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Why some pregnant women refuse glucose challenge test? Turkish pregnant women's perspectives for gestational diabetes mellitus screening

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ABSTRACT

OBJECTIVE: Diabetes in pregnancy is associated with several adverse outcomes for both mother and baby. Awareness is the first step toward identifying pregnant women with diabetes. The purpose of this study was to assess Turkish pregnant women's opinion and practice about 50-g glucose challenge test (GCT) and to assess the reasons why some of them refuse the test.

METHODS: This study was conducted on 312 patients at any age and gestational week in Istanbul, Turkey, by a personal interview using self-created questionnaire. Women were asked about their opinion and practice about 50-g GCT.

RESULTS: Among women who were ≤28 weeks of gestation, 42.5% (n=82/193) exhibited their desire to have a GCT in their ongoing pregnancy, 40.9% (n=79/193) pointed out their reluctance, and 16.6% (n=32/193) indicated that they had no opinion about the subject. Women who were ≤28 weeks of gestation and did not want to have GCT, were asked to explain the reasons of their reluctance. The most frequently indicated reason was the belief that GCT is harmful for their babies and themselves (n=62/79, 78.5%). Of the women who were >28 weeks of gestation, 37.8% (n=45/119) had GCT in the ongoing pregnancy, while 62.2% (n=74/119) did not have GCT. The most frequently indicated reason why women did not have a GCT was the belief that GCT is harmful for themselves and the baby (n=37/74, 50%).

CONCLUSION: This study exposes an important problem - misinformation about 50-g GCT - that carries a dangerous potential for missing the diagnosis of gestational diabetes. Study findings put forth the need for raising awareness among pregnant women and training health-care professionals about the subject.

Keywords: Awareness; gestational diabetes mellitus; glucose challenge test; pregnancy.

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Gestational diabetes mellitus (GDM), defined as glucose intolerance starting with the onset of pregnancy, is one of the most common metabolic disorders complicating pregnancy [1]. The prevalence of gestational diabetes is about 6–7% in the United States [2]. The prevalence varies among racial and ethnic groups, generally in parallel with the prevalence of Type 2 diabetes. There are several adverse outcomes associated with GDM, for mother and fetus. Related complications include preeclampsia, macrosomia, large for gestational age

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infant, maternal and infant birth trauma, and increased risk of operative and cesarean delivery [3, 4]. An adequate and efficient treatment may reduce the risk of maternal and neonatal adverse outcomes such as preeclampsia and macrosomia [5, 6].

The purpose of screening is to identify asymptomatic individuals. Nevertheless, there is no universally agreed approach of screening for GDM; moreover, there is not an agreement on appropriate glucose thresholds at which GDM is diagnosed. American Congress of Obstetricians and Gynecologists (ACOG) still recommends two-step approach using the Carpenter-Coustan criteria cutoffs [1]. The first step is a 50-g glucose challenge test (GCT). Screen positive patients go on to the second step, a 100-g 3-h oral glucose tolerance test (GTT), which is the diagnostic test for gestational diabetes. A patient is diagnosed with GDM if two or more of four values are elevated on the GTT. Another diagnostic test that is performed in one stage is 75-g 2-h oral GTT. Universally, screening is performed at 24–28 weeks of gestation [1, 2], but it can be performed as early as the first prenatal visit in case of high-risk pregnant women. Awareness of this disease, performance of screening and diagnostic tests is the key factors to reduce the risk of adverse outcomes.

The purpose of this study was to assess Turkish pregnant women's views and practices about GCT and to assess the reasons associated with refusal of the test, in women receiving antenatal care from a single tertiary hospital.

