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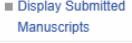
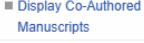



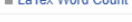
Judul Artikel : Endodontic Emergencies in Mumbai City during COVID-19  
 Lockdown and Different Phases of Unlock.  
 Penulis : Omkar Shinde, Ajinkya M. Pawar, Kulvinder Singh Banga, Jatin Atram  
 and **Dian Agustin Wahjuningrum**  
 Jurnal : International Journal of Environmental Research Public  
 Health 2021, 18, 7314.  
 ISSN.16604601, 16617827  
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1	Manuscript was submitted to Journal “ <b>Int. J. Environ. Res. Public Health</b> ” (ID: <b>ijerph-1271710</b> )	<b>Received: 7 Juni 2021</b>
	Decision: Thank you very much for uploading the following manuscript to the MDPI submission system. One of our editors will be in touch with you soon	
2	<b>Assistant Editor Assigned (ID: ijerph-1271710)</b> was assigned to editor	<b>Received: 9 Juni 2021</b>
	Decision: Your manuscript has been assigned to Dana Sopoian for further processing who will act as a point of contact for any questions related to your paper	
3	<b>Revision 1 (ID: ijerph-1271710)</b> was reviewed	<b>Received: 30 Juni 2021</b>
	Decision: Major revision (Due date 10 Juli 2021)	
4	<b>Second revision (ID: ijerph-1271710)</b> was resubmitted to Journal	<b>1 Juli 2021</b>
	Decision: Thank you very much for providing the revised version of your paper: We will continue processing your paper and will keep you informed about the status of your submission.	
5	Decision: <b>Accepted for Publication</b>	<b>04 Juli 2021</b>
6	<b>Published online</b>	<b>08 Juli 2021</b>
7	<b>Published on International Journal of Environmental Research Public Health 2021, 18, 7314.</b> <a href="https://doi.org/10.3390/ijerph18147314">https://doi.org/10.3390/ijerph18147314</a>	<b>08 Juli 2021</b>



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## Article Information Overview

Manuscript ID	<b>ijerph-1271710</b>
Status	Website online
DOI	10.3390/ijerph18147314
Publication Certificate	A4 
Banner	<a href="#">Download Banner (PDF)</a>
Website Links	<a href="#">Abstract</a> <a href="#">HTML version</a> <a href="#">PDF version</a> <a href="#">Manuscript</a>
Article type	Article
Title	Endodontic Emergencies in Mumbai City during COVID-19 Lockdown and Different Phases of Unlock
Journal	<i>International Journal of Environmental Research and Public Health</i>
Volume	18
Issue	14
Abstract	<p>The present descriptive research focused on determining the traits of patients who required endodontic treatment during the COVID-19 lockdown and various stages of unlocking in Mumbai metropolitan region. The descriptive analysis was carried out by examining the patients who were registered at Nair Hospital Dental College, Mumbai during four phases of lockdown (25 March to 31 May 2020) and eight phases of unlock (1 June 2020 to 31 January 2021). The evaluation was performed by evaluating the number of days and the overall number of patients reported for endodontic treatment for the first and subsequent visits. Each patient underwent intensive triage, which included taking their body temperature, oxygen saturation level, and travel history. The sex, age, and endodontic diagnosis of the offending tooth were also reported. The pain parameters were analyzed using a verbal numerical rating score (VNRS). During the lockdown phases, 297 patients seeking endodontic treatment visited the hospital over a total of 26 working days, and during the unlock phases, 16,195 patients visited the hospital over 189 working days. The average age of the patients that visited were 31–40 years of age (57.23%). The mean VNRS score was <math>5.85 \pm 1.62</math>. For both the lockdown and unlock periods, a significantly higher percentage of males visited dental school (<math>p &lt; 0.001</math>). When compared to other stages, the number of patients attending during lockdown phase 4 (55.56%) and unlock phase 8 (32.35%) was the highest. The majority of endodontic emergency diagnoses were reversible pulpitis (36.5%) and symptomatic irreversible pulpitis (33.14%), all of which had higher mean VNRS (<math>p &lt; 0.05</math>). Of the 49 patients that reported with COVID-19 symptoms, 11 tested positive. During the lockdown and unlock periods, 12 of the 41 treating workers tested positive. Personal protective equipment and patient screening are critical in shielding clinicians during the COVID-19 pandemic.</p>
Keywords	COVID-19; endodontic emergency; epidemiologic investigation; verbal numerical rating scale; vital pulp therapy; lockdown; Mumbai metropolitan region



### data

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#### Editor Decision

Decision Accept in current form  
Decision Date 3 July 2021

#### Review Report

Reviewer 1 [Review Report \(Round 1\)](#)  
Reviewer 2 [Review Report \(Round 1\)](#) [Review Report \(Round 2\)](#)  
Reviewer 3 [Review Report \(Round 1\)](#)

#### APC information

Journal APC: 2,300.00 CHF  
Total Payment Amount: 2,300.00 CHF

#### Previously Published Papers

Pawar, B.A.; Pawar, A.M.; Bhardwaj, A.; Wahjuningrum, D.A.; Rahardjo, A.K.; Luke, A.M.; Metzger, Z.; Kfir, A. Effect of Adaptive, Rotary, and Manual Root Canal Instrumentation in Primary Molars: A Triple-Armed, Randomized Controlled Clinical Trial. *Biology* 2021, 10, 42. doi: [10.3390/biology10010042](https://doi.org/10.3390/biology10010042)

Pawar, A.M.; Bhardwaj, A.; Banga, K.S.; Singh, G.; Kfir, A.; Luke, A.M.; Dinata, V.; Wahjuningrum, D.A. Deficiencies in Root Canal Fillings Subsequent to Adaptive Instrumentation of Oval Canals. *Biology* 2021, 10, 1074. doi: [10.3390/biology10111074](https://doi.org/10.3390/biology10111074)

Thakur, B.; Bhardwaj, A.; Wahjuningrum, D.A.; Luke, A.M.; Shetty, K.P.; Pawar, A.M.; Reda, R.; Seracchiani, M.; Zanza, A.; Testarelli, L. Incidence of Post-Operative Pain following a Single-Visit Pulpotomy in Primary Molars Employing Adaptive, Rotary, and Manual Instrumentation: A Randomized Clinical Trial. *Medicina* 2023, 59, 355. doi: [10.3390/medicina59020355](https://doi.org/10.3390/medicina59020355)

Shetty, V.; Yelke, S.; Wahjuningrum, D.A.; Luke, A.M.; Testarelli, L.; Giardino, L.; Pawar, A.M. Post-Operative Quality of Life after Single-Visit Root Canal Treatment Employing Three Different Instrumentation Techniques—An Institutional Randomized Clinical Trial. *J. Clin. Med.* 2023, 12, 1535. doi: [10.3390/jcm12041535](https://doi.org/10.3390/jcm12041535)

Khanvilkar, U.; Patil, H.; Bandekar, S.; Kshirsagar, S.; Pawar, A.M.; Wahjuningrum, D.A.; Pagnoni, F.; Reda, R.; Zanza, A.; Testarelli, L. Pushout Bond Strength of Root Fillings after Irrigation of Root Canals Utilizing Sodium Hypochlorite, Chlorhexidine, and Homeopathic Mother Tincture (*Arnica Montana*). *Clin. Pract.* 2023, 13, 305-314. doi: [10.3390/clinpract13010028](https://doi.org/10.3390/clinpract13010028)

#### Related Papers Published in MDPI Journals

Hashnain, A.; Hashmi, M.Z.; Bhatti, U.A.; Nadeem, B.; Wei, G.; Zha, Y.; Sheng, Y. Assessment of Air Pollution before, during and after the COVID-19 Pandemic Lockdown in Nanjing, China. *Atmosphere* 2021, 12, 743. doi: [10.3390/atmos12060743](https://doi.org/10.3390/atmos12060743)

Roberts, L.R.; Solomon, S.; Renati, S.J.; Montgomery, S. Exploring Mental Health during the Initial COVID-19 Lockdown in Mumbai: Serendipity for Some Women. *Int. J. Environ. Res. Public Health* 2021, 18, 12542. doi: [10.3390/ijerph182312542](https://doi.org/10.3390/ijerph182312542)

Elalouf, A.; Moran, R.; Yaron, B.; Oman, M. Pediatric Dental Emergency Visits and Treatment during Lockdown in the COVID-19 Pandemic: A Retrospective Study. *Int. J. Environ. Res. Public Health* 2022, 19, 3774. doi: [10.3390/ijerph19073774](https://doi.org/10.3390/ijerph19073774)

Charbonnier, E.; Goncalves, A.; Puechlong, C.; Montalescot, L.; Le Vigouroux, S. Two Years and Four Time Points: Description of Emotional State and Coping Strategies of French University Students during the COVID-19 Pandemic. *Viruses* 2022, 14, 782. doi: [10.3390/v14040782](https://doi.org/10.3390/v14040782)

If you have any questions or concerns, please do not hesitate to contact [ijerph@mdpi.com](mailto:ijerph@mdpi.com).

