








Impact of coronavirus pandemic in appointments and anxiety/concerns of patients regarding orthodontic treatment

Paula Cotrin^{1,2}  | Renan Morais Peloso¹  | Renata Cristina Oliveira¹  |
Ricardo César Gobbi de Oliveira¹  | Nubia Inocencya Pavesi Pini¹  |
Fabrício Pinelli Valarelli¹  | Karina Maria Salvatore Freitas^{1,2} 

¹Department of Orthodontics, Ingá University Center UNINGÁ, Maringá, Brazil

²Department of Orthodontics, Bauru Dental School, University of São Paulo, Bauru, Brazil

Correspondence

Karina Maria Salvatore Freitas, Department of Orthodontics, Ingá University Center UNINGÁ, Rod PR 317, n. 6114, 87035-510, Maringá, PR, Brazil.
Email: kmsf@uol.com.br

Abstract

Objective: To evaluate the impact of the coronavirus pandemic and the quarantine in orthodontic appointments, and patients' anxiety and concerns about their ongoing orthodontic treatment.

Settings and sample population: Patients from private dental clinics of two orthodontists that were undergoing active orthodontic treatment.

Material and methods: An online anonymous questionnaire regarding their anxiety about the coronavirus situation, availability/acceptance to attend an appointment, among others, was answered by orthodontic patients. Descriptive statistics with percentages was performed and responses were compared between sexes, cities, and association of the feelings/level of anxiety of patients and willingness to attend an appointment were performed with chi-square, independent t test, one-way ANOVA and Tukey's tests.

Results: The questionnaire was answered by 354 patients (231 female; 123 male) with mean age of 35.49 years. Most patients are respecting the quarantine, 44.7% related to be calm and 46.3% afraid or anxious. The level of anxiety was greater for females than males. There was significant association of the level of anxiety and the willingness to attend an appointment. The greatest concern of patients was delay in the end of treatment.

Conclusion: The quarantine and coronavirus pandemic showed to have impact on orthodontic appointments and patients' anxiety. Patients willing to attend an orthodontic appointment presented significantly lower level of anxiety than patients that would not go or would go only in urgency/emergency. Females were more anxious than males about coronavirus pandemic, quarantine and impact on their orthodontic treatments. Delay in treatment was the greatest concern of patients undergoing orthodontic treatment.

KEYWORDS

COVID-19, dental care, infection, online communication, orthodontics



1 | INTRODUCTION

In December 2019, the Chinese city of Wuhan reported an outbreak of atypical pneumonia caused by the 2019 novel coronavirus. Cases were exported to other Chinese cities, as well as internationally, triggering a global outbreak. In 30 January 2020, the World Health Organization (WHO) labelled it as a pandemic. Globally, as of 10 May 2020, there were 3,917,366 confirmed cases of COVID-19, including 274,361 deaths, reported by WHO.¹ This scenario is compelling countries around the world to have preparedness plans and mitigation interventions for quick deployment globally.²

The unpredictable and inevitable character of new infectious diseases has been recognized along the millennia. This kind of disease causes global and social economic impact related to unexpected illnesses and deaths, as well as interference in travel plans, business and normal life activities.³ Dubious or even false information about the disease behaviour, geographic range, number of infected and actual mortality rate has led to insecurity and fear in the population.⁴ From the first impressions about epidemiological data about the COVID-19 pandemic,^{5,6} studies about how this can impact the mental health are recommended.⁷

The COVID-19 is a viral infection caused by the novel coronavirus; interpersonal transmission occurs mainly via respiratory droplets and contact transmission, in addition to these characteristics, asymptomatic subjects and patients in the incubation period are also carriers of the novel coronavirus.^{8,9} A recent study¹⁰ showed that coronavirus (previously known as SARS-CoV-2) aerosol transmission is plausible, since the virus can remain viable and infectious in aerosols for hours and on surfaces up to days. Besides that, aerosols from infected people may pose an inhalation threat even at considerable distances and in enclosed spaces, particularly if there is poor ventilation.¹¹

