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# The relationship between mode of delivery and postpartum depression

Leyla Kaya, Zerrin Çiğdem<sup>1</sup>

## Abstract:

**PURPOSE:** Postpartum period is a critical interval in which the woman is under risk for psychiatric disorders including postpartum depression (PD). This study was performed to investigate the impact of the mode of delivery on the occurrence of PD in primiparous mothers.

**MATERIALS AND METHODS:** This correlational study was performed on 244 primiparous women (aged 15–49 years) in 17 primary health-care centers. Sociodemographic, obstetric, and PD-related data were gathered using questionnaires and the Edinburgh Postnatal Depression Scale (EPDS) on the 1<sup>st</sup> and 3<sup>rd</sup> months after delivery. The questionnaires were administered to all primiparous mothers who were registered to the relevant health-care center. Questionnaires were administered by the researcher for 25–30 min with face-to-face interview technique.

**RESULTS:** Comparison of EPDS scores on the 1<sup>st</sup> and 3<sup>rd</sup> months indicated that there was a remarkable decline over time ( $Z = 11.112$ ,  $P = 0.001$ ). There was an inverse association between educational level and EPDS scores on the 3<sup>rd</sup> month ( $P = 0.037$ ). On the other hand, no significant relationship was detected between age groups, occupation, income, place of accommodation, and EPDS scores. Evaluation of the relationship between obstetric features and EPDS scores revealed that desired and performed modes of delivery, induction, episiotomy, and spinal anesthesia were not linked with EPDS scores. The postpartum behavior ( $\chi^2 = 10.315$ ;  $P = 0.035$ ) and feeding method of infants ( $\chi^2 = 6.109$ ;  $P = 0.013$ ) were associated with EPDS scores on the 1<sup>st</sup> month, but not with EPDS scores on the 3<sup>rd</sup> month.

**CONCLUSION:** Effective measures must be established for early recognition of factors affecting the occurrence of PD. Health planners and policymakers must spend their efforts for promotion of the knowledge and attitudes of mothers during pregnancy. Identification of factors for PD necessitates implementation of multicentric, controlled trials on larger series.

## Keywords:

Cesarean section, delivery, labor, postpartum depression, pregnancy

Department of Nursery,  
Zeynep Kamil Maternity  
and Childrens Training  
and Research Hospital,  
Istanbul, <sup>1</sup>Department of  
Nursery, Institute of Health  
Sciences, Hasan Kalyoncu  
University, Gaziantep,  
Turkey

## Address for correspondence:

Ms. Leyla Kaya,  
Ph. D. Student of Midwifery,  
Faculty of Health Sciences,  
University of Health  
Sciences, İstanbul, Turkey.  
E-mail: leylakaya02@  
hotmail.com  
Assist. Prof. Dr. (Ph.D),  
Ms. Zerrin Çiğdem,  
Department of Nursery,  
Institute of Health  
Sciences, Hasan Kalyoncu  
University, Gaziantep,  
Turkey.  
E-mail: zercigdem@gmail.  
com

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## Introduction

Postpartum depression (PD) has become the most frequent complication of childbirth, especially in developed countries. Its prevalence has been estimated as 10%–15% and its formation is affected by several factors such as lack of social support, previous history of depression, and personal vulnerability.<sup>[1]</sup> PD is characterized by tearfulness, despondency, emotional lability, feelings of guilt and inadequacy, lack of appetite, suicidal thoughts, disturbance

of sleep, poor concentration and memory, fatigue, and irritability.<sup>[2]</sup> PD can be detected at any time during the 1<sup>st</sup> year after delivery.

