Int J Clin Exp Med 2019;12(5):6078-6086
www.ijcem.com /ISSN:1940-5901/IJCEM0092054

Original Article

Anxiety, depression, and prenatal attachment levels in pregnant women with gestational diabetes mellitus

Şükran Özkahraman-Koç[1], Sıddıka Ersoy[2], Belgin Yıldırım[3], İsmail Hakkı Ersoy[4]

[1]Department of Midwifery, Süleyman Demirel University Faculty of Health Sciences, Isparta, Turkey; [2]Division of Medical Nursing, Department of Nursing, Süleyman Demirel University Faculty of Health Sciences, Isparta, Turkey; [3]Division of Public Health Nursing, Adnan Menderes University Nursing Faculty, Aydın, Turkey; [4]Division of Endocrinology and Metabolism, Department of Internal Medicine, Isparta City Hospital, Isparta, Turkey

Received January 30, 2019; Accepted April 9, 2019; Epub May 15, 2019; Published May 30, 2019

Abstract: The current study aimed to determine anxiety, depression, and prenatal attachment levels in patients with gestational diabetes mellitus. For a total of 486 women with GDM, the mean Prenatal Attachment Inventory (PAI) score was 67.30 ± 13.64%. In terms of the Self-Perception of Pregnancy Scale with two factors, the factor 1 score was 21.65 ± 6.72 and the factor 2 score was 11.26 ± 3.72. Based on the Hospital Anxiety and Depression Scale-Anxiety (HADS-A) scale, almost half of the patients (48.10%) had normal scores. One-third (32.50%) of the patients had high scores. Based on the Hospital Anxiety and Depression Scale-Depression (HADS-D) scale, more than half of the patients (59.70%) had normal scores. A few (21.80%) of the patients had high scores, requiring support. Results showed a statistically significant correlation between several factors, including the number of children, number of pregnancies, whether pregnancy was intended, emotions after being aware of pregnancy, and mean scores for the scales used in this study ($p < 0.05$). In the current study, although most of the pregnant women were diagnosed with gestational diabetes mellitus after becoming pregnant, prenatal attachment scores were high. Additionally, one-third of the patients with gestational diabetes mellitus had high anxiety and depression scores. Moreover, body perception was moderate, while maternal perception was high.

Keywords: Gestational diabetes mellitus, anxiety, depression, prenatal attachment

Introduction

Gestational diabetes mellitus (GDM), a health concern commonly observed today, is diagnosed in the second or third trimester of pregnancies without diabetes prior to pregnancy. Pregnant women physiologically develop insulin resistance to provide adequate nutrition for the fetus. If the pancreas of pregnant woman is unable to release enough insulin to overcome the physiological insulin resistance, GDM occurs. GDM results in several complications, including preeclampsia and cesarean deliveries in pregnant women and polyhydramnios, macrosomia, birth trauma, pre- and post-natal mortality, and hypocalcemia in fetuses. The International Association of Diabetes and Pregnancy Study Groups recommends that pregnant women should be screened for GDM using a 2-hour 75 gr oral glucose tolerance test between weeks 24 and 28 of gestation. A high value is necessary for diagnosis [1-4].

Many pregnant women do not have clear knowledge regarding the changes occurring in their body during pregnancy. They need to be prepared for the pregnancy in all aspects and embrace these changes. Body perception needs to remain positive despite the changes. This will allow pregnant women to have lower anxiety and depression levels, ensuring a healthy pregnancy period in terms of physiological and psychological aspects [5]. The response of women to physiological, psychological, and social changes that occur during pregnancy varies depending on their past experiences. Some women can easily adapt, while others may experience mental issues. Previous studies have shown that this causes negative effects on the baby [6-10]. In addition, previous studies have shown that pregnancies cause anxiety in women. The prenatal period is the time period from conception to birth, in which mother-infant attachment begins. The attachment theory was first described by Bowlby and developed by

Ainsworth et al. Bowlby defined attachment as a strong bond between two individuals. The attachment theory argues that attachment to the mother is important for the survival of the child [11-14]. In the prenatal period, attachment decreases as anxiety increases in pregnant women. It increases as positive health behaviors increase. The current study, therefore, aimed to determine anxiety, depression, and prenatal attachment levels in GDM patients.

Materials and methods

Samples

The population for this cross-sectional study included pregnant women diagnosed with gestational diabetes, admitted to the Isparta City Hospital Endocrinology and Metabolic Diseases Clinic, between August 1, 2018, and November 30, 2018. Sample size was calculated using G*Power 3. In the study, the scale mean score was 61.72 ± 10.72 [11]. Influence quantity was considered as 0.20 and $\alpha = 0.05$, with a power of 95%. The sample size was calculated to be 305. This study used the random sampling method, a non-probability sampling method. A total of 486 pregnant women with GDM constituted the sample group. They are highly representative of the study population. The hospital selected for the study, Affiliated to the Ministry of Health, is located in the Province of Isparta in the South of Turkey (Mediterranean Region).

