



# Journal of Dental Research

**Volume 2**  
**Issue 2**  
**(Supplement 1)**  
**July – December 2020**

## MAKE A DIFFERENCE DURING THE COVID-19 PANDEMIC



Wash Your Hands



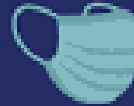
Wear a Mask and Avoid Crowds



Maintain distance

Save PPE for Those on the Front Lines

The general public should wear cloth face coverings



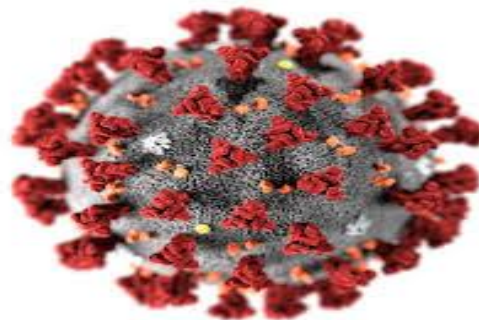
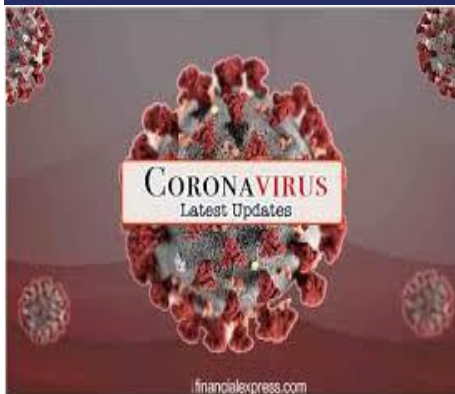
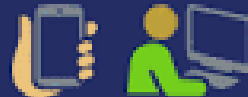
Follow Food Safety Guidelines



Donate Blood and Plasma



Report Fraudulent COVID-19 Tests, Vaccines and Treatments



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# From the Desk of Editor-in-Chief

With immense pleasure I would like to announce that we are publishing the Volume 2 Issue 2 Supplement 1 of MIDSAR Journal of Dental Research after the successful publication of complete volume one. *“Everything is possible when you have right people to support”* I would like to extend my heartfelt thanks to the authors and our management for their constant faith in me and their utter support in this hard time of corona pandemic.

The Volume 2 Issue 2 (Supplement 1) has been created with the great efforts of providing the quality manuscripts rather than the quantity, the volume contains knowledge, anxiety, infection control, attitude and practice during the recent pandemic of Covid 19. This supplement also provides management of patients and precautions to be undertaken during Covid 19 pandemic while dealing with patients in various departments. Also it enlightens the clinical presentations of mucormycosis and other oral mucosal lesions associated with Covid 19. It also highlights about the awareness of proper use of masks and gowns during clinical practice.

I dedicate this issue to all the faculty members of MIDSAR Dental College, Latur who immediately responded to the call for manuscripts and submitted their valuable work to the Journal.

**Dr. Suresh S. Kamble**  
**Principal,**  
**MIDSAR Dental College, Latur**

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# A QUESTIONNAIRE SURVEY BASED COVID-19 APPRAISAL STUDY

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## **Abstract:**

### **Objective:**

To seek and analyze knowledge and information known to MDS students about masks and medical gowns they wear while attending or treating patients in Covid-19 pandemic.

### **Method:**

This study evaluated post graduate students of MIDSR Dental College Latur based on structured printed questionnaire. The questionnaire was designed with closed-ended (dichotomous and multiple choice questions) and open-ended questions. The target sample size was 45 (total PG's students), amongst 44 participated in the survey. It was conducted from 18<sup>th</sup> September, 2020 to 25<sup>th</sup> September, 2020. To make it unbiased personal identification was made optional. The data was analyzed based on clear and readable answers.

### **Results:**

Total 44 students actively participated in the study. Among them 40.91 % were male and 59.08% were female. The age of participates was from (average age) 24 to 35 years. According to statistical analysis 93% of students were using N95 type respiratory masks. 44 respondent use reusable/autoclavable types of medical gowns. Respiratory valve type mask is used by 37 participants and 67% responded to option "no" to framed question whether respiratory valve type mask is better than respiratory non-valve type mask. 44% participants dispose their reusable masks after 4-5 days of use.

### **Conclusion:**

MIDSR dental college MDS students have basic knowledge about masks and medical gowns. For more advanced and indepth knowledge about PPE,s further education and comprehension is required.

**Keywords:** SARS COV-2; Covid-19; questionnaire survey; Clinical practices; Personnel protective equipment; Dental hospital; Maharashtra, India.