The COVID-19 pandemic has other implications: family organization, closure of schools, companies and public places, changes in work routines leading to a great fear of the unknown.⁴ The media and public health generally focus on the biological and health consequences of the virus and the pandemic. Mental health issues that coincide with emerging diseases and epidemic are rarely examined.¹² Furthermore, little is known about the feeling and anxiety of orthodontic patients related to the impact of the pandemic and the social distancing, since it is known that missed appointments are associated to a prolonged treatment time.^{13,14}

In many countries, recommendations of the national councils of dentistry are to interrupt elective dental treatments and only emergency or urgency cares are allowed. In other places, social distancing is recommended but dental offices are still able to remain open, with usual dental care, providing the necessary biosafety measures, according to the recommendations of the national dental associations.¹⁵ However, many patients are not aware whether or not to attend their appointments with the orthodontist.

This way, the objective of the present study was to evaluate the level of anxiety and concerns of orthodontic patients regarding the

coronavirus pandemic and the impact of the quarantine in appointments and in their orthodontic treatment.

2 | MATERIAL AND METHODS

This study was approved by the Research Ethics Committee of the Ingá University Center UNINGÁ, Maringá, Brazil (CAAE 30797120.0.0000.5220).

Sample inclusion criteria were as follows: patients undergoing active orthodontic treatment on the private clinics of two orthodontists (KMSF and FPV), age over 12 years, agree to participate in the survey.

A Google forms questionnaire was sent to patients of private dental clinics from two orthodontists (FPV and KMSF) in two metropolitan cities of two different regions of Brazil, Bauru-SP-Southeast; and Porto Velho-RO-North, by WhatsApp Messenger App (WhatsApp Inc). Patients and the respective orthodontists were not identified, and the patients agreed to participate in the study.

Patients answered several questions about personal information (age, gender, city/state) and regarding the quarantine and their anxiety. The levels of anxiety about the coronavirus pandemic and the impact of quarantine in the orthodontic treatment were evaluated by a numerical rating scale (NRS),¹⁶ being 0 no anxiety and 10 extreme anxiety.

The questionnaire, which is described in Table 1, was available for responses only for 72 hours. Responses were obtained and tabulated in excel, for statistical analysis.

2.1 | Statistical analysis

Descriptive statistics was performed. Comparison between males and females was performed with independent t test. To evaluate association of the feeling and level of anxiety regarding quarantine/coronavirus pandemic and the willingness to attend an orthodontic appointment, the chi-square, one-way ANOVA and Tukey's tests were used.

Comparison of the observance of quarantine measures and the anxiety about the coronavirus pandemic and impact on orthodontic treatment was performed by one-way ANOVA and Tukey tests. Correlations between age of the patients and the levels of anxiety about the coronavirus pandemic and impact on orthodontic treatment were performed with Pearson's correlation coefficient.

Statistical analysis was performed with Statistica software (version 10.0; Statsoft, Tulsa, USA), and results were considered significant for $P < .05$.

3 | RESULTS

Four hundred and seventy-one questionnaires were sent, and 354 patients answered, with a response rate of 75.16%. From the 354 patients, 231 were females and 123 males; mean age was 35.49 years

TABLE 1 Questionnaire applied to orthodontic patients

Q1. How old are you?
Q2. Gender: () Male () Female
Q3. Where do you live (City/State)?
Q4. How are you respecting the quarantine? () I do not leave home for nothing () I am staying home as much as possible (going out only to buy food/medicine) () I am going out as usual
Q5. Do you work or study? If so, how is your activity? () Yes, I am leaving home for work/study () Yes, but I am working/studying at home () I do not work/study
Q6. Considering the general anxiety level, how are you feeling about the quarantine and the coronavirus pandemic? ()Calm ()Anxious ()Fear ()Panic ()Indifferent
Q7. In a scale from 0 to 10, how is your anxiety with the coronavirus pandemic? () 0 () 1 () 2 () 3 () 4 () 5 () 6 () 7 () 8 () 9 () 10
Q8. If your orthodontist got in touch to schedule an appointment during the quarantine, would you be willing to go? ()Yes ()Only in case of urgency/emergency ()No
Q9. What is your greatest concern about how quarantine can affect your orthodontic treatment? ()Delay of treatment end ()Impair the final result ()Debonding of brackets worsening the malocclusion ()Break of accessories causing discomfort/injury ()I am not concerned
Q10. In a scale from 0 to 10, how is your anxiety regarding the impact of the coronavirus pandemic and quarantine in your orthodontic treatment? () 0 () 1 () 2 () 3 () 4 () 5 () 6 () 7 () 8 () 9 () 10
Q11. What do you consider important, in this actual situation, in a dental office? (select all that apply) () Disposable lab coat () Disposable surgical mask () Disposable medical head cap () Use of face shield in addition to the surgical mask () Avoid crossing other patients at reception () PPE for patients () Alcohol gel at reception

