Comparison of Maternal Attachment Level, Post-traumatic Stress Disorder, Anxiety and Depression Risk, and Related Factors in Mothers of Preterm Babies with Mothers of Term Babies

Erken Doğum Yapan Annelerde Maternal Bağlanma Düzeyi, Travma Sonrası Stres Bozukluğu, Kaygı, Depresyon Riski ve İlişkili Faktörlerin Zamanında Doğum Yapan Annelerle Karşılaştırılması

Barış Güller* (0000-0001-7911-4614), Erbu Yarcı** (0000-0003-4434-0958), Ferhat Yaylacı* (0000-0002-1360-7771)

*Dörtçelik Children's Hospital, Clinic of Child and Adolescent Psychiatry, Bursa, Turkey
**Dörtçelik Children's Hospital, Clinic of Neonatology, Bursa, Turkey

Abstract

Introduction: The aim of this study is to compare the level of attachment, post-traumatic stress disorder (PTSD), depression, anxiety risk levels, and related factors in mothers with preterm infants followed in the neonatal intensive care unit and mothers who gave birth at term in the first six months.

Materials and Methods: There were 72 mothers who gave birth prematurely and 66 mothers who gave birth at term included in the study. Hospital Anxiety Depression Scale (HADS), Perinatal Post Traumatic Stress Disorder Scale-II (PPQ-II), Maternal Attachment Inventory (MAI), and Parental Bonding Instrument (PBI) were filled in by the mothers.

Results: The number of days after birth was 76.79±43.01 in preterm babies and 78.57±36.48 in term babies. There was no significant difference between the two groups regarding the days after birth (p=0.548). The mean maternal age of preterm babies was 29.36±6.17 years. There was no significant difference between the two groups regarding the mean maternal age (p=0.717). In mothers who gave birth prematurely, the rate of having less than a high school education level was higher (p=0.036) and the monthly income level was lower (p=0.012). The mean scores of MAI (p=0.026), PPQ-II (p=0.018), and HADS depression scores were higher in mothers who gave birth prematurely (p=0.018). A significant negative correlation was found between PPQ-II and the baby's birth weight (r=-0.186; p=0.029). A negative correlation was found between HADS depression scores and the birth week (r=-0.188; p=0.027), baby's birth weight (r=-0.262; p=0.002), maternal age (r=-0.190; p=0.025), maternal education level (r=-0.227; p=0.007) and monthly income level (r=-0.168; p=0.049).

Conclusion: Our study provides important data that the risk level of PTSD and depression is high in mothers who gave birth prematurely, and factors such as maternal age, education level, socioeconomic level, birth week, and baby's weight are associated with these risks. It is also noteworthy that the level of attachment to the baby is higher in mothers who gave birth prematurely. Our results emphasize the importance of investigating the psychological reactions of mothers in the early postpartum period, receiving post-natal support, and having a social worker and psychologist in neonatal intensive care units.

Öz

Giriş: Çalışmanın amacı yenidoğan yoğun bakım servisinde takip edilmiş erken doğan bebek sahibi anneler ile hastanemize doğum sonrası bebeğini rutin kontrol için getiren zamanında doğum yapan annelerde bağlanma düzeyi, travma sonrası stres bozukluğu (TSSB), depresyon, kaygı risk düzeylerinin ve ilişkili faktörlerin karşılaştırılmasıdır.

Gereç ve Yöntem: Çalışmaya dahil edilen erken doğum yapan anne sayısı 72, zamanında doğum yapan anne sayısı ise 66 idi. Anneler tarafından Hastane Anksiyete Depresyon Ölçeği (HADÖ), Perinatal Travma Sonrası Stres Bozukluğu Ölçeği-II (PTÖ-II), Maternal Bağlanma Ölçeği (MBÖ) ve Ana Babaya Bağlanma Ölçeği (ABBÖ) dolduruldu.

