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Determination of Maternal Attachment Level and Associated Factors of Mothers of Premature Infants Long-Term Hospitalized in the Neonatal Intensive Care Unit

Abstract

Aim: This study aimed to determine maternal attachment level and its related factors in the mothers of premature neonates hospitalized in the Neonatal Intensive Care Unit (NICU) for a long time.

Methods: This was an analytic study carried out during June to November 2017 in the NICU of three state University Hospitals in Konya. The participants consisted of 127 mothers of premature neonates who had been hospitalized for at least 30 days. Data were collected by the Neonatal-Maternal Data Sheet and the Maternal Attachment Inventory (MAI). The dependent variable of the study was the MAI score, and the independent variables were the characteristics of the mother and the neonates. Data were analyzed by percentage, mean ± standard deviation, and multiple regressions. A *P* of less than .05 was considered as statistically significant.

Results: The maternal attachment mean scores of mothers were 99.09 ± 7.32. The highest score that can be obtained from the scale is 104, according to which can be said that the attachment level of the mothers is good. No correlation was found between the characteristics of neonates and maternal attachment score ($P > .05$). The result of regression analysis showed that the frequency of the mother's visit of the neonate, income level, hugging the neonate, maternal age, and the number of pregnancies had a significant association with the maternal attachment score ($P < .05$).

Conclusion: Our results confirmed that a decrease in the frequency of mothers visiting and hugging neonate, a decrease in income level, as well as an increase in maternal age and the number of pregnancies may pose a risk for mother-neonate attachment. So, it is suggested that nurses encourage mothers to visit, hug, and breastfeed their neonates to improve mother-neonate attachment. In addition, hospital administrations should provide family-centered care infrastructures to improve maternal attachment.

Keywords: Maternal attachment, Mother, Nurse, Neonatal intensive care unit, Premature neonates

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Introduction

For the families, having a new neonate is a happy event. Parents dream of their babies being born on time and healthy.[1,2] However, one out of every ten babies may bear prematurely before completing the 37th gestational week.[3] The care requirements of a premature neonate are different from that of a neonate born on time and healthy. In addition, most premature neonates need to be hospitalized in the intensive care units and have to struggle with some health problems and survival.[2,4,5] In this process, mother-neonate interaction is interrupted, and their attachment process can be negatively affected.[1]

Mother-neonate attachment, which is important for healthy development, is defined as the love bond that a mother develops with the neonate as a result of the satisfying and pleasant interaction between themselves.[6-9] The mother-neonate attachment process is affected by many factors during pregnancy, childbirth, and postpartum periods.[2,6,10,11] Hospitalization of the premature neonate in the postpartum period may adversely affect mother-neonate attachment in many ways. For example, it may prevent sharing the same room (rooming in), breastfeeding, and skin-to-skin contact. Also, the mother cannot take a role in care of the neonate and may experience some problems such as pain, fatigue, and insomnia after birth.[6,12–15] Neonates may also stimulate by uncomfortable stimuli such as excessive sounds, light, scents, and repetitive painful procedures in NICU. These excessive and uncomfortable stimuli may prevent the neonates from perceiving and responding appropriately to the tactile, auditory, visual, and olfactory stimuli from their mothers.[1,2,6,14,16,17]

The premature birth of a baby creates a crisis for the family. In this crisis, parents are afraid of losing their neonate due to health problems. Specially, having a premature neonate can cause a feeling of guilt, inadequacy, and anxiety in the mother. These problems experienced by premature infants and their parents may negatively affect the mother-neonate relationship and attachment.[1,5,7,17–19]

Mother-neonate closeness and attachment are important for both mother and neonate.[4,12] Many studies have been examined the parent-child relationship[1,15,20] and studies examining mother-neonate attachment in premature neonates hospitalized in the NICU have increased

recently.[1,12,19,21] However, this study aimed to determine maternal attachment level and its related factors in the mothers of premature neonates hospitalized in NICU for a long time. The findings of this study can guide the planning of nursing interventions and hospital policies aimed at strengthening the attachment processes of premature neonates and their mothers in the NICU.