Questionnaires

Questionnaires used in the study comprised four sections. The first section of the questionnaire included a personal information form. This form was developed by the authors based on a literature review [6-8]. The form includes questions concerning factors such as age, number of pregnancies, first gestational age, presence of GDM in other pregnancies, age of marriage, weight prior to pregnancy, gestational week, educational status, and occupational status. The second section of the questionnaire included prenatal attachment inventory (PAI). PAI was developed by Mary Muller in 1993 [15]. PAI was adapted to Turkish in 2009 [14]. PAI is a 21-item and 4-point Likert scale designed to determine emotions, thoughts, and conditions of pregnant women during pregnancy, as well as the level of attachment to the fetus during the prenatal period. Each item is scored with points ranging from 1 to 4 (1 = never, 2 = sometimes, 3 = frequently, and 4 = always). Scores may range from 21 to 84 points, with higher scores indicating increased prenatal attachment. Cronbach's Alpha reliability coefficient of PAI was found to be 0.84. The third section of the questionnaire included the hospital anxiety and depression scale (HADS). HADS was developed by Zigmond and Snaith in 1983 and adapted to Turkish, with a validity and reliability study by Aydemir et al. in 1997 [16, 17]. HADS comprises 14 questions. In the reliability study, Cronbach's Alpha coefficient for anxiety and depression subscales was found to be 0.85 and 0.77, respectively. Responses are scored with points ranging from 0 to 3 in the 4-point Likert scale. The anxiety subscale was scored as 3-2-1-0, while the depression subscale was scored as 0-1-2-3. For each subscale, the lowest score is 0 and the highest score is 21. Cut-off points for anxiety and depression scales are 10 and 7, respectively. Patients obtaining scores above these points were considered as the risk group. This scale aims to determine the risk group by screening for anxiety and depression in patients with physical disease in a short time. Moreover, HADS is used to assess changes in the emotional states of patients. The fourth section of the questionnaire included the Self-Perception of Pregnancy Scale (SPPS), developed by Kumcagiz, Ersanlı, and Murat in 2017 [5]. SPPS is a two-stage scale that aims to measure Maternal Perception (factor 1) and Body Perception (factor 2). SPPS consists of 12 items (seven for Maternal Perception in pregnancy - factor 1 subscales and five for Body Perception in pregnancy - factor 2). Maternal Perception in Pregnancy - factor 1 consists of positive questions, while Body Perception in Pregnancy - factor 2 consists of negative questions. Negative expression is reverse-coded. SPPS is designed as a 4-point Likert scale (4 always, 3 frequently, 2 sometimes, and 1 never). Each subscale is separately evaluated. In the factor 1 subscale, a higher score indicates a higher level of Maternal Perception in Pregnancy, while a lower score indicates a lower level of Maternal Perception in Pregnancy. In the factor 1 subscale, the highest score is 28 and the lowest score is 7. In the factor 2 subscale, a higher score indicates negative Body Perception in Pregnancy, while a lower score indicates positive Body

Perception in Pregnancy. In the factor 2 subscale, the highest possible score is 20 and the lowest score possible is 5. SPPS may not assess psychological and physical disorders in pregnant women [5].

Evaluating the understandability of questions in the questionnaire form, as a pilot application, 10 pregnant women were asked to answer the questionnaire. Based on this application, it was observed that there was no need to make any changes in the data collection form. Pilot application data were not included in the study data.

Statistical analysis

Data were analyzed using descriptive statistics, t-tests, variance analysis, Kruskal-Wallis tests, and Mann-Whitney U-tests. $P < 0.05$ indicates statistical significance.

Results

A total of 486 pregnant women with GDM were included in the study. Results showed that 76.10% of these women had a nuclear family structure. The mean age was 29.21 ± 6.26 years. The distribution of demographic characteristics of the pregnant women based on scale scores used in the study is shown in **Table 1**.

It was determined that 222 (45.70%) of the pregnant women were high-school graduates, 248 (51.00%) were employed, and 245 (52.30%) had a middle-income level. When the communication statuses of the pregnant women with their spouses were examined, 54 (11.10%) stated that they never communicated with their spouses and 200 (41.20%) stated that they communicated with their spouses at a middle level. In addition, 64 (13.20%) of the pregnant women stated that their spouses did not help them in daily life. Only 100 (20.60%) stated that they received support in every way. Statistically significant differences were found concerning employment status, communication status with spouses, getting support from spouses, Body Mass Index (BMI), and mean scores in the scales used in this study ($p < 0.05$). In addition, results showed a significant correlation between family type and HADS-A and SPPS factor 2 subscale scores ($p < 0.05$). There was no significant correlation between PAI, HADS-D, and SPPS factor 1 subscale mean scores ($p < 0.05$). No significant correlation was found between educational status and HADS-A mean scores ($p > 0.05$), although a significant correlation was found between educational status and mean scores in all other scales ($p < 0.05$). No significant correlation was found between income status and PAI and HADS-A mean scores ($p > 0.05$). However, a significant correlation was found between income status and mean scores in all other scales ($p < 0.05$) (**Table 1**).

