International Journal of Medical Laboratory 2021;8(3):162-167.

Short Article

The Prevalence of Gestational Diabetes Mellitus in Pregnant Women Referred to Amir al-Mu'minin Hospital of Gerash City, Fars Province, Iran

Elham Rezaee [1,5] M.Sc., Fariba Mohammadi [2] M.Sc., Mohammad Javad Boozhmehrani [3] M.Sc., Parisa Bagheri [4*] M.Sc.

[1] Department of Medical Parasitology and Mycology, Paramedical School, Gerash University of Medical Sciences, Gerash, Iran
[2] Department of Clinical Biochemistry, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
[3] Department of Parasitology and Mycology, School of Medicine, Shahid Sadoughi University of Medical Sciences,Yazd, Iran
[4] Department of Medical Hematology and Blood Banking, Paramedical School, Gerash University of Medical Sciences, Gerash, Iran
[5] Department of Parasitology and Mycology, School of Medicine, Shiraz University of Medical Sciences, Shiraz, Iran

ABSTRACT

Article history
Received: 17 Apr 2020
Accepted: 6 Aug 2021
Available online: 25 Sep 2021

Keywords
Carpenter and Coustan criteria
Gestational diabetes mellitus
Oral glucose tolerance test
Iran

Background and Aims: The increasing number of pregnant women being diagnosed as having gestational diabetes mellitus (GDM) and lead health care providers to develop reliable screening protocols and know the exact worldwide epidemiology of the disease. This study seeks to obtain data that will help to improve the epidemiologic knowledge about this disease.
Materials and Methods: This cross-sectional study was performed on 953 pregnant women seeking routine prenatal screening tests. Participants participate with using Carpenter-Coustan criteria in the study. Statistical analysis was performed using SPSS software.
Results and Conclusions: Among 953 pregnant women , 38 participants (4%) were detected to have GDM . Fifty percent of patients in the study were overweight .The data showed a significant difference in the mean age between the diabetic and non-diabetic groups. The high prevalence of GDM in young Iranian pregnant women may emphasize the need for early diagnosis and treatment to avoid adverse outcomes associated with GDM.

*Corresponding Author: Department of Medical Hematology and Blood Banking, Paramedical School, Gerash University of Medical Sciences, Gerash, Iran. **Tel:** +989398539794; **Email:** bagheri.parisa2020@yahoo.com

[DOI: 10.18502/ijml.v8i3.7322]

Introduction

Gestational diabetes mellitus (GDM) is an intolerance of glucose, defined as hyperglycemia occurring in pregnancy and resolving after birth. This metabolic disorder is currently regarded as the most common medical complication of the gestation period, which develops during the second and third trimester of pregnancy [1]. To date, several risk factors have been identified to be correlated with GDM, including pregnancy, maternal body mass index (BMI), the family history of diabetes mellitus (DM), polycystic ovarian syndrome (PCOS), advancing maternal age, and the previous history of gestational diabetes [2]. In this context, previous research has also established that the high prevalence of obesity and advancing maternal age impose a heavy burden on the health system due to increasing the incidence of GDM [3]. However, gestational diabetes research remains inconclusive in the precise mechanisms that induce hyperglycemia in pregnant women. The existing body of research on the pathophysiology of GDM suggests that increased insulin resistance is a hallmark of gestational diabetes, which is caused by some pregnancy hormones and, to a lesser extent, excessive fat deposits during the gestation period. If this is so, the increased insulin secretion from pancreatic β-cells can not compensate for insulin resistance. Consequently, insulin resistance may prevent cellular glucose uptake by this mechanism and result in a disease phenotype that resembles diabetes in humans [4].

