

PREVALENCE OF POSTPARTUM DEPRESSION DETERMINED USING THE EDINBURGH POSTNATAL DEPRESSION SCALE IN JEDDAH, SAUDI ARABIA

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Abstract

Although postpartum depression (PPD) is prevalent and has significant negative impacts, there is currently no standardized screening program to identify affected mothers. Different Saudi Arabian cities have shown a varying PPD prevalence, with Riyadh being much higher. A translated version of the Edinburgh Postnatal Depression Scale (EPDS) was used to ascertain PPD prevalence in Jeddah. The Relative Importance Index (RII) was employed to evaluate the key indicators of PPD through the EPDS. The PPD prevalence rate was 39.5%, with no significant differences between age groups. The RII ranked first on the EPDS, which was related to patient happiness, was the most significant factor. Women in Jeddah demonstrated a high prevalence of PPD. We recommend organized screening programs to examine women during antenatal visits and the postpartum period for early intervention, management, and psychosocial support and to alleviate the negative impact of PPD.

Postpartum depression (PPD) is a mood disorder classified under major depressive disorders, typically arising within four weeks to one year following childbirth. It is a crippling mental health issue that many new mothers face, affecting about 10–15% of adult mothers annually. It represents a substantial burden that affects the mother, the newborn, the family, and society as a whole. Although it might be expected for women in their postpartum period to experience feelings of sadness, fatigue, and mood swings due to hormonal fluctuations after childbirth, patients with PPD have dysphoric mood, hopelessness, anxiety, and fatigue, which affects the mother's ability to function and attend to the infant's basic needs such as breastfeeding and establishing an emotional bond. These symptoms may lead to feelings of guilt, shame, and isolation, potentially exacerbating the condition. In more extreme cases, affected women may develop harmful thoughts directed toward themselves or their infants. This might result in long-term effects on the child's cognitive, emotional, and social development.

Keywords: Postpartum Depression, Edinburgh Postnatal Depression Scale, Screening, Prevalence

Introduction

Postpartum depression (PPD) is characterized by several symptoms, including depression; anxiety; feelings of incompetence or guilt, particularly concerning the care of the newborn; an inability to cope; loss of control; disturbing compulsive thoughts; irrational fears; and despair. On some occasions, new mothers have suicidal or infanticidal ideation (**Callari et al., 2014**). The consequences of PPD are not limited to the mother; rather, they extend to the children, as they may impair their development. Mothers with PPD exhibit more negative and disengaged behavior, which may hinder the maturation of a child's social, cognitive, and behavioral skills (**Alharbi and Abdulghani, 2014**). Despite the high prevalence and negative consequences of PPD, routine screening is still not a standard of care. In 2015, the United State Preventive Services Task Force recommended the screening of all pregnant and postpartum women (**Çela and Kola, 2019**). However, this approach has not been practically applied in all institutes. Moreover, since no standardized screening method has been universally recommended, many countries do not routinely screen for PPD during antenatal or postnatal follow-ups. Therefore, developing many tools to determine the risk or screen for PPD is crucial, considering the underestimated percentage of women affected by PPD and its adverse effects on the mother and fetus/newborn. A valid tool for this assessment is the Edinburgh Postnatal Depression Scale (EPDS), which allows an early identification and addresses women's psychological vulnerabilities predisposing them to PPD. Furthermore, this is crucial, because even if a woman is not clinically depressed during the assessment, she may develop depressive symptoms within the first 12 months postpartum. Researchers have found that it is a reliable and valid screening tool (**Wilkinson et al., 2016**). EPDS had a sensitivity of 86% and specificity of 93% in the Caerphilly sample of **Harris et al. (1989)**. **Ghubash et al. (1997)** concluded that the translated Arabic version of the EPDS is valid and reliable. Therefore, we adopted this questionnaire to identify the incidence of PPD in our study population [5]. We aimed to recognize the burden of PPD on women in King Abdulaziz Medical City, National Guard Hospital, Jeddah, Saudi Arabia.

Methods

Study design and participants

This cross-sectional study was conducted in King Abdulaziz Medical City (KAMC), Jeddah, Saudi Arabia. Women who gave birth between October 2021 and March 2022 and consented to participate in the study were included. In contrast, women with current depressive disorders or other psychiatric illnesses and those who failed to complete the questionnaire were excluded. Overall, 308 women in their postnatal period participated in the study.

Study objectives

The study's objectives are as follows: (1) to assess the prevalence of PPD in the National Guard Hospital, Saudi Arabia; (2) to establish an efficient and feasible tool for screening for perinatal depression among patients; and (3) to determine the risk factors that can lead to PPD. The secondary objective was to determine the risk factors associated with suicidal ideation.

