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Determination of Maternal Attachment, Breastfeeding Self-Efficacy, and Insufficient Milk Perception of Mothers in COVID-19 Pandemic*

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ABSTRACT

Objective: This study aimed to determine the maternal attachment, breastfeeding self-efficacy, and perceived insufficient milk supply of mothers of babies placed in a neonatal intensive care unit in the face of restrictions of the COVID-19 pandemic. **Materials and Methods:** This was a descriptive and cross-sectional study. The study was conducted at the neonatal intensive care unit of a public hospital in eastern Turkey. The sample consisted of 292 mothers of term babies treated in the neonatal intensive care unit. Data were collected using a sociodemographic characteristics questionnaire, the Maternal Attachment Inventory, the Breastfeeding Self-Efficacy Scale, and the Perception of Insufficient Milk Questionnaire. **Results:** Participants had a mean maternal attachment, breastfeeding self-efficacy, and the perception of insufficient milk score of 61.80 ± 14.60 , 43.88 ± 11.52 , and 24.53 ± 13.61 , respectively. While the breastfeeding self-efficacy score was a significant explanatory variable that increased the maternal attachment score, the perception of insufficient milk score was a significant explanatory variable that decreased it ($p < 0.05$). Participants with a positive COVID-19 test while their baby is in intensive care have a lower maternal attachment score. Participants who were separated from their babies during the pandemic and thought that they could not breastfeed sufficiently had a lower mean perception of insufficient milk score ($p < 0.05$). **Conclusion:** Pandemic restrictions have a negative effect on maternal attachment. Breastfeeding self-efficacy and perception of insufficient milk are effective variables that explain maternal attachment.

Keywords: Attachment, Breastfeeding, COVID-19, Neonatal Intensive Care.

COVID-19 Pandemisinde Annelerin Maternal Bağlanma, Emzirme Öz Yeterlilik ve Yetersiz Süt Algısının Belirlenmesi

ÖZ

Amaç: Bu çalışma, COVID-19 salgınının kısıtlamaları karşısında yenidoğan yoğun bakım ünitesine (YYBÜ) yerleştirilen bebeklerin annelerinin anneye bağlanma, emzirme öz yeterliliği ve algılanan yetersiz süt tedarikini belirlemeyi amaçladı. **Gereç ve Yöntem:** Bu çalışma tanımlayıcı ve kesitsel tiptedir. Çalışma Türkiye'nin doğusundaki bir devlet hastanesinin YYBÜ'sünde gerçekleştirildi. Örneklem YYBÜ'de tedavi gören, zamanında doğmuş bebeği olan 292 anneden oluşuyordu. Veriler sosyodemografik özellikler anketi, Maternal Bağlanma Ölçeği, Emzirme Öz Yeterlilik Ölçeği ve Yetersiz Süt Algısı anketi kullanılarak toplandı. **Bulgular:** Katılımcıların ortalama maternal bağlanma, emzirme öz yeterliliği ve yetersiz süt algısı skorları sırasıyla 61.80 ± 14.60 , 43.88 ± 11.52 ve 24.53 ± 13.61 idi. Emzirme öz yeterliliği maternal bağlanmayı artıran anlamlı bir açıklayıcı değişken iken, yetersiz süt algısını düşüren anlamlı bir açıklayıcı değişkendi ($p < 0,05$). Bebeği yoğun bakımdayken COVID-19 testi pozitif çıkan katılımcıların maternal bağlanmalarının daha düşük olduğu bulundu. Pandemi sürecinde bebeklerinden ayrılan ve yeterince emziremediklerini düşünen katılımcıların yetersiz süt algısı puan ortalaması daha düşüktü ($p < 0,05$). **Sonuç:** Pandemi kısıtlamalarının anneye bağlanma üzerinde olumsuz etkisi vardır. Emzirme öz-yeterliliği ve yetersiz süt algısı maternal bağlanmayı açıklayan etkili değişkenlerdir.

Anahtar Kelimeler: Bağlanma, COVID-19, Emzirme, Yenidoğan Yoğun Bakım.

