Anxiety and Depression of Neonatal Intensive Care Unit Mothers During the COVID-19 Pandemic

COVID-19 Pandemisi Sırasında Yenidoğan Yoğun Bakım Ünitesi Annelerinin Kaygı ve Depresyonu

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Abstract

Background: To determine the prevalence of anxiety and depression of the mothers whose babies were admitted to neonatal intensive care unit (NICU) for any reason other than COVID-19 during the pandemic, and the effect of duration of NICU stay on mothers' anxiety and depression.

Materials and Methods: The NICU mothers were divided into three groups according to duration of hospitalization of their babies. The duration of hospitalization of the babies was < 7 days for the first group of the mothers (G1), ≥ 7- <14 days for the second group (G2), and ≥ 14- < 30 days for the third group (G3). The anxiety level of the mothers was assessed with "State Trait Anxiety Inventory (STAI)", and a cut-off score above 40 was used to define probable clinical levels of anxiety. Depression was evaluated with "Edinburgh Postpartum Depression Scale (EPDS)", and a cut-off score above 12 was considered as probable risk for presence of postpartum depression.

Results: Among 150 mothers (in each group n=50), the STAI-State scores of all mothers were > 40, indicating clinical levels of anxiety. Seventy three (48.7%) of the mothers had a EPDS score > 12. The STAI-State scores of the mothers in G3 were higher than the mothers in G2 (p=0.029). Depression scores did not differ between the three groups.

Conclusions: All the NICU mothers were found to be anxious and nearly half of them were depressive. Mean state anxiety levels were higher in mothers of babies who stayed longer in NICU.

Key Words: COVID-19 pandemic, Depression, Anxiety, Neonatal intensive care unit

Öz

Amaç: Pandemi döneminde COVID-19 dışında herhangi bir nedenle bebeği yenidoğan yoğun bakım ünitesine (YYBB) yatırılan annelerde kaygı ve depresyon prevalansını ve YYBB'de kalma süresinin annelerin kaygı ve depresyonuna etkisini belirlemek.

Materyal ve Metod: YYBB anneleri bebeklerinin hastanede yatış sürelerine göre üç gruba ayrıldı. Bebeklerin hastanede yatış süresi birinci grup annelerde (G1) < 7 gün, ikinci grupta (G2) ≥ 7- <14 gün, üçüncü grupta (G3) ≥ 14- < 30 gündü. Annelerin kaygı düzeyleri "Durumluk Sürekli Kaygı Envanteri (STAI)" ile değerlendirildi ve 40'ın üzerinde bir kesme puanı, olası klinik kaygı düzeylerini tanımlamak için kullanıldı. Depresyon "Edinburgh Doğum Sonrası Depresyon Ölçeği (EPDS)" ile değerlendirildi ve kesme puanının 12'nin üzerinde olması doğum sonu depresyon varlığı için olası risk olarak kabul edildi.

Bulgular: Yüz elli anne arasında (her grupta n=50), tüm annelerin STAI-Durumluk puanları >40 idi ve bu da klinik kaygı düzeylerini gösteriyordu. Annelerin 73'ünün (%48.7) EPDS puanı >12 idi. Grup 3'teki annelerin STAI-Durumluk puanları G2'deki annelerden daha yüksekti (p=0.029). Depresyon puanları üç grup arasında farklılık göstermedi.

Sonuç: Tüm YYBB annelerinin kaygılı olduğu ve yaklaşık yarısının depresif olduğu saptandı. YYBB'de daha uzun süre kalan bebeklerin annelerinde ortalama durumluk kaygı düzeyleri daha yüksekti.

Anahtar Kelimeler: COVİD-19 pandemisi, Depresyon, Kaygı, Yenidoğan yoğun bakım ünitesi

Introduction

The COVID-19 pandemic caused great stress and anxiety among people all over the world (1). During pregnancy, the prevalences of anxiety and depressive symptoms were found to be increased significantly compared to the pre-pandemic period, and the reason for this was speculated to have arisen from fear of infection, social isolation, and uncertainty surrounding viral spread (2,3). Following delivery, most mothers stated that the COVID-19 pandemic had adversely affected their social and family relationships. In addition, they perceived maternal role in the family, and most mothers expressed a feeling of anxiety for their family's health and loneliness (4). Especially the mothers, whose babies needed neonatal intensive care unit (NICU) admission, expressed higher levels of worry about infecting their babies and a greater degree of helplessness compared to the ones who gave birth to healthy babies (4).

