

# Prevalence and Risk Factors for Postpartum Depression: A Cross-Sectional Study

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## Abstract

**Background:** One of the most important health problems affecting the mother and child is postpartum depression (PPD). This study aimed to determine the frequency and risk factors that contribute to PPD in order to help identify those at high risk and implement preventive measures.

**Methods:** We conducted a cross-sectional study in Zagreb, Croatia, from November 2022 to April 2023 on a convenient sample of mothers (N=195) with children up to six months of age, using the Edinburgh Postpartum Depression Questionnaire and the Multidimensional Scale of Perceived Social Support. The data were collected during home visits by visiting nurses or meetings of the Vita breastfeeding support group.

**Results:** Symptoms of PPD of varying intensity were present in 43 (22.05%) of the participants. It was found that the mothers with previous mental disorders ( $\chi^2=6.85$ ,  $P=.01$ ) and those less satisfied with their partners' support ( $\chi^2=18.93$ ,  $P=.00$ ) had more depressive symptoms than those who did not have previous mental disorders and were satisfied with their partners' support. Also, it was found that mothers with depressive symptoms had a lower level of support from their significant others ( $t=3.96$ ,  $P<.01$ ), family ( $t=3.64$ ,  $P<.01$ ) and friends ( $t=3.39$ ,  $P<.01$ ) than mothers without such symptoms.

**Conclusion:** The prevalence of PPD in the sample was high, and it was shown that the following risk factors influenced its occurrence: previous mental disorders, dissatisfaction with emotional support from the partner, and a lower level of social support from significant others, family and friends. It is important to raise awareness of this problem and recognize the symptoms in time, which could facilitate the implementation of appropriate preventive measures and the provision of appropriate therapy.

**Keywords:** postpartum depression, risk factors, prevalence, emotional support, social support

## Introduction

Postpartum depression (PPD) is a mental health condition which, according to the Diagnostic and Statistical Manual for Mental Disorders, Fifth Edition (DSM-5), is classified as a depression with onset within four weeks of postpartum (1). According to the International Classification of Disease (ICD), PPD begins by the first six weeks of the postpartum phase (2). However, many studies have shown that the onset can be after the puerperium, within the first postpartum year (3,4). Childbirth is a difficult and exhausting process since the mother goes through many physical, emotional, hormonal and psychological changes throughout pregnancy. Moreover, enormous changes occur in her social life (5).

The numerous risk factors for postpartum depression may involve a variety of biological, social, psychological and obstetrical issues, which have strong to weak associations with the development of PPD (6,7).

Depression and anxiety in pregnancy, postpartum blues, history of depression, neuroticism, excessive stress inducing life events, poor marital relations, lack of social support and low self-esteem are strongly associated with postpartum depression (8,9). In addition, low socioeconomic status, single marital status, unwanted pregnancy and obstetrical stressors are reported to have relatively weaker association with PPD (7,10). Mothers who have experienced related complications during pregnancy or childbirth, such as preterm delivery, prenatal hospitalization, emergency cesarean section, preeclampsia or decreased infant health are shown to have increased risk of developing PPD (11,12).

However, breastfeeding could be considered as a potential measure to prevent PPD (13,14). Furthermore, emotional support is one of the most important social factors during postpartum recovery, as it makes women feel loved and cared for, encouraging them to face the issues in their new role (15,16). Studies in both developed and developing countries have shown that lack of social support is an independent predictor of PPD (17,18).

PPD has many features similar to depression, which can occur at other times in women's lives with an additional history of childbirth. Symptoms include depressed mood, apathy, changes in sleep patterns, changes in appetite, feelings of worthlessness, inability to concentrate and suicidal ideation. Patients with PPD may also experience anxiety or psychotic symptoms (5). However, recent studies have shown that PPD has some specific symptoms and risk factors in comparison to major depressive disorder, and is heterogeneous with various subtypes according to the onset and severity (3).

The prevalence of PPD reported in the literature varies substantially, depending on the definition of the disorder, country, diagnostic tools and the period over which the prevalence is determined (5,19). A meta-analysis encompassing 565 studies from 80 different countries or regions has shown that the global prevalence of PPD is approximately 17.22% (20).

The consequences of PPD are negative, not only for mothers but also for the children, since it affects the child's psychological and intellectual abilities, as well as mother-child bonding (21). These negative consequences can be prevented by the early diagnosis of the mother, with timely care and management. Understanding the risk factors would also help in preventing and managing the disorder (21). Therefore, this study aimed to examine the prevalence of PPD in a sample of mothers with children up to six months of age in the area of Novi Zagreb, and to determine the risk factors (how the child is fed, lack of emotional support from the partner, previous mental disorders of the mother and the maturity of the child) associated with PPD. Moreover, we also examined the differences in social support between mothers with and without symptoms of PPD.