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INTRODUCTION

In March 2020, the World Health Organization (WHO) declared the outbreak of coronavirus disease (COVID-19) as a global pandemic (WHO, 2020). Subsequently, the first confirmed case of COVID-19 in Türkiye was reported on March 11, 2020 (WHO, 2020; Republic of Türkiye Ministry of Health, 2020). The novel coronavirus, responsible for COVID-19, demonstrated the capacity to infect individuals across all age groups, including neonates and children (Dong et al., 2020).

The neonatal period is a critical period that shapes human development in the short and long term (Cetisli et al., 2018). Within this period, breastfeeding and secure maternal attachment are essential for infant development (Altay & Arıkan, 2021). Breastfeeding serves not only as the primary means of nutrition but also for establishing maternal attachment (Gibbs et al., 2018). Importantly, available evidence indicated that breastfeeding remains safe and should be encouraged during the COVID-19 pandemic (Liu et al., 2022).

Breastfeeding self-efficacy, defined as the mother's belief in her ability to successfully breastfeed, plays a pivotal role in the initiation and continuation of breastfeeding (Cetisli et al., 2018). Additionally, the perception of insufficient milk supply constitutes a critical determinant of breastfeeding outcomes. Although true lactation insufficiency is rare, and many mothers experiencing breastfeeding difficulties report a perception of inadequate milk supply (Kent et al., 2021; Sandhi et al., 2020). Moreover, breastfeeding self-efficacy and perceived insufficient milk affect each other (De Roza et al., 2019).

The literature has determined that mothers can be supported in gaining the confidence they need regarding their experiences with their babies in the neonatal intensive care units (NICU) by determining their breastfeeding self-efficacy and attachment levels in the postpartum period (Gumussoy et al., 2020; Gunes et al., 2021).

The COVID-19 pandemic has posed significant challenges to maternal and neonatal care, particularly through the implementation of restrictive policies in NICU, such as limitations on parental visits. Such measures, while aiming to reduce infection risk, have inadvertently disrupted early maternal-infant contact, thereby potentially influencing maternal attachment and breastfeeding behaviors (Altay & Arıkan, 2021). Given the negative impact of the pandemic on the mother-infant dyad, there is a need to strengthen maternal attachment and improve mothers' breastfeeding self-efficacy and their perception of milk supply. In literature, studies on the relationship between maternal attachment and breastfeeding self-efficacy (Gumussoy et al., 2020; Peñacoba & Catala, 2019) and breastfeeding self-efficacy and perceived insufficient milk (Sandhi et al., 2020) were found. However, the lack of research investigating how policies imposed during the COVID-19 pandemic

affect maternal attachment, breastfeeding self-efficacy and perceptions of insufficient milk in mothers of NICU infants limits understanding of the potential adverse effects on maternal and neonatal health and hinders the development of effective support interventions.

The aim of this study was to examine several questions:

- What are the levels of maternal attachment, breastfeeding self-efficacy and perception of insufficient milk in mothers whose infants were admitted to the NICU during the period of restrictions due to the pandemic?
- Do the sociodemographic characteristics of mothers affect maternal attachment, breastfeeding self-efficacy and perception of insufficient milk?
- Do the attitudes and behaviors of mothers in the NICU during COVID-19 affect maternal attachment, breastfeeding self-efficacy and perception of insufficient milk?

MATERIALS AND METHODS

Study design and setting

This study is descriptive and cross-sectional type. The study was conducted between March-October 2021 at the NICU of a hospital in eastern Türkiye. The study sample consists of 292 mothers of babies born between 37 and 40 weeks and who were placed in the NICU due to hyperbilirubinemia, meconium aspiration or hypoglycemia. Random sampling was performed. All participants met the inclusion criteria and agreed to participate in the study. There was no similar study conducted during the pandemic. Therefore, a post hoc power analysis was performed on the total data collected between March and October 2021. The results showed that a sample of 292 mothers would be large enough to detect significant differences (effect size=0.283, margin of error=0.05, and power=0.99).

Inclusion criteria of the study

The inclusion criteria were (1) mother and baby not having a problem that prevents breastfeeding (congenital anomaly, neurological disorders, cleft palate or cleft lip, etc. for the baby, and drug use, psychological disorders, mastitis, weaning, etc. for the mother), (2) being 18 years of age or over, (3) gestational age between 38-40 weeks, (4) mother having no vision and hearing problems and (5) mothers who volunteered to participate in the study. Mothers who did not take a PCR (Polymerase Chain Reaction) test or who tested positive for COVID-19 were not included in the study.