Data Collection

The data were collected from women through face-to-face interviews to fill out the questionnaire during their stay in the inpatient postnatal ward, where the EPDS was administered to them directly. The EPDS used to interview patients was the Arabic version of the EPDS that was validated by **Ghubash et al. (1997)**

The patient's depression was measured using the EDPS, which is a 10-question survey based on a Likert-like scale coded with values between 0 and 3 points; the higher the number, the more likely the sum would be indicative of PPD.

Statistical analysis

Continuous and categorical variables are expressed as means and standard deviations and frequencies and percentages, respectively. The histogram and Kolmogorov–Smirnov test were applied to test the statistical normality assumption, and Levene's test was used to test the homogeneity of variance statistical assumption. Cronbach's alpha was used to assess the internal consistency of the questionnaire. The EPDS questionnaire total subscale scores were computed as an item parcel by adding the scale indicators according to the author's scoring system. The cutoff values of 8, 9, 11, and 14 were applied to the women's EPDS total score to denote unlikely, possible, high possibility, and positive status of PPD for the analyzed women, respectively (Alsayed et al., 2021). The area under the receiver operating curve (AUC-ROC) test was used to assess the sensitivity and specificity of the total EPDS questionnaire score in predicting women's previous depressive episodes. Multivariate binary logistic regression analysis was used to assess the factors that may help explain women's current depression status and past exposure to depressive episodes. The association between the predictors and outcome in the multivariate logistic regression was expressed as multivariate-adjusted odds ratios (OR) with their associated 95% confidence intervals. A Box-Cox interaction effect test was applied to women's dichotomized age and polygamy on their odds of PPD, using dummy-coded effect variables. Multivariate binary logistic regression analysis was applied to the dichotomized likelihood of PPD (low versus high EPDS depression scores).

All statistical analyses were performed using the SPSS IBM statistical analysis program version 21, and the statistical alpha significance level was set at $p < 0.05$.

Reliability analysis of the EPDS questionnaire

The Cronbach's alpha test of internal consistency showed that the ten indicators measuring women's PPD using the EPDS questionnaire were internally consistent; as such, the scale can be reliably used on Arabic people (Cronbach's alpha = 0.77). The AUC-ROC test was used to assess the overall accuracy of the EPDS total score in predicting women's previous episodes of depression, and the results showed that the EPDS total score was substantively specific and sensitive in predicting women's previous exposure to depression episodes (AUC-ROC = 0.787, $p < 0.001$).

Ethical considerations

Informed consent was obtained from each participant before they were interviewed. Additionally, ethical approval was obtained from the Institutional Review Board (IRB) of King Abdullah International Medical Research Center (KAIMRC), National Guard Health Affairs (NGHA), Jeddah, Saudi Arabia (reference number: JED-20-427780-174035) in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki).

Results

Overall, 308 patients participated in the 6-month study period. The mean age of patients was 29.60 ± 5.6 years, and the median number of previous pregnancies was 2 pregnancies, with an interquartile range (IQR) of 3 pregnancies.

Table 1 describes the patients' medical histories, delivery types, and associated complications. The most common delivery mode was a vaginal delivery, followed by cesarean section (CS). When asked if their husbands were in polygamous marriages, most women reported being in a monogamous marriage. Table 2 describes the questions and the frequency of responses to each question.

Table 1 Descriptive analysis of the postnatal women's sociodemographic, medical, and gynecological history

Variable	Frequency (percentages)
Mode of delivery	
Spontaneous vaginal delivery	193 (62.5%)
Cesarean section	111 (35.9%)
Vacuum (Kiwi)	4 (1.3%)
Forceps	1 (0.3%)
Type of delivery	
Elective	130 (55.8%)
Emergency	103 (44.2%)
Polygamous husband	18 (5.8%)
Employment status	50 (16.2%)
History of anemia	85 (27.5%)
Previous history of depression	21 (6.8%)
Family history of psychiatric illness	19 (6.1%)
Postpartum hemorrhage during current delivery	32 (10.4%)
NICU admission of current newborn	47 (15.2%)

NICU: Neonatal Intensive Care Unit

Table 2: Descriptive analysis and mean rankings of women's perceptions of the postpartum (EPDS) scale indicators.