Journal	IJERPH (ISSN 1690-4601)
Manuscript ID	ijerph-1271710
Type	Article
Title	Endodontic emergencies in Mumbai city during COVID-19 lockdown and different phases of unlock.
Authors	Omkar Shinde , Ajinkya M. Pawar , Kulvinder Singh Banga , Jatin Atram , Dian Agustin Wahjuningrun *
Abstract	The present descriptive research focused on determining the traits of patients who required endodontic treatment during the COVID-19 lockdown and various stages of unlocking in Mumbai metropolitan region. The descriptive analysis was carried out by examining the patients who were registered at Nair Hospital Dental College, Mumbai during four phases of lockdown (March 25th to May 31st, 2020) and eight phases of unlock (1st June 2020 to 31st January 2021). The evaluation was performed by evaluating the number of days, overall number of patients reported for endodontic treatment for the first and subsequent visits. Each patient underwent intensive triage, which included taking their body temperature, oxygen saturation level, and travel history. The sex, age, and endodontic diagnosis of the offending tooth were also reported. The pain parameters were analyzed using VNRS. During the lockdown phases, 207 patients seeking endodontic treatment visited the hospital in a total of 26 working days, and during the unlock phases, 16,195 patients visited the hospital in 189 working days. The average age of the patients that visited were 31-40 years of age group (57.23%). The mean VNRS score was $5.85 \pm 1.62$ . For both the lockdown and unlock periods, a significantly higher percentage of males visited dental school ( $p < 0.001$ ). When compared to other stages, the number of patients attending during lockdown phase 4 (55.58%) and unlock phase 6 (32.35%) was the highest. The majority of endodontic emergency diagnoses were reversible pulpitis (36.5%) and symptomatic irreversible pulpitis (33.14%), all of which had higher mean VNRS ( $p < 0.05$ ). Of the 49 patients that were reported with COVID-19 symptoms, 11 were tested positive. During the lockdown and unlock periods, 12 of the 41 treating workers tested positive. Personal protective equipment and patient screening are critical in shielding clinicians during the COVID-19 pandemic.

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### Authors' Responses to Reviewer's Comments (Reviewer 1)

Author's Notes	Comment
	Comment 1: This study followed patients in an environment locked down by COVID-19. It is very interesting to observe that the number of patients has clearly decreased and the number of traumatic teeth has also decreased. However, it is difficult to understand the results from tables, so it needs some modification.
	<b>Response: We would like to thank the reviewer for their positive comments, and we have made changes in the manuscript as per suggested.</b>
	Comment 2: L20: VNRS should be written as a "verbal numerical rating score (VNRS)" because some people may not understand it.
	<b>Response: Thank you so much for the suggestion and we have amended it in the suggested line.</b>
	Comment 3: L26: Isn't 32.35% in phase 8?
	<b>Response: Thank you so much for the suggestion and we have amended it in the suggested line.</b>
	Comment 4: L25-28: This result is not possible to read from tables. Add a new table or delete the text.
	<b>Response: Thank you so much for the suggestion and we have amended the same in Table 3 of the manuscript by adding the percentages (%) for easy understanding.</b>
	Comment 5: L28-31: This result is also similarly unreadable from the table and it are not described in the results paragraph. Add a new table, or describe it in the results paragraph, and add (data not shown).
	<b>Response: Thank you so much for the suggestion and we have amended the same in the results section (L160-163).</b>
	Comment 6: L110-111: The total number of workdays and patients is not described in Table 1, it should be added.
	<b>Response: Thank you so much for the suggestion and we have amended the same in Table 1.</b>
	Comment 7: L116-118: Add "(Table 2)" to the end of the sentence.
	<b>Response: Thank you so much for the suggestion, but we would like to differ from the reviewer with due respect as the data mentioned in these sentences is presented in Table 1.</b>
	Comment 8: L130-131: Add "(Table 4)" to the end of the sentence.
	Comment 9: L131-133: Add "(Table 5)" to the end of the sentence.
	<b>Response: Thank you so much for the suggestion, but we would like to differ from the reviewer with due respect as the data mentioned in these sentences is presented in Table 3.</b>
	Comment 10: L141-145: The description of "Table 3" is not included in the results paragraph.
	<b>Response: Thank you so much for the suggestion, but we would like to bring to the Reviewer's notice that Table 3 is included in the Results section (L86-187).</b>
	Comment 11: L146-148: This result is not possible to read from tables. Add a new table, or describe it in the results paragraph, and add (data not shown).
	<b>Response: Thank you so much for the suggestion, we have made the table more explanatory by adding bold text and changing the p value position. We hope that the reviewer is satisfied with the changes in Table 3.</b>
	Comment 12: L150 and L208: Isn't a body temperature of 32.7 degrees too low? Please check again.
	<b>Response: Thank you so much for the suggestion. We apologise for the typographical error from our side. We have made the necessary changes.</b>

Author's Notes File [Report Notes](#)

- Quality of English Language
- English very difficult to understand/incomprehensible  
 Extensive editing of English language and style required  
 Moderate English changes required  
 English language and style are fine/minor spell check required  
 I am not qualified to assess the quality of English in this paper

	Yes	Can be improved	Must be improved	Not applicable
Does the introduction provide sufficient background and include all relevant references?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is the research design appropriate?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are the methods adequately described?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are the results clearly presented?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Are the conclusions supported by the results?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

**Comments and Suggestions for Authors** This study followed patients in an environment locked down by COVID-19. It is very interesting to observe that the number of patients has clearly decreased and the number of traumatic teeth has also decreased. However, it is difficult to understand the results from tables, so it needs some modification.

Point

L20: VNRS should be written as a "verbal numerical rating score (VNRS)" because some people may not understand it.

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Submission Date 07 June 2021

Date of this review 22 Jun 2021 01:01:53

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Journal [IJERPH](#) (ISSN 1660-4601)  
 Manuscript ID [ijerph-1271710](#)  
 Type Article  
 Title [Endodontic emergencies in Mumbai city during COVID-19 lockdown and different phases of unlock.](#)  
 Authors Omkar Shinde , Ajinkya M. Pawar , Kulvinder Singh Banga , Jatin Atram , Dian Agustin Wahjuningrun \*

**Abstract** The present descriptive research focused on determining the traits of patients who required endodontic treatment during the COVID-19 lockdown and various stages of unlocking in Mumbai metropolitan region. The descriptive analysis was carried out by examining the patients who were registered at Nair Hospital Dental College, Mumbai during four phases of lockdown (March 25th to May 31st, 2020) and eight phases of unlock (1st June 2020 to 31st January 2021). The evaluation was performed by evaluating the number of days, overall number of patients reported for endodontic treatment for the first and subsequent visits. Each patient underwent intensive triage, which included taking their body temperature, oxygen saturation level, and travel history. The sex, age, and endodontic diagnosis of the offending tooth were also reported. The pain parameters were analyzed using VNRS. During the lockdown phases, 297 patients seeking endodontic treatment visited the hospital in a total of 26 working days, and during the unlock phases, 16,195 patients visited the hospital in 189 working days. The average age of the patients that visited were 31-40 years of age group (57.23%). The mean VNRS score was  $5.85 \pm 1.62$ . For both the lockdown and unlock periods, a significantly higher percentage of males visited dental school ( $p < 0.001$ ). When compared to other stages, the number of patients attending during lockdown phase 4 (55.56%) and unlock phase 6 (32.35%) was the highest. The majority of endodontic emergency diagnoses were reversible pulpitis (36.5%) and symptomatic irreversible pulpitis (33.14%), all of which had higher mean VNRS ( $p < 0.05$ ). Of the 49 patients that were reported with COVID-19 symptoms, 11 were tested positive. During the lockdown and unlock periods, 12 of the 41 treating workers tested positive. Personal protective equipment and patient screening are critical in shielding clinicians during the COVID-19 pandemic.

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Is the research design appropriate?	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Are the methods adequately described?	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Are the results clearly presented?	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Are the conclusions supported by the results?	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Comments and Suggestions for Authors** This version of the manuscript looks really good and polished. However, in the strengths of the study section the authors can write a sentence, "For the first time in scientific literature, this study has presented such an important issue".

Submission Date 07 June 2021  
 Date of this review 01 Jul 2021 14:03:33



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Journal [IJERPH \(ISSN 1660-4601\)](#)  
 Manuscript ID [ijerph-1271710](#)  
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 Title [Endodontic emergencies in Mumbai city during COVID-19 lockdown and different phases of unlock.](#)  
 Authors [Omkar Shinde](#) , [Ajinkya M. Pawar](#) , [Kulvinder Singh Banga](#) , [Jatin Atram](#) , [Dian Agustin Wahjuningrun \\*](#)

**Abstract** The present descriptive research focused on determining the traits of patients who required endodontic treatment during the COVID-19 lockdown and various stages of unlocking in Mumbai metropolitan region. The descriptive analysis was carried out by examining the patients who were registered at Nair Hospital Dental College, Mumbai during four phases of lockdown (March 25th to May 31st, 2020) and eight phases of unlock (1st June 2020 to 31st January 2021). The evaluation was performed by evaluating the number of days, overall number of patients reported for endodontic treatment for the first and subsequent visits. Each patient underwent intensive triage, which included taking their body temperature, oxygen saturation level, and travel history. The sex, age, and endodontic diagnosis of the offending tooth were also reported. The pain parameters were analyzed using VNRS. During the lockdown phases, 297 patients seeking endodontic treatment visited the hospital in a total of 26 working days, and during the unlock phases, 16,195 patients visited the hospital in 189 working days. The average age of the patients that visited were 31-40 years of age group (57.23%). The mean VNRS score was  $5.85 \pm 1.62$ . For both the lockdown and unlock periods, a significantly higher percentage of males visited dental school ( $p < 0.001$ ). When compared to other stages, the number of patients attending during lockdown phase 4 (55.56%) and unlock phase 6 (32.35%) was the highest. The majority of endodontic emergency diagnoses were reversible pulpitis (36.5%) and symptomatic irreversible pulpitis (33.14%), all of which had higher mean VNRS ( $p < 0.05$ ). Of the 49 patients that were reported with COVID-19 symptoms, 11 were tested positive. During the lockdown and unlock periods, 12 of the 41 treating workers tested positive. Personal protective equipment and patient screening are critical in shielding clinicians during the COVID-19 pandemic.

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Authors' Responses to Reviewer's Comments (Reviewer 3)

**Author's Notes** Comment 1: this is well-written manuscript and I have no comments, bit I suggest to rewrite the conclusion part and make the strong connection with the results presented. Please check the reference list once again.

**Response:** We would like to thank the reviewer for their encouraging comments, and we have made changes in the manuscript as per suggested.

Review Report Form

- Quality of English Language
- English very difficult to understand/incomprehensible
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Are the conclusions supported by the results?	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Comments and Suggestions for Authors** Dear authors,  
 this is well-written manuscript and I have no comments, bit I suggest to rewrite the conclusion part and make the strong connection with the results presented. Please check the reference list once again.

