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Relationship Between Anxiety and Prenatal Attachment Level in Pregnant Women Diagnosed with Covid-19

Covid-19 Tanısı Almış Gebelerde Kaygı ile Prenatal Bağlanma Düzeyi Arasında İlişki

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ABSTRACT

Objective: To evaluate the relationship between anxiety and prenatal attachment in pregnant women diagnosed with COVID-19. **Materials and Methods:** The cross-sectional, correlational and descriptive study was conducted between October 15, 2021, and December 31, 2021. The sample consisted of 278 pregnant women who were admitted to the gynecology service in a training and research hospital. Data were collected using the Personal Information Form, State Anxiety Scale, Trait Anxiety Scale, and Prenatal Attachment Inventory. **Results:** The average age of the participants was 29.45 ± 5.59. 48.9% of them were between 19-28 years old, the average gestational week was 34.24 ± 4.13. The mean score on the State Anxiety Scale was 48.61 ± 11.42; the mean score on the Trait Anxiety Scale was 43.67 ± 8.49; and the mean score on the Prenatal Attachment Inventory was 68.08 ± 12.35. A significant difference was found between the thoughts experienced when diagnosed with COVID-19 and the mean scores of the Prenatal Attachment Inventory, State Anxiety Scale, and Trait Anxiety Scale. When the relationship between the scales was evaluated, it was determined that there was a high, positive and significant correlation between the state anxiety level and the trait anxiety level (r=0.849; p<0.001); and a very low and negative correlation between the prenatal attachment and the trait anxiety level (r=-0.154; p=0.010).**Conclusion:** Pregnant women have high levels of state and trait anxiety, while prenatal attachment levels are moderate. Being diagnosed with COVID-19 has significant effects on anxiety and attachment. Prenatal attachment has been found to decrease as anxiety levels increase. Strengthening psychosocial support and counseling services to reduce anxiety during pregnancy is recommended.

Keywords: COVID-19, Pregnancy, Anxiety, Prenatal attachment

ÖZET

Amaç: COVID-19 tanısı almış gebelerde kaygı ile prenatal bağlanma arasındaki ilişkiyi değerlendirmektir. **Gereç ve Yöntem:** Kesitsel, ilişki arayıcı ve tanımlayıcı tipte gerçekleştirilen çalışma 15.10.2021-31.12.2021 tarihlerinde yapılmıştır. Çalışmanın örneklemini bir Eğitim ve Araştırma Hastanesinde kadın doğum servisine yatışı yapılan 278 gebe oluşturmuştur (n=278). Veriler; Kişisel Bilgi Formu, Durumluluk Kaygı Ölçeği, Sürekli Kaygı Ölçeği ve Prenatal Bağlanma Envanteri ile aracılığıyla toplanmıştır. **Bulgular:** Katılımcıların yaş ortalaması 29,45 ± 5,59 olup, %48,9'u 19-28 yaş arasında ve gebelik haftası ortalaması 34,24 ± 4,13'tür. Durumluluk Kaygı Ölçeği puan ortalaması 48,61 ± 11,42; Sürekli Kaygı Ölçeği puan ortalaması 43,67 ± 8,49; Prenatal Bağlanma Envanteri puan ortalaması 68,08 ± 12,35'tir. COVID-19 tanısı alındığında yaşanılan düşünce ile Prenatal Bağlanma Envanteri, Durumluluk Kaygı Ölçeği ve Sürekli Kaygı Ölçeği puan ortalamaları arasında anlamlı farklılık bulunmuştur. Ölçekler arasındaki ilişki değerlendirildiğinde durumluluk kaygı düzeyi ile sürekli kaygı düzeyi arasında yüksek düzeyde, pozitif yönlü, anlamlı (r=0,849; p<0,001); prenatal bağlanma ile süreklilik kaygı düzeyi arasında oldukça düşük ve negatif bir korelasyon (r=-0,154; p=0,010) olduğu belirlenmiştir. **Sonuç:** Gebelerin durumluluk ve sürekli kaygı düzeyleri yüksek, prenatal bağlanma düzeyleri ise orta düzeydedir. COVID-19 tanısı alma durumu, kaygı ve bağlanma üzerinde anlamlı etkiler göstermiştir. Kaygı düzeyleri arttıkça prenatal bağlanmanın azaldığı belirlenmiştir. Gebelikte kaygıyı azaltmaya yönelik psikososyal destek ve danışmanlık hizmetlerinin güçlendirilmesi önerilmektedir.

Anahtar Kelimeler: COVID-19, Gebe, Kaygı, Prenatal bağlanma

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INTRODUCTION

Prenatal attachment is an abstract concept that represents a close relationship and begins with pregnancy, continues after birth, and has an impact on maternal role development. It is felt most intensely in the postpartum period (Brandon et al., 2009). Prenatal attachment is effective in establishing the mother-infant bond and gaining the role of motherhood in the postpartum period; also affecting the mother-infant relationship and parenting behavior (Rubin, 1976). The existence and quality of attachment are accepted as basic indicators of happiness and satisfaction in all developmental stages from infancy to later phases. One study observed a correlation between maternal-fetal attachment during pregnancy and maternal-infant attachment in the postpartum period (Rodriquez and Tucker, 2011). In this regard, it was claimed that psychological health during pregnancy is associated with maternal-fetal attachment development and early postpartum attachment (McNamara et al., 2019).