The distribution of obstetric characteristics of pregnant women and the scales used in this study are shown in **Table 2**. Results showed that 67.50% of the pregnant women had not been diagnosed with diabetes within 24-28 weeks of gestation, while 80.70% had never been diagnosed with diabetes prior to this gestation. Furthermore, it was found that 246 (50.60%) of the pregnant women were having their first pregnancy. A total of 140 (28.80%) had at least one child aged < 5 years, while 350 (72.00%) had planned/intended pregnancies. In addition, 22 (4.50%) of the pregnant women experienced fear and anger when they became aware of their pregnancy, while 136 (13.20%) that had not planned/intended for pregnancy considered abortion. An examination of individual social support status during pregnancy revealed that 272 (56.00%) had received support from their family. The mean BMI was 29.06 ± 4.63 kg/m^2.

Based on study results, the mean PAI score in pregnant women diagnosed with GDM was found to be 67.30 ± 13.64% (27-83). Based on HADS, 48.10% of the patients had normal anxiety scores, with a mean HADS-A score of 8.66 ± 4.28. Moreover, 59.70% had normal depression scores, with a mean HADS-D score of 7.74 ± 4.28. Based on SPPS, factor 1 and factor 2 scores were 21.65 ± 6.72 and 11.26 ± 3.7, respectively. A statistically significant correlation was found between the number of children, number of pregnancies, whether pregnancy was intended, emotions after being aware of pregnancy, and mean scores in the scales used with BMI ($p < 0.05$). Although there was a significant correlation between social support status during the pregnancy and PAI, HADS-A, and HADS-D scores ($p < 0.05$), no significant correlation was found between social support status and factor-1 and factor-2 subscale mean scores ($p > 0.05$) (**Table 2**).

Table 1. Distribution of demographic characteristics of the pregnant women based on scale scores

Demographic Variable		n	%	PAI	HADS-A	HADS-D	Factor-1 Maternal Perception	Factor-2 Body Perception
Family type	Nuclear family	370	76.1	66.97 ± 13.93	8.90 ± 3.87	7.79 ± 4.45	21.66 ± 6.66	11.47 ± 3.19
	Extended family	102	21.0	67.86 ± 13.15	7.96 ± 3.78	7.52 ± 3.86	21.74 ± 6.77	11.11 ± 3.87
	Fragmented family	14	2.9	71.85 ± 7.13	7.42 ± 4.98	7.71 ± 1.54	20.71 ± 8.22	13.28 ± 2.33
KW				0.827	9.048	1.280	0.119	9.298
p				0.66	0.01	0.52	0.94	0.01
Educational status	Premary school	82	16.9	62.78 ± 15.78	8.58 ± 4.07	9.21 ± 4.97	18.97 ± 7.38	13.73 ± 3.37
	High school	222	45.7	67.58 ± 13.21	8.90 ± 4.08	7.72 ± 4.29	21.18 ± 6.85	11.51 ± 3.75
	University	182	37.4	69 < 0.001 ± 12.70	8.39 ± 3.60	7.08 ± 3.74	23.42 ± 5.71	9.82 ± 3.14
KW				9.865	0.717	8.938	24.789	66.991
p				< 0.001	0.69	0.01	< 0.001	< 0.001
Employment status	Housewife	238	49.0	66.73 ± 13.90	8.80 ± 4.09	8.11 ± 4.80	20.51 ± 6.93	12.19 ± 3.70
	Employed	248	51.0	67.84 ± 13.38	8.52 ± 3.72	7.37 ± 3.66	22.75 ± 6.33	10.35 ± 3.52
t				-106.439	-39.824	-31.569	-66.686	-55.403
p				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Income status	Good	108	22.2	67.94 ± 15.15	8.29 ± 3.67	6.94 ± 3.88	22 < 0.001 ± 6.59	10.25 ± 3.96
	Middle	254	52.3	67.73 ± 11.50	8.70 ± 3.81	7.64 ± 4.10	22.71 ± 6.08	11.17 ± 3.37
	Bad	124	25.5	65.87 ± 16.08	8.90 ± 4.28	8.61 ± 4.78	19.17 ± 7.45	12.29 ± 3.95
F				0.929	0.720	4.582	12.269	9 < 0.0014
p				0.39	0.48	0.01	< 0.001	< 0.001
Communication status with their spouses	No	54	11.1	55.44 ± 18.36	11.18 ± 3.73	10.92 ± 5.07	13.88 ± 5.91	14 < 0.001 ± 3.25
	Little	110	22.6	64.56 ± 16.18	9.41 ± 3.75	8.69 ± 4.54	19.38 ± 7.34	12.89 ± 3.98
	Middle	200	41.2	69.69 ± 10.47	8.11 ± 3.71	7.17 ± 3.89	23.44 ± 5.52	10.38 ± 3.41
	Very	122	25.1	71.11 ± 9.35	7.77 ± 3.88	6.39 ± 3.27	24.21 ± 4.84	1 < 0.001 ± 2.95
KW				30.655	39.155	40.771	88.826	72.770
p				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Helping spouses	No	64	13.2	58.84 ± 17.11	9.84 ± 3.71	9.53 ± 5.32	17.93 ± 7.81	12.65 ± 3.48
	Little	150	30.9	66.86 ± 14.76	9.09 ± 3.91	8.32 ± 4.10	19.93 ± 7.19	12.61 ± 3.78
	Middle	172	35.4	67.96 ± 12.30	8.29 ± 3.96	7.27 ± 4.34	22.59 ± 6.11	10.74 ± 3.67
	Very	100	20.6	72.24 ± 7.94	7.90 ± 3.72	6.50 ± 2.99	25 < 0.001 ± 3.73	9.20 ± 2.55
KW				26.933	14.552	20.161	46.161	64.067
p				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
BMI	Normal weight	103	21.2	69.61 ± 14.03	8.66 ± 4.22	6.90 ± 4.16	22.38 ± 6.12	9.91 ± 3.39
	Overweight	179	36.8	70.78 ± 12.24	7.84 ± 3.33	7.03 ± 3.83	21.73 ± 6.74	11.08 ± 3.82
	Obese	204	42.0	63.08 ± 13.51	9.37 ± 4.08	8.77 ± 4.49	21.21 ± 6.98	12.08 ± 3.59
F				18.254	7.431	10.809	1.060	12.496
p				< 0.001	< 0.001	< 0.001	0.34	< 0.001

