

# Psychological Status of Orthodontic Patients During Covid-19 Pandemic and its Impact on their Treatment Process

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**Objectives** The present study aimed to investigate the patients' psychological status, level of awareness, and attitude toward the coronavirus disease 2019 (COVID-19) pandemic and its effects on the process of orthodontic treatment in patients at the School of Dentistry, Shahid Beheshti University of Medical Sciences, and three private clinics in the city of Tehran in 2021-2022.

**Methods** A questionnaire with four parts was designed. The participant's general information and the information regarding orthodontic treatments were collected in the first part, and the patient's knowledge and attitude in confronting COVID-19 were collected in the next two parts. In the last part, the patient's psychological status was assessed using Kessler's Psychological Distress Scale (K10). A total of 300 questionnaires were distributed among the patients in four clinics. Spearman's correlation coefficients, the t-test, and U Mann-Whitney statistical test were used at a significance level of 0.05.

**Results** A total of 209 patients undergoing fixed orthodontic treatment participated in the present study. The mean score of the K10 questionnaire among the participants was 11.93. 30.14% of the participants could not attend their orthodontic appointments at least once during 6 months. 59.8% of the participants reported much concern about going to the dental office and contracting a disease. 25.8% of patients were worried about falling brackets, loosening bands, and breaking wires during the outbreak. On the other hand, 69.8% had no problem in contacting their orthodontist.

**Conclusion** Most patients had no missed orthodontic appointments during 6 months, and more than a quarter believed that COVID-19 had affected their orthodontic treatments. The patients' psychological status was not suitable especially in women. In general, with higher educational level, the awareness of COVID-19 increased, and the psychological status worsened.

**Keywords** COVID-19; Orthodontic appliance; Psychological distress

## Introduction

Since the beginning of the coronavirus disease 2019 (COVID-19) pandemic, many changes have occurred in living conditions. Quarantine and reduced commuting in public places are among these events. COVID-19 has psychological consequences as well, and dental practices are no exception to this rule. <sup>1</sup> Based on official sources, the first case of death from COVID-19 in Iran was announced on January 28, 2020. <sup>2</sup> This pandemic has also influenced the psychological and mental aspects of individuals in society. Some of the factors affecting the occurrence of psychological symptoms in the general public include concerns about the risk of contracting the disease, the future employment status and revenue sources of individuals and families, and also the long period of home quarantine. <sup>3</sup> Several protocols have been published so far regarding compliance with hygiene during this period. Dental treatments are among the cases that were predicted to be closely related to the incidence rate of this disease due to the connection with individuals' aerosols and saliva. <sup>4</sup> In Iran, the lowest confirmed infection rate was reported among dental assistants. <sup>5</sup> Due to the high number of sessions and the need for examination of their dental status, orthodontic treatments also require patient's regular attendance in clinics. Regarding specialized orthodontic treatment

activities, cases such as bonding, de-bonding, and broken bracket replacement are susceptible to producing aerosols and infectious droplets. This issue induces the risk of cross-infection (from patient to patient, patient to therapist, and therapist to patient), particularly if precise measures are not taken to control the infection. <sup>6</sup> Moreover, during this period, patients may encounter various orthodontic emergencies, such as falling brackets, breaking wires, etc., but they cannot receive the required treatment on time if they lack access to their orthodontist. It is essential to understand orthodontic patients' worries about treatment during this unprecedented period. It is necessary to investigate the problems faced by patients during consecutive shutdowns and quarantines <sup>3</sup>; this issue requires investigations to assess the challenges faced by patients in such crises from various dimensions. Various studies have demonstrated that the extent of stress and anxiety concerning contracting the disease can impact an orthodontic patient's desire for treatment adherence and the necessary cooperation for regular periodic visits. <sup>7, 8, 9</sup> A study in the United States <sup>7</sup> reported that patients with mental distress had less confidence in resuming their orthodontic treatments than normal patients. According to the results of a study in Nigeria <sup>8</sup>, 74% of patients expressed concern about missed orthodontic appointments and 50% about prolonged treatment in the near future. In Italy <sup>9</sup>, the

extent of worry, age, and gender affected the level of fear of COVID-19. The present study aimed to investigate the orthodontic patients' psychological status during the COVID-19 pandemic and the effects of the pandemic on the process of orthodontic treatment at the School of Dentistry, Shahid Beheshti University of Medical Sciences, and three private clinics in the city of Tehran in 2021-2022.

