



Impact of Delayed Orthodontic Care during COVID-19 Pandemic in Terms of Emergencies and Anxiety Experienced by Orthodontic patients-A questionnaire Study.

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KEY WORDS- Covid-19, quarantine, anxiety, emergencies, orthodontics

AIM - To assess the Impact of delayed orthodontic care during COVID-19 pandemic in terms of Emergencies and Anxiety experienced by orthodontic patients.

MATERIAL AND METHODS - It is a self-designed questionnaire study. Which consists of 13 questions. First part consists of demographic questions. This was followed by questions related to orthodontic treatment, including type of appliance, when was their last visit, and any current problem. A list of the most common orthodontic emergencies was provided as a checklist which include debonded bracket, long poking wire and others participants were required to select the answers that applied to him or her.

RESULTS - A total of 83% participants responded to the survey. Out of which 35 participants were male and 65 were female. Chi square test was performed and Correlation between concerns about orthodontic treatment and anxiety during lockdown was calculated with a P value of 0.035. The study revealed that the fear of pandemic and discomfort due to orthodontic problems increased the level anxiety among the most of the patients

CONCLUSION- The survey shows it is important that orthodontic professionals are looking after their patients mentally, if not physically. Also, proper communication with patients and explanation on how to maintain proper oral care and how to manage any emergency.

I. INTRODUCTION

The novel corona virus disease 2019 (COVID-19) was announced as a public health emergency of international concern by the World Health Organization (WHO) on March 13, 2020 (1). Since the emergence of the disease in late December 2019, it became a pandemic and spread out widely affecting more than 200 countries and territories. ¹ By early April 2020, over a third of the global population was under some form of movement restriction or COVID-19 lockdown. China was the first country to have a COVID-19 lockdown, in Wuhan on 23 January. At its peak, China's quarantine measures were enforced in at least 20 provinces/regions. India commenced a 3-week coronavirus lockdown, with a total ban on venturing out of home on 24 March². 'Quarantine' is one of the oldest and most effective tools of controlling communicable disease outbreaks. This public health practice was used widely in fourteenth century Italy, when ships arriving at the Venice port from plague-infected ports had to anchor and wait for 40 days (in Italian: quaranta for 40) before disembarking their surviving passengers.⁵ Forty days provided ample time for the incubation time to

be completed so that yet asymptomatic cases became symptomatic and could therefore be identified. Quarantine was implemented successfully as an effective measure during the SARS epidemic in 2003.

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. Orthodontic treatment is generally not considered as 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 orthodontist in time of need.

Understanding whether patients realize the importance of regular follow-up, feel the need for orthodontic treatment to be regarded as emergencies, or assess the reason for anxiety or inconveniences in the minds of patients undergoing orthodontic treatment in the time where they are entirely restricted to the confines of their homes. This study is mainly aimed at finding the anxiety and emergencies reported in orthodontic patients during coronavirus lockdown.



II. METHODOLOGY

Data for this questionnaire-based study was obtained after the approval of the institution research ethics committee, and patients' consent to participate.

Selection criteria

Those individuals undergoing fixed orthodontic treatment, whose treatment started before the implementation of lockdown.

Study design

A self – designed closed ended questionnaire was given to the patients visiting the department of orthodontics after the lockdown has been lifted out.

Study duration

The data was collected between October 15, 2020 and November 30, 2020. A total of 100 filled questionnaires were received, and the data was assessed.

Sample size determination

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

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

where

- $Z_{(1-\alpha)} = 1.96$ (for 95% confidence interval)
- $P = 0.50$ (based on the probability, that approximately 50% of the population would require emergent treatment)
- $Q = 1 - P$
- δ (margin of error) = 0.05
- $N = 100$ rounded off to 120
- The sample size $N = 120$

Anticipating 15–20% of a non-response rate for online surveys, the sample size was inflated to 120. So, the total sample size needed for the present study was 120 participants, to receive a minimum of 100 responses.

Data collection

The samples were selected by random sampling methods, based on the selection criteria of those patients visiting department of orthodontics and dental facial orthopaedics of Rajarajeswar dental college and hospital.

The questionnaire consists of 13 questions. First part of survey was dedicated to demographic questions, including age, gender, and educational background.

This was followed by questions related to participants' orthodontic treatment, including type of orthodontic appliance (fixed, removable, clear aligner, retainer), when was their last orthodontic visit, and any current orthodontic problem. A list of the most common orthodontic emergencies was provided as a checklist and participants were required to select all answers that applied to him or her, including debonded bracket, long poking wire, sharp end of ligature tie, broken fixed retainer, broken or loose expander, lost or broken removable retainer, oral ulcer, inflammation, swelling, exudate, bleeding, bad odor, or others. Each item in the list was accompanied by an illustrative image for simplification purposes.

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 includes the expression of participants' responses to the study questionnaire using frequency and proportions.

