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# A comprehensive analysis of postpartum depression and delivery characteristics: a cross-sectional study

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## ABSTRACT



**Objective:** We attempted to identify risk factors for postpartum depression (PPD) by evaluating individuals in terms of their birth patterns, as well as other characteristics, including income level, smoking habits, number of children, age, and history of antidepressants. **Methods and results:** Participants completed a questionnaire consisting of three sections: demographic characteristics, delivery characteristics, and Edinburgh Postpartum Depression Scale. Participants with a depression medical history had a higher depression level during the postpartum. There were significant correlations between postpartum depression, the husband's working status, the desire for the pregnancy, and the patient's depression medical history. PPD levels did not differ for other birth-related variables.

**Conclusions:** It is important to use appropriate screening tools to identify mothers with PPD in the community. It is also important to instruct mothers about how to care for both their babies and themselves. For this reason, the mother should be monitored for the first six months postpartum, and social - familial support should also be monitored.

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## Introduction

The health of a mother reflects the health of a community. Nurturance of the baby after birth is the primary responsibility of the mother in most societies [1]. However, the postpartum period does not only bring joy and success. Depression is an increasingly common problem affecting almost all segments of the society, with the postpartum period carrying a high risk for psychiatric disorders [2]. Thus, the global prevalence of postpartum depression (PPD) is estimated at 100-150 per 1,000 births, and is even higher in lower-income and middle-income countries [3,4]. Due to this high incidence, early detection of PPD is critically important. The lack of adequate healthcare facilities and professionals in remote areas may further increase the risk for undetected PPD [5].

The mother candidate must adapt to the physiological and mental changes related to pregnancy. She is also at higher risk for psychological problems during the postpartum, a condition that not only affects her but also her infant [2]. According to DSM-5, PPD is a major depression form, typically occurring within one month

after birth and including symptoms such as postpartum pessimism, anorexia, and the feeling of inadequacy [4].

Although the etiology of PPD is unclear, hormonal changes, family problems, social factors, and inadequate psychological support are considered risk factors [5-6]. Several postpartum hormones have been associated with PPD, including prolactin, but causal relationships are difficult to specify [7].

Although PPD symptoms usually appear within the first few weeks after birth, they may appear immediately after birth or months later. Today, there is still no clear consensus on the time and duration of PPD emergence [3]. Nevertheless, early detection and treatment of PPD can prevent disruption of the baby's psychological and neurological development and helps protect the mother from self or infant harm [4].

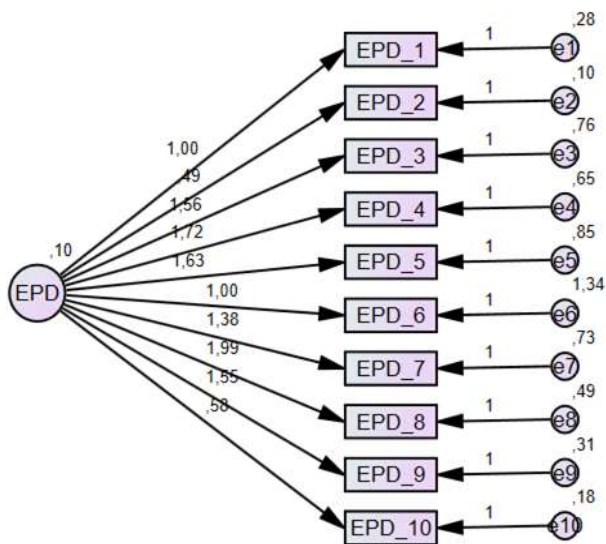
In this study, we attempted to identify risk factors for postpartum depression (PPD) by evaluating individuals in terms of their birth patterns, as well as other characteristics, including income level, smoking habits, number of children, age, and history of antidepressants.