MATERIALS AND METHODS

This study was carried out at the Department of Obstetrics and Gynecology of Istanbul Medeniyet University, Goztepe Training and Research Hospital, Istanbul, Turkey and was approved by the Institutional Review Board and Ethics Committee. 312 pregnant patients at any age and gestational week, who attended antenatal outpatient clinics, were included. All patients gave their informed consent before their inclusion in the study. In our clinic, investigation of GDM is performed using "two-step approach" as recommended by the ACOG, at 24–28 weeks of gestation [1], and GCT is accepted to be positive when the glucose level is ≥140 mg/dl. In this study, women were asked about their opinion and practice about 50-g GCT. Women with known DM were excluded. All participants were interviewed face-to-face only by the first author and received a self-created questionnaire, in the antenatal outpatient clinics. Women were asked about demographic data including age, parity, diagnosis of prediabetes, family history of diabetes, history of gestational diabetes, working status, and educational level. Gestational age was calculated from the 1st day of last menstrual period preceding the pregnancy. Since universal screening is performed at 24–28 weeks of gestation, responders were separated into two groups being ≤28 weeks of gestation and >28 weeks of gestation. Women ≤28 weeks pregnant were asked whether they accepted to have a GCT in the ongoing pregnancy (options were classified as yes, no, no idea). Women who replied the questions as yes or no, received an open-ended question: "What is the reason of your willingness/unwillingness to have a GCT?" Women >28 weeks pregnant were asked whether they had had a GCT. These women subsequently received a similar open-ended question: "What is the reason for having/not having a GCT?"

Statistical analyses were performed using the statistical software SPSS 15.0 (SPSS, Inc., Chicago, IL, USA). Descriptive statistics were used to evaluate patient responses. The distribution of variables was tested with the Kolmogorov–Smirnov test. Continuous variables were presented as median, minimum, maximum, and interquartile range (IQR) and categorical variables were defined as frequencies and percentages. Multiple logistic regression analyses were employed for both groups to predict screening test status based on sociodemographic variables. Odds ratios (ORs) and related confidence intervals (CIs) were also provided variables in the models. All statistical tests were 2-sided. $P<0.05$ was considered statistically significant.

RESULTS

A total of 312 pregnant women who attended antenatal clinics were included in the study. The characteristics of the women are summarized in Table 1. The median age was 28 years (IQR: 9.75) (range: 17–43 years). Of the women interviewed, 61.8% (n=193/312) were ≤28 weeks pregnant and 38.2% (n=119/312) were >28 weeks pregnant. The median gestational age was 23.9 (IQR: 18.08) with a range of 4.8–41.5 weeks.

Among the women who were ≤28 weeks pregnant, 42.5% (n=82/193) indicated that they wanted to have a GCT in present pregnancy, 40.9% (n=79/193) indicated that they did not want to have a GCT and 16.6% (n=32/193) indicated that they had no opinion about the subject. A subset of women who were ≤28 weeks pregnant and wanted to have a GCT in present pregnancy (50/82,

Table 1. Obstetrical and demographic characteristics of all pregnant women

Characteristics	n=312	%
Age (years)		
Median age (IQR)	28.0 (9.75)	
Range	17.0-43.0	
Gestational age (weeks)		
Median gestational age (IQR)	23.9 (18.08)	
Range	5.0-41.5	
Parity		
Primiparous	115	36.9
Multiparous	197	63.1
Past gestational diabetes*	15	4.8
Diagnosed with prediabetes	2	0.6
Family history of diabetes		
1st degree relative	77	24.7
2nd degree relative	19	6.1
Working status		
Not working	258	82.7
Working	54	17.3
Educational status		
Illiterate	9	2.9
Primary school	108	34.6
Secondary	63	20.2
High school	96	30.8
University	36	11.5

*If not first pregnancy; IQR: Interquartile range.

Table 2. Reasons of women who were unwilling to have a glucose challenge test and less than and equal to 28 weeks pregnant

Reasons	n=79	%
Harmful for me and the baby	62	78.5
Unneeded	9	11.4
Test too unpleasant*	6	7.6
Doctor hasn't recommended me	2	2.5

*If not first pregnancy.

Table 3. Reasons of women who did not have a glucose challenge test and more than 28 weeks pregnant

Reasons	n=74	%
Harmful for me and the baby	37	50
Screening period has passed	19	25.7
Did not know that GCT was necessary	7	9.5
Doctor has not recommended me	5	6.8
Test too unpleasant *	4	5.4
Unneeded	2	2.7

GCT: Glucose challenge test;*If not first pregnancy.

60.9%) indicated that the only reason for their willingness to have a GCT was the recommendation made by their doctors; while the remaining 39.1% (n=32/82) indicated that the main reason was their belief in GCT's being useful for them. Women who were ≤28 weeks pregnant and did not want to have a GCT explained the reasons which were given in Table 2. The most frequently indicated reason was the belief that GCT is harmful for their babies and themselves (n=62/79, 78.5%).

