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GENERAL GYNECOLOGY

The influence of infant characteristics on postpartum depression among mothers with hospitalized infant in NICU

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Abstract

Purpose The purpose of the study to determine the prevalence of mother postpartum depression and to examine the association between infant characteristics and postpartum depression in the neonatal intensive care unit.

Methods A quantitative cross-sectional survey design was conducted in three government teaching hospitals in Jordan. A convenience sample of 188 mothers with hospitalized 188 infants in NICU was recruited. Questionnaires were used to collect the quantitative data, which include Infant Demographic Data Questionnaire, Mother Demographic Data Questionnaire and Edinburgh Postnatal Depression Scale (EPDS). The study revealed that infant characteristics such as gestational age, medical condition classification, and birth weight are found to be significant factors that influence depression among mothers.

Results The results showed that mothers with infants admitted to NICU experience postpartum depression with a mean of 3.82 and median of 4.04. There were significant differences based on gestational age, birth weight, and classification of medical condition and mothers' postpartum depression.

Conclusion Knowing the relationship of certain infant's characteristics and postpartum depression can help to focus on relevant infant characteristics so that timely interventions to improve mothers' well-being can be developed.

Keywords Postpartum depression · NICU · Mother · Infant · Characteristic

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What does this study add to the clinical work

1. The findings contribute to the development of support and educational programs for new mothers or high-risk mothers with infants admitted to NICU.
2. Professionals may use these findings to assess the depression levels and symptoms of negative psychological states, and subsequently develop ways to support mothers during their baby's time in the NICU – such as providing a parenting guide, a NICU guide, and a keepsake booklet for mothers.
3. The findings of this study is necessary to be familiar to the NICU nurses to develop a new appropriate and relevant skills among neonatal nurses which necessary to help mother in NICU, to build effective interpersonal interaction help nurses to interact effectively with mothers.

Introduction

Mothers experience stress when their newborn is admitted to the neonatal intensive care unit (NICU). It is simple to think that in this setting, postpartum depression (PPD) in women may be more prevalent. A recent study evaluated the prevalence of PPD in 131 moms who had infants who were admitted to the NICU [1].

The most effective predictors of PPD were depression during the current and previous pregnancies as well as issues with the current delivery. Additionally, there is a higher chance of getting PPD if a child spends more than two weeks in the NICU [2]. While this study suggests that PPD risk is higher for moms whose infants are admitted to the NICU. This population's PPD rate was only somewhat higher than the general population's (15%) rate [3].

Mothers with premature infants admitted to the NICU report more psychological distress than mothers with full-term infants. The literature review indicates that mothers with hospitalized infants in the NICU are able to outline numerous psychological and emotional difficulties, such as postpartum depression [1–4].

Postpartum depression is a very important issue. Unaddressed, it may be harmful to the family system by influencing the behaviours and cognitions displayed by parents to their children [5]. A premature birth with the infant hospitalized in NICU has been associated with psychological problems among mothers, the most common of which is postpartum. High prevalence of depression among mothers of premature infants compared with mothers with healthy full-term infants may be attributed to interrupted psychological processes during the pregnancy period and delivery, concern for their infant's well-being, and NICU experience [3]. Separation from the infant is another factor that increases the risk of postpartum depression [6]. Early separation between parents and infants, that is, within the first 24 h after birth, contributes to an increase in parental depression [6]. There are no studies that determined the postpartum depression among hospitalized infant in NICU and its association with infants' characteristics. Therefore, the aim of this study to determine the prevalence of mother postpartum depression and to examine the association between infant characteristics and postpartum depression in the neonatal intensive care unit.

Methods

Participants

The sampling technique was convenience sampling. Sample size is calculated based on the estimation population proportion formula. The population size was 364 infants admitted to NICU per year, so the sample size was 188 mothers of infants admitted to NICU. The inclusion criteria include mothers who are Jordanian, consent to participate in the study, understand the Arabic language, have an infant hospitalized in the NICU, have an infant who is the product of a singleton pregnancy, no previous admission experience and who visited their infant at least once throughout the hospitalization period, no experience of psychological problems. The exclusion criteria are mothers with critically ill infants in the NICU, mothers who have never visited their infant, mothers whose hospitalized infant is the product of a twin pregnancy, transfer cases from other hospitals and surgical cases.

