

Frequency of Gestational Diabetes Mellitus in Pregnant Women: A Cross-Sectional Study

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Abstract

Aim: The present study aims the determination the frequency of gestational diabetes mellitus in pregnant women using Diabetes in a pregnancy Study group Criteria

Study design: A cross-sectional study

Place and Duration: This study was conducted at BMC Liaquat University of Medical Health Sciences Jamshoro, Pakistan from July 2020 to July 2021.

Methodology: All the pregnant women who had visited the antenatal clinic during the whole duration of the study were checked for diabetes using Diabetes in a pregnancy Study group of criteria after attainment of consent from the patients. The patients were given a dose of 75 grams of glucose mixed in 100ml of water in a non-fasting state. Blood samples of the patients were collected after 2 hours of administration of the glucose.

Result: A total of 12450 participants were considered in the study. The mean age of gestation in the study was 27.46 ± 5.91 weeks. About 18.1% had a family history of diabetes and 22% had a family history of hypertension. Positive family history of GDM was there in only 7% of patients. A total of 1494 (12%) patients were diagnosed with GDM and overt diabetes on the antenatal visit. There was the absence of a known risk in 373 (25%) patients.

Conclusion: The frequency of GDM in pregnant women was 12% irrespective of any known risk factor. Universal screening of GDM should be made mandatory in all pregnant patients, in all trimesters of the pregnancy.

Keywords: Gestational Diabetes mellitus, Pregnant, Screening

Introduction

GDM is a common pathology in 15% of pregnant women on a global level [1]. The disease is associated with higher maternal and fetal morbidity and mortality rate. It is a potential danger to maternal and fetal health in developing countries such as Pakistan where there is a lack of awareness about health, lack of health facilities, and lack of medical care. Patients with GDM are at a higher risk of developing Type 2 diabetes mellitus (T2DM) later in their life [2]. GDM also represents chronicity of dysfunction of the beta cell of the pancreas [3]. Moreover, it also assists in the detection of the stage of Type 2 diabetes mellitus (T2DM). One of the benefits of GDM is the judgment and prediction of beneficial exercise and diet for the prevention of diabetes onset [4]. Fifteen percent of pregnant women in the World suffer from GDM. According to a study, Asian pregnant women are at a higher risk of GDM than comparatively [5]. The frequency is significantly higher in the women of South Asia. The prevalence of GDM in India has been noticed to be 10% to 18% [6].

The current status of the prevalence of GDM is not certain in this country due to variations in the technique of screening. However, it has been noticed that the prevalence of T2DM is becoming higher in younger women which is an indication of a higher risk of prevalence of GDM. There is not a certain international method of diagnosing GDM which is a reason there is not a confirmed percentage of prevalence of GDM on a global level [7]. The criteria already present are country-specific such as one that has been recommended by American Diabetes Association, National Diabetes Data Group (NDDG) (USA & Europe), Canadian Diabetes in Pregnancy Study Group (CANDIES), German Diabetes Association, and Diabetes, Japan Diabetes Association, UK (NICE Guidelines) and Australasian Criteria. The common condition in all these diagnostic criteria is the fasting of the patient. However, most of the patients that visit an antenatal clinic are not in the state of fasting [8]. This is why an easier approach and simpler test is required which is also evidence-based and economical. The diagnostic criteria of DIPSI recommend dissolving 75-gram glucose in 100 ml water and administering it in a non-fasting state. Only one reading after 2 hours of administration of the glucose is needed. The reading should be less than 140 mg/dl [6]. The women who have the adequate response of insulin to the administered glucose, have normal tolerance of glucose and they show a normal value of blood glucose level. Whereas, those women who have deficient glucose tolerance, show an impaired insulin response.

This method is suitable for most of the health settings working in Pakistan because the major issue here is compliance. The present study aims at finding the prevalence of GDM using DIPSI criteria.

Methodology

The present study is a cross-sectional study. The study was carried out in the department of Gynecology and Obstetrics of our hospital. Permission was taken from the ethical review committee of the institute. A total of 12450 participants, who had visited for the antenatal check-up, were considered in the study. The weight of the patients was recorded on the visit to maintain a record card for the patient. The weight was measured in kilograms through a manual weighing scale available at the outpatient clinic.