The prevention of PD is not always possible; however, health professionals may aid in the recognition and elimination of risk factors. The most frequently reported risk factors involve an early history of depression, history of psychiatric illness, depression during pregnancy, lack of social support, and recent life stresses. Moreover, the delivery of a female infant and grand multiparity have been reported as risk factors in some countries.<sup>[3,4]</sup> The mode of delivery has been postulated as a risk

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factor for PD; however, there is substantial controversy in reports published on this topic.<sup>[5-9]</sup> Josefsson *et al.* have expressed that there was no relationship between the type of delivery and incidence of PD.<sup>[5]</sup> Hung demonstrated that delivery method has no correlation with postpartum psychiatric disorders.<sup>[6]</sup> Adewuya *et al.* concluded that vaginal delivery by using tools or cesarean section (CS) is among the major factors in the incidence of PD.<sup>[7]</sup> Fisher *et al.* stated that CS could be related to the incidence and severity of symptoms of PD.<sup>[8]</sup> Chaaya *et al.* stated that the incidence of PD has been greater in women with vaginal delivery compared with those who had undergone CS.<sup>[9]</sup>

Identification of the risk factors for PD is important for selection of the appropriate mode of delivery. Training for determination of the type of delivery and its complications is an important responsibility of planners and health-care providers to promote the knowledge and attitudes of mothers. In order to eliminate the controversies of delivery type, it is important to establish the principles and to guide the attitudes of mothers' for the best course of action. Our aim was to investigate whether there is an association between the mode of delivery and occurrence of PD.

## Materials and Methods

### Study design

This correlation study was implemented in 17 health-care centers in the city of Batman between January 2014 and April 2014. The approval of the local Institutional Review Board was obtained prior to the study and all participants gave informed consent.

The questionnaires were administered to all primiparous mothers who were registered to the relevant health-care center. Questionnaires were administered by the researcher for 25–30 min with face-to-face interview technique.

A total of 244 mothers aged 15–49 years who volunteered for participation in this study were included in the study. Unwillingness for participation and illiteracy were exclusion criteria.

Data were collected using a questionnaire that comprised of three sections including questions for sociodemographic, obstetric, and PD-related issues. The third section focusing on PD was comprised of the Edinburgh Postnatal Depression Scale (EPDS), which is a self-report scale designed to detect and screen PD.<sup>[10]</sup> The EPDS has been validated in Turkish population and its validity and reliability were found to be adequate.<sup>[11]</sup> The questions are related with the mood (eight items) and anxiety (two items), and

each item is rated on a 4-point scale (range: 0–3). The EPDS has been applied to participants at the 1<sup>st</sup> and 3<sup>rd</sup> months postpartum. The validation study revealed that an EPDS score >12 was consistent with depression.<sup>[11]</sup> These patients were referred to the second stage for further evaluation and management. The EPDS score ranges between 0 and 30, while the cutoff point was 12.<sup>[11]</sup> The patients with EPDS score >12 were referred to secondary care centers since they were under higher risk for PD. The sensitivity and specificity of EPDS were reported as 0.85 and 0.77, respectively.<sup>[10]</sup> The EPDS was developed to determine the depressive mood, anxiety, and difficulty of sleep.<sup>[12]</sup> Results support use of the EPDS as a screening tool for PD in this population.<sup>[13,14]</sup> The data were collected by administration of the questionnaire at the end of 1<sup>st</sup> and 3<sup>rd</sup> months. The interviews were performed in a silent room and attention was paid for maintenance of the privacy of patients. The first, second, and third chapters of the questionnaire used in this study consisted of 23, 19, and 10 items, respectively.

### Statistical analysis

Analysis of data was performed using the Statistical Package for the Social Sciences version 15.0 (SPSS Inc., Chicago, Illinois, USA). Normal distribution of variables was tested with Kolmogorov–Smirnov test. Wilcoxon signed rank test was used for qualitative variables without normal distribution. Comparative analysis of quantitative variables was performed with Pearson Chi-square test. Patients with EPDS scores >12 were assumed to be under increased risk for PD. Confidence interval was 95% and  $P < 0.05$  was considered statistically significant.

## Results

The average age of participants was  $23.32 \pm 4.07$  years (range: 18–37 years). The mode of delivery was vaginal in 164 (67.2%) patients and CS in 80 (32.8%) women.

