



Evaluating Postpartum Attachment, Anxiety, and Depression Following Covid-19 Infection During Pregnancy Among a Turkish Cohort

Türkiye’de Gebelikte COVID-19 Enfeksiyonu Geçiren Annelerde Doğum Sonrası Bağlanma, Anksiyete ve Depresyonun Değerlendirilmesi

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ABSTRACT

Objective: To evaluate the effects of COVID-19 on mother-infant bonding by using the Maternal Attachment Inventory, Edinburgh Postnatal Depression Scale, and Postpartum Specific Anxiety Scale on postpartum women who had COVID-19 during their pregnancies in Türkiye.

Material and Method: This study was conducted on 180 patients using the Maternal Attachment Inventory, Edinburgh Postnatal Depression Scale, and Postpartum Specific Anxiety Scale.

Results: There was no significant difference in terms of the Maternal Attachment Inventory, Edinburgh Postnatal Depression Scale, and Postpartum Specific Anxiety Scale scores in groups. There was a significant difference regarding the gestational week in which the disease was diagnosed, which was significantly higher in the asymptomatic group ($p=0.04$) and there was a significant difference in the symptomatic group in terms of thoracic involvement visualized with computer tomography scan ($p<0.001$). An increase in depression symptoms was observed in only 1.6% of all patients. Moderately increased anxiety symptoms were observed in 44.4% of the patients.

Conclusion: The COVID-19 pandemic has been a stress factor on all individuals causing a psychological burden on many aspects. According to our results, pandemic moderately increased anxiety levels among the pregnant population and it affected mother-infant bonding significantly in a negative manner.

Keywords: Anxiety, COVID-19, Depression, Maternal attachment.

ÖZET

Amaç: Türkiye’de gebelikleri sırasında COVID-19 geçiren annelere doğum sonrası Maternal Bağlanma Ölçeği, Edinburgh Doğum Sonrası Depresyon Ölçeği ve Doğum Sonrası Spesifik Anksiyete Ölçeği kullanılarak COVID-19’un anne bebek bağlanmasına etkilerini değerlendirmeyi amaçladık.

Gereç ve Yöntem: 180 hasta üzerinde Maternal Bağlanma Ölçeği, Edinburgh Doğum Sonrası Depresyon Ölçeği ve Doğum Sonrası Spesifik Anksiyete Ölçeği kullanılarak yapılmıştır.

Bulgular: Maternal Bağlanma Ölçeği, Edinburgh Doğum Sonrası Depresyon Ölçeği ve Doğum Sonrası Spesifik Anksiyete Ölçeği puanları açısından gruplar arasında anlamlı fark yoktu. Asemptomatik grupta hastalığın tanı konulduğu gebelik haftası anlamlı olarak daha yüksek izlendi ($p=0,04$) ve semptomatik grupta bilgisayarlı tomografi ile görüntülenen toraks tutulumu açısından anlamlı fark vardı ($p<0.001$). Tüm hastaların sadece %1,6’sında depresyon semptomlarında artış gözlemlendi. Hastaların %44,4’ünde orta derecede artmış anksiyete belirtileri gözlemlendi.

Sonuç: COVID-19 pandemisi tüm bireyler üzerinde birçok açıdan psikolojik yük oluşturan stres faktörü olmuştur. Bulgularımıza göre pandemi, gebe nüfusta kaygı düzeylerini orta düzeyde artırdı ve anne bebek bağlanmasını önemli ölçüde olumsuz yönde etkiledi.

Anahtar Sözcükler: Anksiyete, COVID-19, Depresyon, Maternal bağlanma.

Introduction

Mother-infant bonding (MIB) is defined as the development of the first and most basic relationship between the mother and the newborn, and this bond establishes a sense of trust in the newborn (1). Postpartum MIB disorders are seen in approximately 7-11.3% of the general population (2). According to the bonding theory, the failure of the proper development of MIB in early childhood can cause personality disorders and emotional distress in adulthood (3). It has been shown in several studies that MIB disorders have negative effects on the child's cognitive development such as brain development and language skills development (4, 5). Risk factors that may disrupt the healthy development of MIB should be determined and expectant mothers should be supported during and after pregnancy.