Measurements

Sociodemographic Characteristics Questionnaire

The sociodemographic characteristics questionnaire was based on a literature review conducted by the researchers (Gumussoy et al., 2020; Gunes et al., 2021, Kent et al, 2021).

Maternal Attachment Inventory (MAI)

The scale was developed by Mary E. Muller (1994). The scale was adapted into Turkish by Kavlak and Şirin (2009). The scale, consisting of 26 items, is a four-point Likert

type. As the score obtained from the scale increases, maternal attachment increases. The original scale has a Cronbach's α of 0.85 (Muller, 1994). The internal validity of the Turkish version of the scale is 0.82 (Kavlak & Şirin, 2009), which was 0.97 in the present study.

Breastfeeding Self-Efficacy Scale-Short Form (BSES-SF)

Dennis (2003) developed a short form of the BSES-SF and recommended that researchers employ it because it is easier to use and more accurate than the BSES. The BSES-SF was adapted to Turkish by Aluş Tokat and Okumuş (2010). The scale consisting of 14 items is a five-point Likert type. As the score obtained from the scale increases, mothers' breastfeeding self-efficacy also increases. The Turkish version has a Cronbach's alpha of 0.86, which was 0.94 in the present study.

Perception of Insufficient Milk (PIM)

The scale was developed by McCarter-Spaulling and Kearney (2001). The questionnaire consists of six items. The first item is a nominal question (yes/no) in which the respondent is asked whether mother believes mother has enough milk to satisfy her baby. The remaining items are rated on a ten-point Likert-type scale ("0 = strongly disagree" to "10 = strongly agree"). The total score ranges from 0 to 50, with higher scores indicating higher perceived adequacy of milk supply. The questionnaire was adapted to Turkish by Gokceoglu and Kucukoglu (2017). The Turkish version has a Cronbach's alpha of 0.86, which was 0.94 in the present study.

Data collection

First, all mothers were requested to take PCR (Polymerase Chain Reaction) tests, a diagnostic method used to detect the presence of SARS-CoV-2 virus, before visiting the clinic. Mothers who did not take PCR tests or tested positive for COVID-19 were encouraged to send their breast milk to the clinic. However, they were not allowed to visit the clinic or participate in the breastfeeding and care of their babies. Mothers who tested negative for COVID-19 were placed in the maternal hotel of the clinic and were allowed to participate in the care of their babies or breastfeed them. Participants rested at the hotel at other times. Clinical nurses monitored the babies until discharge. Participants were asked not to leave the clinic until discharge, and if they did, they were asked to take PCR tests again. These procedures including PCR testing, accommodation arrangements at the maternal hotel, and permissions regarding infant care were determined and implemented by the hospital management as part of institutional COVID-19 protocols, independent of the research team.

Participants were interviewed at the hotel out of care, treatment, and feeding hours. The researcher complied with preventive measures (mask, social distance, hygiene, etc.) during the interviews. Participants filled out the data collection tools themselves, but the researcher was present to answer any questions. It took

each participant 30 minutes to fill out the data collection tools.

Data analysis

The data were analyzed using the Statistical Package for Social Sciences (SPSS v. 22.0) at a significant level of 0.05. Number, percentage, mean, and standard deviation were used for descriptive statistics. Normality was tested using the Kolmogorov-Smirnov test and skewness and kurtosis values. An independent sample t-test was used to compare scale scores. One-way analysis of variance (ANOVA) was used to compare independent groups. Bonferroni test was used for multiple comparisons. A stepwise method and multiple regression analysis were used as multivariate analyses for detecting significant factors.

Ethical Approval

The study was approved by a Regional Ethical Review Board in Turkey (No: B.30.2.ATA.0.01.00/115, Date: 25.03.2021). Permission was obtained from the hospital. All mothers were informed about the research purpose and procedure. Informed consent was obtained from those who agreed to participate in the study. Permission was obtained from the authors of the scales.

RESULTS

Most participants were 20-35 years of age (82.9%). More than a quarter of the participants had high school degrees (38.7%). Less than half the participants had a negative income (income < expense). 67.1% of the participants had a vaginal birth, and 79.1% stated that their pregnancies were planned. Less than half the participants noted that they had received training in breastfeeding (breastfeeding training) before (39.7%). The babies were 11.42 ± 6.72 days old. More than half of the babies were girls (52.7%).