Aim

The study aimed to determine maternal attachment level and its related factors in the mothers of premature neonates hospitalized in NICU for a long time.

Research Questions

1. What is the maternal attachment level of mothers of premature neonates hospitalized in the NICU for a long time?
2. Do the characteristics of neonates and mothers affect maternal attachment?

Material and Methods

Type of Research

This study is an analytic type.

Setting and Date of the Research

The research was carried out in the NICU of three state university hospitals located in the city center of Konya, during June to November 2017.

Research Population and Sampling

The population consisted of mothers of neonates hospitalized in the NICU for at least 30 days. The sample size was calculated using the formula [n = t2σ2/d2].[22] In the formula, t = 1.96 is the 95% confidence interval, σ = 5.463 is the standard deviation of the previous study, and d = 1 is the ± deviation from the mean.[1] According to this, the sample size was determined as at least 115, so 127 mothers were included in this study. Mothers who had a neonate that need surgery or a congenital anomaly, were illiterate, and diagnosed with a mental problem were excluded from the study. Posthoc power analysis was performed for the sample size. In this study, the R^2 value was found to be 0.38 (Table 4). Effect size f^2 value of this value was calculated as 0.61.[23] When power level was calculated for n = 127 and five independent variables and effect size f^2 value 0.61 via G*Power 3.4 program, power was found as 1.000. All mothers whose neonates hospitalized for at least 30 days in the NICU of all three hospitals and met the inclusion criteria were included in the study.

Data Collection Tools

Data were collected using the mother and premature neonate information form and maternal attachment inventory. The premature neonate information form contained information such as the neonate's gender, gestational and postpartum age, birth weight, feeding style, and duration of hospitalization. The mother's information form included of demographic data, social support systems, state of being born voluntarily, mode of delivery, time of seeing the neonate after birth, breastfeeding status, frequency of hugging the neonate, visiting the neonate, participating in the care, and postpartum relations with spouse. These information forms were prepared by the researchers based on the literature.[1,5,7,17–19]

Maternal Attachment Inventory (MAI)

MAI was developed by Muller[24] (1994), which measures maternal feelings and behaviors and can be applied by self-report. Its reliability by Cronbach Alpha value was reported as 0.76 in mothers with a 4-month-old babies and 0.85 in mothers with an 8-month-old babies.[24] This scale adapted to Turkish by Kavlak and Şirin[8] in 2009 and has been used in various studies examining maternal attachment in the mothers of premature babies in our country. There are 26 questions in the MAI that individuals can use to describe their feelings. The feelings of mothers towards their babies are scored as "(a) Always = 4 points, (b) Frequently = 3 points, (c) Sometimes = 2 points, and (d) Never = 1 points". A high score indicates that maternal attachment is high. The lowest score on the scale is 26, the highest score is 104, and there is no cut off point.[8] Cronbach Alpha reliability coefficient of scale was 0.77 that reported by Kavlak and Şirin[8] in mothers with a one-month-old babies, 0.82 in mothers with a four-month-old babies and 0.92 in this study.

For collecting the data, the Premature Neonate Information Form was filled by the researcher based on the data obtained from the files of the neonates. The mother information form and the MAI were filled by the mothers in a suitable room in the NICU.

The independent variables of the study are information about the baby (baby's gender, gestational and postnatal age, birth weight, feeding style, and duration of hospitalization) and the mother (education, age, social support systems, state of being born voluntarily, mode of delivery, time to see the baby after birth, time to see the baby after birth), and information about breastfeeding, hugging the neonate, visiting the hospital, participating in her care, postpartum partner relationships).

Analysis of Data

The analysis was performed using SPSS statistical software version 22 (IBM SPSS Corp.; Armonk, NY, USA).[25] Data were summarized as mean (standard deviation), frequency, and percentage. The normal distribution of maternal attachment scores was determined by skewness, kurtosis values, and Kolmogorov-Smirnow test. Mann Whitney *U*-test and Kruskal Wallis test (Mann Whitney *U*-test with advanced Bonferroni correction analysis) were used according to the number of groups in comparison of maternal attachment score averages of mothers according to independent variables. The independent variables that had an effect on maternal attachment scores were evaluated with multiple regression (backward method) analysis. A *P* value of less than .05 was considered as statistically significant.