All the pregnant women who had visited for a routine antenatal checkup were included in the study, irrespective of the number of visits. Informed consent was taken from all the patients before conducting the blood glucose test. 'Universal Screening' principle was implemented. Those patients who had a negative blood glucose test for GDM were screened again between the 26th to 28th gestational weeks. If the test again comes out negative, the patient was re-screened for GDM between 34th to 36th gestational weeks. The method adopted for the screening was the DIPSI. This criterion was not only used for screening, it was also used for the diagnosis of GDM. Hence, it was also predictive of the adverse outcomes of the pregnancy.

All the patients were informed, counseled, and described the method of the glucose test. They were informed that a solution of 100 ml of water having dissolved 75 grams of glucose was given to them. A plasma level of glucose was evaluated after 2 hours of ingestion of glucose mixed water. A cut-off value of more than 140mg/dl was considered for the diagnosis of GDM. The value of the plasma glucose level between 120mg/dl – 139 mg/dl was considered to be Gestational impaired Glucose Tolerance (GIGT). A plasma glucose level of more than 200 mg/dl was labeled as overt diabetes mellitus.

According to the exclusion criteria, women with a previous diagnosis of type 1 or type 2 diabetes mellitus and those who were a known case of 'Hyperglycemia in Pregnancy' were not included in the study to avoid any error in the result. The data of the study were analyzed in IBM SPSS version 26. The significance was checked by an application of Chi-square and Student's t-test.

Result

A total of 12450 pregnant women were screened for GDM through DIPSI criteria. The mean ages of the patients were 28.12 ± 5.8 years. The mean of the gestational age in weeks was 27.46 ± 5.91 weeks. A total of 3859 (31%) of the women were Primigravida and 8591 (69%) of them were multigravida. According to the gestational age of the fetus, 622 (5%) of the patients were in their first trimester of pregnancy, 4731 (38%) were in the second trimester and 7097 (57%) were in the third trimester of pregnancy. Table 1 exhibits baseline characteristics. Out of 12450 pregnant women, 2845 (22.85%) had shown gestational glucose intolerance (GGI). A total of 1272 (10.21%) were diagnosed with GDM and 222 (1.78%) were diagnosed with Overt diabetes. The graphical comparison of the patients according to the absence and presence of the disease has been shown in Figure 1. The age distribution of the patients has been given in Table 2.

Most of the patients who had been seen with GDM were above the age of 30 years. An increase in the incidence of GDM was seen in multigravida women in the first trimester of pregnancy. Common risk factors that had been observed in data collection were a positive family history of GDM, diabetes mellitus, and hypertension. The presence and absence of the risk factors have been given in Table 3.

Table 1. Baseline characteristics of the study participants

Variables	Group A (BSL < 140 mg/dl)	Group B (BSL > 140 mg/dl)	p-value	Overall
n	10956	1494	-	12450
Age of the patient (years)	28.24 ± 5.7	29.65 ± 6.2	<0.0001	28.12 ± 5.8
Gestational age (weeks)	27.65 ± 5.8	26.82 ± 5.45	<0.0001	27.46 ± 5.91
Gravidity				
Primigravida	2739 (25%)	403 (27.97%)	0.542	3142 (25.23%)
Multigravida	8217 (75%)	1091 (73.03%)		9308 (74.76%)
Trimester of pregnancy				
First trimester	438 (4.65%)	105 (7.02%)	<0.0001	543 (4.36%)
Second trimester	4163 (37.99%)	597 (39.96%)	<0.0001	4760 (38.23%)
Third trimester	6355 (58%)	792 (53.01%)	<0.0001	7147 (57.41%)