In the study, the relationship between sociodemographic characteristics and MAI, BSES-SF and PIM scores was investigated. Education and income levels were found to be significantly related to the participants' MAI scores ($p < 0.001$). The mean MAI score of participants who planned their pregnancies and had previously received education about breastfeeding was significantly higher than those who did not plan and had no education. There was also a weak correlation between postnatal age and MAI scores ($p < 0.001$, Table 1).

Participants had a mean MAI, BSES-SF, and PIM score of 61.80 ± 14.60 , 43.88 ± 11.52 , and 24.53 ± 13.61 , respectively (Table 2). A multiple regression analysis was performed using the stepwise method to determine the associated of perceived insufficient milk and breastfeeding self-efficacy on maternal attachment. The results showed that perceived insufficient milk and breastfeeding self-efficacy affected maternal attachment ($F(2,291) = 40.945$, $p < 0.001$). The regression model accounted for 22% of the total variance of the MAI score (Adj. $R^2 = 0.215$). The BSES-SF score ($\beta = .664$) was a significant explanatory variable that increased the MAI score, whereas the PIM score ($\beta = -0.298$) was a significant explanatory variable that decreased it (Table 3).

Table 1. The comparison of the mean scores of MAI, BSES-SF, and PIM according to the demographic characteristics of the mothers (n=292).

Variables		N	%	MAI		BSES-SF		PIM	
				X±SS	Test / p	X±SS	Test / p	X±SS	Test / p
Age (year)	^a 19y <	23	7.9	59.30±14.88	F=0.658	41.74±16.07	F=1.054	25.35±17.71	F=2.690
	^b 20-35	242	82.9	62.24±14.52	p=0.519	43.80±10.99	p=0.350	23.83±12.90	p=0.070
	^c 36>	27	9.2	59.96±15.27		46.71±11.70		30.15±15.12	
Education (degree)	^a Literate	19	6.5	53.95±16.78	F=5.636	39.79±11.41	F=1.742	19.26±15.12	F=2.284
	^b Primary school	53	18.2	61.42±14.95	p<0.001	46.13±11.55	p=0.158	28.09±14.61	p=0.079
	^c High school	113	38.7	59.54±14.71	a-c<d	43.05±11.63		23.85±12.93	
	^d Bachelor's	107	36.6	65.72±12.91		44.36±11.28		24.43±13.30	
Income	^a Negative	125	42.8	57.16±15.56	F=15.044	41.04±11.12	F=7.292	21.49±13.43	F=6.250
	^b Neutral	110	37.7	63.38±12.03	p<0.001	45.45±10.78	p<0.001	27.62±12.52	p=0.002
	^c Positive	57	19.5	68.91±10.72	a<b<c	47.05±12.50	a<b	25.26±14.78	a<b
Planned pregnancy	Yes	231	79.1	64.18±13.01	t=5.717	44.61±11.11	t=2.131	24.32±13.45	t=0.532
	No	61	20.9	52.77±16.73	p<0.001	41.10±12.65	p=0.034	25.36±14.30	p=0.595
Delivery type	Vaginal	196	67.1	61.51±14.92	t=0.489	43.84±11.16	t=0.085	24.34±13.55	t=0.354
	C-section	96	32.9	62.40±13.99	p=0.625	43.96±12.28	p=0.933	24.94±13.82	p=0.724
Baby's sex	Girl	154	52.7	63.18±13.48	t=1.708	44.06±11.13	t=0.284	24.44±13.44	t=0.123
	Boy	138	47.3	60.26±15.66	p=0.089	43.67±11.98	p=0.776	24.64±13.86	p=0.902
Receiving training in breastfeeding	Yes	116	39.7	64.34±13.67	t=2.432	45.32±11.60	t=1.743	25.21±13.79	t=0.685
	No	176	60.3	60.13±14.99	p=0.016	42.93±11.40	p=0.082	24.09±13.52	p=0.494
Postnatal age		X±SS		r	p	r	p	r	p
		11.42±6.72		0.205	p<0.001	0.047	0.428	0.057	0.331

F:One way Anova, t: Independent groups t test, Bonferroni analysis.

Table 2. Mean scores of the MAI, BSES-SF, and PIM scores (n = 292).

