

## Knowledge Level, Attitude and Behaviours About Glucose Challenge Test Among Turkish Pregnant Women Türk Populasyonundaki Gebelerin Glikoz Yükleme Testi Hakkındaki Bilgi Düzeyleri, Tutum ve Davranışları

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### Abstract

**Objectives:** Debates continue about the best screening and diagnostic method for Gestational Diabetes Mellitus (GDM). However, the number of the studies investigating the awareness and related behaviors of pregnant women about gestational diabetes mellitus screening tests are limited in the literature. This study was planned to investigate the levels of knowledge about the glucose challenge tests, attitudes towards agreeing to these tests and facts affecting their final decisions about having these tests done or not of pregnant women.

**Materials and Methods:** This study is a survey, conducted among pregnant women admitted to our obstetric outpatient clinic for pregnancy follow-up, between February 2015 and April 2015. A fourteen items long questionnaire was administered to pregnant women who participated in the study.

**Results:** A total of 476 pregnant women participated in the study. The average age of the participating women was determined to be 27.7 (17-42) years. We found a statistically significant difference between having good knowledge and having the glucose challenge test done or considering to have it done in the current pregnancy ( $p < 0.05$ ). A statistically significant difference was found between having glucose challenge test done during the previous pregnancy and having the test done or considering to have it done during the current pregnancy ( $p < 0.001$ ). The difference between the level of education and having a good level of knowledge was statistically significant ( $p < 0.001$ ).

**Conclusion:** No scientifically confirmed complications related to the glucose challenge tests exist. We believe that the pregnant women are misinformed about glucose loading tests and should be reeducated to correct their knowledge through training programs.

**Key words:** Attitude, glucose challenge test, knowledge, pregnant

### Öz

**Amaç:** Gestasyonel diabetes mellitus (GDM) ile ilgili en iyi tarama ve tanı yönteminin ne olduğu konusundaki tartışmalar devam etmektedir. Gebelerin gestasyonel diabetes mellitus tarama testleri ile ilgili farkındalığı ve bunu etkileyen faktörlerle ilgili çalışmalar sınırlı sayıdadır. Bu çalışma gebelerin glikoz yükleme testleri konusundaki bilgi düzeyleri, bu testleri yaptırma konusundaki tutum ve davranışları ve bu testleri yaptırma konusundaki son kararlarını etkileyen faktörleri araştırmak için yapılmıştır.

**Materyal ve Metot:** Bu çalışma Şubat 2015 ve Nisan 2015 arasında gebelik takibi için gebe polikliniğimize başvuran gebeler arasında yürütülen bir anket çalışmasıdır. Çalışmaya katılan gebelere 14 soruluk anket uygulanmıştır.

**Bulgular:** Çalışmaya toplam 476 gebe katılmıştır. Katılan gebelerin ortalama yaşı 27,7(17-42) yıl idi. İyi bilgi düzeyine sahip olma ile bu gebelikte glikoz testini yaptırma veya testi yaptırmayı düşünme arasında istatistiksel anlamlı farklılık tespit edilmiştir ( $p < 0,05$ ). Önceki gebelikte testi yaptırmaya ile bu gebelikte testi yaptırmaya veya yaptırmayı düşünme arasında istatistiksel anlamlı farklılık tespit edilmiştir ( $p < 0,001$ ). Eğitim düzeyi ile iyi bilgi düzeyine sahip olma arasında da istatistiksel anlamlı farklılık tespit edilmiştir ( $p < 0,001$ ).

**Sonuç:** Glikoz yükleme testleriyle ilgili literatürde henüz tespit edilmiş komplikasyon yoktur. Glikoz yükleme testleri konusunda gebe kadınların yanlış bilgilendirildiğine ve bilgilerini düzeltmek için eğitim programları ile yeniden bilinçlendirilmeleri gerektiğine inanıyoruz

**Anahtar kelimeler:** Tutum, glikoz yükleme testi, bilgi, gebe

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## Introduction

Gestational diabetes mellitus (GDM) is a glucose tolerance defect, first diagnosed during pregnancy.<sup>1</sup> GDM may lead to polyhydramnios and macrosomia during pregnancy; shoulder dystocia, bone fractures, nerve damage and associated permanent deformities during delivery; and metabolic problems, such as hypocalcemia and hypoglycemia during neonatal period.<sup>2</sup> The prevalence of GDM varies between 1% and 14% in different populations.<sup>3</sup> In Turkey, the prevalence of GDM is determined to be between 1.2% and 4.5%.<sup>4</sup> It is believed that the rate of Gestational Diabetes Mellitus increases in parallel with the increasing rate of obesity.

