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Original Article

Prevalence of Postpartum Depression; a longitudinal study

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ABSTRACT

***Background*:** Mothers are highly vulnerable to depression within the first year after childbirth. Approximately 10-20% of mothers suffer from depression during this period, and half of these women with symptoms of prominent postpartum depression (PPD) remain undiagnosed. The Edinburgh Postnatal Depression Scale (EPDS) is the most widely applied screening instrument for PPD evaluation. In this study, we evaluated EPDS scores (score ≥12) at discharge and 2, 28 and 42 days following delivery to determine the risk factors and prevalence of PPD in mothers of infants admitted to the Neonatal Intensive Care Unit (NICU).

***Methods*:** A sample of 682 women completed the EPDS scale upon admission and hospital discharge. PPD assessment was performed at days 28 and 42 following delivery via phone interviews.

***Results*:** Upon admission, the average EPDS score was 9.72 (SD=4.4) and 27.4% of women (n=187) had EPDS scores ≥ 12. At discharge and 28 and 42 days following delivery, the average scores were normal as follows: 9.34 (SD=3.8), 9.12 (SD=3.7) and 8.52 (SD=3.36), respectively. Within the mentioned intervals, 25.4% (n=173), 23.3% (n=141) and 15.3% (n=88) of women presented with PPD. A positive correlation was shown between EPDS scores on admission and D42 (P = 0.001) that all PPD cases at D42 had EPDS score ≥ 12 on admission The analysis showed that multiple gestation (P=0.001) and advanced age (P=0.001) were significantly associated with PPD.

***Conclusion*:** As the results indicated, women with EPDS scores ≥ 12 should benefit from close follow-ups during the postpartum period and be provided with psychological support.

Keywords: Depression, Edinburgh Postnatal Depression Scale, NICU, Pregnancy

Introduction

While a variety of distressful reactions are highly expected among women at the time of childbirth, severe and prolonged psychological problems such as postpartum depression (PPD) are of greater clinical concern. Mothers are highly vulnerable to depression within the first year after childbirth. Approximately 10-20% of mothers suffer from depression during this period (1). Unfortunately, half of women with symptoms of prominent PPD, which is one of the most common complications of childbirth, remain undiagnosed (2, 3).

If not treated, PPD may affect the mother-infant bonding, leading to attachment insecurity, developmental delays and social-interaction difficulties (4, 5). Infants admitted to neonatal intensive care units (NICUs) are at high risk of PPD complications. In fact, mothers with PPD are twice as likely to experience future episodes of depression over a five-year period (6).

According to the Diagnostic and Statistical Manual for Mental Disorders (DSM-IV-TR) and the International Classification of Diseases (ICD-10), the period of postpartum depression may extend to four and six weeks after birth, respectively. The National Institute for Health and Care Excellence (NICE) guidelines recommends PPD screening at 4-6 weeks after delivery.

Prevalence of PPD ranges between 3.5% and 63.3% in the general population (7) and 14% and 53% in NICUs (8). In Iran, no previous study has focused on the prevalence of PPD in NICUs, although in a previous study, the prevalence of PPD was estimated at 25% in the general population (range: 19-43%) (9).

The Edinburgh Postnatal Depression Scale (EPDS) is the most widely applied screening instrument for the evaluation of PPD. In this longitudinal study, we assessed EPDS scores (scores ≥ 12) during the postpartum period (at

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discharge and days 2, 28 and 42 following delivery) to determine the risk factors and the prevalence of PPD in mothers of NICU-admitted neonates. Stressful life events, e.g., NICU admission of infants, were regarded as risk factors for PPD (10).

The results of this study could provide clinicians with the most recent knowledge on whether economic status, educational level, age, primiparity/multiparity, mode of delivery, duration of infant hospitalization, history of abortion or multiple birth are independent risk factors for PPD. The prevalence of PPD in the NICU was speculated to be higher than the general population and these mothers were expected to require exclusive psychosocial support.

Method

This longitudinal study was conducted on mothers of infants admitted to the NICU during 2013-2014 at Imam Reza Hospital, affiliated to Mashhad University of Medical Sciences, Mashhad, Iran. The study protocol was approved by the ethics committee of Mashhad University of Medical Sciences. The study procedures were thoroughly explained to the infants' guardians and written informed consents were obtained before participation.