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## INTRODUCTION:

A deadly virus evolved in December-2019. This virus expanded globally from Wuhan, China and was reported to cause the severe acute respiratory syndrome. It was declared a pandemic on March 11, 2020, by the World Health Organization (WHO).<sup>[1]</sup> The International Committee of Taxonomy of Viruses (ICTV) gave the name SARS-COV-2, Severe Acute Respiratory Syndrome (SARS-2), as it significantly affects the Upper respiratory tract. Presentation of COVID-19 and the disease course is unpredictable and ranges from asymptomatic to mild respiratory infections to pneumonia and even acute respiratory distress syndrome (ARDS),<sup>[2]</sup> including severe morbidity and mortality. The symptoms may include fever, sore throat, dry cough, muscle pain, excessive fatigue, reduction or loss of smell or taste. Other diagnosed cases may present flu-like symptoms (runny nose)<sup>[3-5]</sup> or stomach upset (nausea or diarrhea), and severe symptoms include respiratory distress and pneumonia.<sup>[6-8]</sup> The SARS-CoV-2 has a size of between 60 and 160 nm, which is very similar to the size of influenza viruses (80-100 nm). Therefore, one exhaled breath aerosol particle (between 0.1 and 0.5 micrometer) could contain at least one virus.<sup>[9]</sup>

Covid -19 virus is transmitted in direct or indirect ways. The direct spread is through direct contact with an infectious person and indirectly through aerosol, droplets (coughing, sneezing), contact with contaminated surfaces, or the mucosal surface of the face such as oral cavity, nose, and eyes with infected hands.

The virus is transmitted through aerosol or by touching contaminated hands to any part of the face; one should cover and protect these surfaces to prevent exposure and also to prevent the spread. In the covid crisis, different types of masks became available to protect one from direct exposure. WHO has also given various guidelines regarding different types of masks, how to wear the Mask, disposal methods, etc.

The water spray in and around dental practitioners produce aerosols. Dentists daily deal with aerosols in the form of ultrasonic splatter, air-rotor splatter during its use, and they are also at a high risk of

contagion due to the exposure to saliva, blood, and aerosol/ droplet production during the majority of dental procedures. These instruments create a visible spray containing droplets of water, saliva, blood, microorganisms, and other debris.<sup>[10]</sup> Aerosol particles can remain suspended in the clinical environment for up to 30 minutes after the end of an operative procedure.<sup>[11]</sup>

The dentist should take specific precautionary measures about the aerosol procedures and to prevent and control the spread of infection. So to prevent the exposure and spread of the covid-19 virus, dentists must use masks and medical gowns, and other personal protective equipment (PPE). There are different varieties of masks and medical gowns available in markets, such as three-ply masks, two-ply masks, N-95 masks, cloth masks, homemade masks, etc. The gowns are also available in several varieties depending upon coverage and weaving materials. This study was done to evaluate the types of masks and medical gowns used among MDS students.

## METHODS:

During the academic year of 2020-2021, this survey was conducted at MIDSR DENTAL COLLEGE, research, and teaching institute at Latur. The survey was a cross-sectional type of survey. The method used to collect each participant's responses was based on structured printed questionnaire. The target population was MDS students from the same college. Out of 45 enrolled PG students, 44 students submitted their responses. The questionnaire was formulated simple and clear to get an appropriate response and also to reduce bias. The local ethical board approved this study of the institution. Before conducting the survey, each student's oral consent was taken and made them understand the importance of this survey.

This survey included specific Inclusion and Exclusion criteria.

### Inclusion criteria:

- 1] MDS students of First, Second and Third year.
- 2] No age limits.
- 3] Male and female MDS students.

**Exclusion criteria:**

- 1] Participants refusing to give consent for the study.
- 2] Pass out students from the same college.
- 3] Paramedical staff
- 4] Covid positive students

The survey was conducted from September 18, 2020, to September 25, 2020. It was conducted in six different departments, and the format was circulated to each MDS student personally in printed form.

The questionnaire format has been divided into five sections and gave each section a separate title. Titles for sections were formatted, keeping the expected understanding of the subject by the students. Most of the questions were close-ended, but very few were open-ended.

**Questions in each section were as follows:****Section A: Basic Information**

Name of the PG student: (Optional):-

Age:-

Sex:-

Department (Optional):-

Pedo./Ortho./Endo./Prosth./OS./Pedo.

In which Year of MDS are you? - First/Second/Third

**Section B: Information regarding MASKS****1] What type of Mask are you using for patient management in your department?**

- (I) Medical Mask (3 ply)
- (II) Respiratory Mask (e.g., N-95)
- (III) Non-Medical Mask (cloth mask)
- (IV) All of the Above
- (V) Any other.....

**2] If you are using Respiratory Mask, Which type of Respiratory Mask are you using?**

- (I) N95
- (II) KN95
- (III) FF2
- (IV) FF3
- (V) Others.....

**3] Does your Respiratory Mask have a valve?**

- (I) Yes
- (II) No

**4] Do you reuse your Mask?**

- (I) Yes
- (II) No

**5] If you are reusing your Mask, which type of Mask you are reusing?**

- (I) Medical Mask (3 ply)
- (II) Respiratory Mask (e.g., N-95)
- (III) Non-Medical Mask (cloth mask)
- (IV) All of the Above
- (V) Any other.....