	Frequency	Percentage	Mean score rank
1. I have been able to laugh and see the funny side of things			9
As much as I always could	263	85.1	
Not quite so much now	33	10.7	
Definitely Not so much now	9	2.9	
Not at all	4	1.3	
2. I have looked forward to enjoyment to things			8
As much as I ever did	249	80.6	
Rather less than I used to	44	14.2	
Definitely less than I used to	14	4.5	
Hardly at all	2	0.6	
3. I have blamed myself unnecessarily when things went wrong			2
No, never	138	44.7	
Not very often	58	18.8	
Yes, some of the time	79	25.6	
Yes, most of the time	34	11	
4. I have been anxious and worried for no good reason			1

No, not at all	107	34.6	
Hardly ever	49	15.9	
Yes, sometimes	119	38.5	
Yes, very often	34	11	
5. I have felt scared or panicky for no very good reason			4
No, not at all	133	43	
No, not much	66	21.4	
Yes, sometimes	86	27.8	
Yes, quite a lot	24	7.8	
6. Things have been getting on top of me			3
No, I have been coping as well as ever	122	39.5	
No, most of the time I have coped quite well	81	26.2	
Yes, sometimes I have not been coping as well as usual	81	26.2	
Yes, most of the time I have not been able to cope at all	25	8.1	
7. I have been so unhappy that I have had difficulty sleeping			5
No, not at all	157	50.8	
Not very often	74	23.9	
Yes, sometimes	58	18.8	
Yes, most of the time	20	6.5	
8. I have felt sad or miserable			
No, not at all	200	64.7	7
Not very often	87	28.2	
Yes, quite often	11	3.6	
Yes, most of the time	11	3.6	
9. I have been so unhappy that I have been crying			6
No, never	192	62.1	
Only occasionally	93	30.1	
Yes, quite often	11	3.6	
Yes, most of the time	13	4.2	
10. The thought of harming myself has occurred to me			10
Never	294	95.1	
Hardly ever	10	3.2	
Sometimes	5	1.6	
Yes, quite often	0	0	

The question most frequently answered negatively was, “I have been anxious or worried for no good reason.” This was followed by “I have blamed myself unnecessarily when things went wrong” and “Things have been getting on top of me.” The women's top perceived indicator of PPD was their sense

of anxiousness and worry for no validated reason. However, the least perceived indicator of PPD was suicidal thoughts, although 15 (4.8%) women had rarely-to-sometimes experienced suicidal ideation. PPD was likely in 32.6% of the patients with an EPDS score ≥ 9 . Of these, 8.1% had probable depression (score ≥ 14). Table 3 describes the proportion of PPD among patients.

Table 3 Proportion of postpartum depression among the patients.

	Frequency	Percentage /SD
Overall EPDS score, mean (SD)		6.61 (4.76)
Overall EPDS score levels		
Depression not likely (EPDS score ≤ 8 points)	208	67.3
Possible Depression: (EPDS score = 9–11)	57	18.4
Fairly high depression possibility (EPDS score = 12–13)	19	6.1
Probable depression (EPDS score ≥ 14 points)	25	8.1

EPDS: Edinburgh Postnatal Depression Scale; SD: standard deviation

Multivariate regression analysis showed that neonatal admission to the Neonatal Intensive Care Unit (NICU), a history of depression, and being married to a polygamous husband significantly correlated with the likelihood of having PPD.

Table 4 shows the multivariate logistic binary regression analysis of patients' likelihood of PPD; women married to polygamous husbands had a significantly higher mean predicted probability of PPD than women with monogamous husbands. Women with polygamous husbands aged ≤ 30 years were slightly more predisposed to high PPD than those aged >31 years. However, women married to polygamous husbands did not show a significant correlation with their history of depression. In contrast, patients' EPDS scores had a significant positive correlation with a history of depression. The mean EPDS score was 25% higher in patients with previous depressive episodes ($p < 0.001$).

Table 4 Multivariate logistic binary regression analysis of high risk of postpartum depression.

Parameter	Multivariate adjusted OR	95% CI for OR		p-value
		Lower	Upper	
Age of the women in years	0.954	0.883	1.031	0.236
Mode of delivery	1.052	0.842	1.314	0.657
Positive family history of depression	0.702	0.182	2.711	0.608
Positive family history of psychiatric illness	0.354	0.072	1.737	0.201
Positive experience of postpartum hemorrhage	0.871	0.324	2.341	0.785
Newborn required NICU admission	2.591	1.222	5.493	0.013
Positive history of previous depressive episodes for the women	5.508	2.076	14.618	0.001

Number of previous pregnancies-parities	1.11	0.91	1.353	0.305
Employed women	1.274	0.574	2.829	0.552
Positive history of anemia	1.202	0.624	2.316	0.582
Marriage to a polygamous husband	3.609	1.146	11.361	0.028
Constant	0.4			0.404

CI: confidence interval; NICU: Neonatal Intensive Care Unit; OR, odds ratio

Furthermore, suicidal ideation was screened using the question, “the thought of harming myself has occurred to me.” The multivariate binary logistic regression analysis showed that age, having a polygamous husband, scoring ≥ 1 to the questions “I have looked forward with enjoyment to things” and “I have been so unhappy that I have been crying” were all significantly associated with the odds of having suicidal ideation. Table 5 describes the multivariate logistic binary regression analysis of the patient’s likelihood of suicidal ideation.