Patients who had high EPDS scores at the end of 1<sup>st</sup> and 3<sup>rd</sup> months were 100 (41%) and 13 (5.3%), respectively. No significant association was observed between the risk of depression and EPDS scores on the 1<sup>st</sup> ( $P = 0.827$ ) and 3<sup>rd</sup> months ( $P = 0.291$ ).

The average age at first marriage was  $21.49 \pm 3.87$  years (range: 16–34). The mean duration of marriage was  $2.01 \pm 1.64$  years (range: 1–7). The majority of pregnancies were planned (78.3%,  $n = 191$ ), and only 2% ( $n = 5$ ) of pregnant women were diagnosed for a health problem during pregnancy. The preferences of patients for the mode of delivery were vaginal (80.7%,  $n = 191$ ) and CS (4.1%,  $n = 10$ ).

Table 1 demonstrates the average EPDS scores and Cronbach's  $\alpha$  values at the end of the 1<sup>st</sup> (0.95) and 3<sup>rd</sup> months (0.83). Comparison of EPDS scores on the 1<sup>st</sup> and 3<sup>rd</sup> months indicated that there was a remarkable decline over time ( $Z = 11.112, P = 0.001$ ).

Analysis of sociodemographic parameters yielded that there was a significant difference between EPDS values of mothers on the 1<sup>st</sup> ( $\chi^2 = 7.659; P = 0.054$ ) and 3<sup>rd</sup> months ( $\chi^2 = 8.509; P = 0.037$ ) with various educational backgrounds [Table 2]. There was an inverse association between educational level and EPDS scores both on the 3<sup>rd</sup> month ( $P = 0.037$ ). On the other hand, no significant relationship was detected between age groups, occupation, income, place of accommodation, and EPDS scores.

Evaluation of the relationship between obstetric features and EPDS scores revealed that desired and performed modes of delivery, induction, episiotomy, and spinal anesthesia were not linked with EPDS scores [Table 3].

The postpartum behavior ( $\chi^2 = 10.315; P = 0.035$ ) and feeding method of infants ( $\chi^2 = 6.109; P = 0.013$ ) were associated with EPDS scores on the 1<sup>st</sup> month, but not with EPDS scores on the 3<sup>rd</sup> month [Table 4].

**Table 1: Cronbach's  $\alpha$  values and comparison of Edinburgh Postnatal Depression Scale scores on 1<sup>st</sup> and 3<sup>rd</sup> months**

Variable	Time interval	Cronbach's $\alpha$	Average <sup>§</sup>	Z	P
EPDS	1 <sup>st</sup> month	0.95	12.19±8.53	11.112	0.001*
	3 <sup>rd</sup> month	0.83	3.38±3.81		

\*Statistically significant; <sup>§</sup>The average values are expressed as mean±SD. EPDS=Edinburgh Postnatal Depression Scale, SD=Standard deviation

**Table 2: Maternal sociodemographic features and depression risk according to Edinburgh Postnatal Depression Scale scores (n=244)**

Characteristics	1 <sup>st</sup> -month EPDS					3 <sup>rd</sup> -month EPDS				
	Low, n (%)	High, n (%)	Total, n (%)	$\chi^2$	P	Low, n (%)	High, n (%)	Total, n (%)	$\chi^2$	P
<b>Age groups</b>										
≤19	29 (11.9)	30 (12.3)	59 (24.2)	5.125	0.275	55 (22.5)	4 (1.6)	59 (24.2)	1.916	0.751
20-24	65 (26.8)	44 (18.0)	109 (44.6)			102 (41.9)	7 (2.9)	109 (44.6)		
25-29	34 (13.9)	20 (8.2)	54 (22.2)			53 (21.8)	1 (0.4)	54 (22.2)		
30-34	14 (5.7)	6 (2.4)	20 (8.2)			19 (7.7)	1 (0.4)	20 (8.2)		
35-39	2 (0.8)	-	2 (0.8)			2 (0.8)	-	2 (0.8)		
Total	144 (59.1)	100 (40.9)	244 (100)			231 (94.7)	13 (5.3)	244 (100)		
<b>Educational level</b>										
Literate	23 (9.4)	23 (9.4)	46 (18.8)	7.659	0.054*	43 (17.7)	3 (1.2)	46 (18.9)	8.509	0.037*
Primary school	48 (19.6)	44 (18.3)	92 (37.9)			90 (36.9)	2 (0.8)	92 (37.8)		
Secondary school	31 (12.7)	13 (5.3)	44 (18.0)			38 (15.6)	6 (2.4)	44 (17.9)		
High school and higher	42 (17.2)	20 (8.1)	62 (25.3)			60 (24.6)	2 (0.8)	62 (25.4)		
Total	144 (58.9)	100 (41.1)	244 (100)			231 (94.8)	13 (5.2)	244 (100)		
<b>Occupation</b>										
Employed	14 (5.8)	7 (2.9)	21 (8.6)	0.556	0.456	21 (8.6)	-	21 (8.7)	1.293	0.255
Homemaker	130 (53.2)	93 (38.1)	223 (91.4)			210 (86.0)	13 (5.4)	223 (91.3)		
Total	144 (59)	100 (41)	244 (100)			231 (94.6)	13 (5.4)	244 (100)		