In December 2019, an outbreak of pneumonia emerged in Wuhan, China. This pneumonia, which developed due to the new SARS-CoV-2 agent, was called Coronavirus disease (COVID-19). Since its emergence, the number of COVID-19 patients has surged dramatically, and the disease has spread rapidly through person-to-person transmission. On March 11, 2020, Turkiye's first COVID-19 case was identified, and on the same day, the Turkish Ministry of Health introduced a guide, algorithms, and application schemes to combat COVID-19 (Turkish Ministry of Health, 2020). Many groups were adversely affected during the pandemic, and one of them is women. While the normal flow of life continued, women required more health services for pregnancy and childbirth. COVID-19 contact tracing service standards have been implemented for pregnant women who have been in contact with COVID-19 patients during the pandemic. Additionally, individual midwifery services have begun to be provided to pregnant women during labor and the postpartum period. Literature findings indicate that some pregnant women are compromised due to the serious viral infection response related to COVID-19 (Kakemam et al., 2025). Existing literature indicates that some pregnant women are particularly vulnerable to complications arising from COVID-19 infection. These risks may include preterm birth, intrauterine growth restriction, hemorrhage, fetal anomalies, and increased maternal and fetal mortality (Sklaveniti, 2020). Additionally, COVID-19 infection may negatively affect the prenatal attachment process, potentially impacting the emotional bond between the mother and her unborn child. Studies have shown that heightened anxiety and fear associated with COVID-19 can influence maternal behaviors and perceptions, which are crucial for developing a secure prenatal attachment. For instance, a research has demonstrated that increased maternal anxiety during the pandemic is associated with lower prenatal attachment scores (Schaal et al., 2023). Conversely, factors such as higher relationship satisfaction and positive coping mechanisms have been linked to stronger maternal-fetal attachment, suggesting that emotional support and coping strategies play significant roles in fostering prenatal attachment during these challenging times.

During the pandemic, not only physical problems but also psychological anxiety levels in pregnant women have increased. The negative effects of the COVID-19 pandemic during pregnancy include increased emotional instability and susceptibility to stress due to hormonal fluctuations and concerns about harming the fetus. Therefore, the stress and anxiety experienced during the COVID-19 process reduce mother-baby bonding, cause symptoms to appear more

during pregnancy, and affect the development of the fetus and the mother's perspective on the birth process. Considering the perinatal experiences of women, it is certain that the COVID-19 pandemic is the biggest source of anxiety for them (Albayrak et al., 2021). In a study examining the psychopathological consequences of the pandemic, it was observed that depression, anxiety, and negative mood increased in pregnant women compared to non-pregnant women. It was also observed that positive mood significantly decreased in pregnant women (López-Morales et al., 2021). In a study conducted on pregnant women in China, 44.6% of participants reported probable depression, 29.2% probable anxiety, and 7.4% suicidal ideation (Yang et al., 2020). In another study conducted during the pandemic period by Yassa et al. (2020), 61.6% of pregnant women were found to have high obsessive symptom scores related to the COVID-19 pandemic. Recent studies on the general population have shown an increase in depression and anxiety symptoms during the pandemic (Swami et al., 2021; Khademian et al., 2021). According to the findings, perinatal depression and anxiety caused by pregnancy in women intensified the concerns of both pregnant women and their families, and caused psychological problems during the pandemic. Accordingly, it can be expected that both prenatal and postnatal mother-infant relationships may be negatively affected (McNamara et al., 2019; Albayrak et al., 2021). Therefore, more studies are needed to reveal the effects of psychological experiences during the COVID-19 outbreak on the mother-infant relationship.

The current study examines the effect of anxiety on prenatal attachment in pregnant women with COVID-19. When the literature was reviewed, it was determined that there were studies with different sample sizes on anxiety and prenatal attachment in COVID-19 (Karakuş Turan, 2021; Abbasoglu et al., 2023; Düdükcü et al., 2023). In our study, the relationship between prenatal attachment and state and trait anxiety in pregnant women with COVID-19 was evaluated.

MATERIALS AND METHODS

Type of Research

The cross-sectional, correlational and descriptive study was conducted among pregnant women diagnosed with COVID-19 who were admitted to the gynecology service in a training and research hospital between October 15 and December 31, 2021.

Universe And Sample of the Research

The current study was conducted in the COVID-19 service of a training and research hospital in Türkiye between October 2021 and November 2021. The universe of the study consisted of pregnant women who applied to the COVID-19 service of this hospital. The number of pregnant women hospitalized in the COVID-19 ward between 01.01.2021 and 30.06.2021 was 1275. A power analysis was conducted to calculate the sample size. The G*Power 3.1.9.7 program was used to determine the sample size of the research (Faul et al., 2007). Taking into account Cohen's (1988) medium effect size recommendation and the data from the study conducted by Naghizadeh and Mirghafourv (2021) (effect size 0.21), the sample size was calculated using a single-group case model with a t-test. Accordingly, the effect size is d = 0.21. It was determined that 297 people should be reached with a confidence interval of 95% and a margin of error of 5%. A total of 297 people were invited to the study, and the study was completed with 278 people (Twelve individuals were excluded because of inadequate data, and seven people were excluded due to previous use of psychiatric drugs).