Several studies have shown that postpartum depression and/or anxiety are associated with impaired MIB (6-9). Better MIB assessment scores have been reported in patients who have received anxiety treatment during the postpartum period (10). The frequency of major or minor depression in the first 3 months following birth has been estimated to be 19.2%, and the frequency of anxiety disorders has been reported to be 8-13% (11,12). Higher frequency rates of 6.1-27% have also been reported for postpartum anxiety (13). Factors such as negative experiences during pregnancy or postpartum period, mode of delivery, number of children, and maternal age are known to have an effect on MIB (14). In addition, in mothers who tested positive for COVID-19 during pregnancy, anxiety, and depression symptoms frequency can increase and cause bonding problems between mother and the baby in the postpartum period. Although there are studies conducted among pregnant women reporting no risk to the fetus during pregnancy, there are several cases suggesting vertical transmission (15,16). This uncertainty regarding the effects of COVID-19 during pregnancy especially on the fetus can cause extra psychological burden during the postpartum period and increase anxiety, risk of postpartum depression, and attachment problems.

This study aimed to evaluate the effects of COVID-19 on MIB by using the Maternal Attachment Inventory (MAI), Edinburgh Postnatal Depression Scale (EPDS), and Postpartum Specific Anxiety Scale (PSAS) on

postpartum women who had COVID-19 during their pregnancies in Türkiye.

Material and Method

This prospective observational study was conducted at the University of Health Sciences, Istanbul Kanuni Sultan Süleyman Training and Research Hospital Department of Obstetrics and Gynecology between 30 June 2020- 30 June 2021. The study protocol was approved by the institution's ethics committee on 29/06/2020 (the number: 2020.06.111). Written informed consent was obtained from all subjects. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

180 patients who had positive PCR-test results for COVID-19 during pregnancy or who were considered positive according to their thoracic computer tomography (CT) findings were included in the study. Pregnant women were divided into 3 groups according to the trimesters in which they tested positive and 2 groups according to whether they had symptoms or not. Pregnant women aged between 18-47 years, who conceived spontaneously, with no obstetrical complications, who gave birth at term, and who did not have preexisting psychiatric conditions or who did not receive any psychiatric treatments were included in the study. Patients who had baby blues or postpartum depression in their previous pregnancies, had gynecological malignancies, developed complications during pregnancy or who did not complete the questionnaires (scales), who had a family history of violence or abuse, adolescent pregnancies, and patients with fetal anomalies diagnosed during pregnancy were excluded from the study.

The data of the patients included age, gravidity, parity, weeks of gestation at which COVID-19 was diagnosed, birth weight of babies, 1st and 5th minute APGAR scores, COVID-19 related symptoms, history of contact, chronic diseases, CT findings and PCR test results. All patients were asked to complete the MAI, EPDS and PSAS scales at their 3-month postpartum controls.

The Edinburgh Postpartum Depression Scale (EPDS) was created to screen for postpartum maternal depression symptoms (17). It is a self-assessment scale consisting of 10 items, which includes the psychological state of the individual. Each item is scored on a 4-point Likert scale rated 0-3. The total score can range from 0-30, and high scores are associated with depression. The Turkish version of EPDS was used in this study (18). The cutoff value is determined to be 13, and the risk of developing major depression increases in patients with scores of ≥ 13 (17). The sensitivity for the cutoff value varies between 38-43% and specificity between 98-99% depending on the trimester of the patient (19).

The Postpartum Specific Anxiety Scale (PSAS) was developed to evaluate anxiety symptoms in the postpartum period. The scale, first created by Fallon et al, has 51 items and has four subtypes: maternal competence and attachment anxieties (Items 1-15), infant safety and welfare anxieties (Items 16-26), practical infant care anxieties (Items 27-33), and psychosocial adjustment to motherhood (Items 34-51) (20). Responses to the items are rated on a 4-point Likert scale ranging from 1 to 4 (1=never, 2=sometimes, 3=often, 4=almost always) (20). The Turkish validation PSAS was conducted by Duran and the Cronbach's alpha coefficient was found to be 0.91(21). It is revealed that those who score 73 and below on the scale have low postpartum anxiety levels, those who score 74-100 have moderate anxiety, and those who score 101 and above have high levels of anxiety.