Submission Date 07 June 2021  
 Date of this review 29 Jun 2021 11:25:37



1 Article

# 2 Endodontic emergencies in Mumbai city during COVID-19 3 lockdown and different phases of unlock.

4 Omkar Shinde<sup>1</sup>, Ajinkya M. Pawar<sup>1</sup>, Kulvinder Singh Banga<sup>1</sup>, Jatin Atram<sup>1</sup>, Dian Agustin  
5 Wahjuningrun<sup>2,\*</sup>

6 <sup>1</sup> Department of Conservative Dentistry and Endodontics, Nair Hospital Dental College, Mumbai 400034,  
7 Maharashtra India; (O.S.) [omkarshinde0206@gmail.com](mailto:omkarshinde0206@gmail.com); (A.M.P.) [ajinkya@drpawars.com](mailto:ajinkya@drpawars.com); (K.S.B.)  
8 [kshanga@gmail.com](mailto:kshanga@gmail.com); (J.A.) [jatin.atram2008@gmail.com](mailto:jatin.atram2008@gmail.com)

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13 **Abstract:** The present descriptive research focused on determining the traits of patients who  
14 required endodontic treatment during the COVID-19 lockdown and various stages of unlocking in  
15 Mumbai metropolitan region. The descriptive analysis was carried out by examining the patients  
16 who were registered at Nair Hospital Dental College, Mumbai during four phases of lockdown  
17 (March 25th to May 31st, 2020) and eight phases of unlock (1st June 2020 to 31st January 2021). The  
18 evaluation was performed by evaluating the number of days, overall number of patients reported  
19 for endodontic treatment for the first and subsequent visits. Each patient underwent intensive  
20 triage, which included taking their body temperature, oxygen saturation level, and travel history.  
21 The sex, age, and endodontic diagnosis of the offending tooth were also reported. The pain  
22 parameters were analyzed using VNRS. During the lockdown phases, 297 patients seeking  
23 endodontic treatment visited the hospital in a total of 26 working days, and during the unlock  
24 phases, 16,195 patients visited the hospital in 189 working days. The average age of the patients  
25 that visited were 31-40 years of age group (57.23%). The mean VNRS score was  $5.85 \pm 1.62$ . For  
26 both the lockdown and unlock periods, a significantly higher percentage of males visited dental  
27 school ( $p < 0.001$ ). When compared to other stages, the number of patients attending during  
28 lockdown phase 4 (55.56%) and unlock phase 6 (32.35%) was the highest. The majority of  
29 endodontic emergency diagnoses were reversible pulpitis (36.5%) and symptomatic irreversible  
30 pulpitis (33.14%), all of which had higher mean VNRS ( $p < 0.05$ ). Of the 49 patients that were  
31 reported with COVID-19 symptoms, 11 were tested positive. During the lockdown and unlock  
32 periods, 12 of the 41 treating workers tested positive. Personal protective equipment and patient  
33 screening are critical in shielding clinicians during the COVID-19 pandemic.

34 **Keywords:** COVID-19; endodontic emergency; epidemiologic investigation; verbal numerical  
35 rating scale; vital pulp therapy; lockdown; Mumbai Metropolitan Region.

## 37 38 1. Introduction

39 The COVID-19, which is caused by the Severe Acute Respiratory  
40 Syndrome Coronavirus 2 (SARS-CoV-2) exhibits symptoms such as fever,  
41 dry cough, nausea, difficult breathing, and shortness of breath [1]. On  
42 December 30, 2019, several COVID-19 cases were registered in China's  
43 Wuhan Province [2]. On March 11, 2020, the World Health Organization



44 (WHO) declared it a global pandemic [3]. Since then, every part of human  
45 life has been influenced. COVID-19 spreads by sneezing and coughing,  
46 nasal droplets and polluted surfaces, and mucous membranes of the lips,  
47 skin, and nose [4].

48 On January 30, 2020, India reported the first case of COVID-19 in the  
49 city of Thrissur, Kerala. By February 3, two more cases of students  
50 returning to India from China's Wuhan Province had been identified.  
51 There was no evidence of a significant increase in recent COVID-19 cases  
52 over the next two days. At the beginning of March 2020, the number of  
53 new cases of COVID-19 in India increased significantly. On March 9,  
54 2020, the city of Pune identified the first confirmed COVID-19 case in  
55 Maharashtra. Following that, new cases had been registered in major  
56 Maharashtra cities such as Mumbai, Nagpur, and Ahmednagar [5].

57 By the mid of March 2020, owing to the number of active cases of  
58 COVID-19 in India, the Prime Minister of India announced a nationwide  
59 lockdown for 21 days on 24 March 2020, at 8 p.m., to control the further  
60 spread of the virus [6]. The national lockdown put restrictions on the  
61 movement of 1.3 billion people. Only medical emergencies were initially  
62 permitted. Even after the announcement of the national lockdown, new  
63 cases were reported by the city of Mumbai at an alarming rate of more  
64 than 40 cases per day, up to a maximum of 3659 cases on a single day (21  
65 August 2020), compared to other regions of Maharashtra [7].

66 Endodontic infections can be extremely painful, and endodontic  
67 emergencies are a common form of dental emergency. In patients who  
68 needed endodontic care, there was no assurance that the same would be  
69 handled during the lockdown. The Nair Hospital Dental College was one  
70 of the few hospitals that provided emergency dental care. During the  
71 period of lockdown, the emergency treatment was provided in the  
72 emergency ward located on the first floor of the dental hospital.  
73 Eventually, at the end of second phase of unlock i.e., from 29<sup>th</sup> July the  
74 hospital turned into a full-fledged OPD and treatment in all the  
75 departments.

76 The current descriptive analysis has been carried out and the  
77 characteristics of patients visiting the dental school are put forward with  
78 a primary complaint suggestive of endodontic origin. This analysis was  
79 performed at the 4 phases of lockdown (25<sup>th</sup> March 2020 to 31<sup>st</sup> May 2020)  
80 and during the 08 phases of unlock (1<sup>st</sup> June 2020 till January 31, 2021).

## 81 **2. Materials and Methods**

### 82 *2.1 Study Setting*

83 Nair Hospital Dental College, Mumbai is an integrated health care  
84 organization. Its comprehensive health records stores linked information  
85 on all aspects of dental care for each patient across all care settings (for  
86 example, outpatient, inpatient, and emergency department). Each patient  
87 was assigned a unique medical record number that allows for the linkage  
88 of data across all dental care aspects. Nair Hospital Dental College had a  
89 diverse patient population from Mumbai Metropolitan Region (MMR)  
90 and other locations.

### 91 *2.2 Study Design and Patients*

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We performed a retrospective cohort study that consecutively visited the emergency department (ED) and referred to the Department of Conservative Dentistry and Endodontics of Nair Hospital Dental College 15<sup>th</sup> April – 31<sup>st</sup> May 2020. The patients were divided into lockdown/ED (25 March 2020 – 31 May 2020) and unlock/Out-Patient Department (OPD) of Conservative and Endodontics (1<sup>st</sup> June 2020 – 31<sup>st</sup> January 2021). We followed up with the patient till the second visit.

### 2.3 Data Sources

We obtained information from the Nair Hospital Dental College, Mumbai database. The database contains data for inpatient and outpatient visits at Nair Hospital Dental College, Mumbai, including demographic characteristics, diagnoses, procedures, medications and laboratory tests. After the inception of the COVID-19 pandemic, each patient was subjected to a thorough examination of their body temperature, pulse rate, oxygen saturation and travel history (Figure 1). We excluded patient who showed COVID-19 symptoms. The diagnoses were rendered using the American Board of Endodontics and the American Association of Endodontics consensus guidelines [8]. Diagnoses were extracted from both the inpatient and outpatient records.

### 2.4 Ethical Approval

Ethical approval for the execution of the descriptive analysis was obtained based on the Declaration of Helsinki from the Institutional Review Board (EC-ND-156). Permission for the project was also obtained from the principal and head of the department.

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**Figure 1.** Patient triage form that was recorded for each patient.

#### *2.4 Statistical Analysis*

The data was entered and analyzed using the Statistical Package for Social Sciences (SPSS) for Windows 26.0. (SPSS, Inc. Chicago, Illinois) Descriptive analysis was done to compare patients between first and second visits and patients during the lockdown and unlock phases.

### **3. Results**

The lockdown and unlock duration were divided into 4 and 8 phases, respectively (Table 1). During lockdown, Nair Hospital Dental College had 26 working days and a total of 297 patients visited the hospital. No patients visited during phase 1 lockdown (25<sup>th</sup> March to 14<sup>th</sup> April 2020). However, during the different phases of unlock in 189 working days, 16195 patients visited the hospital. The patient flow drastically increased during unlock phases. The percentage of patients visiting during lockdown phase 4(55.56%), and unlock phase 8(32.35%), was highest compared to other phases (Table 1).

