Impact of COVID-19 Lockdown on Patients Undergoing Orthodontic Treatment: A Questionnaire Study

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Abstract
With COVID-19 declared as a worldwide pandemic, a nationwide lockdown was implemented overnight in India on March 24, 2020. With no prior warning or anticipation, patient appointments were temporarily ceased as institutions and clinics were indefinitely closed. To our knowledge, no study addresses the orthodontic patient perspective in such testing times, where they are entirely restricted to the confines of their homes.

Aim: To assess the impact of the COVID-19-related lockdown on the treatment and psychology of patients undergoing orthodontic treatment.

Material and methods: A self-designed online exploratory questionnaire of 15 questions was distributed to 500 potential responders selected from obtained lists through messages and emails. It was mandatory to answer all questions and the survey was anonymized and did not contain any identifying information. Online consent was taken before participation in the study. The obtained data were evaluated using descriptive and inferential statistics.

Results: The response rate was 81.6%. The study revealed that the majority of patients were affected by the lack of access to orthodontic visits. The reasons for the same were attributed to fear of increased treatment duration, inconveniences caused by poking wires, broken brackets, etc., and lack of communication between the orthodontists and patients, among the various other reasons. The importance of orthodontic appointments was also understood by patients.

Conclusion: The study threw light on the essential need for understanding the psychology of patients undergoing orthodontic treatment. In any situation where patients do not have access to seek help, all the factors discussed in the study should be considered and it is of utmost importance that orthodontic professionals see to it that their patients are being looked after mentally, if not physically, in whatever way possible.

Keywords
Challenges, corona, COVID-19, lockdown, orthodontic, orthodontic patient, patient psychology, treatment

Introduction
With the rapid rise in the number of cases with COVID-19, the pandemic led to several governments across the world taking action and many cities were placed under complete lockdown, travel bans were implemented, and schools, universities, and private clinics were indefinitely closed.¹

The restrictions in India came into force overnight on March 24, 2020,² which at first was announced to be for 21 days following which continued to be extended due to the steady increase in incidence rates. As a result, all OPDs, dental clinics, and institutions across India were instructed to be shut, leaving only emergency services functioning.

Thus, with no prior warning or anticipation, orthodontic appointments were temporarily ceased. In the field of orthodontics, treatment is generally not considered an emergency. However, what is not understood is the importance of regular check-ups or monthly appointments, as well as the impact of restrictions put on patients concerning visiting their orthodontists in times of need.

Understanding whether patients realize the importance of regular follow-ups, feel the need for orthodontic treatment
to be regarded as emergencies, or assess the reasons for fear or inconveniences in the minds of patients undergoing orthodontic treatment in a time where they are entirely restricted to the confines of their homes are grey areas that are left unexplored.

With this background, the study was conceived, and a survey was circulated to assess the impact of the COVID-19-related lockdown on those patients undergoing orthodontic treatment across the nation.

**Methodology**

Data for this questionnaire-based cross-sectional study was obtained after the approval of the institutional research ethics committee, and patients’ consent to participate.

**Selection Criteria**

Those individuals undergoing orthodontic treatment of any form (fixed/removeable appliances), whose treatment started before the implemented lockdown.

**Study Design**

A self-designed closed-ended online questionnaire.

**Study Duration**

The data was collected between April 10, 2020 and May 3, 2020.

A total of 408 filled questionnaires were reverted, and the data was assessed.

**Sample Size Determination**

The sample size was determined using the formula for the research methodology

\[ N = \frac{Z^2(1-\alpha) \times PQ}{\delta^2} \]

where

\[ Z_{(1-\alpha)} = 1.96 \text{ (for 95\% confidence interval)} \]

\[ P = 0.50 \text{ (based on the probability, that approximately 50\% of the population would require emergent treatment)} \]

\[ Q = 1 - P \]

\[ \delta \text{ (margin of error) = 0.05} \]

\[ N = 384.16 \text{ rounded off to 400} \]

The sample size N = 400

Anticipating 15–20\% of a non-response rate for online surveys, the sample size was inflated to 500. So, the total sample size needed for the present study was 500 participants, to receive a minimum of 400 responses.

