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A key challenge in gestational diabetes screening: resistance to oral glucose tolerance test screening and implications for neonatal health

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ABSTRACT

Objective: Gestational diabetes mellitus (GDM) is the most common endocrine disorder in pregnancy, and the number of pregnant women resistant to oral glucose tolerance test (OGTT) has increased significantly in recent years. In this study, we investigated the extent of resistance to OGTT screening among pregnant women followed-up in our hospital and the effects of this situation on the newborn.

Materials and Method: We conducted this study with pregnant women and their babies who were regularly followed up in the Obstetrics and Gynecology Department and Pediatrics Department of our hospital between December 1, 2015, and December 31, 2017. While we included those who did not accept an OGTT in the study group (Group 1), and we created the control group with those who accepted the test. Besides, the control group was divided into two groups as those accepted as GDM (Group 2) and normal (Group 3). Ultimately, we scrutinized the relationship between the OGTT and clinicopathological findings.

Results: We included a total of 906 pregnant women and their babies in the study. Of women, 374 (41.3%) did not accept the test. The cesarean (C/S) delivery rate was significantly lower in the babies of mothers who did not have an OGTT ($p<0.05$). In addition, the hospitalization rate of the newborn babies of mothers who had an OGTT but did not have gestational diabetes was significantly lower than the other two groups ($p<0.05$).

Conclusion: Our study revealed that resistance to the OGTT was a far-reaching issue and may lead to an increase in the hospitalization of newborns. Our results suggested that the inability to perform OGTT may have been due to some unidentified problems.

Keywords: Oral glucose tolerance test, OGTT, pregnancy, diabetes, newborn

INTRODUCTION

Gestational diabetes mellitus (GDM) is the most common endocrine disease in pregnancy and, by definition, refers to diabetes mellitus disease first diagnosed during pregnancy (1-4). In a normal pregnancy, some physiological changes, such as hyperinsulinemia, increased insulin sensitivity, and mild postprandial hyperglycemia, occur to meet the increasing needs of the mother and the baby, especially after the second trimester (5,6). If the patient's glucose metabolism before pregnancy is normal, the development of GDM stems from metabolic dysfunction (7,8). If GDM cannot be diagnosed and an appropriate approach cannot be provided, there may be an increase in many fetal and maternal complications such as macrosomia, polyhydramnios, intrauterine growth restriction, preeclampsia, increased cesarean section (C/S) rate, and neonatal morbidity and mortality (9-12).

However, in recent years, it has been reported that there has been a substantial increase in the number of pregnant women who do not want to have an oral glucose tolerance test (OGTT) (13). One of the most important reasons for this situation is that the healthcare

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personnel does not adequately inform pregnant women regarding this test (13). In other words, it is imperative to explain the routine screening procedures to pregnant women (13,14). Misleading information in the media can be indicated as another factor in this situation. As a matter of fact, pregnant women influenced by social media may oppose screening tests without investigating the issue in depth (13,14). Another factor is that pregnant women are not adequately informed about the likelihood of the above-mentioned health problems unless screening (14). Nevertheless, there are quite a few studies on resistance to OGTT screening among pregnant women in Turkey.

Ultimately, this study aimed to evaluate the resistance to OGTT screening among pregnant women who were followed up regularly in our center in the two years and to compare the clinical results of the infants of women who were screened and who could not.

MATERIAL AND METHOD

Ethical Approval

Ethics committee approval was obtained from Kırıkkale University Non-Interventional Research Ethics Committee (Date: 21.11.2018, Decision No: 2018.11.11) granted the relevant approval to our study. We carefully minded that all procedures applied in this study complied with the 1964 Helsinki Declaration and the ethical standards of the National/Institutional Scientific Research Committee.

Patients

We performed this retrospective study with mothers and their babies who were regularly followed up in the Obstetrics and Gynecology Department and Pediatrics Department of our hospital between December 1, 2015, and December 31, 2017. We excluded women giving birth in our hospital despite having been followed up in another center, those not followed up regularly, those with multiple pregnancies, and those with missing data in their hospital file records (delivery room registry or electronic hospital file). We extracted the information, such as hospitalization status, maternal age, gestational age, delivery type, birth weight, and Apgar scores, from the relevant patient files. We also excluded newborns with missing data. We sought whether the mothers were screened for an OGTT during pregnancy, and we confirmed such information from the mothers' electronic hospital files. At first, we divided the participants into two groups: those who did not accept the OGTT (Group 1) and those who accepted the test. The groups were compared by maternal age, birth weight, time of delivery, and Apgar scores. Then, we re-analyzed the participants accepting the test and separated them into two groups to evaluate hospitalization and C/S rates: GDM group (Group 2) and normal-OGTT group (Group 3). Owing to inadequate registration, we did not consider data showing any problems observed during the diagnosis and follow-up of babies.