The frequency of males visiting the dental hospital was much higher than females during the lockdown (256 out of 297 i.e. 86.19%) and unlock phases (10201 out of 16195 i.e. 63%). Only 1 patient visited the dental hospital during lockdown aged above 50 years which can be attributed to

194 the high risk of COVID-19 infection. The highest number of patients  
 195 visited during lockdown 4 (243 out of 297) and unlock 8 (9196 out of  
 196 16195) phases belonged to 31-40 years of age group (Table 2).  
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199 **Table 1.** The number of working days, number and percentages (%) of the patients visited the  
 200 dental school for first and follow up visit during the different lockdown and unlock phases.  
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Lockdown Phases	No. of working days	First Visit (% of 194)	Follow up Visit (% of 103)	Total (% of 297)
Phase 1 25th March to 14th April 2020	0	0	0	0
Phase 2 15th April to 3rd May 2020	6	29(14.94%)	13(12.62%)	42(14.14%)
Phase 3 4th May to 17th May 2020	9	58(29.89%)	32(31.06%)	90(30.30%)
Phase 4 18th to 31st May 2020	11	107(55.17%)	58(56.32%)	165(55.56%)
Unlock Phases	No. of working days	First Visit (% of 4471)	Follow up Visit (% of 11724)	Total (% of 16,195)
Phase 1 1st June to 30th June 2020	12	125(2.79%)	103(0.87%)	228(1.40%)
Phase 2 1st July to 31st July 2020	25	244(5.45%)	481(4.10%)	725(4.47%)
Phase 3 1st August to 31st August 2020	27	507(11.33%)	708(6.03%)	1215(7.50%)
Phase 4 1st September to 30 September 2020	23	673(15.05%)	686(5.85%)	1359(8.39)
Phase 5 1st October to 30th October 2020	26	595 (13.30%)	1003(8.55%)	1598(9.86%)
Phase 6 1st November till 30th November 2020	25	503(11.25%)	1897(16.18%)	2400(14.81%)
Phase7 1st December till 31st December 2020	24	701(15.67%)	2731(23.29%)	3432(21.19%)
Phase8 1st January till 31st January 2021	27	1123(25.16%)	4115(35.13%)	5238(32.35%)

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 211 **Table 2.** Demographic data with respect to the sex and age of patients that visited the dental  
 212 school during during the different lockdown and unlock phases.  
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Lockdown	Sex		Age						Total
	Male	Femal e	13-20	21-30	31-40	41-50	51-60	>60	
Phase 1	0	0	0	0	0	0	0	0	0
Phase 2	35	7	2	2	35	2	1	0	42
Phase 3	76	14	7	9	68	6	0	0	90
Phase 4	145	20	4	17	140	4	0	0	165
Total	256	41	13	28	243	12	1	0	297
Unlock	Sex		Age						Total

	Male	Femal e	13-20	21-30	31-40	41-50	51-60	>60	
<b>Phase 1</b>	201	27	9	16	193	7	2	1	228
<b>Phase 2</b>	603	122	25	65	570	29	21	15	725
<b>Phase 3</b>	980	235	83	165	798	71	59	39	1,215
<b>Phase 4</b>	1,031	328	92	183	853	95	85	51	1,359
<b>Phase 5</b>	1,121	477	113	265	912	131	105	72	1,598
<b>Phase 6</b>	1,695	705	228	375	1319	221	159	98	2,400
<b>Phase 7</b>	1,867	1,565	353	527	1825	415	187	125	3,432
<b>Phase 8</b>	2,703	2,535	525	753	2726	798	285	151	5,238
<b>Total</b>	10,201	5,994	1,428	2,349	9,196	1,767	903	552	16,195

Also, the mean VNRS for different sex, age and endodontic emergencies is presented in Table 3. Patients in the age group of 31 – 40 and the endodontic emergency of related to reversible pulpitis and symptomatic irreversible pulpitis, exhibited the significantly higher VNRS ( $p < 0.05$ ).

A total of 194 and 4471 patients were referred for endodontic care during the lockdown and unlock phases, respectively, for the first visit. Also, 103 and 11724 patients during the lockdown and unlock phases, respectively were attending the hospital as follow-up visit and required continuation of their endodontic treatment. Reversible pulpitis and symptomatic irreversible pulpitis were the most common chief complaints during the lockdown and unlock phases of the first and follow-up visit. Highest patients were referred during lockdown phase 4 (55.17%) and unlock phase 8 (25.16%) of the first visit. 56.32% of the patients were referred during lockdown phase 4, and 35.13% of the patients were referred during unlock phase 8 of the follow-up or second visit (Table 4 and 5). The patient flow was higher for both lockdown and unlock phases from the Mumbai Metropolitan Region (MMR) compared to Non-MMR Region (Table 6).

**Table 3.** The total number of patients with different sex, age, endodontic emergencies and the mean VNRS for that visited the dental school during during the both the phases.

Variables	Number	Mean VNRS Score	P value of VNRS
<b>Sex</b>			<b>&gt;0.05</b>
Male #	10,457	6.56 ± 1.47	
Female	6,035	6.27 ± 1.53	
<b>Age</b>			<b>&lt;0.05</b>
13-20	1,441	5.01 ± 1.58	
21-30	2,377	5.23 ± 1.49	
31-40	9,439	5.85 ± 1.62*	
41-50	1,779	5.16 ± 1.34	
51-60	904	4.79 ± 1.43	
>61	552	4.54 ± 1.33	
<b>Diagnosis</b>			<b>&lt;0.05</b>
Reversible Pulpitis	6,021	5.45 ± 1.35*	
Symptomatic Irreversible Pulpitis	5,467	5.37 ± 1.46*	
Symptomatic Apical Periodontitis	1,921	5.11 ± 1.51	
Chronic Apical Abscess	1,451	5.02 ± 1.64	
Acute Apical Abscess	1,516	5.04 ± 1.53	
Complicated Crown Fracture	137	3.85 ± 0.56	
Dislocation of tooth	80	3.01 ± 0.02	

The value marked with (#) exhibited significantly higher of patients according to the sex.

The values marked with (\*) exhibited significantly higher VNRS ( $p < 0.05$ ) amongst the different age group and endodontic emergency.

The lockdown resulted in low number of trauma (complicated crown fracture and avulsion) cases which was 12 as compared to number of cases reported during unlock phases which was about 205. A total of 1,516 patients who had a chief complaint of acute apical abscess were reported during lockdown and unlock phases. Out of these 424 patients had a temperature of more than 32.7°C. All of them were found to be safe from COVID-19 infection after proper questionnaire evaluation.

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279 **Table 4.** Number of patients that visited the dental school for their first visit for different  
 280 endodontic emergencies during lockdown and unlock phases.  
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Lockd own	Reversib le pulpitis	Symptomati c Irreversible Pulpitis	Symptomati c Apical Periodontiti s	Chron ic Apical Absce ss	Acute Apical Absce ss	Complicated Crown Fracture	Avulsio n	Total (% of 194)
Phase 1	0	0	0	0	0	0	0	0
Phase 2	18	4	3	2	1	1	0	29 (14.94%)
Phase 3	33	8	7	5	4	1	0	58 (29.89%)
Phase 4	57	15	11	9	11	3	1	107 (55.17%)
Unloc k	Reversib le pulpitis	Symptomati c Irreversible Pulpitis	Symptomati c Apical Periodontiti s	Chron ic Apical Absce ss	Acute Apical Absce ss	Complicated Crown Fracture	Avulsio n	Total (% of 4,471)
Phase 1	72	22	4	13	7	6	1	125 (2.79%)
Phase 2	100	66	23	26	24	4	1	244 (5.45%)
Phase 3	190	132	55	59	64	5	2	507(11.33%)
Phase 4	254	179	99	63	71	5	2	673(15.05%)
Phase 5	225	203	45	88	25	5	4	595(13.30%)
Phase 6	169	166	54	52	52	6	4	503(11.25%)
Phase 7	324	212	81	86	84	7	7	701(15.67%)
Phase 8	384	307	145	92	181	7	7	1,123(25.16%)

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284 **Table 5.** Number of patients that visited the dental school for their second/follow up visit for  
 285 different endodontic emergencies during lockdown and unlock phases.  
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Lockd own	Reversib le pulpitis	Symptomati c Irreversible Pulpitis	Symptomati c Apical Periodontiti s	Chron ic Apical Absce ss	Acute Apical Absce ss	Complicated Crown Fracture	Avulsio n	Total (% of 103)
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Phase	Unlocked	Reversible pulpitis	Symptomatic Irreversible Pulpitis	Symptomatic Apical Periodontitis	Chronic Apical Abscess	Acute Apical Abscess	Complicated Crown Fracture	Avulsion	Total (% of 11,724)
Phase 1	0	0	0	0	0	0	0	0	0
Phase 2	6	1	1	2	2	1	0	13	13 (12.62%)
Phase 3	11	8	4	5	3	1	1	32	32 (31.06%)
Phase 4	15	16	9	8	7	2	1	58	58 (56.32%)
Phase 1	30	31	17	12	10	2	1	103	103 (0.87%)
Phase 2	143	141	65	51	71	5	5	481	481 (4.10%)
Phase 3	249	245	31	51	124	5	3	708	708 (6.03%)
Phase 4	225	224	67	69	89	7	5	686	686 (5.85%)
Phase 5	359	368	61	81	117	12	5	1,003	1,003 (8.55%)
Phase 6	696	655	227	145	154	11	9	1,897	1,897 (16.18%)
Phase 7	1,004	1,052	321	196	129	19	10	2,731	2,731 (23.29%)
Phase 8	1,457	1,412	591	336	286	22	11	4,115	4,115 (35.13%)



**Table 6.** Number of patients that visited the dental school from Mumbai metropolitan region and Non-Mumbai metropolitan region during lockdown and unlock phases.

<b>Lockdown</b>	<b>Mumbai metropolitan region</b>	<b>Non-Mumbai metropolitan region</b>	<b>Total (% of 297)</b>
<b>Phase 1</b>	0	0	0
<b>Phase 2</b>	37	5	42 (14.14%)
<b>Phase 3</b>	82	8	90 (30.30%)
<b>Phase 4</b>	145	20	165 (55.56%)
<b>Unlock</b>	<b>Mumbai metropolitan region</b>	<b>Non-Mumbai metropolitan region</b>	<b>Total (% of 16195)</b>
<b>Phase 1</b>	197	31	228 (1.40%)
<b>Phase 2</b>	556	169	725 (4.47%)
<b>Phase 3</b>	910	305	1,215 (7.50%)
<b>Phase 4</b>	1,107	525	1,359 (8.39%)
<b>Phase 5</b>	960	638	1,598 (9.86%)
<b>Phase 6</b>	1,302	1,098	2,400 (14.81%)
<b>Phase 7</b>	2,011	1,421	3,432 (21.19%)
<b>Phase 8</b>	3,035	2,203	5,238 (32.38%)

#### 4. Discussion

SARS-CoV-2, the virus that causes COVID-19, has an average incubation period of 2 to 14 days. Patients that have no symptoms or are in the incubation process are thought to be able to infect others [9]. Despite the fact that Covid-19 active cases were on the rise in Maharashtra and Mumbai at the beginning of March 2020, all dental schools remained open and operational as normal. In the second half of March 2020, India's Prime Minister announced a national shutdown, prompting all to close, including dental colleges, for 21 days. The Municipal Corporation of Greater Mumbai (MCGM) founded, Nair Hospital Dental College (NHDC) in Mumbai, which was one of the country's only dental schools that offered emergency dental care during lockdown. The estimated number of patients declined significantly as a result of the limitations imposed during the lockdown. Furthermore, since other dental schools were closed during the lockdown, the number of first-time patients visiting NHDC rose (194 First visits and 103 Second visits out of 297 patients).