Bulgular: Erken doğan bebeklerde doğum sonrası geçen gün sayısı 76,79±43,01, zamanında doğan bebeklerde 78,57±36,48 idi. Doğum sonrası geçen gün için iki grup arasında anlamlı farklılık yoktu (p=0,548). Erken doğan bebeklerin anne yaş ortalaması 29,36±6,17 yıl bulundu. Anne yaş ortalamaları için iki grup arasında anlamlı farklılık yoktu (p=0,717). Erken doğum yapan annelerde lise altı eğitim düzeyine sahip olmak daha yüksek (p=0,036), aylık gelir düzeyi daha düşüktü (p=0,012). Erken doğum yapan annelerde MBÖ (p=0,026), PTÖ-II (p=0,018) ve HADÖ depresyon puan ortalaması daha yüksekti (p=0,018). PTÖ-II ile bebeğin doğum kilosu arasında negatif korelasyon saptandı. (r=-0,186; p=0,029). HADÖ depresyon ile doğum haftası (r=-0,188; p=0,027), bebeğin doğum kilosu (r=-0,262; p=0,002), anne yaşı (r=-0,190; p=0,025), anne eğitim düzeyi (r=-0,227; p=0,007) ve aylık gelir düzeyi (r=-0,168; p=0,049) arasında negatif korelasyon bulundu.

Sonuç: Çalışmamız erken doğum yapan annelerde TSSB ve depresyon risk düzeyinin yüksek olduğu, anne yaşı, eğitim düzeyi, sosyoekonomik düzey, bebeğin doğum haftası ve ağırlığı gibi faktörlerin bu riskler ile ilişkili faktörler olduğu şeklinde önemli veriler sunmaktadır. Ayrıca erken doğum yapan annelerde bebeğe bağlanma düzeyinin daha yüksek bulunması da dikkat çekicidir. Sonuçlarımız, erken doğum sonrası annelerin psikolojik tepkilerinin erken dönemde araştırılmasının ve doğum sonrası destek almasının, yenidoğan yoğun bakım ünitelerinde sosyal çalışma uzmanı ve psikolog bulundurulmasının önemini vurgulamaktadır.

Introduction

The World Health Organization (WHO) defines births that occur before the 37th gestational week as preterm birth. According to research supported by the American Psychiatric Association and WHO; 15 million babies were born prematurely in 2010 (1). Premature babies are at high risk for neurodevelopmental, gastrointestinal, and respiratory problems. It has been reported that mothers who gave birth prematurely may experience more stress, and financial and relationship difficulties compared to those who gave birth on time due to existing risks and care problems (2). Attachment is a strong bond that develops between the baby and the mother (primary caregiver) and creates a sense of trust (3). In addition, the secure attachment of the mother to her own parents may also positively affect the bond she will establish with her baby (4). Besides, the level of attachment of the mother to her own parents may affect the postnatal mental health of the mother (5). The postpartum period is a source of stress for most mothers. In preterm birth, factors such as the threats to the health of the baby, separation from the baby due to the intensive care process, and the risk of retardation in the baby's physical development can be counted amongst stressful life events. For all these reasons, mothers who gave birth prematurely have a higher risk of mental health deterioration than those who gave birth on time (6). In the literature, high PTSD,

anxiety, and depression symptoms have been reported in mothers who gave birth prematurely in the first 6 months postpartum (7,8). Mental health deterioration in mothers who gave birth prematurely may also lead to attachment problems by reducing accessibility for the baby (9). In addition, it has been shown that the risk of postpartum depression is higher in mothers with insecure attachments when compared to mothers who have a secure attachment with their babies (10).

In our country, although some studies investigate mental health symptoms and mother-infant attachment in mothers with preterm babies, the number of studies evaluating a mother's attachment to her own parents and baby, as well as PTSD, depression, and anxiety risk levels is limited.

The aim of this study is to compare the level of attachment, PTSD, depression, anxiety risk levels, and related factors in the first six months of mothers with preterm infants who were hospitalized in the neonatal intensive care unit of a secondary-level children's hospital and mothers with term infants who were brought to the same hospital for routine controls. The hypotheses of the study include that preterm birth will negatively affect the attachment between the mother and the baby, and the unhealthy attachment relationship of the mother with her own parents may increase this risk. In addition, it was found that the risk levels of PTSD, depression, and anxiety were higher in mothers

who gave birth prematurely. It is also predicted that increasing maternal and infant-related characteristics such as maternal education level, socioeconomic status, week of birth, and baby weight may also protect maternal mental health.

