

## Anxiety and depression levels in women with hyperglycemia in pregnancy: a comparative study with normoglycemic women

*Gebelikte hiperglisemisi olan kadınlarda anksiyete ve depresyon düzeyleri: normoglisemik kadınlarla karşılaştırmalı bir çalışma*

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### ABSTRACT

**Aim:** The aim of this study is to investigate the anxiety and depression levels of women with hyperglycemia in pregnancy and to compare them with normoglycemic women at similar gestational weeks.

**Materials and Methods:** Diabetic pregnant women (pregestational diabetes mellitus, gestational diabetes mellitus) at 32-34 weeks and normoglycemic pregnant women at similar gestational weeks were evaluated with the Hospital Anxiety and Depression Scale to determine anxiety and depression levels.

**Results:** In our study patients with fetal complications associated with poorly controlled diabetes, such as large for gestational age (p: 0.04) and polyhydramnios (p: 0.03), exhibited significantly lower levels of anxiety symptoms. No significant difference was found between the diabetes group and the control group in terms of anxiety and depression symptoms

**Conclusion:** The fact that anxiety symptoms were significantly less in polyhydramnios and large for gestational age patients, which are the result of poorly controlled diabetes, suggests that hyperglycemia may have an impact on anxiety levels.

**Keywords:** Anxiety, depression, diabetes mellitus, hospital anxiety and depression scale.

### ÖZ

**Amaç:** Bu çalışmanın amacı gebelikte hiperglisemisi olan kadınların anksiyete ve depresyon düzeylerini incelemek ve benzer gebelik haftalarındaki normoglisemik kadınlarla karşılaştırmaktır.

**Gereç ve Yöntem:** 32-34 haftalarındaki Diabetik gebeler (Pregestasyonel diabetes mellitus, gestasyonel diabetes mellitus) ile benzer gebelik haftalarındaki normoglisemik gebeler anksiyete ve depresyon düzeylerinin belirlenmesi için Hastane Anksiyete ve Depresyon ölçeği ile değerlendirildiler.

**Bulgular:** Çalışmamızda diyabetin fetal komplikasyonları olan gebelik haftasına göre büyük fetüs (p: 0.04) ve polihidroamniyos (p:0.03) gelişen olgularda anksiyete semptomları anlamlı olarak daha az saptandı. Diyabet grubu ile kontrol grubu arasında anksiyete ve depresyon semptomları açısından anlamlı fark saptanmadı.

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Application date: 18.03.2024

Accepted: 24.05.2024

**Sonuç:** *Kötü kontrollü diyabetin sonucu olan polihidramniyos ve gebelik haftasına göre büyük fetüs olgularda anksiyete semptomlarının anlamlı olarak az bulunması hipergliseminin anksiyete üzerinde etkisinin olabileceğini düşündürmektedir.*

**Anahtar Sözcükler:** *Anksiyete, depresyon, diabetes mellitus, hastane anksiyete ve depresyon ölçeği.*

## INTRODUCTION

Pregnancy is an important period in a woman's life where physiological, psychological, and social changes that begin with fertilization are experienced and adaptation to these changes is necessary. Pregnant women may experience fluctuating levels of stress throughout pregnancy, and mood disorders, including depression, are commonly reported (1).

Hyperglycemia stands as a prevalent medical conditions encountered by women throughout the course of pregnancy. Statistics from the International Diabetes Federation suggest that roughly one out of every six live births, amounting to 16.8%, is delivered by women grappling with varying degrees of hyperglycemia during gestation. Hyperglycemia can cause serious complications for both mother and baby including increased risk for cesarean delivery, birth trauma, hypertensive disorders of pregnancy, macrosomia or large babies which may require an operative delivery resulting in shoulder dystocia and other birth injuries; respiratory distress syndrome; hypoglycemia; polycythemia; jaundice/hyperbilirubinemia as well as long-term risks including childhood obesity later on life (2).

Recent studies has shown an association between diabetes and depression, emphasizing that diabetes may increase the risk of depression in non-pregnant patients (3) and that depression may be a risk factor for type 2 diabetes (4). There exists limited literature concerning the psychological stress and depression levels experienced by women diagnosed with pregestational diabetes mellitus (PGDM) and gestational diabetes mellitus (GDM) (1).

In this study, we aimed to evaluate women with PGDM and GDM in terms of depression and anxiety symptoms.

## MATERIALS and METHODS

This study was conducted prospectively in the obstetrics and gynecology department of a tertiary care hospital between May 2021 and August 2021.

Pregnant women with GDM or PGDM without chronic disease at 32-34 weeks of gestation, with

a singleton live fetus, at a social level to read and respond to the tests and who agreed to participate in the study (Diabetes group) and a similar number of non-diabetic pregnant women (control group) were included in the study. Those with a history of psychiatric illness were excluded. Ethics committee approval for this study was obtained from the local ethical Committee (22.04.2021/1377). Participants were informed the purpose of the research.