Criteria For Inclusion in The Study

Pregnant women diagnosed with COVID-19 who applied to the COVID-19 service between October 15 and December 31, 2021, agreed to participate in the study, could read and understand Turkish, were literate, had not previously been diagnosed with anxiety disorder or psychiatric disorder before, and had completed their 20th week of pregnancy were included in the study.

Data Collection Tools

Participant Information Sheet, SAI, TAI, and PAI were used for data collection.

Participant Information Sheet: The sheet was prepared by the authors based on the literature analysis. It was rearranged as a result of the feedback received. The form consists of 12 items regarding sociodemographic, obstetric and infection characteristics such as COVID-19 infection characteristics, age, education, gestational week and infection symptoms.

State Anxiety Inventory (Sai)-Trait Anxiety Inventory (Tai): This tool was prepared by Spielberger et al. (1970) The translation of the inventory into Turkish and the validity-reliability assessment were performed by Öner and LeCompte (1983). The State-Trait Anxiety Inventory includes 40 items that individuals use while expressing their feelings. Depending on how they feel and the severity of their feelings, a participant selected one of the options “not at all” (1), “somewhat” (2), “very much” (3), or “totally” (4). While scoring the reverse items representing positive emotions, items with one weight value were converted to four and those with four weight values were converted to one. In direct expressions representing negative emotions, 4 indicates a high level of anxiety. For the reverse items, on the other hand, four indicates low anxiety and one indicates high anxiety. Higher scores suggest high anxiety, whereas lower scores indicate lower anxiety. The same applies when interpreting scores in percentile order. The sum of the direct items representing negative emotions and the converted sum of the reverse items representing positive emotions were calculated to determine the total scale score. The total score that a participant can receive from each scale ranges from 20 to 80. There is no cutoff point. In this study, the Cronbach's alpha coefficient of the state anxiety scale was found to be .857, and the Cronbach's alpha coefficient of the trait anxiety scale was found to be .832. The researchers gathered scale data by directly asking the participants.

Prenatal Attachment Inventory (PAI): This tool was prepared by Mary Muller (1990). The adaptation of the inventory into Turkish and the validity-reliability study were performed by Yılmaz and Beji (2013). The inventory includes 21 items to explain pregnant women’s experiences, thoughts, and feelings, as well as to determine levels of prenatal maternal-fetal attachment. Participants rated each item on a four-point Likert scale, ranging from 1 (never) to 4 (always). The minimum and maximum scores that can be obtained from the scale are 21 and 84, respectively. Higher scores indicate higher prenatal maternal-fetal attachment. It is applied to pregnant women who have completed the 20th week of pregnancy. The Cronbach's alpha coefficient for the Turkish version was reported as .84 (Yılmaz and Beji, 2013). In the current study, the Cronbach's alpha coefficient of the prenatal attachment inventory scale was calculated as .984.

Ethical Aspects Of The Study

Ethical approval for conducting the research was obtained from the Non-Interventional Clinical Research Ethics Committee of a public university training and research hospital (Date:

14.10.2021, Approval Number: 1589). Also, research permissions were received from the Ministry of Health (Decision No: 2021-10-01T21_22_37), General Directorate of Health Services, and a public Training and Research Hospital. The study was carried out under the principles of the Declaration of Helsinki.

Data Collection

The preliminary application of the research was carried out in the Gynecology and Obstetrics Service of a training and research hospital. Twenty pregnant women, who completed their 20th week of pregnancy and were diagnosed with COVID-19, participated in this preliminary phase. As a result of the pre-application, the research method and data collection forms were evaluated. Since it was determined that there was no need for any changes or arrangements, the pregnant women included in the pre-application were included in the sample. Researchers collected the data through face-to-face interactions with the participants. The participants were interviewed once in a suitable environment in the obstetrics and gynecology service. During the interview, the information in the Informed Consent Form was read out, and verbal and written consent of all participants was received. Pregnant women who agreed to participate in the study filled out a Personal Information Form, State and Trait Anxiety Scale, and Prenatal Attachment Inventory, and the interview lasted about 10-15 minutes.

Data Analysis

SPSS 22.0 for Windows package software was used for statistical analysis of the data. Descriptive statistical test (mean, standard deviation, minimum and maximum values, and percentiles) were used to evaluate the findings. T-test (independent samples t-test) and one-way analysis of variance were performed to compare the scale scores with the variables. Plus, a Post hoc Bonferroni analysis was conducted for the variables that were found to be statistically different by the comparisons. The Pearson correlation analysis was performed to determine the correlations between the scales. The $p<0.05$ level was considered statistically significant.

While evaluating the normality analysis of the data, in order to determine which distribution the data of the variables came from, the Kolmogorov-Smirnov test statistics and p value, skewness and kurtosis coefficients were examined, and in line with the suggestion of Tabachnick and Fidell (2013), if the p value was greater than 0.05 or the skewness and kurtosis coefficients were within the limits of ±2, the distribution of the data was accepted to be within normal limits.