(SD = 13.93); 241 (68.1%) were from Bauru, State of São Paulo and 113 (31.9%) from Porto Velho, State of Rondônia.

With respect to the suggested quarantine (Q4), 78.2% are going out just when needed, 13.0% are not leaving home and 8.8% are going out as usual and not respecting the quarantine. The majority of patients (55.6%) are working/studying at home, 26.3% are leaving home for work/study and 18.1% do not work/study (Q5).

Regarding the feeling about the coronavirus pandemic and social distancing (Q6), 44.7% of the patients are calm, 23.4% reported to

TABLE 2 Results of the comparison between males and females

Questions	Males (N = 123)	Females (N = 231)	P
	N (%)	N (%)	
4. How are you respecting the quarantine?			
Do not leave home	19 (15.5%)	27 (11.7%)	$\chi^2 = 1.04$ DF = 2 $P = 0.592^a$
Stay home as possible	93 (75.6%)	184 (79.7%)	
Going out as usual	11 (8.9%)	20 (8.6%)	
6. Feeling about the quarantine and coronavirus pandemic			
Calm	69 (56.1%)	89 (38.5%)	$\chi^2 = 15.85$ DF = 4 $P = .003^{a,*}$
Anxious	25 (20.3%)	56 (24.2%)	
Fear	19 (15.5%)	64 (27.7%)	
Panic	1 (0.8%)	11 (4.8%)	
Indifferent	9 (7.3%)	11 (4.8%)	
7. Level of anxiety/ coronavirus	Mean (SD) 4.29 (2.18)	Mean (SD) 5.35 (2.48)	$P = .000^{T,*}$
8. Would go to an appointment?			
Yes	93 (75.6%)	120 (52.0%)	$\chi^2 = 19.32$ DF = 2 $P = .000^{a,*}$
Yes, if urgency/emergency	21 (17.1%)	68 (29.4%)	
No	9 (7.3%)	43 (18.6%)	
9. Greatest concern about how quarantine can affect the orthodontic treatment			
Delay	65 (52.9%)	106 (45.9%)	$\chi^2 = 19.55$ DF = 4 $P = .000^{a,*}$
Impair final result	4 (3.2%)	2 (0.9%)	
Worsen the malocclusion	25 (20.3%)	22 (9.5%)	
Discomfort/injuries	2 (1.6%)	5 (2.2%)	
No concern	27 (22.0%)	96 (41.5%)	
10. Level of anxiety/ impact on orthodontic treatment	Mean (SD) 3.37 (2.08)	Mean (SD) 4.40 (2.40)	$P = .000^{a,*}$

^aChi-square test.

^TIndependent t test.

*Statistically significant for $P < .05$.

be afraid (fear), 22.9% are anxious, 5.6% are indifferent and 3.4% are in panic. The mean level of anxiety related to coronavirus pandemic was 4.98 (SD = 2.42).

Most patients (60.2%) would go to an appointment, 25.1% would go only in case of urgency/emergency, and 14.7% would not go (Q8).