## Materials and Methods

This research was carried out in the Obstetrics and Gynecology outpatient clinics in Mardin State Hospital, Mardin, Turkey. Approval was obtained from the Mardin Provincial Directorate of Health’s Ethics Committee (Document no. 37201737-806.02.02- E545, Date: 10/03/2020) and the research was carried out in accordance with the Helsinki Declaration, published by the World Medical Association. In order to determine sample size, we relied on Lebel et al.’s study (2020) to arrive at a minimum sample size of 70. 150 patients who gave birth between 15.03.2020-15.06.2020 and applied to the Mardin State Hospital Obstetrics and Gynecology outpatient clinics for delivery volunteered for the study. Those between the 7th and 28th day of postpartum period were included in the study. Patients experiencing trauma related to stillbirth, fetal anomalies, or premature birth (< 34 weeks) were excluded.

### Data Collection Tools

A questionnaire consisting of three parts, demographic characteristics, delivery characteristics, and Edinburgh Postpartum Depression Scale (EPDS), was used as a data collection tool. The Edinburgh Postpartum Depression Scale measures depression with ten items on the 4-point Likert type scaled from 0 to 3, with reverse coding as needed. Total scores can range from 0 to 30 [8,9]. Engindeniz et al. (1996) reported internal consistency of 0.79 [10]. Confirmatory Factor Analysis (CFA) results analyzed in AMOS 24.0 program are shown in Figure 1 for the suitability of all items of the scale used in the study. According to CFA, all validity index values exceeded those accepted in the literature [11-13]. Thus, EPDS measures of the postpartum depression show a high level of consistency.



**Figure 1.** Scale items CFA results (CMIN/DF: 1.959; CFI: 0.872; GFI: 0.923; AGFI: 0.878; RMSEA: 0.080.)

### Statistical Methods

Frequency analysis was used to describe nominal and ordinal data; means and standard deviations were used to describe interval measurement data. To analyze differences between nominal and ordinal data, Chi-Square and Chi-Square Likelihood Ratio analyses were used. The normality of depression scores was assessed using the Kolmogorov Smirnov test. Since the scale means were normally distributed, independent t-tests were used to examine differences between the two groups, and ANOVA for differences between more than two groups. Spearman correlation was used to describe relationships between scale and categorical variables. Regression analysis was used for the PPD scale, with relevant ordinal or nominal covariates coded as dummy variables. All analyses were performed in SPSS 17.0 for Windows, with a 95% confidence interval and 0.05 significance level.

## Results

Demographic characteristics of the participants are shown in Table 1.

**Table 1.** Demographic characteristics of participants

	Frequency (n)	Percent (%)
<b>Age</b>		
Under 35	124	82.7
35 and above	26	17.3
<b>Marital status</b>		
Civil marriage	148	98.7
Religious marriage	2	1.3
<b>Marriage order</b>		
First	142	94.7
Two or more	8	5.3
<b>Marriage duration</b>		
Under 1 year	15	10.0
1-5 years	59	39.3
5-10 years	40	26.7
Over 10 years	36	24.0
<b>Working status</b>		
Yes	12	8.0
No	138	92.0
<b>Husband working status</b>		
Yes	139	92.7
No	11	7.3
<b>Monthly income</b>		
Under 1500 TL	5	3.3
1500-2499 TL	27	18.0
2500-5000 TL	118	78.7
<b>House</b>		
Owner	78	52.0
Rental	72	48.0
<b>Smoking</b>		
Yes	17	11.3
No	133	88.7
<b>Depression history</b>		
Yes	17	11.3
No	133	88.7
<b>Number of children</b>		
One	55	36.7
More than one	95	63.3

In brief, the majority of women (82.7%) were under 35 years old, were in their first marriage (94.7%), and had had an official marriage (98.7%). 49.3% had been married for 5 years or less, 26.7% for 5-10 years, and 24.0% for over 10 years. Most were housewives (92.7%) and came from households having a monthly income between 2500-5000 TL (78.7%). 11.3% had a history of depression, 36.7% had one child whereas 63.3% had more than one child.

The distribution of the participants' delivery related information is presented in Table 2.

