

Original Article

The Effects of Education on Oral Glucose Tolerance Test in First Antenatal Care Follow-Up on Having the Test: Semi-Experimental Study

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Abstract

Background: Although the Oral Glucose Tolerance Test (OGTT) is routinely recommended during pregnancy, the number of people who have the test is decreasing. Failure to perform the OGTT poses a risk for both mother and baby health.

Objective: This study was conducted to investigate the effects of the education given on the Oral Glucose Tolerance Test in the first antenatal follow-up of pregnant women on having the test.

Methodology: In this study, 385 pregnant women (192 in the control group and 193 in the education group) were included. The present study was designed as a quasi-experimental study. The education group was provided with comprehensive education on the oral glucose tolerance test by the researcher after the questionnaire and then an education brochure on the oral glucose tolerance test. The pregnant women in both groups were contacted by phone between the 30th and 37th weeks of pregnancy and were asked whether they had the test or not. In data analysis, descriptive statistics, Chi-square independence test and Binary regression analysis were conducted.

Results: Before the education, most pregnant women in both groups would not have OGTT in their current pregnancy ($p > 0.05$). In the second interview after the education, 79.3% of the participants in the education group had oral glucose tolerance test, whereas only 38.5% of the participants in the control group had oral glucose tolerance test ($p < 0.05$). The binary regression analysis results showed that the rate of having oral glucose tolerance test was higher in those with high school and university education ($p < 0.05$).

Conclusion: The findings indicated that the education provided using written, verbal, and visual methods based on scientific evidence in the first antenatal follow-ups increased the rate of having oral glucose tolerance test during pregnancy.

Keywords: Antenatal diagnosis, education, glucose tolerance test, pregnancy

Background

Oral Glucose Tolerance Test (OGTT) is a test with high sensitivity and is widely utilized in the diagnosis and screening of Gestational Diabetes Mellitus (GDM) (Donovan et al., 2013). Both national and international institutions and organizations recommend OGTT to be performed on all pregnant women in GDM screening during pregnancy (American College of Obstetricians and Gynecologists (ACOG), 2020; International

Association of Diabetes and Pregnancy Study Groups Consensus (IADPSG), 2010; Risky Pregnancies Management Guideline, 2014; Turkish Society of Gynecology and Obstetrics, 2016; World Health Organization (WHO), 2018). Since Turkey has an ethnically risky structure for diabetes, the Ministry of Health recommends OGTT to be performed by all pregnant women at 24-28 weeks of gestation, regardless of whether they are at low or high risk (Risky Pregnancies Management

Guideline,2014). However, in recent years, misperceptions due to misinformation on the diagnosis and screening tests of GDM in our country and the decisions not to have the test performed pose a considerable risk for the health of the mother and baby. It has been suggested that trying to inform pregnant women who were not properly informed in the first antenatal follow-ups is not very effective in changing attitudes and behaviors towards the test (Cakir & Yesilcicek Calik, 2020). In many studies investigating the OGTT status of pregnant women and the factors affecting it, it has been revealed that pregnant women do not have accurate knowledge and awareness about OGTT and healthcare professionals do not adequately inform pregnant women on this issue (Cakir & Yesilcicek Calik, 2020; Desdicioglu et al., 2017, Hocaoglu et al., 2019, Karasu,2018; Turkyilmaz, 2016). However, it has been stated that education on various issues during the antenatal period has favorable effects on the well-being of both mother and child through enabling positive behavioral changes in pregnant women (Akkus et al.,2018, Bolsoy, Celik & Simsek,2019, Cankaya & Simsek,2021, Gonenc et al.,2016, Koruk et al.,2017, Tokat & Okumus, 2013, Usal Tarhan, 2019). Given the positive effects of education on the protection and development of health, nurses/midwives who have an educational role should provide pregnant women with necessary education based on scientific evidence, and they should be informed about what kind of harm the statements made on television or social media without any scientific basis may cause to the pregnant women and their babies (Cakir & Yesilcicek Calik, 2020; Desdicioglu et al.,2017). This research was conducted since there are few studies in the literature investigating the effects of the education provided to pregnant women about OGTT on their decision to have the test.

