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Antenatal Factors Affecting the Decision to Have an Oral Glucose Tolerance Test

Oral Glukoz Tolerans Testi Yaptırma Kararını Etkileyen Antenatal Faktörler

Ali Gursoy[1], Kemal Atasayan[2], Ezgi Dogan Tekbas[3]

[1]Maltepe University, Faculty of Medicine, Department of Obstetrics and Gynecology, İstanbul, Turkey
[2]Bezmialem University, Faculty of Medicine, Department of Obstetrics and Gynecology, İstanbul, Turkey
[3]Hospital Cologne-Holweide, Department of Obstetrics and Gynecology, Germany

Abstract

Aim: We aimed to investigate the factors that may affect the pregnant's decision to have an oral glucose tolerance test (OGTT) between 24-28 gestational weeks.

Material and Method: This descriptive and cross-sectional study was conducted prospectively with 307 pregnant women. Demographic characteristics of the pregnant women, pregnancy follow-up findings, antenatal tests, and their decision for having an OGTT were questioned and recorded. All the factors were analyzed that may have a possible effect on the OGTT decision.

Results: Fifty-three percent of the participants had OGTT during pregnancy. The rate of positive OGTT was found to be 8.5%. Body mass index, gravida, history of abortion, miscarriage risk, weight gain during pregnancy, the rate of using antenatal folic acid and iron supplementation were similar between the groups that had and did not have OGTT ($p > 0.05$). In the univariate model, age, parity, planned pregnancy, regular follow-up, educational status and physical activity were found to have a significant effect on predicting patients who will have OGTT ($p < 0.05$). Also, antenatal screening tests and level 2 obstetrics ultrasonography were shown to have a significant independent effect in predicting patients who will have OGTT ($p < 0.05$).

Conclusion: By evaluating the factors that may affect the decision of pregnant about OGTT during pregnancy follow-up, we can predict the patients who tend not to have GDM screening and we can increase the screening rate by giving these pregnant women more detailed information. Thus, we have a chance to diagnose and treat more GDM and reduce related mortality and morbidity.

Keywords: Gestational diabetes, oral glucose tolerance test, pregnancy, maternal serum screening tests

Öz

Amaç: Gebelerin 24 - 28. gebelik haftaları arasında oral glukoz tolerans testi (OGTT) yaptırma kararını etkileyebilecek faktörleri araştırmayı amaçladık.

Gereç ve Yöntem: Tanımlayıcı ve kesitsel olan bu çalışma prospektif olarak 307 gebe ile yapılmıştır. Gebelerin demografik özellikleri, gebelik takip bulguları, antenatal testleri ve OGTT yaptırma kararları sorgulanarak kaydedildi. OGTT kararını etkileyebilecek tüm faktörler analiz edildi.

Bulgular: Katılımcıların %53'ü hamilelik sırasında OGTT testi yaptırmayı kabul etti. OGTT sonucunun pozitiflik oranı %8.5 olarak saptandı. OGTT olan ve olmayan gruplar arasında vücut kitle indeksi, gravida, düşük öyküsü, düşük riski, gebelikte kilo alımı, antenatal folik asit kullanımı ve demir kullanımı oranları benzerdi ($p > 0.05$). Tek değişkenli modelde; yaş, parite, planlı gebelik olması, düzenli gebelik takibi yapılması, eğitim durumu ve fiziksel aktivitenin OGTT yaptıracak hastaları öngörmede anlamlı etkisi olduğu bulundu ($p < 0.05$). Ayrıca antenatal tarama testleri ve 2. düzey obstetrik ultrasonografinin OGTT olacak hastaları öngörmede anlamlı bağımsız etkiye sahip olduğu gösterilmiştir ($p < 0.05$).

Sonuç: Gebelerin takipleri sırasında OGTT ile ilgili kararını etkileyebilecek faktörleri değerlendirerek GDM taraması yaptırmama eğiliminde olan hastaları öngörebilir ve bu gebelere daha detaylı bilgi vererek tarama oranını artırabiliriz. Böylece daha fazla GDM tanısı koyarak tedavi etme ve buna bağlı oluşabilecek mortalite ve morbiditeyi azaltma fırsatı bulabiliriz.

