

# Oral Glucose Tolerance Test: who gives information and is it sufficient?

## Oral Glikoz Tolerans Testi: Kim bilgi veriyor ve yeterli mi?

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### ABSTRACT

**Purpose:** Oral glucose tolerance test (OGTT) is a very important procedure in diagnosing diabetes mellitus. It is very crucial to perform OGTT according to the rules that must be taken into account in preparation period of the test. Our aim was to determine the level of awareness and the source of information among the patients about the OGTT procedure.

**Materials and Methods:** The 680 outpatients, who were sent to the laboratory for OGTT, were asked to answer the questions reflecting the level of knowledge about OGTT. The data related to the answers to the questions were presented as numbers and ratios. Statistical analysis was made by chi square test.

**Results:** Only 160 (23.5%) of patients declared that they have got information about OGTT. The source of knowledge was mostly their clinicians 425 (62.5%) and the laboratory staff 255 (37.5%). According to the declaration of patients that they got information or not there was a statistically significant difference with the education level ( $p < 0.05$ ).

**Conclusion:** Although giving information to patients is the responsibility of the clinicians, the laboratory staff should try to understand if the patients are well informed or not, when giving OGTT appointment to the patients in order to complement insufficient information.

**Key words:** OGTT; diabetes mellitus; glucose

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## ÖZET

**Amaç:** Oral glukoz tolerans testi (OGTT), diabetes mellitus teşhisinde çok önemli bir prosedürdür. Testin hazırlık döneminde dikkate alınması gereken kurallara göre OGTT yapılması çok önemlidir. Amacımız, hastaların OGTT işlemi hakkında farkındalık düzeyini ve bilgi kaynağını belirlemektir.

**Gereç ve Yöntemler:** OGTT için laboratuvara gönderilen poliklinikte 680 hastadan OGTT hakkındaki bilgi düzeyini yansıtan soruları yanıtlamaları istendi. Soruların cevaplarına ilişkin veriler, sayı ve oran olarak sunulmuştur. İstatistiksel analiz ki kare testi ile yapıldı.

**Bulgular:** Hastaların sadece 160'ı (% 23,5) OGTT hakkında bilgi sahibi olduğunu bildirdi. Bilgi kaynağı çoğunlukla klinisyenler 425 (% 62,5) ve laboratuvar personeliydi 255 (% 37,5). Hastaların bilgi alıp almama beyanına göre eğitim düzeyi ile istatistiksel olarak anlamlı farklılık vardı ( $p < 0,05$ ).

**Sonuç:** Hastalara bilgi vermek klinisyenlerin sorumluluğunda olsa da, yetersiz bilgileri tamamlamak için hastalara OGTT randevusu verirken, laboratuvar personeli hastaların iyi bilgilendirilip bilgilendirilmediğini anlamaya çalışmalıdır.

**Anahtar kelimeler:** OGTT; diabetes mellitus; glukoz

## INTRODUCTION

The reliability of laboratory results is influenced by many factors starting from pre-preanalytical phase through preanalytical, analytical and post analytical phases that constitutes total testing process. The most important stages of the total testing process are the phases before analysis as they are the most susceptible periods for errors beginning from the test requisition to the sample analysis (1).

Some tests though seem to be standard and simple, may require extra instructions before and during the sampling procedures. One of these tests is plasma glucose determination which is analyzed as the constituent of OGTT. The quality of the sample is very important since the test result is used to diagnose diabetes mellitus (DM) which is estimated to affect 592 million of people globally by the year 2035 (2, 3). A 2 hour plasma glucose value after 75 grams OGTT is one of the tools for the diagnosis of diabetes mellitus (4,5). Blood specimen quality is very important in analytical processes and producing test results in order not to cause medical errors (6). Therefore, patients should obey all the preanalytical rules properly to obtain the correct test results for diagnosis.

It is well known that many diet and life-style factors may affect the OGTT results, so clear information should be given to the patients

in order to eliminate those effects. The patient should be informed; i) to consume usual meal beginning three days before the test, ii) to avoid strong physical activity the day before the test, iii) to fast at least 12 hours before the test, iv) not to walk around or smoke during the test (7). These information should be explained to the patient in detail because it is suggested that patient perception of understanding health instructions is important in achieving healthy results (8). According to us, it is not well known who gives or should give the information to the patients and how sufficient is the given information.

We thought that many of the patients are not informed enough about the pre-procedure of OGTT and the importance of the rules that should be obeyed for OGTT. Inadequate literacy is suggested to be common among patients with diabetes which may lead to adverse outcomes (9).

The aim of our study was to determine the level of awareness and the source of information among the patients about the OGTT procedure.

## MATERIALS AND METHODS

This study was made with the participation of patients of our hospital's outpatients clinic. The patients were selected from people who were sent to the phlebotomy unit from endocrinology and internal medicine

departments for OGTT performance. They were asked to answer the questions of the survey about demographic data and the knowledge level about OGTT. An approval was obtained from the ethics committee of our hospital. A written informed consents were taken from all participants.

