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ORIGINAL ARTICLE

Prevalence of postpartum depression after normal vaginal delivery and related variables

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ABSTRACT

Objective: This study aimed to determine the prevalence of postpartum depression (PPD) in mothers after normal vaginal delivery (NVD) and to identify associated risk factors.

Material and Methods: Two hundred post-NVD mothers participated in this cross-sectional study. The Edinburgh Postnatal Depression Scale (EPDS; cutoff ≥13) and sociodemographic information were used. The chi-square test or Fisher's exact test was applied to assess categorical variables, while the Mann–Whitney U test and independent samples t-test were used to compare continuous variables. Logistic regression was performed to identify predictors of postpartum depression; $p<0.05$ was considered statistically significant.

Results: The prevalence of PPD was 15% (n=30). Logistic regression revealed a significantly higher risk of PPD among mothers with comorbidities (OR=21.0), unplanned pregnancies (OR=83.5), smoking (OR=27.6), lack of a companion (OR=35.8), obstetric complications (OR=31.7), and formula use (OR=17.8) (all $p<0.001$).

Conclusion: PPD is a significant public health concern among mothers after NVD and is strongly associated with specific risk factors. Routine PPD screening and targeted support are crucial for mothers with these risk factors.

Keywords: Edinburgh postpartum depression scale, normal vaginal delivery, postpartum depression, risk factors.

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INTRODUCTION

Pregnancy is an important period in a woman's life that requires physiological, psychological, and social changes, as well as adaptation to these changes. The changes that occur before and after birth may cause pregnant women to experience various problems and may negatively affect their health. For some mothers, emotional problems may arise, the most common and challenging of which is depression. Postpartum depression (PPD), which occurs through the interaction of depressive symptoms, anxiety, and increased irritability, is an important public health problem that affects the quality of life of new mothers, with a reported incidence of 17.2% worldwide, 27% in Middle Eastern countries, and 23.8% in Türkiye.[1–3]

The postpartum period, which is typically defined as the time from birth until the reproductive organs return to their pre-pregnancy state, is critical for both the mother and the child. Factors such as hormonal changes in the mother, breast milk production, postpartum pain, and neonatal care can lead to significant physiological and psychological changes.[4] These multifaceted changes make women particularly vulnerable to mental health disorders, with anxiety and depression emerging as the most common comorbidities.[5]

Postpartum depression is included among mood disorders in the DSM-IV and is defined by the "postpartum onset" specifier. Some studies have reported that it may occur at any time between 6–12 weeks postpartum and up to one year after delivery. Postpartum depression (PPD) is characterized by the presence of five or more diagnostic criteria for at least two weeks. These include insomnia or hypersomnia, psychomotor agitation or retardation, fatigue, feelings of guilt or sadness, changes in appetite, decreased concentration, and suicidal ideation. According to the DSM, PPD is classified as a non-psychotic major depressive disorder.[6]

Many scales have been used to screen for postpartum depression. One of the most widely used and reliable screening tools for identifying women at risk of postpartum depression is the Edinburgh Postpartum Depression Scale (EPDS).[7,8] Although the EPDS is not a diagnostic instrument, a cutoff score of ≥13 has been reported to yield a sensitivity of 61.5% and a specificity of 77.4%.[9]

Inadequate rest, malnutrition, smoking, multiparity, exposure to violence or abuse by healthcare providers, a psychiatric history such as depression or anxiety, stressful life events including financial difficulties, relationship problems or the loss of a loved one, as well as difficult or traumatic childbirth experiences, may complicate both physical and psychological recovery and increase vulnerability to depression.[10,11] These findings underscore the need for targeted support during the postpartum period. Healthcare providers should proactively screen women for postpartum depression during both antenatal and postnatal visits. Depression may become chronic, recurrent, and/or treatment-resistant, and women who receive inadequate care are at increased risk of the consequences of untreated emotional illness, including suicide, which accounts for approximately 20% of postpartum maternal deaths.[12–15]

In light of these data, the present study aimed to determine the impact of the birth process and a postpartum follow-up care program on postpartum depression in a redesigned mother-friendly hospital, and to evaluate its role in the prevention and management of postpartum depression by identifying high-risk groups.

MATERIAL AND METHODS

This study was conducted using a cross-sectional design at a tertiary care institution between January 2025 and March 2025.