Table 2. Distribution of obstetric characteristics of pregnant women and scales used in this study

Demographic Variable		n	%	PAI	HADS-A	HADS-D	Factor-1 Maternal Perception	Factor-2 Body Perception
Number of pregnancies	1	246	50.6	70.74 ± 10.59	8.22 ± 3.90	6.80 ± 3.61	22.86 ± 5.89	10.47 ± 3.12
	2	176	36.2	67.64 ± 13.41	8.54 ± 3.83	7.60 ± 4.13	21.60 ± 6.81	11.38 ± 3.77
	3	52	10.7	54.34 ± 15.09	11.11 ± 3.51	11.53 ± 4.82	17.69 ± 7.78	13.50 ± 4.63
	4	12	2.5	47.83 ± 17.49	8.66 ± 3.28	12.33 ± 4.84	14.83 ± 6.42	15.66 ± 2.80
KW				65.79	25.87	49.36	32.78	35.93
p				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Number of childrens	None	246	50.6	70.74 ± 10.59	8.22 ± 3.90	6.80 ± 3.61	22.86 ± 5.89	10.47 ± 3.12
	0-5 age	140	28.8	61.20 ± 16.92	9.28 ± 3.88	9.25 ± 5 < 0.001	19.32 ± 7.32	12.38 ± 4.19
	6-11 age	50	10.3	66.36 ± 12.99	10.12 ± 4.24	8.60 ± 4.17	20.72 ± 7.71	12.32 ± 4.26
	12 age and over	50	10.3	68.40 ± 11.41	7.60 ± 2.99	7.20 ± 3.87	23.16 ± 5.98	10.88 ± 3.51
KW				30.255	15.999	22.312	28.199	21.607
p				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Desired pregnancy	Yes	350	72.0	72.70 ± 7.90	7.50 ± 3.33	6.12 ± 2.87	25.64 ± 1.76	9.49 ± 2.39
	No	136	28.0	53.39 ± 15.36	11.64 ± 3.69	11.88 ± 4.50	11.39 ± 2.68	15.77 ± 2.52
Z				-19.106	-19.124	-18.997	-19.140	-19.134
p				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Emotions after being aware of pregnancy	Happy/joyful	350	72.0	71.63 ± 9.13	7.71 ± 3.41	6.36 ± 3.02	25.03 ± 3.32	9.74 ± 2.65
	Sad/worry	114	23.5	56.61 ± 16.97	11 < 0.001 ± 4.17	10.84 ± 4.77	13.49 ± 5.53	14.85 ± 3.38
	Fear/anger	22	4.5	53.81 ± 15.32	11.63 ± 3.38	13.45 ± 5.42	10.18 ± 2.46	16.54 ± 1.92
KW				89.219	67.099	95.115	209.252	183.895
p				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Social support status during the pregnancy	Husband	188	38.7	65.82 ± 13.59	9.28 ± 3.98	8.19 ± 4.48	21.52 ± 6.73	11.31 ± 3.66
	Own family	272	56.0	68.36 ± 13.93	8.24 ± 3.81	7.44 ± 4.26	21.54 ± 6.83	11.27 ± 3.83
	Friend	26	5.3	66.92 ± 9.63	8.53 ± 3.82	7.53 ± 2.10	23.76 ± 5.23	10.53 ± 2.87
KW				8.649	7.448	6.054	3.289	.301
p				0.01	0.02	0.04	0.19	0.86
BMI			28.22 ± 4.56	-6.99 ± 13.90	-6.34 ± 3.89	-5.42 ± 4.16	-19.34 ± 6.85	-8.94 ± 3.64
t				-103.024	-35.982	-28.710	-62.201	-54.141
p				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001