Materials and Methods

Design and Aim: The present study, which was designed as quasi-experimental research, aims to analyze the knowledge level of pregnant women about OGTT, and find out the effects of comprehensive education of OGTT on their status of having this test. This research was conducted between September 2018 and April 2019 in the obstetrics and gynecology outpatient clinic of an education and research hospital in a province in the east of Turkey.

The Population/Sample: In the sample size calculation of this study, using the data of 2017 (n=2075), the sample size was 325 at 95% confidence interval, with Type-1 error level of 5%, prevalence of 50%, "design effect" of 1, and "cluster" of 1. Considering potential losses, 385 pregnant women (Control Group: 192; Education Group: 193) were included in the present study in which a simple random sampling method was used, pregnant women with even numbers according to their outpatient registration numbers were included in the education group, and those with odd numbers were included in the control group. Pregnant women who were pregnant between the gestational ages of 20-45 had no problems in communicating, were not diagnosed with Diabetes Mellitus (DM), did not give premature birth, agreed to participate in this study, and could be reached by phone between the 30th and 37th weeks of pregnancy were included.

Data Collection Tools: An introductory information form and a questionnaire about whether pregnant women had OGTT were used as data collection tools.

Introductory Information Form: Research data were collected by administering a questionnaire consisting of 37 queries in total, which was prepared based on the literature (Desdicioglu et al., 2017, Karasu,2018, Turkyilmaz et al., 2016) including the socio-demographic characteristics of pregnant women, questions about the previous and current pregnancy, OGTT knowledge levels, and whether they had the test or not. The questionnaire about whether they had OGTT or not was composed of three questions. The responses given to the open-ended questions about the OGTT were systematically listed and the opinions containing the same semantically identical expressions were combined.

Data Collection: The data were collected by face-to-face interview method during working hours (08.00-16.00) in the obstetrics and gynecology outpatient clinic, and then by telephone between the 30th and 37th weeks of pregnancy. First, the pregnant women who met the research criteria were contacted, information was given about this research, and verbal consent was obtained from the pregnant women who volunteered to participate. The data collection process was performed in two stages. In the first stage, an introductory information form was administered to the pregnant women during their

first antenatal follow-up of primiparous-multiparous pregnant women who applied to the obstetrics and gynecology outpatient clinic. In this study, the education group was provided with comprehensive education on the OGTT test, which lasted approximately 20-25 minutes, individually by the researcher following the introductory information form, and reinforcement questions were asked to the pregnant women after the education. The questions of the pregnant women who had questions about the issue were answered, and following the education, an education brochure on OGTT containing the titles of "What is OGTT? When is it done? What are the risks of GDM? Who are in the risk group? Is OGTT harmful during pregnancy? Should OGTT be done during pregnancy? How is OGTT done during pregnancy?" (ACOG,2020; American Diabetes Association [ADA], 2019, Committee on Practice Bulletins, 2018; Diabetes Diagnosis and Treatment Guideline, 2019, Donovan et al., 2013, IADPSG, 2010, Risky Pregnancies Management Guideline, 2014, Turkish Society of Gynecology and Obstetrics, 2016, WHO,2018). The purpose of giving the educational brochure was the belief that the more senses were addressed with learning materials in the learning process, the more permanent the learning (Kaya, 2006). Studies show that visual brochures rather than plain texts given only in line with the literature are also successful in increasing the effectiveness of education (Kamaruddin, Chairunnisab & Ismail 2015, Mutlu et al., 2020). When preparing the brochure of OGTT in pregnancy, the remarks of obstetrics and gynecology nursing, public health nursing academicians, gynecology and obstetrics department physicians, and midwifery department academicians were considered. Experts were asked to rate each subject and suggest their considerations, if any. For content validity, each subject was scored as 4 strongly appropriate, 3 appropriate, 2 moderately appropriate, and 1 inappropriate. The content validity index was calculated with the scores obtained after expert opinions, and the appropriateness of the content was tested. For a scale to have sufficient content validity, its content validity index must be above 0.80 (Burns & Grove,1993). The content validity index was calculated as 0.90 and was sufficient. On the other hand, only the introductory information form was administered to the control group, and