Anahtar Kelimeler: Gestasyonel diyabet, oral glukoz tolerans testi, gebelik, anne serumu tarama testleri

Corresponding *(İletişim)*: Ali Gursoy,Maltepe University Hospital, Ataturk Cad. Cam Sok. 3/A 34843 Maltepe, İstanbul, TURKEY
E-mail *(E-posta)*: aligursoy44@hotmail.com
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INTRODUCTION

Gestational diabetes mellitus (GDM) is the most common medical complication of pregnancy with a prevalence of 9% to 26% of pregnancies worldwide.[1] The prevalence of GDM increases day by day in parallel with the rise in the prevalence of obesity and type 2 diabetes mellitus (DM).[2] After the 24th week of pregnancy, it is recommended that all pregnant women have a GDM screening test.[3] It is estimated that 70% of women with GDM will have the risk of developing type 2 DM in the following years.[4] Detection of GDM and accordingly a controlled course of blood sugar levels can reduce maternal and infant mortality and morbidity.

The oral glucose tolerance test (OGTT) measures the body's response to glucose. For the test, a glucose solution is drunk after fasting. A blood test is then done to determine if it is metabolizing the glucose properly. There are two different types of OGTT. In the two-step GDM test, the venous glucose level is scanned 1-hour after the administration of 50 g of oral glucose solution. For pregnant women whose glucose levels exceed the screening threshold, a 3-hour 100 g diagnostic test is applied. For the diagnosis of gestational diabetes mellitus, two or more abnormal values must be detected in the 3-hour OGTT. In the one-step GDM test, the venous glucose level is scanned fasting, 1-hour and 2-hour after the administration of 75 g of oral glucose solution.[A] One abnormal result is enough for GDM diagnosis.

Maternal overweight, obesity, previous history of GDM, family history of abnormal sugar metabolism, advanced age, childbearing, cigarette smoking and physically inactive lifestyle before and during pregnancy are major risk factors for GDM.[5] Women with GDM have a higher risk of developing gestational hypertension, pre-eclampsia, eclampsia, polyhydramnios, cesarean section, gestational weight gain, postnatal depression perineal trauma and type 2 diabetes.[6,7]

Fetal hyperinsulinemia may cause respiratory distress by adversely affecting the amount of lung surfactant synthesis, thus increasing the rate of intensive care admission and morbidity in the neonatal period. Children of women with GDM face an increased risk of macrosomia, neonatal hypoglycemia, hyperbilirubinemia, hypocalcemia, birth trauma, shoulder dystocia, respiratory distress syndrome, type 2 DM, cardiovascular disease and unfortunately stillbirth.[8-11]

There are many maternal and fetal complications that may be caused by GDM, and despite this, some pregnant women do not want screening tests. In our study, we planned to investigate the factors that may affect the OGTT decision. In the light of our study, we hope to increase the number of patients who are not expected to have the OGTT test. Thus, since the diagnosis of GDM will increase with the test, it will be more possible to reduce the fetal and maternal morbidity associated with GDM.

MATERIAL AND METHODS

The descriptive, cross-sectional study was carried out prospectively at the department of obstetrics and gynecology of Maltepe University between August 2019 and August 2021. Pregnants between 24 and 28 gestational weeks were included in the study. Those who did not approve to participate in the study, pregnants with pregestational diabetes and women with multiple pregnancies were excluded from the study.

Age, height, weight, gravida, parity, abortion, weight gain up to the 28th week, whether the pregnancy was planned or not, educational status, folic acid support, iron supplement use, and physical activities were questioned. In addition, history of miscarriage risk during pregnancy, whether they had regular antenatal follow-ups, first-trimester screening tests, detailed fetal anatomic sonography in the second trimester, whether they had OGTT and how they got information about OGTT were questioned. The study was conducted in accordance with the Declaration of Helsinki Ethical Principles. Ethics committee approval was obtained for this study. All participants gave written consent for the study.