## Methods

### *Study design*

This was a cross-sectional study.

### *Ethics*

The study was conducted in accordance with the institutional Code of Ethics. All the methods were performed in accordance with the relevant guidelines and regulations. Written informed consent was obtained from all the study participants. The study protocol was approved by the Ethics Committee of the Zagreb-Centar Health Center (Document number: UR 251-510-03-20-22-02.)

### *Participants*

A convenient sample of mothers with children up to six months of age who used the home care service (visiting nurses) or attended breastfeeding support groups were included in this study. Participation was completely anonymous and voluntary.

### *Data collection and study tool*

Data were collected by visiting nurses or during meetings of the Vita breastfeeding support group. The participants filled out a questionnaire after reading the study information and signing a written informed consent. The questionnaire was filled out in paper form.

The first part of the questionnaire consisted of six questions related to the participants' general sociodemographic data (child's age, mother's age, educational level; and work, economic and marital status).

The second part of the questionnaire was designed specifically for the needs of this study to determine the risk factors present in the development of PPD, consisting of nine questions (the number of spontaneous abortions, the course of the current pregnancy, the method of delivery, assessment of the maturity of the newborn, direct and early skin-to-skin contact, how the child is fed, previous mental disorders and the emotional support of the partner).

The third part of the questionnaire consisted of the Edinburgh Postpartum Depression Scale (EPDS), which is a widely used 10-item self-report questionnaire that measures depressive symptoms in postpartum women, including the severity of various depressive symptoms over the past week on a scale from

0 to 3, with a maximum score of 30 and a cutoff score of 13. The Croatian translation of the EPDS proved to be valid for the triage of postpartum depression and is recommended for clinical and healthcare purposes (22). The Cronbach alpha in our study was .89.

The final part of the questionnaire consisted of the Multidimensional Scale from Perceived Social Support (MSPSS) (23), with 12 statements that measure the perceived social support from family, friends and other persons. Each source of social support is assigned 4 items. On a scale from 1 (completely disagree) to 7 (completely agree), participants should mark their degree of agreement with each statement. The total score for each of the 3 dimensions is calculated as the average of the estimates of the items that compose it. The theoretical range of the scores is from 1 to 7, with a higher score indicating a higher degree of support. The Cronbach alpha in our study was .91 for the subscales of support from family and other persons, and .93 for the subscale of support from friends.

### *Statistical analysis*

The data were analyzed using descriptive statistics, including frequencies, percentages, means and standard deviations. The Chi-square and *t*-test were used to assess the significance among the variables. The value  $P < 0.05$  was used as the level of significance.

IBM SPSS Statistics Version 26 (Armonk, IBM, New York, USA) was used for statistical analysis.

## **Results**

The participants' sociodemographic data are presented in Table 1. The study included 195 mothers, ranging from 21 to 40 years of age. The largest percentage of the mothers (35.9%) were between 31 and 35 years of age. The children's average age was 12.17 weeks old ( $SD=8.57$ ). Most of the participants were married (75.9%), held a bachelor's or master's degree (71.3%), were employed (90.8%) and perceived their socioeconomic status as average (56.9%).

Table 2 shows that most of the mothers (85.1%) experienced an orderly course of pregnancy, and in 87.7% delivery was on time. The largest percentage of the participants (72.3%) had a vaginal birth, and after giving birth, most of the mothers had direct (74.4%) and early skin-to-skin contact with their babies (82.5%). The majority of the participants had no prior history of mental illness (92.8%). Moreover, the results indicate that 74.4% of the mothers were completely satisfied with the emotional support provided by their partners. The largest number of participants (60.5%) were breastfeeding their children exclusively on demand. Combining breastfeeding with expressed mother's milk or infant formula was practiced by 22.6% of the mothers, while 16.9% exclusively fed their children infant formula.

### The Edinburgh Postnatal Depression Scale (EPDS)

Most of the participants, 152 (77.9%) had fewer than a total of 13 points on the EPDS, while the remaining 43 (22.05%) had 13 or more points, indicating the presence of symptoms of depression.