This heterogeneous disorder has been known to present itself with variable severity and symptoms. It was found to be associated with an increased risk of pregnancy complications for both mother and fetus, such as preeclampsia, stillbirth, shoulder dystocia, Caesarean section, neonatal hypoglycemia, and jaundice, as well as fetal macrosomia [5]. Furthermore, neonates born from mothers with poorly controlled and untreated GDM are at higher risk of developing type 2 diabetes mellitus (T2DM) in addition to their mothers [6]. It has previously been observed that these sequelae of GDM could be attenuated by early diagnosis and appropriate management of the disorder [7]. Suitable and proper management has also been shown to require a reliable and feasible screening protocol, taking timely action, and knowing the exact worldwide prevalence and epidemiology of GDM [8].

A systematic review of the literature published between 2005 and December 2018 demonstrated that the highest prevalence of GDM was found in the Middle East and some North African countries (median value = 15.2%) [9]. In addition, recent work by Jafari et al. (2015) has established that the prevalence of GDM in Iran is 3.41%, with the highest prevalence of 18.6% [10].

Considering everything, it is evident that we require to conduct studies to plan for the allocation of resources that would result in improved maternal and neonatal health outcomes. In this study, we attempt to

[DOI: 10.18502/ijml.v8i3.7322]

determine the prevalence of GDM in pregnant women referred to Amir al-Mu'minin Hospital of Gerash city, Fars Province, Iran, from 19 March 2016 to 20 March 2019, along with risk factors of GDM.

Materials and Methods

This cross-sectional study was carried out in Amir al-Mu'minin Hospital of Gerash city, Fars Province, Iran, from 19 March 2016 to 20 March 2019. All pregnant women seeking prenatal health care underwent tests for diabetes diagnosis and screening according to the American Congress of Obstetrics and Gynecology (ACOG) guidelines using Carpenter-Coustan criteria after being informed and obtaining their consent to participate in the study. The ACOG panel recommends a diagnostic strategy for the screening of GDM in pregnant women. They endorse a diagnostic approach using a 1-h 50 g glucose challenge test (50-g GCT) followed by a 3-h 100 g oral glucose tolerance test (100-g OGTT) in women with an abnormal screening GCT result (≥ 130 mg/dl). In addition, the ACOG panel expresses their formal support for the threshold values detecting hyperglycemia in pregnancy (≥ 95, ≥ 180, ≥ 155, and ≥ 140 mg/dl for fasting blood sugar (FBS), 1-h, 2-h, and 3-h plasma glucose tests, respectively). We conducted experiments on 953 pregnant women (mean age ± standard deviation (SD), 28.24 ± 5.88 years) with a gestational age between 24 and 32 weeks and considered two abnormal values (in each person) that are equal to or greater than the established threshold values as the indicators of getting GDM. This study was approved by the Ethics Committee of Gerash University of Medical Sciences (IR.GERUMS.REC.1398.015). Only pregnant women who were not known as diabetic before pregnancy were included in the study. In addition, the subjects suffering from chronic and severe diseases or currently receiving treatment with corticosteroids were excluded from this study. The participants diagnosed with GDM were asked to complete a questionnaire documenting maternal age, the number of pregnancies, level of education, the family history of diabetes, gestational BMI, the history of abortion, stillbirth, GDM, congenital disorders in previous pregnancies, and job status.

Statistical analysis

Data management and statistical analysis were performed using SPSS software (version 20). Data were expressed as the mean ± SD. The normality of data was confirmed using the Kolmogorov-Smirnov test (KS test). In addition, significance levels were set at the 5% level using the student t-test and Chi-square analysis.

Results and Discussion

A total of 953 pregnant women with an average age of 28.24 ± 5.88 (range, 13 to 48) were included in this cross-sectional study. Besides, results showed that most of them (62.4%) were aged between 25 and 30 at the beginning of the investigation. Moreove, 4% of those who screened using the Carpenter-Coustan criteria were diagnosed with GDM. Diabetic pregnant women's age (38 participants) ranged from 17 to 48 with an average age of 30.94 ± 6.83, whereas non-diabetic subjects fell into the age group of 13 to 47 with an average of 28.13 ±

[DOI: 10.18502/ijml.v8i3.7322]