Ethics

This study was approved by the Ethics Committee of Necmettin Erbakan University, Meram Faculty of Medicine Non-Pharmaceutical and Non-Medical Device Research (Decision no. 2017/980). In addition, after obtaining institutional approval from the hospitals, the mothers were informed about the methods and purposes of the study, and written informed consent was obtained.

Results

As shown in Table 1, 53.5% of the neonates were male, 40.2% were born with very low birth weight, 67.7% were extremely premature, and 77.2% were born as a result of a single pregnancy. It was determined that the postnatal age of 86.6% of the neonate was between 30 and 59 days and the average hospitalization period was 38.94 ± 22.18 days, and 22.8% of them were hospitalized for 46 days or longer.

Of the mothers; 34.6% were in the 17-25 age group, 66.1% were primary school graduates, and 55.1% expressed their income as medium level. It was determined that 56.7% of the mothers had 1-2 pregnancies and 78.7% of them gave birth by cesarean section. The most of mother (70.1%) hugging their neonate every 2-3 h, 9.5% of them do not hold their neonate yet, 70.9% of them visit their neonate every 2-3 h, and 70% of them take care of their neonate (feeding, diaper cleaning, general body care, massage, kangaroo care, etc.) (Table 2).

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Table 1. Distribution of Descriptive Characteristics of the Babies of the Mothers Participating in the Study (N = 127)

Babies characteristics	N	%
Gender		
Female	59	46.5
Male	68	53.5
Baby's birth weight *(mean = 1473 ± 701.36)*		
Extremely low birth weight (455-1000 g)	32	25.2
Very low birth weight (1001-1500 g)	51	40.2
Low birth weight (1501-2500 g)	31	24.4
Normal birth weight (2501-3550 g)	13	10.2
Pregnancy type (single/multiple)		
Multiple pregnancy	29	22.8
Singleton pregnancy	98	77.2
Level of prematurity		
Extremely preterm (24-27 weeks)	86	67.7
Very preterm (28-31 weeks)	28	22.1
Moderate to late preterm (32-37 weeks)	13	10.2
Postnatal age		
30-59 days	110	86.6
60-134 days	17	13.4
Duration of hospitalization of the baby *(mean = 38.94 ± 22.18)*		
30-45 days	98	77.2
46-134 days	29	22.8

Table 2. Distribution of Descriptive Characteristics of the Mothers Participating in the Study (N = 127)

Maternal characteristics	N	%
Age groups *(mean = 28.06 ± 5.40)*		
17-25 ages	44	34.6
26-30 ages	41	32.3
31-42 ages	42	33.1
Level of education		
Primary School	84	66.1
High School	24	18.9
University	19	15.0
Incoming level		
Low	23	18.1
Medium	70	55.1
High	34	26.8
Number of pregnancies		
1-2 pregnancies	72	56.7
3-4 pregnancies	45	35.4
5-11 pregnancies	10	7.9
Type of birth		
Normal delivery	27	21.3
Cesarean delivery	100	78.7
Frequency of hugging the neonate		
Never	12	9.5
Less than every 2-3 days	13	10.2
Once a day at most	13	10.2
Every 2-3 h (always)	89	70.1
Frequency of visiting the neonate in the NICU		
Once or twice a week	7	5.5
Once every day	30	23.6
Every 2-3 h every day	90	70.9
Participation in the care of the neonate		
No	33	26.0
Yes*	94	74.0

*Feeding, changing the baby's diapers, general body care, massage, kangaroo care, etc.

As Table 3 illustrated, the maternal attachment score of mothers was 99.09 ± 7.32, and the mean sub items score was 3.81 ±.28 (out of 4 points). The highest score that can be obtained from the scale is 104, and it can be said that the attachment level of the mothers in our study is quite good.