Statistical Analysis

Mean, standard deviation, median lowest, highest, frequency and ratio values were used in the descriptive statistics of the data. The distribution of variables was measured with the Kolmogorov - Smirnov test. The Mann - Whitney U test was used in the analysis of quantitative independent data. The Chi - Square test was used in the analysis of qualitative independent data. The effect level was investigated by univariate and multivariate logistic regression. SPSS 27.0 program was used in the analysis.

RESULTS

A total of three hundred seven pregnant who met the criteria were included in the study. The mean age was 30.9±5.7 (18-48). While 53.4% (n:164) of the participants had OGTT, 46.7% (n:143) did not have a GDM screening test. 47.6% of the participants were university graduates. The rate of those who had at least one anomaly screening test during pregnancy was 67.4%. In our clinic, one step 75 gr or two steps 50 gr OGTT was recommended according to the demographic characteristics of pregnant women and the obstetrician's choice. The screening test was performed with 50 gr (two-step) in 75% and with 75 gr (one-step) in 25% of the pregnant women. The positivity rate of OGTT was found to be 8.5% (**Table 1**).

Body mass index (BMI), gravida, history of abortion, miscarriage risk and weight gain during pregnancy were similar between the groups that had and did not have OGTT ($p > 0.05$) during pregnancy. In addition, the usage rate of antenatal folic acid and iron supplementation was also similar ($p > 0.05$) (**Table 2**).

Table 1. Demographic Characteristics

		n	Median
BMI	<25	53	17.3%
	25-30	145	47.2%
	>30	109	35.5%
Weight Gain	<7 kg	143	46.6%
	>7 kg	164	53.4%
University Graduate	No	161	52.4%
	Yes	146	47.6%
Physical Activity	No	197	64.2%
	Yes	110	35.8%
Planned Pregnancy	No	61	19.9%
	Yes	246	80.1%
Regular Follow-Up	No	31	10.1%
	Yes	276	89.9%
Gravida	Primigravida	138	45.0%
	Multigravida	169	55.0%
Parity	Nulliparous	158	51.5%
	Multiparous	149	48.5%
Abortus Imminens		59	19.2%
History of Abortus		51	16.6%
Folic Acid Supplement		263	85.7%
Iron Supplement		248	80.8%
Antenatal Screening	No	100	32.6%
	Yes	207	67.4%
Level 2 USG	No	117	37.1%
	Yes	193	62.9%
Source of Information	Doctor	77	25.1%
	Media	157	51.1%
	Social Environment	73	23.8%
Reason For Not Doing	Harmful	52	36.4%
	Previously Done	27	18.9%
	Not Recommended	18	12.6%
	Unnecessary	46	32.2%
How Many Gram OGTT	50 gr	123	75.0%
	75 gr	41	25.0%
OGTT Result	(-)	150	91.5%
	(+)	14	8.5%