**6] How many days after you reuse the Mask?**

- (I) I don't reuse any of the masks
- (II) The next day
- (III) After 2-3 days
- (IV) After 4-5 days
- (V) After more than five days

**7] If you reuse your Mask, after how many reuse cycles you dispose of it off?**

- (I) I don't reuse any of the masks
- (II) After 2-3 times of reuse
- (III) After 4-5 times of reuse
- (IV) Dispose off only after visible soiling or tearing of the Mask

**8] How many Masks you use while treating patients? (One Mask over the other Mask)**

- (I) I use only a single Mask
- (II) I use two similar masks over one another
- (III) I use two different masks over one another
- (IV) I use more than two masks

**9] For how many hours can you comfortably wear a respirator Mask continuously in your department?**

- (I) Less than 1 hour
- (II) More than 1 hour but less than 2 hours
- (III) More than 2 hours but less than 3 hours
- (IV) More than 3 hours but less than 4 hours
- (V) More than 4 hours



### Section C: Information about MEDICAL GOWNS and PPE kits

#### 1] What type of Medical Gown do you wear?

- (I) Disposable
- (II) Reusable/ Autoclavable
- (III) I don't use gowns

#### 2] If your Medical Gown is reusable, what is its making material?

- (I) 100% Cotton
- (II) 100% polyester
- (III) Polyester + Cotton
- (IV) No idea

#### 3] What type of Cuff does your Medical Gown have?

- (I) Elastic Cuff
- (II) Knit cuff
- (III) Thumb Cuff
- (IV) None of the above

#### 4] What type of Neck Closure your Medical gowns have?

- (I) Tape Tab Neck
- (II) Hook & Loop
- (III) Both
- (IV) Other than above .....
- (V) No idea

#### 5] How many hours you can comfortably wear your Medical gown?

- (I) Less than 1-hour
- (II) More than 1 hour but less than 2 hours
- (III) More than 2 hours but less than 3 hours
- (IV) More than 3 hours but less than 4 hours
- (V) More than 4 hours

### Section D: IDEAL REQUIREMENTS OF A MASK

#### 1] Does your Mask cover your Nose to chin area?

- (I) It does cover my Nose only
- (II) It does cover my Nose and chin
- (III) It doesn't fit my Nose
- (IV) It doesn't fit my chin
- (V) It neither covers my Nose nor my chin

#### 2] Does your Mask's Nose Bridge properly fit your Nose?

- (I) Yes
- (II) No
- (III) Don't know

#### 3] What types of elastic cords/ tie bands does your Mask have?

- (I) The secure Ears loop behind the ears
- (II) Head and neck loops Mask
- (III) Tie back Mask
- (IV) Other than above

#### 4] If you are using Earloop Mask, does it lead to discomfort to your ears?

- (I) Always
- (II) Sometimes
- (III) Never

#### 5] Which Mask is ideal for you for patient management (non-aerosol procedures)?

- (I) Cloth mask
- (II) Two-ply surgical mask
- (III) Three ply surgical mask
- (IV) Respirators (e.g., N95)
- (V) No idea

#### 6] Which Mask is ideal for you for patient management (aerosol procedures)?

- (I) Cloth mask
- (II) Two-ply surgical mask
- (III) Three ply surgical mask
- (IV) Respirators (e.g., N95)
- (V) No idea

#### 7] Do you think a Respiratory Valve type Masks is better than Respiratory Non-valve type Masks?

- (I) Yes
- (II) No
- (III) I never used respiratory valve type Masks

#### 8] If you are using Respiratory Valve type Masks, in what way is it better?

- (I) It allows me to breathe
- (II) It will cause me less exertion than respiratory Non-valve type masks

- (III) It will provide me more comfort than Respiratory Non-valve type masks
- (IV) Other than the above options
- (V) All of the above options

**9] Do you check the quality of Mask before you buy them?**

- (I) Yes
- (II) No

**10] How do you check the quality of Masks?**

- (I) Fit test
- (II) Any holes in the Mask
- (III) Any dirt on Mask
- (IV) All of the above
- (V) None of the above

**Section E: IDEAL REQUIREMENTS OF MEDICAL GOWNS**

**1] How much length do your Medical Gowns cover your body?**

- (I) Up to the knee
- (II) Just below the knee
- (III) Till toe (having foot cover)

**2] Does your Medical Gowns cover your body completely?**

- (I) Yes
- (II) No
- (III) Never observed

**3] What types of Sleeves your Medical Gowns should have?**

- (I) Long sleeves
- (II) Short sleeves
- (III) Sleeveless

Enough confidentiality was maintained regarding personal information, and even if someone mentioned their names and departments, the data was kept secret and inaccessible to people other than the investigators.

The data was then collated, tabled, and subjected to simple statistical tests.

**RESULTS:**

Demographic data is represented in Table No 1. Total 44 students responded; amongst them, female students were 26 (59.09%), and male students were 18 (40.91%) followed the next. The majority of students were from 1st year 17 (38.64%) followed by 2nd 12 (27.27%) and 3rd 15 (34.09%).

According to section B questions, 93% of students use a respiratory type of masks as shown in Graph No 1; among the respiratory type of masks, 91% are using N95 Mask while 37 respondent use respiratory masks having valve according to Graph No 2 and 3. 39 students reuse there N95 type of respiratory masks according to graphic report soon in Graph No 4. According to statistical report as in Graph No 6, 39% reuse their Mask after 4-5 days, and 23% reuse their Mask after 2-3 days, and 44% dispose it off after 4-5 times of reuse, and 42% of them dispose it off after 2-3 times of reuse as in Graph No 7. Based on the study by the graphical method, as shown in Graph 8, while treating patients, 57% use two different types of masks one over another. 32% can wear masks for more than 2hrs but less than 3hrs based on the report of Graph No 9.