FINDINGS

As seen in Table 1, 48.9% of the pregnant women participants aged 19-28 years had a mean age of 29.45 ± 5. 31.7% were primary school graduates, and 92.1% were unemployed. The mean gestational week of the participant pregnant women was 34.24 ± 4.13, 81.3% were at 29-37 weeks of pregnancy, the mean number of pregnancies was 2.71 ± 1.44, 64.4% had 2-4 pregnancies before, 74.5% had a planned pregnancy, and 92.1% were willing to become pregnant. The mean time since the COVID-19 diagnosis of the participants was 3.40 ± 4.20 days. Furthermore, 58.6% of the participants applied to the hospital with a cough complaint, 67.6% of them had a cough complaint since they were diagnosed, 33.2% of them stated that they did not know what to do after learning the PCR test was positive and were hospitalized for an average of 2.85 ± 3.49 days (Table 1).

Table 1. Distribution of The Descriptive Characteristics of Pregnant Women

	n	%
Age (years)		
19 – 28	136	48.9
29 – 38	117	42.1
39 and above	25	9.0
Education		
Illiterate	21	7.6
Primary	88	31.7
Secondary	84	30.2
High School	59	21.2
College	26	9.3
Employment		
Employed	22	7.9
Unemployed	256	92.1
Place of living		
City	236	84.9
County	42	15.1
Number of pregnancies		
First pregnancy	63	22.7
2nd - 4th pregnancy	179	64.4
5th or above	36	12.9
Number of alive children		
1	130	46.8
2 - 4	138	49.6
5 and above	10	3.6
Planned pregnancy		
Yes	207	74.5
No	71	25.5
Willingness to become pregnant		
Yes	256	92.1
No	22	7.9
Time since COVID-19 diagnosis		
0-8 days	251	90.3
9-17 days	21	7.6
18 days and above	6	2.1
Symptoms leading to a have a COVID-19 test*		
Shortness of breath	154	55.4
Headache	75	27.0
Loss of smell	23	8.3
Weakness	76	27.3
Loss of taste	32	11.5
Cough	163	58.6
Fever	98	35.3
Runny nose	18	6.5
Nausea	18	6.5
Vomiting	18	6.5
General body pain	75	27.0
Other	107	38.5
Symptoms after positive PCR test*		
Cough	188	67.6
Fever	123	44.2
Nausea	26	9.4
Vomiting	27	9.7
Runny nose-sneezing	22	7.9
Weakness	113	40.6
Back/low back pain	62	22.3
Muscle and joint pain	81	29.1
Loss of smell	48	17.3
Loss of taste	43	15.5
Headache	75	27.0
Shortness of breath	142	51.1

Table 1. Distribution of The Descriptive Characteristics of Pregnant Women (Continued)

Thoughts following a positive PCR test result		
I thought I was going to die	34	12.4
I thought my baby could get hurt	43	15.6
I was so scared	58	21.1
I didn't know what to do	92	33.2
I thought I'd get over it without any problems	23	8.5
I was worried when I first heard it, but then my worries were gone	25	9.2
Mean age (years)	29.45±5.59 (min-max: 19-47)	
Mean gestational week X̄±SD (min-max)	34.24 ± 4.13 (min-max: 20-40)	
Mean number of pregnancies X̄±SD (min-max)	2.71 ± 1.44 (min-max: 1-7)	
Mean number of alive children X̄±SD (min-max)	1.63 ± 1.44 (min-max: 0-6)	
Mean time since COVID-19 diagnosis (days) X̄±SD (min-max)	3.40 ± 4.20 (min-max: 0-26)	
Mean duration of hospitalization X̄±SD (min-max)	2.85 ± 3.49 (min-max: 0-23)	

X̄: mean value, SD: Standart Deviation, *More than one option is selected

According to the findings, the mean SAI, TAI, and PAI scores of the participants were 48.61 ± 11.42, 43.67 ± 8.49, and 68.08 ± 12.35, respectively. These results indicated that pregnant women diagnosed with Covid-19 have mild anxiety and their prenatal attachment levels are above the average (Table 2).

Table 2. SAI, TAI, and PAI Mean Scores

	Highest - lowest scores that can be obtained	X̄±SD (min-max)
SAI	20 - 80	48.61 ± 11.42 (31 – 74)
TAI	20 - 80	43.67 ± 8.49 (29 – 65)
PAI	21 - 84	68.08 ± 12.35 (41 – 84)

SAI: State Anxiety Inventory, TAI: Trait Anxiety Inventory, PAI: Prenatal Attachment Inventory, X̄: mean value

In the comparison of the sociodemographic, obstetric, and COVID-19 diagnosis characteristics of the pregnant women with the total scale scores, a significant difference was found between the SAI and the variables of willingness to become pregnant, having a COVID-19 test due to nausea and general body pain, having back/low back pain and headache after a positive PCR test, and thoughts after learned positive PCR test ($p<0.05$). A significant difference was found between the TAI and the variables of place of living, willingness to become pregnant, time since COVID-19 diagnosis, having a COVID-19 test after loss of smell and general body pain, having nausea and runny nose-sneezing after a positive PCR test, and thoughts after learned positive PCR test ($p<0.05$). A significant difference was found between PAI and age, educational status, employment, place of living, number of pregnancies, number of alive children, planned pregnancy, willingness to become pregnant, time since COVID-19 diagnosis, cough after a positive PCR test, vomiting, loss of taste, thoughts following a positive PCR test result variables ($p<0.05$) (Table 3).