Discussion

The current study investigated anxiety, depression, and prenatal attachment levels in pregnant women with GDM. Although most patients (80.7%) had been diagnosed with GDM following the pregnancy, the mean PAI score (67.30 ± 13.64) was high. This result is similar to the findings of other studies conducted in Turkey, as well as abroad, concerning healthy and risky pregnancies [14, 18-28]. Previous studies have shown that prenatal attachment is affected by several factors. The reason why different factors have been emphasized in each study is that these studies are conducted on pregnant women with different cultural characteristics. The current study found a positive correlation between having intended an pregnancy and pleasure when they first became aware of the pregnancy [14, 20, 22, 29], social support received [30], regular medical examinations, and prenatal attachment. In addition, a negative correlation was found between increased number of pregnancies and history of terminated pregnancy and prenatal attachment [31]. Prenatal attachment has been found to be increased in pregnant women that are employed, have higher education levels, better income levels, and improved communication with and support from a spouse [14, 20-24, 28, 29, 32-35]. Almost half of the pregnant women (41.8%) had normal weights prior to pregnancy. After the pregnant women with GDM adapted to the diet regimen concurrently initiated with treatment, their weight problem was significantly controlled. Pregnant women with BMI-defined obesity were found to have the lowest attachment scores. There is no clear data on prenatal or maternal attachment in pregnant women diagnosed with GDM. Several studies have stated that the possibility of having results out of a normal pregnancy process, along with increased healthcare needs and risks associated with having a healthy baby, cause more intense stress in pregnant women. Thus, prenatal attachment will be more difficult due to these difficulties [36, 37]. Prenatal attachment scores were found to be higher in pregnant women diagnosed with diabetes prior to pregnancy and diagnosed with GDM in previous pregnancies. The effects of diabetes mellitus on prenatal attachment are lower due to patient adaptation to the disease and active participation in treatment.

Examination of HADS-A revealed that approximately half of the GDM pregnant women (48.10%) had normal scores. One-third (32.50%) had high scores, requiring support. Examination of HADS-D revealed that more than half of the patients (59.70%) had normal scores. A few (21.80%) had high scores, requiring support. It has been reported that the prevalence of depression in pregnant women varies between 21% and 25% [38]. In another study, HADS score percentages in pregnant women in Asia and Western Europe were reported to be 17.5% and 19.5%, respectively [39]. In studies including the end of delivery, it has been stated that anxiety is generally more intense and prominent during the pregnancy [40]. In the current study, low levels of education for the mother, being employed, economic status, unplanned pregnancy, emotions after first being aware of pregnancy, number of children, level of communication with spouse, perceived spouse and social support levels, increased number of pregnancies, history of GDM in previous pregnancies, and increased obesity following pregnancy [38, 41, 42] were found to be associated with HADS-D scores, in accord with previous studies. A nuclear family structure, being employed, economic status [38, 41] unplanned pregnancy, number of children [38, 41], emotions after first being aware of pregnancy, level of communication with spouse [38], level of support from spouse/social circle [38], frequency of medical examinations, increased number of pregnancies, history of GDM in previous pregnancies, and increased weight following pregnancy [42], were all found to be associated with HADS-A scores, in accord with previous studies ($p < 0.05$). A comparison of results obtained from HADS with those from other studies revealed that the patients did not receive very high scores [38, 39]. In studies on anxiety and depression in pregnant women with GDM, it has been emphasized that GDM has an impact on anxiety. This rate is higher in high-risk pregnancies [43, 44]. Some studies have reported that GDM increases emotional stress in pregnant women [45]. Having or not having GDM makes no difference in terms of depression levels, but it significantly increases anxiety [46]. GDM may result in anxiety and depression, while the use of insulin does not significantly change this. There are no significant differences between having GDM or not in the subsequent weeks of gestation [47]. It has

been reported that the maternal attachment rate in pregnant women at high risk of preterm birth is low and negatively correlated with depression [43] It has been suggested that increased need for care, new risks, increased stress, anxiety, and depression levels in pregnant women diagnosed with GDM have a negative effect on prenatal attachment until coping mechanisms are developed or professional support is received.