routine outpatient service was provided. No education was given for OGTT, and no education brochure was provided. In the second stage, pregnant women in both the education and control groups were contacted by phone between the 30th and 37th weeks of pregnancy, and their status of having the test and being affected by the media was asked in an interview that lasted nearly 10 minutes; it was asked whether the education given in addition to the education group affected the decision for having the test. No data loss occurred as the first stage of the data collection process was performed via the face-to-face interview method. However, since data collection in the second stage was performed by phone call, seven participants could not be reached by phone (wrong phone number/not answering the phone), and nine participants were not included in the analysis as two participants had abortion/curettage. However, the data collection process continued until the calculated sample size was achieved.

Data Analysis: The data obtained in the present study were analyzed using the software of SPSS (Statistical Package for Social Sciences) 24.0. Descriptive statistics were used to evaluate the data, while Chi-square test and binary regression analysis were used for comparisons between groups. The results were considered significant at $p < 0.05$ with a confidence interval (CI) of 95%.

Ethical Aspect of This Research: To conduct this study, institutional permission (dated August 06, 2018, and numbered E.9068) and ethics committee approval (dated July 30, 2018, and numbered 34884) were obtained. Pregnant women participating in this study were informed about this study and their verbal consent was obtained. This research was conducted under the ethical principles and the principles of the Declaration of Helsinki 2008, which is based on the "human" element.

Results

Socio-demographic, Obstetric and OGTT Characteristics of Pregnants:

The findings obtained in the present study showed that 38.5% of the pregnant women in the control group were in the 25-29 age group, and 44% of the pregnant women in the education group were in the 30-45 age group. The pregnant women and their husbands in both groups were mostly educated at primary school or below, their place of residence was mostly in the province in both groups

[Control Group (CG): 69.8%, Education Group (EG): 65.8%] and they did not work in any job (CG:84.4%, EG: 75.1%) (Table 1). Most of the pregnant women in both groups did not have a known chronic disease and were mostly multiparous. The majority of pregnant women (CG: 77.6%, EG: 82.9%) had knowledge about OGTT and they obtained this information from the doctor (CG: 69.8%, EG: 55.3%) in the first place, entourage (CG: 44.0, EG: 46.1%) in the second-order, and the media (CG: 42.8%, EG: 46.1%) in the third order (Table 1).

Comparison of some Characteristics of Pregnants according to Pre-education OGTT

Status: In this study, 70.3% of pregnant women in CG and 76.7% of pregnant women in EG stated that they would not have OGTT in their current pregnancy; the reasons for not wanting to have the test were determined as the negative comments that the majority of the pregnant women in both groups heard from their immediate circle and the media about not being

healthy. The pregnant women in both groups mostly stated that performing OGTT during pregnancy was harmful (CG: 39.1%; EG: 49.2%) or they were undecided about this issue (CG: 34,4%; EG: 26,9%) (Table 2, $p>0.05$).

Comparison of some Characteristics of Pregnants in terms of having OGTT after Education:

After the education, 79.3% of EG pregnant had OGTT, and they stated that the test should be administered was the most effective in having the test. Most of the EG pregnant women stated that the media did not affect the decision to have the test, and there was a significant difference between the groups (Table 3, $p<0.05$).

Determining Independent Risk Factors Affecting to have OGTT:

The independent risk factors affecting having OGTT are presented in Table 4. Accordingly, it was noticed that being a high school and university graduate was effective in having OGTT (Table 4, $p<0.05$). Other independent variables stated in the table were not determined as risk factors.

Table 1.Socio-demographic, obstetric and OGTT characteristics of pregnant

Socio-demographic, Obstetric Characteristics	Subdimensions	Group	
		Control Group(N=192)	Education Group (N=193)
Age	20-24	60(31.3)	60(31.1)
	25-29	74(38.5)	48(24.9)
	30-45	58(30.2)	85(44.0)
Education status	Primary School or Below	82(42.7)	96(49.7)
	High School	74(38.5)	53(27.5)
	University and Above	36(18.8)	44(22.8)
Husband education status	Primary School or Below	76(39.6)	72(37.3)
	High School	66(34.4)	67(34.7)
	University and Above	50(26.0)	54(28.0)
Place of residence	City center	134(69.8)	127(65.8)
	District	49(25.5)	42(21.8)
	Village	9(4.7)	24(12.4)
Employment status	Yes	30(15.6)	48(24.9)

