

The Effect of Gestational Diabetes on Depression and Breastfeeding Self-Efficacy in Pregnancy and Postpartum Period

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ABSTRACT

Objective: This study aims to explore the effect of gestational diabetes mellitus (GDM) on depression and breastfeeding self-efficacy during pregnancy and the postpartum period.

Methods: This descriptive study was conducted in Obstetrics and Perinatology clinics of two university hospitals in Turkey between July 2016 and June 2017. Women were followed up twice. The first follow-up was performed face-to-face in the gestational week 34th to 38th and the second one was performed by telephone in the 8th week of the postpartum period. In the first follow-up, 104 pregnant women with GDM and 133 pregnant with non-GDM women were interviewed. In the second follow up, 30 women could not be reached in both groups. Data were collected by the Individual Description Form, Edinburgh Postpartum Depression Scale, and Breastfeeding Self-Efficacy Scale-Short Form. Descriptive statistics, repeated measures analysis of variance, and correlation analysis were used in the analysis.

Results: The depression risk of mothers with GDM was found higher compared to non-GDM mothers. No significant difference was found between the depression and breastfeeding self-efficacy mean scores in the antenatal and postpartum period of women by the presence of GDM. There was no significant difference between the depression and breastfeeding self-efficacy mean scores in the antenatal and postpartum period by the presence of GDM and some confounding variables. As the breastfeeding self-efficacy level of mothers with GDM increased, the depression risk decreased.

Conclusion: It has been concluded that GDM does not have an impact on depression and breastfeeding self-efficacy during pregnancy and in the postpartum period.

Keywords: Breastfeeding self-efficacy, depression, gestational diabetes, nursing

1. INTRODUCTION

Gestational diabetes mellitus (GDM) first occurs in pregnancy especially in the second or third trimester and is defined as the hyperglycemia that continues during pregnancy (1). The prevalence of GDM in all pregnancies is approximately 7% (2). International Diabetes Federation stated that 21.3 million or 16.2% of live births in a year had hyperglycemia during pregnancy and 86.4% of these cases were affected by GDM (3). The prevalence of GDM in Turkey changes between 3.17% and 9.2% (4,5). There are four factors that may lead to lower breastfeeding rate in women with GDM: increased cesarean rate, delayed lactation and milk production, separation of newborn from the mother, and early feeding provided to newborn with formula (6–8). Previous studies (9–12) have reported that breastfeeding rates of the mothers with GDM are low, breastfeeding duration is short, and they have a negative perception about the inadequate lactation. These

negative thoughts about breastfeeding are related to the breastfeeding self-efficacy perception of the mother which is one of the factor affecting breastfeeding (13). Breastfeeding self-efficacy perception is influenced by four main sources of information; namely the individual's previous breastfeeding experience, others' experiences, the presence of support for breastfeeding and such psychological answers as anxiety, stress, fatigue and depression (13–15).

The increase in insulin resistance during pregnancy may cause the development of GDM and also depression (16). Increase in the inflammatory response and in stress hormones such as cortisol during pregnancy (17), increase of insulin resistance and hyperglycemia combination may increase the probability of depression in pregnant women with GDM (16). Pregnant women with GDM were more likely to have a higher rate of depression compared to healthy pregnant women, but the

difference was not significant (18,19). Huang et al. reported that hyperglycemia was correlated to antenatal depressive symptoms in pregnancy but it wasn't correlated to postpartum depression (20). In another research (21), it was reported that women with GDM were at risk for antenatal depression three to four times higher compared to non-GDM women when the age, income level, education level, and parity were adjusted.

Few studies focused on the relationship between depression and breastfeeding self-efficacy, being one of the psychological responses that may affect the self-efficacy perception of the mother about breastfeeding. It was reported in two previous studies that (22,23) the higher the depression scores of mothers were, the lower their breastfeeding self-efficacy was.

The negative mood of women with GDM, as a result of their higher inclination to depression, reduces the self-efficacy of the individual and may negatively affect the breastfeeding self-efficacy. In addition to the negative impact of existing insulin resistance on breastfeeding in women with GDM, the presence of depression reduces their breastfeeding self-efficacy and may increase the negative breastfeeding outcomes in postpartum (14,15,24). In this regard, the evaluation of breastfeeding self-efficacy in pregnant women with GDM in the antenatal period is of great importance. The purpose of this study was to explore the effect of GDM on depression and breastfeeding self-efficacy during pregnancy and the postpartum period.