\*Statistically significant. EPDS=Edinburgh Postnatal Depression Scale

## Discussion

Our results for sociodemographic features were consistent with data derived from relevant literature.<sup>[2-4]</sup> The economic and sociocultural variations between geographic regions may be responsible for the differences in publications reported from different centers. EPDS score on 3<sup>rd</sup> month is found to be 5.3%, which is significantly less than that on 1<sup>st</sup> month. This decrease may be attributed to the increased compliance of mothers after delivery. Our results were consistent with previous studies which demonstrated that there was no statistically significant relationship between age and PD.<sup>[15]</sup>

Our findings support that higher educational level was associated with decreased risk for PD. No relationship could be identified between the educational level and occurrence of PD.<sup>[15]</sup> Improved sociocultural and economic status provides a better capability for solution of problems, enhanced self-esteem, and decreased worry about the future. Patients with better educational background may seek professional help more readily to deal with problems linked with PD.

Occupational status is another parameter which may influence the risk for PD. Women with a professional career are supposed to be under less risk for PD due to increased communication with social environment. There are contradictory results on this association and our data did not confirm the link between occupation and risk for PD.<sup>[16]</sup> However, it must be remembered that only 9% of women included in this study had a professional career.

**Table 3: Evaluation of depression risks based on obstetric data and Edinburgh Postnatal Depression Scale scores (n=244)**

Characteristics	1 <sup>st</sup> -month EPDS					2 <sup>nd</sup> -month EPDS				
	Low, n (%)	High, n (%)	Total, n (%)	$\chi^2$	P	Low, n (%)	High, n (%)	Total, n (%)	$\chi^2$	P
Desired mode of delivery										
Vaginal	113 (46.4)	84 (34.4)	197 (80.7)	4.195	0.123	185 (75.9)	12 (4.9)	197 (80.7)	1.296	0.523
Unplanned	22 (9.0)	15 (6.1)	37 (15.2)			36 (14.8)	1 (0.40)	37 (15.2)		
CS	9 (3.7)	1 (0.4)	10 (4.1)			10 (4.09)	-	10 (4.1)		
Total	144 (59.1)	100 (40.9)	244 (100)			231 (94.7)	13 (5.3)	244 (100)		
Mode of delivery performed										
Vaginal	96 (39.3)	68 (27.9)	164 (67.2)	0.048	0.827	157 (64.4)	7 (2.8)	164 (77.2)	1.113	0.291
CS	48 (19.7)	32 (13.1)	80 (32.8)			74 (30.4)	6 (2.4)	80 (32.8)		
Total	144 (59)	100 (41)	244 (100)			231 (94.8)	13 (5.2)	244 (100)		
Additional intervention during delivery										
No	5 (2.0)	9 (3.8)	14 (5.7)	3.334	0.068	14 (5.8)	-	14 (5.7)	0.836	0.361
Yes	139 (56.9)	91 (37.3)	230 (94.3)			217 (88.9)	13 (5.3)	230 (94.3)		
Total	144 (58.9)	100 (41.1)	244 (100)			231 (94.7)	13 (5.3)	244 (100)		
Determination of mode of delivery										
Health-care personnel	108 (44.3)	78 (31.8)	186 (76.2)	3.889	0.143	176 (72.2)	10 (4.1)	186 (76.2)	0.700	0.705
Patient	24 (9.9)	9 (3.7)	33 (13.5)			32 (13.1)	1 (0.4)	33 (13.6)		
Spouse	12 (4.9)	13 (5.4)	25 (10.3)			23 (9.4)	2 (0.8)	25 (10.2)		
Total	144 (59.1)	100 (40.9)	244 (100)			231 (94.7)	13 (5.3)	244 (100)		
Site of delivery										
Public hospital	105 (43.0)	73 (29.9)	178 (72.9)	0.703	0.704	167 (68.4)	11 (4.5)	178 (72.9)	0.965	0.617
Private hospital	38 (15.6)	27 (11.1)	65 (26.7)			63 (25.8)	2 (0.9)	65 (26.7)		
Home	1 (0.4)	-	1 (0.4)			1 (0.4)	-	1 (0.40)		
Total	144 (59.0)	100 (41.0)	244 (100)			231 (94.6)	13 (5.4)	244 (100)		