Based on the graphical report of Section C, regarding the information about medical gowns and PPE kits, 44 respondents use reusable/autoclavable type of medical gowns by analysis in Graph No 10. 61% of students use polyester+cotton material of medical gowns, as shown in Graph No 11. 73% and 46% have elastic type cuff and tape tab neck type of medical gowns according to Graph No 12 & 13. Statistical Graph No 14 shows that 34% and 25% can wear their gowns for more than 2 hrs and more than 1hours respectively.

According to section D and Graph No 15, 98% of student's mask cover their nose and chin, and 42 student's mask nose bridge properly fit their Nose as shown in Graph No 16. 48% of students use head and neck type masks, as reported in Graph No 17. The use of ear loop mask cause discomfort to ears to among 24 respondents according to graph no 18. For patient management during aerosol and non-aerosol procedures 55% respondent based on graph no 19 and 86% respondent based on graph no 20 use a respiratory type of mask. 67% of respondents think that respiratory valve type mask is not better than

respiratory non-valve type mask. Regarding the respiratory valve type masks, 41% have not selected any options, as shown in Graph No 22. According to Graph No 23 and Graph No 24, 43 students check the masks' quality, and 86% check all the mentioned quality, that is, the fit test, any holes in the Mask, and any dirt on Mask.

This survey has benefited all the students. On the students' feeding, the survey helped them gain information about various types of masks and gowns to be used in covid-19 pandemic, the reuse practice and made them curious to know about valves in Mask. It also helped them in selecting the masks and surgical gowns' quality.

#### DISCUSSIONS:

Students, especially those with limited clinical experience, should be very careful about infectious diseases to protect themselves and their patients, and the employees.<sup>[12]</sup> The survey is set out to access the knowledge regarding the various types of masks and medical gowns. During the mid-phase of covid-19, students were more focused on masks and gowns to be used. The demands for facemasks and medical gowns were high during the same phase.<sup>[13]</sup> A reported study says that most of the students use N95 masks. N95 is near the ideal mask for health care workers and dentists, as it achieves a very close facial fit and very efficient filtration of airborne particles. The edges of the respirator are designed to form a seal around the nose and mouth. A surgical mask is a loose-fitting, disposable device that creates a physical barrier between the mouth and nose of the wearer and potential contaminants in the immediate environment. Note that the surgical mask edges are not designed to form a seal around the nose and mouth.<sup>[14]</sup> To increase the self-life of N95 masks, it can be covered by surgical masks, and it can be discarded after use. N95 may not provide full protection. Based on a study report, 37 students use respiratory valve type masks, and 41% have not responded about the betterment of respiratory masks this might mean that students know the disadvantage of respiratory valve type mask, but they still use them. Respiratory valve type masks are beneficial as it makes breathing more efficiently and reduces heat build-up. Note that a

respiratory valve type mask should not be used where the sterile condition is needed. If your respirator is damaged or soiled or breathing becomes difficult, you should remove the respirator, discard it properly, and replace it with a new one. To safely discard your N95 respirator, place it in a plastic bag, and put it in the trash.

According to CDC guidelines, N95 can be reused five times, rotate their use each day, allowing them to dry for long enough so that the virus is no longer viable (> 72 hours) Because coronavirus lose their viability significantly after 72 hours.<sup>[15]</sup> 48% of students use head and neck loop masks as ear loop type of masks results in discomfort and pain over ears. Masks can be worn for more than 2hrs, but less than 3 hrs by 32% response given by students, and medical gowns can be worn for more than 1 hr but less than 2hrs by 34% response of students. Medical gowns are personal protective garments that act as a barrier between patients and clinicians to protect them from microorganisms, body fluids, and other particulate matters. It should cover the body from shoulder to knee and arm from wrist to above elbow.<sup>[16]</sup> All the students use a reusable type of medical gowns and which is better than disposable gowns as disposable gowns release more toxins compounds such as dioxins and mercury into the environment during the disposable process and reusable gowns are not perfect but are better in terms of the environment.<sup>[17]</sup>

#### CONCLUSION:

MIDSr dental college students have basic knowledge about masks and medical gowns. Majority of students knows the disadvantage of masks still 37 students they use respiratory valve type mask. For more advanced and in-depth knowledge about PPE,s further education and comprehension is required.

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Graph No 23: Do you check the quality of Mask before you buy them?

Graph No 24: How do you check the quality of Masks?

Graph No 25: How much length does your Medical Gowns cover your body?

Graph No 26: Does your Medical Gowns cover your body completely?

Graph No 27: What types of Sleeves your Medical Gowns should have?

