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Sociodemographic and obstetric risk factors for postpartum depression

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Abstract

Objective: To examine the impact of sociodemographic and obstetric factors on the outcomes of postpartum depression (PPD).

Methods: This cross-sectional study was conducted on women attending routine obstetric and gynecologic follow-up visits at 6–8 weeks postpartum from April 2024 to December 2024. Sociodemographic and obstetric data were collected through structured questionnaires and medical records. PPD was assessed using the Turkish version of the Edinburgh Postpartum Depression Scale (EPDS), with a cutoff score of 13 for diagnosis.

Results: A total of 489 women with a mean age of 30.04 ± 4.54 years were included. Significant associations were found between postpartum depression (PPD) and maternal age (p = 0.049), BMI (p = 0.002), parity (p = 0.025), and gestational age (p = 0.016). Women over 40 years, those with higher BMI, and nulliparous women had higher rates of PPD. No significant relationships were observed between PPD and educational level, employment status, mode of delivery, blood type, birth weight, or baby gender.

Conclusion: The findings of the study suggest maternal age, BMI, parity, and gestational age as significant risk factors for postpartum depression. These factors should be prioritized in screening programs to enable early detection and intervention.

Keywords: Postpartum depression, maternal health, preterm birth, body mass index, parity

Introduction

Postpartum depression (PPD) is a common and clinically significant mood disorder that affects approximately 15–20% of women in the year following childbirth.[1] Despite its high prevalence, a significant proportion of cases remain undiagnosed and untreated, with estimates indicating that up to 50% of affected individuals do not receive timely intervention. In some cases, depressive symptoms may arise during pregnancy and intensify in the postpartum period. The risk of PPD is particularly elevated during the first two months after childbirth, although it can develop at any time within the first year.[2]

The diagnostic criteria for PPD remain a topic of ongoing discussion, particularly with regard to the timing of onset. PPD is considered as depression that begins within the first four weeks following childbirth. However, emerging evidence suggests that PPD may have a later onset, and some researchers argue that any major depressive episode occurring within the first year postpartum should be considered PPD.[3]

If left undiagnosed and untreated, PPD can lead to significant long-term consequences for both maternal and neonatal health. The disorder has been associated with a range of adverse outcomes, including chronic depression, impaired maternal functioning, and poor infant care. Affected mothers may experience emotional, cognitive, and physical impairments. In severe cases, PPD may be associated with suicidal ideation or infanticidal

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thoughts. Additionally, the bond between mother and infant may be compromised, which can adversely affect the child's emotional and developmental well-being.[4]

The etiology of PPD is considered multifactorial, with both psychosocial and obstetric factors implicated in its onset and progression. Numerous risk factors have been identified, including history of depression, low income, lack of social or partner support, early maternal age, unplanned pregnancies, intrauterine growth restriction (IUGR), premature birth, and infant gender. Hormonal fluctuations, particularly in estrogen and progesterone levels during the perinatal period, are also thought to contribute to the pathophysiology of PPD.[5,6] However, despite the identification of several potential risk factors, no single factor has been conclusively proven to account for the disorder's complex nature, necessitating further research to elucidate the underlying mechanisms.

In Turkey, research on maternal mental health before and after childbirth remains relatively limited, with few studies addressing risk factors of PPD. Given the importance of contextualizing mental health findings within specific regional and cultural settings, it is essential to conduct studies that identify relevant risk factors in different populations. Therefore, this study aimed to evaluate the role of sociodemographic and obstetric factors in the development of PPD.

Methods

This cross-sectional study was carried out at the obstetrics and gynecology outpatient clinics of a private hospital from April 2024 to December 2024, following approval from the Istanbul Medipol University Non-Interventional Clinical Research Ethics Committee (Approval number: 343, date: 28.03.2024). All participants provided written informed consent after receiving detailed information on the study's objectives and methodologies. The inclusion criteria comprised women who had delivered a singleton infant 6–8 weeks prior and attended routine follow-up visits at the hospital's obstetrics and gynecology clinics. Exclusion criteria included:(1) severe pregnancy-related complications or medical conditions; (2) emergency cesarean section or high-risk deliveries (placental abruption, placenta previa, insulin-dependent maternal diabetes, and maternal heart disease); (3) communication impairments (e.g., illiteracy in Turkish, auditory or verbal difficulties); and (4) prior psychiatric disorders with active treatment. Obstetric data were extracted from the hospital's electronic database and patient records.

