



Original Article

First Clinical Appointment after the COVID-19 Lockdown: Reflections from Orthodontic Patients and Their Anxiety Levels

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Main Points

- Patients receiving fixed orthodontic treatment are anxious during the clinical visit because of the Covid 19 pandemic, with women being more anxious than men.
- No significant relationship was found between the presence of chronic diseases and anxiety levels.
- A positive correlation was found between age and trait anxiety.

ABSTRACT

Objective: To evaluate the views and anxiety levels of orthodontic patients during the first clinical appointment after the coronavirus disease 2019 (COVID-19) lockdown.

Methods: Data were collected using a questionnaire that was administered to patients aged over 14 years who resumed their scheduled orthodontic treatment at Adiyaman University, Faculty of Dentistry, Department of Orthodontics during the normalization period after the COVID-19 lockdown. Anxiety levels of the participants were assessed using the State-Trait Anxiety Inventory (STAI).

Results: The study included 241 participants, comprising 177 (73.4%) women and 64 (26.5%) men with a mean age of 17.73 ± 3.27 years. Anxiety levels were significantly higher in women (State-trait index-State anxiety [STAI-S]: 39.26 ± 9.81 , State-trait index-Trait anxiety [STAI-T]: 43.53 ± 9.16) than in men (STAI-S: 34.32 ± 10.12 , STAI-T: 38.5 ± 7.87) ($P < .01$). No significant relationship was found between the presence of chronic diseases and anxiety levels ($P > .05$), while a positive correlation was found between age and trait anxiety ($P = .041$). Of all patients, 79.7% were positive about rescheduling their clinical appointment. Participants with higher anxiety levels indicated that they considered dental clinics as risky environments for the spread of COVID-19 infection ($P < .01$) and thus wanted to resume their treatment once the pandemic had ended ($P < .05$).

Conclusion: The results indicate that patients receiving fixed orthodontic treatment were anxious in the clinic.

Keywords: COVID-19, patient, anxiety, orthodontics

INTRODUCTION

On December 31, 2019, the Chinese health authorities reported a cluster of 27 cases of pneumonia of an unknown etiology in the city of Wuhan, Hubei Province, China.¹ The disease later became known as Coronavirus 2019 (COVID-19) caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection, and then rapidly spread throughout the world. On March 11, 2020, the World Health Organization (WHO) declared this outbreak as a global pandemic.^{2,3}

Numerous health ministries around the world recommended postponement or cancelation of dental procedures that were not urgent due to the difficulty in maintaining social distancing and the potential for aerosol spread of the virus during these procedures.^{4,5} Orthodontic treatment is a prolonged process requiring regular

follow-up. However, orthodontic treatments had to be abruptly suspended for millions of people around the world during the pandemic.⁶

The COVID-19 pandemic brought not only the risk of death from the viral infection but also unbearable psychological pressure on people around the world.^{7,8} The continuous spread of the pandemic, strict isolation measures, and the closure of schools and public places has led to a sharp increase in the anxiety and depression levels of general adult and pediatric populations.⁹⁻¹¹ Cotrin et al.¹² conducted an online survey to examine the effect of the COVID-19 pandemic and lockdown on the clinical appointments, concerns, and anxiety levels of orthodontic patients. The survey indicated that the pandemic and the lockdown had an impact on orthodontic appointments and anxiety levels of the patients.

Following the relaxation of lockdown measures in the new normalization period, dental services, along with orthodontic services, were reopened in accordance with the new measures designated by the national health committee of each country. The present study aimed to investigate state anxiety, trait anxiety, and treatment-related experiences and concerns of patients who resumed their orthodontic visits during the normalization period after the nationwide lockdown.

METHODS

The study protocol was approved by the Republic of Turkey, Ministry of Health (Approval No: 020-06-15T16_07_06), and ethical approval was obtained from Adiyaman University Clinical Research Ethics Committee (No: 2020/7-11). On March 17, 2020, the Health Ministry canceled all dental procedures that were not urgent; orthodontic appointments were postponed indefinitely. On June 1, 2020, dental services were resumed, and dental appointments were rescheduled in accordance with the new measures brought in during the new normalization period.