Table 3. Comparison of The Participants' Socio-Demographic, Obstetric and COVID-19 Associated Characteristics with SAI, TAI, and PAI Scores

	SAI (X̄±SD)		TAI (X̄±SD)		PAI (X̄±SD)	
Age (years)						
19 – 28	50.04 ± 11.54	F=0.933	44.43 ± 8.22	F=1.158	70.61 ± 12.28[ab]	***F=7.710***
29 – 38	47.07 ± 11.02	p=0.593	43.03 ± 8.61	p=0.259	66.56 ± 11.80[a]	***p=0.001***
39 and above	48.04 ± 12.07		42.52 ± 9.35		61.44 ± 12.10[b]	
Education						
Illiterate	51.29 ± 9.34		48.71 ± 7.55		59.86 ± 15.37[a]	
Primary	47.47 ± 11.03	F=1.120	42.94 ± 8.88	F=1.163	65.60 ± 11.72[b]	***F=7.188***
Secondary	48.86 ± 11.38	p=0.295	43.51 ± 8.30	p=0.254	68.46 ± 11.72[c]	***p<0.001***
High School	50.46 ± 12.83		44.10 ± 8.83		70.61 ± 11.77	
College	45.31 ± 10.49		41.62 ± 6.46		76.12 ± 9.19[abc]	
Employment						
Employed	48.55 ± 12.50	t=0.027	43.32 ± 9.14	t=0.204	74.05 ± 12.67	***t=-2.380***
Unemployed	48.61 ± 11.35	p=0.979	43.70 ± 8.45	p=0.839	67.57 ± 12.21	***p=0.018***
Place of living						
City	48.17 ± 11.55	t=-1.535	42.83 ± 8.53	***t=-4.850***	68.97 ± 11.99	***t=2.903***
County	51.10 ± 10.46	p=0.126	48.43 ± 6.56	***p<0.001***	63.05 ± 13.29	***p=0.004***
Number of pregnancies						
First pregnancy	50.48 ± 12.24	F=0.972	44.21 ± 8.35	F=0.737	73.32 ± 11.64[a]	***F=2.422***
2nd - 4th pregnancy	47.70 ± 10.96	p=0.525	43.13 ± 8.59	p=0.861	68.42 ± 11.13[b]	***p<0.001***
5th or above	49.83 ± 11.99		45.44 ± 8.20		57.19 ± 12.84[ab]	
Number of alive children						
1	49.71 ± 12.28	F=0.928	44.27 ± 8.54	F=1.119	72.32 ± 11.47[b]	***F=2.715***
2 - 4	47.02 ± 10.08	p=0.602	42.64 ± 8.27	p=0.306	65.46 ± 11.31[ab]	***p<0.001***
5 and above	56.20 ± 13.62		50.20 ± 8.02		49.20 ± 10.00[a]	
Planned pregnancy						
Yes	48.71 ± 11.08	t=0.242	43.65 ± 8.40	t=-0.085	70.08 ± 11.97	***t=4.858***
No	48.32 ± 12.43	p=0.809	43.75 ± 8.82	p=0.933	62.24 ± 11.65	***p<0.001***
Willingness to become pregnant		***t=-2.950***		***t=-3.222***		***t=3.924***
Yes	48.02 ± 11.16	***p=0.003***	43.20 ± 8.36	***p=0.001***	68.91 ± 11.91	***p<0.001***
No	55.41 ± 12.48		49.18 ± 8.30		58.41 ± 13.54	
Time since COVID-19 diagnosis						
0-8 days	48.11 ± 11.43	F=2.850	43.04 ± 8.52	***F=7.780***	68.82 ± 12.16	***F=5.509***
9-17 days	54.24 ± 11.59	p=0.060	49.10 ± 5.53	***p=0.001***	62.67 ± 12.51	***p=0.005***
18 days and above	49.67 ± 3.26		51.33 ± 5.68		56.00 ± 10.33	
Symptoms leading to a having a COVID-19 test*						
Shortness of breath	50.68 ± 11.83	0,090	44.97 ± 8.66	0,185	66.83 ± 12.26	0,431
Headache	51.61 ± 11.20	0,100	46.39 ± 8.80	0,521	67.61 ± 13.29	0,894
Loss of smell	51.22 ± 10.72	0,346	47.22 ± 7.56	***0,005***	68.04 ± 15.07	0,731
Weakness	49.20 ± 11.04	0,165	43.89 ± 8.84	0,054	67.18 ± 13.39	0,890
Loss of taste	50.25 ± 10.71	0,532	46.34 ± 7.27	0,096	64.28 ± 14.58	0,631
Cough	50.13 ± 11.78	0,056	44.97 ± 8.26	0,104	66.95 ± 12.38	0,078
Fever	51.26 ± 12.56	0,165	46.17 ± 8.89	0,904	66.35 ± 12.57	0,521
Runny nose	49.44 ± 10.95	0,631	43.89 ± 6.92	0,264	64.89 ± 14.08	0,218
Nausea	**53.44 ± 13.99**	***0,008***	47.06 ± 10.32	0,235	67.89 ± 9.43	0,749
Vomiting	50.78 ± 12.36	0,099	45.44 ± 9.88	0,754	67.44 ± 11.48	0,180
General body pain	53.25 ± 12.47	***0,010***	**47.23 ± 9.16**	***0,002***	65.72 ± 12.97	0,411
Other	47.94 ± 11.13	0,321	42.61 ± 8.21	0,088	**71.33 ± 11.02**	***0,000***
Symptoms after positive PCR test*						
Cough	49.78 ± 12.00	0,521	44.70 ± 8.58	0,155	66.96 ± 12.16	***0,005***
Fever	50.57 ± 12.63	0,555	46.23 ± 8.87	0,392	65.81 ± 11.84	0,164
Nausea	52.08 ± 12.67	0,397	47.46 ± 8.99	***0,028***	64.08 ± 11.65	0,322
Vomiting	51.89 ± 13.27	0,473	47.11 ± 9.58	0,066	67.41 ± 10.66	***0,004***
Runny nose-sneezing	52.09 ± 11.98	0,201	**47.77 ± 7.98**	***0,030***	63.55 ± 11.95	0,150
Weakness	48.31 ± 11.97	0,089	43.60 ± 8.75	0,472	66.84 ± 12.75	0,143
Back/low back pain	52.45 ± 11.05	**0,022**	47.66 ± 7.51	0,385	64.90 ± 13.04	0,584
Muscle and joint pain	49.67 ± 10.91	0,100	46.30 ± 8.30	0,185	65.74 ± 12.35	0,372
Loss of smell	50.06 ± 11.32	0,256	46.27 ± 8.64	0,382	66.31 ± 12.01	0,574
Loss of taste	49.26 ± 9.83	0,053	44.93 ± 6.72	0,473	**67.51 ± 12.66**	***0,002***
Headache	***53.08 ± 11.40***	***0,020***	47.12 ± 8.61	0,105	66.21 ± 13.89	0,721

