IMPAIRED GLUCOSE TOLERANCE IN PREGNANT WOMEN WITH VAGINAL CANDIDIASIS

VAGİNAL KANDİDİASİS'Lİ GEBE KADINLARDA BOZULMUŞ GLUKOZ TOLERANSI

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ABSTRACT

Purpose: *To evaluate whether vaginal candidiasis is a risk factor for impaired glucose tolerance in pregnant women.* ***Methods:*** *A case control study of 64 pregnant women with vaginal candidiasis, positive microscopy, and 59 candida negative control subjects, all of whom were undergoing standardized 75 g oral glucose tolerance testing between 24 and 28 weeks of their pregnancies, were enrolled. Patients were included only if they had no known diabetes mellitus or previous historic risk factors for gestational diabetes mellitus, and had not been receiving antibiotic therapy. We compared glucose levels at fasting, 30 minutes, 60 minutes and 120 minutes, and the perinatal and neonatal outcomes in the two groups.* ***Results:*** *There were no statistical differences between the case and control groups in terms of demographic properties. Glucose concentrations were higher in pregnant women with vaginal candidiasis than in the control subjects at fasting (89 vs. 84 mg/dL, p=0.021), 30 minutes (139 vs. 126 mg /dL, p=0.050), and 60 minutes (124 vs. 106 mg/dL, p=0.018) after intake of 75 g of glucose. The two groups did not differ in glucose levels 120 minutes after glucose intake. The gestational diabetes ratio was 3.1% and 3.4% in the study and control groups respectively (p=0.274).* ***Conclusion:*** *Tolerance to glucose in pregnant women with vaginal candidiasis seems discretely impaired.* ***Key Words:*** *Gestational Diabetes, Impaired Glucose Tolerance, Vaginal Candidiasis.*

ÖZET

Amaç: *Çalışmanın amacı vaginal candidiasis' in gebe kadınlarda bozulmuş glukoz toleransını belirlemede bir risk faktörü olup olmadığını belirlemek.* ***Materyal ve Metod:*** *Mikroskopisi pozitif 64 vaginal candidiasis' li gebe kadın ile 59 candida negatif kontrol vakasına gebeliklerinin 24 ile 28. haftasında 75 gm oral glukoz tolerans testi uygulandı. Vakaların demografik özellikleri, glukoz seviyeleri ve gestasyonel diyabet oranları istatistiksel olarak karşılaştırıldı.* ***Bulgular:*** *Demografik özellikler açısından her iki grup arasında fark yoktu. 75 gm glukoz alımından sonra açlık(88 vs 84mg /dL, p=0.02), 30. dakika (138 vs 126 mg/dL, p=0.05) ve 60. dakika kan şekerleri(124 vs 106 mg/dL, p=0.01) vaginal candidiasis'li gebe kadınlarda belirgin yüksekti. İki grup arasında 120. dakika kan şekerleri ve gestasyonel diyabet oranları açısından belirgin fark saptanmadı.* ***Sonuçlar:*** *Vaginal candidiasis'li gebe kadınlarda glukoz töleransı bozulduğu saptandı. Bu yorumu desteklemek için iyi planlanmış daha geniş prospektif vaka kontrol çalışmalarına ihtiyaç vardır.*

Anahtar Kelimeler: *Bozulmuş Glukoz Toleransı, Gestasyonel Diyabetes, Vaginal Candidiasis.*

INTRODUCTION

Gestational diabetes mellitus or impaired glucose tolerance in pregnancy is one of the most common clinical issue facing obstetricians from their patients. The use of traditional historic risk factors (family or personal history of diabetes, previous adverse pregnancy outcome, glucosuria, obesity etc.) to identify gestational diabetes mellitus will miss half of all women with gestational diabetes mellitus (1,2). For this reason, many physicians prefer to screen all pregnant patients as a matter of practicality (2).

Specific risk factors and the degree of their influence on GDM prevalence are difficult to quantify across populations. There is no doubt that women with poorly controlled diabetes mellitus frequently have recurrent vaginal candidiasis (3,4), especially when glucosuria (5) is present. Currently, we do not know exactly whether a relationship is present between vaginal candidiasis and gestational diabetes mellitus.

The possible link between sugar intolerance and vaginal candidiasis in pregnancy has been a matter of debate for many years. To study the glucose metabolism in pregnant women with vaginal candidiasis, we compared 75 g oral glucose tolerance test results in pregnant women with proven vaginal candidiasis in their pregnancies between 24 and 28 weeks with the same levels in candida negative control subjects. We checked plasma glucose levels before and 30, 60 and 120 minutes after the intake of 75 g of glucose in the two groups. We compared the gestational diabetes mellitus ratio and impaired glucose tolerance in both the case and control groups.