Statistical Analysis

We analyzed the data using the SPSS version 22.0 (Statistical Package for the Social Sciences, Inc.; Chicago, IL, USA). We displayed quantitative data as mean±SD or percentage, while categorical data were shown as median (maximum-minimum). We run the statistical analyses at a 95% confidence interval. In all statistical analyses, we considered a p-value less than 0.05 to statistically significant.

RESULTS

We included a total of 906 pregnant women and their infants in the study. Of these women, 532 (58.7%) agreed to have an OGTT. We accepted 114 (12.6%) of those having the OGTT as with gestational diabetes, while the remaining was regarded as normal.

Considering the groups that accepted (n=532) and did not accept the OGTT (n=374), the infants of both groups were with similar maternal age, birth weight, gestational age, Apgar scores, and mode of delivery. Hospitalization rates in the group that did not accept the OGTT (18.7%) significantly higher than the group having the OGTT (11.7%) (**Table 1**).

Table 1. Clinical characteristics of the groups

		Those who did not accept OGTT (n=374)	Those who accepted OGTT (n=532)	p-value
Maternal age (years), median (min-max)		28 (17-45)	28 (17-44)	0.317
Birth weight(g), median (min-max)		3130 (560-4575)	3151 (600-5060)	0.213
Gestational age at birth (weeks), median (min-max)		38 (22-42)	38 (25-42)	0.305
1. min Apgar score, median (min-max)		9 (1-10)	9 (2-10)	0.087
5. min Apgar score, median (min-max)		10 (2-10)	10 (3-10)	0.302
Mode of delivery	C/S n (%)	233 (62.3%)	360 (67.7%)	0.09
	NSVB n (%)	141 (37.7%)	172 (32.3%)	
Hospitalization in the NICU n (%)		70 (18.7%)	62 (11.7%)	0.003

OGTT: Oral glucose tolerance test, NICU: Neonatal intensive care unit

Then, we compared the GDM and normal-OGTT groups by mode of delivery and hospitalization rates. C/S rates in Group 1 (62.3%) were significantly lower than in Group 2 (81.6%) (p<0.001) but similar to the rates in Group 3 (64%). Also, the difference between Group 2 and Group 3 was significant (p<0.01) (**Table 2**).

While we found the hospitalization rates of the newborns of those with not gestational diabetes (Group 3) to be 9.8%, the rates of the remaining two groups (Group 1 and Group 2) were similar to each other and were significantly higher than Group 3 (p=0.001) (**Table 2**).

Table 2. Comparison of delivery mode and hospitalization rates among all the groups

		Group 1* (n= 374)	Group 2** (n=114)	Group 3*** (n=418)	p value
Mode of delivery	Vaginal n (%)	141 (37.7)	21 (%18.4)	151 (%36.1)	<0.001
	C/S n (%)	233 (62.3%)	93 (81.6%)	267 (63.9%)	
Hospitalization in the NICU n (%)		70 (18.7%)	21 (18.4%)	41 (9.8%)	0.001

C/S: Cesarean section, NICU: neonatal intensive care unit
* Those who did not accept the OGTT
** Those who accept and GDM
*** Those who accept and normal-OGTT

DISCUSSION

The recommendation of all reliable organizations such as the World Health Organization, International Diabetes and Pregnancy Working Group Association, Turkish Endocrinology and Metabolism Association is to perform an OGTT during pregnancy and screen GDM (15-17). However, in recent years, there has been an increasing reluctance to do this test among women, which is supported by the results of studies conducted in Turkey (13,14). However, these studies only examined the factors affecting the decision of not having an OGTT among pregnant women, but the consequences of such a decision on newborns remained unclear. For this reason, our study differed from previous studies. Among the participants, 41.9% did not accept having an OGTT. In some studies conducted in Turkey, it was reported that this rate could reach 50%. High refusal rates may indicate that the situation is an important health problem that should be dealt with urgently (14, 18).