During the lockdown periods, the total number of patients visiting the emergency ward for endodontic care was 297 out of 26 working days, while the total number of patients visiting the Department of Endodontics was 16195 out of 189 working days. A substantial number of patients visited the dental school during the lockdown, and this number gradually increased as the unlocking process progressed. The importance of patient screening (Figure 1) during these processes was emphasized, and it is still necessary today. This was done by COVID-19 disease

318 specific questionnaire, which possessed all the basic information of the  
319 patients' demographics (if the patient is from the hotspot or no), history  
320 of travel, contact with any COVID-19 positive patient, any symptoms of  
321 COVID-19 like fever, chills, cough, and cold.

322 None of the patients were reported with any symptoms of COVID-19  
323 as evaluated by the specific questionnaire during the lockdown.  
324 However, 49 patients during the unlock phases reported to have  
325 symptoms and were referred to Topiwala National Medical College,  
326 Mumbai (TNMC) for reverse transcription polymerase chain reaction  
327 (RT-PCR) test. Of 49 patients, 38 turned back to the department and  
328 presented a negative report of COVID-19 infection. The rest 11 patients  
329 failed to report to the department. On telephonic communication, they  
330 were reported to be positive with COVID-19 infection and were admitted  
331 to COVID care centers (CCC) close to their residence. These patients were  
332 residing in various hotspots (enlisted by MCGM) of the city namely, 03  
333 from Dharavi, 04 from Worli, 01 from Borivali and 01 from Mulund. Only  
334 02 patients that were tested positive were not from the hotspots or  
335 containment zones. As a result, the disease-specific questionnaire proved  
336 to be a valuable tool for patient screening and preventing the spread of  
337 COVID-19 infection among health-care staff (HCW) serving NHDC.

338 No patients had a confirmed or suspected asymptomatic COVID-19  
339 infection or were experiencing COVID-19 symptoms. Greater number of  
340 male patients were reported during the lockdown (256 out of 297  
341 patients) and till phase 5 of unlock (1121 out of 1598 patients). It  
342 eventually changed to almost similar number of males and females from  
343 the Phase 7 of unlock. This could be due to the relaxation and permission  
344 to use the public transport at a speculated given time. The visitors to the  
345 dental school ranged in age from 13 to >60 years. Patients in the oldest  
346 age groups (51 to 60 years = 904 out of 16492 patients and >60 years = 552  
347 out of 16492 patients) had the lowest number of patients during  
348 lockdown and unlock phases. This may be due to the younger family  
349 members' and their own knowledge of the existence of comorbidities and  
350 the associated weaker COVID-19 prognosis [10,11].

351 Fever was recorded in a total of 28% patients (424 out of 1516 patients  
352 of lockdown and unlock period) with acute apical abscess who had a  
353 body temperature of more than 32.7°C. They were found to be safe of  
354 COVID-19 infection after the questionnaire evaluation, and thus their  
355 fever was identified as one of the systemic manifestations of acute apical  
356 abscess [12]. A highly recommended Q COVID-19 Ag test was performed  
357 on these patients [13], which showed up negative. As a consequence, a  
358 fever alone should not be the only sign or symptom of COVID-19 to be  
359 considered. COVID-19 is currently diagnosed using a combination of  
360 epidemiologic data, clinical symptoms, chest computed tomographic  
361 imaging results, and laboratory tests, including RT-PCR respiratory tract  
362 specimens.

363 The following measures were taken in the lockdown phase, during  
364 which the cases of COVID-19 were rising at alarming numbers. The most  
365 common endodontic emergency reported during the lockdown and  
366 unlock was reversible pulpitis followed by symptomatic irreversible  
367 pulpitis, symptomatic apical periodontitis, acute apical abscess, chronic

368 apical abscess, complicated crown fracture and avulsion. The rendering of  
369 treatment to these endodontic emergencies is highly risky due to the fact  
370 of these treatments being high aerosol generating. Reducing treatment  
371 time and exposure control are two ways the risk of infection for  
372 endodontic treatment could be reduced. In cases with vital pulps,  
373 pulpotomy was considered as a treatment option as it is shown to reduce  
374 considerable pain providing comfort to the patient [14]. Another option  
375 that was considered was partial pulpotomy using mineral trioxide  
376 aggregate (MTA) for cases with irreversible pulpitis [15]. This option has  
377 shown promising results in permanent teeth with multiple years of  
378 follow up. For patients requiring root canal treatments use of single file  
379 systems was preferred as it substantially reduced the working time and  
380 preventing the risk from reesterilization. As the treatment were provided  
381 by experienced endodontists (minimum 6 years), exposing an IOPA  
382 radiograph was avoided. The IOPA radiograph (placing of sensor/films)  
383 can stimulate saliva secretion, coughing, nausea and vomiting and causes  
384 exposure to patients' oral cavity [16]. The favourable drugs of choice that  
385 were prescribed for patients with severe dental pain for treating acute  
386 pulpitis were Acetaminophen (1000mg every 6-8 hours), or Ketorolac  
387 tromethamine (10mg every 6 hours), or Piroxicam (20mg every 12 hours)  
388 [17]. Also, in patients experiencing pain suffering from symptomatic  
389 irreversible pulpitis, oral dexamethasone (4mg) was prescribed to reduce  
390 the pain considerably [18]. Due to the conflicting research on Ibuprofen  
391 usage during COVID-19, it was not prescribed to the patients [19]. Also,  
392 as the treatment procedures generated droplets and aerosols, mandatory  
393 use of rubber dam was practiced as it has shown to reduce these issues by  
394 about 70% around a 3 feet diameter operating area [20].

395 The treatment was provided taking into consideration the guidelines  
396 of Centre for Disease Prevention and Control (CDC) by keeping no  
397 patients in the waiting area of the department. Socially distant office  
398 chairs were placed in the parking and the patient was allowed to come to  
399 the department floor only when his appointment time was reached. Care  
400 was also taken to avoid any overlap of appointments for each operator in  
401 the department. The treatment was provided to the patients on alternate  
402 dental chairs assuring a distance of more than recommended 2 m (6 feet)  
403 in each direction [21]. Also, as recommended by WHO, 5% sodium  
404 hypochlorite, with a 1:100 dilution was applied on surfaces after the  
405 dental procedure for 10 mins [22].

406 There was also a significant reduction in physical accidents. The  
407 reduction of outdoor activities during the lockdown may consequently  
408 resulted in a decrease in trauma occurrences. During the 4 phases of  
409 lockdown in patients reporting, only 12 (first visit: 5 complicated crown  
410 fractures and 1 avulsion; second visit: 4 complicated crown fractures and  
411 2 avulsion) presented traumatic injuries. During the different phases of  
412 unlock the traumatic injury cases increased to 45 complicated crown  
413 fractures and 28 avulsion (first visit) and 83 complicated crown fractures  
414 and 49 avulsion (second visit). The reduced number of traumatic injuries  
415 during COVID-19 could be due to the restrictions for travel and limited  
416 availability of public transport to only healthcare and essential workers.

417 During the unlock phases, the number of patients reporting to the  
418 dental hospital increased as the cases of COVID-19 were falling and there  
419 was relaxation of the travel requirements. The treatments to these were  
420 provided with all the measures from the triage screening to the wearing  
421 of PPE and restricting the time of exposure of the endodontists, post  
422 graduate students, nursing staff, and auxiliary staff to the patients' oral  
423 cavity.

424 A total of 41 HCWs, that included teaching staff, post-graduate  
425 students, interns, under-graduate students, nursing staff, servants, and  
426 clerks in the department of Conservative Dentistry and Endodontics were  
427 taking appropriate safety precautions when handling the patients directly  
428 or indirectly. At all times, they were wearing N95 masks, gloves, caps,  
429 shoe covers, face shields, and personal protective gowns. Direct  
430 transmission (via cough, sneeze, or droplet inhalation), touch  
431 transmission (via oronasalocular route), and aerosol transmission are the  
432 three most common modes of transmission for COVID-19 [23].  
433 Furthermore, due to the high risk of aerosol production during dental  
434 treatment, the operatories were properly ventilated and fitted with HEPA  
435 filter air purifiers, which has been shown to minimise dental healthcare  
436 worker exposure to aerosols by 80 – 95% [17,24]. Since the lockdown, 12  
437 HCWs have tested positive for COVID-19 infection, including 3 teaching  
438 faculty, 3 post-graduate students, 1 intern, 3 under-graduate students,  
439 and 2 servants. The safety precautions and screening measures  
440 introduced since the announcement of lockdown (March 25, 2020) have  
441 proven to be successful in protecting HCWs, with just a few cases of  
442 positive COVID-19 infections while providing care.  
443

## 444 5. Conclusions

445 In the current descriptive analysis, while rendering treatment to a  
446 total of 16,492 patients during lockdown and unlock (till January 31, 2021)  
447 12 of the 41 dental, nursing and auxiliary staff were tested positive. The  
448 low number of infected HCWs was due as the treatment that was  
449 performed sticking to the ideal guidelines of practicing dentistry during  
450 COVID-19. The recent COVID-19 pandemic challenges the existing  
451 clinical procedures. Our prime focus as dental healthcare professionals is  
452 to assist our patients in their time of need. Reducing the treatment time  
453 and exposure control are two ways to significantly reduce the risk of  
454 COVID-19 spreading during endodontic treatment.  
455

456 **Author Contributions:** Conceptualization, A.M.P., O.S., and K.S.B.; methodology, A.M.P.;  
457 validation, A.M.P. and J.A.; formal analysis, O.S.; investigation, O.S. and A.M.P.; resources, K.S.B.;  
458 A.M.P.; and D.A.W.; data curation, O.S.; writing—original draft preparation, A.M.P.; writing—  
459 review and editing, D.A.W.; visualization, K.S.B.; supervision, A.M.P.; project administration, O.S.  
460 All authors have read and agreed to the published version of the manuscript.