According to the results of the Chi-square tests presented in Table 3, there were no statistically significant differences ( $p > .05$ ) between the mothers exhibiting symptoms of depression and those without such symptoms in regard to how the child is fed and the child's maturity. However, the Chi-square test is statistically significant ( $p < .05$ ) for the variables of the partners' emotional support and previous mental disorders, which means that the participants who had

**Table 1.** The participants' sociodemographic data

Child's age (in weeks)	M=12.1 (SD=8.57) N (%)
<b>Mother's age (in years)</b>	
<21	0 (0.0)
21–25	16 (8.2)
26–30	66 (34)
31–35	70 (35.9)
36–40	37 (19.0)
>40	6 (3.1)
<b>Marital status</b>	
Married	148 (75.9)
Cohabitation	47 (24.1)
<b>Educational level</b>	
Elementary school	1 (0.5)
High school	55 (28.2)
Bachelor's or master's degree	139 (71.3)
<b>Perceived socioeconomic status</b>	
Below average	1 (0.5)
Average	111 (56.9)
Above average	83 (42.6)
<b>Working status</b>	
Full time employment	177 (90.8)
Part-time employment	0 (0.0)
Independent activity	2 (1.0)
Student	2 (1.0)
Unemployed	14 (7.2)

more PPD symptoms were less satisfied with their partners' emotional support and had experienced more previous mental disorders.

The Multidimensional Scale of Perceived Social Support (MSPSS)

On average, the mothers had a high level of social support. Those with symptoms of PPD had a lower level of support from significant others, family and friends than mothers without such symptoms (Table 4).

**Table 2.** Data on the mothers and newborns

	N (%)
<b>Number of spontaneous abortions</b>	
No miscarriages	154 (79.0)
One	33 (16.9)
Two	8 (4.1)
<b>The course of pregnancy</b>	
Orderly	166 (85.1)
With complications	29 (14.9)
<b>Manner of delivery</b>	
Vaginal delivery	141 (72.3)
Instrumental vaginal	3 (1.5)
Planned C-section	23 (11.8)
Emergency C-section	28 (14.4)
<b>Assessment of maturity</b>	
Premature birth	12 (6.2)
Born at term	171 (87.7)
Born postterm	12 (6.1)
<b>Direct skin-to-skin contact</b>	
Yes	145 (74.4)
No	50 (25.6)
<b>Early skin-to-skin contact</b>	
Yes	161 (82.5)
No	34 (17.5)
<b>How the child is fed</b>	
Breastfeeding on demand	118 (60.5)
Combined feeding	44 (22.6)
Dairy preparations	33 (16.9)
<b>Previous mental disorders</b>	
No	181 (92.8)
Depression	8 (4.1)
Other mental disorders	6 (3.1)
<b>Emotional support from partner</b>	
Entirely satisfied	145 (74.4)
Partially satisfied	46 (23.6)
Dissatisfied	4 (2.0)



**Table 3.** Results of the  $\chi^2$  test of the frequency of risk factors for the development of depression between mothers with and without depressive symptoms

	Symptoms of depression N	No symptoms of depression N	$\chi^2$ (P)
<b>How the child is fed</b>			
breastfeeding on demand	20	98	4.75 (.09)
combined feeding	14	30	
dairy preparations	9	24	
<b>Emotional support from partner</b>			
entirely satisfied	21	124	18.93 (.00)
partially satisfied	20	26	
dissatisfied	2	2	
<b>Previously experienced mental disorders</b>			
no	36	145	6.85 (.01)
yes	7	7	
<b>Maturity of newborn</b>			
born prematurely	3	9	.14 (.93)
born at term	37	134	
born postterm	3	9	
<b>The course of pregnancy</b>			
orderly	35	131	.136 (.712)
with complications	8	22	
<b>Manner of giving birth</b>			
vaginal delivery and instrumental vaginal	35	109	2.828 (.243)
planned C-section	4	25	
emergency C-section	4	19	

**Table 4.** Differences in the level of support from significant others, family and friends between mothers with and without depressive symptoms

	Symptoms of depression	N	M	SD	df	t
1. Support from significant others	YES	43	5.90	1.09	193	3.96**
	NO	152	6.61	0.71		
2. Family support	YES	43	5.32	1.48	193	3.64**
	NO	152	6.21	1.07		
3. Support from friends	YES	43	5.12	1.67	193	3.39**
	NO	152	6.04	1.10		

## Discussion

PPD symptoms of varying intensity were present in 22.05% of the mothers. A previous study conducted in Croatia had recruited 272 women and used the diagnostic criteria according to the DSM-IV-TR. Out of the 272 recruited women, 12 (4.4%) experienced a

minor depressive episode and 10 (3.7%) had a major depressive episode with postpartum onset, with an overall prevalence for both minor and major depressive episodes of 8.1% (24). A previous review of the literature had observed inconsistent PPD prevalence, with 1.9% to 82.1% in developed countries and 5.2% to 74% in developing countries (17).