The greatest concern of the patients about the impact of quarantine in their respective orthodontic treatment is the delay in the end of treatment (48.3%), followed by breakage of brackets worsening the malocclusion (13.3%). Only 2% are worried with the breakage



Answers	Yes N (%)	No N (%)	Yes, if emergency N (%)	P
Calm	114 (53.5%)	17 (32.7%)	27 (30.3%)	$\chi^2 = 47.97$ DF = 8 P = .000***
Anxious	46 (21.6%)	10 (19.2%)	25 (28.1%)	
Fear	34 (16.0%)	22 (42.3%)	27 (30.3%)	
Panic	1 (0.5%)	3 (5.8%)	8 (9.0%)	
Indifferent	18 (8.4%)	0 (0.0%)	2 (2.3%)	
Level of anxiety/ coronavirus	Mean (SD) 4.31 (2.19) ^a	Mean (SD) 6.10 (2.38) ^b	Mean (SD) 5.94 (2.45) ^b	P = .000 [†]
Level of anxiety/ impact on orthodontic treatment	Mean (SD) 3.39 (2.08) ^a	Mean (SD) 5.09 (2.39) ^b	Mean (SD) 4.97 (2.41) ^b	P = .000 [†]

Note: Different lowercase letters in the same row indicate the presence of a statistically significant difference by Tukey's test.

*Statistically significant for $P < .05$.

**Chi-square test.

†One-way ANOVA test.

TABLE 3 Results of the comparison of the willingness to attend an appointment and the feeling and anxiety about the coronavirus pandemic

of the accessories causing discomfort or injuries, and 1.7% are concerned with the impairment in the final result. Besides, 34.7% have no concern (Q9). The mean level of anxiety related to the impact of the coronavirus pandemic and quarantine in orthodontic treatment was 4.04 (SD = 2.34).

More males related to be calm than females, which were feeling more anxious, afraid and in panic in relation to quarantine and the coronavirus pandemic than males (Table 2). The level of anxiety about the coronavirus pandemic was significantly greater for females than for males. Males were more willing to go a dental appointment than females. Females were more concerned on how quarantine can affect their orthodontic treatment than males. Males were more concerned about the delay in treatment and worsen in malocclusion than females. The level of anxiety about the impact of coronavirus pandemic on orthodontic treatment was significantly greater for females than for males (Table 2).

Patients that reported to be calm and indifferent were more willing to attend an appointment than patients that were anxious, afraid (fear) or in panic. Patients willing to go to an orthodontic appointment presented significantly lower score of anxiety than patients that would not go or would go only in case of emergency (Table 3). Patients that are not respecting the quarantine showed significantly lower levels of anxiety about the coronavirus pandemic and the impact on orthodontic treatment (Table 4). There was no significant correlation between the age of the patients and the levels of anxiety about the coronavirus pandemic and impact on orthodontic treatment (Table 5).

In relation to the precautionary measures to avoid contamination in dental offices, most patients reported as important all the disposable PPEs: surgical masks (88.7%), medical head cap (81.1%), laboratory coat (55.9%), and also the use of face shield (55.1%). Avoid crossing other patients at reception was considered important for 78.0% of the subjects and PPE for patients, for only 35%. Alcohol gel available at reception was the most indicated measure by the patients (91.8%)(Q11).

4 | DISCUSSION

When the questionnaire was sent for patients, quarantine and social distancing had been recommended in Brazil for about 1 month, and the coronavirus pandemic was at the beginning of the outbreak's rising curve, according to experts,¹⁷ with just over a thousand deaths due to COVID-19 and about 25 thousand cases confirmed.¹⁸ But in other countries like Italy, Spain, United Kingdom and United States, the situation was worse, and due to electronic and digital media, everyone is informed of the global situation and the risk of a major outbreak with many deaths in our country. It is known that there is association between the use of social medias and anxiety.¹⁹

Some impacts, as stress that can lead to depression due to social distancing and isolation, are related to increased vulnerability of mental health.⁷ So, the primary objective of this survey was to evaluate the preliminary effects of quarantine on orthodontic treatments, besides to assess the level of anxiety, awareness, concerns and attitude of patients facing this pandemic. Studies like this are useful because they raise clinically important information and more nuanced understanding regarding the present situation, helping the clinicians to provide besides the needed dental care, also necessary hosting and attention.

Despite the limitation of a non-probabilistic sample, which does not allow population inferences or generalizations, the online survey methodology allows a quick problem overview, concerning so many doubts and uncertainties. Even so, the methodology expanded the sample to two different and distant Brazilian regions.