Of the women who were >28 weeks pregnant, 37.8% (n=45/119) already had GCT in present pregnancy, while 62.2% (n=74/119) did not. All the women who were >28 weeks of gestation expressed that their doctor gave information to them about the issue. A subset of women who were >28 weeks of gestation and had a GCT in present pregnancy (34/45, 75.6%) indicated the only reason of having test was recommendation of their doctors, while 24.4% (n=11/45) indicated that the main reason was their belief of GCT's being useful for them. The reasons why women did not have a GCT were shown in Table 3. The most frequent reason was the belief that "GCT is harmful for me and the baby" (n=37/74, 50%).

Multiple logistic regression analysis examined whether any of the sociodemographic variables predicted pregnant women's likelihood of willingness for having a GCT at any gestational age, controlling for other variables. The result of multiple logistic regression analysis showed that for a one-unit increase in age, about 10% decrease in the odds of willingness to have a GCT (OR=0.90; CI: 0.8–0.9; p=0.045) should be expected among women who were ≤28 weeks of pregnancy (Table 3). In addition, among women who were >28 weeks pregnant, multiple logistic regression analysis revealed that one-unit increase in age decreases the odds of having a GCT about 8% (OR=0.92; CI: 0.8–0.9; p=0.045). Moreover, the odds of having a GCT are about 3.5 times greater for working women than for not working women (OR: 3.37; 95% CI: 1.05–11.09; p=0.041) adjusting for other variables (Table 4). It was of interest to determine whether there is an association

Table 4. Multiple logistic regression analysis for women who are ≤28 weeks pregnant to predict willingness to have a glucose challenge with sociodemographic variables

Determinants	p	Adjusted OR	95% CI for OR	
			Lower	Upper
Age	0.003*	0.902	0.842	0.966
Gestational week	0.245	1.031	0.979	1.086
Parity				
Multiparous	0.271	0.671	0.330	1.364
Family history of diabetes	0.294			
1st degree relative	0.335	1.476	0.669	3.258
2nd degree relative	0.172	2.527	0.667	9.570
Past gestational diabetes				
Yes	0.328	0.501	0.125	2.002
Working status				
Working	0.310	1.544	0.668	3.566
Educational status	0.659			
Secondary school	0.615	1.268	0.502	3.203
High school	0.446	0.713	0.299	1.702
University	0.770	1.180	0.389	3.579

*p value less than 0.05 is considered as significant; OR: Odds ratio; CI: Confidence interval.

Table 5. Multiple logistic regression analysis for women who are >28 weeks pregnant to predict to have a glucose challenge with sociodemographic variables

Determinants	p	Adjusted OR	95% CI for OR	
			Lower	Upper
Age	0.045*	0.924	0.855	0.998
Gestational week	0.108	0.906	0.804	1.022
Parity				
Multiparous	0.233	1.682	0.716	3.954
Family history of diabetes	0.949			
1st degree relative	0.964	0.977	0.353	2.702
2nd degree relative	0.747	0.723	0.100	5.210
Past gestational diabetes				
Yes	0.734	0.671	0.067	6.706
Working status				
Working	0.041*	3.411	1.049	11.093
Educational status	0.332			
Secondary school	0.608	0.736	0.228	2.373
High school	0.744	1.174	0.448	3.074
University	0.113	3.345	0.753	14.866

*p value less than 0.05 is considered as significant; OR: Odds ratio; CI: Confidence interval.

between education and acceptance of GCT. The patients who had no idea (79 patients) were excluded thus remaining 233 patients were included. The results are given in Table 5. Interestingly, there was no association between the educational levels of the patients and willingness/having of a GCT (p=0.791).

DISCUSSION

GDM is associated with several adverse outcomes for both mother and baby. Offspring of such a pregnancy is at higher risk to develop Type 2 diabetes, obesity, and cardiovascular disease later in life [7, 8]. Screening methods and diagnostic tests are performed to identify pregnant women with GDM. Diagnosis of GDM enables initiation of the adequate treatment, thus reduce the risk of serious perinatal complications and maternal adverse outcomes [5, 6, 9, 10]. Although the importance of screening and diagnostic tests for GDM is obvious; implementing these tests successfully depends on the pregnant women's baseline knowledge about the disease, diagnostic approach, and the tests.