The Maternal Attachment Inventory (MAI) was developed by Mary E. Muller in 1994 to measure attachment with maternal love (22). The reliability coefficient of the MAI was found to be Cronbach alpha 0.85. Each item of the inventory is evaluated by a 4-way to 26-point Likert-type scale ranging from "always" to "never". Always has 4 points, often 3 points, sometimes 2 points, and never has 1 point. The lowest score, which can be obtained from the scale is 26, and the highest score is 104. A high score indicates a high maternal attachment (23). The Turkish version of the MAI was used in this study (23).

Statistical Analysis

Data analysis was performed using IBM SPSS Statistics

version 20.0 software (IBM Corporation, Armonk, NY, USA). The distributions of continuous variables were determined by Kolmogorov-Smirnov test. Descriptive statistics for continuous variables were expressed as mean and standard deviation (SD). Frequency distribution was shown for categorical data. The continuous variables, which were not normally distributed were evaluated by Mann-Whitney U or Kruskal-Wallis tests depending on a number of independent groups. Categorical data were analyzed by Pearson's χ^2 test. A *p-value less than 0.05* was considered statistically significant.

Results

All patients were grouped according to the trimester in which they were diagnosed with COVID-19 and their sociodemographic data and EPDS, PSAS, and MAI scores are listed in Table I. A mean age of 25.69 ± 7.44 , a mean gravidity of 2 ± 0.7 , and a mean parity of 0.9 ± 0.7 were calculated for the 1st trimester. The mean gestational week at diagnosis was 11.15 ± 2.8 , the mean birth weight of the newborns was 3131.15 ± 291 , the mean 1st minute Apgar score was 7.1 ± 0.3 , and the mean 5th minute Apgar score was 9. 53.8% of the patients reported having a positive contact with a COVID-19 patient. 7.7% had a history of chronic disease. COVID-19 PCR test was positive in 92.3% of the patients. 23.1% of the patients were asymptomatic. 92.3% of the patients refused to have a CT scan, and 7.7% of them had thoracic involvement with different intensities. EPDS was calculated to be 7.3 ± 2.6 , PSAS 72.1 ± 15.1 , and MAI 86.5 ± 11.9 for the patients in the 1st trimester group.

In the 2nd trimester group, the mean age was 26.85 ± 5.64 , the mean gravidity was 2.4 ± 1.4 , and the mean parity was 1.1 ± 1.2 . The mean weeks of gestation at diagnosis was calculated to be 20.92 ± 4.3 , and the mean birth weight of the newborns was 2984.2 ± 451.8 grams. 1st and 5th minute Apgar scores were 7 ± 0.3 and 9 respectively. Among the patients, 51.8% of them had a history of contact with a COVID-19 positive patient and 3.6% had a history of chronic disease. The PCR test was positive in 98.2% of the patients. Among the patients, 30.4% of them were asymptomatic, 62.5% of the patients refused to have a CT scan, and 16.1% did not show up to their CT scan appointments. Patients of 21.4%

had positive CT findings. EPDS was determined to be 7.1 ± 2.3 , PSAS was 74.8 ± 11.1 and MAI was 84.5 ± 8.5 in this group.