2. METHODS

2.1. Design and Population

This descriptive study was conducted in Obstetrics and Perinatology clinics of two university hospitals in Izmir province between July 2016 and June 2017. The number of individuals to be included in the sample by using the calculation formula for sample size with an unknown population (25) was determined as 100 (GDM prevalence was accepted as 0.07 according to ADA (2)). One hundred and four pregnant women with GDM and 133 non-GDM pregnant women who complied with the inclusion criteria were incorporated into the study through a convenience sampling method.

The inclusion criteria for both groups are as follows: (a) Elder than 18 years old, (b) reading and writing in Turkish, (c) being in the gestational age 34th to 38th, (d) not being diagnosed with chronic illnesses (Type 1 and Type 2 Diabetes Mellitus, renal failure, epilepsy, hypertension etc.), depression or any other psychiatric disease before, (e) voluntary participation in the research. In addition to these inclusion criteria, the special conditions were (f) not having any other pregnancy complication apart from GDM for GDM group and (g) not having any pregnancy complication for the non-GDM group.

2.2. Measurements

Data were collected by using "Individual Description Form", "Edinburgh Postpartum Depression Scale (EPDS)" and "Breastfeeding Self-Efficacy Scale (BSES) – Short Form".

"Individual Description Form": The form prepared by the researcher using the literature (5,9,10,14,22) which was composed of antenatal and postpartum period description form. This form contains 23 questions related to socio-demographic and obstetrics characteristics and breastfeeding conditions of the women.

"Edinburgh Postpartum Depression Scale (EPDS)": The scale developed by Cox et al. (26) is used to determine both the antenatal and postpartum depression risk (26,27). This is a self-evaluation Likert type scale composed of ten questions. Turkish reliability and validity of the scale was performed by Engindeniz (28) in 1996. The cut-off score of the scale was stated to be 12-13 and the individuals getting the score of 12 and above were evaluated as a risk group. Cronbach's alpha value was found as 0.79 in the reliability and validity study of Engindeniz (28) In this study, Cronbach alpha value was determined as 0.78 in the antenatal and postpartum period.

"Breastfeeding Self-Efficacy Scale (BSES) – Short Form": This five-point Likert type scale was developed by Dennis and Faux (15) and composed of 14 items that evaluates how competent the mother feel about breastfeeding. The lowest score that can be obtained from the scale is 14 while the highest score is 70 and an increase in scores denotes that breastfeeding self-efficacy is higher. The scale is suitable to use in the postpartum period but it can also be used in antenatal period by using the "future tense" in the items of the scale (15,29). Cronbach alpha value of the scale was found as 0.94 by Dennis and Faux and 0.86 by Aluř Tokat and Okumuř who performed its Turkish reliability and validity (30). In this study, Cronbach alpha's value was found as 0.84 for Antenatal Breastfeeding Self-Efficacy Scale and 0.74 for Postpartum Breastfeeding Self-Efficacy Scale.

2.3. Data Collection

Data were collected by the first researcher from pregnant women, who came for routine control, in the Non-Stress Test polyclinic in the hospital. The researcher regularly went to the hospital two days a week to collect data. Women in both groups were followed up two times. The first follow-up was performed face-to-face in the gestational age 34th to 38th and the second one was performed by telephone in the 8th week of the postpartum period. In the first follow-up, 104 women with GDM and 133 non-GDM women were asked to fill Antenatal Description Form, EPDS, and Antenatal BSES-Short Form. In the second follow-up, 74 women with GDM and 103 non-GDM women were reached by telephone and they were asked to fill Postpartum Description Form, EPDS, and Postpartum BSES-Short Form. In the second follow-up, 30 women could not be reached in both groups (Figure 1).