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462 **Institutional Review Board Statement:** The study was conducted according to the guidelines of  
463 the Declaration of Helsinki and approved by the Institutional Ethics Committee of Nair Hospital  
464 Dental College (EC-ND-156).

465 **Informed Consent Statement:** Patient consent was waived due to the nature of the current study  
466 being a retrospective.

**Data Availability Statement:** The data is the property of the Department of Conservative Dentistry and Endodontics, Nair Hospital Dental College, under Dr. K. S. Banga and he should be contacted if the data needs to be shared.

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## 474 References

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532 1105-1118, DOI:10.1098/rsif.2009.0516.

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Received: 7 June 2021

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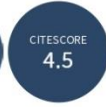
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Article

# Endodontic Emergencies in Mumbai City during COVID-19 Lockdown and Different Phases of Unlock

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**Abstract:** The present descriptive research focused on determining the traits of patients who required endodontic treatment during the COVID-19 lockdown and various stages of unlocking in Mumbai metropolitan region. The descriptive analysis was carried out by examining the patients who were registered at Nair Hospital Dental College, Mumbai during four phases of lockdown (25 March to 31 May 2020) and eight phases of unlock (1 June 2020 to 31 January 2021). The evaluation was performed by evaluating the number of days and the overall number of patients reported for endodontic treatment for the first and subsequent visits. Each patient underwent intensive triage, which included taking their body temperature, oxygen saturation level, and travel history. The sex, age, and endodontic diagnosis of the offending tooth were also reported. The pain parameters were analyzed using a verbal numerical rating score (VNRS). During the lockdown phases, 297 patients seeking endodontic treatment visited the hospital over a total of 26 working days, and during the unlock phases, 16,195 patients visited the hospital over 189 working days. The average age of the patients that visited were 31–40 years of age (57.23%). The mean VNRS score was  $5.85 \pm 1.62$ . For both the lockdown and unlock periods, a significantly higher percentage of males visited dental school ( $p < 0.001$ ). When compared to other stages, the number of patients attending during lockdown phase 4 (55.56%) and unlock phase 8 (32.35%) was the highest. The majority of endodontic emergency diagnoses were reversible pulpitis (36.5%) and symptomatic irreversible pulpitis (33.14%), all of which had higher mean VNRS ( $p < 0.05$ ). Of the 49 patients that reported with COVID-19 symptoms, 11 tested positive. During the lockdown and unlock periods, 12 of the 41 treating workers tested positive. Personal protective equipment and patient screening are critical in shielding clinicians during the COVID-19 pandemic.

**Keywords:** COVID-19; endodontic emergency; epidemiologic investigation; verbal numerical rating scale; vital pulp therapy; lockdown; Mumbai metropolitan region



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## 1. Introduction

The COVID-19, which is caused by the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) exhibits symptoms such as fever, dry cough, nausea, difficulty breathing, and shortness of breath [1]. On 30 December 2019, several COVID-19 cases were registered in China's Wuhan Province [2]. On 11 March 2020, the World Health Organization (WHO) declared it a global pandemic [3]. Since then, every part of human life has been influenced. COVID-19 spreads by sneezing and coughing, nasal droplets and polluted surfaces, and the mucous membranes of the lips, skin, and nose [4].

On 30 January 2020, India reported the first case of COVID-19 in the city of Thrissur, Kerala. By February 3, two more cases of students returning to India from China's Wuhan Province had been identified. There was no evidence of a significant increase in recent

COVID-19 cases over the next few days. At the beginning of March 2020, the number of new cases of COVID-19 in India increased significantly. On 9 March 2020, the city of Pune identified the first confirmed COVID-19 case in Maharashtra. Following that, new cases had been registered in major Maharashtra cities such as Mumbai, Nagpur, and Ahmednagar [5].

By the mid of March 2020, owing to the number of active cases of COVID-19 in India, the Prime Minister of India announced a nationwide lockdown for 21 days on 24 March 2020, at 8 p.m., to control the further spread of the virus [6]. The national lockdown put restrictions on the movement of 1.3 billion people. Only medical emergencies were initially permitted. Even after the announcement of the national lockdown, new cases were reported by the city of Mumbai at an alarming rate, more than 40 cases per day, up to a maximum of 3659 cases on a single day (21 August 2020), compared to other regions of Maharashtra [7].

Endodontic infections can be extremely painful, and endodontic emergencies are a common form of dental emergency. In patients who needed endodontic care, there was no assurance that the same would be handled during the lockdown. The Nair Hospital Dental College was one of the few hospitals that provided emergency dental care. During the period of lockdown, emergency treatment was provided in the emergency ward located on the first floor of the dental hospital. Eventually, at the end of the second phase of unlock i.e., on 29 July, the hospital turned into a full-fledged OPD and offered treatment in all the departments.

The aim of the current descriptive analysis was to report the characteristics of patients visiting the department of Conservative Dentistry and Endodontics at Nair Hospital Dental College, Mumbai, with a primary complaint suggestive of endodontic origin. The objective of the analysis was to figure out the pattern of such patients during the four phases of lockdown (25 March 2020 to 31 May 2020) and eight phases of unlock (1 June 2020 till 31 January 2021).

## 2. Materials and Methods

### 2.1. Study Setting

Nair Hospital Dental College, Mumbai is an integrated healthcare organization. Its comprehensive health records store linked information on all aspects of dental care for each patient across all care settings (for example, outpatient, inpatient, and the emergency department). Each patient was assigned a unique medical record number that allowed for the linkage of data across all dental care aspects. Nair Hospital Dental College had a diverse patient population from Mumbai Metropolitan Region (MMR) and other locations.

### 2.2. Study Design and Patients

We performed a retrospective cohort study on people who consecutively visited the emergency department (ED) and were referred to the Department of Conservative Dentistry and Endodontics of Nair Hospital Dental College 15 April–31 May 2020. The patients were divided into lockdown/ED (25 March 2020–31 May 2020) and unlock/Out-Patient Department (OPD) of Conservative and Endodontics (1 June 2020–31 January 2021). We followed up with patients until their second visit.

### 2.3. Data Sources

We obtained information from the Nair Hospital Dental College, Mumbai, database. The database contains data for inpatient and outpatient visits at Nair Hospital Dental College, Mumbai, including demographic characteristics, diagnoses, procedures, medications, and laboratory tests. After the inception of the COVID-19 pandemic, each patient was subjected to a thorough examination of their body temperature, pulse rate, oxygen saturation, and travel history (Figure 1). We excluded patients who showed COVID-19 symptoms. The diagnoses were rendered using the American Board of Endodontics and the American Association of Endodontics consensus guidelines [8]. Diagnoses were extracted from both the inpatient and outpatient records.

Nair Hospital Dental College		
	Date:	
Case Paper No.		
Name:		
Mobile Number:		
Residential Address:		
Temperature:	Sp O2:	Pulse:
Screening Questions		
1) Are you having fever, chills?	Yes / No / Not sure	
2) Are you having a running nose?	Yes / No / Not sure	
3) Are you having sore throat?	Yes / No / Not sure	
4) Are you having cough?	Yes / No / Not sure	
5) Are you having diarrhoea?	Yes / No / Not sure	
6) Are you feeling breathlessness?	Yes / No / Not sure	
7) Are you having body ache, fatigue?	Yes / No / Not sure	
8) Have you travelled recently?	Yes / No / Not sure	
9) Have you travelled to and back?	Yes / No / Not sure	
10) Have you come in contact with anyone who has travelled?	Yes / No / Not sure	
11) Have you come into contact with anyone who had flu like symptoms?	Yes / No / Not sure	
Patient sent for dental OPD		
Patient sent for COVID-19 Screening		
Attending Intern / Doctor	Patient's signature	

**Figure 1.** Patient triage form that was recorded for each patient.

#### 2.4. Ethical Approval

Ethical approval for the execution of the descriptive analysis was obtained based on the Declaration of Helsinki from the Nair Hospital Dental College Institutional Ethics Committee (EC-ND-156/2020, dated: 19 September 2020). Permission for the project was also obtained from the principal and head of the department.

#### 2.5. Statistical Analysis

The data was entered and analyzed using the Statistical Package for Social Sciences (SPSS) for Windows 26.0. (SPSS, Inc. Chicago, IL, USA) Descriptive analysis was done to compare patients between first and second visits and patients during the lockdown and unlock phases.

### 3. Results

The lockdown and unlock duration were divided into four and eight phases, respectively (Table 1). During lockdown, Nair Hospital Dental College had 26 working days, and a total of 297 patients visited the hospital. No patients visited during phase 1 lockdown (25 March to 14 April 2020). However, during the different phases of unlock over 189 working days, 16,195 patients visited the hospital. The patient flow drastically

increased during unlock phases. The percentage of patients visiting during lockdown phase 4 (165 of 297; 55.56%) and unlock phase 8 (5238 of 16,195; 32.35%), was highest compared to other phases (Table 1).

**Table 1.** The number of working days, number, and percentages (%) of the patients visited the dental school for their first and follow-up visit during the different lockdown and unlock phases.