**Table No. 1**

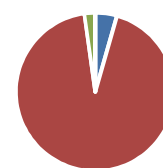
Profile		Number	Percentage
Gender	Male	18	40.91%
	Female	26	59.09%
Year of MDS	1 <sup>st</sup> years	17	38.6%
	2 <sup>nd</sup> years	12	27.7%
	3 <sup>rd</sup> years	15	34.09%

**Graph No. 1:** What type of mask you are using for patient management in your department?

1) What type of mask you are using for patient management in your department

(I) Medical Mask (3 ply)  
5%

(II) Respiratory Mask (e.g. N95)  
93%



(III) Non Medical Mask (cloth mask)  
2%

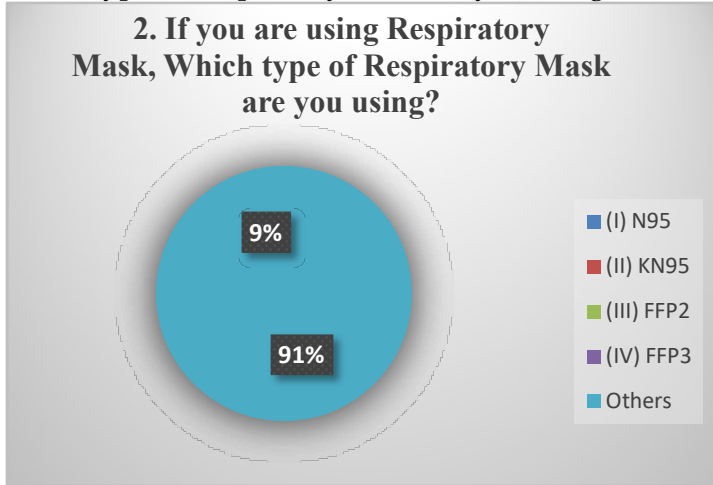
(IV) All of the Above  
0%

(V) Any other  
0%

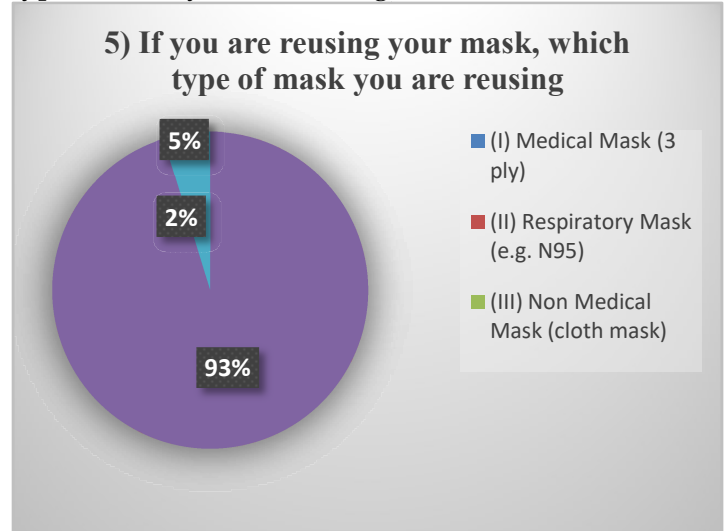
- (I) Medical Mask (3 ply)
- (II) Respiratory Mask (e.g. N95)
- (III) Non Medical Mask (cloth mask)
- (IV) All of the Above
- (V) Any other



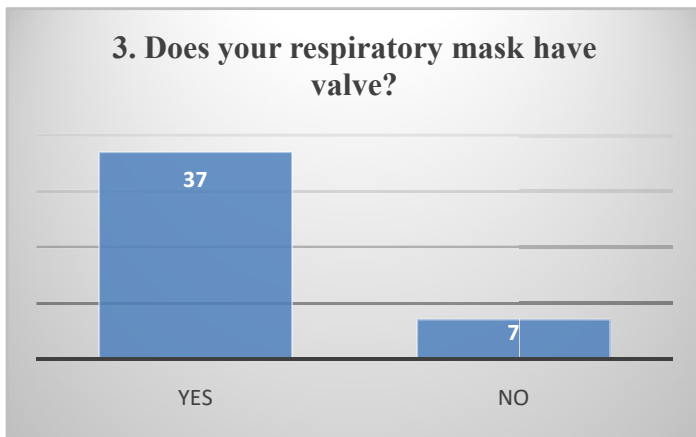
**Graph No 2:** If you are using Respiratory mask, which type of Respiratory mask are you using?



**Graph No 5:** If you are reusing your mask, which type of mask you are reusing?



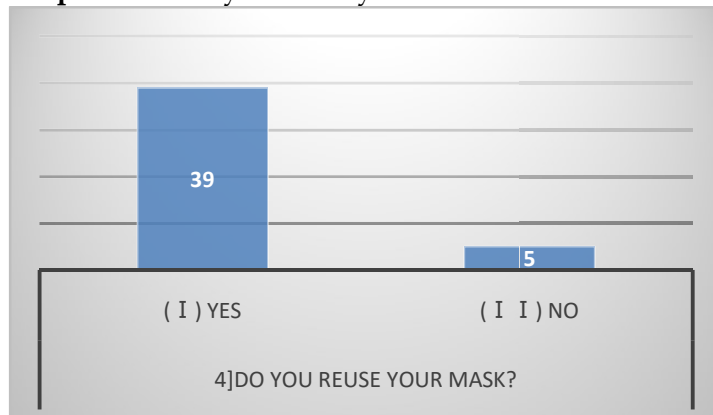
**Graph No 3:** Does your Respiratory mask have valve?