Scales	Mean	±SD	Min-Max
Maternal Attachment Inventory (MAI)	61.80	14.60	19-78
Breastfeeding Self-Efficacy Scale-Short Form (BSES-SF)	43.88	11.52	14-70
Perception of Insufficient Milk (PIM)	24.53	13.61	0-50

Table 3. The effects of perceived insufficient milk and breastfeeding self-efficacy on maternal attachment (n = 292).

Scales	B ¹ (95% CI)	SE	β ²	t	p	VIF
Constant	32.718 (26.213-39.223)	3.305		9.900	p<0.000	
BSES-SF	0.842 (0.635-1.049)	0.105	0.664	8.000	p<0.000	2.555
PIM	-0.320 (-0.495-0.145)	0.089	-0.298	-3.594	p<0.000	2.555

Notes: F: 40.945, p < 0.001, R:0.470, R²:0.221, Adjust R²:0.215, Durbin- Watson: 1.292.Dependent Variable: MAI, ¹Non-standardized Coefficient, ²Standardized Coefficient

A multiple regression analysis was performed using the stepwise method.

A quarter of the participants tested positive for COVID-19 during their babies' hospital stay (24%). Most participants were separated from their babies after a while due to the pandemic (separation) (87%). Most of the participants believed that they breastfed their babies insufficiently due to the pandemic (perceived insufficient milk supply) (86.6%). Most participants adhered to the preventive measures at the unit; hand hygiene (84.6%) and social distancing (71.2%). COVID-19 experience affected participants' maternal attachment levels. Participants who had not tested positive for COVID-19 before had a significantly higher mean MAI score than those

who had (p<0.05). Participants who adhered to hand hygiene and social distancing measures had a significantly higher mean MAI score than those who did not (p<0.05, Table 4). Separation and perceived insufficient milk supply affected participants' PIM scores. Participants who were separated from their babies after birth due to the pandemic had a significantly lower mean PIM score than those who were not. Participants who believed that they had insufficient milk supply due to the pandemic had a significantly lower mean PIM score than those who did not (p<0.05, Table 4)

Table 4. Comparison of the mean MAI, BSES-SF and PIM scores of the participants according to their attitudes and behaviors in the NICU (n=292).

	N	%	MAI		BSES-SF		PIM	
Variables			X±SS	Test and p	X±SS	Test and p	X±SS	Test and p
Having tested positive for COVID-19								
Yes	70	24.0	57.69±14.52	t=2.732	44.34±10.01	t=0.388	26.01±12.70	t=1.043
No	222	76.0	63.09±14.42	p=0.007	43.73±11.97	p=0.698	13.88±0.93	p=0.298
Separation from baby after birth due to pandemic								
Yes	254	87.0	65.00(59.00)*	U=4060.000	43.00(56.00)*	U=4398.000	22.00(51.00)*	U=3636.5
No	38	13.0	62.50(56.00)*	p=0.114	45.00(56.00)*	p=0.378	31.50(51.00)*	00 p=0.014
Perceived insufficient milk supply due to the pandemic								
Yes	253	86.6	65.00(56.00)*	U=4415.000	43.00(56.00)*	U=4245.500	22.00(51.00)*	U=3467.0
No	39	13.4	63.00(59.00)*	p=0.290	46.00(56.00)*	p=0.161	31.00(51.00)*	00 p=0.003
Preventive measure (hand hygiene)								
Yes	247	84.6	62.60±14.17	t=2.223	43.60±11.67	t=0.950	23.96±13.44	t=1.683
No	45	15.4	57.38±16.22	p=0.027	45.38±10.61	p=0.343	27.67±14.27	p=0.093
Preventive measure (social distancing)								
Yes	208	71.2	63.59±13.88	t=3.361	44.46±10.95	t=1.367	24.73±13.38	t=0.388
No	84	28.8	57.36±15.45	p=0.001	42.43±12.77	p=0.173	24.05±14.24	p=0.699

F:One way Anova, t:Independent groups t test, Bonferroni analysis. U:Mann Whitney U, *[Median (Range)]

A multiple regression analysis was performed to determine the associated of the variables on participants' MAI and PIM scores. The regression model showed that COVID-19 experience affected participants' MAI scores ($F(2,291)=7.924$, $p<0.001$). Having tested positive for COVID-19 before ($\beta=-$

0.123) and having difficulty adhering to social distancing ($\beta=-0.168$) were significant variables reducing the MAI scores. The regression model explained 4.5% of the MAI score (Adj. $R^2=0.045$) (Table 5).