Sociodemographic data, including maternal age, comorbidities, education level, smoking history, body mass index (BMI), and blood type, were collected for each participant. Obstetric data, such as parity, gestational age at birth, 1st and 5th minute Apgar scores, mode of delivery, type of anesthesia, indications for cesarean section, history of COVID-19 infection during pregnancy, birth weight, infant gender, newborn status, and need for neonatal intensive care unit (NICU) support, were retrieved from the hospital's database.

Participants in the study completed the Turkish version of the Edinburgh Postpartum Depression Scale (EPDS), a validated 10-item self-report measure specifically designed for the screening of depressive symptoms in postpartum women. Originally developed by Cox et al. in 1987 and subsequently adapted into Turkish by Engindeniz et al..[7,8] The scale utilizes a four-point Likert response format (0–3: never, rarely, generally, always). A cutoff score of 13 is established to identify women at risk for postpartum depression, with total scores ranging from 0 to 30, where higher scores indicate more severe depression. The EPDS demonstrated robust internal consistency, with a Cronbach's alpha of 0.79 during validity-reliability assessments, exhibiting a sensitivity of 86% and a specificity of 78%.

Sample size estimation was performed using G*Power 3.1, based on Özcan et al.'s[9] systematic review and meta-analysis, which reported a 23.8% prevalence of postpartum depression in Turkey. Based on a 95% confidence level ($\alpha = 0.05$), a ±5% margin of error, and 80% power, the minimum required sample size was calculated to be 279 participants.

Statistical Analysis

Statistical analyses were performed using IBM SPSS Statistics version 22. The Kolmogorov-Smirnov test was employed to assess the normality of the data. The results indicated that the data did not adhere to a normal distribution. Descriptive statistics were applied to summarize the data. For categorical data, Chi-square tests, Fisher's Exact test, Fisher-Freeman-Halton Exact test, the Continuity (Yates) correction, and McNemar's test were employed. The statistical significance level was established at $p < 0.05$.

Results

During the study period, a total of 574 deliveries were recorded, with 523 women attending the routine postpartum follow-up examination. Among them, 34 women were excluded due to a history of psychiatric illness or treatment (n = 12), language barriers (n = 5), severe preeclampsia (n = 3), and emergency cesarean delivery (n = 14). Consequently, the final analysis comprised 489 women.

The mean age of patients was 30.04 ± 4.54 years. Parity ranged from 0 to 4 (median 1), and the mean BMI was 30.55 ± 4.57. Regarding educational attainment, 4.9% (n = 24) had primary education, 15.7% (n = 77) had secondary education, 34.8% (n = 170) had high school education, 15.5% (n = 76) had an associate degree, and 29% (n = 142) had a bachelor's degree. Regarding employment status, 59.9% (n = 293) were unemployed, while 40.1% (n = 196) were employed. Blood type distribution was as follows: 40.1% (n = 196) were A Rh(+), 14.1% (n = 69) were B Rh(+), 28.2% (n = 138) were O Rh(+), 6.1% (n = 30) were AB Rh(+), 1.2% (n = 6) were AB Rh(-), 4.3% (n = 21) were O Rh(-), 4.7% (n = 23) were A Rh(-), and 1.2% (n = 6) were B Rh(-).

In terms of maternal age, 26.2% (n = 79) were over 40 years, and 73.8% (n = 361) were under 40 years. BMI categories included 8.6% (n = 42) with normal weight, 39.1% (n = 191) who were overweight, 36.4% (n = 178) with Class I obesity, 11.7% (n = 57) with Class II obesity, and 4.3% (n = 21) with Class III obesity. In terms of parity, 47.4% (n = 232) were nulliparous, 39.1% (n = 191) were primiparous, and 13.5% (n = 66) were multiparous. Of the participants, 87.5% (n = 428) reported no chronic illness, and 9.8% (n = 48) were smokers (Table 1).