PATIENTS AND METHODS

This study was conducted in the antenatal outpatient clinic and dermatology clinic of Ankara Education and Research Hospital from November 1999 to September 2002. The study was approved by the medical ethics committee of the institution and informed consent was obtained from each patient included in the study.

Patient Selection

A total of 64 pregnant women with vaginal candidiasis and 59 control cases who had no signs of vaginal candidiasis were enrolled in the study. Patients were included only if they had no known diabetes mellitus or previous historic risk factors for GDM, had not been receiving antibiotic therapy, and did not have any serious disease or immune deficiency disease. None of the patients were receiving corticosteroids. Multiple pregnancies were not included in this study.

After we had taken a careful history and performed a physical examination, we examined the pregnancy by ultrasound. Ultrasound examinations were performed by one observer (M.C.). Information about age, parity, gestational age, body mass index, family history of diabetes mellitus, duration of vaginal candidiasis symptoms and drug use was obtained from each patient.

Outcome Measures

Detection of Vaginal Candidiasis

In symptomatic patients, after inspection of the vulva area, an unmoistened speculum was inserted in the vagina, and sterile specimens were obtained from the upper third of the vagina by spatula for fresh wet mount preparations. After the patient had been examined, the spatula was smeared on a glass slide within 2 minutes and a droplet of 10% potassium hydroxide solution was added for direct phase contrast microscopy at x400 magnification. One observer (H.K.) looked for either hyphea or blastospores of yeast. Patients who had vaginal candidiasis (n=64) were included in the study group.

Patients with no evidence of vaginal candidiasis were recruited as control subjects (n=59). In the selection of the control subjects, care was taken that their age was between 18 and 35 years.

Oral Glucose Tolerance Test

All patients submitted an oral glucose tolerance test under strict supervision. Over the 3 days before the oral glucose tolerance test, the patients were required to eat a sufficient amount of carbohydrates and were requested to engage in normal physical activity. The test was performed in the morning after 10 to 14 hours of fasting. At first, a blood sample was taken to ascertain fasting glucose levels. All patients drank 75 g of glucose dissolved in 200 mL of water quickly. Blood samples were drawn at 30, 60 and 120 minutes after the intake of 75 g glucose. During this test, the patients remained comfortable, but were not allowed to perform physical activity, drink, eat or smoke. After the test, none of the patients required diet regulation except for the gestational diabetes mellitus cases.

Statistics

All statistical analyses of demographic properties and calculations were performed with the SPSS software program for Windows. In the analyses of continuous responses, the groups were compared by t test; for discrete data this was

done by means of the chi-square test. A p value of 5% or less was considered statistically significant.

RESULTS

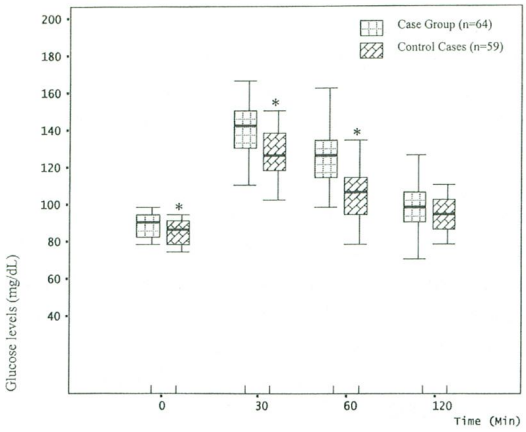
The study group did not differ from the control group in terms of maternal age, parity, gestational age, or in medication usage terms (Table 1). A family history of diabetes mellitus was found in 3 of 64 study patients and in 2 of 59 control subjects (p=0.072). In the study group, vaginal candidiasis had been present for 3 months in 40 patients, for 2 months in 16 patients, and for 1 month in 8 patients. There was no correlation between glucose levels and duration of symptoms.

Fasting plasma glucose was higher in pregnant women with vaginal candidiasis (89.7 mg/dL vs. 84.3 mg/dL, p=0.021). Also, plasma glucose was increased at 30 minutes (139.6 mg/dL vs. 126.7 mg/dL, p=0.048), and at 60 minutes (124.6 mg/dL vs. 106.1 mg/dL, p=0.018) after the intake of 75 g of glucose (Fig. 1). After 2 hours, the difference in plasma glucose was not significant (98.3 mg/dL vs. 95.7 mg/dL, p= 0.09) (Fig. 1).

Table 1: Demographic properties of pregnant women with vaginal candidiasis (case group) and without vaginal candidiasis (control group).

Parameter	Case group (n=64)	Control subjects (n=59)
Mean parity	1.6 ± 0.5	1.4 ± 0.7
Mean age (y)	26.4 ± 7.2	25.7 ± 6.3
Gestational age (w)	26.3 ± 2.1	25.9 ± 2.4
BMI (kg /m^2)	23.8 ± 4.1	24.5 ± 4.6
Family history of diabetes mellitus	9	8

* No differences between the two groups were found.