	No	162(84.4)	145(75.1)
Is there any known disease?	Yes	14(7.3)	20(10.4)
	No	178(92.7)	173(89.6)
Parity	Primiparous	58(30.2)	63(32.6)
	Multiparous	134(69.8)	130(67.4)
OGTT information status	Yes	149(77.6)	160(82.9)
	No	43(22.4)	33(17.1)
If yes, from where?*	Media	68(42.8)	70(46.1)
	Internet	40(25.2)	55(36.2)
	Book-Magazine	1(0.6)	11(7.2)
	Nurse/Midwife	28(17.6)	13(8.6)
	Doctor	111(69.8)	84(55.3)
	Entourage	70(44.0)	70(46.1)
Is your current pregnancy planned?	Yes	167(87.0)	127(65.8)
	No	25(13.0)	66(34.2)
Will she go for regular health check-ups during the current pregnancy?	Yes	184(95.8)	184(95.3)
	No	8(4.2)	9(4.7)

*Multiple Response

Table 2. Comparison of some Characteristics of Pregnants according to Pre-education OGTT Status

Pre- education		Group		X ² P
Variable	Subdimensions	Control Group (N=192) N(%)	Education Group (N=193) N(%)	
Will you have an OGTT in your current pregnancy?	Yes	57(29.7)	45(23.3)	2.006
	No	135(70.3)	148(76.7)	0.157
If yes, why?	My doctor considers it necessary	19(37.3)	19(43.2)	
	It is necessary for my baby's health	17(33.3)	9(20.5)	1.989 0.370
	It is necessary for my own health	15(29.4)	16(36.4)	
	I've heard negative comments from my immediate circle	25(31.3)	20(22.0)	
If no, why?	Because it's not healthy	36(45.0)	36(39.6)	4.657
	I have read/heard from the media that it is detrimental	13(16.3)	25(27.5)	0.199
	My OGTT was normal in my previous pregnancy	6(7.5)	10(11.0)	
Is OGTT harmful during	Yes	75(39.1)	95(49.2)	4.269

pregnancy?	No	51(26.6)	46(23.8)	0.118
	Undecided	66(34.4)	52(26.9)	
If yes, why?	I have read/heard from the media that it is detrimental	15(20.0)	13(13.7)	11.685 0.003
	I've heard negative comments from my immediate circle	26(34.7)	15(15.0)	
	Harmful for my baby's health	34(45.3)	67(70.5)	
	Necessary for my own and my baby's health	23(45.1)	6(13.0)	
	It is harmless if the doctor recommends it	28(54.9)	31(67.4)	
If no, why?	Since it is in the same proportion as the amount of sugar consumed daily	-	9(19.6)	18.911 0.000
Is education required for OGTT?	Yes	146(76.0)	167(86.5)	6.962 0.008
	No	46(24.0)	26(13.5)	

Pearson chi-square test

Table 3. Comparison of some Characteristics of Pregnants in terms of having OGTT after Education

After education		Group		X ²
Variable	Subdimensions	Control Group (N=192) N(%)	Education Group (N=193) N(%)	
Have you had an OGTT?	Yes	74(38.5)	153(79.3)	65.998 0.000
	No	118(61.5)	40(20.7)	
If yes, why?	I had the test for my baby's health	14(18.9)	52(34.0)	90.763 0.000
	I learned that it is necessary to have	15(20.3)	85(55.6)	
	I had to find out if I had diabetes	10(13.5)	16(10.5)	
	My physician recommended	35(47.3)	-	
	I've heard negative comments from my immediate circle	47(39.8)	14(35.0)	
If no, why?	I'm not sure	29(24.6)	18(45.0)	6.665 0.036

	whether it's healthy			
	Because of the news, I heard from the media	42(35.6)	8(20.0)	
Did the media influence your OGTT decision?	Yes	83(43.2)	17(8.8)	59.309
	No	109(56.8)	176(91.2)	0.000
Pearson chi-square test				