The causes of infant admission to the NICU included prematurity, severe complications associated with prematurity, congenital anomalies and/or other severe medical conditions. A total of 1000 infants were admitted to the NICU during the study period. Overall, 682 mothers met the inclusion criteria and were enrolled in the study.

The EPDS in Farsi was used in this study for PPD evaluation. A copy of the scale was distributed among the subjects at day two after delivery and at hospital discharge. Subjects with scores ≥ 12 were considered to have PPD. Given the fact that PPD symptoms may correspond with baby blues, which may remit within two weeks after delivery, PPD assessment was performed at discharge and days 28 and 42 after delivery via phone interviews. It should be noted that the majority of women were discharged earlier than the neonates. All women were contacted via phone calls to complete EPDS.

Score 12 was regarded as the threshold for EPDS, according to many studies in Western and Eastern countries. Telephone interviews were conducted throughout the study by a single physician. Unfortunately, after 4 and 6 weeks, 11.4% and 15.8% of cases were unavailable for the follow-ups, respectively. Subjects with scores ≥ 12 at day 42 following delivery were referred to a psychiatric.

Other socio-demographic parameters were collected separately, using an additional questionnaire. Age, place of residence, economic status, educational level, primiparity or multiparity, mode of delivery, history of abortion or multiple gestations, infant transfer to the NICU and neonatal conditions were inquired.

Based on EPDS scores at discharge and days 2, 28 and 42 following delivery, prevalence of PPD was measured. The potential risk factors for PPD were investigated and compared at the specified time intervals, using Pearson's Chi-square (corrected by Fisher's exact test for small samples).

For the evaluation of predictive variables, multivariate stepwise regression was performed in our study. Only variables with a P-value ≤ 0.05 were retained in our final model. Microsoft Excel was used for data entry, and data analysis was performed, using SPSS version 19. P-value ≤ 0.05 was considered statistically significant.

Results

Based on the assessment at admission, 682 mothers were included in our sample. The subjects were divided into two groups, based on EPDS scores: non-depressed group (EPDS score < 12) (n=495, 72.6%) and depressed group (EPDS score ≥ 12) (n=187, 27.4%). As the results indicated, the average EPDS score was 9.72 (SD=4.4). Upon discharge, 509 mothers (74.6%) had EPDS scores < 12 and 173 cases (25.4) had EPDS scores ≥ 12; the average EPDS score was 9.34 (SD=3.8).

In total, 604 mothers answered our phone calls for the assessment at day 28 following delivery. As the results indicated, 463 women (76.7%) had EPDS scores < 12 and 141 cases (23.3%) had EPDS scores ≥ 12; the average EPDS score was 9.12 (SD=3.7). At day 42 following delivery, among 574 respondents, 486 cases (84.7%) had EPDS scores < 12 and 88 cases (15.3%) had EPDS scores ≥ 12; the average EPDS score was 8.52 (SD=3.36). The mean duration of neonatal hospitalization was 12.08 days (SD=6.38), and the mean age of women was 25.29 years (SD=4.44).

Economic status was poor, normal and good in 78 (11.4%), 461 (67.6%) and 143 (21%) cases, respectively. In terms of educational level, 31 women (4.5%) were illiterate, 126 women (18.5%) had elementary level education, 227 cases (33.3%) had middle school education and 298 cases (43.7%) had secondary level and academic education.

Single birth was reported in 574 mothers (84.2%) and multiple gestations was observed in 108 neonates (15.8%) (i.e., twins, triplets or quadruplets). Overall, 232 infants (34%) required respiratory support and ventilation, whereas 450 cases (66%) did not. As the results indicated, 80 women (11.7%) had a prior history of abortion (one or more cases), whereas 602 cases (88.3%) did not.

Also, caesarean section accounted for 467 births (68.5), whereas normal vaginal delivery was reported in 215 cases (31.5%). In addition, 368 neonates (53.8%) were first children of the family, whereas 314 cases (46.2%) were next-born children. Overall, 330 (48.4%) and 352 (51.6%) neonates were female and male, respectively.