## Methods and Materials

In this descriptive-analytical study, patients over 15 years of age were investigated in the orthodontics department at the School of Dentistry, Shahid Beheshti University of Medical Sciences, and three private clinics undergoing fixed orthodontic treatment in 2021-2022. Patients whose fixed orthodontic treatments had been completed before the COVID-19 pandemic were excluded from the study.

First of all, a questionnaire was formulated based on two studies conducted in Nigeria and China.<sup>8, 10</sup> The questionnaire was designed in four parts: Demographic information, patient's knowledge regarding COVID-19, patient's attitude toward orthodontic treatment during the pandemic, and patient's psychological status. To assess the validity, eight faculty members (four faculty member from the orthodontics department and four from the oral and community health department) reviewed the questions.<sup>11</sup> The content validity index (CVI) was calculated for each question. The questions that gained the minimum CVR value (0.75) were selected<sup>11</sup> and other questions were deleted; ultimately, the final version of the questionnaire was formulated with 47 questions.

The first part of the questionnaire contained 16 questions asking about demographic information, vaccination status, and how to communicate with the orthodontist. The second part contained 15 questions asking about the effects of the pandemic on economic status, social relations, and orthodontic treatment in terms of increasing the treatment duration or costs, negative consequences on the treatment outcomes, and the number of missed appointments during six months leading to the study time. The third part contained six questions asking about the patient's knowledge regarding COVID-19. The fourth part, with 10 questions, assessed the patient's psychological status in the last month. Kessler's K10 questionnaire was used for this part. This questionnaire scored each patient from 0 to 40.<sup>12</sup>

Three hundred questionnaires were distributed among the patients of four clinics; 209 questionnaires were filled out by the patients from December 01, 2021 to April 16, 2022 (the sixth peak of COVID-19). Sampling was performed using the convenience sampling method. The patients meeting the inclusion criteria were provided a

questionnaire and were asked to fill it out if they desired. Then, the statistics related to the mean mortality and morbidity rates in the six months leading up to the time of filling out the questionnaire were also extracted from the World Health Organization (WHO) website.<sup>13</sup> The mean cases of COVID-19 infection in the six months leading up to the time of filling out the questionnaire by month were reported to be 17,293, 16,266, 13,113, 11,379, and 8,596 people, respectively, and the mean mortality rates in the mentioned time were 274, 262, 233, 171, and 118 people, respectively. In addition, the current study was conducted from December 2021 to the end of April 2022 with monthly mean cases of COVID-19 infection of 6,746, 2,779, 2,230, 24,291, and 7,634 people, and mortality of 122, 64, 31, 93, and 170 people, respectively.<sup>12</sup> The sample size was calculated as 165 people using the following formula, and finally, 209 questionnaires were filled out.

$$n = \frac{z^2_{qp}}{d^2} = ((1.96)^2 * 0.7 * 0.3) / (0.07)^2 = 165$$

This research was registered in the Ethics Committee of the Dental Research Institute of Shahid Beheshti University of Medical Sciences (ID: IR.SBMU.DRC.REC.1400.181).

## Statistical Analysis and Data Analysis

Data were evaluated using SPSS 26 software. The frequency, percentage, and mean for all items of each question, depending on the type of variables, were presented in the data descriptive report section. Spearman's correlation coefficients and the t-test and U Mann-Whitney statistical tests were used for data analysis.

## Results

A total of 209 people (female = 75.6%, male = 24.4%, mean age = 25.28 years, age range = 15-49 years) participated in this research.

Most of the participants (96.4%) were from Tehran and Alborz provinces. Considering that most of the patients admitted to the college were under 20 years of age, the number of participants from the School of Dentistry was much less than those from the three private offices (14 people versus 61, 59, and 75 people); 59.8% of the patients had academic educational levels and 39.8% had no academic educational levels.

Also, more than half of the patients (56.4%) were in contact with their orthodontist by phone and about 31% by text messages or social networks.

Regarding the results of the second part of the questionnaire, at least in half of the patients, the COVID-19 epidemic negatively affected their economic status and their families. Furthermore, in about half of the

people (53.1%), this pandemic negatively affected their social relationships (family or friendly relationships or both).