Shortness of breath	49.18 ± 11.81	0,261	44.18 ± 8.70	0,144	66.50 ± 12.22	0,044
Thoughts following a positive PCR test result						
I thought I was going to die[a]	55.18 ± 10.66[ab]		50.24 ± 7.21[ab]		62.12 ± 12.90[ac]	
I thought my baby could get hurt[b]	53.93 ± 12.32[c]		47.95 ± 8.32[c]		67.98 ± 10.76	
I was so scared[c]	54.98 ± 10.49	***F=23.401***	47.91 ± 6.59	***F=27.771***	68.33 ± 11.88	***F=5.141***
I didn't know what to do[d]	44.90 ± 8.51[c]	***p<0.001***	40.47 ± 7.19[c]	***p<0.001***	66.64 ± 11.69[b]	***p<0.001***
I thought I'd get over it without any problems[e]	38.30 ± 7.95[a]		36.35 ± 6.07[a]		72.39 ± 13.66[c]	
I was worried when I first heard it, but then my worries were gone[f]	39.89 ± 5.69[b]		36.89 ± 4.78[b]		76.14 ± 11.64[ab]	

*More than one option is selected, F: One-way ANOVA was conducted, t: Student t-test was used, SAI: State Anxiety Inventory, TAI: Trait Anxiety Inventory, PAI: Prenatal Attachment Inventory, a-c: significant differences were observed between groups with the same letter, X̄: mean value

When the relationship between the scales was evaluated, it was determined that there was a strong and significant positive relationship between SAI and TAI scores (r=0.849; p<0.05); and a weak and significant negative relationship was found between TAI and PAI scores (r=-0.154; p<0.05) (Table 4).

Table 4. Correlation Between State & Trait Anxiety Inventories and Prenatal Attachment Inventory

		SAI	TAI	PAI
SAI	**r**	1	***0.849***	-0.051
	p		***0.001***	0.400
TAI	**r**		1	***-0.154***
	p			***0.010***
PAI	**r**			1
	p			

SAI: State Anxiety Inventory, TAI: Trait Anxiety Inventory, PAI: Prenatal Attachment Inventory

DISCUSSION

The most important findings of this study indicate that pregnant women diagnosed with COVID-19 had high anxiety levels and moderate prenatal attachment levels. The study found a strong and positive correlation between state and trait anxiety levels, while a weak but significant negative correlation was found between trait anxiety and prenatal attachment. This result suggests that as anxiety levels increase, pregnant women's emotional bonds to their babies decrease. Furthermore, age, education, employment status, place of residence, number of pregnancies, planned pregnancy, and emotions experienced after COVID-19 diagnosis were found to significantly differ in both anxiety and attachment levels. In particular pregnant women who stated, "I was worried, but my anxiety decreased afterward" had lower anxiety and higher attachment scores, indicating that positive emotional coping strengthens attachment. Overall, the study highlights that increased anxiety during the COVID-19 period negatively impacts prenatal attachment and the importance of psychosocial support during pregnancy.