During COVID-19 pandemic, the NICU visitation policies are reported to change extremely from NICU to NICU (5-7). In order to control the spread of COVID-19, many hospitals have strict visitor restriction policies, and these restrictions have significantly limited parental presence for newborns admited to NICUs (5-7). The changes in NICU visiting policies might carry the risk of secondary unintended short and long term consequences (8-10). In the short term, for instance, there would be no or limited skin-to-skin care during the NICU stay, which has been shown to have physiological and psychological benefits for both the newborns and their parents (8). Also, kangaroo mother care, known to reduce mortality of low birth weight neonates, could not be performed, and direct breastfeeding could not be provided due to those restrictions (10). Besides babies of mothers with suspected or confirmed COVID-19, admissions to NICUs are ongoing for other reasons. During the pandemic, both giving birth to an unhealthy baby and not being able to see their babies due to visiting restrictions of NICUs might seriously impair mothers' psychological states (4-7). In this study, we primarily aimed to find out prevalence of anxiety and depression of the mothers whose babies were admitted to NICU for any reason other than COVID-19. Secondarily, we aimed to determine the effect of duration of NICU stay of babies on mothers' anxiety and depression.

Materials and Methods

This was a prospective study conducted in June 2021 in a training and research hospital. Ethics committee approval was obtained for the study from Harran University clinical ethic committee (date: 24.05.2021, number: 19).

Neonatal intensive care unit protocol during the pandemic

During the study period, parents were allowed to visit their babies at NICU only on admission and on Fridays, and the parents were called by phone to give information about the health status of their babies on Tuesdays. In addition, parents were called by phone to be informed, if their baby's clinical condition worsened or if it was decided to discharge their baby. Parents could call the NICU at any time and get information. The huge workload of our NICU staff, rapid patient circulation of our NICU, the lack of single family rooms, and the presence of limited number of available protective equipment for families were the main reasons why we applied so strict visitor restrictions. The parents were not allowed to handle their babies or engage in kangaroo care during their visitation. The parents were asked to bring expressed breast milk to NICU any time they wanted during the NICU stay.

All parents had to wear masks, gloves, disposable clothing, and social distancing practices were adopted during NICU visits. The babies born from mothers with suspected or confirmed COVID-19 were kept isolated in a dedicated area of the NICU ("quarantine zone"), where parents were not allowed, and physician and nurses had to wear personal protective equipment according to the Centers for Disease Control and Prevention guidelines. We did not routinely test the babies for COVID-19, if there was no contact history of COVID-19.

Study sample

We included mothers who did not have any signs of infection and whose babies were admitted to the NICU for any reason other than COVID-19. Informed consent was obtained from all individuals included in this study. The mothers were divided into three groups according to duration of hospitalization of their babies when they participated in the study. The duration of hospitalization of the babies was < 7 days for the first group of the mothers (G1), ≥ 7- <14 days for the second group (G2), and ≥ 14- < 30 days for the third group (G3). Mothers who had any symptoms of infection and had a language problem that would impair compliance with the study, and mothers of babies whose duration of NICU stay > 30 days during enrollment to the study were excluded from the study.

Data collection

The anxiety level of the mothers was assessed with "State Trait Anxiety Inventory (STAI)", and depression was evaluated with "Edinburgh Postpartum Depression Scale (EPDS)" during mothers' NICU visits on Fridays. All mothers were asked face-to-face questions of both scales one by one by the researchers.

The STAI was developed by Spielberger et al. in 1970, and adapted to Turkish by Oner and Le Compte in 1983 (11,12). The STAI has two subscales: state (STAI-S) and trait (STAI-T). There are 40 items in total, 20 items in each scale; STAI-S determines how the individual feels at a certain moment and under certain conditions, and STAI-T generally determines how the individual feels, regardless of the situation and circumstances. The internal consistency of the Turkish version of STAI-S and STAI-T are high (Cronbach α for STAI-S= 0.92 and Cronbach α for STAI-T= 0.80) (12). The answers are scored between 1 and 4 on a 4-point Likert scale, and high overall scores indicate that the level of anxiety is high. A cut-off score of 40 is used to define possible clinical levels of anxiety