Table I. Comparison of Data Between Trimesters

		1 st trimester	2 nd trimester	3 rd trimester	p value
Age (years)		25.69± 7.44	26.85± 5.64	28.21± 6.42	0.179
Gravidity		2± 0.7	2.4± 1.4	2.5± 1.4	0.532
Parity		0.9± 0.7	1.1± 1.2	1.2± 1.2	0.487
Weeks of gestation		11.15± 2.8	20.92± 4.3	34.82± 3.4	<0.001
Birth weight (gr)		3131.15± 291	2984.2± 451.8	2963.82 507.9	0.470
APGAR 0 min		7.1± 0.3	7± 0.3	7± 0.7	0.825
APGAR 5 min		9	9	8.9± 0.4	0.147
EPDS		7.3± 2.6	7.1± 2.3	7.1± 2.1	0.886
PSAS		72.1± 15.1	74.8± 11.1	73± 11	0.589
MAI		86.5± 11.9	84.5± 8.5	84.5± 9.6	0.324
Symptoms	None	3 (23.1%)	17(30.4%)	37(33.3%)	0.544
	Cough	2 (15.4%)	15(26.8%)	25(22.5%)	
	Cough+Fever	4 (30.8%)	11(19.6%)	24(21.6%)	
	Cough+Fever+ Shortness of breath	3(23.1%)	4(7.1%)	15(13.5%)	
	Cough+Fever+ Sore throat	0(0)	2(3.6%)	2(1.8%)	
	Diarrhea	1(7.7%)	0(0)	1(0.9%)	
	Myalgia	0(0)	5(8.9%)	4(3.6%)	
	Anosmia	0(0)	2(3.6%)	3(2.7%)	
Contact	No	6 (46.2%)	27(48.2%)	63(56.8%)	0.507
	Yes	7(53.8%)	29(51.8%)	48(43.2%)	
Chronic disease	No	12 (92.3%)	54(96.4%)	109(98.2%)	0.507
	Yes	1(7.7%)	2(3.6%)	2(1.8%)	
PCR	Negative	1(7.7%)	1(1.8%)	12(10.8%)	0.07
	Positive	12(92.3%)	55(98.2%)	99(89.2%)	
CT	Negative	0(0)	9(16.1%)	19(17.1%)	<0.001
	Mild	0(0)	4(7.1%)	17(15.3%)	
	Moderate	0(0)	5(8.9%)	27(24.3%)	
	Severe	1(7.7%)	3(5.4%)	9(8.1%)	
	Suspicious	0(0)	0(0)	6(5.4%)	
	Patient did not want to have CT	12(92.3%)	35(62.5%)	33(29.7)	

Significant results ($p < 0.05$) are shown in bold. EPDS: The Edinburgh Postpartum Depression Scale. PSAS: The Postpartum Specific Anxiety Scale. MAI: The Maternal Attachment Inventory. CT: Patients with atypical involvement in thorax computed tomography were evaluated as negative. Patients with typical involvement in thorax computed tomography were evaluated as mild, moderate, and severe.

The third trimester group had a mean age of 28.21 ± 6.42 , mean gravidity of 2.5 ± 1.4 , and mean parity of 1.2 ± 1.2 . The mean weeks of gestation at diagnosis was determined to be 34.82 ± 3.4 . The mean birth

weight of the newborns was 2963.82 ± 507.9 grams. First minute Apgar score was 7 ± 0.7 and 5th minute Apgar score was 8.9 ± 0.4 . Among patients, 43.2% of them had contact with a COVID-19 positive patient and 1.8% had a history of chronic disease. The PCR test was positive in 89.2% of the patients. Among the patients 33.3% of them were asymptomatic, 29.7% of the patients refused to have CT scan and 17.1% failed to be present at their CT appointments, 5.4% had suspicious areas of involvement on CT and 47.7% had positive thoracic involvement. EPDS was determined as 7.1 ± 2.1 , PSAS was 73 ± 11 , and MAI was 84.5 ± 9.6 in the third trimester.

When these 3 trimester groups were compared with each other, there was no significant difference in terms of EPDS, PSAS, and MAI scores, with p-values of 0.886, 0.589, and 0.324, respectively. On the other hand, a significantly higher percentage of patients refused a CT scan in the 1st and 2nd trimester compared to the 3rd trimester ($p < 0.001$).