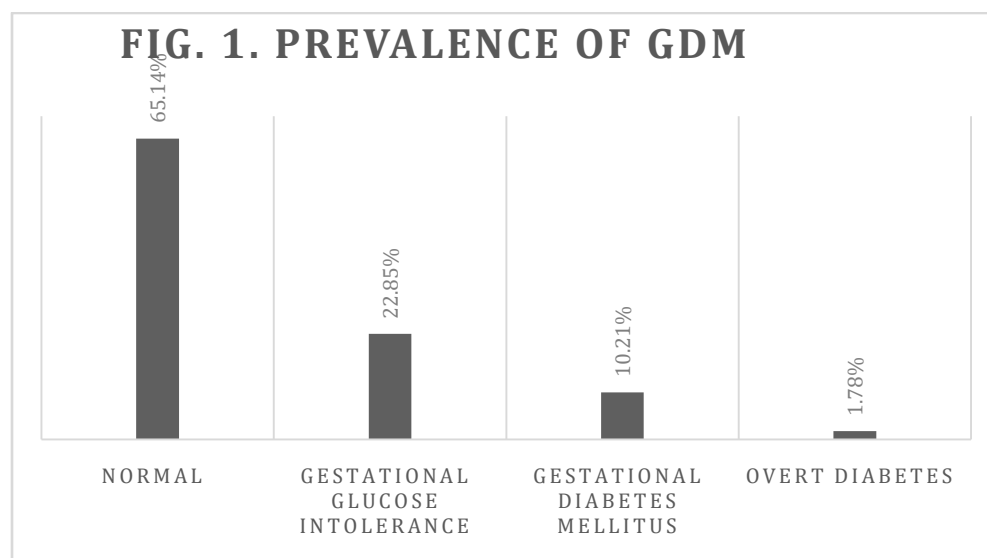


Table 2. Distribution of gestational age, and gravidity of the participants

Variables	DIPSI Criteria				
	Normal n=8111	GGI n=2845	GDM n=1272	Overt n=222	Overall n=12450
Age (Years)					
<19	120 (78.94%)	24 (15.79%)	8 (5.26%)	0 (0%)	152 (1.22%)
20-25	2865 (68.97%)	857 (20.63%)	342 (8.23%)	90 (2.17%)	4154 (33.37%)
26-30	2881 (63.85%)	1081 (23.96%)	465 (10.31%)	85 (1.88%)	4512 (36.24%)
>30	2245 (61.81%)	883 (24.31%)	457 (12.58%)	47 (1.29%)	3632 (29.17%)
Trimester					
First Trimester	80 (14.73%)	108 (19.89%)	330 (60.77%)	25 (4.6%)	543 (4.36%)
Second Trimester	3152 (66.22%)	1089 (22.88%)	423 (8.89%)	96 (2.02%)	4760 (38.23%)
Third Trimester	4879 (68.27%)	1648 (23.06%)	519 (7.26%)	101 (1.41%)	7147 (57.41%)
Gravidity					
Primigravida	2027 (64.5%)	711 (22.63%)	318 (10.12%)	86 (2.74%)	3142 (25.23%)
Multigravida	6084 (65.36%)	2134 (22.92%)	954 (10.25%)	136 (1.46%)	9308 (74.76%)

Table 3. Risk factors of GDM

Risk factors	Percentage
GDM Family history	7
Hypertension family history	24
Diabetes Mellitus Family history	19
No known risk factors	25

Discussion

The frequency of gestational diabetes in the present study was 12%. The screening method used was DIPSI criteria. The prevalence of GDM was correlated with advancing age, parity, a positive history of GDM, a history of diabetes mellitus in the immediate relatives. The present study is consistent with the study of Yuen et al and Rahman et al in terms of the association of GDM

with a family history of diabetes and over-weight. These both are considered to be strong risk factors for GDM along with parity, advancing age, and previous history of GDM [9] [10].

The prevalence of GDM on a global level lies from 1.4% to 14% and it is variable in different ethnic and racial groups. Caucasian women have shown lesser prevalence than Asian women [9]. A comparison of GDM prevalence in European women and Indian subcontinent women was done by Jawa et al. They observed that women of the Indian subcontinent have 11 times more prevalence of GDM compared to European women [11]. On the other hand, studies done in Pakistan show a range of prevalence from 4.2 to 26%. However, there is a conflict of results in different studies conducted in Pakistan. There is versatility in the results of different studies and the reason behind this is a selection of different screening criteria [12].

A comparison of GDM and non-GDM subjects show that the age of the patients suffering from GDM was older. The mean age of GDM was 29.65 ± 0.62 years and the mean age of the non-GDM subjects was 28.24 ± 5.7 years. According to the study by Seshiah et al, patients above the age of 25 years were at a higher risk of having GDM [6]. The mean age of the patients of GDM was 33 ± 22.8 years as per the study of Bibi et al [13]. These results are not consistent with the results of the present study in which the age ranged from 20 years to 25 years.

According to the guidelines of the Royal College of Gynecology and Obstetrics, individuals under the age of 25 years are less likely to develop GDM. Contrary to that, younger participants in the present study were not spared. Several studies support the idea of obesity being one of the prominent risk factors of GDM. Obesity, especially at the beginning of the pregnancy, is a predisposing factor in the development of GDM [14]. Out of all the mentioned risk factors of GDM, maternal obesity is a modifiable factor. Women have a great tendency of gaining visceral and central fat which is a predisposing factor of insulin resistance as well as cardiovascular disease [15]. The population under study is either illiterate or less educated which is why awareness regarding disease is not common in them. This is also a reason for the increased incidence of obesity. A positive family history of T2DM is a potential risk factor correlated with the development of GDM. According to the study of Naheed et al, more than half of the patients included in the study had a positive family history of diabetes mellitus [16].