Also, 27.2% of the participants stated that COVID-19 had impacted their orthodontic treatment. Less than a third of all patients (about 30%) had missed their regular orthodontic appointments once or more during the last six months. Finally, about a quarter of patients (25.8%) had faced problems such as falling brackets or sharpness of wires during the epidemic outbreak, and about 10% believed that the lack of access or limited access to the dentist during this period had caused problems for them.

In the third part of the questionnaire, questions asked about participants' knowledge and awareness of COVID-19.

The first four questions of the third part of the

**Table 1-** Range, mean, standard deviation of psychological test scores, and patient's level of awareness

	Min	Max	Mean	Median	Standard deviation
Psychological test scores (0-40)	0	36	11.93	11.00	7.449
Score of level of awareness (0-4)	0	4	0.99	1.0000	1.02853

In general, a higher score on the K10 test denotes the individual's worse psychological status, and a mean score of 11.9 was obtained in the present study.

According to research conducted among students at universities of medical sciences in Tehran, the findings related to the criterion validity and the cut-off point of this questionnaire indicate that the best cut-off point of this questionnaire among medical science students is 8, with a sensitivity of 81%, a specificity of 80.5%, and the overall categorization error of 16.5%.<sup>16</sup> In the cut-off point of 27, the individuals who are separated from the sample group surely have psychological disorder traits<sup>17</sup>; however, the score that induces the best balance between these two factors is 8. In the current research, 80 people (38.6%) scored 8 and below and 8 (3.8%) scored 27 and above.

The U Mann-Whitney test was used to assess the relationship of gender with psychological status and willingness to continue orthodontic treatment and visit the clinic. Gender was significantly related to psychological status (p-value = 0.006). Table 2 shows the means and standard deviations (SD) of the K10 test score for both genders.

**Table 2 –** Psychological test score status by gender

	Number of participants	Mean	Standard deviation
Women	158	12.73	7.427
Men	49	9.37	6.993

questionnaire had one point each; therefore, each patient could gain a score between 0 and 4. In order to make sure of selecting and scoring the correct option in each of the questions, two studies, one conducted by the Cochrane Institute and another in Iran, were used.<sup>14, 15</sup> Regarding the participants' level of awareness of the four questions related to this part, 40.3% scored 0 and 1% scored 4 (maximum score). Furthermore, more than half of the individuals (58.1%) scored between 1 and 3.

In the fourth part of the questionnaire concerning the patient's psychological status measurement, 207 participants responded to all questions. These individuals scored between 0 and 36. On average, the psychological part score was 11.93 and the median score was 11 (Table 1).

Furthermore, among the four questions selected from the second part of the questionnaire, the question "I will most likely get infected with COVID-19 if I go for orthodontic treatment" had a significant relationship with gender (p-value <0.001). The p-values for the other three questions ("If I had known the COVID-19 outbreak would last this long, I would not have started orthodontic treatment" - "I want to finish my orthodontic treatment as soon as possible" - "Orthodontic treatments are long-term and it is not important for me that sometimes I do not go to the clinic/school during the epidemic") were 0.1 and above.

## Discussion

The current research investigated the patient's psychological status, level of awareness, and attitude toward the COVID-19 pandemic and its effect on the process of orthodontic treatment in patients at the School of Dentistry, Shahid Beheshti University of Medical Sciences, and three private clinics in Tehran in 2021-2022.

In the present study, the mean psychological test score was 11.93, while the mean score of this test in Xiong et al.'s study in China was reported to be 18.3. During the COVID-19 outbreak, about one-third of orthodontic patients experienced mental distress.<sup>10</sup> In Arqub et al.'s study in the United States, the range of K10 scores was between 10 and 50, and the mean score obtained by the participants was 13.16.<sup>7</sup> In Wu et al.'s research in China,

an online questionnaire was collected from 587 orthodontic patients and 220 temporomandibular disorder (TMD) patients, the K10 test mean score in orthodontic patients was 18.33, and the mean test score in TMD patients was 19.68.<sup>18</sup> The higher scores of this test in China could be attributed to the fact that this country was the starting point of this disease and also because of its unknown mechanism and related issues, which had led to more concerns among the people and patients in those regions.