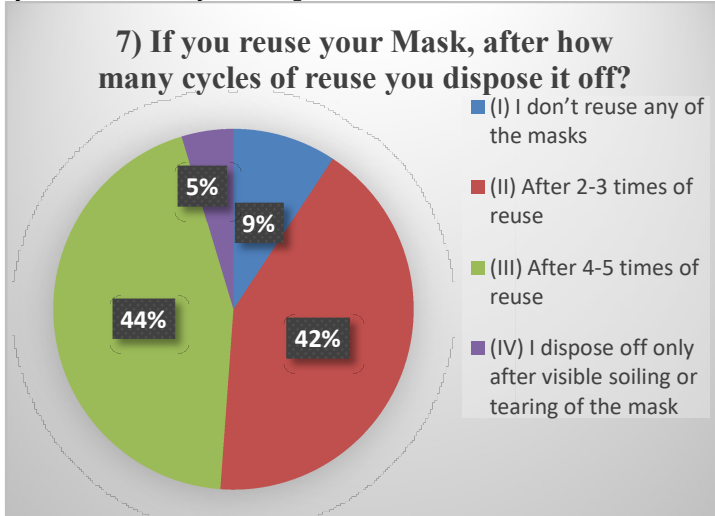
**Graph No 6:** How many days after you reuse the mask?



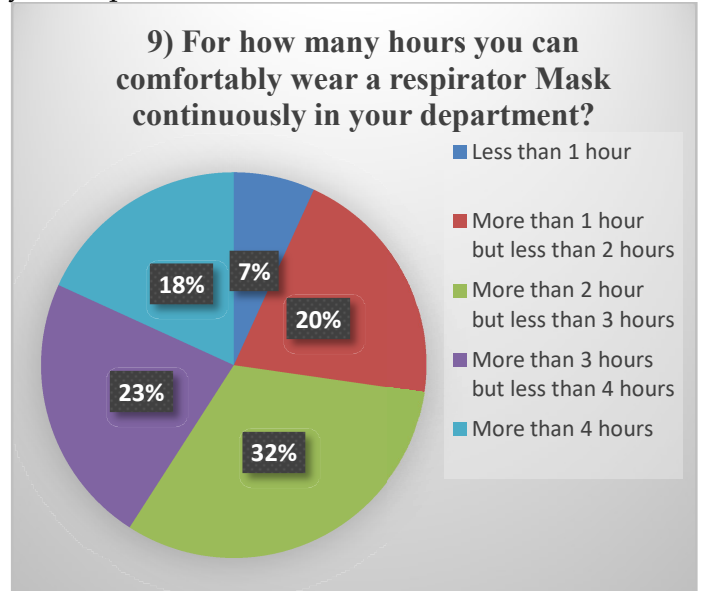
**Graph No 4:** Do you reuse your mask?



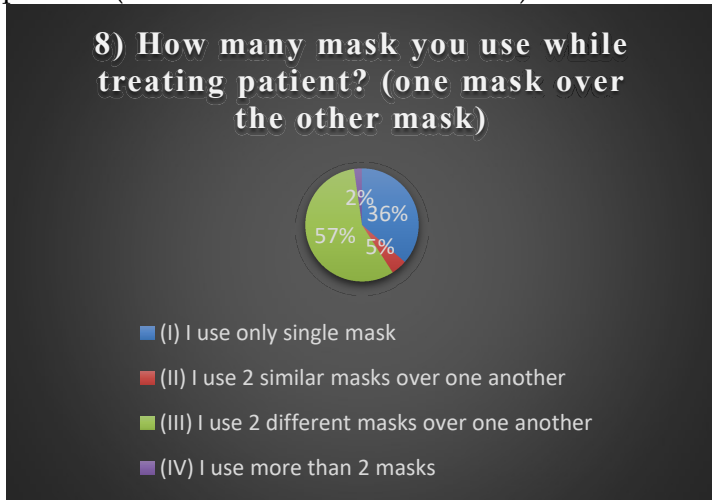
**Graph No 7:** If you reuse your mask, after how many cycles of reuse you dispose it off?



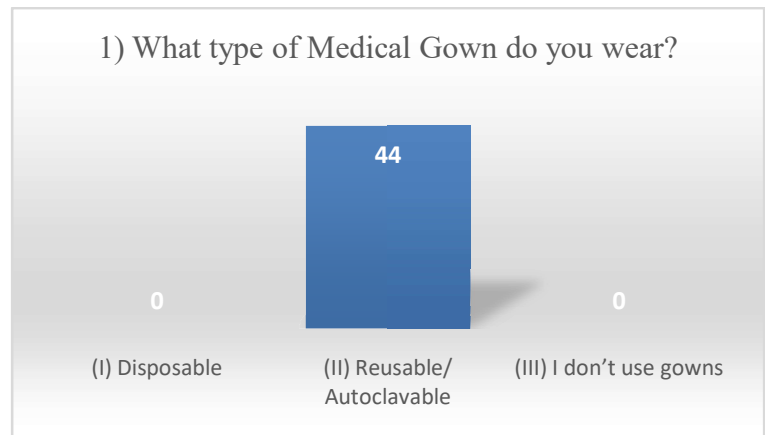
**Graph No 9:** For how many hours you can comfortably wear a respirator mask continuously in your department?