Data collection was achieved using a questionnaire that was administered to patients aged over 14 years who had resumed their fixed orthodontic treatment at Adiyaman University, Faculty of Dentistry Department of Orthodontics, and consented to participate in the study. A written informed consent form was obtained from each subject or guardian. To avoid the possibility of incorrect results or incomplete questionnaires if filled in before the treatment, each patient was given a disposable pen and asked to fill out the questionnaire after their visit to the clinic.

The questionnaire consisted of 2 sections. The first section involved questions probing patients' demographic profile, treatment-related experiences and concerns during the lockdown period, and their expectations from the orthodontics clinic. The second section included the State-Trait Anxiety Inventory (STAI), which is a self-report scale developed by Spielberger et al.¹⁴ STAI is a self-report inventory comprising 2 separate self-report scales which measure state anxiety (STAI-S) (how one feels at a particular moment; e.g., dental visit) and trait anxiety (STAI-T) (how one

usually feels). The STAI-S score is calculated based on 20 four-point Likert-type items designed to measure anxiety on a scale from 1 (not at all) to 4 (very much so). In contrast, the STAI-T score is calculated based on 20 four-point Likert-type items designed to measure anxiety on a scale from 1 (almost never) to 4 (almost always). STAI has been validated for many situations and populations.¹⁵⁻¹⁷ In the present study, the Turkish version of STAI that was verified by Le Compte and Oner¹⁸ was utilized.

Statistical Analysis

The universe of the study consisted of 496 patients who presented to the Orthodontics Department at Adiyaman University School of Dentistry. Based on the 95% CI ($t = 1.96$), with an estimated incidence of 0.05¹⁹ and a sampling error of 0.05, the optimal sample size was calculated as 116 based on the Cohen's criteria.²⁰

Statistical analyses were performed using Number Cruncher Statistical System 2007 (Kaysville, Utah, USA). Descriptive statistics were expressed as mean, standard deviation (SD), median, frequency (n), ratio, minimum, and maximum. Normal distribution of data was assessed using the Shapiro-Wilk test. When the number of possible answers given to the questions was 3 or more, the anxiety scores of the individuals who chose these options were compared using the one-way analysis of variance test for variables with normal distribution and the Kruskal-Wallis test for variables with the non-normal distribution. Post hoc analysis was performed using Tamhane correction for continuous variables with non-normal distribution and Bonferonni correction for continuous variables with normal distribution. When the number of possible answers given to the questions was 2, the anxiety scores of the individuals who chose these options were compared using Student's t -test for variables with normal distribution and the Mann-Whitney U -test for variables with non-normal distribution. Correlations between continuous variables were determined using Spearman's correlation coefficient. A P value of $< .05$ was considered significant as applicable.

RESULTS

Of the 496 patients, 281 (56.6%) of them were able to attend the first appointment when the study was conducted. Of these 281 patients, 241 (85.7%) of them consented to participate in the study. To increase the power of the study, a total of 241 patients were included in the analysis, comprising 177 (73.4%) women and 64 (26.5%) men. The participants were aged between 14 and 36 years, with a mean age of 17.73 ± 3.27 years. Of the 241 participants, 13 (5.4%) of them had a chronic disease.

The mean STAI-S score was 38.00 ± 10.08 , and the mean STAI-T score was 42.25 ± 9.09 . According to the Student's t -test and the Mann-Whitney U -test, these scores were significantly higher in women than in men ($P < .01$ for both). No significant relationship was found between the presence of chronic diseases and anxiety scores (Student's t -test and Mann-Whitney U tests) ($P > .05$). Table 1 presents the anxiety scores of the participants compared with their descriptive statistics.

