

## Identifying the Predictors of Attachment to Preterm Hospitalized Infants during the Covid-19 Pandemic: A Cross-Sectional Study

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### Abstract

**Background:** Separation of the mother from her preterm hospitalized infant and the restrictions imposed by the Covid-19 pandemic can influence psychological dimensions such as the mothers' attachment to the preterm infants.

**Methods:** This cross-sectional correlational study was conducted during the Covid-19 pandemic and before the nationwide vaccination in a 4-month period from December 2020 to March 2021 on 190 mothers whose preterm infants were admitted to the neonatal intensive care unit (NICU) of the selected hospitals in Isfahan, Iran. All mothers with the inclusion criteria had the chance of participating in the study. After obtaining their consent, they completed Brockington's Postpartum Bonding Questionnaire, Corona Disease Anxiety Scale (CDAS), the multidimensional scale of perceived social support (mspss), and a researcher-made form concerning the Maternal-Neonatal Demographic Characteristics.

**Results:** The Covid-19 anxiety ( $12.21 \pm 10.31$ ), perceived social support ( $66.55 \pm 12.81$ ) and maternal attachment ( $43.81 \pm 6.82$ ) were estimated to be at the levels of mild, high, and medium respectively. As shown by the results of the Pearson correlation coefficient, a significant relationship was observed between the Covid-19 anxiety and maternal attachment ( $P < 0.001$ ). No significant relationship was observed between the perceived social support and maternal attachment at the significance level of 0.05 ( $p < 0.05$ ). Moreover, based on the results of the final multiple regression model, the Covid-19 anxiety, income level of the mother and her job were significant predictors of maternal attachment ( $P < 0.001$ ).

**Conclusion:** Based on the results of the study, increased anxiety of the Covid-19 could reduce the level of maternal-neonatal attachment. The factors of Covid-19 anxiety, income level and job of mothers were significant predictors of maternal attachment.

**Key Words:** Anxiety, Attachment, Covid-19, Perceived social support, Preterm, Infant Psychology.

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## 1- INTRODUCTION

The Covid-19 crisis has significantly affected the general mental health of societies and has led to widespread depression and anxiety among people (1). Creating an unprecedented public crisis, the recent Covid-19 pandemic has posed a risk on vulnerable groups. Therefore, close monitoring, identification and support of vulnerable groups is essential. Pregnant and postpartum women are among these vulnerable groups (2). While having numerous concerns about the health of the family and their children, pregnant women are anxious about compulsory behavioral changes such as social isolation, telework, transportation problems, looking after children, and health care (3). The most prevalent anxiety in postpartum women is their fear of infection and also the health of the baby after delivery and during breastfeeding (4). Moreover, factors such as fear of being infected with the virus during the hospital stay, reduced social support due to the limited visits, and the contrast between their pre-pandemic expectations and the actual experience of giving birth during the pandemic may play a crucial role in increasing the stress of women (5).

In addition to the mentioned factors, having a preterm infant hospitalized in NICU can by itself be stressful and put the parents at risk of psycho-emotional harms (3). Being separated from their infant, parents will inevitably experience a high level of severe anxiety (6). This stress, especially in mothers, can disrupt the process of maternal-neonatal attachment after the infant's hospitalization (7). Incomplete formation of attachment, in turn, can lead to severe physical and psychological problems in infants (8).

Attachment is defined as the creation of love and mutual connection between parents and infants created through the process of bonding. According to Klaus and Kennel, the early postpartum period is

of great significance in creating emotional attachment between mother and infant (9). Therefore, given the hospitalization of the preterm infants after their birth and the limited presence of family and relatives at the time of their admission due to the fear and anxiety caused by Covid-19 pandemic (10), it is almost impossible for the parents of these infants to be present in hospital that in turn can challenge the attachment process. As such, the researchers tried to identify the predictors of the mothers' attachment to the preterm infants hospitalized during the Covid-19 pandemic.