Lockdown Phases	No. of Working Days (26 Days)	First Visit (% of 194)	Follow-Up Visit (% of 103)	Total (% of 297)
Phase 1 25 March to 14 April 2020	0	0	0	0
Phase 2 15 April to 3 May 2020	6	29 (14.94%)	13(12.62%)	42 (14.14%)
Phase 3 4 May to 17 May 2020	9	58 (29.89%)	32(31.06%)	90 (30.30%)
Phase 4 18 to 31 May 2020	11	107 (55.17%)	58(56.32%)	165 (55.56%)
Unlock Phases	No. of Working Days (189 Days)	First Visit (% of 4471)	Follow-Up Visit (% of 11,724)	Total (% of 16,195)
Phase 1 1 June to 30 June 2020	12	125 (2.79%)	103 (0.87%)	228 (1.40%)
Phase 2 1 July to 31 July 2020	25	244 (5.45%)	481(4.10%)	725 (4.47%)
Phase 3 1 August to 31 August 2020	27	507 (11.33%)	708 (6.03%)	1215 (7.50%)
Phase 4 1 September to 30 September 2020	23	673 (15.05%)	686 (5.85%)	1359 (8.39)
Phase 5 1 October to 30 October 2020	26	595 (13.30%)	1003 (8.55%)	1598 (9.86%)
Phase 6 1 November till 30 November 2020	25	503 (11.25%)	1897 (16.18%)	2400 (14.81%)
Phase 7 1 December till 31 December 2020	24	701 (15.67%)	2731 (23.29%)	3432 (21.19%)
Phase 8 1 January till 31 January 2021	27	1123 (25.16%)	4115 (35.13%)	5238 (32.35%)

The frequency of males visiting the dental hospital was much higher than females during the lockdown (256 out of 297 i.e., 86.19%) and unlock phases (10,201 out of 16,195 i.e., 63%). Only 1 patient visited the dental hospital during lockdown aged above 50 years, which can be attributed to the high risk of COVID-19 infection. The highest number of patients who visited during lockdown 4 (243 out of 297) and unlock 8 (9196 out of 16,195) phases belonged to the 31–40-years-old group (Table 2).

**Table 2.** Demographic data with respect to the sex and age of patients that visited the dental school during the different lockdown and unlock phases.

Lockdown	Sex		Age						Total
	Male	Female	13–20	21–30	31–40	41–50	51–60	>60	
Phase 1	0	0	0	0	0	0	0	0	0
Phase 2	35	7	2	2	35	2	1	0	42
Phase 3	76	14	7	9	68	6	0	0	90
Phase 4	145	20	4	17	140	4	0	0	165
Total	256	41	13	28	243	12	1	0	297
Unlock	Sex		Age						Total
	Male	Female	13–20	21–30	31–40	41–50	51–60	>60	
Phase 1	201	27	9	16	193	7	2	1	228
Phase 2	603	122	25	65	570	29	21	15	725
Phase 3	980	235	83	165	798	71	59	39	1215
Phase 4	1031	328	92	183	853	95	85	51	1359
Phase 5	1121	477	113	265	912	131	105	72	1598
Phase 6	1695	705	228	375	1319	221	159	98	2400
Phase 7	1867	1565	353	527	1825	415	187	125	3432
Phase 8	2703	2535	525	753	2726	798	285	151	5238
Total	10,201	5994	1428	2349	9196	1767	903	552	16,195

The mean VNRS for different sex, age and endodontic emergencies is presented in Table 3. Patients in the age group 31–40-years-old and with an endodontic emergency related to reversible pulpitis and symptomatic irreversible pulpitis exhibited significantly higher VNRS ( $p < 0.05$ ).

**Table 3.** The total number of patients with different sex, age, endodontic emergencies, and the mean VNRS for those who visited the dental school during both of the phases.

Variables	<i>p</i> Value	Number (%)	Mean VNRS Score	<i>p</i> Value of VNRS
<b>Sex</b>				
Male #	<0.05	10,457 (63.40%)	6.56 ± 1.47	>0.05
Female		6035 (36.60%)	6.27 ± 1.53	
<b>Age</b>				
13–20	<0.05	1441 (8.73%)	5.01 ± 1.58	<0.05
21–30		2377 (14.41)	5.23 ± 1.49	
31–40		9439 (57.23%)	5.85 ± 1.62 *	
41–50		1779 (10.79%)	5.16 ± 1.34	
51–60		904 (5.48%)	4.79 ± 1.43	
>61		552 (3.36%)	4.54 ± 1.33	
<b>Diagnosis</b>				
Reversible Pulpitis	<0.05	6021 (36.29%)	5.45 ± 1.35 *	<0.05
Symptomatic Irreversible Pulpitis		5467 (32.94%)	5.37 ± 1.46 *	
Symptomatic Apical Periodontitis		1921 (11.56%)	5.11 ± 1.51	
Chronic Apical Abscess		1451 (8.74%)	5.02 ± 1.64	
Acute Apical Abscess		1516 (9.14%)	5.04 ± 1.53	
Complicated Crown Fracture		137 (0.83%)	3.85 ± 0.56	
Dislocation of Tooth		80 (0.50%)	3.01 ± 0.02	

The values marked with (#) exhibited significantly higher number of patients according to sex and those marked with (\*) exhibited significantly higher VNRS ( $p < 0.05$ ) amongst the different age groups and types of endodontic emergency.

A total of 194 and 4471 patients were referred for endodontic care during the lockdown and unlock phases, respectively, for their first visit. Also, 103 and 11,724 patients during the lockdown and unlock phases, respectively, were attending the hospital for a follow-up visit and required continuation of their endodontic treatment. Reversible pulpitis and symptomatic irreversible pulpitis were the most common chief complaints during the lockdown and unlock phases of the first and follow-up visit. The highest number of patients were referred during the lockdown phase 4 (55.17%) and unlock phase 8 (25.16%) for their first visit. Furthermore, 56.32% of the patients were referred during lockdown phase 4, and 35.13% of the patients were referred during unlock phase 8 for the follow-up or second visit (Tables 4 and 5). The patient flow was higher for both lockdown and unlock phases from the Mumbai metropolitan region (MMR) compared to non-MMR region (Table 6).

The lockdown resulted in a low number of trauma (complicated crown fracture and avulsion) cases, which was 12, compared to the number of cases reported during the unlock phases, which was about 205. A total of 1516 patients who had a chief complaint of acute apical abscess were reported during lockdown and unlock phases. Out of these, 424 patients had a temperature of more than 37.2 °C. All of them were found to be safe from COVID-19 infection after proper questionnaire evaluation.

Of the 16,492 patients treated, 49 presented with COVID-19 symptoms during the triage process and were referred for RT-PCR testing, and 11 individuals tested positive. Additionally, of the 41 healthcare workers (HCW) that were posted while rendering treatments during lockdown and unlock, 12 tested positive.

**Table 4.** Number of patients that visited the dental school for their first visit for different endodontic emergencies during lockdown and unlock phases.

Lockdown	Reversible Pulpitis	Symptomatic Irreversible Pulpitis	Symptomatic Apical Periodontitis	Chronic Apical Abscess	Acute Apical Abscess	Complicated Crown Fracture	Avulsion	Total (% of 194)
Phase 1	0	0	0	0	0	0	0	0
Phase 2	18	4	3	2	1	1	0	29 (14.94%)
Phase 3	33	8	7	5	4	1	0	58 (29.89%)
Phase 4	57	15	11	9	11	3	1	107 (55.17%)
Unlock	Reversible Pulpitis	Symptomatic Irreversible Pulpitis	Symptomatic Apical Periodontitis	Chronic Apical Abscess	Acute Apical Abscess	Complicated Crown Fracture	Avulsion	Total (% of 4471)
Phase 1	72	22	4	13	7	6	1	125 (2.79%)
Phase 2	100	66	23	26	24	4	1	244 (5.45%)
Phase 3	190	132	55	59	64	5	2	507(11.33%)
Phase 4	254	179	99	63	71	5	2	673(15.05%)
Phase 5	225	203	45	88	25	5	4	595(13.30%)
Phase 6	169	166	54	52	52	6	4	503(11.25%)
Phase 7	324	212	81	86	84	7	7	701(15.67%)
Phase 8	384	307	145	92	181	7	7	1123(25.16%)

**Table 5.** Number of patients that visited the dental school for their second/follow-up visit for different endodontic emergencies during the lockdown and unlock phases.

Lockdown	Reversible Pulpitis	Symptomatic Irreversible Pulpitis	Symptomatic Apical Periodontitis	Chronic Apical Abscess	Acute Apical Abscess	Complicated Crown Fracture	Avulsion	Total (% of 103)
Phase 1	0	0	0	0	0	0	0	0
Phase 2	6	1	1	2	2	1	0	13 (12.62%)
Phase 3	11	8	4	5	3	1	1	32 (31.06%)
Phase 4	15	16	9	8	7	2	1	58 (56.32%)
Unlock	Reversible Pulpitis	Symptomatic Irreversible Pulpitis	Symptomatic Apical Periodontitis	Chronic Apical Abscess	Acute Apical Abscess	Complicated Crown Fracture	Avulsion	Total (% of 11,724)
Phase 1	30	31	17	12	10	2	1	103 (0.87%)
Phase 2	143	141	65	51	71	5	5	481 (4.10%)
Phase 3	249	245	31	51	124	5	3	708 (6.03%)
Phase 4	225	224	67	69	89	7	5	686 (5.85%)
Phase 5	359	368	61	81	117	12	5	1003 (8.55%)
Phase 6	696	655	227	145	154	11	9	1897(16.18%)
Phase 7	1004	1052	321	196	129	19	10	2731(23.29%)
Phase 8	1457	1412	591	336	286	22	11	4115(35.13%)

**Table 6.** Number of patients that visited the dental school from the Mumbai metropolitan region and non-Mumbai metropolitan region during lockdown and unlock phases.