Table 5. Multiple regression analysis of the effects of mothers' attitudes and behaviors in the NICU on MAI during the COVID-19 pandemic.

Participants' Attitudes and Behaviors at the NICU during the COVID-19 Pandemic		B ¹ (95% CI)	SE	β^2	t	p	VIF
MAI	Constant	58.959(55.548-62.370)	1.733		34.022	0.000	
	Having tested positive for COVID-19 (COVID-19 experience)	-4.205(-8.142-0.268)	2.000	-0.123	-2.102	0.036	1.046
	Having difficulty adhering to social distancing	5.401(1.668-9.113)	1.886	0.168	2.863	0.005	1.046

Notes: F: 7.924, $p < 0.001$, R:0.228, R^2 :0.052, Adjust R^2 :0.045, Durbin- Watson: 1.053.

DISCUSSION

This study investigated maternal attachment, breastfeeding self-efficacy, and perceived insufficient milk supply in mothers of babies placed in a NICU at the stages of the pandemic.

In this study, the maternal attachment score (61.80 ± 14.60) of the participants was found to be below average when compared to other studies conducted during the pandemic period (Çelik ve Çopur, 2023). In a study, it was reported that mothers staying in the same rooms as their healthy babies had a MAI score of 100.47 ± 5.05 (Oskovi-Kaplan et al., 2021). Another study investigated the effectiveness of interventions for strengthening mother-infant bonding during the pandemic and found that mothers had a mean pretest MAI score of 64.6 (Wang et al., 2021). A separate study found that mother-infant attachment decreased on the pandemic (Manuela et

al., 2021). These results indicate that healthcare professionals should consider the pandemic conditions and find ways to make sure that mothers spend time with their babies.

A multiple regression analysis was performed to examine the association of breastfeeding self-efficacy and perceived insufficient milk supply on maternal attachment in the pandemic. The results showed that the regression model explained 22% of the MAI scores. The results indicated that the BSES-SF score was an explanatory variable increasing the MAI score, whereas the PIM score was an explanatory variable decreasing it. Breastfeeding plays a crucial role in mother-infant attachment (Gibbs et al., 2018; Cetisli et al., 2018). Peñacoba and Catala conducted a systematic review for associations between breastfeeding and mother-infant relationships (Peñacoba and Catala, 2019). There was evidence that

secure attachment between mother and baby was achieved mostly through breastfeeding. Another study found that there was a significant relationship between breastfeeding self-efficacy and mother-infant attachment (Gümüşsoy et al. 2020). Our results also showed that breastfeeding self-efficacy affected maternal attachment significantly. During the pandemic, healthcare professionals should not only allow mothers to spend time with their babies but also consider breastfeeding self-efficacy to ensure mother-infant attachment.

Participants had a mean PIM score of 24.53 ± 13.61 , suggesting moderate perceptions of insufficient milk supply. Perceived insufficient milk supply is a critical factor affecting breastfeeding in the first six months. Perceived insufficient milk supply is one of the main reasons given for formula supplementation and breastfeeding discontinuation (Rodrigo et al., 2019). Our results showed that the PIM score was an explanatory variable reducing the MAI score. Another study reported that mothers with high perceived breastfeeding self-efficacy were more likely to consider their breastmilk sufficient (Gokceoglu & Kucukoglu, 2017). The inability of mothers to have sufficient contact with their babies due to the pandemic may explain why our participants have perceptions of insufficient milk supply, which negatively affects mother-infant attachment.

This study investigated whether participants' sociodemographic characteristics affected their MAI, BSES-SF, and PIM scores. Participants with a negative income had lower MAI, BSES-SF, and PIM scores than those with a positive income. Another study found that mothers with a positive income had higher BSES-SF and PIM scores than those with a negative income (Gokceoglu & Kucukoglu, 2017). Our results are consistent with those of earlier studies conducted before the pandemic. Many families in Turkey have faced financial difficulties since the pandemic began. Almost half of our participants reported a negative income (42.8%). Therefore, our results show that low socioeconomic status affects mother-infant attachment and breastfeeding self-efficacy.