The survey was created independently by the authors (Table 1). The questions were open ended in order not to lead the patients. The questionnaire was given to the patient by the laboratory staff before the first blood draw. They were told to answer all the questions in the survey and the ones who refused to take part were not included in the study. The level of knowledge about OGTT was evaluated according to the correct answers to questions 6-10.

The data related to the answers to the questions were presented as numbers and ratios. Statistical analysis about the relation of gender, profession and education with the level of knowledge was made by chi square test. A p value <0.05 was accepted as significant.

## RESULTS

The mean age of the 680 patients (360 females and 320 males) was  $51.5 \pm 12.3$  years. There was not a statistically significant difference between gender, occupation and the level of knowledge about OGTT ( $p > 0.05$ ).

Eighty (11.8%) of the patients were not literate, 380 (55.9%) were graduated from the primary, 70 (10.3%) were graduated from secondary school. The number of patients graduated from the college was 100 (14.7%) while only 50 (7.3%) of the patients graduated from university. Their level of education and professions are shown in Graphs 1 and 2, respectively.

Only 160 (23.5%) of patients declared that they have got information about OGTT. The source of knowledge was mostly their clinicians 425 (62.5%) and the laboratory staff 255 (37.5%). According to the declaration of patients that they got information or not, there was a statistically significant difference according to the education level ( $p < 0.05$ ). The higher is the level of education, the higher is the self declaration of getting information.

The best known information by the patients was the fasting period before OGTT which was known by everybody. The purpose of OGTT was known by 480 (70.6%) patients. Half of the patients 340 (50%) knew the blood retrieval times during OGTT. The restrictions until the blood retrieval after glucose loading were not known by 440 (64.7%) of the patients. Only 220 (32.4%) of the patients knew how long OGTT will last. Finally, the reference ranges for fasting and post prandial 2 hours plasma glucose levels were not known by non of the patients.

**Table 1.** Questionnaire about the level of knowledge about OGTT  
**Tablo 1.** OGTT hakkında bilgi düzeyi anketi

No:	Questions	
1	Did you get information about OGTT?	Yes: 23.5% No: 76.5%
2	Where did you get information about OGTT?	Physician: 62.5% Laboratory: 37.5%
3	Do you know the reference range for fasting plasma glucose?	Knows: non
4	Do you know the reference range for post prandial 2 hours plasma glucose?	Knows: non
5	Have you ever done OGTT before?	Yes: 10.3%
6	What is the purpose of the OGTT?	Knows: 70.6%
7	How long fasting is necessary for OGTT?	Knows: 100%
8	What should not be done after taking glucose?	Knows: 35.3%
9	How long does OGTT last?	Knows: 32.4%
10	When is the blood retrieval after taking glucose?	Knows: 50%

Five of the questions which were reflecting their OGTT knowledge level were evaluated together. One hundred sixty of the patients (23.5%) answered all the five questions true while 80 of the patients (11.8%) had one false answer. One hundred ten patients (16.2%) had three, 170 patients (25%) had two and 160 patients (23.5%) had one correct answer. Half of the patients (50%) who answered all 5 questions correctly had told that they had got no information either from the doctor or the laboratory.

## DISCUSSION

As a result of our study, the fact that approximately half of the patients did not have enough information about OGTT shows that a significant portion of the patients were not prepared properly for OGTT.

This study was planned to determine how well and by whom patients are informed before OGTT, which is still widely used for diagnosing type 2 DM or gestational diabetes (4). When performing glucose tolerance test, the changes in blood glucose concentration due to given glucose indicate the degree of impairment in glucose tolerance. Therefore the factors influencing the blood glucose concentration have to be minimized (2). Thus accurate results can be obtained and the diagnosis can be made safely.

Preanalytical variables such as physical activity, fasting period, diet, water intake, drugs and dietary supplements should be reminded to the patients for accurate results since each of them introduce a certain degree of variability to the results. Their cumulative effect can strongly influence the level of glucose causing false positive or negative errors in measurement (2,10). If enough information is not given to the patients, the proper patient preparation for OGTT will not come true and erroneous test results can wrongly be attributed to the clinical condition. OGTT test requests are usually made from internal medicine, endocrinology and gynecology clinics, patients are mostly informed about these tests by the doctors or nurses of these departments, laboratory staff can also inform

the patients about the preanalytical process and provides information on sample submission times.