Materials and Methods

In the study, 77 mothers with preterm babies who were treated in the neonatal intensive care unit of a secondary-level regional pediatric hospital and 74 mothers with term babies who were brought to outpatient clinics other than child psychiatry in the same hospital for routine postnatal check-ups were contacted. Among the mothers who gave birth prematurely and whose babies were hospitalized in the neonatal intensive care unit between June 2021 and March 2022, and met the inclusion criteria were included in the study. The mothers who gave birth prematurely were contacted via the contact information in their files and informed about the study. They filled in the forms when they brought their babies to the hospital for routine control and if the babies had already been routinely checked, they were invited to the hospital to fill in the forms. Moreover, mothers who gave term births filled out the forms after being directed to the child psychiatry outpatient clinic during their application for routine control in other hospital departments. Among the mothers who gave birth prematurely, the ones who gave birth one to six months ago were included in the study.

The mothers who were illiterate, who had a baby with congenital anomalies, and congenital neurological and motor deficits were excluded from the study. Stage 1-2-3 hypoxic-ischemic encephalopathy patients who were diagnosed with perinatal asphyxia and treated for hypothermia due to the disease and those who were followed up with the diagnosis of acute bilirubin encephalopathy due to indirect hyperbilirubinemia were excluded from the study. Five mothers who gave birth prematurely and eight who gave birth at term were excluded from the study due to missing data and incorrect form filling. As a result, the number of mothers with preterm babies included in the analysis was 72 and the number of mothers with term babies was 66. After being included and informed about the study, the mothers completed the sociodemographic data form, HADS to determine the risk of depression and anxiety, PPQ-II to measure how often the symptoms

of PTSD were experienced in the postpartum period, MAI to measure maternal attachment to their babies, and PBI to measure the attachment pattern to their own parents. Ethical approval was obtained for the study from Uludağ University Clinical Research Ethics Committee dated 26.05.2021 and numbered 2021-6/25.

Assessment Tools

Sociodemographic Data Form

Regarding the parents, there were questions in the form such as the age of the mother and father, their education level, their working status, occupations, current number of children, the presence of a known health problem or a chronic disease in the mother, whether the mother has had a past or present psychiatric disorder, if the parents were together or separated, and the monthly income level of the family. The monthly income level of the family was evaluated in Turkish lira, and statistical analyzes were made by dividing them into two groups according to the income level as the minimum wage and below and above the minimum wage. Regarding the pregnancy process of the mother, questions including whether there was a previous miscarriage or child loss, whether assisted reproductive techniques (in vitro fertilization) were used in the last pregnancy, whether any intervention was applied in the last birth to assist the birth (such as the use of vacuum, forceps), the last type of delivery (normal, cesarean delivery), whether there was a history of a problematic or risky pregnancy were asked. The mothers were informed that the presence of conditions such as having a pregnancy under the age of 18, the mother being overweight, having diseases prior to the pregnancy such as cardiac diseases, diabetes mellitus, hypertension, and epilepsy, having an overweight baby, history of ectopic pregnancy, history of multiple pregnancies such as twins or triplets and retardation in the baby's development were considered as risky pregnancies and they were then asked to indicate if any of these conditions were present. The form also included questions regarding the baby's date of birth, birth week, birth weight, the timing of the birth (preterm, term), the baby's gender, feeding style (bottle or breastfeeding), and feeding type (breast milk, formula, mixed).

Maternal Attachment Inventory (MAI)

Maternal attachment on the 26-item scale was tested in two phases. The first phase occurs around a month after birth, includes physical recovery, and the time when the mother is busy with the care of herself and her baby, and the second phase, which is completed in the fourth or fifth months after the birth, is when the maternal identity is gained and the feeling of attachment to the baby and maternal competence is at the highest level. A high score indicates high maternal attachment. In the scale development study, Cronbach's alpha was found to be 0.76 in the fourth month after birth, and 0.85 in the eighth month. The MAI is a self-administered scale that can be filled in by literate women. In the Turkish validity and reliability study conducted by Kavlak and Şirin (12), the MAI was found to be valid and reliable in mothers who had a baby of at least one month old (11).

Perinatal Post-traumatic Stress Disorder Scale-II (PPQ-II)

It measures the frequency of post-traumatic symptoms related to the birth experience, such as disturbing thoughts, re-experiencing, avoidance behaviors, hyperarousal, numbness, and feelings of guilt, within one year after birth. High scores obtained from the scale indicate a high level of perinatal trauma symptoms (13). The Turkish validity and reliability study was performed by Komurcu Akik and Durak Batigun (14). The analysis revealed that the PPQ-II is a valid and reliable scale for measuring the symptoms of perinatal post-traumatic stress experienced by the mother (14).