Table 2. Factors Affecting Decision to Have OGTT

		OGTT (-)		OGTT (+)		
		n	%	n	%	p
BMI	<25	29	20.3%	24	14.6%	
	25-30	66	46.1%	79	48.2%	0.415 X^2
	>30	48	33.6%	61	37.2%	
Weight Gain	<7 kg	66	46.2%	77	47%	0.889 X^2
	>7 kg	77	53.8%	87	53%	
University Graduate	No	97	67.8%	64	39%	0.000 X^2
	Yes	46	32.2%	100	61%	
Physical Activity	No	102	71.3%	95	57.9%	0.015 X^2
	Yes	41	28.7%	69	42.1%	
Planned Pregnancy	No	40	28%	21	12.8%	0.001 X^2
	Yes	103	72%	143	87.2%	
Regular Follow-Up	No	22	15.4%	9	5.5%	0.004 X^2
	Yes	121	84.6%	155	94.5%	
Gravida	Primigravida	56	39.2%	82	50%	0.057 X^2
	Multigravida	87	60.8%	82	50%	
Parity	Nulliparous	64	44.8%	94	57.3%	0.028 X^2
	Multiparous	79	55.2%	70	42.7%	
Abortus Imminens	No	122	85.3%	126	76.8%	0.060 X^2
	Yes	21	14.7%	38	23.2%	
Abortus	No	117	81.8%	139	84.8%	0.490 X^2
	Yes	26	18.2%	25	15.2%	
Folic Acid Supplement	No	25	17.5%	19	11.6%	0.141 X^2
	Yes	118	82.5%	145	88.4%	
Iron Supplement	No	29	20.3%	30	18.3%	0.659 X^2
	Yes	114	79.7%	134	81.7%	
Antenatal Screening	No	85	59.4%	15	9.1%	0.000 X^2
	Yes	58	40.6%	149	90.9%	
Level 2 USG	No	90	62.9%	24	14.6%	0.000 X^2
	Yes	53	37.1%	140	85.4%	
Source of Information	Doctor	49	34.3%	108	65.9%	
	Media	44	30.8%	33	20.1%	0.000 X^2
	Social Environment	50	34,9%	23	14%	

X^2 Ki-kare test

The age of the patients, the rate of university graduates, the rate of physical activity, planned pregnancy rates and regular follow-up rates were significantly higher in the group that had OGTT ($p < 0.05$). In addition, the rate of those who had anomaly screening test and level 2 USG was significantly higher in the group who had OGTT ($p < 0.05$). In the group that had OGTT, the rate of being informed about OGTT from the doctor was significantly higher than the group that did not have OGTT ($p < 0.05$) (**Table 2**).

In the univariate model significant effects of age, parity, planned pregnancy, regular follow-up, educational status, physical activity, anomaly screening test and level 2 USG were observed in predicting patients who will have OGTT ($p < 0.05$). In the multivariate reduced model significant-independent efficacy of antenatal screening test and level 2 USG was observed in predicting patients who will have OGTT ($p < 0.05$) (**Table 3**).

Table 3. Univariate and Multivariate Analysis

	Univariate Model			Multivariate Model		
	OR	%95 GA	p	OR	%95 GA	p
Age	1.075	1.032-1.121	0.001			
Parity	0.603	0.384-0.948	0.028			
Planned Pregnancy	2.644	1.472-4.75	0.001			
Regular Follow-up	3.131	1.391-7.047	0.006			
University Graduate	3.295	2.058-5.275	0.000			
Physical Activity	1.807	1.122-2.911	0.015			
Antenatal Screening	14.557	7.775-27.255	0.000	16.78	8.23-34.20	0.000
Level 2 USG	9.906	5.714-17.172	0.000	11.472	5.99-21.97	0.000

Lojistik regresyon (Forward LR)

DISCUSSION

As a primary outcome, we investigated the rates of pregnant women to have GDM screening tests and possible reasons that may affect their decision to have this test. The rate of having the GDM screening test was found to be 53%, similar to other studies.[12,13] OGTT was positive in 8.5% of 164 people who had the test. In the Basbug et al study, the positivity rate was found to be 7.9%.[13]

While the age of pregnant women was not a factor affecting the OGTT decision in several studies, in our study the pregnant women who decided to have the test were found to be older ages.[12,14,15] We think that this contrast is due to the decrease in pregnancy rates in advanced maternal age and due to the increased maternal and fetal risks in advanced maternal age pregnancies. As the mother's age progresses, pregnant women may want to minimize the risks that may occur by performing antenatal tests.

Hussain et al. and Turkyilmaz et al. stated that the level of knowledge about GDM is related to education, while Shriraam et al. suggested that there is no relationship with education level.[15-17] We found that the rate of university graduates having the screening test was significantly higher in our study. We believe that it would be useful to give a more detailed information about GDM to those who are not university graduates in order to have the OGTT test in the outpatient clinic.