(13).
"Edinburgh Postpartum Depression Scale (EPDS)," which evaluates the postpartum depression status of women, was developed by Cox et al (14). The Turkish validity and reliability tests were performed by Engindeniz et al, and the internal consistency of the Turkish version of this scale was found to be 0.79 (15). The scale has 10 self-reported questions, rated on a four-point Likert scale, which are scored from 0 to 3. The scores are summed for a total score. The scale is scored between 0 and 30, and a cut-off score above 12 is considered as probable risk for the presence of postpartum depression. Mothers, who scored above 12 on the scale, were referred to a psychiatrist for further evaluation and treatment.
Data were also collected for the following variables: maternal age, gravidity, and parity. For the newborns, birth weight, gestational week, and the primary diagnoses at admission were recorded. The primary diagnosis at admission was defined as the condition to be chiefly responsible for occasioning the admission of the neonate to the NICU for care.

Statistical analyzes
The Statistical Package for Social Sciences version 21.0 (SPSS Inc., Chicago, IL, USA) was used for statistical analyses. The normality was assessed using descriptive statistics and Kolmogorov Smirnov test. Categorical variables were expressed as frequency and percentage. Normally distributed continuous variables were expressed as mean ± standard deviation (SD) and non-normally distributed variables were expressed as median (interquartile range [IQR] p25-p75). Chi-square test was performed for categorical variables. The one-way analysis of variance (ANOVA) or Kruskal Wallis test was used for analysis of continuous variables. Dunn post hoc tests were used for pairwise comparisons.

In the assessment of the correlations between variables, Pearson's correlation test was used for variables with parametric distribution and Spearman's correlation test was used for those that had non-parametric distribution. A p-value < 0.05 was accepted as statistically significant.

Results
During the study period, 213 mother- baby dyads were eligible for enrollment, 63 of them were excluded because of predetermined reasons, and 150 mother- baby dyads were analyzed (Figure 1). The primary diagnoses of the neonates at admission to NICU are shown in Table 1. The mean EPDS score of all mothers was found to be 12.67±4.85, and 73 (48.7%) of the mothers had a score higher than 12. The median STAI-S score of all mothers was 50 (50-50), and the median STAI-T score was 47 (45-48). The mean STAI-S score of all mothers was 49.66±1.47, and the mean STAI-T score was 46.81±3.58. All the STAI-S scores, and 145 (96.7%) of the STAI-T scores were > 40, indicating clinical levels of anxiety. Maternal age, parity, delivery mode and gender were not found to differ between the three groups. The babies of mothers in G1 had greater gestational ages and birth weights compared to the babies of mothers in G3. The STAI-T scores did not differ between groups, but the STAI-S scores of the mothers in G3 were higher compared to the mothers in G2 (p=0.029). The EPDS scores did not differ between the groups. Comparisons of demographic findings, and anxiety and depression scores by groups are shown in Table 2. Duration of hospitalization of babies in NICU was positively correlated with STAI-S and EPDS scores (r, p= 0.178, 0.029; 0.170, 0.038, respectively) (Table 3).
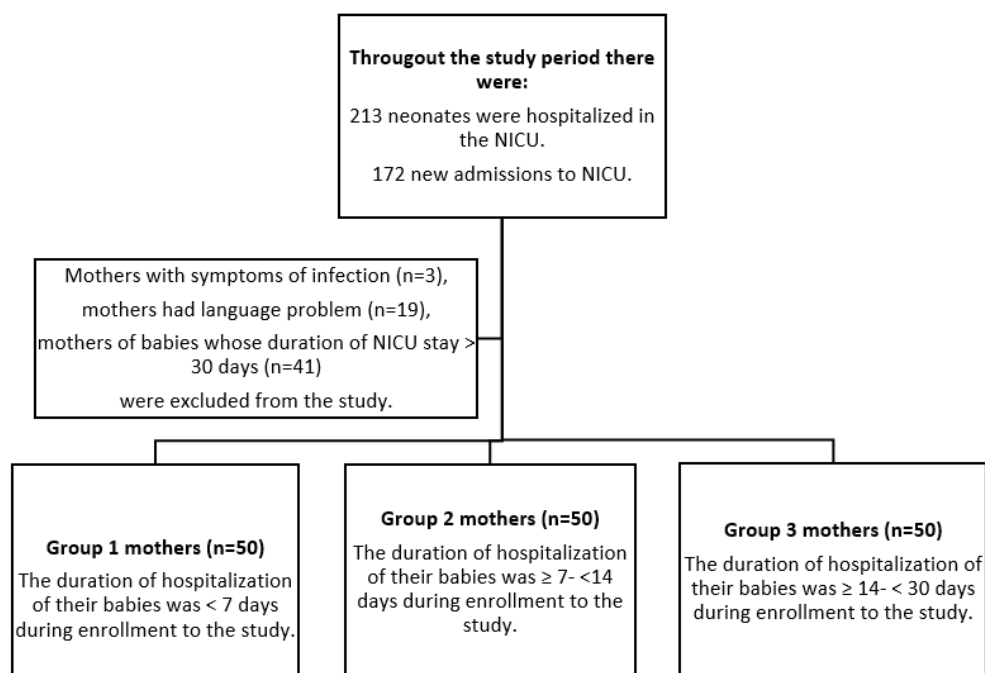