It seems that patients are respecting the social distancing recommendation, since 78.2% are leaving their homes only when necessary and most patients are working/studying at home. Patients that are respecting the quarantine, not leaving home or going out only when necessary showed significantly higher levels of anxiety about the coronavirus pandemic and the impact on orthodontic treatment (Table 4). However, even in this coronavirus outbreak situation, 44.7% related

TABLE 4 Results of the comparison of the observance of quarantine measures and the anxiety about the coronavirus pandemic and impact on orthodontic treatment (one-way ANOVA and Tukey tests)

Levels of anxiety	Do not leave home N (%)	Stay home as much as possible N (%)	Go out normally N (%)	P
Level of anxiety/ coronavirus	Mean (SD) 5.28 (2.37) ^a	Mean (SD) 5.17 (2.41) ^a	Mean (SD) 2.87 (1.61) ^b	$P = .000^*$
Level of anxiety/ impact on orthodontic treatment	Mean (SD) 4.30 (2.34) ^a	Mean (SD) 4.21 (2.34) ^a	Mean (SD) 2.10 (1.37) ^b	$P = .000^*$

Note: Different lowercase letters in the same row indicate the presence of a statistically significant difference.

*Statistically significant for $P < .05$.

TABLE 5 Results of the correlations between age of the patients and levels of anxiety about the coronavirus pandemic and impact on orthodontic treatment (Pearson's correlation coefficient)

Correlations	r	P
Age × Level of anxiety/coronavirus	.034	.522
Age × Level of anxiety/impact on orthodontic treatment	.031	.554

to be calm and 5.6%, indifferent. However, 46.3% answered that is afraid or anxious with the pandemic. It indicates that most patients are aware of the seriousness of the coronavirus pandemic, although the study was conducted preliminarily, before the peak of contamination occurred in Brazil. The average level of anxiety was approximately 5, showing a moderate degree of anxiety of the evaluated patients.

The level of anxiety related to the impact of the coronavirus pandemic and the quarantine in orthodontic treatment was approximately 4; 1 point less than anxiety about the pandemic itself. A recent survey conducted in China showed that the overall prevalence of anxiety related to the pandemic alone was about 34%.²⁰ It is speculated that Brazilian people are more anxious due to the large amount of information received in TV news and internet, and the fear of the unknown, of what may happen in the near future.

Males related to be calmer than females and the level of anxiety was significantly greater for females regarding the pandemic. This result is in accordance with a nationwide survey of psychological distress among Chinese people in the COVID-19 epidemic, where female respondents showed significantly higher psychological distress than their males counterparts.²¹ Females were also feeling more anxious about the impact of the quarantine in orthodontic treatment. Males were more willing to attend an orthodontic appointment, and women were less worried about delay in treatment than men (Table 2). This result is probably because women feel safer staying at home or going to the orthodontist only in case of urgency/emergency. A previous study on the distress during a disease epidemic also showed that women have a higher risk for psychological distress during quarantine than men.²²

There was no correlation between the age of the patients and level of anxiety (Table 5). A recent research showed that younger people reported a significantly higher prevalence of anxiety and depressive symptoms during pandemic than older people.²⁰ The absence of correlation in our study is probably because the questionnaire was sent in early quarantine period, when subjects were not yet showing much signs of stress and anxiety.

Most patients (60.2%) reported that would go to an appointment if the dentist/staff called to schedule. Patients were more concerned

about the delay in finishing treatment, because they expect the duration of treatment to be as short as possible.²³ A previous research indicated that missed appointments increase orthodontic treatment time.¹⁴ The American Association of Orthodontists (AAO) provides weekly updates on how orthodontists should act during the pandemic. When the survey was sent, recommendation was to follow all applicable federal, provincial, state and local authorities' guidance concerning closure recommendations for non-emergency care.²⁴ So, taking into account that in some locations the dental services may be suspended for long periods and added to the concern of patients with delayed treatment, the orthodontist should consider possible ways to minimize the delay of treatments, such as types of orthodontic archwires and appliances that allow spaced appointments, without losing treatment efficiency.²⁵