The result of the study showed that the characteristics of the neonate (gender, birth weight, gestational week, etc.) had no relationship with the maternal attachment level ($P > .05$). However, regarding maternal characteristics, 11 independent variables were found to be associated with maternal attachment score ($P < .05$). These 11 variables, which were determined to have a relationship with the maternal attachment score, were included in the multiple regression model (Backward). In the regression analysis, 6 of the 11 variables (having another child, having relationship with the spouse after birth, the mother's residence and participating in the care of the neonate, breathing and breastfeeding status of the neonate) were excluded from the regression model ($P > .05$). The results of showing the remaining five variables in the model are given in Table 4.

It is seen that the remaining five variables in the model explained the variation (variance) of maternal attachment score by 38%. Variables that have a significant effect on maternal attachment score, from most important/effective to least important according to the standardized regression coefficient (β = *beta*) were frequency of visiting the neonate, income level ($P < .001$), holding the neonate, maternal age, and number of pregnancies ($P < .05$). Among these variables, the increase in the frequency of mother's visits to the neonate, income level, hugging the neonate had a statistically significant positive relationship with maternal attachment scores, while the increase in age and number of pregnancies had negative relationship. Mothers' maternal attachment level increases by 9.15 points in those who visit their neonate every 2-3 h or every day compared to those who visit their

Table 3. Maternal Attachment Scale, Total, and Item Scores of the Mothers

Dependent variable	N	Min.-Max.	Total scale mean ± standard deviation	Item score mean ± standard deviation
Maternal attachment scale score	127	59.0-104.0	99.09 ± 7.032	3.81 ±.28

Table 4. Independent Variables Affecting the Level of Maternal Attachment (*N*: 127)

Independent variables	B	S. error	ß	t	*P*	95% confidence intervals	
						Min	*Max*
(Constant)	71.70	6.26		11.452	<.001001	59.30	84.09
Frequency of visiting	9.15	2.49	0.29	3.678	<.001001	4.23	14.08
Income level	5.01	1.36	0.27	3.694	<.001001	2.33	7.70
Frequency of hugging the **babneonate** arms	4.94	1.94	0.20	2.554	.012*	1.11	8.78
Age	-2.87	1.12	-0.19	2.555	.012*	-5.10	-0.65
Number of pregnancies	-4.76	2.00	-0.18	2.380	.019*	-8.72	-0.80

Dependent variables: Maternal Attachment Scale Score
R: 0.64; adjusted R^2: 0.38; *F*: 16.465; *P*: < .001001; Dur bin Watson: 2.03.
*<.05.

neonate once a week or less. Regarding income, those whose income level was moderate/good increase by 5.01 points compared to those whose income was low. Considering the care, those who did not hugging the neonate increase by 4.94 points; and regarding age, maternal age decreases by -2.87 points in those aged 31 and over compared to those aged 17-30; in those who conceive five or more, it decreases by -4.76 points compared to those who conceive 1-4 times.

Discussion

The study aimed to determine maternal attachment level and its related factors in the mothers of premature neonates hospitalized in the NICU for a long time. Our result showed that the total MAI mean scores of the mothers were at a good level. Evaluating the attachment scores of mothers of term healthy newborns in different studies were similar to ours. For instance, Kavlak and Şirin[8] (2009) reported the attachment score of mothers as 94.878 ± 6.048, Şen[25] (2007) reported it as 97.02 ± 8.37, and Şolt Kırca and Savaşer[26] (2017) determined it as 97.34 ± 4.61 in prim parous mothers, and 95.22 ± 5.63 in multiparous mothers. However, in a similar study conducted in our country, the mean maternal attachment score of mothers of premature babies was found to be 87.19 ± 5.46, which is considerably lower than our result.[1] Cho et. al.[21] evaluated the effect of kangaroo care on premature babies and found the maternal attachment mean score (Korean version, 5-point Likert) at (4.24-4.48) before the intervention. In our study, it was found to be (3.81 ±.28) based on a 4-point Likert level, and it can be stated that the results are similar. Although the attachment levels of mothers of premature babies were found to be higher in this study than in other studies in our country, but it would be beneficial to improve the attachment level of mothers whose premature neonates hospitalized for a long time.