Diagnosis criteria for Gestational Diabetes Mellitus around the world is still unclear. In the Hyperglycemia and Adverse Pregnancy Outcomes (HAPO) study, it has been noted that high glucose values during pregnancy, even below the diagnostic values for GDM, have been associated with maternal, fetal and neonatal adverse outcomes. Hence, a decision to revamp the diagnosis criteria for GDM has been made.<sup>5</sup> On the other hand, it has been suggested that screening based on risk factors can give diagnostic false negatives for gestational diabetes mellitus in some patients.<sup>6</sup> In another study comparing screening of pregnant women with risk factors and screening all of the pregnant women suggested that screening of pregnant women regardless of risk factors is associated with better perinatal outcomes.<sup>7</sup> Some authors suggest that the importance of glucose challenge test in pregnancy in determining the risk for Type 2 Diabetes Mellitus is equivalent to that of pap smear screening to cervical cancer.<sup>8</sup>

Debates continue about the best screening and diagnostic method for GDM. However, the number of the studies investigating the awareness and related behaviors of pregnant women about gestational diabetes mellitus screening tests are limited in the literature.<sup>9,10</sup> This survey study is planned for evaluating pregnant women's level of knowledge about glucose challenge tests, their attitude towards having these tests done, and the reasons affecting the decision to have these tests done. Pregnant not considering glucose load tests were asked about the reasons behind their decisions.

## Materials and Methods

This survey study is conducted with patients who were admitted to our Obstetric outpatient clinic for routine pregnancy follow-up in between February 2015 and April 2015. Board of ethics approval was obtained beforehand. Pregnant women who agreed to participate and whose pregnancies were confirmed by fetal heart rate during ultrasound examinations were included in the study. The ones at early weeks of gestation with no discernable fetal heart rate and those going thorough labor were excluded from the study. Following their informed consents, the 14 questions long questionnaire was administered to the participants. Patients were seen only once.

The questionnaire consisted of 14 questions seeking basic sociodemographic information about pregnant women, measuring their levels of knowledge about glucose loading test, attitudes towards accepting the glucose loading test, behaviours towards agreeing glucose loading test and determining the reasons behind these behaviours. The questions(Q) included in the questionnaire can be seen in Table 1.

**Table 1.** Survey Questions

Q1-Birth date of the pregnant women
Q2-When is the last menstrual period?
Q3-When is glucose loading test done? (Which week or month of the pregnancy?)
Q4-Why is glucose loading test done?
Q5-Have you got diabetes mellitus diagnosis?
Q6-Have you got a relative who diagnosed with diabetes mellitus?
Q7-If the answer of the previous question is “yes”what is the degree of relationship?
Q8-What is your education level?
Q9-Is higher levels of glucose during pregnancy harmful to the mother and the baby?
Q10-What may be the harmful effects of high glucose levels during pregnancy for the baby and the mother? You can choice more than one answer?
Q11-Did you have glucose loading test in the previous pregnancy?
Q12-Do you consider doing glucose loading test in the current pregnancy?
Q13-If your answer to the previous question is “yes” what are the reasons to consider doing glucose loading test? You can choice more than one answer?
Q14-What are the reasons for not to consider doing the glucose challenge test?