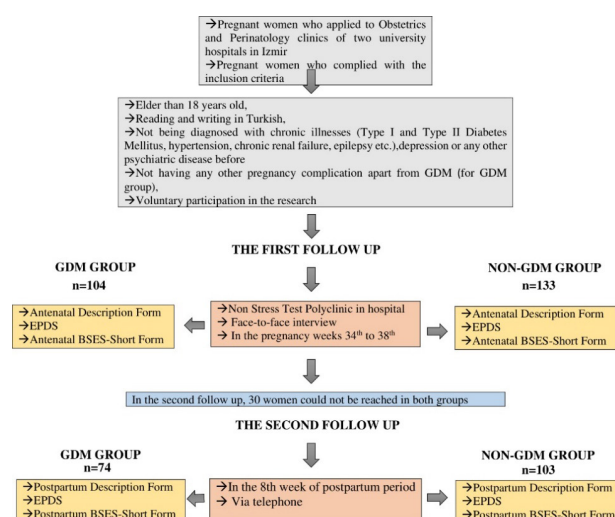


Figure 1. Flow diagram of the research process

2.4. Data Analysis

The data were analyzed by using SPSS 25 (IBM Corp. Released in 2017. IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp.). All values were presented as mean±standard deviation, percent, and frequencies. Repeated measures of analysis of variance were analyzed by Mauchly's sphericity test and Box's Test of Equality of Covariance Matrices. "Repeated Measurements Analysis of Variance" was used to compare the means of repeated measurements. If parametric tests (factorial design for repeated measures analysis) did not provide the preconditions, Greenhouse-Geisser (1959) correction or Huynh-Feldt (1976) correction was used for corrections to the "Degrees of Freedom" or "Friedman Test". "The Corrected Bonferroni Test" was used for multiple comparisons. Variables were evaluated after controlling for normality and homogeneity of variances with the "Shapiro Wilk and Levene Test". "Pearson Correlation Coefficient" was used for the relationship between continuous variables, and "Fischer's Exact Test" and "Chi-square Test" were used for categorical data. p values < 0.05 were considered statistically significant.

2.5. Ethical Considerations

Ethical approval was obtained from the "Non-Interventional Clinical Research Ethics Committees" of both universities in which the study was performed (Date: 26.05.2016, Decision No: 129; Date: 26.01.2017, Decision No: 2). Written consent was provided by participants and hospitals where the study was conducted.

3. RESULTS

The descriptive characteristics of the women are shown in Table 1. The mean age ($t=3.905$; $p=0.001$), number of pregnancies ($\chi^2=6.684$; $p=0.035$) and the rate of GDM history in previous pregnancies ($\chi^2=13.336$; $p=0.001$) were higher for the mothers with GDM compared to non-GDM mothers.

The mothers' with GDM education level ($\chi^2=9.963$; $p=0.019$) and social supports ($\chi^2=5.090$; $p=0.024$) were lower and breastfeeding in postpartum ($\chi^2=15.928$; $p=0.001$) started later (Table 1).

The depression risk for the mothers with GDM was 39.4% in the antenatal period and 27% in the postpartum period while these rates were 30.8% and 19.4% respectively in the non-GDM mothers and the difference was not statistically significant (Table 2).

No significant difference was found between the mean scores of depression and breastfeeding self-efficacy in the antenatal and postpartum period in the women by the presence of GDM. Including the age and BMI as covariance, there was no significant difference between the mean scores of depression and breastfeeding self-efficacy in the antenatal and postpartum period by the presence of GDM (Table 3).

The mean scores of depression and breastfeeding self-efficacy in antenatal and postpartum period of women by the presence of GDM and some variables were given in Table 4. No statistically significant difference between antenatal and postpartum periods in the mean scores of depression and breastfeeding self-efficacy according to the presence of GDM and type of birth, GDM history in previous pregnancy, presence of social support and planned pregnancy. In the presence of GDM and parity model, there was a statistically significant difference between the mean scores of antenatal and postpartum depression while no significant difference was found between the mean scores of breastfeeding self-efficacy (Table 4).

The higher the breastfeeding self-efficacy level of mothers with GDM both in the antenatal ($r=-0.248$; $p=0.033$) and postpartum period ($r=-0.392$; $p=0.001$), the lower their depression risk became. No correlation was found in non-GDM mothers in the antenatal period while the higher the breastfeeding self-efficacy in the postpartum period ($r=-0.351$; $p=0.001$) resulted in the lower the depression risk (Table 5).