Table 1. Distribution of variables and their comparison with STAI-S and STAI-T scores

Variables	n (%)	Mean ± SD	STAI-S		STAI-T		
			Min–Max (Median)	P	Mean ± SD	Min–Max (Median)	P
Q1. What is your gender?							
Female	177 (73.4%)	39.26 ± 9.81	21-66 (39)	.001**a	43.53 ± 9.16	20-68 (43)	.001**b
Male	64 (26.5%)	34.32 ± 10.12	20-71 (33.5)		38.5 ± 7.87	22-58 (38)	
Q2. Do you have a chronic disease?							
Yes	13 (5.4%)	33.15 ± 9.09	20-52 (34)	.78a	40.23 ± 6.88	32-52 (38)	.410b
No	228 (94.5%)	38.28 ± 10.09	21-71 (38)		42.37 ± 9.2	20-68 (42)	
Q3. Did you ever have an urgent orthodontic condition (e.g., cheek injury caused by the extension of the wire to the distal segment) during the lockdown?							
Yes	123 (51%)	38.06 ± 9.74	20-65 (37)	.852a	43.3 ± 9.05	20-62 (43)	.081b
No	118 (51%)	37.95 ± 10.45	21-71 (38.5)		41.25 ± 9.06	20-68 (41)	
Q4. If Yes, what did you do to solve the problem?							
I solved the problem myself	68 (55.2%)	39.03 ± 10.54	22-66 (39)	.478c	42.33 ± 9.12	22-63 (41)	.967d
I scheduled an appointment with the clinic after failing to solve it myself.	33 (26.8%)	36.55 ± 9.91	22-65 (36)		41.85 ± 9.58	20-59 (42)	
I immediately scheduled an appointment with the clinic.	22 (17.8%)	38.05 ± 9.21	22-56 (37)		42 ± 8.3	24-57 (40.5)	
Q5: What do you and your family members think about rescheduling your clinical appointment?							
We are both positive	192 (79.7%)	37.05 ± 9.52	20-66 (37)	.008**c	41.5 ± 8.81	20-68 (41)	.009**d
I am positive but my family is hesitant.	26 (10.8%)	39.12 ± 9.25	21-57 (40.5)		44.27 ± 9.38	28-62 (47)	
We are both hesitant.	17 (7.1%)	45 ± 9.17	33-60 (43)		47.94 ± 9.2	29-61 (49)	
Q6: What was your biggest concern regarding your orthodontic treatment during the lockdown?							
Delay in the completion of the treatment	115 (47.7%)	38.75 ± 10.34	21-65 (39)	.031**c	43.42 ± 9.27	20-65 (43)	.803d
Obtaining undesirable treatment outcomes	20 (8.3%)	35.91 ± 9.35	22-57 (35)		42.45 ± 8.7	28-56 (41)	
Breakage of the brackets and worsening of the problem	32 (13.2%)	39.71 ± 9.32	21-52 (42)		45.06 ± 8.21	31-59 (46)	
Being hurt by the wires and the broken brackets	10 (4.1%)	49.67 ± 7.79	40-59 (47.5)		47 ± 10	31-55 (52)	
I had no concerns at all.	64 (26.5%)	36.42 ± 8.01	23-59 (36)		43.55 ± 6.67	23-56 (44)	
Q7: Do you consider dental clinics as risky environments for the spread of COVID-19 infection?							
Yes	121 (50.2%)	40.74 ± 9.28	21-66 (41)	.001**a	44.63 ± 8.26	29-65 (45)	.001**b
No	120 (49.8)	35.54 ± 10.28	20-71 (35)		40.15 ± 9.41	20-68 (40)	
Q8: Do you perform additional procedures for cleaning your body and clothes after arriving home from the clinic?							
Yes	216 (89.6%)	38.3 ± 9.62	20-66 (38)	.402a	42.56 ± 9.05	20-68 (42)	.565b
No	25 (10.4%)	37.4 ± 12.94	22-71 (36.5)		41.53 ± 9.35	22-58 (41.5)	
Q9: How would you like to continue your treatment during the COVID-19 pandemic?							
Continue as before	126 (52.3%)	36.4 ± 9.89	20-71 (36)	.008**c	41.06 ± 9.49	20-68 (41)	.024**d
Resume after the pandemic	112 (46.4%)	39.55 ± 10.06	21-66 (40)		43.47 ± 8.49	20-65 (43)	
Complete it immediately	3 (1.2%)	51.5 ± 7.78	46-57 (51.5)		54 ± 4.24	51-57 (54)	

*P < .05, **P < .01. aMann–Whitney U-test; bStudent’s t-test; cKruskal–Wallis test; dOne-way analysis of variance.