Among the 489 women, the mean gestational age was 270.19 ± 8.14 days, and the mean birth weight was 3338.66 ± 439.34 grams. The mean 1st and 5th minute Apgar scores were 7.92 ± 0.90 and 9.06 ± 0.70, respectively. Regarding delivery, 85.1% (n = 416) underwent cesarean section, with 69.5% (n = 289) receiving general anesthesia. The primary indications for cesarean were previous cesarean section (48.6%, n = 202) and cephalopelvic disproportion (18.8%, n = 78). COVID-19 infection during pregnancy was reported by 6.3% (n = 31) of women. Birth weight distribution showed 92.6% (n = 453) of infants with normal weight, 2.7% (n = 13) with low birth weight, and 4.7% (n = 23) with macrosomia. In terms of newborn gender, 53.6% (n = 262) were male, and 46.4% (n = 227) were female. NICU admission occurred in 9.2% (n = 45) of infants (Table 2).

No significant associations were observed between educational attainment (p = 0.082), maternal blood type (p = 0.513), or employment status (p = 0.963) and PPD. Maternal age was significantly associated with PPD (p = 0.049), with women over 40 years having a higher rate of PPD (12.7%) compared to those under 40 years (5.9%). BMI also showed a significant association with PPD (p = 0.002). Parity was significantly related to PPD (p = 0.025), with nulliparous women exhibiting a higher rate of PPD (10.8%) compared to primiparous (5.8%) and multiparous women (16.7%). No significant relationships were found between chronic illness (p = 0.787) or smoking status (p = 0.763) and PPD (Table 3).

Table 1. Maternal characteristics

		Minimum	Maximum	Mean±SD
Age		19	44	30.04±4.54
Parity (median)		0	4	0.69±0.79 (1)
Body Mass Index (BMI)		20.07	46.25	30.55±4.57
			n	**%**
Education Level	Primary School		24	4.9
	Secondary School		77	15.7
	High School		170	34.8
	Associate Degree		76	15.5
	Bachelor's Degree		142	29
Employment Status	Unemployed		293	59.9
	Employed		196	40.1
Blood Type	A Rh(+)		196	40.1
	B Rh(+)		69	14.1
	O Rh(+)		138	28.2
	AB Rh(+)		30	6.1
	AB Rh(-)		6	1.2
	O Rh(-)		21	4.3
	A Rh(-)		23	4.7
	B Rh(-)		6	1.2
Maternal age groups	>40 years		79	16.2
	<40 years		410	83.8
BMI	Normal		42	8.6
	Overweight		191	39.1
	Class I obesity		178	36.4
	Class II obesity		57	11.7
	Class III obesity		21	4.3
Parity	Nulliparous		232	47.4
	Primiparous		191	39.1
	Multiparous		66	13.5
Chronic Illness	No		428	87.5
	Yes		61	12.5
Smoking	No		441	90.2
	Yes		48	9.8

Table 2. Birth and newborn characteristics

		Minimum	Maximum	Mean±SD (Median)
Gestational Age (days)		223	290	270.19±8.14 (270)
Birth Weight (grams)		1790	4815	3338.66±439.34 (3320)
1st Minute Apgar Score		2	9	7.92±0.90 (8)
5th Minute Apgar Score		4	10	9.06±0.70 (9)
		n		%
Gestational Age	Preterm	23		4.7
	Term	466		95.3
Mode of Delivery	Cesarean Section	416		85.1
	Vaginal Delivery	73		14.9
Type of Anesthesia (n=416)	General Anesthesia	289		69.5
	Spinal Anesthesia	127		30.5
Indications for Cesarean Section (n=416)	Prolonged Labor	38		9.1
	Preeclampsia	6		1.4
	Breech Presentation	30		7.2
	Previous Cesarean Section	202		48.6
	Fetal Distress	21		5
	Cephalopelvic Disproportion	78		18.8
	Transverse Presentation	17		4.1
	Intrauterine Growth Restriction (IUGR)	5		1.2
	History of Uterine Surgery	5		1.2
	Macrosomia	9		2.2
	Oblique Presentation	2		0.5
	Placenta Previa	2		0.5
	Genital Warts	1		0.2
COVID-19 infection during pregnancy	No	458		93.7
	Yes	31		6.3
Birth weight	Low Birth Weight	13		2.7
	Normal Birth Weight	453		92.6
	Macrosomia	23		4.7
Baby Gender	Female	227		46.4
	Male	262		53.6
NICU (Neonatal Intensive Care Unit)	No	444		90.8
	Yes	45		9.2