Inferential statistics

Chi – square test was used to compare the differences in the distribution of responses for the study questionnaire.

The level of significance (p-value) was set at $p < 0.05$.

III. RESULTS



A total of 100 participants responded to the survey. the questionnaire was mainly divided into two main domains. First part of survey was dedicated to demographic questions, including age, gender, and educational background. This was followed by questions related to participants' orthodontic treatment.



Q1.Age

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
AGE	100	12.00	36.00	22.5900	5.50683
Valid N (listwise)	100				

Q2.Gender

Gender			
		Frequency	Percent
Valid	Male	35	35.0
	Female	65	65.0
	Total	100	100.0

Table: Distribution of study participants according to the gender.

Q3 Where do you live (City/State)

All the patients are from the state of Karnataka

Q4. How are you respecting the quarantine?

Q4. How are you respecting the quarantine?			
		Frequency	Percent
Valid	Idonotleavehomeforanything	25	25.0
	Iamstayinghomeasmuchaspossible	71	71.0
	Iamgoingoutasusual	4	4.0
	Total	100	100.0

Q5. Do you work or study? If so, how is your activity?

Q5. Do you work or study? If so, how is your activity?			
		Frequency	Percent
Valid	Yes I am leaving home for work/study	8	8.0
	Yes but I am working/studying at home	88	88.0
	Idonot work/study	4	4.0
	Total	100	100.0

Q6. Considering the general anxiety level, how are you feeling about the quarantine and the coronavirus pandemic?

Q6. Considering the general anxiety level, how are you feeling about the quarantine and the coronavirus pandemic?			
		Frequency	Percent
Valid	Anxious	32	32.0
	Fear	54	54.0



	Panic	6	6.0
	Indifferent	8	8.0
	Total	100	100.0

Q7. In a scale from 0 to 10, how is your anxiety and frequency of anxiety with the coronavirus pandemic?

Q7. In a scale from 0 to 10, how is your level of anxiety with the coronavirus pandemic?			
		Frequency	Percent
Valid	Mild	1	1.0
	Moderate	40	39.6
	Severe	57	56.4
	Extreme	2	2.0
	Total	100	99.0
Total		100	100.0

Q8. If your orthodontist got in touch to schedule an appointment during the quarantine, would you be willing to go?

Q8. If your orthodontist got in touch to schedule an appointment during the quarantine, would you be willing to go?			
		Frequency	Percent
Valid	Yes	25	25
	Only in case of emergency	67	67
	No	8	8
	Total	100	100

Q9. What is your greatest concern about how quarantine can affect your orthodontic treatment?

Q9. What is your greatest concern about how quarantine can affect your orthodontic treatment?			
		Frequency	Percent
Valid	Delay of treatment end	44	44
	Impair the final result	10	10
	Debonding of brackets and worsening them a occlusion	10	10
	Break of accessories causing discomfort/injury	36	36
	Total	100	100

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?



Q10. In a scale from 0 to 10, how is frequency of your anxiety regarding the impact of the coronavirus pandemic and quarantine in your orthodontic treatment?

		Frequency	Percent
Valid	Occasionally	13	13
	Often	72	72
	Usual	15	15
	Total	100	100
Total		101	100.0

Q10. In a scale from 0 to 10, how is level of your anxiety regarding the impact of the coronavirus pandemic and quarantine in your orthodontic treatment?

		Frequency	Percent
Valid	Mild	7	7
	Moderate	64	64
	Severe	25	25
	Extreme	4	4
	Total	100	100

Q11. What do you consider important, in this actual situation, in a dental office? (select all that apply)

Q11. What do you consider important, in this actual situation, in a dental office? (select all that apply)

Valid	Disposable lab coat	60
	Disposable surgical mask	100
	Disposable medical headcap	80
	Use of face shield in addition to the surgical mask	90
	Avoid crossing other patients at reception	70

	PPE for patients	70
	Alcohol gel at reception	90

Q12. When was the last orthodontic visit?

Most of the patients replied their last orthodontic visit is before 5 months – 6 months

Q13. What is the most frequent complication you have faced due to the closure of clinic during the pandemic?

Q13. What is the most frequent complication you have faced due to the closure of clinic during the pandemic?

		Frequency	Percent
Valid	Debonding of brackets	57	57
	Long poking wire	27	27
	Sharp end of ligature wire	9	9
	Broken fixed retainer	3	3
	Broken or loose retainer	4	4
	Total	100	100