Q, question; SD, standard deviation; Min–Max, minimum–maximum, STAI-S, State-trait index-State anxiety; STAI-T, State-trait index-Trait anxiety.

According to the Spearman’s correlation analysis, a positive correlation was found between age and STAI-T score ($P < .05$), while no significant correlation was found between age and STAI-S score ($P > .05$) (Table 3).

Of all participants, 123 (51%) indicated that they needed urgent orthodontic care during the quarantine period, while 118 (49%) indicated that they did not have such a need. Of the 123 patients, 68 (55.2%) of them solved the problem by themselves, 33 (26.8%)

Table 2. Distribution of responses provided for multiple-answer questions

Variables	n (%)
Q10. What could be the cause of the psychological pressure and concerns you experience during your clinical visits (if any)? Please indicate (you may choose multiple options).	
Having direct contact with COVID-19-positive cases	50 (12%)
Contracting COVID-19 infection during the appointment	71 (17.1%)
Inadequacy of the measures	35 (8.4%)
Violation of rules by other people	115 (27.7%)
Uncertainty about the end of the pandemic	80 (19.3%)
Fearing that the pandemic will never be controlled	49 (11.8%)
Fear of being stigmatized if tested positive for COVID-19	15 (3.6%)
Q11. What is the most important issue that requires utmost attention in a dental clinic during the pandemic? (You may choose multiple options)	
Admission of one patient at a time at the entrance	66 (17%)
Use of a protective facemask by the dentists	83 (21.3%)
Patients' keeping their facemask on throughout the clinic visit except for during the treatment	50 (12.9%)
Use of a face shield in addition to a protective facemask by the dentists	86 (22.1%)
Use of a disposable head cover by the dentists	56 (14.4%)
Use of a disposable laboratory coat by the dentists	48 (12.3%)

scheduled an appointment with the clinic after failing to solve the problem by themselves, and 22 (17.8%) of them immediately scheduled an appointment with the clinic.

About rescheduling their dental appointments, 192 (79.7%) participants indicated that they themselves, as well as their families, were both positive about this rescheduling, whereas 26 (10.8%) participants stated that they were happy, but their families were hesitant, and 17 (7.1%) participants revealed that they themselves, as well as their families, were both hesitant about the rescheduling.

When asked what their biggest concern was, 115 (47.7%) participants indicated that they were most concerned about a delay in completing their treatment, 20 (8.3%) of them were most concerned about an undesirable treatment outcome, 32 (13.2%) of them were most concerned about the breakage of their orthodontic appliances (wire and brackets), 10 (4.1%) of them were most concerned about being hurt/injured by breakage of the orthodontic appliances, whereas 64 (26.5%) of them indicated having no concerns during this period.

More than half of the participants ($n = 121$; 50.2%) indicated that they considered dental clinics as risky environments for the spread of COVID-19 infection, while the remaining 120 (49.8%) participants indicated that they did not.

Most of the participants ($n = 216$; 89.6%) considered that they took extra measures to clean their body and clothes after arriving home from the clinic, while 25 (10.4%) of them indicated that they did not.

Of the 241 participants, 126 (52.3%) of them stated that they wanted to continue their treatment as they did before the pandemic, 112 (46.4%) of them declared that they wanted to continue their treatment after the pandemic had ended, and 3 (1.2%) of them indicated that they wanted to complete their treatment immediately.

About the causes of psychological pressure experienced in the clinic, "violation of rules by other people" was indicated as the most common cause by the participants ($n = 115$; 27.7%), followed by "uncertainty about the end of the pandemic" ($n = 80$; 19.3%), and "the risk of contracting COVID-19 during the appointment" ($n = 71$; 17.1%). On the other hand, about the issues that required utmost attention in a dental clinic during the pandemic, "use of a face shield in addition to a protective facemask by the dentists" was found to be the most popular response (22.1%), followed by "use of a protective facemask by the dentists" (21.3%), and "admission of one patient at a time at the entrance" (17%) (Table 2).