Parental Bonding Instrument (PBI)

The individual is asked to indicate how much the items reflect the behaviors of her mother or father regarding the first 16 years of her life. It can be filled by male or female adult individuals. No age range has been reported for it. A high score in the care dimension indicates the warm, understanding, and accepting perception of the concerned parent. The high scores obtained from the over-protection sub-dimension indicate that parents exhibit an attitude that is not overprotective or against autonomy. The increase in the total score and sub-dimensions indicates positive attachment (15). Turkish validity and reliability study was performed by Kapçı and Küçüker (16).

Hospital Anxiety and Depression Scale (HADS)

It was developed to determine the risk of anxiety and depression in patients and to measure its level and change in severity (17). The Turkish validity and reliability study of the scale was conducted in a group of 213 healthy university students aged 18-28 and a group of 136 patients (66 males and 70 females) aged 17-79 years, who had any physical illness, and it was reported that it was a valid and reliable scale in both groups. The cut-off points were determined as 10 for the anxiety subscale and 7 for the depression subscale. The Turkish validity and reliability study was performed by Aydemir et al. (18).

Statistical Analysis

SPSS statistical package program (SPSS for Windows, 25.0) was used for data entry and analysis. Data obtained by measurement are shown as arithmetic mean ± standard deviation, and data obtained by counting as a percentage (%). Kolmogorov Smirnov test was used to evaluate the fit of numerical variables to normal distribution. Categorical variables such as children's gender, parental education levels, and monthly income level were compared with chi-square analysis and Fisher's Exact test. The mean scores of MAI, PPQ-II, PBI, and HADS were compared with the Mann-Whitney U test because the data were not normally distributed. Spearman correlation analysis was used for non-normally distributed data while comparing the relationships between MAI, PPQ-II, PBI, and HADS subscales and monthly family income, maternal education level, and birth week. Statistical significance was accepted as $p<0.05$ at the 95% confidence interval.

Results

There were 72 mothers who gave preterm births and 66 mothers who gave term births who filled out the forms completely. The number of days after birth was 76.79±43.01 in preterm babies and 78.57±36.48 in term babies. There was no significant difference between the two groups regarding the days after birth (p=0.548). Female babies consisted of 54.2% of preterm babies and 43.9% of term babies. There was no significant difference between the two groups regarding the genders of the babies (p=0.230). The mean age of mothers of preterm babies was

29.36±6.17 years, and the mean age of the fathers of these preterm babies was 33.51±6.52 years. The mean age of mothers of term babies was 29.83±5.54 years, and the mean age of fathers of these term babies was 33.30±5.88 years. There was no significant difference between the two groups regarding the mean age of the mother and father (the p-value for the mean age of the mother=0.717, the p-value for the mean age of the father=0.829). While 44.4% of mothers who gave birth prematurely had an education level below high school, this level was found to be 27.3% in mothers who gave birth at term. The mothers who gave birth prematurely were more likely to have an education level below high school (p=0.036). Besides, the monthly income level was significantly lower in this group of mothers (p=0.012). No significant difference was seen between the two groups in comparisons regarding the father's education level (p=0.637), mother's employment status (p=0.961), father's employment status (p=0.227),

presence of siblings of the baby (p=0.483) and parental marital status (p=0.227) (Table 1).

In mothers who gave preterm birth, having a history of risky pregnancy in the past was significantly higher (p=0.007) while feeding the baby with breast milk (p=0.026) and breastfeeding (p=0.011) rates were significantly lower. Also, no significant difference was found between the two groups in the comparisons regarding whether there was a previous loss of children (p=0.682), whether assisted reproductive technology was used for pregnancy (p=1.000), whether there was an assisted intervention during labor (p=0.368), whether the mother had a physical illness (p=0.068), the presence of psychiatric disease in the mother (p=0.497), and type of delivery (p=0.103) (Table 2).