EPDS=Edinburgh Postnatal Depression Scale, CS=Cesarean section

**Table 4: Assessment of depressive risks reflected to and Edinburgh Postnatal Depression Scale scores according to maternal perception (n=244)**

Characteristics	1 <sup>st</sup> -month EPDS					2 <sup>nd</sup> -month EPDS				
	Low, n (%)	High, n (%)	Total, n (%)	$\chi^2$	P	Low, n (%)	High, n (%)	Total, n (%)	$\chi^2$	P
Description of infant										
Calm	41 (16.9)	24 (9.9)	65 (26.6)	10.315	0.035*	64 (26.2)	1 (0.4)	65 (26.6)	4.179	0.382
Agitated	33 (13.6)	19 (7.8)	52 (21.3)			47 (19.3)	5 (2.0)	52 (21.3)		
Sleeps irregularly	20 (8.19)	28 (11.4)	48 (19.7)			45 (18.5)	3 (1.2)	48 (19.8)		
Uncomfortable	34 (13.9)	14 (5.8)	48 (19.7)			45 (18.5)	3 (1.2)	48 (19.8)		
Positive impression	16 (6.5)	15 (6.1)	31 (12.7)			30 (12.3)	1 (0.4)	31 (12.7)		
Total	144 (59)	100 (41)	244 (100)			231 (94.8)	13 (5.2)	244 (100)		
Feeding										
Breastfeeding alone	130 (53.3)	79 (31.2)	209 (85.7)	6.109	0.013*	197 (80.8)	12 (4.91)	209 (85.7)	0.495	0.482
Mixed	14 (5.8)	21 (8.7)	35 (14.3)			34 (13.9)	1 (0.40)	35 (14.3)		
Total	144 (59.1)	100 (39.9)	244 (100)			231 (94.7)	13 (5.3)	244 (100)		
Breastfeeding success										
Perfect	64 (26.3)	58 (23.8)	122 (50)	5.520	0.137	116 (47.5)	6 (2.45)	122 (50)	0.709	0.871
Good	49 (20.1)	30 (12.3)	79 (32.4)			75 (30.8)	4 (1.7)	79 (32.4)		
Not bad	28 (11.4)	11 (4.5)	39 (15.9)			36 (14.8)	3 (1.22)	39 (15.9)		
Bad	3 (1.2)	1 (0.4)	4 (1.7)			4 (1.63)	-	4 (1.7)		
Total	144 (59)	100 (41)	244 (100)			231 (94.7)	13 (5.3)	244 (100)		
Impact of baby on marriage										
Positive	105 (43)	83 (34)	188 (77.1)	5.335	0.069	181 (74.2)	7 (2.9)	188 (77.0)	4.193	0.123
Negative	5 (2.1)	5 (2.1)	10 (4.1)			9 (3.7)	1 (0.4)	10 (4.1)		
No impact	34 (13.9)	12 (4.91)	46 (18.8)			41 (16.8)	5 (2.0)	46 (18.9)		
Total	144 (59)	100 (41)	244 (100)			231 (94.7)	13 (5.3)	244 (100)		