Type 1 or type 2 diabetes diagnosed before conception was considered pregestational diabetes mellitus. GDM was defined as abnormal glucose tolerance first diagnosed during pregnancy. A fetus weighing >90th percentile for gestational age was considered large for gestational age. Polyhydramnios were diagnosed when the single deepest pocket (SDP)  $\geq 8$  cm or the amniotic fluid index (AFI)  $\geq 24$  cm.

A 75-g oral glucose tolerance test (75 g OGTT) was performed at 24-28 weeks of gestation in all cases except pregestational diabetes mellitus cases. For 75 g OGTT, the International Association of Diabetes and Pregnancy Study Groups (IADPSG) reference values (fasting blood glucose: 92 mg/dl, 1st-hour postprandial blood glucose: 180 mg/dl, 2nd-hour postprandial blood glucose: 153 mg/dl) were taken as the basis. A single high value was considered diagnostic for GDM (5).

All patients included in the study were evaluated with the Hospital Anxiety and Depression Scale (HADS) between 32 and 34 weeks of gestation at the visit after the 75 g OGTT result. As a self-reported instrument, the Hospital Anxiety and Depression Scale is composed of 14 items, seven of which provide an assessment of depression and seven of which provide an assessment of anxiety. Responses are rated on a four-point Likert scale and scored between 0-3. Developed in 1982 by Zigmond and Snaith, the Hospital Anxiety and Depression Scale has a cut-off point of 7 for anxiety and depression. According to the scale, 0-7 points are considered normal, 8-10 points are considered suspicious, and 11 points and above are considered unhealthy (6). The validity and reliability study of

this scale was conducted by Aydemir et al. in 1996 and was adapted to Turkish society. In the validity study adapted to our country by Aydemir, the cut-off point of the scale was determined as >10 for anxiety and >7 for depression (7). The objective of the scale is not to provide a diagnosis, but rather to swiftly identify the at-risk group through screening for anxiety and depression.

Statistical analysis was conducted using IBM SPSS Statistics for Windows, Version 23.0 (IBM Corporation, Armonk, NY, USA). Descriptive statistics were expressed as the mean  $\pm$  standard deviation. Categorical variables are presented as numbers and percentages. Student t-test and Mann-Whitney-U test were used in comparing the continuous variables, while the Chi-Square test was used to compare categorical variables.  $p < 0.05$  was considered statistically significant.

## RESULTS

During the study, 96 patients were included. While 46 of these cases were complicated with diabetes during pregnancy (Diabetes group), glucose intolerance was not detected in 50 cases (the Control group). While 27 patients complicated with diabetes were diagnosed with GDM, 19 cases were diagnosed with PGDM. A combination of diet and exercise (diet + exercise) was sufficient to maintain normoglycemia in 13 of the patients in the diabetes group, but insulin was needed in 33 of these patients. The demographic

characteristics of both groups are presented in Table-1.

Large for gestational age was found in 23/96 (23.9%) pregnant women and polyhydramnios was found in 13/96 (13.5%).

The anxiety and depression status of pregnant women was determined by applying the Hospital Anxiety and Depression Scale. Accordingly, 37 (38.5%) of the 96 pregnant women who participated in the study had symptoms of depression, while 33 (34.4%) had symptoms of anxiety. In 21 (21.8%) patients, both depression and anxiety symptoms were found together. The mean anxiety score of the pregnant women who participated in the study was  $9.06 \pm 4.495$ , while the mean depression score was  $6.41 \pm 3.588$ . The diabetes group and the control group were compared in terms of anxiety and depression symptoms, and no significant difference was found (Table-2). Likewise, no significant difference was found between women with gestational diabetes mellitus and PGDM in terms of anxiety and depression symptoms ( $p:0.27$ ).

The relationship between depression and anxiety scores in patients with large for gestational age and polyhydramnios is shown in Table-3. Anxiety symptoms were significantly lower in pregnant women with large for gestational age and polyhydramnios.

Patients in the diabetes group were compared in terms of anxiety and depression symptoms according to diagnosis and treatment regimen, and no significant difference was found (Table-4).

**Table-1.** Comparison of demographic characteristics of diabetes and control groups.

Parameter	Diabetes group n:46		Control group n: 50		P value
	Mean	SD	Mean	SD	
Maternal age	30.8	6.4	27.5	4.6	0.005
Gravidity	2.87	1.7	2.52	1.4	0.28
Parity	1.33	0.9	1.18	1.1	0.49
Miscarriage	0.54	1.4	0.34	0.5	0.35
Body mass index	34.4	5.5	27.8	3.4	<0.001

**Table-2.** Comparison of DM and control groups in terms of depression and anxiety symptoms.

	Diabetes group n:46		Control group n: 50		P value
	N	%	N	%	
Depression score >7	17	(36.9%)	20	(40%)	0.76
Anxiety score >10	13	(28.2%)	20	(40%)	0.22