Although SPPS, recently developed in Turkey in 2017, was used in the current study, it has not yet been utilized in other studies. Present study results will, therefore, be discussed along with results of studies in which body perception was evaluated with different scales. SPPS factor 1 subscale was found to be associated with educational status, employment, economic status, emotions after being aware of pregnancy, intended pregnancy, number of children, level of communication with her spouse, perceived level of support from spouse and social circle, increased obesity following pregnancy, and history of GDM in previous pregnancies ($p < 0.05$). SPPS factor 2 subscale was found to be associated with family type, educational status, employment, economic status, emotions after being aware of pregnancy, intended pregnancy, number of children, level of communication with her spouse, perceived level of support from spouse and social circle, increased obesity following pregnancy, and history of GDM in previous pregnancies ($p < 0.05$). A study on body perception using different scales in the literature supports current findings [5]. Affected by sociodemographic features, body perception is negatively affected by increased weight and altered hormonal order during pregnancies [5, 48]. It has been reported that negative body perception is associated with a weak mother-infant relationship during the prenatal period, contributing to long and difficult deliveries [49]. Pregnant women that are more concerned with their physical appearance, believing that their body and facial appearance are not sufficiently good, losing sexual attraction, feeling fat during pregnancy, as well as pregnancies at an early age, have been associated with decreased self-esteem and increased stress, anxiety, and predisposition to depression [48, 50, 51]. There is a need for further studies on anxiety, depression, self-perception, and prenatal attachment levels in pregnant women diagnosed with GDM.

The primary limitation of the current study was that the data had certain weaknesses. The study was limited by the cross-sectional design and small sample size. Results obtained from this study can only be generalized to the sample. In addition, it is possible that responses given by GDM pregnant women to the scale may not reflect their true attitude. Another limitation is that the scales used in the study did not help in the diagnosis of disease. They did not evaluate physical disorders in pregnant women with GDM. Therefore, results of the current study were limited to the scope of the scales. Apart from these limitations, this study has several strengths. It addresses a health concern that has become more common recently. It targets a high-risk group that may have significant impact. Healthcare professionals play an important role as patient instructors. Future studies should be carried out with larger sample sizes, obtaining more information about GDM.

Conclusion

In recent years, the prevalence of GDM has increased, worldwide. GDM increases maternal and fetal morbidity and causes medical problems. Pregnant women live with several factors that may cause anxiety and stress. Anxiety and depression statuses should be considered in pregnant women diagnosed with GDM. In addition, pregnant women tend to have lower anxiety and depression levels when their body perception continues to be positive. In addition to its role in development, prenatal attachment is an indicator of the adaptation to pregnancy. In the current study, prenatal attachment scores in pregnant women were found to be high. High levels of prenatal attachment toward the baby are important in improving preventive mental health and community mental health. It is the responsibility of healthcare professionals to offer every woman the opportunity to have a healthy pregnancy and a healthy baby, providing prenatal care services suitable for GDM pregnant women and eliminating anxiety and depression.

Acknowledgements

The authors would like to thank the GDM pregnant women that agreed to participate in this study. The English in this document was checked by the editor, a native speaker of English,

after checking the corrective translator after translating to English.

Disclosure of conflict of interest

None.

Address correspondence to: Dr. Şükran Özkahraman-Koç, Department of Midwifery, Süleyman Demirel University Faculty of Health Sciences, 32260, Isparta, Turkey. Tel: +902462113267; Fax: +90246 237 16 10; E-mail: sukranozkahraman@sdu.edu.tr