Setting

This study was conducted in three government teaching hospitals in Jordan, selected because they are the biggest teaching hospitals in Jordan. Hospital A is located in Amman, with a capacity of 1100 beds and NICU capacity of 65 beds. Hospital B is located in Al Mafraq, with a capacity of 120 beds and NICU capacity of 24 beds. Hospital C is located in Irbid, with a capacity of 140 beds and NICU capacity of 30 beds. All NICUs are Level III NICUs, all provide similar medical services: advanced respiratory support and mechanical ventilator support.

Instruments

Infant demographic data questionnaire

Demographic data about infants were collected from medical files and the electronic medical system. Information obtained includes infants' name, gender, birth weight, gestational age, and medical diagnosis. Information on infant characteristics was sorted into three classes according to the severity of the infants' medical conditions because all hospitals in Jordan follow this classification (Kliegman, Stanton, Geme, Schor, and Behrman, 2015). The "severe" class consists of infants who are fasting, depending on total parental nutrition (TPN) and intravenous fluid, or depending completely on mechanical ventilators; the "moderate" class consists of infants who need oxygen supplements by incubator or nasal cannula, phototherapy, nasogastric tube feeding, or blood transfusion; and the "mild" class consists of infants who are admitted to the NICU for feeding and weight gain (Kliegman et al., 2015).

Mothers' demographic data questionnaire

The Mothers' demographic data questionnaire was developed to collect information about gender, age, education level, financial status, history of infertility, history of medical disorder, distance between home and hospital, transportation, number of visits, type of delivery, number of children.

Edinburgh postnatal depression scale (EPDS)

The Edinburgh Postnatal Depression Scale (EPDS) was the instrument used in this study. It was created in the beginning to help identify potential depressive symptoms in the postpartum period. It is helpful in recognizing depression symptoms and has sufficient sensitivity and specificity to recognize depressive symptoms in the prenatal period. The Edinburgh Postnatal Depression Scale (EPDS) was created in the beginning to help identify potential depressive symptoms in the postpartum period. It is helpful in recognizing depression symptoms and has sufficient sensitivity and specificity to recognize depressive symptoms in the prenatal period.

The EPDS is a ten-item questionnaire. Women are asked to answer each question in terms of the past seven days. A score is calculated by adding the individual items, as indicated below, for each question (note some items have reversed scoring): As much as I always could (score of 0), Not quite so much now (score of 1), Definitely not so much now (score of 2) and Not at all (score of 3). The total score of 13 or more is considered a flag for the need for follow up of possible depressive symptoms. In the antenatal period, repeat the EPDS in 2–4 weeks if a women's score is 13 or more in line with clinical judgement. If the second EPDS score is 13 or more, refer to an appropriate health professional, ideally the women's usual general practitioner. In the postnatal period, arrange referral or ongoing care if a women's score is 13 or more in line with clinical judgement.

Data collection

On the first day of hospital admission, the infant's files and electric medical system records were checked, to identify those who met the inclusion criteria. The home address and phone number of eligible patients were recorded.

The researcher explained the purpose and significance of the study to all potential participants. They were informed that their participation is voluntary, and they could choose to withdraw at any time. Additionally, the participants were assured that all data will be kept confidential. Written informed consent was obtained from mothers after they agreed to participate in the study. The EPDS questionnaire was distributed to mothers. The collected questionnaires were sealed envelope and kept it locked locker, and the only researcher has a key for this locker to provide the privacy and confidentiality of mother's information's.

Results

Normality test for the data distribution

A Kolmogorov–Smirnov test ($p < 0.5$) (Razail and Wah, 2011) and a visual inspection of the histograms, normal Q–Q plots, and box plots show that depression scores do not follow a normal distribution, with space a askewness of − 0.301 (SE = 0.251), and kurtosis − 0.976 (SD = 0.251). Thus, nonparametric tests are used.