5.81. Comparing the two results shows that the mean age of diabetic women is significantly higher than that of non-diabetic participants ($p = 0.004$). Further analysis showed that there is a significant difference in the mean FBS between the diabetic (92.74 ± 19.85 mg/dl) and non-diabetic groups (81.62 ± 9.56 mg/dl) ($p < 0.01$). Moreover, similar statistical tests revealed that the mean blood glucose concentrations at 60 and 120 min were significantly higher in diabetic pregnant women (207.64 ± 44.03 mg/dl vs. 129.16 ± 29.69 mg/dl at 60 min, $p < 0.0001$; 180.58 ± 63.29 mg/dl vs. 105.37 ± 25.5 mg/dl at 120 min, $p < 0.0001$). In the final part of the study, diabetic pregnant women were asked to answer several questions, and the statistics summary is presented in Table 1. From the data in Table 1, no significant differences were found between the history of GDM and abortion and the GDM history and job status. The Chi-square test also did not show any significant relationship between different age and gestational BMI groups.

Table 1. The baseline characteristics of diabetic pregnant women

BMI (kg/m^2)	Number	Percentage (%)
18.5-24.9	19	50
25-29.9	19	50
Educational level		
Illiterate	1	2.6
Primary school	1	2.6
Middle school/ high school	24	63.2
Undergraduate and higher levels	12	31.6
Job status		
Housewife	34	89.5
Employed	4	10.5
The family history of diabetes		
Yes	24	63.2
No	14	36.8
Parity		
0	8	21.1
1	18	47.4
2	11	28.9
3	1	2.6
The history of gestational diabetes mellitus		
Yes	35	92.1
No	3	7.9
The history of abortion		
Yes	4	10.5
No	34	89.5
The history of stillbirth		
No	38	100
The history of congenital disorders		
No	38	100

[DOI: 10.18502/ijml.v8i3.7322]

This study aims to assess the prevalence of GDM in pregnant women referred to Amir al-Mu'minin Hospital of Gerash city and to analyze some factors influencing the risk of GDM. This study has shown that the prevalence of GDM is decreased by using the Carpenter-Coustan criteria for diagnosing the disease according to the comparison of the result with findings of other studies conducted in different regions of Iran that used the International Association of Diabetes and Pregnancy Study Groups (IADPSG) criteria [11].

Among medical complications during pregnancy, GDM is considered the most common medical problem faced by pregnant women [1]. This multifactorial disease is defined as various degrees of maternal glucose intolerance with first recognition during pregnancy and characterized by insulin resistance and decreased pancreatic beta-cell function [4]. As mentioned in the literature review, several factors can increase the risk of GDM and put a tremendous burden on the health care system [12]. Furthermore, it is now well established from various studies that maternal diabetes is known to be a risk factor for pregnancy complications [5, 6]. Previous studies indicated that the increased incidence of obesity and GDM worldwide, in addition to the burden of appropriate GDM management, lead medical scientists to develop feasible screening protocols and know the exact worldwide epidemiology of the disease [7, 8].

As mentioned in the introduction, the region-specific prevalence of GDM is highly variable. A recent systematic review performed by McIntyre et al. (2019) has shown that the highest prevalence of GDM can be observed in the Middle East and North African (Iran, United Arab Emirates, Qatar, Bahrain, and Israel) [9]. Moreover, a systematic review of GDM prevalence has been undertaken in Iran, revealing that the prevalence ranges from 1.3 to 18.6% [10]. In the current study, the prevalence of GDM was estimated to be 4%. In addition, further analysis showed that there is a significant difference in the mean age between the diabetic and non-diabetic groups ($p = 0.004$). Unfortunately, the study was limited by the lack of information on the baseline characteristics of non-diabetic pregnant women.

Conflicts of Interest

The authors declared no conflict of interest.

Acknowledgment

This study was supported by Gerash University of Medical Sciences in Gerash, Fars Province, Iran.

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