Table 1. Descriptive characteristics of mothers

Variables	With-GDM (n=74)		Non-GDM (n=103)		Statistical Significance*
	Mean±SD (Min-max)		Mean±SD (Min-max)		
Mean age (year) (Min-max)	31.94±5.96 (19-46)		28.33±6.15 (18-43)		t=3.905 p=0.001
	N	%	n	%	
Education					
Literate	11	14.9	4	3.9	
Primary education	44	59.5	64	62.1	$\chi^2=9.963$ p=0.019
Secondary education	11	14.9	28	27.2	
High education	8	10.8	7	6.8	
Income status**					
Low income	26	35.1	42	40.8	
Equal to income expense	47	63.5	54	52.4	
High income	1	1.4	7	6.8	
Having social support					
Yes	62	83.8	97	94.2	$\chi^2=5.090$ p=0.024
No	12	16.2	6	5.8	
Number of pregnancy					
1	10	13.5	29	28.1	$\chi^2=6.684$ p=0.035
2	20	27.0	30	29.2	
≥3	44	59.5	44	42.7	
Status of planned pregnancy					
Planned	41	55.4	55	53.4	$\chi^2=0.773$ p=0.680
Unplanned but I am grateful	25	33.8	40	38.8	
Unplanned, I do not feel ready	8	10.8	8	7.8	
GDM history in previous pregnancy					
Primigravid/abortion	13	17.6	35	34.0	$\chi^2=13.336$ p=0.001
Yes	12	16.2	3	2.9	
No	49	66.2	65	63.1	
Pre-pregnancy BMI classification**					
Underweight (<18.5)	-	-	11	10.7	
Normal weight (18.5-24.99)	24	32.4	48	46.6	
Pre-obesity (25.00-29.99)	20	27.0	30	29.1	
Obesity (>30)	30	40.5	14	13.6	
Type of birth					
Vaginal birth	18	24.3	33	32.0	$\chi^2=1.249$ p=0.264
Caesarean birth	56	75.7	70	68.0	
Time to start breastfeeding after birth					
15-30 minute	9	12.2	19	18.4	$\chi^2=15.928$ p=0.001
31-60 minute	5	6.7	24	23.3	
61-180 minute	31	41.9	42	40.8	
>180 minute	29	39.2	18	17.5	

Note: *Chi-square test was used.

**Cannot be statistically analyzed because the sample set is less than five

Table 2. The depression risks of mothers in antenatal and postpartum period

Depression Risk (EPDS≥ 12)	With GDM		Non-GDM		Statistical Significance*
	n	%	n	%	
Antenatal Period					
Have risk	41	39.4	41	30.8	$\chi^2=1.906$ $p=0.167$
Not have risk	63	60.6	92	69.2	
Postpartum Period					
Have risk	20	27.0	20	19.4	$\chi^2=1.426$ $p=0.232$
Not have risk	54	73.0	83	80.6	

Note: * Chi-square test was used.

Table 3. EPDS and BSES means of mothers according to the presence of Gestational Diabetes

Variables	With GDM Mean±SD	Non-GDM Mean±SD
Antenatal EPDS	10.28±5.64	10.17±5.03
Postpartum EPDS	7.98±5.16	7.84±5.07
Depression*presence of GDM ^a		$p=0.967$
Depression*presence of GDM ^b		$p=0.779$
Antenatal BSES	60.06±8.71	58.37±9.65
Postpartum BSES	62.09±7.47	60.88±8.83
Self-efficacy*presence of GDM ^c		$p=0.563$
Self-efficacy*presence of GDM ^d		$p=0.661$

Note: Multivariate test was used for statistical analysis.

^aDesign: Intercept + presence of GDM, Within Subjects Design: Depression,

^bDesign: Intercept + Age + BMI + presence of GDM, Within Subjects Design: Depression,

^cDesign: Intercept + presence of GDM, Within Subjects Design: Self-efficacy,

^dDesign: Intercept + Age + BMI + presence of GDM, Within Subjects Design: Self-efficacy

Table 4. EPDS and BSES Means of Mothers According to the Presence of Gestational Diabetes and Some Variables