EPDS=Edinburgh Postnatal Depression Scale

In the literature, unplanned pregnancies may be a factor which increases the likelihood of PD.<sup>[16,17]</sup> We noted

that there was no difference between planned and unplanned pregnancies in terms of risk for PD. This

difference may insource from the fact that our series was comprised of primiparous women and the majority of pregnancies were planned. There are various reports on the relationship between the mode of delivery and PD.

Garthus-Niegel *et al.* found that mothers, who prefer cesarean delivery but deliver vaginally, have more PD than those who prefer and have a vaginal delivery and stated that these mothers' preference for childbearing might be a contributing factor.<sup>[18]</sup> Adams *et al.* revealed that the birth type cannot be associated with PD, and the emotional disorders present during pregnancy are the main affecting factors.<sup>[19]</sup> Sword *et al.* also found that the type of labor was not a risk factor for the development of PD in a study conducted in Canada.<sup>[20]</sup> Patel *et al.*, in their study of 14,663 mothers, found that the type of labor was not a risk factor for PD.<sup>[21]</sup> Yang *et al.* reported that the risk of acquiring PD was lower in mothers with a normal or instrumental vaginal delivery compared to mothers with an emergency CS.<sup>[22]</sup> Women, who have a strong antepartum preference for vaginal delivery but have a cesarean delivery may be at an increased risk for PD in the early postpartum period.<sup>[23]</sup> An association has been established between PD and delivery by forceps and vacuum or CS.<sup>[24]</sup> Durukan *et al.* found that birth type was not a risk for PD in their cohort study.<sup>[25]</sup> The noteworthy factors they found were social factors such as co-work status, pregnancy mood, previous PD history, presence of premenstrual syndrome, marital and family problems, and anxiety that the baby would affect marriage. Our data support that planned and performed modes of delivery, episiotomy, and induction and spinal anesthesia were not linked with EPDS. Thus, we suggest that physiological factors – rather than the mode of delivery – may influence the risk for PD.

The difference between EPDS scores on the 1<sup>st</sup> and 3<sup>rd</sup> months may be due to the sleep disturbances which adversely affect the mother more prominently in the postpartum period in the present study; method of feeding was found to be associated with EPDS scores on the 1<sup>st</sup> month. In the early postpartum period, decreased self-care and disturbance of sleep may negatively affect the mood of the mother. On the 3<sup>rd</sup> month, no difference was evident between EPDS scores of women with different feeding methods for the infant.

An important clinical implication of the present study is that it may be possible to identify women who are under risk for PD. Thus, it can be possible to meet the needs of this risk group before and during childbirth. Hopefully, our data may provide a reference for gynecologists, obstetricians, and health providers that should help with the prevention of PD among pregnant women and mothers.

This study has certain limitations such as retrospective design, small sample size, and information limited to the experience of a single institution. Furthermore, the impacts of environmental, social, and ethnic factors must be remembered during interpretation and extrapolation of our data to larger populations. It must be taken into account that the scales developed for PD are indicators of risk, rather than being a strict diagnostic criterion.

## Conclusion

Effective measures must be established for early recognition of factors affecting the occurrence of PD. Health planners and policymakers must be aware of risk factors for PD and should spend their efforts for promotion of the knowledge and attitudes of mothers during pregnancy. Identification of factors for PD necessitates implementation of multicentric, controlled trials on larger series. Enhancement of social support mechanisms for pregnant women, improvement of the quality of prenatal care, and education of women for modes of delivery and breastfeeding can be useful for achievement of more favorable outcomes.

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## Conflicts of interest

There are no conflicts of interest.

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Kaya and Çiğdem: Type of delivery and postpartum depression

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