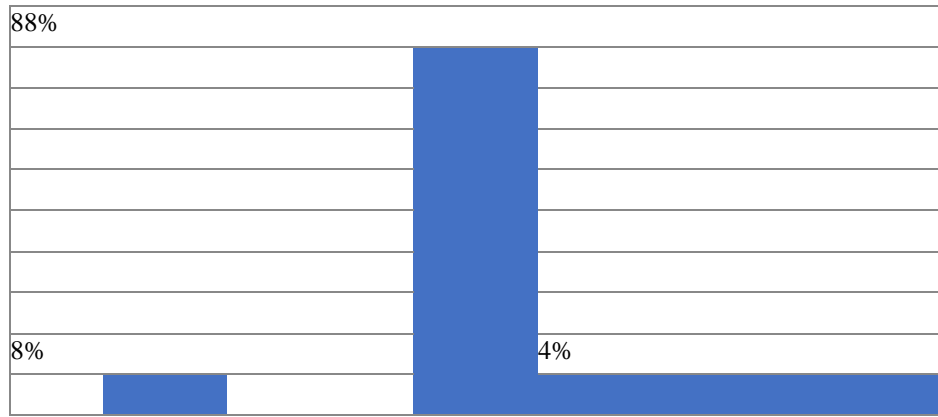


Figure3. Graph: Distribution of responses towards patient's professional activities

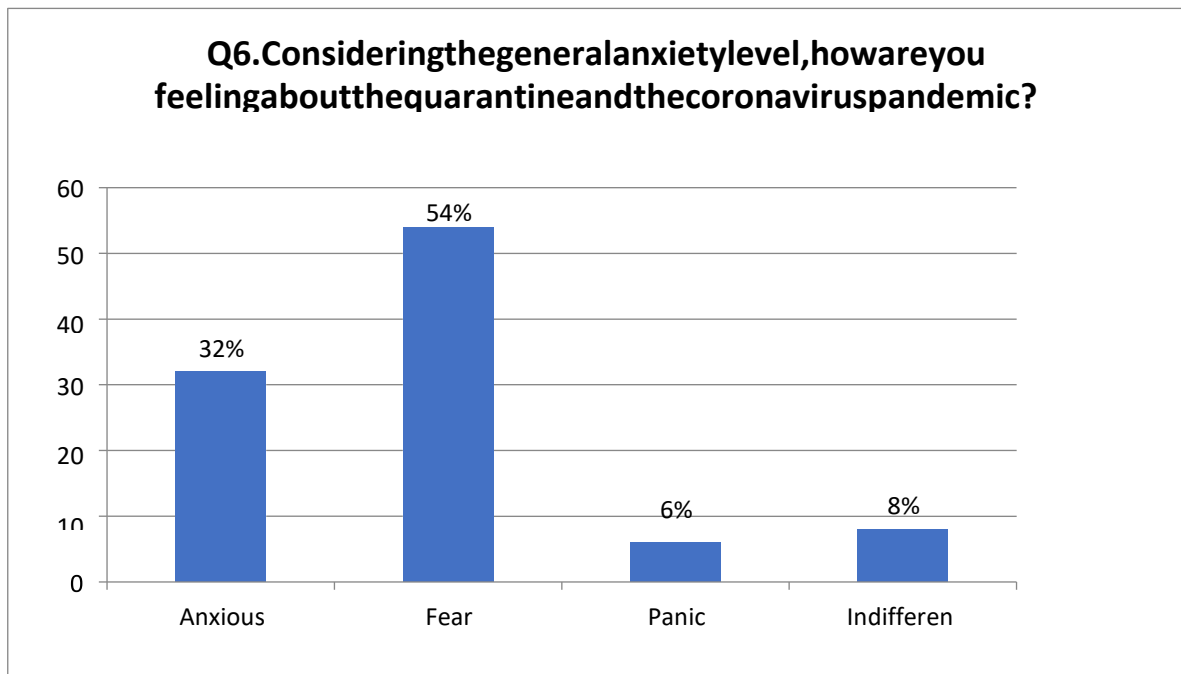




Figure 4. Graph: Distribution of responses towards patient's anxiety levels about the quarantine and the corona virus pandemic.