Table 5 Multivariate logistic binary regression analysis of postpartum suicide risk.

Parameter	Multivariate adjusted OR	95% CI for OR		p-value
		Lower	Upper	
Age (years)	.881	.786	.987	.029
Marriage to polygamous husband=yes	6.507	1.104	38.347	.038
Q_2: Loss of joy in things	2.748	1.205	6.269	.016
Q_5: Scare and panic for no good reason	1.491	.818	2.717	.192
Q_6: Feeling overwhelmed	.685	.341	1.377	.289
Q_7: Problematic sense of unhappiness	1.427	.772	2.635	.256
Q_9: Crying due to feeling unhappy	1.899	.991	3.639	.050
Positive history of anemia during pregnancy?	.364	.081	1.647	.190
Constant	.369			.554

CI: confidence intervals OR: odds ratio

Discussion

PPD falls under the perinatal depression spectrum, which includes various mood disorders that can affect women during pregnancy and approximately 12 months after childbirth. Although the disorder was first described in the early 1950s by Hemphill, it was believed at that time to be confined to what is now referred to as “postpartum blues,” occurring shortly after childbirth due to hormonal causes, as per Kendell in 1987. However, in the 1980s, researchers began to understand that it was more complex. The condition extends beyond the immediate postpartum period and can affect mothers through many external causes (Hapgood et al., 1988; O'Hara et al., 1983). In 1994, the first diagnostic and statistical manual of mental disorders (DSM) for PPD was published. According to the American Psychiatric Association 2013, symptoms of the disorder include a depressed mood; loss of interest or pleasure, appetite, sleep, and energy; difficulty concentrating or making decisions, and suicidal ideation. Recently, most studies conducted on PPD have been based on maternal depression in the first postpartum year.

In this cross-sectional study, PPD prevalence was estimated to be 32.6% among 308 women, which is much higher than the estimated prevalence of 17% found in the systematic review and meta-analysis by Shorey et al. (2018). In a Moroccan study, the prevalence was estimated to be 20.1% (Agoub et al., 2005). A PPD prevalence of 20.9% was identified in a cross-sectional multicenter study of 172 mothers

in the western region of Saudi Arabia (**Alsayed et al., 2021**). In another study in Jeddah, published in 2015, 280 mothers were reviewed; their estimated PPD prevalence was 23.9%, and postpartum blues (PPB) were a notable independent risk factor for developing PPD in their study population (80.6%) (**Almarzouki et al., 2015**). Primary Health Care (PHC) centers in the eastern province had an estimated PPD prevalence of 17.8% [13]. Two research groups in Riyadh showed differing percentages; one was 33.2%, and the other was 38.5%. (**Alharbi and Abdulghani, 2014; Al Nasr et al., 2020**). In 2017, **Bawahab et al. (2017)**, based in Jeddah, Saudi Arabia, reviewed antenatal depression prevalence among 320 women in an antenatal clinic starting at 8 weeks of pregnancy until term. They found that 57.5% of the participants had antenatal depression. This was higher than that reported by **Moawed et al. (2015)** who found the antenatal depression rate among women in Riyadh, Saudi Arabia, to be approximately 44.2%. The variation in prevalence among the different populations can be attributed to the various assessment tools and cutoffs used. Here, the EDPS was used to measure the likelihood of women developing PPD. According to **Evins et al. (2000)**, the incidence of PPD detection was higher when using the EPDS than with routine clinical evaluation.

In a longitudinal cohort study in Sweden, the prevalence was significantly lower (10%) in postpartum mothers followed for 1 year after delivery, with younger women being more predisposed to scoring higher on the EPDS (**Sunnqvist et al., 2019**). Here, age alone was not a statistically significant variable. However, when associated with polygamy, younger women, particularly those aged <30 years, displayed higher EDPS scores and were more likely to develop suicidal ideation. A meta-analysis of the effect of polygamy on women's mental health found that various mental health issues were significantly associated with polygamy in women (**Shepard, 2012 19**). Polygamy in the Middle East is an acceptable Islamic practice referring to men with more than one wife. This might explain the geographical variability in prevalence between the Middle East (26%) and Europe (8%) **Shorey et al. (2018)**. Moreover, it is not uncommon for Middle Eastern women to desire male offspring, as **Bawahab et al. (2017)** found that the number of daughters was significantly associated with PPD.