Lockdown	Mumbai Metropolitan Region	Non-Mumbai Metropolitan Region	Total (% of 297)
Phase 1	0	0	0
Phase 2	37	5	42 (14.14%)
Phase 3	82	8	90 (30.30%)
Phase 4	145	20	165 (55.56%)
Unlock	Mumbai Metropolitan Region	Non-Mumbai Metropolitan Region	Total (% of 16,195)
Phase 1	197	31	228 (1.40%)
Phase 2	556	169	725 (4.47%)
Phase 3	910	305	1215 (7.50%)
Phase 4	1107	525	1359 (8.39%)
Phase 5	960	638	1598 (9.86%)
Phase 6	1302	1098	2400 (14.81%)
Phase 7	2011	1421	3432 (21.19%)
Phase 8	3035	2203	5238 (32.38%)

#### 4. Discussion

SARS-CoV-2, the virus that causes COVID-19, has an average incubation period of 2 to 14 days. Patients that have no symptoms or are in the incubation process are thought to be able to infect others [9]. Despite the fact that COVID-19 active cases were on the rise in Maharashtra and Mumbai at the beginning of March 2020, all dental schools remained open and operational as normal. In the second half of March 2020, India's Prime Minister announced a national shutdown, prompting all to close, including dental colleges, for 21 days. The Municipal Corporation of Greater Mumbai (MCGM)-founded Nair Hospital Dental College (NHDC) in Mumbai was one of the country's only dental schools that offered emergency dental care during the lockdown. The estimated number of patients declined significantly as a result of the limitations imposed during the lockdown. Furthermore, since other dental schools were closed during the lockdown, the number of first-time patients visiting NHDC rose (194 first visits and 103 second visits out of 297 patients).

During the lockdown periods, the total number of patients visiting the emergency ward for endodontic care was 297 over 26 working days, while the total number of patients visiting the Department of Endodontics was 16,195 over 189 working days. A substantial number of patients visited the dental school during the lockdown, and this number gradually increased as the unlocking process progressed. The importance of patient screening (Figure 1) during these processes was emphasized, and it is still necessary today. This was done by a COVID-19 disease-specific questionnaire, which possessed all the basic information on the patients' demographics (if the patient was from a hotspot or no), history of travel, contact with any COVID-19-positive patient, and any symptoms of COVID-19, like fever, chills, cough, and cold.

None of the patients were reported with any symptoms of COVID-19 as evaluated by the specific questionnaire during the lockdown. However, 49 patients during the unlock phase were reported to have symptoms and were referred to Topiwala National Medical College, Mumbai (TNMC) for reverse transcription polymerase chain reaction (RT-PCR) test. Out of these 49 patients, 38 returned to the department and presented a negative report of COVID-19 infection. The other 11 patients failed to report to the department. On telephonic communication, they were reported to be positive with COVID-19 infection and were admitted to COVID care centers (CCC) close to their residence. These patients resided in various hotspots (enlisted by MCGM) of the city namely, three from Dharavi, four from Worli, one from Borivali, and one from Mulund. Only two patients that were tested positive were not from the hotspots or containment zones. As a result, the disease-specific questionnaire proved to be a valuable tool for patient screening and preventing the spread of COVID-19 infection among healthcare staff (HCW) serving NHDC.

No patients had confirmed or suspected asymptomatic COVID-19 infection or were experiencing COVID-19 symptoms. A greater number of male patients were reported during the lockdown (256 out of 297 patients) and until phase 5 of unlock (1121 out of 1598 patients). It eventually changed to an almost similar number of males and females in the Phase 7 of unlock. This could be due to the relaxation and permission to use the public transport at a speculated given time. The visitors to the dental school ranged in age from 13 to >60 years. Patients in the oldest age groups (51 to 60 years = 904 out of 16,492 patients and >60 years = 552 out of 16,492 patients) had the lowest rate of coming in for treatment during the lockdown and unlock phases. This may be due to the younger family members and their own knowledge of the existence of comorbidities and the associated weaker COVID-19 prognosis [10,11].

Fever was recorded in a total of 28% patients (424 out of 1516 patients of lockdown and unlock period) with acute apical abscess who had a body temperature of more than 37.2 °C. They were found to be safe of COVID-19 infection after the questionnaire evaluation, and thus, their fever was identified as one of the systemic manifestations of acute apical abscess [12]. A highly recommended Q COVID-19 Ag test was performed on these patients [13], which showed up negative. As a consequence, a fever alone should not be the only sign or symptom of COVID-19 to be considered. COVID-19 is currently diagnosed us-



ing a combination of epidemiologic data, clinical symptoms, chest computed tomographic imaging results, and laboratory tests, including RT-PCR respiratory tract specimens.

The following measures were taken in the lockdown phase, when cases of COVID-19 were rising at alarming numbers. The most common endodontic emergency reported during the lockdown and unlock was reversible pulpitis, followed by symptomatic irreversible pulpitis, symptomatic apical periodontitis, acute apical abscess, chronic apical abscess, complicated crown fracture, and avulsion. The rendering of treatment to these endodontic emergencies is highly risky due to the fact that these treatments are high-aerosol generating. Reducing treatment time and exposure control are two ways the risk of infection for endodontic treatment could be reduced. In cases with vital pulps, pulpotomy was considered a treatment option, as it is shown to reduce pain considerably, providing comfort to the patient [14]. Another option that was considered was partial pulpotomy using mineral trioxide aggregate (MTA) for cases with irreversible pulpitis [15]. This option has shown promising results in permanent teeth with multiple years of follow-up. For patients requiring root-canal treatments, the use of single file systems was preferred as it substantially reduced the working time and prevented the risk from reesterilization. As the treatment was provided by experienced endodontists (minimum 6 years), exposing an IOPA radiograph was avoided. The IOPA radiograph (placing of sensor/films) can stimulate saliva secretion, coughing, nausea, and vomiting and causes exposure to patients' oral cavity [16]. The favorable drugs of choice that were prescribed for patients with severe dental pain for treating acute pulpitis were acetaminophen (1000 mg every 6–8 h), ketorolac tromethamine (10 mg every 6 h), or piroxicam (20 mg every 12 h) [17]. Additionally, in patients experiencing pain suffering from symptomatic irreversible pulpitis, oral dexamethasone (4 mg) was prescribed to reduce the pain considerably [18]. Due to the conflicting research on ibuprofen usage during COVID-19, it was not prescribed to the patients [19]. As the treatment procedures generated droplets and aerosols, the mandatory use of a rubber dam was practiced, as it has been shown to reduce these issues by about 70% around a 3 feet diameter operating area [20].

Treatment was provided taking into consideration the guidelines of Center for Disease Prevention and Control (CDC) by keeping no patients in the waiting area of the department. Socially distant office chairs were placed in the parking lot, and the patient was allowed to come to the department floor only when his appointment time was reached. Care was also taken to avoid any overlap of appointments for each operator in the department. The treatment was provided to the patients on alternate dental chairs, ensuring a distance of more than the recommended 2 m (6 feet) in each direction [21]. Additionally, as recommended by WHO, 5% sodium hypochlorite, in a 1:100 dilution, was applied on surfaces after the dental procedure for 10 min [22].

There was also a significant reduction in physical accidents. The reduction of outdoor activities during the lockdown may have consequently resulted in a decrease in trauma occurrences. During the four phases of lockdown, only 12 patients (first visit: five complicated crown fractures and one avulsion; second visit: four complicated crown fractures and two avulsions) presented traumatic injuries. During the different phases of unlock, the traumatic injury cases increased to 45 complicated crown fractures and 28 avulsions (first visit), and 83 complicated crown fractures and 49 avulsions (second visit). The reduced number of traumatic injuries during COVID-19 could be due to the restrictions for travel and the limited availability of public transport to only healthcare and essential workers.

During the unlock phases, the number of patients reporting to the dental hospital increased as the cases of COVID-19 fell and there was a relaxation of the travel requirements. Treatments to these patients were provided with all the measures, from the triage screening to the wearing of PPE and restricting the time of exposure of the endodontists, post-graduate students, nursing staff, and auxiliary staff to the patients' oral cavity.

A total of 41 HCWs, which included teaching staff, post-graduate students, interns, under-graduate students, nursing staff, servants, and clerks in the Department of Conservative Dentistry and Endodontics, were taking appropriate safety precautions when handling

patients directly or indirectly. At all times, they wore N95 masks, gloves, caps, shoe covers, face shields, and personal protective gowns. Direct transmission (via cough, sneeze, or droplet inhalation), touch transmission (via the oronasalocular route), and aerosol transmission are the three most common modes of transmission for COVID-19 [23]. Furthermore, due to the high risk of aerosol production during dental treatment, the operatories were properly ventilated and fitted with HEPA filter air purifiers, which has been shown to minimize dental healthcare worker exposure to aerosols by 80–95% [17,24]. Since the lockdown, 12 HCWs have tested positive for COVID-19 infection, including three teaching faculty, three post-graduate students, one intern, three undergraduate students, and two servants. The safety precautions and screening measures introduced since the announcement of lockdown (March 25, 2020) have proven to be successful in protecting HCWs, with just a few cases of positive COVID-19 infections while providing care.

#### 4.1. Strength

For the first time in scientific literature, this study has presented such an important issue. Endodontic situations account for a considerably large proportion of dental emergencies, even during the COVID-19 pandemic. During the COVID-19 outbreak, the mandatory use of rubber dams, personal protective equipment, and patient screening all play an essential role in keeping healthcare workers safe from contracting the infection.

#### 4.2. Limitations

The current analysis was limited to a single department of an institute, which consisted of only endodontic care. During the COVID-19 outbreak, patients' psychological well-being should also be assessed.

#### 4.3. Challenges

The current study had various challenges: communicating to the patients who reported with COVID-19 symptoms, reduced contact time with patients, and most importantly, fear of contracting the infection.

### 5. Conclusions

In the current descriptive analysis, a total of 16,492 (297—lockdown and 16,195—unlock) patients reported to the dental hospital for various endodontic treatments. The average age group of the patients was between 31 and 40 years. The majority of endodontic emergency diagnoses for the patients reported were reversible pulpitis and symptomatic irreversible pulpitis. While rendering treatment to a total of 16,492 patients during, 49 patients reported with COVID-19 symptoms at the primary screening triage, of which 11 tested positive. A total of 12 of the 41 dental, nursing, and auxiliary staff tested positive during the evaluated duration. The low number of infected HCWs was due to the treatments that were performed sticking to the ideal guidelines of practicing dentistry during COVID-19. The recent COVID-19 pandemic challenges the existing clinical procedures. Our prime focus as dental healthcare professionals is to assist our patients in their time of need. Reducing the treatment time and exposure control are two ways to significantly reduce the risk of COVID-19 spreading during endodontic treatment.

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