The mean MAI score in mothers who gave birth prematurely (99.05±6.67) was significantly higher than in mothers who gave birth at term (97.30±5.58) (p=0.026). The mean PBI over protection control

Table 1. Socio-demographic features		Preterm birth n (%)	Term birth n (%)	p
Days after birth (mean ± SD)		76.79 (±43.01)	78.57 (±36.48)	0.548**
Baby's gender	Female	39 (54.2)	29 (43.9)	0.230*
	Male	33 (45.8)	37 (56,1)	
Birth week (mean ± SD)		34.38 (±1.91)	38.45 (±1,67)	<0.001**
Birth weight (mean ± SD) (gram)		2461.37 (±691.22)	3283,39 (±596.16)	<0.001**
Mother's age (mean ± SD) (year)		29.36 (±6.17)	29.83 (±5.54)	0.717**
Father's age (mean ± SD) (year)		33.51(±6.52)	33.30 (±5.88)	0.829**
Mother's educational level	Below high school	32 (44.4)	18 (27.3)	0.036
	High school and above	40 (55.6)	48 (72.7)	
Father's educational level	Below high school	29 (59.7)	24 (36.4)	0.637*
	High school and above	43 (40,3)	42 (63.6)	
Mother's working status	Working	21 (29.2)	19 (28.8)	0.961*
	Not working	51 (70.8)	47 (71.2)	
Father's working status	Working	72 (100)	64 (97)	0.227***
	Not working	0 (0)	2 (3)	
Monthly income level	Minimum wage or below	53 (73.6)	35 (53.0)	0.012*
	Above the minimum wage	19 (26.4)	31 (47.0)	
Siblings	Yes	53 (73.6)	45 (68.2)	0.483*
	No	19 (26.4)	21(31.8)	
Marital status	Married	72 (100)	64 (97)	0.227***
	Divorced	0 (0)	2 (3)	
*Chi-square tests, **Mann-Whitney U Test, ***Fisher's Exact test, n: Number, %: Percentage, SD: Standard deviation				

dimension score in mothers who gave birth prematurely (24.31±5.73) was significantly lower than in mothers who gave birth at term (26.19±5.57) (p=0.048). The mean PBI care dimension score was found to be 23.61±7.58 in mothers who gave birth prematurely, and 23.86±6.34 in mothers who gave birth at term. In addition, while the mean PBI total score was 47.93±11.69 in mothers who gave birth prematurely, it was 50.21±10.01 in mothers who gave birth at term. There was no significant difference between the two groups for the mean PBI care dimension and PBI total score (p=0.843 and p=0.289, respectively). The mean PPQ-II score (16.40±6.67) in mothers who gave birth prematurely was found to be significantly higher compared to mothers who gave birth at term (12.34 ±7.03) (p=0.018). In addition, the mean HADS depression subscale score in mothers who gave birth prematurely (7.47±3.39) was significantly higher than in mothers who gave birth at term (5.95±3.10) (p=0.018). Although the mean HADS anxiety subscale score (8.52±4.14) was higher in mothers who gave

birth prematurely compared to mothers who gave birth at term (7.28±4.19), this difference was not statistically significant (p=0.085) (Table 3).

In our study, correlation analyzes were performed for PBI, MAI, PPQ-II, HADS, week of birth, birth weight, maternal age, maternal education level, and family monthly income. A significant positive correlation was found between PPQ-II and HADS-A (r=0.565; p=0.000) and between PPQ-II and HADS-D (r=0.413; p<0.001). There was also a significant positive correlation between HADS-A and HADS-D subscales (r=0.585; p<0.001). A significant negative correlation was found between PPQ-II and the baby's birth weight (r=-0.186; p=0.029). A significant negative correlation was found between the HADS-D subscale and birth week (r=-0.188; p=0.027), birth weight of the baby (r=-0.262; p=0.002), maternal age (r=-0.190; p=0.025), maternal education level (r=-0.227; p=0.007) and the monthly income level of the family (r=-0.168; p=0.049) (Table 4).