Conclusion

The present study suggests that the women in Pakistan are at a high risk of developing GDM and they all should be screened in all the trimesters of pregnancy. Creating awareness and educating women about the significance of a healthy diet and physical activity for the maintenance of normal weight can help in controlling the frequency of GDM. Monitoring is highly recommended in pregnant women for the effective prevention of maternal and fetal complications.

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Conflict of interest

There was no conflict of interest

Permission

Permission was asked and taken from the ethical committee of the institute

Reference:

1. Model CC. Standards of medical care in diabetes—2015 abridged for primary care providers. *Diabetes Care*. 2015; 38(1): S1-94.
2. Trivedi D, Chavda V, Patel K. A Study of Gestational Diabetes Mellitus, its Prevalence, Risk Factors and Complications in a Tertiary Care Hospital. EDITORIAL BOARD. 2017 Jul; 18(3):175.
3. Buchanan TA, Xiang A, Kjos SL, Watanabe R. What is gestational diabetes?. *Diabetes Care*. 2007 Jul 1; 30(Supplement_2):S105-11.
4. Carpenter MW. Gestational diabetes, pregnancy hypertension, and late vascular disease. *Diabetes Care*. 2007 Jul 1; 30(Supplement_2): S246-50.
5. Carolan M, Davey MA, Biro MA, Kealy M. Maternal age, ethnicity, and gestational diabetes mellitus. *Midwifery*. 2012 Dec 1; 28(6):778-83.
6. Seshiah V, Balaji V, Balaji MS, Paneerselvam A, Arthi T, Thamizharasi M, Datta M. Prevalence of gestational diabetes mellitus in South India (Tamil Nadu): a community-based study. *JAPI*. 2008 May; 56:329-3.
7. International Association of Diabetes and Pregnancy Study Groups Consensus Panel. Metzger BE, Gabbe SG, Persson B, Buchanan TA, et al. (2010) International association of diabetes and pregnancy study groups recommendations on the diagnosis and classification of hyperglycemia in pregnancy. *Diabetes Care*. 2010; 33:676-82.
8. McIntyre HD, Oats JJ, Zeck W, Seshiah V, Hod M. Matching diagnosis and management of diabetes in pregnancy to local priorities and resources: an international approach. *International Journal of Gynecology & Obstetrics*. 2011 Nov; 115:S26-9.
9. Yuen L, Wong VW. Gestational diabetes mellitus: challenges for different ethnic groups. *World journal of diabetes*. 2015 Jul 25; 6(8):1024.
10. Rahman AS, Jaffri MS, Raza SB, Sattar FA. The prevalence of gestational diabetes in patients attending diabetic clinic at Sir Syed Hospital. *Pak J Pharmacol*. 2007 Jan; 24:37-42.
11. Jawa A, Raza F, Qamar K, Jawad A, Akram J. Gestational diabetes mellitus is rare in primigravida Pakistani women. *Indian journal of endocrinology and metabolism*. 2011 Jul; 15(3):191.

12. Qazi A, Fahim A, Qureshi A, ul Haque M. GESTATIONAL DIABETES MELLITUS: STILL A GREAT PROBLEM. The Professional Medical Journal. 2016 Jan 10; 23(01):015-9.
13. Bibi S, Saleem U, Mahsood N. The frequency of gestational diabetes mellitus and associated risk factors at Khyber teaching hospital Peshawar. Journal of Postgraduate Medical Institute. 2015 May 12; 29(1).
14. Zaman N, Taj N, Nazir S, Ullah E, Fatima N. Gestational Diabetes Mellitus, and Obesity: An experience at a teaching hospital in Bahawalpur, Pakistan. Rawal Medical Journal. 2013; 38(2):165-8.
15. Pi-Sunyer FX. The epidemiology of central fat distribution in relation to disease. Nutrition reviews. 2004 Jul 1; 62(suppl_2): S120-6.
16. Naheed F, Kammeruddin K, Hashmi HA, Narijo S. Frequency of impaired oral glucose tolerance test in high-risk pregnancies for gestational diabetes mellitus. J Coll Physi Surg Pak. 2008 Feb 1; 18:82-5.