Throughout the study period there were:

213 neonates were hospitalized in the NICU.

172 new admissions to NICU.

Mothers with symptoms of infection (n=3),
mothers had language problem (n=19),
mothers of babies whose duration of NICU stay > 30 days (n=41)
were excluded from the study.

Group 1 mothers (n=50)
The duration of hospitalization of their babies was < 7 days during enrollment to the study.

Group 2 mothers (n=50)
The duration of hospitalization of their babies was ≥ 7- <14 days during enrollment to the study.

Group 3 mothers (n=50)
The duration of hospitalization of their babies was ≥ 14- < 30 days during enrollment to the study.

Figure 1. Flow chart for selection of eligible mothers in the study

NICU: Neonatal intensive care unit

Table 1. The primary diagnoses of the neonates at admission to NICU

	N (%)
Respiratory distress	92 (61.3)
Surgical diseases (esophageal atresia, anal atresia, meningomyelocele)	18 (12)
Hypoxic ischemia encephalopathy	18 (12)
Prematurity, feeding intolerance, hypoglycemia	9 (6)
Jaundice	5 (3.3)
Early onset neonatal sepsis	4 (2.7)
Congenital heart disease	4 (2.7)

Table 2. Comparisons of demographic findings, and anxiety and depression scores by groups

	Duration of hospitalization of babies <7 days (G1, n=50)	Duration of hospitalization of babies ≥ 7- <14 days (G2, n=50)	Duration of hospitalization of babies ≥ 14- < 30 days (G3, n=50)	p value
Maternal age (years), median (IQR)	25 (22-29)	26.5 (23.8-32)	27 (21.8-33.3)	0.263 [a]
Cesarean delivery, n (%)	32 (64)	34 (68)	33 (66)	0.915 [b]
Parity, median (IQR)	3 (2-4.25)	4 (2-5.25)	3 (1.75-4.25)	0.137 [a]
Gestational week, median (IQR)	37 (34-38)	36 (31-38)	32 (28.75-37.25)	0.002 [a1]
Sex (male), n (%)	14 (28)	15 (30)	23 (46)	0.117 [b]
Birth weight (g), median (IQR)	2922 (2300-3283)	2390 (1637-3200)	1745(1142-2706)	<0,001 [a1]
STAI-S score, median (IQR)	50 (50-50)	50 (50-50)	50 (49-50)	0.029 [a2]
STAI-T score, median (IQR)	47 (45-47)	47 (47-47)	47 (45-49)	0.211 [a]
STAI-total score, median (IQR)	97 (94-97)	97 (97-97)	96,5 (95-100)	0.296 [a]
EPDS score, mean ± SD	11.5±4.22	12.9±5.22	13.6±4.93	0.088 [c]

EPDS: Edinburgh Postpartum Depression Scale, IQR: interquartile range, SD: standard deviation, STAI-S: State Trait Anxiety Inventory-state subscale, STAI-T: State Trait Anxiety Inventory-trait subscale, [a] Kruskal Wallis test, [b] Chi-square test, [c] One-Way ANOVA test,
[1]G3 and G1 are significantly different,[2]G3 and G2 are significantly different

Table 3. Correlations of duration of hospitalization of babies in NICU with anxiety and depression scores

		STAI-S score	STAI-T score	EPDS score
Duration of hospitalization in NICU, days	r	0.178	0.115	0.170
	p value	0.029	0.161	0.038