Table 2. Birth and postnatal characteristics of the mother and the baby		Preterm birth n (%)	Term birth n (%)	p
Ever lost a child before?	Yes	4 (5.6)	2 (3)	0.682**
	No	68 (94.4)	64 (97)	
Ever had a high-risk pregnancy?	Yes	24 (33.3)	9 (13.6)	0.007*
	No	48 (66.7)	57 (86.4)	
Was there any assisted reproductive technique in the last pregnancy?	Yes	2 (2.8)	2 (3.0)	1.000**
	No	70 (97.2)	64 (97.0)	
Was there an assisted intervention in child birth?	Yes	4 (5.6)	1 (1.5)	0.368**
	No	68 (94.4)	65 (98.5)	
The birth method	Normal	23 (31.9)	30 (45.5)	0.103*
	C-Section	49 (68.1)	36 (54.5)	
Method of feeding the baby	Bottle	23 (31.9)	9 (13.6)	0.011*
	Breastfeeding	49 (68.1)	57 (86.4)	
Baby's feeding type	Breastmilk	35 (48.6)	47 (71.2)	0.026*
	Formula	10 (13.9)	5 (7.6)	
	Mixed (formula + breastmilk)	27 (37.5)	14 (21.2)	
Presence of a physical illness in the mother	Yes	13 (18.1)	5 (7.6)	0.068*
	No	59 (81.9)	61 (92.4)	
Presence of a known psychiatric illness in the mother	Yes	6 (8.3)	3 (4.5)	0.497**
	No	66 (91.7)	63 (95.5)	
*Chi-square tests, **Fisher's Exact test, n: Number, %: Percentage				

Discussion

Our study in which we compared the attachment level, risk levels for PTSD, depression, anxiety disorder, and related factors of mothers with preterm babies followed up in the neonatal intensive care unit of a secondary care pediatric hospital with mothers with term babies in the first six months after birth, provides important data stating that PTSD and depression risk levels are high in mothers who gave birth prematurely, and factors such as maternal education level, maternal age, socioeconomic level, baby's birth weight and birth week are associated with these risk levels. Moreover, it is remarkable that only the birth weight of the baby was found to be associated with the PTSD risk level in the mother among the factors related to the baby and the mother.

Table 3. Comparison of MAI, PBI, PPQ-II, and HADS scores in mothers			
	Mean ± SD		p*
	Preterm birth	Term birth	
Maternal attachment inventory	99.05 (±6.67)	97.30 (±5.58)	0.026
Perinatal post-traumatic stress disorder scale-II	16.40 (±6.67)	12.34 (±7.03)	0.018
Parental bonding instrument care dimension	23.61 (±7.58)	23.86 (±6.34)	0.843
Parental bonding instrument over protection control dimension	24.31 (±5.73)	26.19 (5.57)	0.048
Parental bonding instrument total score	47.93 (±11.69)	50.21 (±10.01)	0.289
HADS anxiety scale	8.52 (±4.14)	7.28 (±4.19)	0.085
HADS depression scale	7.47 (±3.39)	5.95 (±3.10)	0.018
MAI: Maternal attachment inventory, PBI: Parental Bonding Instrument, PPQ-II: Perinatal post-traumatic stress disorder scale-II, HADS: Hospital anxiety and depression scale, *Mann-Whitney U test, SD: Standard deviation			

Table 4. Correlations between the birth week of children, income level, maternal education level, PBI, MAI, PPQ-II and HADS					
	PBI	MAI	PPQ-II	HADS-A	HADS-D
PBI					
MAI	0.034 (p=0.690)	-	-	-	-
PPQ-II	-0.100 (p=0.245)	-0.118 (p=0.167)	-	-	-
HADS-A	-0.028 (p=0.743)	0.001 (p=0.988)	0.565 (p=0.000)	-	-
HADS-D	-0,147 (p=0.085)	-0,110 (p=0.201)	0,413 (p<0.001)	0.585 (p<0.001)	-
Birth week	0.105 (p=0.218)	-0.104 (p=0.224)	-0.129 (p=0.130)	-0.009 (p=0.912)	-0.188 (p=0.027)
Birth weight	0.069 (p=0.421)	-0.018 (p=0.838)	-0.186 (p=0.029)	-0.097 (p=0.258)	-0.262 (p=0.002)
Maternal age	0.017 (p=0.844)	-0.023 (p=0.792)	-0.022 (p=0.802)	0.001 (p=0,992)	-0.190 (p=0.025)
Maternal education level	0.266 (p=0.002)	-0.115 (p=0.180)	0.053 (p=0.538)	0.138 (p=0.107)	-0.227 (p=0.007)
Monthly income level	0.236 (p=0.005)	-0.194 (p=0.023)	0.074 (p=0.386)	-0.050 (p=0.563)	-0.168 (p=0.049)
Spearman's correlation analysis, MAI: Maternal attachment inventory, PBI: Parental bonding instrument, PPQ-II: Perinatal post-traumatic stress disorder scale-II, HADS: Hospital anxiety and depression scale					