In this study, the state anxiety level of pregnant women diagnosed with COVID-19 was higher than the trait anxiety level, but both anxiety levels were moderate according to the scale assessment. This finding is consistent with literature showing that the uncertainty and fear of the disease experienced by pregnant women during the COVID-19 pandemic increase anxiety levels (Lebel et al., 2020; López-Morales et al., 2021). Because pregnancy is a fragile period,

both physically and psychologically, during a pandemic, women's concerns about the potential effects of the infection on their own health and the fetus contribute to increased anxiety levels (Yassa et al., 2020).

The above-average prenatal attachment level obtained in the study is a noteworthy finding. This result demonstrates that pregnant women maintain an emotional bond with their fetuses even during stressful conditions like COVID-19. Similarly, studies conducted by Karakuş Turan (2021) and Albayrak et al. (2021) reported that prenatal attachment scores in pregnant women during the pandemic were moderate to high. This may be related to pregnant women developing more protective behaviors for both their own health and the health of their babies.

The literature indicates that prenatal attachment levels are closely related to the mother's psychological well-being and stress coping skills (McNamara et al., 2019; Craig et al., 2021). Therefore, the above-average prenatal attachment in this study suggests that pregnant women embraced their maternal roles and maintained their emotional bonds with their babies despite the anxiety they experienced. However, the negative correlation between anxiety levels and prenatal attachment supports the possibility that increased anxiety can negatively impact this attachment process. This finding is consistent with the findings of Düdükcü et al. (2023) and Abbasoglu et al. (2023), who reported a similar pattern.

A literature survey revealed that the PAI scores were calculated as 57.327±12.3 by Elkin (2015) 61.26±11.68 by Karakuş Turan (2021), and 61.40±11.78 in the study of Metin and Pasinlioğlu (2016). In the study of Albayrak et al. (2021), it was determined that the average PAI score of pregnant women with low anxiety levels during the COVID-19 pandemic period was 63.67±6.79. It is thought that the reason why the average is higher in this present study compared to the literature is that the person thinks not only about herself but also about her fetus during pregnancy, and that the negative situation experienced does not harm the fetus. Since higher mother-fetus attachment affects not only the gestational period but also postpartum attachment, it is likely to offer a more positive experience for the mother both during pregnancy and the postpartum period.

Comparison of the PAI total scale scores with age indicated that a significant difference exists between PAI scores and age groups; while the mean PAI score of the pregnant women aged 19-28 years old was higher, it was lowest in the pregnant women aged 39 and above. However, no significant differences were observed in the SAI and TAI scores for different age groups. A similar finding was reported by Craig et al. (2021). They also found a significant relationship between age and PAI. In the study conducted by Craig et al. (2021), they examined prenatal attachment during the COVID-19 pandemic period and found that anxiety and obsession did not change significantly by age. As found in our study, there is an inverse relationship between maternal age and prenatal attachment; attachment decreases as age increases, and this was thought to be because women are more willing and interested in pregnancy at younger ages.

The present study found that PAI scores increased as women's education level increased, and this difference was statistically significant. Craig et al. (2021) also reported that women with higher education levels had higher prenatal attachment levels during the COVID-19

period, and that a significant relationship existed between these variables. Similarly, a study conducted in Türkiye by Sarıboğa et al. (2022) reported that prenatal attachment scores increased with higher education levels, and that this relationship was significant. These findings suggest that there is a link between increased education level and fetal acceptance and increased appreciation of pregnancy. Furthermore, increased knowledge and awareness about the pregnancy process positively impacts attachment.

It is observed that employed pregnant women had higher PAI scores compared to those unemployed. Therefore, a statistically significant difference was obtained between employment and prenatal attachment. Similarly, Yılmaz and Beji (2013) found that unemployed pregnant women had lower PAI score medians. The results of this present study indicated that there is a direct correlation between the employment status of pregnant women and prenatal attachment, even during the pandemic. This result can be explained by the idea that employed pregnant women establish a bond with their unborn babies, especially during the holidays -similar to the relationship that working women have with their children- and have a quality attachment.

Additionally, the results showed that pregnant women living in city centers had higher prenatal attachment levels than those living in district centers. Similarly, Öztürk and Erbaş's (2021) study found that pregnant women living in city and district centers had higher mean PAI scores. Furthermore, pregnant women living in district centers had higher mean trait anxiety scores than those living in city centers, and a significant inverse relationship was found between the mean scale score and location. The fact that those living in city centers have easier access to amenities like hospitals may explain the lower anxiety levels.

Different results have been reported in previous studies regarding the effect of the number of pregnancies on prenatal attachment. Some studies reported that prenatal attachment is not associated with the number of pregnancies (Elkin, 2015; Aksoy et al., 2016). Whereas some reports found that women who have their first pregnancy had higher PAI (Oskay et al., 2014; Höbek Akarsu & Oskay, 2017). Similarly, our findings showed that women who have their first pregnancy had higher PAI scores. This result can be explained by the idea that women who had a lower number of pregnancies tend to desire pregnancy more.