**Table 2.** The distribution of the participants' delivery related information

	Frequency (n)	Percent (%)
<b>Contraception method</b>		
Coitus interruptus	54	36.0
Intrauterine device	22	14.7
Condom	18	12.0
Birth control pill	6	4.0
Injection	3	2.0
None	47	31.3
<b>Desired pregnancy</b>		
Yes	119	79.3
No	31	20.7
<b>Delivery type</b>		
Normal	74	49.3
Cesarean section	76	50.7
<b>Anesthesia type</b>		
None	74	49.3
Spinal	42	28.0
General	34	22.7
<b>Birth week</b>		
Preterm	8	5.3
Term	142	94.7
<b>Newborn intensive care history</b>		
Yes	26	17.3
No	124	82.7
<b>Breastfeeding intention</b>		
Yes	145	96.7
No	5	3.3
	<b>Mean</b>	<b>Std. Deviation</b>
Breastfeeding duration	8.94	2.30
Gravida	2.50	1.53
Parity	2.03	1.05
Abortus	0.45	0.81

Coitus interruptus as the contraceptive method was the most popular method, with a rate of 36.0%, followed by intrauterine device (IUD) with a rate of 14.7%. 31.3% of the participants stated did not use contraception and 79.3% stated that their pregnancy was a desired. 50.7% of the

births were Cesarean sections, and general anesthesia was the most preferred anesthesia, with a rate of 22.7%. The preterm birth rate was 5.3%, the newborn intensive care history was 17.3%, and the rate of breastfeeding was 96.7%.

Participants with PPD differed from women without postpartum depression on three demographic/medical history variables. Those with PPD had a higher history of medical depression ( $p = 0.018$ ). In addition, women with PPD were more likely to have had employment outside the home ( $p = 0.045$ ) but their husbands were less likely to have had employment ( $p < 0.001$ ).

Women with PPD differed from women without PPD on two delivery related variables: Those who used the IUD as a contraception method ( $p = 0.014$ ) and those for whom the pregnancy was not desired ( $p < 0.001$ ) was greater for women having PPD. PPD not differ based on other birth-related variables ( $p > 0.05$ ), including delivery type, anesthesia type, preterm or term, and breastfeeding intention.

The results of Spearman correlation analysis performed for the relationship between the significant parameters and the level of postpartum depression are presented in Table 3.

**Table 3.** Spearman correlation analysis results for the relationship between significant parameters and the postpartum depression level

Parameter	r	p
Woman's Working status	-0.160	0.051
Husband's working status	0.269**	0.001
Depression medical history	-0.198*	0.015
Desired pregnancy	0.322**	0.000

\* $p < 0.05$ , \*\* $p < 0.01$

As noted in the table, there were significant and positive correlations between postpartum depression, the husband's working status, and desired pregnancy. Although the correlation between postpartum depression and depression medical history was negative ( $r = -0.198$ ;  $p < 0.05$ ), this was the result of variable coding. That is, those women with a medical history of depression were more likely to have higher PPD levels. A final regression analysis was performed to assess the multivariate relationships between significant covariates and PPD levels, as indicated by the EDPS (Table 4).

Results showed that the husband's working status, depression medical history, and an undesired pregnancy each made a significant contribution to PPD ( $p < 0.05$ ), together explaining 18.9% of the variance in PPD. The regression coefficients indicated that whether or not the woman desired the pregnancy was the strongest predictor of PPD, although both the husband's working status and the woman's history of depression were also significant.

**Table 4.** Regression analysis of the predictive value of the significant parameters on PPD

	Unstandardized Coefficients		Standardized Coefficients		p
	B	Std. Error	Beta	t	
(Constant)	2.313	2.901		0.797	0.427
Husband's working status	4.466	1.395	0.242	3.201	0.002
Depression medical history	-2.294	1.131	-0.151	-2.029	0.044
Desired pregnancy	3.493	0.890	0.294	3.927	0.000

R<sup>2</sup>: 0.189; F: 12.559; p<0.01

## Discussions

In the literature, depression is analyzed and evaluated as a symptomatic and clinical diagnosis. Although clinical diagnosis progress is a medical procedure and must be performed by clinicians, symptomatic depression may be scored on various scales such as Beck Depression Scale, Brief Symptoms scale, etc. [9,14,15]. In our research, depression was evaluated as a symptom. Some research divides the depression scale score into two categories: depression and no depression [16,17]. However, this may lead to inconsistencies such as whether depression is clinically diagnosed or symptomatically evaluated. In addition, transforming a scale depression score into the nominal parameter may cause the loss of statistical sensitivity. For this reason, depression scores were evaluated as a scale parameter.