## 2- METHODS

This descriptive cross-sectional correlational study was conducted on 190 mothers whose preterm infants were hospitalized in the NICUs of the selected hospitals of Isfahan (Beheshti, Amin, Imam Hossein, Asgarieh and Zahraye Marzieh hospitals). Convenience sampling method was performed over a period of 4 months from December 2020 to March 2021.

For data collection, the following questionnaires were used: 1) Maternal-neonatal demographic form; 2) Corona Disease Anxiety Scale; 3) Multidimensional Scale of Perceived Social Support; and 4) Brockington Postpartum Bonding Questionnaire.

Corona Disease Anxiety Scale has been developed and validated by Alipour et al. (11) in Iran to measure the level of anxiety caused by the outbreak of the Covid-19. Using Cronbach's alpha, the reliability of the tool was calculated to be 0.87 for the first factor, 0.86 for the second factor, and 0.91 for the whole questionnaire. In the study of Eyni et al. (12), Cronbach's alpha was estimated to be 0.93. In Ezazi's study (13), the reliability of the scale was estimated to be 0.87 by using Cronbach's alpha method. The final version of the tool contains 18 items and 2 components

(factors). While items 1-9 measure psychological symptoms, items 10-18 measure physical symptoms. The tool is scored based on a 4-point Likert scale (never=0, sometimes=1, most of the time=2, and always=3), where the lowest and highest scores obtained by the respondents are 0 and 54 respectively. Scores 0-16 indicate no anxiety or mild anxiety, 17-29 indicate moderate anxiety, and scores 30-54 are indicative of severe anxiety (11).

Multidimensional Scale of Perceived Social Support, which was developed by Zimet et al. (14) in 1988, is a 12-item questionnaire with a 7-point scale ranging from strongly disagree (1) to strongly agree. The scores range from 12 to 84 and the higher the score, the better is the perceived support. This questionnaire was used in the study of Karami et al. (2017) (15) where Cronbach's alpha was obtained to be 0.80. The Cronbach's alpha of this questionnaire was also estimated to be 0.97 in the study of Tabatabaeichehr (2019) (16).

Brockington's Postpartum Bonding Questionnaire, developed by Brockington in 2006, has 25 items and four components of impaired mother-infant bonding (12 items), rejection and anger (7 items), anxiety about care (4 items), and risk of abuse (2 items). The questionnaire is scored based on a 6-point Likert scale from 0 to 5. The lowest and the highest scores are 0 and 125, where higher scores are indicative of a problem in mother-infant bonding (17). Brockington's questionnaire was used in the study of Aflakseir et al. (2013) (18) in Iran and Cronbach's alpha coefficients of 0.52, 0.67, 0.70 and 0.74 were obtained for the components of impaired mother-infant bonding, rejection and anger, anxiety about care, and risk of abuse respectively. In the study of Khoramirad et al. (2020) (17), it was used for 30 samples and

Cronbach's alpha coefficient of 0.87 was obtained for the whole questionnaire.

GPOWER software was used to estimate the sample size. Considering the confidence level of 95% and the test power of 90%, the required number of participants were estimated to be 190 subjects. Moreover, considering the probable drop of 10% because of the current pandemic condition, the sample size was determined to be 210 subjects. When the plan of the research was approved and after receiving the code of ethics

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from the ethics committee of Isfahan University of Medical Sciences and obtaining a letter of recommendation from the Vice Chancellor for Research, the researcher went to Imam Hossein, Amin, Shahid Beheshti, Asgarieh and Zahraye Marzieh hospitals in Isfahan. After explaining the objectives of the research to the officials of the above hospitals and obtaining the consent and agreement of them, sampling was performed. After reviewing the medical records, the researcher identified 5-7 days old preterm infants. Then, if they met the inclusion criteria, the questionnaires were given to their mothers and were completed by them after obtaining written consent from them. Demographic questionnaire was completed by the researcher and other questionnaires by the mother of the hospitalized preterm infant in the presence of the researcher when the mother was in an appropriate condition.