**Table-3.** Comparison of depression and anxiety scores in terms of Large for gestational age and polyhydramnios

	Depression score (n: 96)		P value	Anxiety score (n: 96)		P value
	>7 (n: 37)	≤7 (n: 59)		>10 (n: 33)	≤10 (n: 63)	
Large for gestational age n:23	8	15	0.67	4	19	0.04
Polyhydramnios n:13	4	9	0.53	1	12	0.03

**Table-4.** Comparison of depression and anxiety scores in terms of Diabetes type (GDM vs. PGDM) and Diabetes treatment (Diet + exercise and insulin)

	Depression score		P value	Anxiety score		P value
	>7	≤7		>10	≤10	
<b>Diabetes type (n:46)</b>			0.54			0.27
GDM	9	18		6	21	
PGDM	8	11		7	12	
<b>Diabetes treatment (n: 46)</b>			0.31			0.07
Diet + exercise	3	10		1	12	
Insulin	14	19		12	21	

## DISCUSSION

Our study did not reveal any significant difference in depression and anxiety symptoms between pregnant women with and without diabetes. However, it was found that those with large-for gestational age or polyhydramnios associated with poor glycemic control had significantly fewer anxiety symptoms than those without.

There are conflicting results in the literature on depression symptoms between patients with and without a diagnosis of diabetes during pregnancy. While some studies have shown no significant difference in depression symptoms between patients with GDM and those without GDM (8-11), a systematic meta-analysis conducted in 2020 by Lee et al. found a notable increase in the risk of antepartum depression development in pregnant women diagnosed with gestational diabetes mellitus (PGDM+GDM) compared to pregnant women without a gestational diabetes mellitus diagnosis during pregnancy (RR = 1.431, 95% CI: 1.205-1.699). However, they did not find an association between PGDM (RR = 1.300, 95% CI: 0.736-2.297) and the risk of developing antepartum depression (12). In our study, no statistically significant difference was observed in depression scores between the gestational diabetes group and the control group, nor within

the diabetes group (between PGDM and GDM). The discrepancies in these findings could potentially be attributed to variations in survey scales and divergent cut-off values utilized across studies.

When studies comparing pregnant women with hyperglycemia with non-diabetic pregnant women in terms of anxiety symptoms are examined, some studies reported similar levels of anxiety symptoms between diabetic pregnant women and pregnant women with normal glucose levels (13-15). A recent systematic review concluded that the diagnosis of GDM elevates the occurrence of anxiety and depression among pregnant women (16). In our study, we observed no statistically significant disparity in anxiety scores between the gestational diabetes mellitus group and the control group, nor within the diabetes mellitus groups (between PGDM and GDM).

In pregestational diabetes mellitus and GDM, a higher amount of blood glucose crosses the placenta and enters the fetal circulation and causes fetal hyperglycemia. Excess glucose in the fetus is stored as body fat –and causes macrosomia, also called "large for gestational age" (17). Data from the Hyperglycemia and Adverse Pregnancy Outcomes (HAPO) study

show a strong linear correlation between maternal glucose concentration and large-for-gestational-age (LGA) fetuses (18). In cases of maternal hyperglycemia, the increase in fetal urine excretion is thought to be related to the increase in osmotic diuresis (19). Consequently, maternal hyperglycemia increases the risk of macrosomia and polyhydramnios. In our study, we found significantly fewer anxiety symptoms in pregnant women with large for gestational age or polyhydramnios compared with those without. Since there is a linear relationship between polyhydramnios/large for gestational age and poorly controlled maternal hyperglycemia, the question arises of whether maternal hyperglycemia has a role in the development of anxiety. To our knowledge, there is currently no published study in the literature that examines the association between glycemic control and anxiety symptoms in pregnant individuals. However, in a meta-analysis evaluating non-pregnant diabetic subjects, no strong association was found between anxiety and glycemic control (20).

In a recent study investigating the association between polyhydramnios and anxiety, polyhydramnios was found to be a risk factor for anxiety (21). Contrary to expectations, our study revealed significantly lower anxiety levels among patients diagnosed with polyhydramnios. This

may be attributed to the different etiologies of polyhydramnios. The main cause of polyhydramnios in our cases was hyperglycemia, whereas, in the other study, the cause of polyhydramnios was not specified.

Our study is subject to limitations, notably the small sample size and the restricted number of cases with polyhydramnios and those categorized as large for gestational age within the control group.

The presence of both PGDM and GDM cases in the diabetes group and the comparison of diabetes cases according to treatment modalities are considered to be the strengths of our study. The limitations of our study include the small number of cases and the small number of polyhydramnios and the large for gestational age cases in the control group.

## CONCLUSION

The significant decrease in anxiety symptoms in polyhydramnios and large for gestational age patients suggests that hyperglycemia or metabolic changes caused by hyperglycemia may have an impact on anxiety. Additional research is warranted to clarify the association between hyperglycemia and anxiety

**Conflict of interest:** The authors in the study admit that there is no conflict of interest.

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