The recommended average weight gain at the end of the second trimester of pregnancy is approximately seven kg. Excess weight gain during pregnancy is associated with adverse perinatal outcomes such as fetal growth, cesarean delivery, preterm birth, hypertensive disorders of pregnancy, GDM and infant mortality.[18] In our study, we observed that weight gain did not affect the decision to have a screening test. Regular exercise during pregnancy helps ensure proper maternal and fetal weight gain. Exercise during pregnancy can also reduce risk of GDM and hypertensive diseases of pregnancy. It is also associated with a shorter first stage of labor and a reduced risk of cesarean section.[19] We investigated whether doing 30 minutes of exercise at least 3 times a week is related to the approach to the screening test.[20] We have ensured that pregnant women who engage in regular physical activity have had diabetes screening test significantly more often. In Basbug et al's study, the rate of those who did a physical activity in the group that had OGTT was 24.8%, while it was 15.8% in the group that did not have OGTT.[13]

For a healthy pregnancy, the prenatal standard follow-up frequency is once a month for the first 28 weeks, every 2 weeks between 28 and 36 weeks and once a week after 36 weeks. We found that pregnant women who had their pregnancy follow-up at recommended intervals had a more positive approach to the screening test.

We determined that the rate of having OGTT in nulliparous pregnant women was found to be significantly higher than in multiparous women. On the contrary Yaprak et al., showed that the rate of having OGTT in those who had their first pregnancies was lower.[14] This difference between the two studies may be due to the fact that pregnant women with their first pregnancy are more compliant with the recommendations of their doctors. Another possible reason is that multiparous pregnant women may have had the test before and did not want to be screened again because it was found to be negative.

Daily iron (30-60 mg) and folic acid (400 µg) supplementation are recommended for every pregnant woman to prevent neural tube defects and anemia.[21] No correlation was found between the regular folic and iron use habits of pregnant women and the rates of having OGTT in our study.

The American Congress of Obstetricians and Gynecologists recommends that all pregnant women be screened or tested for aneuploidy.[22] Screening options include; traditional serum analysis scans such as first-trimester screening, triple marker test, quadruple marker test, neural tube defect screening and cell-free DNA. Level 2 obstetric ultrasound performed around the twentieth week of pregnancy is also a comprehensive assessment of fetal anatomy and development. We detected that the women who had an antenatal genetic screening in the first trimester or level 2 obstetric ultrasound were more prone to do also OGTT test ($p < 0.05$). We thought that this result would be related to the fact that those who are sensitive to the risk of a possible anomaly are also sensitive to the risk of GDM (**Figure 1, 2**).