Abbreviations: EPDS, Edinburgh Postpartum Depression Scale; STAI-S, State Trait Anxiety Inventory- State subscale; STAI-T, State Trait Anxiety Inventory- Trait subscale; r, correlation coefficient

Discussion

In our study, we found that although trait anxiety levels of the mothers were similar between the groups, state anxiety levels were higher in the mothers of babies with longer NICU stay. We also thought that being a NICU mother during the pandemic would be associated with increased levels of state anxiety regardless of trait anxiety levels. Unfortunately, in addition to the fact that all NICU mothers had clinical levels of state anxiety, almost all of these mothers also had clinical levels of trait anxiety. The prevalence of postpartum depression was 48.7%, and although the depression scores increased as the length of stay in the NICU increased, there was no significant difference in the scores between the groups. It could be suggested that lower gestational age and birth weight, and longer NICU stay of the babies would increase the self reported depression scores of mothers, but there was no significant difference in depression scores between the groups, though the gestational ages and birth weights of the babies in G3 were lower compared to the babies in G1. This might be due to the high depression scores in nearly half of the mothers in all groups. It could be speculated that the combined effect of getting pregnant and being in the puerperium period, giving birth to a sick baby, and being restricted to see and touch their babies during NICU stay, rendered the mothers anxious and depressive during the COVID-19 pandemic.

The frequency of postpartum depression varies considerably from country to country and even from region to region in the same country (16-18). In the pre-pandemic period, the prevalence of postpartum depression was reported to vary from 1.9% to 82.1% in developing countries and from 5.2% to 74.0% in developed countries using a self-reported questionnaire, while it was reported to be 25.2% (range: 9.1%-51.3%) in our country (17,18). On the other hand, the rate of postpartum depression was reported to increase to 28%-70% for NICU mothers, and the prevalences of both acute and post-traumatic stress disorders were also high among them (19,20). The COVID-19 pandemic has caused additional damage to the psychosocial well-being of NICU mothers and their families, and it is important that NICU healthcare workers should be alert for detecting individuals and families at risk in order to support them when needed (4,21).

To our knowledge, this is the study with the largest number of participants that evaluated the prevalence of anxiety and depression of new mothers whose babies were hospitalized for any reason other than COVID-19 during the pandemic. It is difficult to evaluate mothers mentally and requires extra effort, especially in units such as our NICU, where the number of patients is high and the patient turnover rate is fast. On the other hand, maternal mental health throughout pregnancy and in the first postpartum year is very important both for well-being of the mother and for the social, emotional, mental and cognitive development of the child (9,22). Therefore, it is important to consider the short and long-term psychological effects of the pandemic on NICU families, especially NICU mothers, and it is advisable to make every effort to prevent or reverse the negative effects of perinatal mental health disorders on both mothers and children (9,22-25).

Our study has some methodological limitations. First, we could not conclude that visitation restrictions alone cause maternal mental health problems, as we did not compare the impact of our visiting policies on maternal mental health with the pre-pandemic period or with different visiting restriction policies. Secondly, numerous risk factors, that had been shown to influence the postpartum anxiety level and prevalence of postpartum depression (such as mental problems/depression prior to and during pregnancy, unplanned/unwanted pregnancy, number of children, bad marital relations/problems with the spouse/dissatisfaction with marital life, violence in the family, etc), were not evaluated in this study (17). Thirdly, our findings could not be generalized to other NICUs as our visiting policy was much more stringent than the visiting policies reported in the literature (5-7). Finally, the groups were not randomised according to the primary diagnoses at admission of the neonates, which could effect the mental health status of the mothers, as the babies who stayed in the NICU longer probably had the worst clinical condition.

Conclusion

The desire to protect babies and healthcare workers from COVID-19 infection leads to various kinds of strict visit restrictions all over the World (6,21). Visit restrictions would have both short and long-term adverse consequences. In the light of our findings, it was found that screening perinatal mental health disorders without delay during the pandemic is of utmost importance, because all the NICU mothers were found to be anxious and nearly half of them were found to be depressive. There is still a big knowledge gap about what awaits those mother- baby dyads in the long term in terms of neurodevelopmental, physical and psychosocial outcomes. Therefore, it might be feasable to allow parental presence in NICUs with preventive measures, as it is proven that mask, social distancing, hygiene rules are all together able to prevent COVID-19 transmission.

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