## **2-1. Inclusion and exclusion criteria**

The inclusion criteria for the mothers were willingness to participate in the study, no use of antidepressants in the last 3 months, having at least the primary school education, and no mood disorder. Inclusion criteria for the infants were the age range of 32-37 weeks, no congenital anomalies, hemodynamic stability, being able to tolerate eating mother's milk either

through breast or gastrostomy tube, and being hospitalized for at least 5-7 days. Abrupt cessation of breastfeeding, bad condition of the infants or their need of resuscitation, infant death, and mother's refusal to complete all questionnaires were considered as exclusion criteria.

### 2-2. Data analysis

Finally, the data collected from 190 samples were entered into SPSS software version 22. Descriptive statistics such as frequency, mean and standard deviation were used in this study. For analyzing the quantitative data, first, the normality of the data was examined based on the Kolmogorov-Smirnov test and, then, after confirmation of normality, independent parametric t-test, ANOVA, Pearson correlation and multiple regression were performed.

### 3- RESULTS

In this study, 210 mothers, whose preterm infants were hospitalized in the NICUs of the selected hospitals of Isfahan, were included in the study. Out of these mothers, 20 were excluded because of the following reasons: one case of maternal CVA; one case of neonatal metabolic syndrome; and 18 cases because of incomplete questionnaires. Finally, the statistical analysis was performed on 190 mothers. The findings of the study are shown in **Tables 1-4**.

Based on the mean and standard deviation of the total score, the level of Covid-19 anxiety ( $12.21 \pm 10.31$ ) was mild, the level of perceived social support ( $66.55 \pm 12.81$ ) was high and the level of maternal attachment ( $43.81 \pm 6.82$ ) was moderate (**Table 3**).

**Table-1:** The demographic characteristics of parents with hospitalized preterm infants

Parents' characteristics	No. (%)		Parents' characteristics	No. (%)		
Mother's infection with Covid-19	Yes	29 (15.3)	Father's education	Under diploma	70 (36.8)	
	No	16 (84.7)		Diploma	72 (37.9)	
Infertility history	Yes	15 (7.9)		Father's job	Associate degree	14 (7.4)
	No	175 (92.1)			Bachelor and above	34 (17.9)
Mother's education	Under diploma	52 (27.4)	Income level		Employee	40 (21.1)
	Diploma	76 (40)		Worker	48 (25.3)	
	Associate degree	18 (9.5)		Self-employed	102 (53.7)	
	Bachelor and above	44 (23.2)		Income = Expenditure 113 (59.5)		
Mother's job	Housewife	176 (92.6)		Income > expenditure 8 (4.2)		
	Employee	14 (7.4)		Income < expenditure 69 (36.3)		
Type of delivery	Cesarean	151 (79.5)	Father's age; mean (sd)			
	Vaginal	39 (20.5)	35.41 (8.01)			
Mother's age; mean (sd)	30.05 (5.75)					

**Table-2:** The demographic characteristics of the hospitalized preterm infants

Infant's characteristics	No. (%)	
Sex	Female	81 (42.6)
	Male	109 (57.4)
Birth order	1st	76 (40)
	2nd	77 (40.5)
	3rd and more	37 (19.5)
Number of fetus	Singleton	173 (91.1)
	Twins	14 (7.4)
	Triplet and more	3 (1.6)
Number of hospitalized days; mean (sd)	6.20 (4.09)	
Birth age (week); mean (sd)	34.12 (1.52)	
Birth weight (g); mean (sd)	2297.76 (1159.6)	