A systematic review by Hahn-Holbrook and colleagues also showed a significant heterogeneity among nations (25). However, the global prevalence of PPD was found to be approximately 17.22% in the largest meta-analysis of PPD to-date (20). The findings of the same meta-analysis revealed that the prevalence of PPD was closely linked to the level of country development and national or regional income. Therefore, the prevalence of PPD in our sample was higher than previously reported, although this could be due to the small sample size, inclusion of a convenient sample of mothers and the research tools employed, which may have affected the final results. Another reason could be that knowing the aim of the study, some of the participants may have been inclined to report particular symptoms.

In our sample, almost 90% of the women had no complications during pregnancy, almost 80% had vaginal delivery and their children were born at term. Mental and physical problems during pregnancy or delivery, postpartum problems with the infant, breastfeeding cessation and negative life events during the previous 12 months were associated with postpartum depression in a study conducted in Finland (26). A study in Croatia, which analyzed prolonged labor ( $\geq 12$  h), very painful birth, complications and illnesses of the mother during and after delivery as a consequence of birth, preterm birth (before week 36) and/or illness of the child (as a consequence of delivery or congenital) showed that peripartal complications are significantly connected with PPD (27). In our sample, there was no statistical difference between mothers with and without depressive symptoms, with regard to the course of pregnancy and delivery.

Our findings indicate that the participants had more symptoms of PPD if they had experienced previous mental disorders, similar to the results of other researchers (28–31). Various studies emphasize the association between a mother's previous mental disorders and PPD (28,29). Furthermore, a study conducted in two regions of the Czech Republic (Brno and Znojmo) concluded that

a personal and family history of depression is significantly connected with PPD (30). Moreover, the results of a systematic review and meta-analysis showed a moderate certainty of evidence for an almost 2-fold higher risk of developing postpartum depression among mothers with a family history of any psychiatric disorder compared to those without such a family history (31).

Our research also shows that mothers with a history mental disorders and those who are less satisfied with their partners' support have more depressive symptoms than mothers without such a history who are more satisfied with their partners' support. Furthermore, mothers with depressive symptoms report a lower level of support from significant others, family and friends than mothers without depressive symptoms. This is in a line with known findings, since the literature shows that poor relationships with spouses or family members and lack of social support are associated with a higher likelihood of women experiencing PPD symptoms (15,32,33). According to the measure of perceived social support, in this study the levels of support from significant others, family and partners are high. However, mothers with depressive symptoms were found to have lower levels of support from significant others, family and friends than mothers without depressive symptoms.

The results of this study suggest that the frequency of PPD is not impacted by how the baby is fed. In contrast, Gaffney et al. (34) found that mothers with depressive symptoms were at greater risk for both low breastfeeding intensity and adding cereal to infant formula at two months of age than those without PPD (34). Moreover, a study by Dennis and McQueen found that all the mothers with PPD were significantly more likely to discontinue breastfeeding at 4 and/or 8 weeks, dissatisfied with their infant feeding method, experience significant breastfeeding problems and report lower levels of breastfeeding self-efficacy (35).

There are several limitations in this study. Our research sample was recruited from a limited community in a single section of the city of Zagreb. Although this study examined

a variety of sociodemographic, maternal and newborn data, employing a questionnaire on social support and depressive symptoms, previous research has shown that biological factors such as oxytocin levels, personality traits, peer support and educational level are also correlated with maternal PPD. Additional personal, sociodemographic and biological factors could be examined in future studies. Moreover, future studies should have a longitudinal or prospective design and assess the symptoms peripartum and at the first week, six months and one year following delivery, in order to obtain insight into PPD.

## Conclusion

The results of our study indicate that 22.05% of the mothers of infants up to 6 months had symptoms of PPD. Mothers who exclusively fed infant formula to their children or gave birth prematurely did not differ in the frequency of PPD symptoms from mothers who exclusively breastfed on demand or gave birth at term. On the other hand, mothers who lacked emotional support from their partners, significant others, family and friends, and had previously experienced mental disorders had more PPD symptoms.

Proper access to maternal mental healthcare could be improved by raising awareness of the features, symptoms and risk factors that lead to postpartum depression. Knowing the risk factors could help in identifying the risk groups and providing appropriate preventive measures and treatment to women suffering from PPD.

## Declarations

### Aknowledgements

This study was part of Karmen Sovulj's Master of Nursing thesis, originally written and defended in the Croatian language.

### Authors' contributions

All the authors have contributed equally to this work and have read and approved the final version of the manuscript.

### Ethics

The study protocol was approved by the Ethics Committee of the Zagreb-Centar Health Center (Document number: UR 251-510-03-20-22-02.)

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### Competing interests

The authors declare no conflicts of interest.

### Data sharing statement

The authors confirm that the data can be obtained by contacting the corresponding author.

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