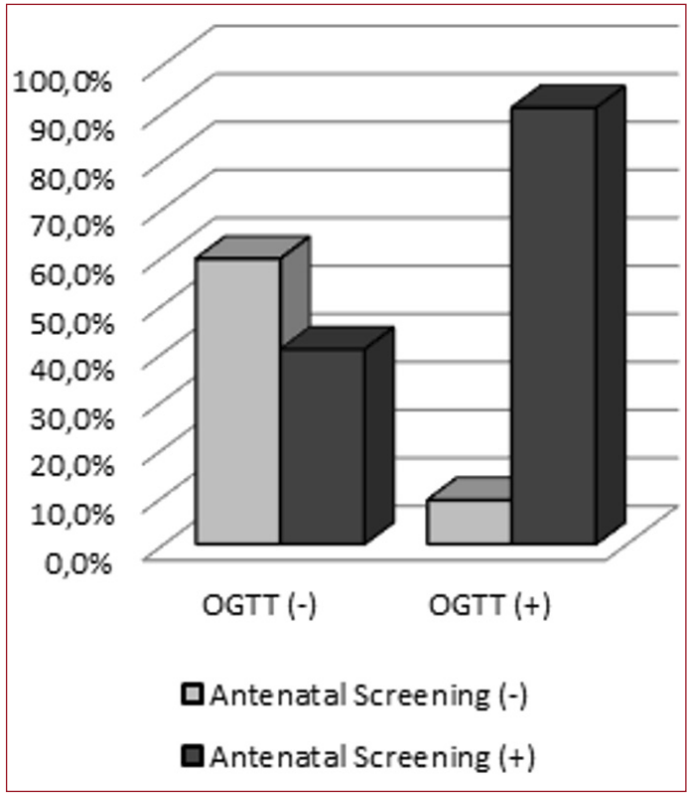

Figure 1. Approach to OGTT of those who had antenatal test

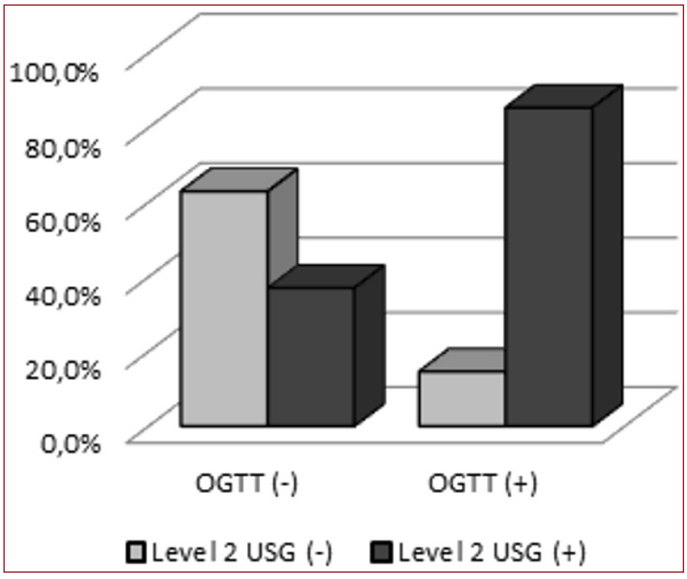

Figure 2. Approach to OGTT of those who had Level 2 Obstetrcis USG

Although there is a lot of confusing and misleading information on social media, there is no reliable study in the literature showing that the GDM screening tests are harmful to the mother and the fetus. During the OGTT, some pregnant women may experience non-serious side effects such as nausea, dizziness and sweating. None of these side effects cause harmful effects to the mother or the baby. Although there is no known harm, we see that the most common reason for not having OGTT in our study was the belief that the test could be harmful to the baby. Other reasons suggested for not having an OGTT are having a negative screening test in the previous pregnancy and the thought that the screening test is unnecessary. Many studies showed that the main reason for not performing the OGTT is the concern of the test that will harm the fetus and the mother.[13-15,23-25] In the source of the misinformation about the GDM screening test, there are posts with false content from social media and visual media.[12-15,26,27] In order to correct this negative perception, pregnant women should be given detailed information about the harms of gestational diabetes and pregnant women should be directed to a screening test. It should be explained with scientific arguments that there are no reported complications of the screening test in the literature so far. We think that the information to be made especially from social media and visual media will correct this misconception.

The limitations of our study are that it was a single-centered study and it was conducted with a small number of people. In addition, as it is made with a sample consisting of only those who applied to the hospital, it does not reflect society.

CONCLUSION

Age, parity, planned pregnancy, regular follow-up, educational status, physical activity, anomaly screening test and level 2 USG decision of the pregnant women were observed to affect the GDM screening decision ($p < 0.05$). In the multivariate reduced model, antenatal screening test and level 2 USG were found to have significant -independent efficacy in predicting patients who would have OGTT ($p < 0.05$). Based on these parameters, we can increase the screening rate by informing the pregnant women who may have a tendency not to have the OGTT test.

ETHICAL DECLARATIONS

Ethics Committee Approval: The study was carried out with the permission of Maltepe University Medical Ethics Committee (Decision No: 2019/900/47).

Informed Consent: All patients signed the free and informed consent form.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The author has no conflicts of interest to declare.

Financial Disclosure: The authors declared that this study has received no financial support.

Author Contributions: All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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