* Differences were significant.

Fig. 1: Comparison of glucose challenge test results of pregnant women with vaginal candidiasis (case group) and without vaginal candidiasis (control group).

There were two gestational diabetes mellitus cases in the study group and two cases in the control subjects. While we assessed their perinatal outcomes, these patients were not included in the analyses. Both groups were similar in terms of birth weight, gestational age at birth, delivery route, macrosomia (Table 2) or preterm labor (1 vs. 1), intra uterine growth restriction (1 vs. 1), and operative delivery. Perinatal mortality or stillbirth was not observed in both groups. There was one case of neonatal hypoglycemia in the study group, but none among the control subjects. However, the data were too limited for full statistical analysis. None of the neonates in both groups had hypocalcemia

Table 2: Perinatal and neonatal outcomes of pregnant women with vaginal candidiasis (case group) and without vaginal candidiasis (control group).

Outcomes	Case group (n_1=62)	Control subjects (n_2=57)	p value
Birth weight (g)	3425.6 ± 385	3386 ± 420	0.451
Mean gestational age at birth (w)	37.6 ± 2.6	38.2 ± 3.4	0.549
Delivery route (%) Vaginal delivery	50/62 (80.6)	46/57 (80.7)	0.328
Cesarean section	12/62 (19.3)	11/57 (19.2)	0.072
Macrosomi	2/62(3.2)	1/57 (1.7)	0.450
Neonatal hypoglycemia	1	0	0.623

or hyperbilirubinemia.

DISCUSSION

In our study, glucose concentrations were higher in pregnant women with vaginal candidiasis than in control subjects at fasting, 30 minutes, and 60 minutes after the intake of 75 g of glucose. Vaginal candidiasis is a frequent finding in patients with diabetes mellitus, especially in uncontrolled cases, but we do not know the clinical significance of vaginal candidiasis in pregnant women with gestational diabetes mellitus. In the literature, many risk factors such as obesity, family history of first degree relative, maternal age and parity have been described (6,7). However, it is not well known whether vaginal candidiasis is a risk factor or not for gestational diabetes mellitus. The increased body mass index in women is likely associated with insulin resistance and lowered glucose tolerance (2,7). In this paper, both groups were similar in terms of body mass index and maternal age. Additionally, we did not find an increased risk for gestational diabetes mellitus in pregnant women with vaginal candidiasis. In other words, pregnant women with vaginal candidiasis did not have an increased prevalence of gestational diabetes mellitus. However, despite the fact that no signs of gestational diabetes mellitus were demonstrated, the clearance of glucose after the oral intake of 75 g of glucose was impaired in pregnant women with vaginal candidiasis.

Although an increased vaginal content of glucose was never proved in women with vaginal candidiasis, in vitro evidence has shown that candida proliferates better in a broth enriched with different sugars (8). Glucose, maltose and sucrose all greatly enhance the adhesion of *Candida albicans* to buccal epithelial cells, but lactose does not (8,9). It is possible that these mechanisms also apply to human vaginal epithelial cells.

As impaired glucose tolerance is closely related to increased insulin resistance, it is the most likely underlying mechanism to explain higher glucose levels after the ingestion of sweets. Therefore, in nonpregnant women, a sugar-limited diet may be the first logical step in treatment (10). In the present study, plasma levels higher than normal were not related with poor perinatal outcomes.

Although it is generally agreed that most pregnant women with GDM have higher perinatal mortality and morbidity rates than healthy pregnant women, the relationship between pregnant women with impaired glucose tolerance and poor perinatal outcome is obscure. In our study, we did not observe any difference in terms of perinatal and neonatal outcome between pregnant women with vaginal candidiasis and our control subjects. The number of our subjects is too limited to make any comments on perinatal outcomes. There is no consensus in the medical literature as to whether impaired glucose tolerance or sub-gestational diabetes mellitus increases the probability of poor perinatal outcome. According to the largest population based study that was performed in Sweden, impaired glucose tolerance (in sub-gestational diabetes mellitus) increased the risk of nonoptimal delivery outcomes such as increased rate of cesarean delivery and birth weight (11). Another study suggested that the increased rate of adverse maternal and fetal outcome, especially high for gestational age, was associated with untreated mild gestational hyperglycemia in women in a control group study (12). In a recent study, however, women with impaired glucose screening were at higher risk of elective cesarean, whereas the numbers of emergency cesarean sections, instrumental deliveries and birth weights were not significantly different (13). In our study, the mean birth weight of infants in the impaired glucose tolerance group was higher, but not significantly so; this was not significantly more frequent in the case group.

In conclusion, tolerance to glucose in pregnant women with vaginal candidiasis is discretely impaired. We did not observe any statistically significant difference in terms of perinatal and neonatal outcomes between pregnant women with vaginal candidiasis and our control subjects.

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