Variables	EPDS		BSES	
	Antenatal Mean±SE	Postpartum Mean ±SE	Antenatal Mean ±SE	Postpartum Mean ±SE
Parity				
Nulliparous	9.900±1.663	6.600±1.610	57.900±2.883	63.600±2.923
Primiparous	9.950 ±1.176	7.400±1.139	59.350 ±2.038	63.200±2.068
Multiparous	10.523 ±0.793	8.568±0.768	60.886 ±1.374	61.250±1.394
Statistical analysis	depression * presence of GDM * parity ^a $p=0.044$		self-efficacy * presence of GDM * parity ^b $p=0.922$	
Type of birth				
Vaginal birth	10.611±1.254	6.889±1.209	60.056±2.198	63.000±2.191
Caesarean birth	10.179 ±0.711	8.339±0.685	60.071 ±1.246	61.804±1.242
Statistical analysis	depression * presence of GDM * type of birth ^c $p=0.197$		self-efficacy * presence of GDM * type of birth ^d $p=0.898$	
GDM history in previous pregnancy				
Yes	6.833±1.514	8.000±1.488	59.750±2.587	61.667±2.640
No	11.143 ±0.749	8.163±0.737	61.163 ±1.280	62.755±1.306
Statistical analysis	depression * presence of GDM * GDM history ^e $p=0.217$		self-efficacy * presence of GDM * GDM history ^f $p=0.968$	
Having social support				
Yes	9.500±0.646	7.661±0.650	59.790±1.182	62.371±1.183
No	14.333 ±1.468	9.667±1.477	61.500 ±2.687	60.667±2.688
Statistical analysis	depression * presence of GDM * social support ^g $p=0.512$		self-efficacy * presence of GDM * social support ^h $p=0.967$	
Status of planned pregnancy				
Planned	8.463±0.786	6.317±0.781	60.146±1.452	63.000±1.460
Unplanned but I am grateful	11.520 ±1.007	10.000±1.000	61.480 ±1.860	61.080±1.869
Unplanned, I do not feel ready	15.750 ±1.780	10.250±1.768	55.250 ±3.288	60.625±3.304
Statistical analysis	depression * presence of GDM * planned pregnancy ^k $p=0.977$		self-efficacy * presence of GDM * planned pregnancy ^m $p=0.618$	

Note: ^aDesign: Intercept + presence of GDM + parity + presence of GDM * parity, Within Subjects Design: depression

^bDesign: Intercept + presence of GDM + parity+ presence of GDM * parity, Within Subjects Design: self-efficacy

^cDesign: Intercept + presence of GDM + type of birth + type of birth * type of birth, Within Subjects Design: depression

^dDesign: Intercept + presence of GDM + type of birth + type of birth * type of birth, Within Subjects Design: self-efficacy

^eDesign: Intercept + presence of GDM + GDM history + presence of GDM * GDM history, Within Subjects Design: depression

^fDesign: Intercept + presence of GDM + GDM history + presence of GDM * GDM history, Within Subjects Design: self-efficacy

^gDesign: Intercept + presence of GDM + social support + presence of GDM * social support, Within Subjects Design: depression

^hDesign: Intercept + presence of GDM + social support + presence of GDM * social support, Within Subjects Design: self-efficacy

^kDesign: Intercept + presence of GDM + planned pregnancy + presence of GDM * planned pregnancy, Within Subjects Design: depression

^mDesign: Intercept + presence of GDM + planned pregnancy + presence of GDM * planned pregnancy, Within Subjects Design: self-efficacy

Table 5: The correlation between mothers' EPDS and BSES mean

	Variables	Antenatal BSES	Postpartum BSES	Postpartum EPDS
With GDM	Antenatal EPDS	r=-0.248 p=0.033	r=-0.277 p=0.017	r=0.642 p=0.001
	Postpartum EPDS	r=-0.257 p=0.027	r=-0.392 p=0.001	
	Postpartum BSES	r=0.338 p=0.003		
Non-GDM	Antenatal EPDS	r=0.001 p=0.987	r=-0.261 p=0.008	r=0.425 p=0.001
	Postpartum EPDS	r=-0.021 p=0.834	r=-0.351 p=0.001	
	Postpartum BSES	r=0.258 p=0.008		

4. DISCUSSION

In this study, the mean age of women with GDM, the number of pregnancies and the rate of having GDM history in a previous pregnancy were found to be higher compared to non-GDM mothers. Similarly, in other studies, mean age (9,31,32) and the number of pregnancies (9,33,34) in mothers with GDM were found to be higher compared to non-GDM mothers and the difference was significant. As mentioned in the literature, having GDM history in a previous pregnancy was found to be one of the relevant factors that increase the risk of GDM development in future pregnancies (9,35,36). The high mean age of women with GDM can be related to the high prevalence of high-risk pregnancies in advanced maternal age (33,35–38). An increase in the number of pregnancies is also one of the factor that increase the GDM risk (38) and the difference between the mothers with and without GDM by the number of pregnancies is thought to be associated with this condition. Nurses should be aware of these risk factors for GDM and should provide antenatal care to women.