Study Population and Sample

The study population consisted of all mothers who had a normal vaginal delivery at Gazi Yaşargil Training and Research Hospital between January 2025 and March 2025. A total of 200 mothers who met the inclusion criteria and signed an informed consent form constituted the study sample. The inclusion criteria were as follows: having undergone a normal vaginal delivery, being 6–8 weeks postpartum, having the ability to read and speak Turkish, and agreeing to participate in the study by signing an informed consent form. The exclusion criteria included cesarean delivery, the presence of a physical or pre-existing psychiatric disorder, mental disability or difficulty in communication, and fetal anomalies.

Data Collection Tools

The following tools were used in the data collection process:

1. ***Sociodemographic Information Form***

   This form was developed by the researchers based on a review of the relevant literature and expert opinions. It included sociodemographic and obstetric characteristics such as age, height, weight, body mass index (BMI), education level, presence of comorbidities, pregnancy planning status, smoking and alcohol use, use of assisted reproductive techniques, mode of delivery, presence of a companion during delivery, access to healthcare personnel, use of epidural analgesia, previous history of depression, development of complications during pregnancy or delivery, breastfeeding status, and formula use.

2. ***Edinburgh Postpartum Depression Scale (EPDS)***

   This scale was developed by Cox et al.[16] and later adapted into Turkish to ensure its validity and reliability. The EPDS consists of 10 items designed to identify depressive symptoms in women after childbirth. Each item is scored from 0 to 3, yielding a total score ranging from 0 to 30. In this study, a cutoff score of ≥13, which is widely accepted in the literature, was used to identify individuals at risk for postpartum depression (PPD).

Data Collection Process

Data were collected through face-to-face interviews conducted by the researchers during outpatient clinic visits at 6–8 weeks postpartum. The purpose and importance of the study were explained to the participants, and voluntary participation was emphasized. The sociodemographic information form and the EPDS were administered to mothers who provided written informed consent. Completion of the questionnaires took approximately 15–20 minutes.

Ethical Considerations

This study was approved by the Ethics Committee of University of Health Sciences, Gazi Yaşargil Training and Research Hospital

(Decision No: 361, Date: 28.02.2025). The study was conducted in accordance with the principles of the Declaration of Helsinki. Participants were informed about confidentiality and anonymity, and it was stated that the data would be used solely for research purposes.

Statistical Analysis

Descriptive statistics were expressed as mean, standard deviation, median, and minimum–maximum values for continuous variables, and as frequencies (n) and percentages (%) for categorical variables. The Kolmogorov–Smirnov test was used to assess normality of data distribution. The independent samples t-test was applied when normality assumptions were met, while the Mann–Whitney U test was used for non-normally distributed data when comparing two groups. The chi-square test or Fisher's exact test, as appropriate, was used to evaluate associations between categorical variables. Logistic regression analysis was performed to identify factors associated with postpartum depression. A $p<0.05$ was considered statistically significant. All statistical analyses were performed using IBM SPSS Statistics version 25.

RESULT

The mean age of the 200 mothers who participated in the study was 27.83±5.73 years (median=27, min=18, max=42), and the mean BMI was 27.21±4.43 (median=27.18, min=16.55, max=40.16). The mean number of children was 2.50±1.41 (median=2, min=1, max=7).

The mean Edinburgh score was 9.37±4.75 (median=10, min=0, max=26). Of the total 200 patients, 15% (n=30) had depression; 41.5% (n=83) were overweight; 41% (n=82) were primary school graduates; and 4% (n=8) had comorbidities. Pregnancy was planned in 89.5% (n=179) of patients; 85.5% (n=171) were non-smokers; none of the patients (n=200) used alcohol; 99% (n=198) had not used assisted reproductive techniques; and all patients (n=200) had a normal vaginal delivery. A total of 85.5% (n=171) had a companion during delivery; 97% (n=194) had access to health personnel; 77% (n=154) did not receive epidural anesthesia; 94.5% (n=189) had no prior history of depression; 91.5% (n=183) had no complications; 96% (n=192) breastfed their infants; and 93.5% (n=187) did not use formula.