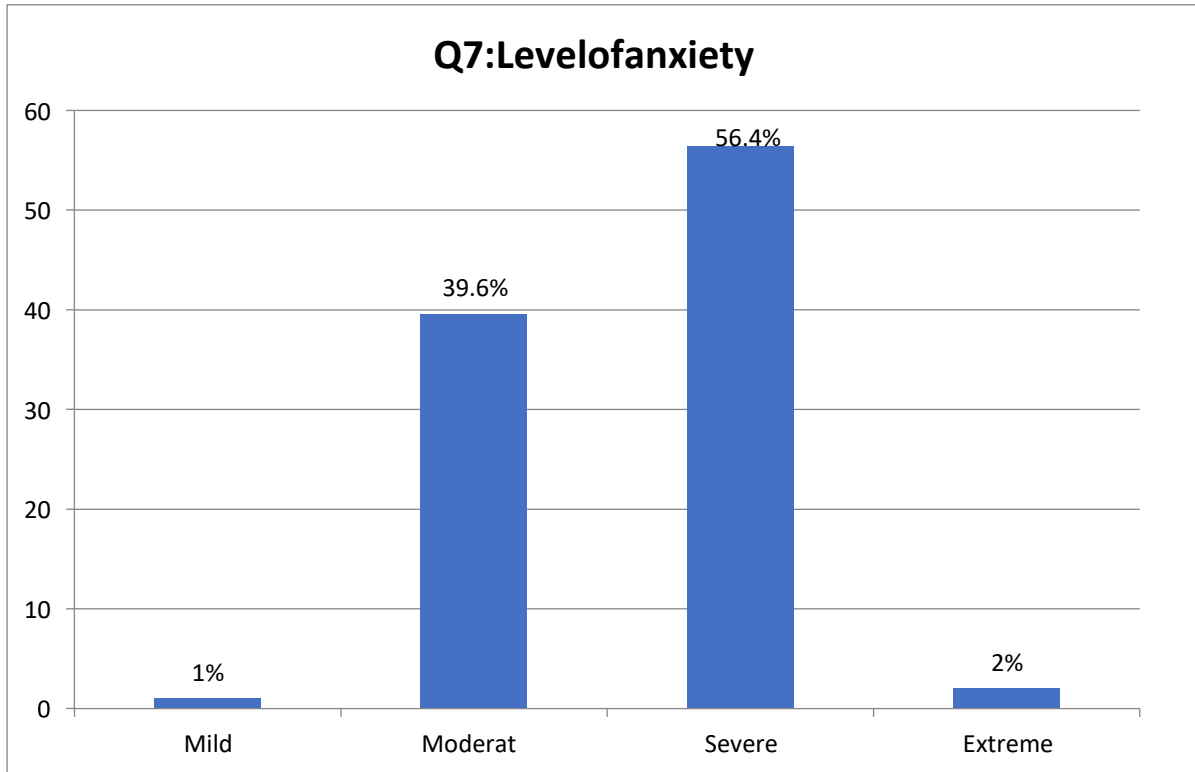


Figure 5. Graph: Distribution of responses towards patient's level of anxiety during the pandemic and quarantine

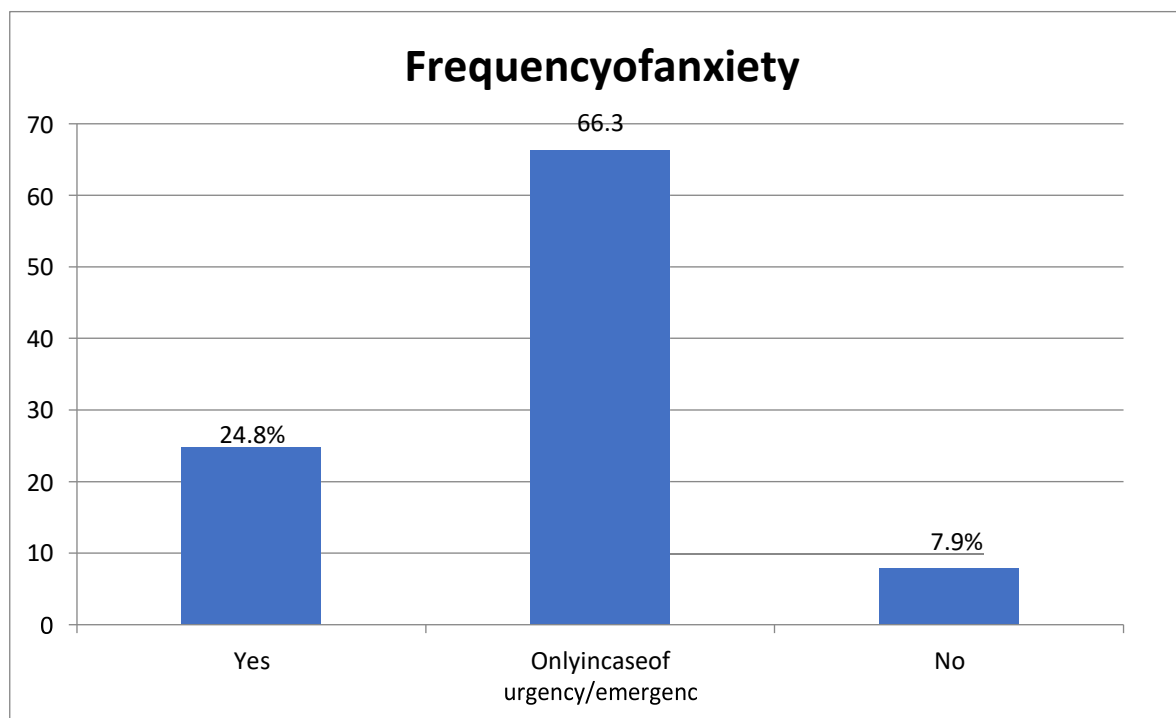




Figure 5. Graph: Distribution of responses towards patient's frequency of anxiety during the pandemic and quarantine