Table 4. Determining Independent Risk Factors affecting to have OGTT

Independent Risk Factors	OGTT Status	
	OR (%95 CI)	p
Age	0.736 (0.467-1.161)	0.187
Education (high school)	0.215 (0.080-0.578)	0.002
Education (university)	0.204(0.051-0.820)	0.025
Husband education status (high school)	1.111(0.441-2.799)	0.823
Place of residence (district)	0.957(0.40-2.274)	0.921
Employment status (no)	1.528(0.477-4.897)	0.476
Chronic disease (no)	1.958(0.410-9.354)	0.400
OGTT information status	0.937(0.321-2.735)	0.905
Planned pregnancy? (no)	0.695(0.287-1.679)	0.419
Regular health checkup	0.524(0.95-2.880)	0.458

Discussion

For a positive pregnancy experience, education, and counseling services, one of the WHO's prenatal care recommendations, are one of the key components of receiving qualified antenatal care (WHO ,2016). Because the aim of the education provided during pregnancy is to be able to recognize risky situations that may occur during pregnancy, birth, and the postpartum period and to provide the necessary treatment and care before it is too late (Hacettepe University Women's Research and Implementation Center [HUWRIC], 2002). In this study, the findings showed that the majority of pregnant women in both groups did not want to have OGTT in their current pregnancies (the primary reason for this was they thought that was not healthy, and the negative comments they heard about OGTT from their immediate circle and the media) ($p>0.05$). On the other hand, in this study, the majority of EG had OGTT after the education given about OGTT in the first antenatal controls (the first reason for this was

that they understood that this test was necessary, and they underwent for the health of their babies) ($p<0.05$). Similarly, in the study of Usal Tarhan (2019), it was revealed that the education given about OGTT increased the knowledge of pregnant women about GDM and decreased their prejudices about OGTT, positively influencing the decision of pregnant women to have these tests (Usal Tarhan,2019). It has been put forward that pregnant education on various issues during the antenatal period contributes to positive behavioral changes in pregnant women and has a favorable impact on the well-being of both mother and child (Akkus et al.,2018, Bolsoy,Celik & Simsek,2019, Cankaya & Simsek, 2021, Gonenc et al.,2016, Koruk et al., 2017, Tokat & Okumus,2013; Usal Tarhan,2019, Yaprak et al.,2019). Likewise, in this study, the education provided both verbally and by giving brochures in the first antenatal follow-ups is effective in reinforcing learning and having OGTT. Because it has been suggested that pregnant women who come to antenatal follow-ups regularly and receive qualified care can ask questions more easily to

healthcare professionals, and the rate of these pregnant women having other antenatal tests and OGTT is higher (Cakir & Yesilcicek Calik,2020, Desdicioglu et al., 2017, Sterne, Logan & Palmer, 2011). Hence, it is considered that pregnant women should be informed accurately by nurses, midwives, or physicians in the first antenatal follow-ups, practices that are harmful to health can be changed through education, verbal education on the subject is valuable in terms of communicating with the person during the education and creating an opportunity to ask questions, providing materials, such as educational brochures and booklets would contribute to the formation of positive behavioral changes in the individual concerning the repetitiveness and permanence of the education. Moreover, it has been revealed that pregnant women who are not given correct or no information in the first antenatal follow-up may experience challenges creating positive behavioral changes in the future, even if education is provided. Therefore, it has been suggested that it would be more effective to continue the education given regularly starting from the first antenatal follow-up (Cakir & Yesilcicek Calik,2020).