The questionnaire included 4 questions to measure pregnant women’s level of knowledge about glucose tolerance tests. Although the timing of glucose challenge test is still controversial, the answers between 24-28 weeks or 6-7 months were thought as right answer<sup>11,12</sup> and assessed “1” point. Any other answers were accepted to be false and received “0” point. Regarding the question “Why is glucose challenge test done?” the answer “For monitoring of the baby during pregnancy and to identify the potential postnatal risks” is given “1” point and the other choices are given “0” points. The question, “Is higher levels of glucose during pregnancy harmful to the mother and the baby?”, is another one to assess the pregnant women’s level of knowledge about glucose tolerance test. The answer “Yes, there is” is given “1”point and the other choices are given “0” point. The question “What may be the harmful effects of uncontrolled high glucose levels during pregnancy to the baby and mother?” is a multiple choice question and to select more than one item is allowed. The items “The baby might end up being overweight”, “Sudden decreases may occur in blood sugar levels of the baby, after delivery”, “The fluid of the baby may be more than normal”, “The mother may experience problems due to difficult delivery” are established facts and each of them were given 1 point. The other choices are not direct complications of gestational diabetes mellitus and these items are marked with “0” points. The answers given to these 4 questions were given a total score between “0” and “7”. Despite containing different questions each other, similar to the study of Shriraa et al. the scores between 0 and 4 were accepted to be poor level of knowledge and the scores between 5 and 7

were accepted to be good level of knowledge because the number of the questions in our study was less than that study.<sup>13</sup>

The pregnant women were grouped into two, based on their attitude towards and behaviour about the glucose loading test and factors possibly interfering with these attitudes and behaviours are considered.

*Group I:* Pregnant women who have the test done or considering to have it done during the current pregnancy

*Group II:* Pregnant women who don't consider having glucose challenge test done in the current pregnancy

Pregnant women who don't consider having glucose challenge test done were asked for their reasons. The choices included "because it is harmful to the baby", "because it is harmful to the mother", "because it is harmful both for mother and the baby", "being already diagnosed with diabetes", and "because of feeling discomfort during the test in the previous pregnancy". The reasons for thinking glucose challenge test is harmful for mother and / or baby were inquired. The choices included "being influenced by radio and television", being influenced by internet", "being influenced by the neighbors", "being influenced by reading", "guidance of health care professionals"

IBM SPSS Statistics 21.0 (IBM Corp. IBM SPSS Statistics for Windows. Released 2012, Version 21.0. Armonk, NY: IBM Corp.) was used for statistical analysis and calculations. The median, minimum and maximum values of age, educational status, gestational age were expressed as numbers and percentage. The distribution of the number of chosen items in the multiple choice questions was expressed as percentage. Chi-Square test was used for the correlation between having glucose challenge test during the previous pregnancy, having relatives with diabetes mellitus and level of education and level of knowledge.

## Results

A total of 476 pregnant women were included in the study. The mean age was 27.70 (17-42) years and the mean gestational age was 21.5 (6-41) weeks. The majority of the participants were elementary school (n=176, 37%) and high school graduates (n=177, 37.20%). Twenty-six (5.50%) of the participants had already been diagnosed with diabetes mellitus. The number of individuals with a relative with diagnosis of diabetes mellitus had glucose challenge test in the previous pregnancy was 200 (42%).

The scores for pregnant women's knowledge level about glucose tolerance tests were 0 to 4 points for 381 (80%) pregnant women and 5 to 7 points for 95 (20%) pregnant women. The detailed distribution of knowledge level of the pregnant women about glucose loading tests who participated to the survey is demonstrated in Table 2.

The number of women who had glucose challenge test in the current pregnancy and considering to have it (group I) was 238 (50%). The majority of women who don't consider to have glucose challenge test (group II), 220 (46%) of them thought that the test is harmful for the baby and/or mother. The majority of group II pregnant women (n=153, 32.10%) stated that they have been influenced by radio and TV in making decision to have glucose challenge test.