Mothers' demographic data

A total of 188 Jordanian mothers with infants admitted to the NICU participated in this study. Mothers' ages ranged between 18 and 42 years, and the mean age for mothers was 27.83 ± 6.069. All mothers were married couples and Muslims. Slightly more than half of the participants (52.6%, $n = 99$) had bachelor's degrees, 19.2% ($n = 36$) had diplomas, 11.2% ($n = 21$) had postgraduate degrees, 17% ($n = 32$) had secondary education. Table 1 represents the demographic characteristics of participating mothers.

Table 1 Infants' demographic data

Variables	Participant characteristics $n=188$
Infant gestational age [*n* (%)]	
Very premature (< 28 weeks)	12 (5.9)
Premature (28–36 weeks)	110 (58.5)
Full-term (37–42 weeks)	66 (35.6)
Infant gender [*n* (%)]	
Male	105 (55.9)
Female	83 (44.1)
Infant birth weight [*n* (%)]	
Very low (< 1500 g)	70 (37.5)
Low (1500–2500 g)	96 (47.3)
Normal (> 2500 g)	22 (15.2)
Classification of medical condition* [*n* (%)]	
Mild	36 (19.1)
Moderate	52 (27.7)
Severe	100 (53.2)

*Source: Classification of medical condition in NICU (7)

Infants' demographic data

In this study, there were a total of 188 infants admitted to NICUs across 3 hospitals. 105 infants were male (55.9%) and 83 (44.1%) were female. More than half of the sample (58.5%, $n=110$) consisted of premature infants aged between 28 and 36 weeks, 35.6% ($n=66$) were full-term babies aged between 37 and 42 weeks, and 5.9% ($n=12$) were very premature infants aged less than 28 weeks. Table 1 represents the demographic characteristics of infants.

Similarity between three hospitals

Similarly, a Kruskal–Wallis test showed no statistically significant differences in terms of infant gestational age ($\chi^2=6.498$, df = 2, $p=0.093$), infant gender ($\chi^2=2.969$, df = 2, $p=0.227$), birth weight ($\chi^2=3.983$, df = 2, $p=0.136$), or classification of medical condition ($\chi^2=11.082$, df = 2, $p=0.017$) (Table 2).

Prevalence of depression among parents with hospitalized infant in NICU

To determine the prevalence of mothers' postpartum depression experienced by Jordanian mothers, results show that mothers with infants admitted to NICU experience postpartum depression with a mean of 3.82 and median of 4.04. Results showed more than half of mothers experience high depression levels, whereas 11.2% experience mild depression levels (Table 3).

Table 2 Similarity of infant characteristics between three hospitals

Characteristics	*N*	Mean rank	χ^2	*p*-value	df
Infant gestational age			6.498	0.093	2
Hospital A	50	93.92			
Hospital B	65	83.88			
Hospital C	73	104.36			
Infant gender			2.969	0.227	2
Hospital A	50	84.96			
Hospital B	65	96.38			
Hospital C	73	99.36			
Infant birth weight			3.983	0.136	2
Hospital A	50	98.04			
Hospital B	65	84.76			
Hospital C	73	100.75			
Medical condition			11.082	0.127	2
Hospital A	50	102.16			
Hospital B	65	107.86			
Hospital C	73	78.55			

* P value < .05

Table 3 Depression levels among Jordanian mothers with hospitalized infants in NICU

Depression level	Mothers (%) ($n=188$)
High	132 (59.5)
Moderate	47 (42.9)
Mild	8 (19)

The influence of infant characteristics on depression

Based on the Mann–Whitney *U* test of 391.9 ($p=0.237$), the mean rank for depression among mothers with male infants (n = 105) was 90.33, whereas it was 99.78 among mothers with female infants ($n=83$). Thus, gender is not a statistically significant contributing infant characteristic to depression. Gestational age was also found to be a significant factor of depression ($\chi^2=25.44$, df = 2, $p=0.001$), such that there was a significant difference between mothers of infants with varying gestational ages. Lower gestational ages result in higher levels of depression ($M=111.12$) than higher gestational ages ($M=65.50$).