Moreover, sociodemographic factors such as age, income, and educational level did not correlate significantly with PPD. This finding is supported by the results of multiple studies in the region conducted by (**Alsayed et al., 2021**); **Alasoom and Koura (2014)**; **Alharbi and Abdulghani (2014)**. Furthermore, (**Agoub et al., 2005**) did not find a significant relationship between PPD and age or other demographic factors. In contrast, (**Sunnqvist et al., 2019**) found that women who had symptoms of depression also had less favorable sociodemographic and lifestyle factors. In contrast, a single status has also been found to be a significant variable associated with PPD (**Hawes et al., 2016**).

According to **Levinson et al. (2022)**, mothers who subjectively experience increased stress during their postpartum period (e.g., a prolonged NICU admission) have increased odds of a positive EPDS screen. The frequency of PPD in mothers of neonates in the NICU ranged from 28% to 70%. Similarly, a significant correlation was found between NICU admission and maternal postpartum depression, with an OR of 2.591 (**Mounts, 2009**). In a study by **Vigod et al. (2010 23)**, NICU admission of preterm or very-low-birth-weight neonates showed a significant risk of PPD during the follow-up, approximately 1 year postpartum, compared with mothers with term-healthy infants (**Vigod et al. 2010; Beck, 2003**). This finding might be due to the inability to breastfeed and bonding difficulties. **Lasheras et al. (2020)** found that the best predictor of PPD in the NICU group was the neonatal illness severity during the first hour of life.

We found that the total EDPS score correlated positively with a previous history of exposure to depressive events. This has been previously discussed in other studies. In a local Saudi study, **Bawahab et al. (2017)** also determined that a history of depression before pregnancy was a major risk factor for developing depression during pregnancy, which was associated with a 22.4-fold increase in the

prevalence of major depression during pregnancy. According to **Räisänen et al. (2014)**, a history of depression was the strongest factor for major depression during pregnancy. It was also suggested that a history of psychiatric illness, even in childhood, could indirectly lead to depressive symptoms at six months postpartum **Bernazzani et al. (1997)**. In a 2001 meta-analysis, a previous history of psychiatric disease, childhood loss of parents, and history of general depression was found to contribute to developing PPD in the first 6 months postpartum (**Beck, 2001**). However, in a recent systematic review, the authors reported that mothers with and without a history of depression have a similar prevalence, and studies should be performed regardless of previous history (**O'Hara, 2001**).

Suicide is the leading cause of maternal death. Moreover, the most common cause of psychiatric hospital admissions in the postpartum period is suicidal ideation (**Byrne et al., 2014**).

The prevalence of suicidal ideation in the literature was measured in multiple ways using the EDPS score. Some studies included patients who chose “hardly ever” in their prevalence, while others did not. This has led to inconsistencies in the reporting of its prevalence. **Bodnar-Deren et al. (2016)** found that the approximate prevalence of suicidal ideation is 2.2%, with 8% requiring emergency psychiatric care. We found that marriage to a polygamous husband and a younger age were significant risk factors, with ORs of 6.507 and 0.881, respectively. We also found that those who answered positively to Q2 and Q9 were more likely to experience suicidal ideation. Therefore, more attention should be given to those who perceive themselves as having lost joy or are crying for no reason. Other risk factors include anxiety, antepartum complications, a history of depression, and perceived inability to meet maternal responsibilities (**Bodnar-Deren et al. (2016)**).

The main limitations of our study were the cross-sectional nature and associated biases. We used one of the EPDS questions to assess suicidality. This may have been helpful but insufficient; therefore, further studies should be performed for its evaluation. We are aware that some of our patients might not have disclosed their status fully due to the social stigma surrounding being in a polygamous relationship. In conclusion, the incidence of PPD in our study is slightly higher than that in studies conducted in the region; however, many women are still missed due to the scarcity of established screening programs. Multiple risk factors, such as a history of depression, polygamy, and prolonged NICU admission, increase the incidence of PPD. Moreover, women are inadequately educated about the signs and symptoms of PPD; therefore, they suffer silently without insight into what they are experiencing. Therefore, we recommend organized screening programs in Saudi Arabia during their antenatal visits and postpartum period to help them access early intervention, referral, and management, along with psychosocial support.

Furthermore, increasing awareness in clinics with pamphlets or support groups for postpartum mothers raises the population's awareness about the signs, symptoms, and facilities to alleviate the negative impact of PPD on the mother, her family, and neonate.

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Data availability statement

Data used in this study are available with the corresponding author on reasonable request.

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