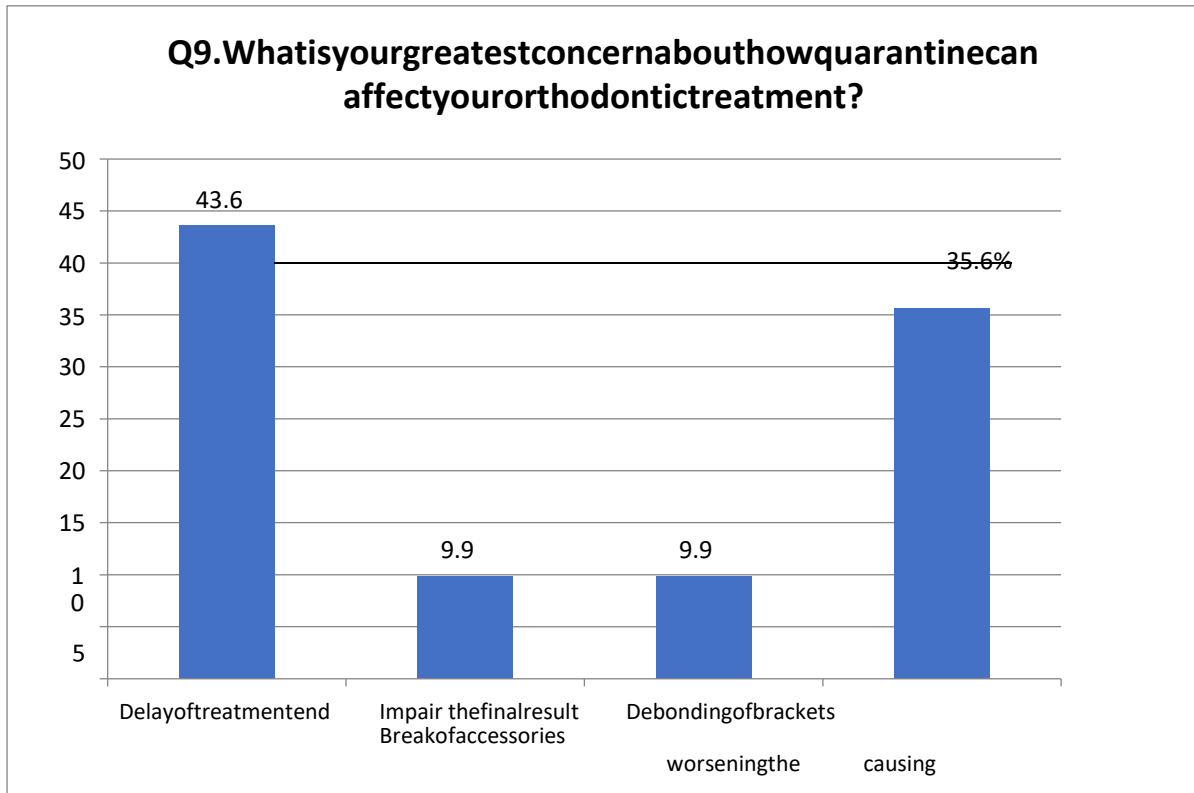
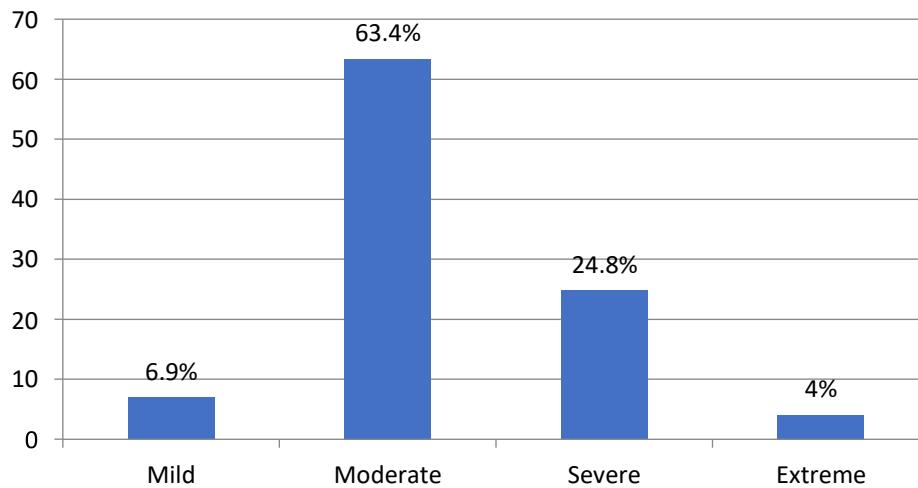


Figure 5. Graph: Distribution of responses towards patient's greatest concern about how quarantine can affect his or her orthodontic treatment.