Table 3. Relationship between maternal characteristics and EPDS

		EPDS Groups		
		PPD n (%)	Normal n (%)	p-value
Education Level	Primary School	1 (4.2)	23 (95.8)	[1]0.792
	Secondary School	5 (6.5)	72 (93.5)	
	High School	10 (5.9)	160 (94.1)	
	Associate Degree	5 (6.6)	71 (93.4)	
	Bachelor's Degree	13 (9.2)	129 (90.8)	
Employment Status	Unemployed	21 (7.2)	272 (92.8)	[2]0.963
	Employed	13 (6.6)	183 (93.4)	
Blood Type	A Rh(+)	15 (7.7)	181 (92.3)	[3]0.513
	B Rh(+)	3 (4.3)	66 (95.7)	
	O Rh(+)	10 (7.2)	128 (92.8)	
	AB Rh(+)	4 (13.3)	26 (86.7)	
	AB Rh(-)	1 (16.7)	5 (83.3)	
	O Rh(-)	1 (4.8)	20 (95.2)	
	A Rh(-)	0 (0)	23 (100)	
	B Rh(-)	0 (0)	6 (100)	
Maternal age groups	>40 years	10 (12.7)	69 (87.3)	[2]0.049*
	<40 years	24 (5.9)	386 (94.1)	
BMI	Normal	1 (2.4)	41 (97.6)	0.002*
	Overweight	23 (12)	168 (88)	
	Class I obesity	4 (2.2)	174 (97.8)	
	Class II obesity	4 (7)	53 (93)	
	Class III obesity	2 (9.5)	19 (90.5)	
Parity	Nulliparous	25 (10.8)	207 (89.2)	[1]0.025*
	Primiparous	11 (5.8)	180 (94.2)	
	Multiparous	11 (16.7)	55 (83.3)	
Chronic Illness	No	31 (7.2)	397 (92.8)	[4]0.787
	Yes	3 (4.9)	58 (95.1)	
Smoking	No	30 (6.8)	411 (93.2)	[4]0.763
	Yes	4 (8.3)	44 (91.7)	

[1]Chi-square test [2]Continuity (Yates) correction [3]Fisher Freeman Halton Exact test
[4]Fisher's Exact test *p<0.05
EPDS: Edinburgh Postnatal Depression Scale; PPD: Postpartum depression

There was a significant association between PPD and gestational age (p = 0.016). However, no significant associations were observed between PPD and mode of delivery (p = 0.279), type of anesthesia (p = 1.000), indications for cesarean section (p = 0.251), or COVID-19 infection during pregnancy (p = 0.344). Additionally, birth weight (p = 0.519), baby gender (p = 0.150), and NICU admission (p = 0.180) showed no significant relationship with PPD (Table 4).

Table 4. Relationship between birth and newborn characteristics and EPDS

		EPDS Groups		p-value
		PPD n (%)	Normal n (%)	
Gestational Age	Preterm	6 (26.1)	17 (73.9)	[1]0.016*
	Term	41 (8.8)	425 (91.2)	
Mode of Delivery	Cesarean Section	43 (10.3)	373 (89.7)	[2]0.279
	Vaginal Delivery	4 (5.5)	69 (94.5)	
Type of Anesthesia (n=416)	General Anesthesia	30 (10.4)	259 (89.6)	[2]1.000
	Spinal Anesthesia	13 (10.2)	114 (89.8)	
Indications for cesarean section (n=416)	Prolonged Labor	5 (13.2)	33 (86.8)	[3]0.251
	Preeclampsia	0 (0)	6 (100)	
	Breech Presentation	1 (3.3)	29 (96.7)	
	Previous Cesarean Section	19 (9.4)	183 (90.6)	
	Fetal Distress	5 (23.8)	16 (76.2)	
	Cephalopelvic Disproportion	9 (11.5)	69 (88.5)	
	Transverse Presentation	1 (5.9)	16 (94.1)	
	Intrauterine Growth Restriction (IUGR)	0 (0)	5 (100)	
	History of Uterine Surgery	0 (0)	5 (100)	
	Macrosomia	2 (22.2)	7 (77.8)	
	Oblique Presentation	0 (0)	2 (100)	
	Placenta Previa	0 (0)	2 (100)	
	Genital Warts	1 (100)	0 (0)	
COVID-19 infection during pregnancy	No	46 (10)	412 (90)	[1]0.344
	Yes	1 (3.2)	30 (96.8)	
Birth weight	Low Birth Weight	2 (15.4)	11 (84.6)	[3]0.519
	Normal Birth Weight	44 (9.7)	409 (90.3)	
	Macrosomia	1 (4.3)	22 (95.7)	
Baby Gender	Female	27 (11.9)	200 (88.1)	[2]0.150
	Male	20 (7.6)	242 (92.4)	
NICU (Neonatal Intensive Care Unit)	No	40 (9)	404 (91)	[3]0.180
	Yes	7 (15.6)	38 (84.4)	