Table 1 shows the sociodemographic characteristics of patients with and without postpartum depression according to the EPDS. The proportion of patients with comorbidities was significantly higher among patients with depression (20%) than among those without depression (1.2%) ($p<0.001$). The proportion of planned pregnancies was significantly lower in patients with depression (40.0%) than in those without depression (98.2%) ($p<0.001$). The proportion of smokers among patients with depression (63.3%) was significantly higher than among patients without depression (5.9%) ($p<0.001$). The proportion of patients with depression who had a companion during delivery (33.3%) was significantly lower than that of patients without depression (94.7%) ($p<0.001$). The proportion of patients with a history of depression was significantly higher in those with depression (36.7%) than in those without depression (0.0%) ($p<0.001$). The proportion of patients with complications was significantly higher among patients with depression (43.3%) than among those without depression (2.4%) ($p<0.001$). The proportion of breastfeeding among patients with depression (73.3%) was significantly lower than among patients without depression (100%) ($p<0.001$). The proportion of formula use in patients with depression (30.0%) was significantly higher than among patients without depression (2.4%) ($p<0.001$).

Despite these findings, no significant relationship was observed between depression and the use of assisted reproductive techniques, access to health personnel, or epidural anesthesia ($p>0.05$).

Table 2 presents the sociodemographic characteristics of patients with and without the possibility of a postpartum depression diagnosis according to the EPDS, analyzed as continuous variables. No significant differences were found between groups in terms of the variables listed in Table 2 ($p>0.05$).

Table 3 shows the evaluation of variables associated with postpartum depression using logistic regression analysis. The probability of being diagnosed with postpartum depression was 21 times higher in mothers with comorbidities than in those without comorbidities ($p<0.001$; 95% CI: 4.007–110.057). The probability of postpartum depression was 83.5 times higher in mothers whose pregnancy was unplanned compared with those whose pregnancy was planned ($p<0.001$; 95% CI: 21.531–323.829). The probability of postpartum depression was 27.636 times higher in mothers who smoked than in non-smokers ($p<0.001$; 95% CI: 10.377–73.604). The likelihood of postpartum depression was 35.778 times higher in mothers without a companion during delivery than in those with a companion ($p<0.001$; 95% CI: 12.987–98.563). Mothers with complications were 31.735 times more likely to be diagnosed with postpartum depression than those without complications ($p<0.001$; 95% CI: 9.306–108.224). The probability of postpartum depression was 17.786 times higher in mothers who used formula than in those who did not ($p<0.001$; 95% CI: 5.034–62.843).

DISCUSSION

This study investigated the prevalence of postpartum depression (PPD) and associated factors in a cohort of 200 mothers who underwent normal vaginal delivery. Our findings revealed a PPD prevalence of 15% using the Edinburgh Postnatal Depression Scale (EPDS) cutoff score of ≥13, which is lower than the reported rates in Türkiye (23.8%) and the Middle East (27%) but within the global range of 17.2%.[17,18] This variation in prevalence may be attributed to differences in screening tools, cultural contexts, and specific characteristics of the study populations.

Our analysis identified several significant personal factors associated with an increased risk of PPD. Mothers with pre-existing medical conditions were 21 times more likely to experience PPD. This finding aligns with previous research indicating that physical health comorbidities can exacerbate physiological and psychological stressors during the postpartum period.[19] Unplanned pregnancy significantly increased the risk of PPD by 83.5 times, which is consistent with studies suggesting that unplanned pregnancies are associated with increased stress, lower social support, and poorer mental health outcomes in mothers.[20]

Furthermore, current smoking was found to increase the odds of PPD by more than 27-fold. This strong association corroborates existing evidence highlighting the detrimental effects of nicotine and other substances on maternal mental health during the postpartum period.[14] The absence of a companion during the postpartum period was also identified as a significant risk factor, with mothers lacking

Table 1: Sociodemographic characteristics of the subjects with and without the possibility of receiving a diagnosis of postpartum depression according to EPDS analyzed as categorical variables