Q10. In a scale from 0 to 10, how is your anxiety regarding the impact of the coronavirus pandemic and quarantine in



Q10F: Frequency of anxiety

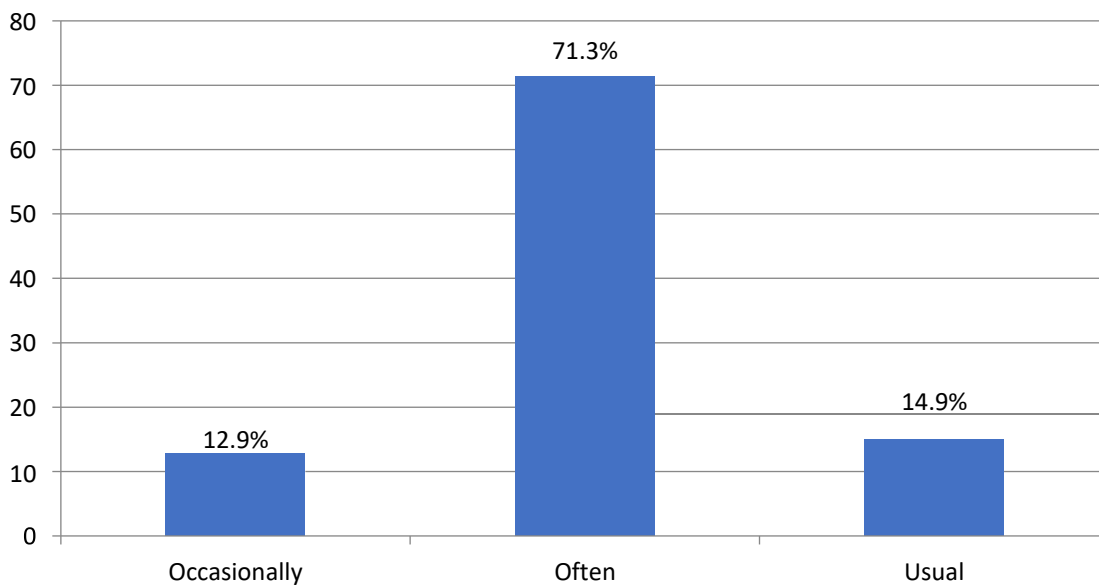


Figure 6. Graph: Distribution of responses towards patient's anxiety and frequency on a scale from 0 to 10, regarding the impact of the coronavirus pandemic and quarantine in your orthodontic treatment.



Correlation of gender and level of anxiety			Gender		Total	
			Male	Female		
level of anxiety with the coronavirus pandemic	Mild	Count	1	0	1	
		%	1.0%	0.0%	1.0%	
	moderate	Count	13	27	40	
		%	13%	27%	40%	
	severe	Count	21	36	57	
		%	21%	36%	57%	
	extreme	Count	0	2	2	
		%	0	2%	2%	
	Total		35	65	100	
				p-value-(0.372)*		

*Test applied: chi square (p < 0.05 is statistically significant)

Correlation between level of anxiety with the coronavirus pandemic in regards to orthodontic treatment and gender			Gender		Total
			Male	Female	
level of anxiety with the coronavirus pandemic regards to orthodontic treatment	Mild	Count	2	5	7
		%	2.0%	5.0%	7.0%
	moderate	Count	25	39	64
		%	25.0%	39.0%	64.0%
	severe	Count	8	17	25



		%	8.0%	17.0%	25.0%
	extreme	Count	0	4	4
		%	0.0%	4.0%	4.0%
	Total		35	65	100
		p-value-(0.416)*			

*Test applied: chi square (p < 0.05 is statistically significant).

Correlation between frequency of anxiety with the coronavirus pandemic in regards to orthodontic treatment and gender			Gender		Total
			Male	Female	
Frequency of anxiety with the coronavirus pandemic in regards to orthodontic treatment	Occasionally	Count	5	8	13
		%	5.0%	8.0%	13.0%
	Often	Count	28	44	72
		%	28.0%	44.0%	72.0%
	Usual	Count	2	13	15
		%	2.0%	13.0%	15.0%
Total		35	65	100	
		p-value-(.162)*			

*Test applied: chi square (p < 0.05 is statistically significant)

Greatest concern about your orthodontic treatment						Total
Correlation between greatest concern about orthodontic treatment and most commonly faced problem during lockdown			Delay of treatment	Impair the final result	Debonding of brackets worsening of malocclusion	
Debonding of bracket	Count	23	9	7	18	57
	%	23.0%	9.0%	7.0%	18.0%	57.0%



Longpocking wire	Count	15	1	1	10	27
	%	15.0%	1.0%	1.0%	10.0%	27.0%

Sharpendofligature	Count	3	0	1	5	9
	%	3.0%	0.0%	1.0%	5.0%	9.0%
Brokenendretainer	Count	2	0	1	0	3
	%	2.0%	0.0%	1.0%	0.0%	3.0%
Brokenorlooserretainer	Count	1	0	0	3	4
	%	1.0%	0.0%	0.0%	3.0%	4.0%
Total		44	10	10	36	100
		p-value-(.305)*				

*Testapplied:chi square(p<0.05isstatisticallysignificant)

