one-step approach in Iran. On the other hand, given the alarming increase in prevalence of other types of diabetes, this study was designed to investigate the prevalence of gestational diabetes based on one step approach.

Method

This cross-sectional analytic study was performed on pregnant women referring health centers in Qom city from June 2013 to September

2014 for prenatal care. A general screening method was used to assess gestational diabetes. So, the city of Qom was divided into four zones and the study samples were chosen from each region from pregnant women aged 15 to 49.

Exclusion criteria included diabetes diagnosed before pregnancy, chronic liver and connective tissue disease, medications that affect glucose metabolism (such as corticosteroids), history of abortion before 24th gestational age. Also, pregnant women who had FBS≥126mg/dL for 2 times at10thweeks of pregnancy were excluded from the study. The data including demographic information and medical records and risk factors of the patients were recorded.

In week 10 of pregnancy, fasting blood sugar (FBS) was checked for all participants and those who had FBS >126mg/dL for 2 times were excluded from the study and all participants who remained in the study underwent OGTT with 75-g glucose at 24-28 weeks of gestation. Gestational diabetes was diagnosed on the basis of at least one abnormal responses of glucose≥ 92mg/dL, 1-hour glucose ≥180 mg/dL or 2-hour glucose ≥153mg/dL.

Results

After applying the exclusion criteria, 4988 patients were enrolled. These demographic characteristics of the women are shown in table 1.

***Table 1**. Baseline characteristics of the patients*

Variable	Mean±SD
Age (years)	27.19±5.41
BMI * (kg/m2)	25.31±4.75
Parity	0.80±0.90

*BMI= Body mass index

Based on 75 g GTT result at 24-28 weeks of gestation, 1036 women (20.76%) were diagnosed with GDM and 3115 women were healthy (Table 2) In addition, based on the results of the FBS testing at 10thweek of gestation, 3750 patients (75.2%) had a FBS< 92 mg/dL and 1238 (24.8%) patients had FBS ≥92 mg/dL and < 126 mg/dL. As shown in table 2, gestational diabetes was significantly associated with maternal age, BMI, history of gestational diabetes, family history of type II diabetes in first-degree relatives, preterm labor, known hypothyroidism prior to pregnancy, and macrosomia.

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Table 2. Frequency of risk factors in women with and without GDM

Variable	GDM+	GDM-	P value
Age (years)	28.5±5.7	26.8±5.2	0.000
BMI (kg/m2)	26.4±5.7	24.9±4.4	0.000
Gravid	2.0±1.1	1.9±1.0	0.409
parity	0.80±0.94	0.80±0.89	0.372
History of GDM	0.019	0.010	0.016
History of type II diabetes in first-degree relatives	17.4	9.8	0.000
History of preterm labor	2.4	0.8	0.000
History of preeclampsia	1.9	1.5	0.347
History of infertility	0.5	1.4	0.017
History of chronic hypertension	1.4	0.9	0.10
Hypothyroidism known before pregnancy	9.7	6.1	0.000
History of Macrosomia	1.4	0.3	0.000
History of infant deaths	0.5	0.5	0.92
History of stillbirth	1.0	1.	0.634
History of abortion	17.4	16.2	0.028

Discussion

In the study, the prevalence of gestational diabetes, according to national protocol was 20.769% which is relatively high. Previous studies before 2015reporteddifferent prevalence ratesof GDM varying from 1 to 14% (15-20). The differences are more evident in studies conducted in Iran where the reported prevalence of the disease differed greatly from 1.3 to 18.6% (1). Sayehmiri and colleagues evaluated the prevalence of gestational diabetes in Iran in a review of 21 articles and the minimum prevalence was found in Kermanshah (0.7%) whereas the maximum prevalence was found in Karaj (18.6%) (10, 21). During 1992 to 2007, Khoshniat Nikoo et al. reported theprevalence of 1.3-8.9% in evaluation of 18 studies (22). In the study by Mirfeyzi and colleagues in 2008 in Karaj, which used the two-step approach, the mean age of the participants was 28.27±4.69 years and the prevalence of GDM was 18.6%.BMI of the participants was not mentioned in this study (23). Significant differences in different countries and even within each of them can be due to differentiation in races and cultures. So it has been reported to be more prevalent among black race as well as Asian, Arab and Chinese women than Caucasian is and European women. The preferred screening and diagnostic methods and their accuracy and even cut off points for gestational diabetes can play a significant role in this regard (1). This difference could also be due to the adopted method of calculating and estimating the prevalence in different studies. The prevalence of GDM increased over the time, probably associated with an increase in average age and weight of the mothers (24). The prevalence of GDM is growing in all developed and developing countries and it is estimated that its increase will continue in coming years due to increasing mean age of population, urban sedentary lifestyle and increasing the number of obese women (15). Effective planning, firstly, requires accurate knowledge of the disease prevalence and associated factors (1).

In comparison with previous studies in Iran, our study has larger sample size and the new protocol provided by the Ministry of Health (one step test) wasused. Of course, Kamali et al. in 2003 have used 75g GTT too.Their sample size was 450 and the prevalence of GDM was 2.9%; Preliminary information of the patients has not been mentioned (25). Shirazian et al. in 2009 reported the prevalence of 7.4% in a population of 924 people with this method (26). Women with GDM who have elevated fasting blood glucose levels and receive no treatment are at increased risk for perinatal complications and fetal macrosomia (27).

In our study, the prevalence of GDM was higher than all studies. It seems that in addition to the impact of the diagnosis method, we face a worrying prevalence of gestational diabetes in the community. This concern is even more significant when we notice that the national protocol has less diagnostic power compared to the diagnostic methodrecommended by the ADA and if we act according to ADA recommendation and consider people with FBS≥92 as GDM, the prevalence even increase to 37.55% which is a big warning sign. Although this estimate may seem high, but it should be examined compared to underlying risk factors of diabetes, which is currently predicted in 10% of the US population (28). It is estimated that pre-diabetes affects at least 26% of the US population aged 20 years and older (29).

A recent study in Rafsanjan on 200 pregnant women with the mean age of 27.72±5.091 years based on IADPSG criteria, reported a 31% prevalence of GDM (30). Another interesting point in this study was that GDM was significantly higher in patients with a history of preterm labor or hypothyroidism which are not considered as risk factor in the literature. However, we confirmed the association between hypothyroidism and gestational diabetes in another study (31). So, it is recommended to consider GDM in patients with a history of preterm labor or hypothyroidism in addition to people who have known risk factors for gestational diabetes .Establishing a uniform approach to diagnosing GDM has many benefits for patients, caregivers, and policymakers. Also, longer-term outcome studies are needed.

Conclusion

It seems that gestational diabetes has reached a high and alarming prevalence our society and requires the attention of health policymakers. GDM is usually associated with an increased risk for a number of complications during pregnancy and postnatal period for the mother and her off-spring.

Conflict of Interest

The authors declare that there is no conflict of interests.

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