DISCUSSION

The present study hypothesized that orthodontic patients have high anxiety levels, there is a positive correlation between age and the presence of chronic diseases, and the anxiety levels are higher in women than in men among these patients during the pandemic. STAI is an anxiety scale commonly used for assessing anxiety among dental patients.^{21,22} The scale consists of 2 components, of which STAI-S assesses how one feels at a particular moment and STAI-T assesses how one usually feels.¹⁴ In the

Table 3. Correlation between age and STAI-S and STAI-T scores (Spearman's correlation coefficient)

Correlation	r	P
Age/STAI-S	0.100	.124
Age/STAI-T	0.133	.041*

STAI-S, State-trait index-State anxiety; STAI-T, State-trait index-Trait anxiety; * $P < .05$.

present study, we preferred STAI for assessing participants' general and occasional anxiety levels, considering the prolonged nature of the pandemic.

On the very first day of the survey (June 8, 2020), the accumulative number of COVID-19 cases reported in Turkey was 171 121 (ranking 17th in the world), the curfew imposed for children under 18 years of age, and the ban on intercity travel had been lifted, and public places had been reopened. Moreover, on the same day, the numbers of newly diagnosed COVID-19 cases and of the deaths caused by COVID-19 were continuously decreasing, and various normalization steps were being taken—both by Turkey and by many other countries around the world.

In line with the normalization processes, the clinical services in our institution were reopened, taking several protective measures for clinical staff such as avoiding the use of aerosol during the procedures, wearing personal protective equipment (laboratory coat, pants, shirt, facemask, face shield), working at half capacity, and limiting clinical care to one patient at a time. Additionally, some measures were determined for patients as well, such as applying hand sanitizer before entering the clinic and keeping their facemask on throughout the clinic visit except for the duration of the treatment. With the implementation of these rules, the clinical appointments for patients were rescheduled after a 3-month lockdown. Irregular attendance to the dental clinic may play an important role in increased dental anxiety.²¹ Accordingly, the present study aimed to assess anxiety levels and concerns and expectations about treatment in patients who resumed their fixed orthodontic treatment at a time when the COVID-19 pandemic was still ongoing.

The mean STAI-S (38.00 ± 10.08) and STAI-T (42.25 ± 9.09) scores in our study were remarkably higher than those measured by Yildirim and Karacay²¹ before the pandemic in orthodontic patients whose demographic profiles were similar to those of our patients. However, our findings were consistent with the increased anxiety and depression levels measured in the general adult and pediatric populations within the first months of the pandemic.^{11,19,23} In our study, "violation of rules by other people" was indicated as the most common cause of psychological pressure in the clinic ($n = 115$; 27.7%), followed by "uncertainty about the end of the pandemic" ($n = 80$; 19.3%). These findings implicate that the patients' fear of contracting COVID-19 during dental procedures was replaced—probably as a result of their observations of the measures taken in the clinic—by other concerns such as the violation of rules (e.g., maintaining social distancing and continuous use of facemask) by other people and uncertainty about the future of the pandemic.

In our study, the STAI-S and STAI-T scores were higher in women than in men. This difference reflects the already known gender-based difference in anxiety and depression levels.^{24,25} Moreover, numerous studies conducted during the COVID-19 pandemic also indicated that women have higher anxiety scores than men.^{9,19,23}