Gestational diabetes mellitus is a clinical disease with both long and short-term effects on mothers and babies (11). If appropriate treatment is not applied after diagnosis, it may be associated with fetal morbidity and mortality (11). Publications on American and European populations reported a relationship between high blood glucose levels and maternal and neonatal complications (19,20). There was evidence in studies conducted in other countries that high blood glucose level may have been associated with maternal and neonatal complications (21,22). For example, some authors reported that abnormal OGTT findings during pregnancy also brought the risk of fetal macrosomia (23,24). Also, they found that the treatment of these pregnant women reduced neonatal complications, including macrosomia (23,24). There was a significant relationship between the blood glucose levels of pregnant women with gestational diabetes and maternal and neonatal complications (24,25).

In our study, we found newborn babies of all mothers to be similar by gestational age, birth weight, and Apgar scores. For this reason, we can predict that these newborns will be in a similar situation in terms of possible morbidities, so their hospitalization rates will be similar. While, the neonatal intensive care unit (NICU) admission rate of the newborn babies of mothers who refused the OGTT was similar to those of mothers with gestational diabetes (18.7% and 18.4%, respectively) the hospitalization rate of the newborns in Group 3 was 9.8%, and the difference was statistically significant. These results suggested that although there were maternal hyperglycemia and GDM, the diagnosis could not be made, follow-up could not be achieved, and preventive measures could not be taken. Therefore, it is possible to assert that not performing GDM screening during pregnancy may increase the hospitalization rates of newborns. Supporting this view, in a study examining the perinatal outcomes of pregnant women who were diagnosed and treated with GDM, it was found that GDM was associated with many adverse perinatal complications such as maternal hyperglycemia, preeclampsia, increased primary cesarean rate, macrosomia, neonatal hypoglycemia, and birth trauma (24,25). Although we could not investigate morbidity in infants in our study due to the incomplete documentation of the data, these complications are associated with an increase in the rate of hospitalization among newborns.

One of the factors affecting neonatal morbidity in maternal hyperglycemia is the increase in the primary C/S rate (26). It was reported that C/S delivery increased neonatal morbidity as an independent parameter when compared with those delivered vaginally. Women with GDM are very likely to have various maternal and fetal complications such as postpartum hemorrhage and infection, preeclampsia, stillbirth, increase in macrosomic babies, birth asphyxia, cephalopelvic imbalance, and fetal distress, which may cause an increase in C/S in women (27,28). Although the relation of GDM with the rise in the C/S rates is not clear in the literature, many studies reported that the C/S rates increased in women with GDM compared to normal pregnant women (27). For example, GDM or the presence of macrosomia in the infant secondary to high glucose levels in the pregnant

woman may lead to changes to the obstetric method and result in higher C/S rates (29,30). In our study, we found the C/S rates to be higher in the group accepted as gestational diabetes. We thought that the high rate of C/S in group 2 was due to possible complications related to GDM. Another expected result of the C/S delivery rate in this group was higher morbidity and hospitalization rates in their infants. However, we interestingly found the opposite, which suggested that failure to perform screening led to the inability to prevent and predict possible morbidities.

Our study had some limitations. First of all, this was a retrospective study so that the internal constraints of retrospective studies (e.g., constant patient population) were also valid for our study, which may not be overcome. Secondly, we had to use local data that included a single hospital. In addition, our data were limited to hospital records. Since the names, IDs, and file numbers of newborns hospitalized after birth may have changed, we did not include individual patient files of these infants in the study. Despite these restrictions, no study has scrutinized this subject in Turkey so far. Therefore, our study can be deemed remarkable in that it revealed the need for prospective, controlled, and multi-center studies on this subject.

CONCLUSION

The resistance to OGTT, which has a vital role in pregnancy monitoring, causes difficulties in daily practice. Our results showed that the resistance to such tests reached a severe extent, and we think that the failure in screening may be associated with unidentified problems.

ETHICAL DECLARATION

Ethics Committee Approval: Approval was obtained from Kırıkkale University Non-Interventional Research Ethics Committee (Date: 21.11.2018, Decision No: 2018.11.11)

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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