Women with early depression symptoms (EPDS score ≥ 12) at admission were compared to asymptomatic participants (Table 1). EPDS score was significantly associated with cesarean section (P=0.03) and advanced age (P=0.001); the mean EPDS score was 9.19±4.23 in cases with vaginal delivery and 9.97±4.47 in cesarean cases. Cesarean section was significantly related to EPDS score ≥12 (P=0.001).

Prevalence of PPD at days 28 and 42 following delivery was significantly related to higher admission EPDS scores specially ≥12. Following delivery. There was a significant correlation between EPDS scores upon admission and scores on day 42 following delivery (P=0.001).

According to Table 2, a significant difference was observed in the prevalence of PPD during the second assessment between subjects with EPDS

Table 1. Comparison of the characteristics of the two groups upon admission

		EPDS score < 12 (%)	EPDS score ≥ 12 (%)	P-value*
N		495 (72.6%)	187 (27.4%)	
Mean age		24.75±3.89	26.72±5.42	0.461
Economic status	Poor	57(11.5%)	21(11.2%)	0.983
	Normal	335 (67.7%)	126 (67.4%)	
	Good	103 (20.8%)	40 (21.4%)	
Educational level	Illiterate	27 (5.5%)	4 (2.2%)	0.291
	Elementary	89 (18%)	37 (19.8%)	
	Middle school	166 (33.5%)	61 (32.5%)	
	Secondary level & academic education	213 (43%)	85 (45.5%)	
Multiple gestation	Single	419 (84.6%)	155 (82.9%)	0.559
	Twins, triplets, etc.	76 (15.4%)	32 (17.1%)	
Ventilation	No	319 (64.4%)	131 (70.1%)	0.175
	Yes	176 (35.6%)	56 (29.9%)	
History of abortion	No	442 (89.3%)	160 (85.6%)	0.232
	Yes	53 (10.7%)	27 (14.4%)	
Mode of delivery	C-section	321 (64.8%)	146 (78.1%)	0.001*
	Vaginal delivery	174 (35.2%)	41 (21.9%)	
Birth order	First born	259 (52.3%)	109 (58.3%)	0.606
	Second born, etc.	236 (47.7%)	78 (41.7%)	
Newborn's gender	Female	241 (48.7%)	89 (47.6%)	0.864
	Male	254 (51.3%)	98 (52.4%)	

* Significance threshold (P≤0.05)

Table 2. Comparison of the prevalence of PPD at day 42 following delivery

	EPDS score upon admission		P-value*	OR [95% CI]
	< 12	≥ 12		
N	459	115		
PPD on day 42 following delivery	24 (5.1)	64 (55.6)	0.001	1.32 [1.25-1.41]

* Significance threshold (P≤0.05)

Score ≥ 12 and others (P=0.001). Also, 55.6% of women with EPDS scores ≥ 12 upon admission suffered from PPD on day 42 following delivery. These women were 1.32 times more susceptible to the development of PPD (95% CI=1.25-1.41). A positive correlation was noted between EPDS scores upon admission and scores on day 42 following delivery (r = 0.5, P=0.001).

On day 42 following delivery, there was significant difference between the two groups in terms of multiple gestation (P=0.04) and advanced age (P=0.001). Also, there was no significant association between cesarean section and EPDS score ≥ 12 (Table 3).

Moreover, women with twins were 2.63 times more likely to develop PPD (95% CI= 1.4-4.94) (Table 4).

Discussion

Screening, medical interventions and preventive efforts for PPD in NICUs are not currently reimbursed by insurance companies, since they involve the infant's mother, who is not an NICU patient. For PPD screening and intervention programs to become obligatory and sustainable, researchers must consider reduced utilization of health care services, resulting in decreased hospital costs.

By implementing regular screening for PPD, we can target mothers who need prompt medical interventions to reduce their chances of developing PPD symptomatology.

As hypothesized, the association between some demographic factors (e.g., aged mothers and multiple gestations) and PPD suggests the importance of screening these variables.

On the other hand, based on multiple studies (11-15), disease-related factors, i.e., infant's length of hospital stay, ventilation, infant's gender and mode of delivery, were not associated with PPD. Moreover, other personal/social factors may be involved in PPD; therefore, further research is required to understand the individual contributions of these factors.