In our study, the depression risk of the mothers with GDM was found higher compared to mothers without GDM in the antenatal and postpartum period; however, the difference was not statistically significant. This result was consistent with some results obtained in the literature (39,40). Similarly, in the study of Beka et al. (41) it was reported that women with GDM were found not to be at higher risk for new-onset mental disorders in pregnancy compared to non-GDM women. In other studies, as different from the result of this research (20,21,42,43), the women with GDM were found to be at higher risk for antenatal and postpartum depression compared to non-GDM women. In the prospective cohort study of Silverman et al. (43), it was determined that individuals with GDM were at risk for 1.7 times more in terms of postpartum depression. In reviewing the literature, it is thought that obtaining different results for both antenatal and postpartum depression risk in women with GDM can be associated with the different cut off score of the scale used in indicating the depression risk, size of sample and

use of different scales. Based on these results, nurses should consider the risk of developing depression in women with GDM.

In this study, in the depression and breastfeeding self-efficacy scores of women by the presence of GDM, no difference was found in terms of the antenatal and postpartum period. The statistical significance did not change when age and BMI values were adjusted. There are few studies in literature related to GDM and breastfeeding self-efficacy. Similar to our study, it was stated that GDM did not have a significant contribution to the development of postpartum depression in the studies (44,45). In other similar studies (41,46), no statistically significant difference was found between the women with and without GDM for all mental disorders during pregnancy and the postpartum period when such characteristics as age and BMI were adjusted and these values were stated not to be associated with depressive symptoms. Contrary to our research result, it was stated in a study (32) that there were significant differences between breastfeeding self-efficacy scores of women with and without GDM. In studies unlike our research result, the women with GDM were stated to be at higher risk for perinatal depression (45,47). It has been established that there is a significant relationship between GDM and depression when age and BMI are adjusted (48) and the women with GDM suffer from antenatal (21) and postpartum depression (49) more.

In the study, no time-dependent difference was ascertained in the depression and breastfeeding self-efficacy scores of the participant mothers by the presence of GDM, type of birth, GDM history in a previous pregnancy, and presence of social support and planned pregnancy. In the presence of the GDM and parity model, a significant difference was found between antenatal and postpartum periods in terms of depression scores. In studies conducted similar to the research result (21,46), low parity in women with GDM affects the frequency of depressive symptoms. In another study being different from the research result (41), a statistically significant difference was not established between the women with and without GDM in terms of all mental disorders during the antenatal and postpartum period when nulliparity was adjusted.

It was determined in the research that the higher the depression risk was both in the antenatal and postpartum period in mothers with GDM, the lower their postpartum breastfeeding self-efficacy was. In previous studies as parallel to the result of this research, a significant and negative relationship was indicated between postpartum breastfeeding self-efficacy and postpartum depression (22,23). In the study of Dennis and McQueen (50), breastfeeding self-efficacy scores of those with the scores BSES >12 are lower than those with the scores BSES <12 in the first week of postpartum. Informing the pregnant women regarding the complications of GDM may cause anxiety, concern, and despair and depression about the pregnancy, which may result in failure of mother to make future plans about her baby. It is thought in this study that depression

and breastfeeding self-efficacy relationship of the pregnant women with GDM in the antenatal period can be associated with these negative thoughts.

5. CONCLUSION

We found that GDM did not have a significant effect on depression and breastfeeding self-efficacy during the antenatal and postpartum period. In terms of some confounding factors, no significant difference was found between the mean scores of depression and self-efficacy in the antenatal and postpartum period by the presence of GDM. It was determined that an increase in the depression risk of mothers with GDM in the perinatal period, negatively affect breastfeeding self-efficacy in postpartum. Early diagnosis of pregnant women by nurses considering the possibility of a relationship between GDM and depression, prediction of the possible risks and their support given to the pregnant women in this regard may contribute to the nursing care. Nurses can reduce the negative breastfeeding outcomes by helping mothers, change their negative emotional inclinations and increasing breastfeeding self-efficacy.

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