Participants who had tested positive for COVID-19 had a lower MAI score than those who had not. Moreover, participants who had difficulty adhering to social distancing at the NICU had a lower MAI score than those who did not. Mothers have to cope with postpartum stressors and the adverse effects of the pandemic (Dekel et al., 2019). As the pandemic unfolded, authorities published guidelines for the admission of infected mothers to health institutions, the prevention of infection, and the care of infants (Wang et al., 2021). However, not all healthcare institutions stick to those guidelines, which may have negatively affected the mother-infant relationship and attachment. Social distancing is a set of actions that involve reducing face-to-face contact to slow down or stop the spread of the coronavirus. Although social

distancing has helped reduce the exponential reproducibility of the virus, it has caused social isolation and reduced community support (Reger et al., 2020). Moreover, it might have been a challenge for mothers to adhere to social distancing at the NICU during the postpartum period.

Participants who were separated from their babies due to the pandemic had a lower mean BSES-SF score than those who were not. Prolonged mother-infant separation during the pandemic has negative consequences (Tomori et al., 2020). When the pandemic started, the NICU restricted parents from taking care of their infants and allowed them on postnatal wards only during certain visiting hours. Mothers who tested positive for COVID-19 were asked to pump their breastmilk and have it delivered to the unit by their relatives. Wang et al. (2020) also reported that Chinese mothers were separated from their infants when the pandemic broke out. They found that mothers were recommended to feed their babies with formula. Research shows that breastfeeding is the best preventative measure available for healthy and at-risk babies and their mothers during the COVID-19 pandemic (Lubbe et al., 2020). Most of our participants were separated from their babies in the first two waves of the pandemic, adversely affecting their breastfeeding practices. Studies conducted in NICU during the pandemic period reported that visitor restrictions negatively affected the growth and development of the baby (Çiğdem et al., 2024). In this case, visitor restrictions may be considered to have a negative impact on breastfeeding. Our participants had low breastfeeding self-efficacy levels. Research shows that the pandemic has a negative relationship with mothers' breastfeeding practices (Wang et al., 2020; Tomori et al., 2020). Our results also show that the pandemic has a negative relationship with mothers' breastfeeding self-efficacy levels.

Strengths and Limitations

This study was conducted during the COVID-19 pandemic. Pandemic conditions have created extraordinary social, emotional, and environmental factors that may affect individuals' breastfeeding self-efficacy levels and perceptions of milk insufficiency. The Breastfeeding Self-Efficacy Scale-Short Form and Perception of Insufficient Milk scales used in the study measure basic psychological structures, and it is thought that these structures maintain their validity during the pandemic process. However, it should be taken into account that pandemic conditions may create different dynamics in measurements and limit the generalizability of the results. Therefore, the findings should be evaluated within the framework of the specific conditions of the pandemic period. There are other limitations to this study. It should be noted that the inclusion of only mothers with negative PCR results may have introduced a selection bias, potentially limiting the generalizability of the findings. One limitation of this study is the lack of a

non-pandemic comparison group, which restricts the ability to evaluate the direct psychological impact of mother-infant separation caused specifically by COVID-19. Future studies comparing similar variables before, during, and after the pandemic may offer a clearer understanding of its effects on maternal emotional well-being.

CONCLUSION

Prolonged mother-infant separation during the COVID-19 pandemic has adversely affected maternal attachment levels, which were much lower than what has been reported by earlier studies. Our results show that breastfeeding self-efficacy and perceived insufficient milk supply are significant variables that explain maternal attachment. Income affects mothers' MAI, PIM, and BSES-SF scores, while planned pregnancy is a significant variable that increases mothers' MAI scores. COVID-19 experience also reduces maternal attachment. Mothers who cannot breastfeed their babies adequately have a high perceived insufficient milk supply. These results suggest that healthcare professionals should promote the contact between mothers and their infants and consider their health and well-being when introducing preventive measures as a response to the pandemic.

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Conflict of Interest

The author declares no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

Author Contributions

Plan, design: SK, GA, DA; **Material, methods and data collection:** SK, GA, HCY, DA; **Data analysis and comments:** SK, GA; **Writing and corrections:** SK, GA, HCY.

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Ethical Approval

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