**Table 2.** The level of knowledge distribution among the participating pregnant women about the glucose loading tests

	Number(%)
<b>Timing of glucose challenge test</b>	
First 12 weeks	2(0.4)
13-23 weeks	48(10.1)
24-28 weeks	190(39.9)
29-36 weeks	11(2.3)
I don't know	211(44.3)
No response	14(3)
<b>Why is the glucose challenge test done</b>	
To predict the method of birth	21(4.4)
To follow-up the mother and the baby during the pregnancy and to assess potential risks after birth	331(70)
There is no utility	49(10.3)
I have no idea	73(15.3)
No response	2(0.4)
<b>Is higher levels of glucose during pregnancy harmful to the mother and the baby</b>	
There is no harm.	15(3.2)
Yes, it is	287(60.3)
I have no idea	174(36.5)
<b>What may be the harmful effects of high glucose levels during pregnancy for the baby and the mother?</b>	
Baby might end up being overweight	127(26.7)
Baby can't gain weight	17(3.6)
Sudden decreases of blood glucose may develop after birth.	141(29.6)
Amniotic fluid volume may be excessive	23(4.8)
Mother may experience complications due to the difficulty in birth	108(22.7)
Jaundice of mother	9(1.9)
I have no idea	51(10.7)
<b>Full score of knowledge</b>	
Number of women scoring 0-4 points	381(80)
Number of women scoring 5-7 points	95(20)

Regarding the relationship between the educational level/ having relatives diagnosed with diabetes mellitus and attitudes and behaviours about having the test done, we did not find any statistically significant differences between the groups ( $p > 0.05$ ,  $p > 0.05$  respectively). Regarding level of knowledge, 60 (63.80%) pregnant women who have a good knowledge had exhibit group I behaviour whereas 178 (50.70%) pregnant women who have poor knowledge had exhibit group I behaviour. We found a statistically significant difference between the two groups ( $p < 0.05$ ). When 91 (60.70%) women in their first pregnancy were excluded, 115 (60.2%) pregnant women who had the glucose

challenge test in the previous pregnancy had exhibit group I behaviour, whereas 30 (30.30%) pregnant women who didn't have the glucose challenge test in the previous pregnancy had exhibit group I behavior. We found a statistically significant difference between the two groups ( $p < 0.001$ ). None of the pregnant women who are illiterate or just literate have a good level of knowledge whereas 30 (31.20%) of the college and university graduates have a good level of knowledge; the difference between the level of education and having a good level of knowledge was statistically significant ( $p < 0.001$ ). The relation between attitude and behaviours of pregnant women about glucose loading test and some meaningful possible factors that affecting them about having the test done is shown on Table 3.

**Table 3.** The relation between attitude and behaviours of pregnant women about glucose loading test and some meaningful possible factors that affecting them about having the test done

Groups	To consider having test done (Group I) n(%)	Not to consider having test done (GroupII) n(%)	p
<b>Full knowledge score</b>			
Good knowledge (5-7)	60 (63.8)	34 (36.2)	<b>0.024</b>
Poor knowledge (0-4)	178 (50.7)	173 (49.3)	
<b>Had the test during the previous pregnancy</b>			
Had	115 (60.2)	76 (39.8)	<b>&lt;0.001</b>
Didn't have	30 (30.3)	69 (69.7)	
First pregnancy	91 (60.7)	59 (39.3)	

## Discussion

In our study, statistically significant differences were detected between having a good level of education and having the test done or considering to have it done during the current pregnancy and between the education level and being well informed indicate that the level of learning the established information, utilizing the available sources more efficiently, and level of knowledge increase as the educational level increases. We observed that the rate of decision to have glucose loading test done increases in parallel with the level of good knowledge. In addition, we observed that the experience gained by glucose tolerance test through previous pregnancies has been shown to play a significantly positive role in deciding to have test during the current pregnancy.

Tighter criteria of the screening test resulted in raising GDM prevalence but reduction of the GDM complications such as maternal weight gain, mean fetal birth weight, large for gestational age fetus.<sup>14</sup> There was an increase of normal postpartum maternal screening test results and decrease of impaired fasting glucose. It has been noted that high glucose values during pregnancy, even below the diagnostic values for GDM, have been associated with maternal, fetal and neonatal adverse outcomes.<sup>15</sup> The glucose challenge test can help identify the risk of fetal macrosomia and to take preventive measures. It is shown that treatment of gestational diabetes mellitus in pregnant women decreases the occurrence of perinatal morbidities such as perinatal death,

shoulder dystocia, bone fractures and nerve damage and improves the mothers' quality of life .<sup>15</sup> In our study, 287 (60.30%) pregnant women answered the question "Is high levels of glucose during pregnancy harmful to the baby and the mother?" as "Yes, it is". It has been proven by numerous studies that high blood glucose levels lead to maternal and fetal complications and the mothers should be alerted better about both. However, increasing awareness can be achieved by education.