Correlationbetweenlevelofanxietywiththepandemicandappointmentscheduleduringpandemic		levelofanxietywiththecoronaviruspandemicinregardstoorthodontictreatment				Total	
		Mild	moderate	Severe	Extreme		
If your orthodontist got into contact to schedule an appointment during the quarantine	Yes	Count	1	17	6	1	25
		%	1.0%	17.0%	6.0%	1.0%	25.0%
In case of emergency		Count	4	42	18	3	67
		%	4.0%	42.0%	18.0%	3.0%	67.0%
No		Count	2	5	1	0	8
		%	2.0%	5.0%	1.0%	0.0%	8.0%
Total			7	64	25	4	100
		p-value-(.522)*					

*Testapplied:chisquare(p<0.05isstatisticallysignificant)



Correlation between level of frequency with pandemic and appointment schedule during pandemic			Frequency of anxiety with the coronavirus pandemic in regard to orthodontic treatment			Total
			Occasionally	often	usual	
If you or the orthodontist got into the schedule of an appointment during the quarantine	Yes	Count	1	21	3	25
		%	1.0%	21.0%	3.0%	25.0%
	In case of emergency	Count	11	44	12	67
		%	11.0%	44.0%	12.0%	67.0%
	No	Count	1	7	0	8
		%	1.0%	7.0%	0.0%	8.0%
	Total		13	72	15	100
		p-value-(.284)*				

*Test applied: chi square (p < 0.05 is statistically significant)

Correlation between Willingness to go to orthodontist Concern regarding quarantine affecting orthodontic treatment			Willingness to go to orthodontist			Total
			Yes	emergency	No	
Concern regarding quarantine affecting orthodontic treatment	Delay of treatment	Count	10	30	4	44
		%	10.0%	30.0%	4.0%	44.0%
	Impair of the final result	Count	2	7	1	10
		%	2.0%	7.0%	1.0%	10.0%
	Debonding or worsening of brackets affecting malocclusion	Count	2	8	0	10
		%	2.0%	8.0%	0.0%	10.0%
	Break of accessories causing discomfort	Count	11	22	3	36
		%	11.0%	22.0%	3.0%	36.0%



	Total		25	67	8	100
		p-value-(.909)*				

*Test applied: chi square (p<0.05 is statistically significant)

Correlation between Concern about how orthodontic treatment will be affected during quarantine and Level of anxiety with the coronavirus pandemic affecting orthodontic treatment			Concern about how orthodontic treatment will be affected during quarantine				Total
			Delayed treatment	Impair the final result	Debonding of brackets	Break of accessories	
Level of anxiety with the coronavirus pandemic affecting orthodontic treatment	Mild	Count	2	2	0	3	7
		%	2.0%	2.0%	0.0%	3.0%	7.0%
	Moderate	Count	28	6	8	22	64
		%	28.0%	6.0%	8.0%	22.0%	64.0%
	Severe	Count	11	2	1	11	25
		%	11.0%	2.0%	1.0%	11.0%	25.0%
	Extreme	Count	3	0	1	0	4
		%	3.0%	0.0%	1.0%	0.0%	4.0%
	Total		44	10	10	36	100
				p-value-(.427)*			

*Test applied: chi square (p<0.05 is statistically significant)

Correlation between Concern about how orthodontic treatment will be affected during quarantine and Frequency of anxiety with the coronavirus pandemic affecting orthodontic treatment.			Concern about how orthodontic treatment will be affected during quarantine				Total
			Delayed treatment	Impair the final result	Debonding of brackets	Break of accessories	
Frequency of anxiety with the coronavirus pandemic affecting orthodontic treatment.	Never	Count	4	3	2	4	13
		%	4.0%	3.0%	2.0%	4.0%	13.0%
	occasionally	Count	37	6	5	24	72
		%					



Orthodontic treatment		%	37.0%	6.0%	5.0%	24.0%	72.0%
	Often	Count	3	1	3	8	15
		%	3.0%	1.0%	3.0%	8.0%	15.0%
Total			44	10	10	36	100
		p-value-(.124)*					

*Test applied: chi square (p < 0.05 is statistically significant)

IV. DISCUSSION

The intension of the study is to get an idea as how this lockdown affected the treatment progress, as well as the difficulties faced by the patients undergoing orthodontic treatment, the results revealed that most patients undergoing orthodontic treatment were concerned about their restrictions to attend their orthodontic appointments. Most of the patients replied that their last orthodontic visit is 5 months back since the last follow up.

Orthodontic therapy usually consists of brackets, bands and fixed appliances along with accessory components in the patients mouth and thus the accumulation of plaque is inevitable.

A study conducted by Huser et al, concluded that the demineralization associated with orthodontic therapy is an extremely rapid process caused by a high and continuous cariogenic challenge in the plaque development around the brackets. because there is going to be inevitable plaque accumulation, along with patient's reduction in adherence to oral hygiene instructions due to prolonged treatment duration.