**Data Collection**

The samples were selected by random sampling methods, based on the collection of a list of those patients receiving orthodontic treatment from various practitioners, clinics, and institutions across the nation.

The questionnaire consisting of 15 questions were distributed to 500 potential responders through email and messages. It was mandatory to answer all questions and the survey was anonymized and did not contain any identifying information. Online consent was taken before participation in the study.

**Statistical Analysis**

Statistical Package for Social Sciences [SPSS] for Windows, Version 22.0, released 2013, IBM Corp., Armonk, NY, was used to perform statistical analyses.

**Descriptive Statistics**

The descriptive analysis included the expression of participants’ responses to the study questionnaire using frequency and proportions.

**Inferential Statistics**

Chi-square goodness of fit test was used to compare the difference in the distribution of responses for the study questionnaire.

The level of significance (p-value) was set at \( p < .05 \).

**Results**

A total of 81.6\% (408 individuals) of the participants responded to the survey. The questions were categorized into three domains as given (Tables 1–3):

- Table 1: Patient general perspective on the importance of regular check-ups/monthly appointments (Q1–Q5).
- Table 2: Impact of lockdown on patients’ visit to orthodontist for treatment needs (Q6–Q12).
- Table 3: Psychological distress among patients regarding post lockdown visit to orthodontist and treatment charges (Q13–Q15).

With descriptive analysis in Figures 1–4.
Table 1. Comparison of Differences in the Distribution of Responses Toward “Patient General Perspective Importance of Regular Check-ups/Monthly Appointments” Domain Using Chi Square Goodness of Fit Test

| Sl No. | Questions                                                                 | Responses                                      | n    | %   | $\chi^2$-value | P-value |
|-------|---------------------------------------------------------------------------|------------------------------------------------|------|-----|----------------|---------|
| Q1    | How long has it been since you visited your orthodontist?                 | More than 1 month                              | 188  | 46.1|                |         |
|       |                                                                           | Much more than 2 months                        | 196  | 48.0| 138.588        | <.001*  |
|       |                                                                           | I do not remember                              | 24   | 5.9 |                |         |
| Q2    | How worried that you are not getting to go for regular follow ups for your treatment? | Very worried, I wish to meet my orthodontist soon | 200  | 49.0|                |         |
|       |                                                                           | Not so worried, everything that goes wrong can be fixed later | 96   | 23.5| 46.118         | <.001*  |
|       |                                                                           | I am more concerned about the worldwide pandemic | 112  | 27.5|                |         |
| Q3    | Are you following all the instructions given by your orthodontist, such as wearing of elastics and other oral hygiene instructions? | Yes, following all of it very accurately         | 232  | 56.9|                |         |
|       |                                                                           | Sometimes, not too regular                     | 104  | 25.5|                |         |
|       |                                                                           | No, I do not have the material needed (eg, My elastics got over and lack of floss) | 72   | 17.6| 105.412        | <.001*  |
| Q4    | Have you been in touch with your orthodontist?                           | Yes, I call my orthodontist if at all I have any problems regarding my treatment | 200  | 49.0|                |         |
|       |                                                                           | No, I have not called my orthodontist since the lockdown started | 196  | 48.0| 169.647        | <.001*  |
|       |                                                                           | I tried calling my orthodontist, but he/she is never reachable | 12   | 2.9 |                |         |
| Q5    | Does your orthodontist check on you regularly?                           | Yes, my orthodontist calls me regularly to check if everything is okay | 172  | 42.2|                |         |
|       |                                                                           | No, my orthodontist has not called me since the lockdown started | 228  | 55.9| 192.235        | <.001*  |
|       |                                                                           | My orthodontist calls me, but I do not pick up because anyway there is no use since I cannot visit him/her | 8    | 2.0 |                |         |

Note: * Statistically significant.