Result of the regression analysis determined that there are five important factors affecting the attachment levels of mothers. Among them, the frequency of mothers visits with her neonate has the highest impact. Attachment levels of mothers who visited their babies every day or 2-3 times a day were found to be significantly higher than those who visited their babies once a week or less. Furthermore, our analysis confirmed that the frequency of hugging the neonate was an important factor affecting the level of attachment. Mothers who hugged their babies had higher levels of attachment. Similarly, Öztürk and Saruhan[1] (2013) found that mothers who visit and hold their babies every day had higher maternal attachment scores than other mothers. In this regards, Cho et. al[21] said that kangaroo care can significantly increase mothers' attachment level. Holding the neonate, showing love, establishing eye, and skin contact are important factors that increase the mother-neonate relationship and attachment.[7] So, it seems important to arrange the newborn units in a way that provides and encourage physical and emotional closeness. The neonatal nurse should inform the mothers about visiting opportunities and encourage the mother to come visit and hold the baby in her arms. Thus, it is highly recommended to review and improve the implementation of family-centered care strategies in NICUs.[1,27,28]

Analysis of data showed that income level was the second important factor in the attachment of mothers. The attachment levels of mothers with high or medium incomes were found to be significantly higher than those with low incomes. Similarly, Çankaya and ark.[27] (2017) found that mothers with good/medium income levels had high MAI scores. However, Öztürk and Saruhan[1] (2013) found that there was no significant relationship between income level and attachment. These controversial results cannot completely clarify whether low income level is a risk factor for maternal attachment or not. So, it was recommended to examine this relationship in future research.

The fourth factor affecting the attachment level of mothers was maternal age. The level of attachment was significantly lower in those with a maternal age above 31 years of age. Similarly, Şen[25] (2007) found that maternal attachment scores decreased significantly as the age of the mother increased. Küçükoğlu, Aytekin, and Gülhaş[29] (2015) found that the needs of older mothers whose babies hospitalized in the neonatal unit were high. The low maternal attachment scores of older mothers highlighted the importance of support in this age group. However, Gültürk, Körükçü, and Kukulu[30] (2018) found that increasing maternal age positively affects attachment. On the other hand, in many studies, no significant difference was found between

the age variable of mothers and the maternal attachment score.[8,15,18,31] It can be concluded that there is no consensus in the literature regarding the effect of maternal age on attachment status, so more studies are needed on this subject.

According to our result, the number of pregnancies of mothers was another important factor that affects the level of attachment. Attachment levels of mothers with five or more pregnancies decrease significantly compared to those with 1-4 pregnancies. Similarly, there are studies that showed that mothers' maternal attachment score decreases as the number of children increases.[20,25,30] So, we can state that as the number of children increases, the time that mothers devote to their children can decrease and it can negatively affect their attachment.

Conclusion

The maternal attachment level of the mothers included in the study was good. The level of maternal attachment in this study was found to be higher than similar studies conducted in mothers of premature babies in our country. The variable that posed the highest risk on mother-neonate attachment was the low frequency of visits by the mother to her neonate. After that, ranked from the most effective to the least effective, was low income level, low frequency of holding the neonate, higher maternal age, and higher number of pregnancies. So, the frequency of visits by mothers to their premature neonates hospitalized in the NICU was the most important determinant of mother-neonate attachment. Neonatal nurses should pay special attention to the attachment levels of mothers whose premature neonates are hospitalized in the NICU for a long time and support them to strengthen their attachment. It will be beneficial to plan an individual nursing intervention to increase mother-neonate attachment of all mothers, especially those who are in the risk group in terms of maternal attachment such as those whose frequency of visiting of neonate is low, their income level is low, mothers that cannot hold their neonate, are over the age of 31, and have more than 5 pregnancies. In summary, it can be suggested that neonatal nurses have to encourage mothers to visit their babies at least once a day, hugging their neonate, and participate in their care.

Ethics Committee Approval: Ethics committee approval was received for this study from the Necmettin Erbakan Üniversitesi Meram School of Medicine Ethics Committee for Non-Pharmaceutical and Non-Medical Device Researches (date: 16.06.2017, decision number: 2017/980).

Informed Consent: Written informed consent was obtained from participants' mothers.

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