References

[1] Lipscombe LL and Hux JE. Trends in diabetes prevalence, incidence, and mortality in Ontario, Canada 1995-2005: a population-based study. Lancet 2007; 369: 750-6.
[2] Gupta Y, Kalra B, Baruah MP, Singla R, Kalra S. Updated guidelines on screening for gestational diabetes. Int J Womens Health 2015; 7: 539-50.
[3] Yener-Öztürk F, Altuntaş Y. Gestational diabetes mellitus. The Medical Bulletin of Şişli Etfal Hospital 2015; 49: 1-10.
[4] Sönmez A, Kutlu M. Current recommendations for gestational diabetes screening. Turkiye Klinikleri J Endocrin-Special Topics; 2010; 3: 1-5.
[5] Kumcağız H. Pregnant women, body image and self-esteem according to the examination of some of the variables. International Journal of Human Science 2012; 9: 691-703.
[6] Orr ST, James SA, Blackmore Prince C. Maternal prenatal depressive symptoms and spontaneous preterm births among African-American women in Baltimore, Maryland. Am J Epidemiol 2002; 156: 797-802.
[7] Hoffman S, Hatch MC. Depressive symptomatology during pregnancy: evidence for an association with decreased fetal growth in pregnancies of lower social class women. Health Psychol 2000; 19: 535-43.
[8] Ekuklu G, Tokuc B, Eskiocak M, Berberoglu U, Saltik A. Prevalence of postpartum depression in Edirne, Turkey, and related factors. J Reprod Med 2004; 49: 908-14.
[9] Üst ZD, Pasinlioğlu T, Özkan H. Investigation of anxiety levels of pregnant women in labor. Anadolu Hemşirelik ve Sağlık Bilimleri Dergisi 2013; 16: 110-5.
[10] Tuncer ET, Çetin N. A comparative study on birth and anxiety. Türkiye'de Psikiyatri 2001; 3: 47-51.
[11] Fonagy P. Introduction to attachment theory. In Attachment Theory and Psychoanalysis. Edited by Fonagy P. New York: Other Press; 2001, pp. 5-18.
[12] Peppers LG, Knapp RJ. Maternal reactions to involuntary fetal/infant death. Psychiatry 1980; 43: 155-9.
[13] Bowlby J. Attachment and loss volume I: attachment. Edited by Bowlby J. New York: Basic Books, Inc; 1982, pp. 177-264.
[14] Yılmaz-Dereli S, Kızılkaya-Beji N. Levels of coping with stres, depression and prenatal attachment and affecting factors of pregnant women. Genel Tıp Dergisi 2010; 20: 99-108.
[15] Muller ME. Development of the prenatal attachment ınventory. West J Nurs Res 1993; 15: 199-211.
[16] Zigmond AS, Snaith RP. The hospital anxiety and depression scale. Acta Psychiatr Scand 1983; 67: 361-70.
[17] Aydemir Ö, Güvenir T, Küey L, Kültür S. Validity and reliability of Turkish version of hospital anxiety and depression scale. Türk Psikiyatri Dergisi 1997; 8: 280-7.
[18] Duyan V, Kapısız SG, Yakut Hİ. The adaptatıon of fetal attachment ınventory to turkısh wıth a group of pregnant women. The Journal of Gynecology - Obstetrics and Neonatology 2013; 10: 1609-14.
[19] Karakoç H, Özkan H. The relationship with prenatal attachment of psychosocial health status of pregnant women. International Journal of Health Sciences 2017; 5: 36-46.
[20] Kartal-Aydın Y, Karaman T. Effect of birth preperation training on prenatal attachment and depression. Zeynep Kamil Tıp Bülteni 2018; 49: 85-91.
[21] Bakır N, Ölçer Z, Oskay Ü. Prenatal attachment levels of high risk pregnants and factors affecting. Uluslar Arası Hakemli Kadın Hastalıkları ve Anne Çocuk Sağlığı Dergisi 2014; 1: 16-36.
[22] Alan-Dikmen H, Çankaya S. Effects of maternal obesıty on prenatal attachment. ACU Sağlık Bil Derg 2018; 9: 118-23.
[23] Baghdari N, Sadeghi Sahebzad E, Kheirkhah M, Azmoude E. The effects of pregnancy-adaptation training on maternal-fetal attachment and adaptation in pregnant women with a history of baby loss. Nurs Midwifery Stud 2016; 5: e28949.
[24] Siddiqui A, Hägglöf B. Does maternal prenatal attachment predict postnatal mother-infant interaction? Early Hum Dev 2000; 59: 13-25.
[25] Vedova-Della A, Dabrassi F, Imbasciati A. Assessing prenatal attachment in a sample of Italian women. J Reprod Infant Psyc 2008; 26: 86-98.
[26] Eswi A, Khalil A. Prenatal attachment and fetal health locus of control among low risk and high risk pregnant women. World Applied Sciences Journal 2012; 18: 462-71.
[27] Pajulo M, Helenius H, Mayes L. Prenatal views of baby and parenthood: association with so-