Table 2. Comparison of Differences in the Distribution of Responses Toward “Impact of Lockdown on Patients’ Visit to Orthodontist for Treatment Needs” Domain Using Chi Square Goodness of Fit Test

| Sl No. | Questions                                                                 | Responses                                      | n    | %   | $\chi^2$-value | P-value |
|-------|---------------------------------------------------------------------------|------------------------------------------------|------|-----|----------------|---------|
| Q6    | What exactly are you most worried about regarding your treatment?         | My treatment time will be longer and I will have my braces on for much more time | 300  | 73.5|                |         |
|       |                                                                           | My treatment can go wrong, things that are not supposed to happen with my teeth can happen | 84   | 20.6| 309.882        | <.001*  |
|       |                                                                           | My orthodontist will have a lot of work post lock down, so he/she will not be able to give enough time to my treatment | 24   | 5.9 |                |         |
| Q7    | Since the lockdown started, have you had any problems with anything fixed in your mouth (eg, brackets, elastics, appliances and plates) | Yes, there are broken brackets and a few things like elastics have come out | 176  | 43.1| 93.882         | <.001*  |

(Table 2 Continued)
| Sl No. | Questions                                                                 | Responses                                                                 | n   | %     | $\chi^2$-value | P-value |
|--------|---------------------------------------------------------------------------|---------------------------------------------------------------------------|-----|-------|----------------|---------|
|        |                                                                           | No, everything is as it was before the lockdown                            | 188 | 46.1  |                |         |
|        |                                                                           | I do not know how to check, and I am unsure                                | 44  | 10.8  |                |         |
| Q8     | What problems are you most commonly facing with your braces?              | The wire came out and is poking me, and I have pain                       | 122 | 29.9  |                |         |
|        |                                                                           | A few brackets and elastics have come out                                  | 140 | 34.3  | 2.294          | .32     |
|        |                                                                           | No problems                                                                | 146 | 35.8  |                |         |
| Q9     | Have you suffered from any emergency such as pain, swelling, lacerations/ | No, my braces/ appliances have not given me any problem                    | 296 | 72.5  |                |         |
|        | cuts, etc., due to treatment since the lockdown?                           | Yes, but I called my orthodontist and asked him/her what to do             | 64  | 15.7  | 283.294        | <.001*  |
|        |                                                                           | Yes, but I took self-medication without informing my orthodontist and I am fine | 48  | 11.8  |                |         |
| Q10    | Do you think that orthodontic treatment should be considered an emergency?| Yes, because I do not want anything to go wrong with my treatment          | 124 | 30.4  |                |         |
|        |                                                                           | Yes, because sometimes certain problems can be considered as emergencies such as cuts/ lacerations, swellings, etc. | 144 | 35.3  | 1.647          | .44     |
|        |                                                                           | No, because it is not life threatening                                     | 140 | 34.3  |                |         |
| Q11    | Who do you think this lockdown is affecting more?                         | I think my orthodontist is more affected than I am                        | 28  | 6.9   |                |         |
|        |                                                                           | I think I am more affected than my orthodontist                            | 48  | 11.8  | 425.176        | <.001*  |
|        |                                                                           | I think this lockdown is affecting both me and my orthodontist equally    | 332 | 81.4  |                |         |
| Q12    | This lock down has:                                                      | Made me realize the importance of me being regular with my appointments   | 268 | 65.7  |                |         |
|        |                                                                           | Made me realize that is okay to miss appointments because nothing happened| 16  | 3.9   | 235.059        | <.001*  |
|        |                                                                           | Made no difference to what I think about my treatment                     | 124 | 30.4  |                |         |
| Q13    | What do you think about your treatment cost following the lockdown?      | Orthodontist may charge extra or advice unnecessary procedures to make up for money loss | 40  |       |                |         |
|        |                                                                           | Not worried, since I believe that the amount remains same that was told to me earlier | 264 | 64.7  | 9.8           | 195.765 |
|        |                                                                           | I am okay with anything as long as my treatment finishes fast             | 104 | 25.5  |                |         |
| Sl No. | Questions                                                                 | Responses                                                                 | n   | %    | $\chi^2$-value | P-value |
|--------|---------------------------------------------------------------------------|---------------------------------------------------------------------------|-----|------|-----------------|---------|
| Q14    | Following this lockdown, when do you plan to visit your orthodontist?    | I will rush to the hospital as soon as I can                               | 88  |      |                 |         |
|        |                                                                            | I will wait for my orthodontist to call me and give me an appointment      | 240 | 58.8 | 21.6           | 119.529 |
|        |                                                                            | I will not go till the pandemic is entirely over                           | 80  | 19.6 |                 |         |
| Q15    | Are you scared to visit your orthodontist after the lockdown ends?        | Yes, I am scared                                                          | 52  |      |                 |         |
|        |                                                                            | No, I am not scared                                                       | 216 | 52.9 |                 |         |
|        |                                                                            | Not so much, but my fear has increased as compared to before              | 140 | 34.3 |                 |         |