**Table-3:** Mean and standard deviation of the research variables in mothers with hospitalized preterm infants

Research variables	SD±Mean
Covid-19 anxiety	12.21±10.31
Psychological symptoms	9.15±6.08
Physical symptoms	1.03±3.05
Perceived social support	66.55±12.81
Maternal attachment	43.81±6.82
Impaired mother-infant bonding	27.29±3.44
Rejection and anger	7.10±2.96
Anxiety about care	5.46±1.67
Risk of abuse	3.95±1.42

**Table-4:** The final model (third model) of multiple regression for investigating the effects of the research variables on attachment

Variable	Beta coefficient ( $\beta$ )		Standard error	t-value	Sig	95% confidence interval	
	Non-standard	Standard				Min	Max
Fixed coefficient	43.418	-	1.754	24.757	<0.001	39.958	46.878
Covid-19 anxiety	0.231	0.349	0.044	5.235	<0.001	0.144	0.318
Income level	3.342	0.236	0.953	3.506	<0.001	1.461	5.222
Mother's job	-3.929	-0.151	1.749	-2.246	0.026	-7.380	-0.478
Third model summary	F=13.302 P<0.001		R-square=0.177			Adjusted-R-square= 0.163	

Based on the results of the Pearson correlation, there was a significant relationship between Covid-19 anxiety and maternal attachment ( $P < 0.001$ ); so that any increase in the level of Covid-19

anxiety decreased the mean score of maternal-neonatal attachment. However, no significant relationship was observed between maternal attachment and perceived social support ( $P < 0.05$ ).

In order to investigate how the maternal attachment is related to the demographic variables of the parents and preterm infants, perceived social support, and Covid-19 anxiety, stepwise multiple regression was used. First, the preconditions of the regression model were. The significance level of Kolmogorov-Smirnov test was 1.230 ( $>0.05$ ), indicating the normality of the model residuals. The Durbin-Watson statistic, with a value between 1.5 and 2.5, showed the independence of the residuals in the model. Moreover, in order to investigate the linearity between the independent variables, variance inflation factor (VIF) and tolerance index were used. Given the fact that the values of VIF and tolerance index were lower than 10 and 0.1 respectively, the problem of linearity was not observed between independent variables. Additionally, in order to examine the homogeneity of the residual variances, statistical scatter plot was used. After drawing it, no trend was observed in the resulting scatter plot indicating the homogeneity of the model's residual variance. As such, all conditions of the regression model were established and the multiple regression tests could be used.

The independent variables of demographic characteristics, Covid-19 anxiety and perceived social support were included in 3 models. Covid-19 anxiety was included in the first model and explained 10% of changes in maternal attachment. Moreover, the variables of the mothers' income level and job were included in the second and third models, respectively, where they explained 17% of the changes in maternal attachment.

The results indicated that Covid-19 anxiety, and the mothers' income level and job were significant predictors of maternal attachment. In other words, Covid-19 anxiety, with the standard beta coefficient of 0.349, had the highest regression effect

on maternal attachment. This means that one unit of increase in the standard deviation of Covid-19 anxiety, decreases maternal attachment by 0.349 units (the higher the scores, the more will be the stressors and the less will be the mother-infant attachment). The results also revealed that the level of income and job of the mothers, with standard beta coefficients of 0.236 and -0.151 respectively, had the highest regression effect on maternal attachment after Covid-19 anxiety. This means that the level of maternal attachment in high-income families is 0.236 units higher than the middle- and low-income families. Moreover, the attachment level of housewives is 0.151 units higher than that of the working mothers (**Table 4**).

#### 4- DISCUSSION

The results of the current study showed that the increase in Covid-19 anxiety could reduce the level of maternal-neonatal attachment. In line with this result, Bonacquisti et al. (2020) indicate the negative effect of anxiety and stress of mothers with preterm infants on mother-infant attachment (19). Moreover, they have reported significant relationships found in several other studies between maternal anxiety/stress and the mother-infant attachment. In line with this result, other studies have also shown that postpartum anxiety and mood symptoms in mothers with NICU experience might increase the risk of impaired mother-infant attachment (20–22). In line with the present study, the reduction of anxiety and stress is considered in all of these studies as a factor for increasing attachment. However, the present study addressed a special form of anxiety, namely Covid-19 anxiety, in a special group of women. In addition to preterm labor stress and having hospitalized preterm infants, these women should tolerate special conditions of Covid-19 pandemic. All of these

distinguish the present study from the other similar studies.