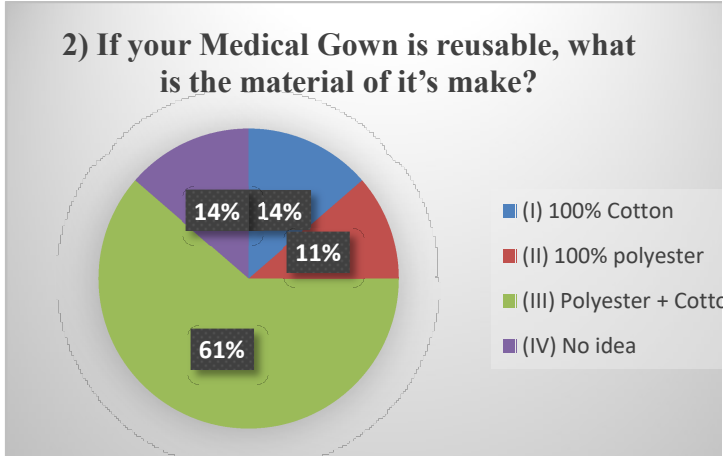
**Graph No 8:** How many mask you use while treating patient? (One mask over the other mask)?



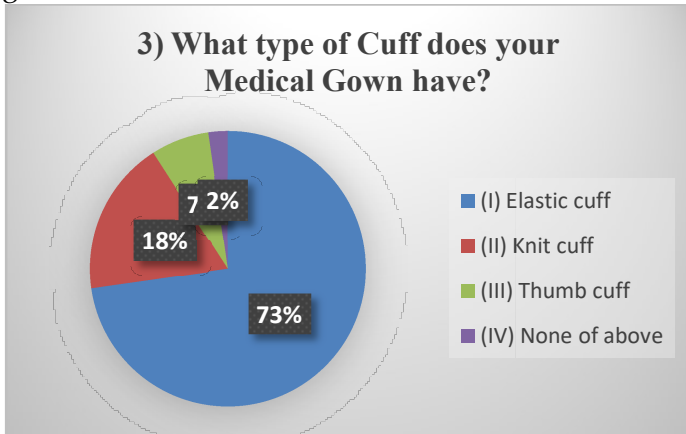
**Graph No 10:** What type of medical gown do you wear?



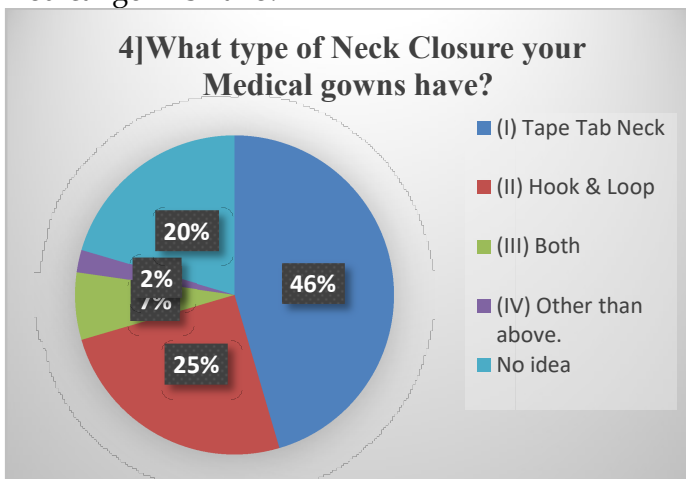
**Graph No 11:** If your medical gown is reusable, what is the material of it's make?



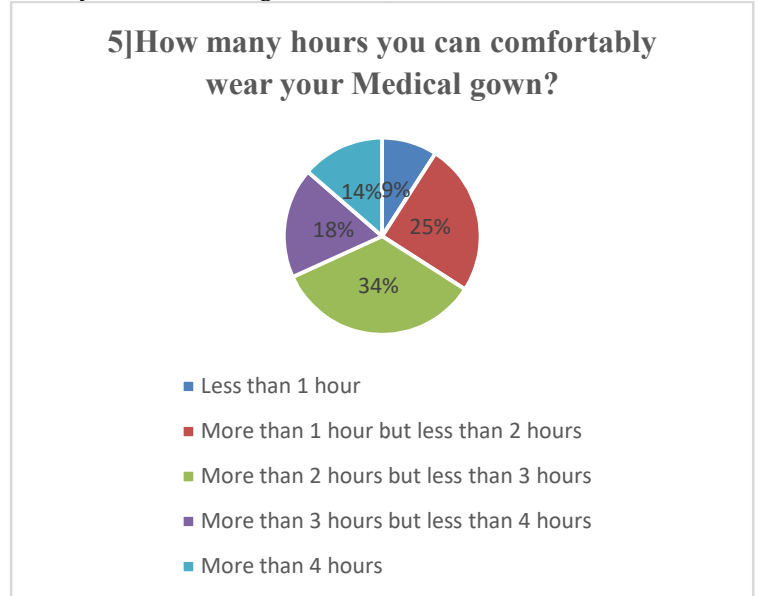
**Graph 12:** What type of Cuff does your medical gown have?