At that point a question arises automatically about the source of the information: Who gives this information to the patients, doctors or laboratory staff? According to recommendations, clinicians and laboratory staff should inform patients about proper preparation for the OGTT (7). It is assumed that either a doctor gives information about OGTT after test requisition or laboratory staff gives information while giving OGTT appointment. However, we wondered if the patients felt informed enough and well prepared for OGTT (Question 1). We determined that only 23.5% of patients declared that they have got information about OGTT, mostly from their doctors (62.5%) and the laboratory staff (37.5%) (Answer to question 2). The remaining patients (%76.5) did not feel themselves informed but when we evaluated the answers to the survey; we realized that the patients who claimed that they did not get information, in fact knew some of the facts about OGTT. This may be due to increasing health literacy of the patients. Many people can get information from the health programs on television or internet. Thus they have a chance to get information besides the doctors and health professionals. However, the fact that the patient has social media information about these tests may lead to a situation that contradicts the clinical practices in some cases. Regarding this, it is important that patients do not interpret the test results to avoid conflict with the clinician. The problem is the border drawn on what the patient should know. In our study, patients could not answer the questions of fasting or 2-hour glucose reference values, and it was thought that they could not interpret the results. It is suggested that improvement in the health literacy of people will help to improve health services and disease control (11). Based on a systematic review of Al Sayah et al. there is an association between health literacy and health outcomes in diabetes (12). We thought that some of the participants of our survey searched information related to diabetes and thus

answered the questions. Fasting period is important and one of the controllable factors prior to blood sample collection for accurate glucose test results (13,14). Due to recognized influence of meals on the concentration of plasma glucose, it is essential for the patients to come fasting for the test and it was seen that all the patients knew this fact well. The most correct answer was for question number 7, asking fasting period before OGTT. Everybody participating to our survey knew that they should come at least 12 hours fasting to OGTT although 76.5% of participants declared that they did not get information about OGTT. We think that they could have learned it both from their doctors, the laboratory, their previous phlebotomy experience or social media. Increasing number of people learn health information through online resources (15). We may think that these information could be taken also from social media. Our finding about this fact is consistent with the findings of Radovanovic et al. who found that their patients were mainly informed about the need to be in the fasting state (7). However, like Radovanovic et al. (7) and Kackov S et al. (16), we are not sure if the patients really did not eat anything at least for 12 hours.

The second most correctly answered question was the sixth question which was about the purpose of OGTT that was answered by the 70% of the OGTT patients. Some of them (10.3%) had a previous experience of OGTT but we think that most of them got this information from their physicians who requested the OGTT test and explained the reason of this requirement.

The blood retrieval times and the duration of the test were known by 50% and 32.4% of participants, respectively. This information might be learned from the laboratory staff before the procedure or previous experience of themselves and relatives. If learned from the laboratory staff or not, the level of knowledge is not satisfactory but our study show that proper information about these facts should be given and the patients should be directed during OGTT.

Most of the patients (64.7%) were not aware of the restrictions which may affect the

reliability of OGTT, like; i) consuming usual meals without changing the quantity and type of the food beginning a few days prior to test, ii) making usual but restricting strong physical activity before OGTT, iii) refraining from caffeine containing drinks, iv) cigarette smoking during the test. These are the most important information that should be given to the patients but it seems that most of the patients do not know anything about these restrictions.

As a general evaluation of the level of OGTT knowledge, we noticed that only 23.5% of the patients knew all the answers to 5 questions associated to the understanding of the whole OGTT procedure. Those patients' level of knowledge is accepted as high. The patients' ratio missing one question was 11.8% and those are accepted as patients having adequate level of information about OGTT. Some of the patients who could not give correct answers to 2 questions may be accepted as having adequate level of information. The others, missing 3 or 4 questions, constitutes 48.5% of the patients and cannot be regarded as having enough information. We may say that nearly half of the patients have not been informed properly by their clinicians or laboratory staff or they did not understand what have been explained to them.

The ratio of self declaration of getting knowledge either from the physician or the laboratory staff was 23.5% which is equal to the ratio of the patients which answered all the questions correctly. However the patients with high level of information are not the same patients as declaring that they have been informed. Half of the patients (50%) with high level of information did not self declare that they have been informed. Those patients either got information from people who had a previous OGTT experience or from internet. But it is thought that it would be a more correct approach for the patient to learn every medical practice with his/her own doctor's information instead of learning from other sources.

The fact that nearly half of the patients (48.5%) did not have enough information

about OGTT shows that substantial proportion of the patients does not come properly prepared for OGTT. Either from their self declaration or the real level of inadequate knowledge (having 3 or 4 incorrect answers) displays that the patients are not well informed about OGTT procedure and requirements. The lack of knowledge is a shared responsibility of both clinicians and laboratory staff. At a recent report issued by the European Commission, the level of communication between patients and their physicians was found to be unsatisfactory mostly because of insufficient time for doctors to spend with patients ([http://ec.europa.eu/public\\_opinion/archives/quali/ql\\_5937\\_patient\\_en.pdf](http://ec.europa.eu/public_opinion/archives/quali/ql_5937_patient_en.pdf)). This fact is also true for our country where the doctors have to spend a very limited time for patients. The

workload is also a problem for the laboratory staff that spend most of their time with preparation of samples for analysis and analytical phase, possibly lacking the time for the communication with the patients.

We conclude that patients are not well informed about preparation period of OGTT both by the doctors and laboratory staff. When requesting OGTT, giving sufficient information about the preparation period of OGTT should be inevitable. Laboratory experts should improve communication with physicians for the importance of proper preparation period of OGTT. Thus reliable OGTT results may be obtained which is used for diagnosis of diabetes mellitus. Moreover, any insufficient information about OGTT should be complemented by the laboratory staff upon giving appointment.

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