Following the analysis according to trimesters patients were divided into 2 groups based on being symptomatic or asymptomatic. Sociodemographic data and EPDS, PSAS, and MAI scores are listed in Table II. In asymptomatic patients, the mean age was 26.43 ± 4.95 years, gravidity was 2.2 ± 1.2 , and parity was 1.1 ± 1.1 . Means weeks of gestation at diagnosis was 30.4 ± 8.6 . The mean birth weight of the newborns was determined to be 3035.8 ± 430.8 . The 1st and 5th minute Apgar scores were 7.1 ± 0.3 and 9, respectively. Among the patients, 54.4% of them had a positive contact history and none of the patients had a history of chronic disease. COVID-19 PCR test was positive in 94.7% of the patients. Patients of 43.9% refused CT scan, 29.8% did not show up to their CT appointments, and 3.5% of the CT findings showed suspicious areas on the scan and 22.8% had thoracic involvement. In asymptomatic patients, EPDS was 7 ± 1.9 , PSAS was 73.4 ± 10.3 , and MAI was 84.8 ± 8.2 .

In symptomatic patients, the mean age was 28.14 ± 6.76 , the mean gravidity was 2.5 ± 1.4 , and the mean parity was 1.2 ± 1.3 . The mean gestational week at diagnosis was reported to be 28.1 ± 8.8 . The mean birth weight of the newborns was calculated to be 2958.1 ± 497.9 grams. The 1st minute Apgar score was 7 ± 0.7 and the 5th minute Apgar score was 8.4

± 0.4 . In 43.1% of the patients, a history of positive contact was reported. Among the patients 4.1% of them had a history of chronic disease. The PCR test was positive in 91.1% of the patients. Patients of 44.7% did not want to have a CT scan, 8.9% failed to show up to their CT appointments, 3.3% had suspicious findings on CT and 43.1% had thoracic involvement. In symptomatic patients, EPDS was 7.2 ± 2.3 , PSAS was 73.5 ± 11.1 , and MAI was 84.6 ± 9.9 .

Table II. Comparison of Data Based on the Presence of Symptoms

		Symptom -	Symptom +	p-value
Age (years)		26.43 $\pm$ 4.95	28.14 $\pm$ 6.76	0.172
Gravidity		2.2 $\pm$ 1.2	2.5 $\pm$ 1.4	0.326
Parity		1.1 $\pm$ 1.1	1.2 $\pm$ 1.3	0.573
Weeks of gestation		30.4 $\pm$ 8.6	28.1 $\pm$ 8.8	0.040
Birth weight (gr)		3035.8 $\pm$ 430.8	2958.1 $\pm$ 497.9	0.255
APGAR 0 min		7.1 $\pm$ 0.3	7 $\pm$ 0.7	0.607
APGAR 5 min		9	8.9 $\pm$ 0.4	0.09
EPDS		7 $\pm$ 1.9	7.2 $\pm$ 2.3	0.748
PSAS		73.4 $\pm$ 10.3	73.5 $\pm$ 11.1	0.898
MAI		84.8 $\pm$ 8.2	84.6 $\pm$ 9.9	0.618
Symptoms	None	57(100%)	0(0)	<0.001
	Cough	0(0)	42(34.1%)	
	Cough+Fever	0(0)	39(31.7%)	
	Cough+Fever+ Shortness of breath	0(0)	22(17.9%)	
	Cough+Fever+ Sore throat	0(0)	4(3.3%)	
	Diarrhea	0(0)	2(1.6%)	
	Myalgia	0(0)	9(7.3%)	
	Anosmia	0(0)	5(4.1%)	
Contact	No	26(45.6%)	70(56.9%)	0.158
	Yes	31(54.4%)	53(43.1%)	
Chronic disease	No	57(100%)	118(95.9%)	0.181
	Yes	0(0)	5(4.1%)	
PCR	Negative	3(5.3%)	11(8.9%)	0.553
	Positive	54(94.7%)	112(91.1%)	
CT	Negative	17(29.8%)	11(8.9%)	<0.001
	Mild	7(12.3%)	14(11.4%)	
	Moderate	6(10.5%)	26(21.1%)	
	Severe	0(0)	13(10.6%)	
	Suspicious	2(3.5%)	4(3.3%)	
	Patient did not want to have CT	25(43.9%)	55(44.7%)	

Significant results ($p < 0.05$) are shown in bold. EPDS: The Edinburgh Postpartum Depression Scale. PSAS: The Postpartum Specific Anxiety Scale. MAI: The Maternal Attachment Inventory. CT: Patients with atypical involvement in thorax computed tomography were evaluated as negative. Patients with typical involvement in thorax computed tomography were evaluated as mild, moderate, and severe.