This study also investigated the relationship between perceived social support and the mothers' attachment to their hospitalized infants in the context of epidemic Covid-19, but no significant relationship was found between these two factors. Similarly, Ponti et al. (2021) (23) did not find any significant relationship between prenatal perceived social support and prenatal attachment. The support of spouse and mother-infant attachment were not also found to be significantly correlated (24). The results of these studies were in line with the present research. Delavari et al. (2018) (25), however, found a positive and significant correlation between social support and maternal-fetal attachment. A positive and moderate relationship was also observed in the study of Cinar et al. (2015) (26) between the total score of attachment and the total score of family social support (26) which was not consistent with the findings of the present study. The intervening Factors such as the mothers' specific characteristics and the use of various questionnaires may justify these differences in results.

Finally, we recognized the Covid-19 anxiety, mothers' income level and mothers' job as three significant predictors of maternal attachment. As we know, the parents whose infants have been admitted to NICUs are at risk of psychological trauma (27). The infant's hospitalization in NICUs in the first weeks of life and the problems caused by parental stress disrupt the mother-infant bonding (28). Thus, the identification of Covid-19 anxiety, as an influential factor affecting the attachment of these mothers, seems to be reasonable in the crucial condition of the Covid-19 pandemic.

In this study, the attachment of middle- and high-income mothers was higher than that of low-income ones. Jamshidimanesh

(29) also found a significant positive relationship between the adequacy of monthly income and maternal attachment behaviors. Khabaz et al. (30) also found out that having a high income enhanced the mother-infant attachment. Both of these studies are in line with our study. In contrast, Daglar and Nur reported that the level of postpartum attachment was not affected by economic status (31). Valizadeh et al. (2013) also argued that the better the economic status of the family, the lower would be the attachment score and suggested that more research be done to investigate this relationship (32). Therefore, although the effect of this factor on the attachment might vary in different sociocultural groups, it was the second factor predicting the mother-infant attachment in the present study.

Furthermore, the present study revealed that the level of mother-infant attachment among housewives was 0.151 units higher than that among working mothers. This finding might be attributed to the fact that housewives have more free time to look after their infants.

Given the fact that reduced stress can promote the level of attachment, it can be said that nurses, due to their continuous and close relationship with the vulnerable people, can play a crucial role in reducing the anxiety of mothers and enhancing their attachment to their infants. Moreover, attachment is a vital factor which affects the growth and development of infants, and hospitalization of infants can disrupt and reduce the level of attachment. Accordingly, nurses, as active and effective members of the treatment team, and healthcare providers should be familiar with the psychological features of mothers so that they can help reduce their anxiety.

#### **4-1. Limitations of the study**

One of the limitations of the present study was the recent pandemic and the lack of

continuous presence of the mothers due to the policies of each hospital that limited our access to the study population. Thus, the questionnaires were completed in appropriate conditions and with prior arrangement. It is suggested that future studies be conducted on the psychological effects and the level of quarantine-caused depression, as well as the effects of education and emotional intelligence on the Covid-19 anxiety.

## 5- CONCLUSION

Pandemic conditions and the resulting limitations have not only led to psychological stress in mothers with preterm infants, but have also imposed a special form of anxiety on them called the Covid-19 anxiety. According to the results of this study, the increase in the level of Covid-19 anxiety reduced the mother-infant attachment in the mothers with preterm infants. As such, the Covid-19 anxiety, along with the income level and job of the mothers were considered as the significant predictors of maternal attachment.

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