Table 3. Comparaison of the characteristics of woman in the two groups at day 42 followign delivery

		Absence of PPD N (%)	Presence of PPD N (%)	P-value*
Number	Among 574 cases	486 (84.7%)	88 (15.3%)	
Day of admission		12.09±5.91	11.26±6.26	0.25
Mean age		25.06±4.23	25.9±5.13	0.001*
Economic status	Poor	63 (13%)	9 (10.2%)	0.77
	Normal	325 (66.9%)	61 (69.3%)	
	Good	98 (20.1%)	18 (20.5%)	
Educational level	Illiterate	23 (4.7%)	4 (4.5%)	0.75
	Elementary level	96 (19.8%)	17 (19.3%)	
	Middle school	163 (33.5%)	25 (28.4%)	
	Secondary level & university education	204 (42%)	42 (47.7%)	
Multiple gestation	Single	413 (85%)	67 (76.1%)	0.04*
	Twins and more	73 (15%)	21 (23.9%)	
Ventilation	No	316 (65%)	63 (71.6%)	0.27
	Yes	170 (35%)	25 (28.4%)	
History of abortion	No	432 (88.9%)	77 (87.5%)	0.71
	Yes	54 (11.1%)	11 (12.5%)	
Mode of delivery	C-section	323 (66.5%)	63 (71.6%)	0.34
	Vaginal delivery	163 (33.5%)	25 (28.4%)	
Birth order	First born	262 (53.9%)	48 (54.5%)	0.91
	Second born, etc.	224 (46.1%)	40 (45.5%)	
Newborn's gender	Female	238 (49%)	44 (50%)	0.85
	Male	248 (51%)	44 (50%)	

* Significance threshold (P≤0.05)

Table 4. Significant factors associated with PPD, according to the stepwise analysis

Risk factors	OR (95% CI)	P-value
Age	1.07 (1.01-1.13)	0.01*
Multiple gestation	2.63 (1.4-4.94)	0.003*

The present study also evaluated the prevalence of PPD in mothers of infants admitted to the NICU. Nearly one-third of mothers in this study met all diagnostic criteria for PPD. PPD was highly correlated with EPDS score at admission. As the results indicated, 15.3% of women had PPD at day 42 following delivery.

There was no association between the level of education and PPD that converges with Goker's study[16], no association was reported between educational level and PPD in some previous studies (16). Conversely, other studies showed that low level of education was more frequently observed among women with PPD (14).

In our study, the risk of PPD on day 42 following delivery did not increase in women with a poor economical status. This finding was contrary to other studies, in which PPD was more common among housewives (14, 16). In many studies, prior history of depression has been confirmed to be a risk factor for PPD (14, 16); therefore, these individuals were excluded from our study.

According to some previous studies, NICU admission and PPD were significantly correlated (18). In our study, the prevalence of PPD at day 42 following delivery was approximately 15.3%, which was close to the prevalence rate reported in a study by Chaaya et al. (14). In our study, women with a score of ≥ 12 upon admission had a 32% higher risk of developing PPD at day 42 following childbirth (1.32 times higher), similar to a study by Dennis et al. (17).

Multivariate stepwise regression showed that advanced age (1.07 times) and multiple gestation (2.63 times) were significantly associated with a higher risk of developing PPD. Therefore, we can speculate that women with twins are potential candidates for a close follow-up, given their higher risk of PPD at day 42 following delivery. However, PPD symptoms due to the high level of maternal distress during neonatal admission reduced within the first six weeks after admission. EPDS score ≥ 12 upon admission was regarded as a predictor of PPD (r=0.51); this was similar to the findings reported by Teissedre & Chabrol and Dennis (2, 17).

Our large sample,due to the high prevalence of PPD in mothers of NICU-admitted neonates in past similar studies,may guarantied valuably of significance relationships founded about risk factors of PPD.Our study included Emam REZAs hospital NICU admitted neonates.. The high rate of caesarean section in our sample can be justified by the fact that this hospital is a tertiary center for maternal and fetal medical problems; this was in line with some previous studies (16, 19). In our study, the diagnosis of PPD was based on EPDS score. Interviews at day 42 following delivery were conducted over the phone. It should be mentioned that use of additional instruments would have been a difficult task in the present study.

Conclusion

The present study demonstrated that EDPS score ≥ 12 upon admission could be indicative of the potential risk of PPD in a sample of mothers of NICU-admitted neonates. Women with advanced age and/or multiple gestations should benefit from PPD screening.

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