ciodemographic and pregnancy factors. Infant Ment Health J 2006; 27: 229-50.
[28] Akbaş M, Akbaş T, Akbaş O, Aknbaş I. An analysis of maternal-fetal attachment level in pregnant women. LIFE: 2017; 3: 77-87.
[29] Camarneiro-Forte AP, Miranda-Justo JMR. Prenatal attachment and sociodemographic and clinical factors in Portuguese couples. J Reprod Infant Psychol 2017; 35: 212-22.
[30] Erkal-Aksoy Y, Dereli-Yılmaz S, Aslantekin F. Prenatal attachment and social support in risk pregnancies. Turkiye Klinikleri J Health Sci 2016; 1: 163-9.
[31] Armstrong D, Hutti M. Pregnancy after perinatal loss: the relationship between anxiety and prenatal attachment. J Obstet Gynecol Neonatal Nurs 1998; 27: 183-9.
[32] Chen CJ, Chen YC, Sung HC, Kuo PC, Wang CH. Perinatal attachment in naturally pregnant and infertility-treated pregnant women in Taiwan. J Adv Nurs 2011; 67: 2200-8.
[33] Lindgren K. Relationships among maternal-fetal attachment, prenatal depression, and health practices in pregnancy. Res Nurs Health 2001; 24: 203-17.
[34] Kwon MK, Bang KS. Relationship of prenatal stress and depression to maternal-fetal attachment and fetal growth. J Korean Acad Nurs 2011; 41: 276-83.
[35] Ossa X, Bustos L, Fernandez L. Prenatal att achment and associated factors during the third trimester of pregnancy in temuco, chile. Midwifery 2012; 28: 689-96.
[36] Malakouti J, Sehhati F, Mirghafourvand M, Nahangi R. Relationship between health promoting lifestyle and perceived stress in pregnant women with preeclampsia. J Caring Sci v2015; 4: 155-63.
[37] Coco L, Giannone TT, Zarbo G. Management of high-risk pregnancy. Minerva Ginecol 2014; 66: 383-9.
[38] Pisoni C, Garofoli F, Tzialla C, Orcesi S, Spinillo A, Politi P, Balottin U, Tinelli C, Stronati M. Complexity of parental prenatal attachment during pregnancy at risk for preterm delivery. J Matern Fetal Neonatal Med 2016; 29: 771-6.
[39] Field T. Prenatal anxiety effects: a review. Infant Behav Dev 2017; 49: 120-8.
[40] Yedid-Sion M, Harlev A, Weintraub AY, Sergienko R, Sheiner E. Is antenatal depression associated with adverse obstetric and perinatal outcomes? J Matern Fetal Neonatal Med 2016; 29: 863-7.
[41] Dikmen-Yildiz P, Ayers S, Phillips L. Depression, anxiety, PTSD and comorbidity in perinatal women in Turkey: a longitudinal population-based study. Midwifery 2017; 55: 29-37.
[42] Marchesi C, Bertoni S, Maggini C. Major and minor depression in pregnancy. Obstet Gynecol 2009; 113: 1292-8.
[43] de Wit L, Jelsma JG, van Poppel MN, Bogaerts A, Simmons D, Desoye G, Corcoy R, Kautzky-Willer A, Harreiter J, van Assche A, Devlieger R, Timmerman D, Hill D, Damm P, Mathiesen ER, Wender-Ozegowska E, Zawiejska A, Rebollo P, Lapolla A, Dalfrà MG, Del Prato S, Bertolotto A, Dunne F, Jensen DM, Andersen L, Snoek FJ. Physical activity, depressed mood and pregnancy worries in European obese pregnant women: results from the DALI study. BMC Pregnancy Childbirth 2015; 15: 158.
[44] Katon JG, Russo J, Gavin AR, Melville JL, Katon WJ. Diabetes and depression in pregnancy: is there an association? J Womens Health (Larchmt) 2011; 20: 983-9.
[45] Kalra B, Gupta Y, Baruah MP. Renaming gestational diabetes mellitus: a psychosocial argument. Indian J Endocrinol Metab 2013; 17: 593-5.
[46] Daniells S, Grenyer BF, Davis WS, Coleman KJ, Burgess JA, Moses RG. Gestational diabetes mellitus: is a diagnosis associated with an increase in maternal anxiety and stress in the short and intermediate term? Diabetes Care 2003; 26: 385-9.
[47] Trutnovsky G, Panzitt T, Magnet E, Stern C, Lang U, Dorfer M. Gestational diabetes: women's concerns, mood state, quality of life and treatment satisfaction. J Matern Fetal Neonatal Med 2012; 25: 2464-6.
[48] Nierop A, Wirtz PH, Bratsikas A, Zimmermann R, Ehlert U. Stress-buffering effects of psychosocial resources on physiological and psychological stress response in pregnant women. Biol Psychol 2008; 78: 261-8.
[49] Chang SR, Chao YM, Kenney NJ. I am a woman and i'm pregnant: body image of women in Taiwan during the third trimester of pregnancy. Birth 2006; 33: 147-53.
[50] Watson B, Fuller-Tyszkiewicz M, Broadbent J, Skouteris H. Development and validation of a tailored measure of body image for pregnant women. Psychol Assess 2017; 29: 1363-75.
[51] Zaltzman A, Falcon B, Harrison ME. Body image in adolescent pregnancy. J Pediatr Adolesc Gynecol 2015; 28: 102-8.