When the patients were analyzed by dividing them into two groups according to their symptomatology, there was no significant difference in terms of EPDS, PSAS, and MAI scores (p values of 0.748, 0.898, and 0.618, respectively). One of the significant differences was observed at the gestational week at which the disease was diagnosed, which was found to be significantly higher in the asymptomatic group ($p = 0.04$). The other significant difference was that a significantly higher number of patients in the symptomatic group had thoracic involvement visualized with a CT scan ($p < 0.001$).

When all pregnant patients were considered together, an increase in depression symptoms was observed in only 1.6% of all patients ($EPDS \geq 13$). Moderately increased anxiety symptoms were observed in 44.4% of the patients (PSAS scores between 74-100).

Discussion

The COVID-19 pandemic has taken the whole world under its influence since the beginning of 2020. The disease had serious psychological, economic, and health effects on people all over the world. In the postpartum period, MIB is affected by many factors such as social support, education level, number of children, income level, and psychological state (24). In this study, we investigated whether the COVID-19 pandemic had any effect on MIB, and the results indicated that the pandemic did not have a significant adverse effect. However, mild anxiety was detected in 44.4% of the study subjects.

It has already been shown that the COVID-19 pandemic increased the degree of anxiety in pregnant women (25). Mothers have concerns about the harmful effects of the virus on their babies and their own health (26). In a study conducted in China, this increase in anxiety was found to be due to the possible vertical transmission of the infection during pregnancy (27). Similarly, in different studies, a higher risk for developing anxiety and depression in pregnant women during the COVID-19 pandemic period was observed, and the risk of developing anxiety was reported to be between 63-68% (26,28). In a study by Yassa et al. during the COVID-19 pandemic period, anxiety and obsessive compulsion scores were found to be higher in pregnant women, but lower anxiety levels

were found in pregnant women compared to non-pregnant women (28). In a study conducted among pregnant women who were not infected during the pandemic, the risk of postpartum depression was reported in 14.7% of the subjects during the postpartum period, and MAI scores were found to be significantly lower in patients with depression compared to the healthy controls (29). In our study, moderately increased anxiety levels were found in 44.4% of the patients, but it was found that it had no effect on depression and MIB. The reason for this could be the easy access that pregnant women have to obstetricians and obstetrics clinics in Türkiye, regardless of the pandemic. Also, a selection bias regarding the study cohort could explain the results. All the patients who were recruited to the study were under pregnancy surveillance at our tertiary obstetrics clinic with adequate obstetricians, patient beds, and intensive care beds available. This might have provided a feeling of security to the patients, which reflected on their results.

In addition to depression and anxiety, we have also assessed secondary parameters related to COVID-19, such as diagnostic use of thoracic CT, weeks of gestation at diagnosis, and presence of thoracic involvement. A significantly higher number of patients in the 1st and 2nd trimester declined CT scan as a diagnostic tool compared to the patients in the 3rd trimester ($p<0.001$). Additionally, the weeks of gestation at diagnosis was found to be significantly higher in asymptomatic patients ($p=0.04$), and a significantly higher number of positive findings with CT scan was reported among symptomatic patients ($p<0.001$).

One of the most important limitations of the study is the lack of comparable data before and during the pandemic. In addition, the absence of a control group and unknown EPDS, PSAS, and MAI values of patients who were not infected during the pandemic period are also limitations. The illiteracy of some patients required the questions to be read and filled out by research assistants. The presence of a third person could have influenced the answers of some of the study subjects. MIB is multifactorial and there are many factors that affect this process before and after birth. In order to comment on MIB disorders and the effect of the pandemic on MIB

multicenter studies with larger numbers and control groups are needed.

The COVID-19 pandemic has been a stress factor on all individuals causing a psychological burden on many levels. According to our results, the pandemic moderately increased the anxiety levels among the pregnant population, and it affected MIB significantly in a negative manner. Nonetheless, more studies are needed to drive a conclusion on the long-term effects of the pandemic on the postpartum period and the bonding between mother and infant.

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