Apart from caries and oral hygiene instructions certain treatment mechanics need regular follow up. The elastics used for retraction or space closure decay overtime. This often goes unnoticed by the patients as they are unaware of the same. Wire bending with loops left in patients mouth for long time, loose bands or sunken bands and loose temporary anchorage devices, can cause deleterious effects in the treatment process.

It was found that majority of patients (70%) are respecting the rules of quarantine and trying to stay in home as much as possible and leaving the home only for emergencies and essentials and following the rules implemented by the government. There are very few patients who leave home to work during lockdown due to their professional demands (4%) (front line healthcare workers). Most of the patients are either working or studying (88%) and they are strictly

adhering to the rules of quarantine and started working or studying from home through online sources. It is also found that majority of patients experienced fear and anxiety due to the corona virus pandemic and lockdown which made them adhere to the rules of pandemic and lockdown implemented by the government.

Most of the patients are mostly anxious about the delay of orthodontic treatment time (43.3%) and breakage of appliances and causing discomfort and injury (35.6%). only few patients (9.9%) are concerned about worsening of malocclusion because most of the patients are unaware of consequences of breaking of appliances. This shows the awareness of the need for regular follow-

ups. This shows that in the study no single problem in particular was the sole cause of emergency or inconvenience. The main cause for these emergencies or inconvenience faced is mainly due to loosen brackets or poking wires the other most common reason was trauma due to the long poking wire or due to loosening of ligatures.

Paula cotrin et al⁴ in her article stated that Breakage of brackets, arch wires, ortubes and/or bands were the most common causes of emergency and/or emergency appointments during the early stage of the pandemic. The level of concern of orthodontists regarding the orthodontic treatment of their patients was similar among specialists, MScs, and PhDs. The level of concern about the financial impact of the COVID-19 pandemic was significantly greater for specialists and MScs than for PhD.

Given that the professional can assess whether to stay open or manage emergencies only, common sense must prevail during a quarantine period.

One choice that can be made is to postpone routine orthodontic appointments, according to the guidelines of the single Nations, but patients need to be assured and followed, especially if they are



experiencing discomfort or problems related to the orthodontic appliance they are using.

Caprioglio et al and Suri et al⁵ in their article mentioned that possible orthodontic emergencies can be managed with simple solutions such as cutting of distal ends of wire with nail cutters, use of over the counter disclosing wax for relief and the importance of virtual assistance in such times.

This survey revealed that most of the patients are anxious about Most of the patients are mostly anxious about the delay of orthodontic treatment time (43.3%) and not able to attend regular followups.

According to Merriam – Webster dictionary (<https://www.merriam-webster.com/dictionary/emergencies>) 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 aspirations or accidental swallowing of appliances need to be considered as potential life-threatening emergencies.

We must keep in mind that, in this case, the rationale is to prevent emergencies, not to cure them.

At this time, there are no definitive clinical protocols supported by robust evidence for orthodontic practice during the COVID-19 pandemic.

Orthodontists should not rush to return to routine orthodontic work and should follow state guidelines. Non-emergency orthodontic visits should be suspended during the severe acute respiratory syndrome coronavirus 2 pandemic in high-risk areas. Resuming orthodontic procedures during the pandemic requires paying special attention to screening, performing maximum efforts to reduce aerosol generation, using appropriate personal protective equipment, having proper ventilation, and fully adhering to sterilization and disinfection principles⁶.

Dealing with an orthodontic emergency should be planned in advance along with the preventive measures in cases of emergencies have to be the mainstay as patient and the orthodontist are not allowed to visit each other during the COVID-19 outbreak. Hence a virtual approach has to be ready on the orthodontist's part to deal with an orthodontic emergency⁷.

The severity and seriousness of the disease should be clearly explained to all the patients, making them aware of the importance of social

distancing and the need for personal protection even after the lockdown has been lifted. It should be made clear that all the patients visiting the clinics should be symptomless and are visiting the hospital only for emergencies. The possible explanation of 67% patients are willing to visit the orthodontist only during the emergency shows the awareness on the pandemic and the various modes of possible transmission of disease in dental office. It should be mentioned that only 8% of the patients are not willing to visit the orthodontist at any time until the entire pandemic is over and 25% of patients are willing to visit the clinic anytime shows their poor awareness on the pandemic and the lockdown.

V. CONCLUSION

1. The study carried out with aim of assessing the impact of lockdown on patients undergoing orthodontic treatment. It is observed that majority of patients have experienced some or the other problem regarding orthodontic treatment.
2. The need for understanding the psychology of patients undergoing orthodontic treatment during the pandemic and lockdown is extremely important.
3. In these situations where patients do not have access to seek help all the discussed factors should be considered. In conclusion 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.
4. proper communication with patients and explanation on how to maintain proper oral care and how to maintain any emergencies when regular follow ups are not possible is highly important.

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