	Depression no (n=170)		Depression yes (n=30)		Toplam (n=200)		p
	n	%	n	%	n	%	
BMI[a]							NA
Weak	2	1.2	1	3.3	3	1.5	
Normal	53	31.2	13	43.3	66	33.0	
Overweight	75	44.1	8	26.7	83	41.5	
I. degree obese	31	18.2	7	23.3	38	19.0	
II. degree obese	7	4.1	1	3.3	8	4.0	
III. degree obese	2	1.2	0	0.0	2	1.0	
Education level[a]							NA
No	14	8.2	0	0.0	14	7.0	
Primary school	65	38.2	17	56.7	82	41.0	
Middle school	42	24.7	9	30.0	51	25.5	
High school	37	21.8	2	6.7	39	19.5	
University	12	7.1	2	6.7	14	7.0	
Comorbidity*							<0.001
No	168	98.8	24	80.0	192	96.0	
Yes	2	1.2	6	20.0	8	4.0	
Planned pregnancy*							<0.001
Yes	167	98.2	12	40.0	179	89.5	
No	3	1.8	18	60.0	21	10.5	
Smoking*							<0.001
No	160	94.1	11	36.7	171	85.5	
Yes	10	5.9	19	63.3	29	14.5	
Alcohol using[a]							NA
Yes	170	100.0	30	100.0	200	100.0	
No	–	–	–	–	–	–	
Assisted reproductive technique*							0.278
No	169	99.4	29	96.7	198	99.0	
Yes	1	0.6	1	3.3	2	1.0	
Mode of delivery[a]							NA
Nvb	170	100.0	30	100.0	200	100.0	
Cs	–	–	–	–	–	–	
Patient with companion*							<0.001
Yes	161	94.7	10	33.3	171	85.5	
No	9	5.3	20	66.7	29	14.5	
Access to healthcare personel*							0.222
Yes	166	97.6	28	93.3	194	97.0	
No	4	2.4	2	6.7	6	3.0	

Table 1 (cont): Sociodemographic characteristics of the subjects with and without the possibility of receiving a diagnosis of postpartum depression according to EPDS analyzed as categorical variables

	Depression no (n=170)		Depression yes (n=30)		Toplam (n=200)		p
	n	%	n	%	n	%	
Epidural anasthesia**							0.145
Yes	36	21.2	10	33.3	46	23.0	
No	134	78.8	20	66.7	154	77.0	
Lifetime history of depression*							<0.001
No	170	100.0	19	63.3	189	94.5	
Yes	0	0.0	11	36.7	11	5.5	
Complication*							<0.001
No	166	97.6	17	56.7	183	91.5	
Yes	4	2.4	13	43.3	17	8.5	
Current Breastfeeding status*							<0.001
Yes	170	100.0	22	73.3	192	96.0	
No	0	0.0	8	26.7	8	4.0	
Formula use*							<0.001
No	166	97.6	21	70.0	187	93.5	
Yes	4	2.4	9	30.0	13	6.5	

a: NA (Not Applicable): Chi-Square test assumptions were not met due to low expected cell counts.*: Fisher's Exact test; **: Chi-Square Test. EPDS: Edinburgh Postnatal Depression Scale; BMI: Body mass index.

Table 2: Sociodemographic characteristics of the subjects with and without the possibility of receiving a diagnosis of postpartum depression according to EPDS analyzed as continuous variables

	Depression no (n=170)	Depression yes (n=30)	Total (n=200)	p
Age mother*				0.317
Mean±SD	27.65±5.64	28.80±6.23	27.83±5.73	
Median (min-max)	27.00 (18–42)	29.00 (18–42)	27.00 (18–42)	
BMI**				0.281
Mean±SD	27.35±4.34	26.40±4.86	27.21±4.43	
Median (min-max)	27.25 (17.65–40.16)	26.31 (16.55–36.79)	27.18 (16.55–40.16)	
Parity*				0.486
Mean±SD	2.46±1.39	2.67±1.49	2.49±1.41	
Median (min-max)	2.00 (1–7)	2.00 (1–6)	2.00 (1–7)	

*: Mann Whitney test; **: Independent samples t test. SD: Standard deviation; BMI: Body mass index.

support being nearly 36 times more likely to develop PPD. This finding underscores the critical role of social support in buffering postpartum psychological distress.[21]

Consistent with the established literature, a history of prior depression emerged as a critical predictor of PPD. This finding was particularly striking in our cohort: while more than one-third

Table 3: Logistic regression analysis of the data found significant by Chi-Square Test

Variable	Odds ratio	%95 CI	p
Comorbidity			
No	Reference		
Yes	21.000	4.007–110.057	<0.001
Planned pregnancy?			
Yes	Reference		
No	83.500	21.531–323.829	<0.001
Smoking			
No	Reference		
Yes	27.636	10.377–73.604	<0.001
Patient with companion			
Yes	Reference		
No	35.778	12.987–98.563	<0.001
Lifetime history of depression[a]			
No	Reference		NA
Yes	–	–	
Complication			<0.001
No	Reference		
Yes	31.735	9.306–108.224	
Current breastfeeding status[b]			
Yes	Reference		NA
No	–	–	
Formula using*			
No	Reference		<0.001
Yes	17.786	5.034–62.843	

a: NA (Not Applicable): Analysis could not be performed due to zero cases in the reference group (no history of depression in the non-PPD group);
b: NA (Not Applicable): Analysis could not be performed as all patients in the non-PPD group were breastfeeding. *: Fisher's exact test. CI: Confidence interval.