In a study conducted with mothers whose babies were followed up in the neonatal intensive care unit, a positive correlation was found between the birth week and breastfeeding self-efficacy, which is defined as the mother's sense of efficacy to breastfeed (19). Additionally, there are studies reporting fewer depressive symptoms in mothers who feed their babies with breastmilk or breastfeed after birth compared to mothers who feed them with formula (20,21). The fact that feeding the baby with breastmilk and breastfeeding rates were lower in mothers who gave birth prematurely, and that HADS depression scores were higher in mothers who gave birth prematurely in our study is compatible with the literature. Considering the positive effects of breastfeeding on maternal mental health and the relationship with the baby, it is important to try to bring the baby together with the mother as early and frequently as possible during the period of stay in the neonatal intensive care unit. In our study, mothers who gave birth prematurely had a higher rate of education level below high school and a lower monthly income. In a study conducted in 2014, low socioeconomic level and low education level were counted among the risk factors for preterm birth (22). Considering the literature data and our study findings, it is seen that close follow-up of those living in socioeconomically disadvantaged regions during pregnancy is important due to the risk of preterm birth.

In a 2013 study, the mean MAI score of 140 mothers whose babies were between 1-4 months old and were treated in the neonatal intensive care unit was found to be 87.19±5.46 (23). The mean MAI score being higher in our study compared to the 2013 study may be explained by the inclusion of mothers whose babies were discharged from the intensive care unit. The increase in mothers' chances of establishing physical intimacy with their babies in the post-discharge period may have increased the MAI scores. While there are studies in the literature showing that preterm birth poses a problem in mother-infant attachment, there are also studies that indicate preterm babies and mothers can be securely attached. In a study conducted with 50 mothers with preterm babies and 30 mothers with term babies in 2006, it was found that only 20% of mothers who gave birth prematurely had a secure attachment 6 months after the birth, while this rate was 53% in those who gave birth at term (24). In another study from 2008, no significant difference was found between the attachment levels of 38 mothers of preterm babies and 45 mothers of term babies. In the same study, it was reported that mothers who gave birth prematurely had the same chance of establishing a secure attachment as mothers who gave birth on time (25). In our study, there was no relationship between maternal age and education level, and mother-child attachment level. In another study investigating the effects of prenatal, perinatal, and postnatal factors on mother-infant attachment, no relationship was found between attachment level and maternal age and education level (26). In the study of Kinsey et al. (27), postpartum attachment scores were found to be lower in older, more educated mothers. Our findings and literature data show that many factors other than socioeconomic level and education level can be effective in the attachment between the mother and the child. In addition, the risk level in many areas such as retardation in fine and gross motor skills, speech delay, learning difficulties, attention deficit, and behavioral problems is higher in preterm children compared to term children (28). It is reported that the level of attachment between the mother and the baby is effective in the emotional, cognitive and physical development of the baby (29). From this point of view, high maternal attachment in mothers who gave birth prematurely in our study can be seen as a protective factor against neurodevelopmental problems in preterm infants.

Although there is data in the literature showing that the mother's level of attachment to her own parents is a predictor of the level of attachment to her baby and the mother's postpartum mental health symptoms, there was no relationship between PBI and MAI, PPQ-II and HADS scales in our study. In addition, there was no significant difference between mothers who delivered prematurely and at term regarding the total mean score of PBI (4,5). One reason for our study findings being different from the literature may be the difficulties experienced by mothers in remembering their relationships with their parents retrospectively, given the stressful postpartum period. In addition, mothers who give birth prematurely may need intensive support from their parents, especially in the postpartum period. In our study, data were collected after the discharge of preterm infants from our hospital. This may have caused bias in their assessment of their attachment levels to their parents.

In the literature, high levels of PTSD have been reported in the first 6 months postpartum in mothers who gave birth prematurely (7). In another study conducted with mothers who gave birth prematurely, it has been reported that on the 1-3 days, 14th day, and 14th month postpartum, they scored higher in questions about traumatic experience compared to the mothers who gave birth at term and that there was no significant decrease in PTSD symptoms on the 14th month (30). The fact that the mean PPQ-II score was higher in mothers who gave birth prematurely in our study is consistent with the literature data. In a study investigating the factors affecting PTSD in mothers with newborn children, factors such as gestational age, baby gender, length of hospital stay, feeding the baby, and mode of delivery were not found to be associated with PTSD. As a result of the study, it was emphasized that preterm birth is traumatic for all parents, regardless of sociodemographic characteristics or the health status of the baby (31). In our study, only a negative correlation was found between the baby's birth weight and PPQ-II. One of the conditions for the newborn to be discharged from the intensive care unit is that the baby reaches an adaptable weight. Even after a long time after birth, parents may be concerned about the baby's weight. The fact that traumatic reactions due to preterm birth were mostly associated with the weight of the baby in a 2014 study, is consistent with the finding we obtained from the study (32).