The current literature suggests that the burden of perinatal mental health disorders, including postpartum depression, is high in low- and lower-middle-income countries [18-19]. Mardin, the site of this project, is located on the Syrian border and has been economically affected by the Syrian civil war. In our study, we found that the PPD level of the participants whose husbands did not have a job was significantly higher ( $p < 0.05$ ), consistent with other findings in the literature. Postpartum women who have low access to healthy and adequate foods due to financial reasons are at higher risk for PPD, and there is evidence that a good traditional diet helps prevent the occurrence of PPD [20].

Consistent with this idea, Rachele et al. reported that a healthy post-natal diet was associated with low PPD [20], further supported by specific food recommendations for the post-partum period in the American and Australian Dietary Guidelines. Mischoulon et al., for example, reported that long chain omega-3 fatty acids in fish play a role in the neurochemical activities and increase cell membrane fluidity; and the brain-derived neurotrophic factor plays a role in regulating neurogenesis and should be included in a postpartum diet [6,21]. Considering the economic level of the population participating in our study,

the high intake of food produced from flour-based products may have contributed to PPD.

We also found that PPD levels were higher in participants who also had outside employment. Work-related stress can increase PPD levels, as women who work part-time or full-time during the prenatal period have higher symptoms of PPD than unemployed ones, perhaps due to the difficulty of the body's adaptation to the physiological changes that occur during and after pregnancy [22,23].

Perhaps most important, participants with a medical history of depression had higher depression levels during the postpartum, consistent with prior findings identifying a history of depression and anxiety as a leading risk factor for [24-26]. It may be that a genetic predisposition is relevant, with the assumption that about 50% of the cases of PPD are genetically related, although specific genetic transmission pathways have yet to be specified [27-29]. Furthermore, several studies indicate that depressive episodes that begin within four weeks postpartum are similar to other depressive disorders such as unipolar disorder or affective disorder [30-31], suggesting that they share a common etiology. Nevertheless, other factors may contribute to or intensify PPD, for example, untreated depression, sleep disturbances [32], and work-related distress [23]. Although the neurobiological events accounting for PPD are not yet fully understood, Frokjaer et al. reported that low levels of serotonin in the cerebrospinal fluid (CSF) occur as a result of the increase in the levels of serotonin carrier protein in the neocortex, due to the hormonal changes in the postpartum period. Low levels of serotonin in the CSF have been associated with depression symptoms.

In our research, PPD levels were higher in women who used IUD as a contraception method, which has also been reported elsewhere [27]. Although multiparity [25] vs nulliparity [26] has been identified as risk factors for PPD in the literature, we did not detect a relationship between these factors in our study. Furthermore, although there was no relationship between breastfeeding and PPD in our study, a finding that conflicts with other reports [24], we

believe breastfeeding can have positive psychological effects by increasing interaction and bonding between mother and infant; it may also reduce the likelihood of the mother harming her newborn. In fact, Dias et al. stated that low breastfeeding experience may increase the risk for PPD [28].

Insofar as treatment of PPD, a systematic meta-analysis by Yan-Jun Guo et al. concluded that fluoxetine, a selective serotonin reuptake inhibitor, is one candidate, but that further research is needed [33]. In addition, the FDA has approved Brexanolone for PPD treatment, a new antidepressant which has only a moderate effect but also minimum adverse effects [34,35].

## Conclusions

It is important to identify mothers with PPD in the community using appropriate screening tools. It is also important to instruct mothers about caring for both their babies and themselves, including helping mothers recognize the signs and the symptoms of PPD before discharge from the hospital. In addition, because PPD may not be experienced within the first month postpartum, the mother should be monitored for the first six months, and social - familial support should strongly encouraged. PPD not only causes suffering for the mother, but reduced functionality can lead to later problems in emotional, cognitive, and social development for the newborn.

## Conflict of interest disclosure

There are no known conflicts of interest in the publication of this article. The manuscript was read and approved by all authors.

## Compliance with ethical standards

Any aspect of the work covered in this manuscript has been conducted with the ethical approval of all relevant bodies. The necessary permission was obtained from the Provincial Health Directorate of Mardin with the letter numbered 37201737-806.02.02- E545 on 10.03.2020.

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