Advanced age and underlying chronic diseases have been shown to be the most critical risk factors for mortality from SARS-CoV-2 infection.²⁶ Studies conducted during the COVID-19 pandemic have also indicated a relationship between the presence of chronic diseases and increased anxiety and stress levels.^{9,19,23} On the contrary, our study found no significant relationship between the presence of chronic diseases and anxiety scores, which could be associated with the fact that our patients had a low mean age (17.13 ± 3.45 years), young individuals have a lower mortality rate than older individuals, and that this phenomenon is frequently mentioned in the mass media.²⁷ In our study, the mean age of the patients ranged between 14 and 36 years, and although a positive correlation was found between age and STAI-T score, no significant correlation was found between age and STAI-S score. These lower STAI-T scores in our participants could be associated with the fact that the curfew imposed for individuals under 18 years of age in Turkey had been lifted at the time of our survey. Wang et al.²³ found no significant relationship between age, anxiety, and stress scores. In contrast, Shevlin et al.⁹ and Wang et al.²⁸ found higher anxiety scores in younger individuals, unlike in our study. Unlike our study, these studies divided the individuals into various age groups (young, middle, and old) and investigated anxiety levels for each group.

Most of our patients indicated that they solved their problems by themselves when they had an urgent dental condition during the lockdown. Moreover, no significant relationship was found between patients' reaction to such problems and their anxiety scores. It was also revealed that participants who had significantly higher STAI-S scores indicated that their biggest concern during the lockdown was being hurt by the distal extension of the wires and broken brackets. These findings implicate that it is highly important for orthodontists to inform their patients about how to manage urgent conditions during the lockdown. Moreover, orthodontists can use mobile applications such as WhatsApp Web (Facebook Inc., Mountain View, California) to remotely monitor their patients and also to guide and comfort them during urgent situations.²⁹

Patients with high anxiety levels may avoid receiving medical care during the pandemic due to their concern that hospitals are a source of infection.³⁰ This phenomenon was confirmed by our findings indicating that some of our patients considered dental clinics to be risky environments for the spread of COVID-19 infection, some other patients and their families were hesitant about rescheduling their appointments, and some patients wanted to continue or complete their treatment after the pandemic ended.

Dental patients are likely to have increased STAI-S and STAI-T levels due to various reasons such as difficulty in maintaining social distancing during dental procedures, patients' keeping their mouth open throughout the procedure, and the news stories broadcasted on televisions and social media about the risk of infection conveyed by dentists. To avoid these concerns, patients should be informed via mass media or face-to-face interactions about the fact that they could minimize the risk of infection by following the instructions dictated by WHO and local authorities,

such as maintaining personal hygiene, keeping social distance, and wearing a facemask.

A significant portion of our patients indicated that “use of a face shield in addition to a protective facemask by the dentists” was the most important issue that required utmost attention in a dental clinic during the pandemic. This finding is highly compatible with the notion that face shields are highly useful when compared to surgical masks, in that they can be used multiple times after being disinfected with water, soap, or sanitizers, can reduce the risk of autoinoculation by preventing contact with the face, and remind the patients about social distancing. A previous simulation study revealed that wearing a face shield decreased the inhalational exposure of the worker to an immediate cough within a diameter of 3 m by 96%.³¹

Most of our patients (89.6%) stated that they performed additional procedures for cleaning their body and clothes after arriving home from the clinic. This finding indicates that most patients paid attention to the hygiene rules dictated by the authorities via mass media for COVID-19 during the lockdown.

Our study was limited in several ways. First, the findings of our study, as in other cross-sectional studies, cover a certain period of the pandemic. Second, as the study was conducted with patients who were continuing fixed orthodontic treatment at a School of Dentistry, the results of the study may not be generalized to other faculties/schools, private clinics, and/or other countries. Accordingly, further studies with larger numbers of participants that cover different periods of the pandemic and utilize different orthodontic appliances are needed to substantiate our findings.

CONCLUSION

Patients receiving fixed orthodontic treatment are anxious, with women being more anxious than men. It was also revealed that most of the patients solved their problems by themselves when they had an urgent dental condition during the lockdown and were positive about the rescheduling of their appointments. Moreover, participants with higher anxiety levels indicated that they considered dental clinics as risky environments for the spread of COVID-19 infection and thus wanted to resume their treatment once the pandemic has ended.

Ethics Committee Approval: This study was approved by Ethics committee of Adiyaman University, (Approval No: 2020/7-11).

Informed Consent: Written informed consent was obtained from the patients who agreed to take part in the study.

Peer-review: Externally peer-reviewed.

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