A 2019 meta-analysis and review study investigated preterm birth as a risk factor for postpartum depression over the past 10 years. It was concluded that although there are methodological differences between the studies, the existence of a relationship between postpartum depression and preterm birth was reported in the majority of the studies (33). In a study investigating postpartum stress and related factors, the risk of depression was reported to be twice as high in mothers who gave birth prematurely compared to mothers who gave birth at term. The risk was found to be higher in mothers who are younger, less educated, and have a lower income (34). In our study, a significant negative correlation was found between the HADS-D subscale and birth week, birth weight, maternal age, maternal education level, and monthly income level. In a study examining the long-term effects of postpartum depression in mothers who gave birth prematurely, 181 mothers and babies were evaluated at five separate times. Although mothers' depression levels decreased over time, symptoms decreased more slowly in those with babies with lower birth weight and in those with lower education and income level (35). The experience that emerged with the increase in parental age may have made it easier for the mother to make sense of the difficulties she faces and to cope with them more easily. Considering the fact that mothers who give birth prematurely are often from regions with low socioeconomic and educational levels and it is more difficult for those living in these regions to reach psychosocial support, the support that can be provided during pregnancy for those living in these regions may contribute to better management of the postpartum period.

Stress is a psychological phenomenon that can manifest in the form of anxiety, depression, and trauma reactions. Although the comorbidity of anxiety and depression in post-traumatic stress reactions is well known, information on the comorbidity of PTSD after preterm birth is more limited (30). In our study, a positive correlation was found between PPQ-II, HADS-A, and HADS-D scales. In a study evaluating the mental health of mothers who gave birth prematurely, the prevalences of post-traumatic stress reactions, depression and anxiety were found to be 52%, 28%, and 17%, respectively. In the same study, it was emphasized that preterm birth can be an important trauma factor for the mother, and the prevalence of depression and anxiety is lower in the mother compared to post-traumatic stress reactions (36). In a study investigating the stress level of mothers who gave birth prematurely, it was reported that there was a relationship between high-level PTSD symptoms (>33%) and high-level depression (>53%) symptoms (37). Providing support to mothers in the early post partum period is critical for reducing depression, anxiety, and traumatic stress levels. This support may include providing information about the condition of preterm babies and helping the mother make sense of her feelings.

Study Limitations

The strengths of the study are the presence of a control group, the evaluation of mothers' attachment levels to both their parents and their babies, and the use of scales that separately assess the risk of anxiety, depression, and PTSD. Despite its strengths, some

limitations can also be mentioned. The limitations of our study include the fact that only self-report scales were filled, the study was conducted in a single center, separate statistics were not made by grouping preterm infants as early, medium, late, and preterm, and the length of stay in the intensive care unit was not reported.

Conclusion

One of the remarkable results of our study is that the mean score of MAI was higher in mothers who gave birth prematurely than in mothers who gave birth at term. In addition, no relationship was found between factors such as maternal age, education level, and the level of attachment between the mother and the baby. Although there have been similar results in the literature, multicenter studies with larger samples will be useful in terms of generalizing these results. Our study provides important data that the risk level of PTSD and depression is high in mothers who gave birth prematurely, and factors such as maternal age, education level, socioeconomic level, birth week and weight of the baby are associated with these risks. Studies aiming to identify mothers at risk for postpartum depression in particular have been a growing area of research that contributes to the prevention and early detection of mental health deterioration (38). Our results emphasize the importance of investigating the psychological reactions of mothers in the early postpartum period, receiving postnatal support, and having a social worker and psychologist in neonatal intensive care units.

Ethics

Ethics Committee Approval: Ethical approval was obtained for the study from Uludağ University Clinical Research Ethics Committee dated 26.05.2021 and numbered 2021-6/25.

Conflict of Interest: No conflict of interest was declared by the authors.

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