(36.7%) of mothers with PPD had a history of depression, none of the mothers in the non-PPD group reported such a history (0%). Although this complete separation precluded inclusion of this variable in the final regression model, this pronounced difference represents an important clinical warning sign. It strongly reinforces the necessity of thorough screening for past and current mental health conditions during antenatal care to identify and support high-risk individuals.[22] Moreover, the presence of complications during pregnancy or delivery increased the likelihood of PPD by nearly 32 times, suggesting that adverse obstetric events may have a substantial impact on maternal mental well-being.[23]

Interestingly, mothers who used formula were almost 18 times more likely to develop PPD than those who did not. Although causality cannot be inferred due to the cross-sectional design of the study, this association may reflect the emotional distress and challenges experienced by mothers with breastfeeding difficulties, which may lead to formula supplementation and an increased risk of PPD. In contrast, exclusive breastfeeding has been associated with hormonal benefits and enhanced mother–infant bonding, potentially offering a protective effect against PPD.[15]

In contrast to some previous studies, no significant association was observed between PPD and factors such as access to healthcare professionals or the use of epidural anesthesia. The lack of association with healthcare access may be explained by the relatively high level of access within the study population. Similarly, the absence of a significant relationship between epidural anesthesia and PPD is consistent with recent evidence suggesting that the method of pain relief during labor may not be a primary determinant of postpartum depression.[24]

Strengths and Limitations

This study benefited from a well-defined sample of mothers who underwent normal vaginal delivery and from a comprehensive

assessment of a wide range of sociodemographic and obstetric factors. However, the cross-sectional design limits the ability to establish causal relationships or determine the temporal sequence of events. In addition, reliance on self-reported data obtained via the EPDS, although a validated screening tool, does not constitute a clinical diagnosis of postpartum depression (PPD). Future longitudinal studies with larger and more diverse samples, incorporating structured clinical interviews, are needed to further elucidate the complex interplay of factors contributing to PPD in this population.

Additionally, the logistic regression analysis yielded some notably high odds ratios with wide confidence intervals (e.g., unplanned pregnancy, OR=83.5). Although these findings indicate strong associations, their magnitude should be interpreted with caution. This statistical instability is likely related to the skewed distribution of cases within certain subgroups. For example, the small number of participants with a specific risk factor in the non-depressed group (e.g., only three women with an unplanned pregnancy) compared with the depressed group may mathematically result in inflated odds ratios and wider confidence intervals.

Implications for Practice and Research

Our findings underscore the importance of targeted interventions for women at higher risk of PPD, including those with pre-existing medical conditions, unplanned pregnancies, a history of smoking or depression, lack of social support, and obstetric complications. Healthcare providers should implement routine screening for PPD during both prenatal and postnatal visits and ensure appropriate support and referral mechanisms. Furthermore, promoting pregnancy planning, encouraging social support networks, and providing comprehensive breastfeeding support may contribute to lower rates of PPD.

Future studies should explore the underlying mechanisms driving these associations and develop culturally appropriate strategies for the effective prevention and treatment of postpartum depression. In addition, the relatively low prevalence of PPD observed in this study warrants further investigation. Comparative studies evaluating the impact of specific healthcare delivery models, such as the “Mother-Friendly Hospital” initiative implemented in our institution, on maternal mental health outcomes may provide valuable insights.

CONCLUSION

This study identified a 15% prevalence of postpartum depression among mothers who underwent normal vaginal delivery and demonstrated significant associations with key personal risk factors, including pre-existing medical conditions, unplanned pregnancy, smoking, lack of a companion, history of depression, and obstetric complications. These findings highlight the importance of routine PPD screening and targeted supportive interventions for the early identification and management of at-risk mothers. Overall, this study provides valuable evidence to support the development of mother-centered healthcare services that prioritize the psychological well-being of women during the postpartum period.

Statement

Ethics Committee Approval: The University of Health Sciences, Gazi Yaşargil Training and Research Hospital Ethics Committee granted approval for this study (date: 28.02.2025, number: 361).

Informed Consent: Informed consent was obtained from the patients.

Conflict of Interest: The authors declare that there is no conflict of interest.

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