[1] Fisher's Exact test [2]Continuity (Yates) correction [3]Fisher Freeman Halton Exact test *p<0.05

EPDS: Edinburgh Postnatal Depression Scale; PPD: Postpartum depression

Discussion

The present study findings suggest that maternal age, BMI, parity, and gestational age are significant risk factors for PPD. Specifically, women over 40 years, those with higher BMI, nulliparous women, and those with preterm births were found to have higher rates of having PPD.

Similar to previous studies, we observed notable variations in the risk of PPD among first-time mothers.[10,11] These differences may be attributed to factors such as a lack of experience and awareness of the challenges and pressures associated with motherhood and the increased caregiving and workload demands placed on new mothers.[12] Future investigations should delve deeper into these factors to elucidate their contributions to the onset of PPD within this group.

Our analysis revealed a significant association between age and PPD, which aligns with findings from previous studies.[13] Several factors may account for this relationship, including the notion that older mothers may face more challenging transitions to motherhood, potentially exacerbated by societal expectations and the lack of social support associated with deviations from normative maternal age.[14] Additionally, the increased incidence of obstetric complications, multiple gestations, and the growing reliance on assisted reproductive technologies have been identified in the literature as potential contributors to higher depression rates in this demographic.[15] The elevated risk of PPD observed in older mothers could reflect underlying biological processes related to reproductive aging and age-associated physiological changes.

This study found a significant link between BMI and PPD, aligning with existing literature. Ertel et al. and Kumpulainen et al. both observed increased depressive symptoms in women with higher BMI.[16,17] Additionally, Mina et al. noted heightened depressive symptoms in severely obese women, regardless of glucocorticoid levels.[18]

This phenomenon may be attributed to body image concerns, as Han et al. reported that negative body image contributed to PPD risk, accounting for 12% of the BMI effect in obese women, where the protective effect of positive body image was absent.[19]

Our findings indicate that women who experience preterm births have higher levels of developing PPD. This aligns with the work of Girchenko et al., who demonstrated that mothers of preterm infants exhibited elevated levels of PPD symptoms up to 12 months postpartum.[20] Similarly, Gentile et al. reported that the likelihood of developing maternal depressive symptoms is

approximately 40% higher for mothers of preterm infants compared to those with full-term births.[21] The emotional stress associated with preterm birth, compounded by challenges such as reduced mother-infant bonding due to extended NICU stays, may contribute to this increased risk of PPD.[22]

It must be acknowledged that this study is not without limitations. Firstly, the study was conducted in a single private hospital, which may limit the generalizability of the findings. Secondly, the cross-sectional design impedes the ability to draw causal inferences between the identified risk factors and PPD. Additionally, the reliance on self-reported data introduces recall and social desirability biases, which could lead to inaccuracies in the findings. Another important limitation is the high proportion of patients who underwent cesarean sections, which may introduce bias and impact the results, as cesarean deliveries are associated with different postpartum experiences compared to vaginal deliveries. Furthermore, the use of general anesthesia in some of the cesarean section patients may have influenced recovery outcomes and PPD risk, potentially confounding the results. Lastly, the lack of longitudinal data on the onset and progression of PPD hinders a comprehensive understanding of its long-term trajectory and development over time. However, the study presents several strengths, including a thorough examination of a range of sociodemographic and obstetric risk factors associated with PPD. Moreover, the use of the validated scale ensures reliable and accurate screening for PPD. Future research should include a more detailed analysis of cesarean subtypes to better understand their potential impact on maternal mental health. Additionally, longitudinal studies with diverse populations, is needed to further explore the causal relationships between these factors and the PPD.

Conclusion

Postpartum depression is a prevalent and significant mental health concern with profound implications for both maternal and infant well-being. The present study underscores the importance of targeted screening and early intervention for at-risk groups, including older women, those with higher BMI, nulliparous women, and those experiencing preterm birth.

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