Orthodontic patients are aware of the need for compliance and attendance to the appointments and care with the appliance in order to obtain a good final result within the period stipulated by the clinician. Some patients (34.7%) had no concern with the impact of the quarantine in their orthodontic treatment. This indicates confidence in the orthodontist. Communication between the orthodontist and the patient, and reassurance by the orthodontist is the mainly reason in predicting patient satisfaction, good dentist-patient relationship and patient cooperation in following the prescribed instructions.²⁶

The feelings and level of anxiety about the coronavirus pandemic and impact of quarantine in orthodontic treatment were significantly associated to the willingness to attend an appointment, since patients that were willing to go to the dental office were more calm or indifferent and reported significantly lower scores of anxiety than patients that would not go or would go only in case of emergency (Table 3).

Regarding the precautionary measures to avoid contamination, the great majority of patients indicated alcohol gel available for patients at reception, avoid crossing other patients, use of disposable surgical masks, medical head caps and laboratory coats; face shields were also considered important. This indicates that patients are conscious that these recommendations are important, and to



follow them will improve the patient/orthodontist confidence and relationship.

Orthodontists and dental staff must be attentive to establish an effective communication with patients, to increase mutual trust, provide information and some type of care, remotely. In this context, the use of telehealth and other technologies to support long-distance health care has stood out as a good option for face-to-face service, especially in disasters and public health emergencies.²⁷ Common modalities include phone calls, live video/teleconferencing, texting messages via WhatsApp or social medias and e-mails, allowing orthodontists and dental staff to communicate 24/7 with patients.²⁸ Certainly, this care and contact with patients will bring greater confidence in the orthodontist and staff and will relieve stress and anxiety regarding patients' ongoing orthodontic treatments. Moreover, it is known that the most important contributing factor to patient satisfaction is the doctor-patient relationship.²⁹

It is clear that face-to-face interactions will certainly always have a central role in health care, and many patients will need to visit the dental office, but a system focused on high-quality non-visit care would work better for many others—and quite possibly for orthodontists as well.³⁰ The future is now, and orthodontics has its space within telemedicine and teledentistry.

The limitations of this study are the cross-sectional design and the reliance on self-reported questionnaires. However, as far as we known, these data were not yet reported in the literature, and it is strongly recommended,⁷ due to the particularities of the current situation.

5 | CONCLUSIONS

The quarantine recommended due to the coronavirus pandemic showed to have impact on orthodontic appointments and anxiety of patients. Patients that were willing to attend an orthodontic appointment presented a significantly lower level of anxiety than patients that would not go or would go only in case of urgency/emergency. Females were more anxious than males about coronavirus pandemic, quarantine and impact on their orthodontic treatments. Delay in treatment was the greatest concern of patients undergoing orthodontic treatment. Alcohol gel available at reception, the use of surgical masks, medical caps and to avoid crossing other patients at reception were the most important precautionary measures considered by patients to avoid contamination by coronavirus in dental offices.

ORCID

Paula Cotrin  <https://orcid.org/0000-0002-6230-0522>

Renan Morais Peloso  <https://orcid.org/0000-0001-5358-0633>

Renata Cristina Oliveira  <https://orcid.org/0000-0002-9629-9283>

[org/0000-0002-9629-9283](https://orcid.org/0000-0002-9629-9283)

Ricardo César Gobbi de Oliveira  <https://orcid.org/0000-0002-0725-2337>

[org/0000-0002-0725-2337](https://orcid.org/0000-0002-0725-2337)

Nubia Inocencya Pavesi Pini  <https://orcid.org/0000-0001-9145-6334>

[org/0000-0001-8604-3201](https://orcid.org/0000-0001-8604-3201)

Fabrício Pinelli Valarelli  <https://orcid.org/0000-0002-4285-486X>

[org/0000-0002-4285-486X](https://orcid.org/0000-0002-4285-486X)

Karina Maria Salvatore Freitas  <https://orcid.org/0000-0001-9145-6334>

[org/0000-0001-9145-6334](https://orcid.org/0000-0001-9145-6334)

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