In the current research, the female participants scored 3.4 units more than their male counterparts in the K10 test, indicating that women experienced more worry and a worse mental status than men. Of course, the number of women in this study was more than men. Also, according to the results of Xiong et al.'s research, women generally showed more concern than men.<sup>10</sup> Peloso et al.'s study in Brazil also indicated that women experienced more anxiety than men.<sup>19</sup> As shown by Quan et al.'s research in China, patients with orthodontic emergencies and women had higher levels of anxiety.<sup>20</sup> In Moghadam et al.'s study in the cities of Birjand and Mashhad, Iran, women also had higher levels of anxiety.<sup>21</sup>

In the present study, only 27.27% of the participants believed that the COVID-19 outbreak has affected and changed their treatment and treatment process. Moreover, 20.1% of patients had missed their appointments once or several times during the last six months due to COVID-19.

In Bustati et al.'s research in Syria, almost all orthodontic patients were compelled to stop their treatment, placing them in a complicated condition and inducing the fear of delayed treatment.<sup>22</sup> These results were due to the period when the study was conducted in this country and the sociopolitical conditions of Syria could have influenced worsening the treatment process and its results. In Nigeria, about a quarter of patients (27.3%) had missed their orthodontic appointments.<sup>8</sup> In Yavan et al.' study in Turkey, visits to the orthodontic clinic had reduced in 48.3% of patients compared to the same period last year when there was no epidemic.<sup>23</sup>

In the present study, the patient's level of awareness of COVID-19 was approximately average to low; the awareness mean score was 0.99, and more than half of the individuals scored between 1 and 3. This issue could originate from patients' less attention to reliable news and media regarding the COVID-19 pandemic, while in Umeh et al.'s study in Nigeria, the level of awareness for the majority of individuals (98%) was reported to be average and higher than the stated value.<sup>8</sup>

In the current research, 27.27% of the individuals believed that the COVID-19 outbreak had influenced their treatment process. Of them, 20.6% stated that

missing an appointment, increasing orthodontic treatment time, or both had affected their treatment. In the study conducted in Nigeria, it was reported that although the fear of contracting the virus during orthodontic appointments made some respondents (39.8%) concerned, they expressed concerns about missed orthodontic appointments (74%) and increased treatment time (50%) in the near future.<sup>8</sup> In Brazil, less than half of orthodontic patients (48.7%) stated that they felt anxiety and worry because of delayed treatment.<sup>19</sup> In a study in Iran, the biggest reason for concern (in 41% of people) during the COVID-19 outbreak was stated to be delayed orthodontic treatment.<sup>21</sup> In Jopson et al.'s study in England, 40% of the participants were concerned that the epidemic would affect the length of treatment.<sup>24</sup> In Shahroudi et al.'s research in Iran, the main concern was the treatment prolongation.<sup>25</sup>

In our study, only 9.6% of the participants were worried about being infected with COVID-19 in case of going to orthodontic treatment. In Martina's study in Italy, out of 272 people undergoing orthodontic treatment who were more aware of the risk of virus transmission in dental offices, 194 (71.3%) thought that going to an orthodontic clinic increased the risk and among 170 (70.8%), the epidemic outbreak increased their fear of going to the dentist.<sup>9</sup> However, this issue could originate from the difference in the study time and the conditions and restrictions imposed in the investigated countries, and it could also stem from the observance of hygiene standards in the clinics.

In the present study, only 15.3% of the patients reported that they didn't have desire to participate in orthodontic appointments during the pandemic period, and other individuals desired to participate in the appointments, or attendance or non-attendance in the appointments did not matter to them. According to the results obtained from the participants' responses in the study conducted in Nigeria, 72.4% preferred to continue their orthodontic treatments.<sup>8</sup> In Italy and in a study conducted on 1566 dental patients, 486 of whom were orthodontic patients, it was concluded that 84.0% of the participants were willing to continue the treatment.<sup>9</sup>

## Conclusion

The results of the present study demonstrated that the psychological status of patients undergoing orthodontic treatment during the COVID-19 period was not hopeful and this status was worse in women than in men. Orthodontic patients' level of awareness of this virus was low. Overall, by increasing the educational level, the level of awareness of COVID-19 increased and the psychological status worsened.

The majority of patients had no missed orthodontic appointments in the 6 months leading up to the study time, and about one third believed that COVID-19 had influenced their orthodontic treatments.

### Limitations

Since this study was conducted in the last months of the COVID-19 outbreak, the obtained results may not be able

to portray a complete picture of the epidemic status. Also, because of the limited population under study, the results are not generalizable to the whole Iranian society.

### Conflict of Interest

No Conflict of Interest Declared ■

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