**Note:** *Statistically significant.*

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**Figure 1.** Distribution of Responses Toward “Patient General Perspective on Importance of Regular Checkups/Monthly Appointments”: (a) Domain—Q1 to Q3 (b) Domain—Q4 and Q5

**Figure 2.** Distribution of Responses Toward “Impact of Lockdown on Patients’ Visit to Orthodontist for Treatment Needs”: (a) Domain—Q6 to Q8 (b) Domain—Q9 to Q11
Discussion

Intending to get an idea as to how this lockdown affected the treatment progress, as well as understanding the difficulties faced, the results revealed that most patients undergoing treatment were concerned about their restriction to orthodontic clinic visits. To our knowledge, no study addresses the orthodontic patient perspective in such testing times.

It was found that a majority of patients did not face inconveniences related to appliances through the lockdown, however, from those who did, there was an almost equal response with poking wires, brackets debonded, and appliances and elastics coming out. This shows that in the treatment progress, which was until then going smoothly.

For example, wire bending with loops left in patient’s mouth for a long time, sunken or loose orthodontic bands, broken fixed functional appliances, and loose temporary anchorage devices, can cause deleterious effects in the treatment progress, which was until then going smoothly.

Apart from caries and oral hygiene assessments, certain treatment mechanics require regular follow-ups. The elastics used for retraction or space closure mechanics decay over time, add to the accumulation of plaque and deterioration of oral hygiene. This often goes unnoticed by patients as they are unaware of the same. Until there are evident inconveniences such as poking distal wires, loose brackets, or lacerations, most teeth-related problems are overlooked.

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For example, wire bending with loops left in patient’s mouth for a long time, sunken or loose orthodontic bands, broken fixed functional appliances, and loose temporary anchorage devices, can cause deleterious effects in the treatment progress, which was until then going smoothly.
A total of 20.6% of the patients were worried about something could go wrong with their treatment. This shows the awareness of the need for regular follow-ups, which is in accordance with 65.7% of patients stating that the lockdown had made them realize the importance of regular follow-ups.

It should be noted here that many times, certain treatment mechanics (such as Begg’s mechanotherapy, Tip Edge mechanotherapy, or final stages of settling the occlusion) require the use of elastics changed by the patient daily. A total of 17.6% of the individuals stated that they did not have the material required to carry out the practices instructed to them by the orthodontist. The unavailability of such material to compliant patients leave both the orthodontist as well as patients in a helpless situation. This creates untoward dental effects such as opening up or spaces or movement of teeth that will result in round-tripping, and thus further increase in treatment duration and subsequent reduction in compliance.

In treatment mechanics such as Begg’s mechanotherapy, elastic wear by the patient is the running force. With one-point contact bracket mechanics, free tipping is unavoidable. This accompanied by incorrect elastic use can lead to detrimental effects on the treatment. However, in recent times, the use of pre-adjusted edgewise appliances dominates the mechanotherapy used for treatment. This could probably be a reason for why the lack of material needed by patients during the lockdown gets overshadowed.

In those cases where patients run out of settling elastics, increasing chewing efficiency (eg. with the help of chewing gum) and instructing patients to chew bilaterally could help settle the occlusion a little better than with no stimulation at all.

The reason for 23.5% of patients not being worried about their treatment, can probably be attributed to those patients who did not face any problems during the lockdown (35.8%), or those patients who were externally motivated to undergo treatment and have no active interest in the same. However, this does not represent the majority of patients affected.