Albeit there is no complete consensus on performing OGTT, both national and international institutions and organizations recommend performing OGTT at 24th-28th gestational weeks for all pregnant women (WHO, 2018; ACOG,2019; Risky Pregnancies Management Guideline,2014; Diabetes Diagnosis and Treatment Guideline 2019). However, despite these recommendations, it has been stated that there has been a decrease in the number of pregnant women who had the test due to written and visual news against OGTT in the media in recent years (Desdicioglu et al.,2017, Hocaoglu et al., 2019, Karasu,2018, Turkyilmaz et al., 2016). In this study, in the second interview after the education, the findings showed that CG pregnant women were more affected by the media in their decision to have OGTT ($p<0.05$). Thus, in systematic reviews, it has been stated that pregnant women are affected by the news on the internet or in the media, and they believe in the accuracy of the information they reach (Ghiasi,2021, Sayakhot & Carolan-Olah, 2016). Similarly, in the study of Cakir & Yesilcicek Calik (2020), it has been stated that pregnant women do not have OGTT since they are affected by the news in the media, they do not have enough information about OGTT, and the pregnant women are not adequately informed by healthcare professionals (Cakir & Yesilcicek Calik, 2020).In studies conducted with pregnant women with various sociodemographic characteristics in different regions of Turkey, it has been revealed that the media has a negative impact on the decision to have OGTT (Cakir & Yesilcicek Calik, 2020; Karasu,2018; Turkyilmaz et al.,2016, Usal Tarhan,2019). The findings obtained in this study suggest that the

comprehensive education given at the right time in pregnancy follow-ups eliminates the disinformation on the OGTT in pregnant women and avoids negative decisions that may threaten the mother-baby health.

It has been stated that some sociodemographic and obstetric characteristics may affect health perception and healthy lifestyle behaviors (Bilgili,2009) In this study, the findings showed that the pregnant women in both groups had an educational status of primary school and below concerning sociodemographic and obstetrical education. Most of them resided in the city center and did not work in any job. The OGTT status of the pregnant women with high school and university education levels was higher than the pregnant women who were primary school graduates ($p<0.05$). It is noticed that different results have been obtained regarding the effects of some sociodemographic characteristics on OGTT in studies conducted in Turkey (Basbug et al.,2018, Cakir & Yesilcicek Calik, 2020, Desdicioglu et al.,2017, Usal Tarhan, 2019). Hence, it can be considered that there is a relationship between sociodemographic characteristics and health literacy because the factor that is effective in making the right decision about the individual's health is health literacy (Dadipour et al., 2017) It has been reported that pregnant women with low health literacy are inadequate in understanding and having tests during the antenatal period, and they do not comply with the recommendations of health professionals (Gokoglu, 2021) As accessing the right information from a reliable source, understanding and using this information is a component of health literacy, it can be suggested that increasing the level of health literacy may lead to increased awareness about the test and to make informed decisions.

In this study, most pregnant women in both groups thought that OGTT before the education was harmful or they were undecided, suggesting that they could not obtain sufficient information about OGTT. Besides, the pregnant women thought they had knowledge about the OGTT before the education was not an effective factor in having the OGTT ($p>0.05$). The statements of the majority of the pregnant women in both groups who think that the test is not harmful, as "it is harmless if the doctor wants it," actually reveal the belief and trust of the pregnant women in the healthcare professionals. However, in recent years, the media in Turkey has shown that the statements made by some doctors, both visually and in writing, about the OGTT are effective in the decision of individuals to have the test (Karasu,2018) In the light of these results, although pregnant women use communication tools, such as the internet and media, to obtain information, healthcare professionals, such as nurses, midwives, and physicians, need education and information provided by considering scientific data for accurate and reliable information.

In conclusion, to increase the awareness of pregnant women about OGTT, education using written, verbal, and visual methods increased the rate of pregnant women who had OGTT. Systematic research on GDM and its complications should be conducted across the countries to eliminate the negative effects of news that are not based on scientific evidence spread from written and visual media, as well as the lack of information about GDM, its risk factors, complications, and OGTT. Furthermore, all women, especially those of reproductive age, should be given comprehensive education by healthcare professionals about GDM, its complications, diagnosis, screening, and treatment, based on scientific evidence, in an understandable language. In-service education should be provided to ensure that the nurses/midwives or physicians who will provide this education have access to the most up-to-date information. Besides, policies should be developed to ensure that people who give inaccurate information to the public via the written or visual media and the press or media organs that spread this inaccurate information are controlled.

Limitation: This research has some limitations. First, some research data were collected by face-to-face interview and telephone interview method. The reliability of these data is limited to the information provided by the participants in the present research. Secondly, there is a common bias effect regarding the intervention and data collection stages being conducted by the same person in this study. This situation might cause some data to be assessed in favor of the education group.

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