Postpartum depression is significantly related to infant birth weight ($\chi^2=29.737$, df = 2, $p=0.001$). Mothers of infants with very low birth weight (< 1500) ($M=107.31$) experience higher depression than those of infants with low and normal birth weight ($M=78.78$, 62.40). Depression is also significantly related to the severity of the infant's medical condition ($\chi^2=53.372$, df = 2, $p=0.001$). Mothers of infants with severe conditions ($n=100$, $M=117.32$) experience more depression than those with moderate

Table 4 The influence of infant characteristics on depression

Infant characteristics	*N*	Mean rank	χ^2	*p*-value	df
Gestational age (weeks)			25.44	0.001	2
Very premature (> 28)	12	111.12			
Premature (28–36)	110	71.38			
Full-term (37–42)	66	65.50			
Medical condition			53.372	0.001	2
Mild	36	40.57			
Moderate	52	86.48			
Severe	100	117.32			

conditions ($n = 52$, $M = 86.48$) and those with mild conditions ($n = 36$, $M = 40.57$) (Table 4).

Discussion

The result showed that mothers with infants admitted to NICU experience depression with a mean of 3.82 and median of 4.04, the result of this study similar to the study result which conducted by Yurdakul et al. who studied a case control study among two groups [8]. The first is the NICU group of mothers with hospitalized infants in NICU, and the second is a control group of mothers with healthy full-term infants. The purpose of this study was to determine depression symptoms, as well as attachment style. The researchers used the Edinburgh Postpartum Depression Scale (EPDS Results showed that depression was significantly higher in the NICU group ($M = 9.6$, SD = 5.6) than in the control group ($M = 4.9$, SD = 4.9). To our knowledge, there are no studies comparing between the influences of infant characteristics on depression. According to our results, as a result of admission of their infants to NICU, the mothers experience postpartum depression. This may be due to the fact that mothers have closer bonding with their infants throughout their pregnancy and elevated anticipation of their roles as primary caregivers. When infants are admitted to the NICU, Jordanian mothers feel like they have lost their role and identity. In addition, females are usually more expressive and emotional. Turning to infant characteristics, the gender of the infant results in a significant difference in depression. Infant gestational age of less than 28 weeks resulted in higher stress scores in mothers. Lastly, mothers of infants with severe medical conditions experienced higher depression than mothers of infants with moderate or mild conditions.

The strengths of this study use a large sample size to achieve the purpose of the study. Data collection was conducted in three major hospitals in Jordan, where participants came from different socioeconomic and education backgrounds, different geographical regions, and different age groups. On the other hand, this study used the convenient sampling technique, which can limit generalizability and increase bias. It is hoped that the large sample size and diverse backgrounds of the participants will offset this limitation. A final factor is that nonparametric tests were used to analyze the data as it did not have a normal distribution.

Clinical practice

Nursing education should be based on best practices and evidence-based case to help support the staff in their important role. Moreover, nursing education should focus on best practices in supporting families and benefits of appropriate family-centered care for NICU infants at every stage of development. For health care professionals, these findings contribute to the development of support and educational programs for new mothers or high-risk mothers with infants admitted to NICU. Professionals may use these findings to assess the depression levels and symptoms of negative psychological states, and subsequently develop ways to support mothers during their baby's time in the NICU—such as providing a parenting guide, a NICU guide, and a keepsake booklet for mothers. Moreover, educational programs for mothers should use a variety of teaching methods, such as verbal instruction, demonstration and interactive hands-on practice, written instruction, animation videos and/or audiovisual materials. For strongest potential influences on parenting and infant outcomes, nurses ought to take into consideration each mothers learning style, collaborate closely with the mothers, and choose the educational method that best meets their needs.

Conclusion

Knowing the relationship of certain infant's characteristics and postpartum depression can help to focus on relevant infant characteristics so that timely interventions to improve mothers' well-being can be developed.

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Declarations

Conflict of interest Authors declare that there is no known conflict of interest or personal relationships that could have influence the research work.

Ethical approval The study was approved by the Ethical Committee of the Medical Research Ethics Committee, Ministry of Health, Jordan (No. Development/plans/73221). Participants were assured of the

confidentiality of the study. Anonymity was established through the use of codes, rather than participants' names.

Informed consent Informed written consent was obtained from participants after clear and detailed explanations about the objectives of the study.

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