Planned pregnancy is an important factor that affects prenatal attachment. Planned pregnancy and willingness to become pregnant increase the mother-infant attachment. Some studies highlighted that women with planned pregnancy had higher PAI scores (Dereli Yılmaz & Kızılkaya Beji, 2010; Çınar et al., 2017). Like the findings reported in the literature, a correlation was identified between planned pregnancy and willingness to become pregnant and PAI scores in the current study; the mean PAI score of those with planned and desired pregnancy was higher.

It is considered normal for pregnant women to worry about their own health and the health of their babies during the pandemic period. A significant correlation was found between the time elapsed after the diagnosis of COVID-19 and the PAI and TAI scores. This finding suggests that as the length of hospital stay increased, the PAI scores of the pregnant women decreased, while the TAI scores increased. As the length of hospital stay increased, prenatal bonding decreased; in other words, as the pregnant woman's anxiety about her own life increased, the bond with the baby decreased. When the literature was examined, it was seen

that a different result was obtained, in contrast to our study. In the study conducted by Karakuş Turan (2021), a positive and weak correlation was found between prenatal bonding and prenatal anxiety in pregnant women who recovered from COVID-19. In another study, it was reported that pregnant women expressed concerns about their health, the health of their unborn children, and at least one relative being infected with COVID-19 (Mortazavi et al., 2021). Unlike the literature, this current study addressed the fact that the length of hospital stay increased the level of continuous anxiety, and accordingly, it was determined that it reduced prenatal bonding.

In pregnant women, the symptoms and findings of COVID-19 are also important issues that need to be addressed in symptom management. When comparing the COVID-19 symptoms and scale scores of pregnant women, it was determined that the average SAI score of those with nausea was higher, and the average TAI score of those with body pain was higher. Figueiro-Filho et al. (2020) reported in their study on pregnant women with COVID-19 that cough (51.8%), fever (40%) and myalgia (43%) were present, but more than 1/3 of the cases showed various other symptoms, and approximately 20% of the cases (759/4,091; 18.4%) had loss of taste/smell. In our study, it is thought that the higher state anxiety score of the pregnant women with nausea is due to the anxiety caused by COVID-19 at that time. General body pain is seen as the body's response to the negative situation experienced. In addition, it is determined that those who experienced back/waist pain following a positive PCR test had higher state anxiety levels, and those with a runny nose and sneezing had higher trait anxiety. The fact that the PCR test is used to detect COVID-19 is thought to cause pain, just as seen in the symptoms, and to be caused by muscle contractions due to the anxiety experienced during the period.

The examination of the feelings of pregnant women following a positive PCR test indicated that pregnant women who commented, “I was worried when I first heard it, but then my worries were gone” had lower mean SAI and TAI scores and a higher PAI mean score compared to other pregnant women. This result may be related to the fact that the positive attitude of the pregnant woman in the period after a positive COVID test reduces anxiety and increases the level of attachment. A study found that pregnant women who were worried about their own health and the health of their babies had more depression and anxiety symptoms during the COVID-19 pandemic (Lebel et al., 2020).

Limitations of The Study

This study has several limitations. First, due to COVID-19 restrictions, all data were collected without direct face-to-face interaction with pregnant women. Pandemic precautions may have limited data collection due to mask and social distancing guidelines. Second, only primiparous women who were literate, able to read and understand Turkish, and diagnosed with COVID-19 were included, limiting the generalizability of the findings to multiparous women, women with pre-existing psychiatric conditions, or those from different educational or linguistic backgrounds. Finally, since the research was conducted at a single medical center, the results may not be representative of other hospitals or regions.

CONCLUSION

The study shows that pregnant women diagnosed with COVID-19 have high anxiety levels and moderate prenatal attachment levels. The study found a strong, positive correlation between state and trait anxiety levels ($r=0.849$; $p<0.001$), while a weak but significant negative

correlation was found between trait anxiety and prenatal attachment (r=-0.154; p=0.010). This result suggests that as anxiety levels increase, pregnant women's emotional bonds with their babies decrease. A significant correlation was observed between prenatal attachment and age, education status, employment, place of living, number of pregnancies, number of living children, planned pregnancy, and willingness to become pregnant. Furthermore, a significant correlation was obtained between the time since COVID-19 diagnosis and thoughts following a positive PCR test. It is observed that the level of state anxiety significantly changed with the willingness to become pregnant and the thoughts after the COVID-19 diagnosis. On the other hand, trait anxiety levels differed significantly with the place of living, willingness to become pregnant, and the thoughts following the COVID-19 diagnosis. The correlations between the scales were analyzed and accordingly, trait anxiety was found to be significantly correlated with prenatal attachment. Also, a significant relationship was observed between state anxiety and trait anxiety scores. Therefore, the factors that affect prenatal attachment and increase anxiety in pregnant women, especially during the pandemic, should be examined. Pregnant women who may be exposed to COVID-19 should be defined as a 'risk group' in early pregnancy. It is therefore thought that monitoring pregnant women by providing appropriate support during the prenatal and postpartum period can promote positive prenatal attachment and thus help reduce anxiety.

Conflict of Interest
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