In our study 331 (69.50%) pregnant women answered the question "What is the purpose of glucose challenge test?" as "To define potential risks for mother and child during the pregnancy follow-up and post-delivery periods". Indeed, glucose challenge test in pregnancy not only detects the risks for the baby and the mother during pregnancy but also defines the risk of developing diabetes mellitus for the baby and the mother at later stages of their lives, and allows taking preventive measures. The studies indicate that risk of developing prediabetes or diabetes mellitus increases 8-fold in the infants of the mothers who developed gestational diabetes mellitus .<sup>16</sup> On the other hand, the risk of developing type 2 diabetes mellitus is higher for pregnant women with gestational diabetes mellitus .<sup>16</sup>

Given the significant correlation between having a good level of knowledge and having glucose challenge test done, we suggest that educating pregnant women would provide a better understanding of the benefits of identifying these risks. The majority of the pregnant women participating in our study were elementary [n=176 (37%)] and high school graduates [n=177 (37.20 %)], and the percentage of the pregnant women with a good level of knowledge was only 20%. As the educational level of the pregnant women increases, the potential risks caused by high glucose levels in pregnancy for both the baby and the mother during pregnancy and postpartum periods would be understood better.

Thirty-six (7.60%) pregnant women who don't consider having glucose challenge test done stated for their reason the discomfort they felt during the previous pregnancy. The most common complaint during the test is nausea followed by vomiting. Therefore, availability of alternative methods has been investigated. In a study, casual plasma glucose, fasting plasma glucose, hemoglobin A1c, and 50g glucose challenge test in the first and second trimesters were compared in terms of sensitivity, and 50 g GCT was found to be the most sensitive test in the diagnosis of gestational diabetes mellitus, in both trimesters .<sup>17</sup> In the second trimester, the glucose challenge test was again found to be the most sensitive test with 100% sensitivity, when the cut-off point of 130 mg/dL was accepted, and 87.50% sensitivity, when the cutoff point 140 mg/dl was accepted<sup>17</sup>. The 50 g GCT has been suggested to be a more reliable test with high sensitivity and specificity in gestational diabetes mellitus screening. In order to overcome nausea and vomiting which may be experienced during test, 50 grams of glucose may be diluted with 3 cups of water and lemon juice may be added. In many studies, it has been shown that the level of insulin secretion depends on the amount of carbohydrate taken with food .<sup>18</sup> Therefore, if there is no carbohydrate metabolism disorder, even large amount of glucose intake would not lead to irregularities in blood glucose levels.

Regarding women who don't consider to have GCT, 220(%46) of them stated that the test is harmful for the baby and/or for the mother. A significant number of these women (n=153, 32.10%) stated that their decision not to have the test done has been

influenced by radio and television programs. In a previous study, pregnant women are reported to receive 40% of the information on gestational diabetes mellitus from TV and radio.<sup>13</sup> We believe that although our population of pregnant women receive most of the information about gestational diabetes mellitus and glucose load tests from the radio and television programs, they probably do not understand sufficiently or misinterpret the information about alternative testing methods. There are also pregnant women who don't consider having the test done, because the result of the test done in the previous pregnancy was normal and re-testing is thought to be unnecessary during the current pregnancy. In our study, 76 (39.80%) of the pregnant women, having had the test done in the previous pregnancy, are considered to be in group II during this pregnancy. However, every pregnancy is different and given the women's age, weight, etc. may change, a previously undiagnosed impairment of glucose metabolism is likely to be manifested during the current pregnancy. We suggest that the lesser ratio of acceptance of the glucose challenge test in our population despite the widespread acceptance in the literature, is due to a lack of sufficient exposure and awareness.

In conclusion, we believe that the glucose challenge test is useful both for pregnant women and fetuses in terms of identifying potential risks during both the antenatal and the postnatal development and taking preventive steps. No scientifically confirmed complications related to the glucose challenge tests exists. We believe that the pregnant women are misinformed and should be reeducated to correct their knowledge through training programs. In this regard, national obstetricians and family physicians, in direct contact with the pregnant women, have an important responsibility.

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