When asked if the patients were regularly in touch with their orthodontists, results showed that approximately 50% patients did keep in touch and 50% did not. These results can again be attributed to the level of interest in treatment, fear as well as problems encountered during the treatment. Another reason could be the lack of transport or facility to visit the orthodontist, despite the need.

Looking at it from the perspective of orthodontists following up on their patients in whichever way possible, 55.9% of the patients replied that they did not receive calls from their orthodontists. This result reflects the very fact that many times the orthodontists themselves forget to realize the fact that their patients too are in helpless situations, and might be worried about their treatment—emphasizing the need for this study.

In such instances, small gestures such as regular check-up calls boost confidence, reduces the worry, and give patients a sense of comfort. This helps the patient understand that their orthodontist cares for their treatment as much as they do.

However, 81.4% of the patients thought that the lockdown was affecting both the orthodontist as well as patient equally. This suggests that the patients too are sympathetic toward the feelings of their doctors through this lockdown.

When asked about the need for orthodontic treatment to be considered as an emergency, results revealed mixed opinions (Figure 2[b]).

According to Merriam-Webster Dictionary (https://www.merriam-webster.com/dictionary/emergency), the word “emergency” is defined as “an unforeseen combination of circumstances or the resulting state that calls for immediate action” or “an urgent need for assistance or relief.”

Going by the definition, though not life-threatening in all situations, certain inconveniences as mentioned earlier, might need immediate attention to reduce the chances of further complications. It also goes without saying that emergencies such as sudden swellings and aspiration or the accidental swallowing of appliances need to be considered as potential life-threatening emergencies.

Response to fear of increased treatment costs, though a small fraction (Figure 4) shows the importance for the orthodontist to re-ensure patients that, provided no additional treatment is essential (with patients’ consent), the treatment cost would remain the same even post the lockdown period. Also, if at all any additional cost is charged to the patient, it would be for the personal protection equipment to ensure safety for both the health care professional as well as the patient.

The severity and seriousness of the spread of disease should be clearly explained to all patients, making them aware of the importance of social distancing and the need for personal protection even after the lockdown has been lifted. If at all patients plan on rushing to their dentists, it should be made sure these patients are symptomless and are visiting hospitals only for emergencies. The possible explanation for 52.9% of patients not having any fear to visit their orthodontist post the lockdown, shows the lack of awareness of the various modes of possible transmission of diseases in a dental office with aerosols, doctors’ proximity to patients, etc.

Finally, it should be mentioned that 27.5% of the patients were more concerned about the worldwide pandemic, and 19.6% of patients stated they will not visit their orthodontists until the entire pandemic is over. This study thus throws light on the awareness of these patients about their health, not considering orthodontic treatment essential at such times. Such patients should be reassured that proper protection will be taken to limit the spread of disease.

Limitations

The study was a self-designed online questionnaire, sent to those undergoing orthodontic treatment through various
platforms such as messages, emails, Facebook, etc., and thus there was a 18.4% non-response rate.

However, irrespective of the nonresponse rate, the purpose of the study was mainly to understand these patients and spread awareness of the same.

This study can thus be considered as an exploratory study to get a generalized idea on the impact of the lockdown on patients and can thus help in the future better understanding of specific patient-related problems. This will further help in improving the patient–doctor rapport as well as enhance practice management skills.

Conclusion

The study was carried out with the aim of assessing the impact of the lockdown on patients undergoing orthodontic treatment, as well as sheds light on how these problems could in turn affect the progress of their treatment.

It was seen that majority of patients had some or the other problem associated with the lockdown, regarding their orthodontic treatment.

The need for understanding the psychology of patients undergoing orthodontic treatment is extremely essential. In any situation where patients do not have access to seek help, irrespective of the cause for restriction to access, all the above discussed factors should be considered.

In conclusion, the take home message from this survey stresses on the importance of orthodontic professionals seeing to it that their patients are being looked after mentally, if not physically, in whatever way possible in such testing times. Also, proper communication with patients and explanations on how to maintain proper self-care, when regular follow ups are not possible, is indispensable. This would ultimately give the patient a sense of reassurance that they are being well looked after.

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