We have found out that about half of the women who were ≤28 weeks pregnant were not considering to have GCT; moreover, more than half of the women who were >28 weeks pregnant had not completed a GCT. The most frequent reason was their belief of an argument declaring the test's harmful effects for them and their babies. As a similar result of a previous study from Turkey, 46% of women who did not consider having a GCT thought that the test is harmful for the baby and/or mother [11].

Measurement of fasting plasma glucose level has been suggested as an alternative to the GCT. It is more reproducible than post-glucose load test [12]. However, a systematic review which provides data from 51 prospective cohort studies suggested that the GCT is better than the fasting plasma glucose test at identifying women with GDM [13]. As a matter of fact,"fasting plasma glucose at 24–28 weeks" for screening may be considered as a practical and cost-effective approach for some low-income countries. However, this approach cannot be generalized for all low-income populations. For instance, Asians have a higher incidence of Type 2 diabetes but fasting hyperglycemia among Asians with GDM is less prominent in

the "hyperglycemia and adverse pregnancy outcome" subjects [14]. Despite GCT and GTT have adverse effects as gastric irritation, delayed emptying, and gastrointestinal osmotic imbalance leading to nausea and, in a small percentage of women, vomiting, there is no evidence about the harmful effects of the tests for the mother and/or baby [15-17]. Moreover, the screening of diabetes in pregnancy which is performed as a one-step or two-step approaches have been recommended [13, 18, 19].

Some women in the study expressed that they considered GCT as an unnecessary test. This may be due to that these pregnant women have had a previous uncomplicated pregnancy or comprehended themselves to be at minimal risk. This result can also be considered as proof of the lack of awareness in this group of women. Furthermore, there were pregnant women who stated that they did not consider to have GCT because their doctor had not recommended it. This finding displays the need for training of health-care professionals about both GDM and GCT. It is a remarkable finding that some pregnant women were unable to complete the test and interpreted GCT as intolerable. Periodic random fasting and 2-h postprandial blood glucose testing may be useful approaches for women that are at elevated risk for GDM but have discomfort after drinking a glucose solution. The intravenous GTT may be an alternative option for women who are unable to tolerate an oral glucose load, but this approach has not been well validated [20, 21].

Multiple logistic regression analysis for all women revealed negative association between age and willingness/having a GCT. This result may have arisen from the possibility that young pregnant women are more likely to accept their doctor's recommendations than the older ones and media and/or social media are more effective on older pregnant women. In addition, our statistical analysis also revealed that working women are more likely to accept a GCT. Contrary to our expectations, no association between family history of DM, history of GDM in a previous pregnancy, and willingness/having of a GCT was detected. However, family history of diabetes, especially in first-degree relatives increases the risk of developing gestational diabetes [22]. Moreover, the recurrence risk of GDM is 48% in women with a prior history of GDM [23]. Our finding of lack of association between the educational level and willingness/having of a GCT is contrary to the results of Türkyılmaz et al. [11] Hussain et al. have shown that educational level is the most significant predictor of GDM knowledge, while Shriraam et al. suggested the education level is not found to be significantly associated with the level of GDM knowledge of women [24, 25].

The rates of screening for GDM in various countries are reported in literature. For instance, the rate is 89% in Israel where a universal screening policy is implemented; 68% in a USA study involving women who are beneficiaries of health-care insurance and aged >25 years; 30% in Lombardy/Italy [26-28]. Our study showed a low acceptance rate of GCT and reflected the lack of GCT awareness among many pregnant women. Many factors may have contributed to this result. We tried to analyze these barriers and reasons as a part of our study.

The present study includes pregnant women with various levels of socioeconomic status, a wide age, and gestational age range. The survey questions were specially designed as open-ended questions to avoid bias. All responses and information on maternal and pregnancy characteristics were received by only the first author. At the same time, our study has some limitations such as including; the study group is a sample that represents those who apply to the hospital, not a population-based group. In addition, this study did not investigate the knowledge level of pregnant women about gestational diabetes.

In summary, this survey has provided useful information from a sample of pregnant women in Istanbul, Turkey about their beliefs and practices related to GCT. These data will help to address both the problem of misinformation about 50-g GCT and secondary results of this misinformation such as missing the diagnosis of gestational diabetes. We believe that there is a strong requirement for raising awareness among women and training health-care professionals about GCT. Furthermore, having a significant role in improving the awareness of women about this issue, support of mass media is necessary.

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