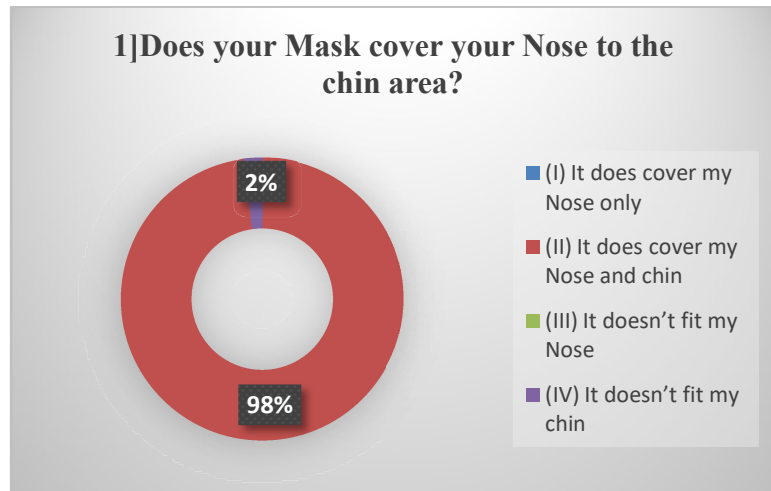
**Graph No 13:** What type of Neck Closure your medical gowns have?



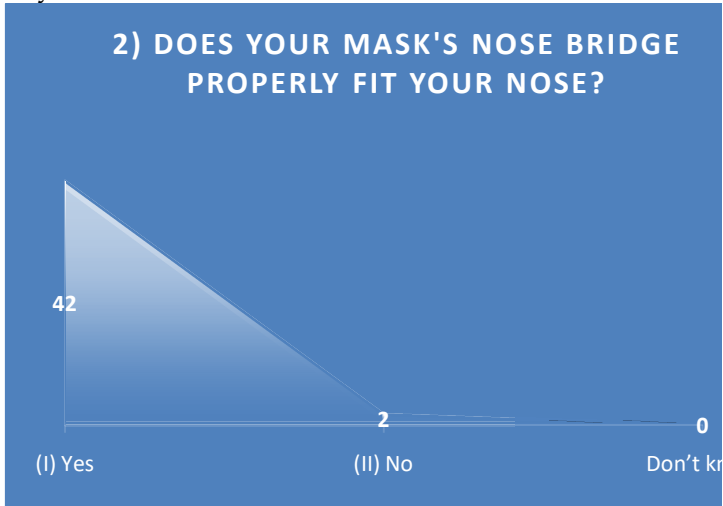
**Graph No 14:** How many hours you can comfortably wear your medical gowns?



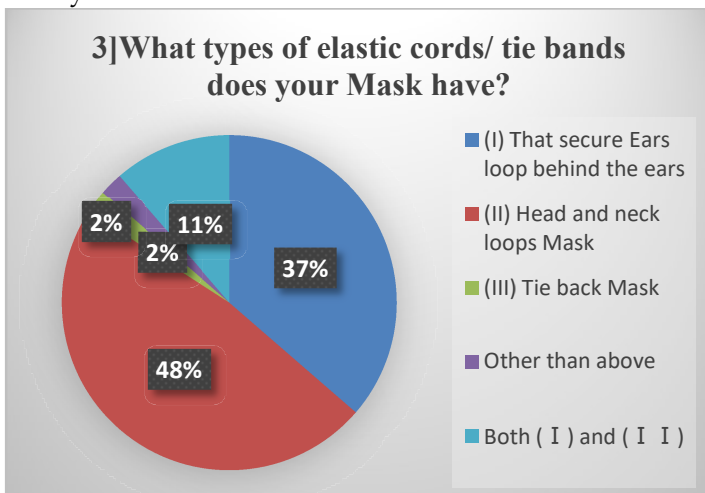
**Graph No 15:** Does your mask cover your nose to chin area?



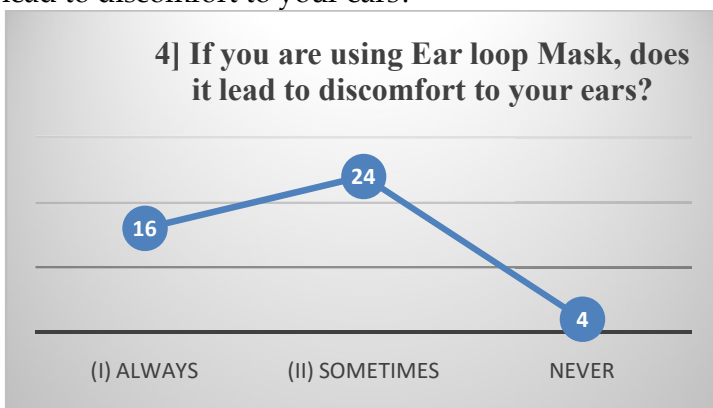
**Graph No 16:** Does your masks nose bridge properly fit your nose?



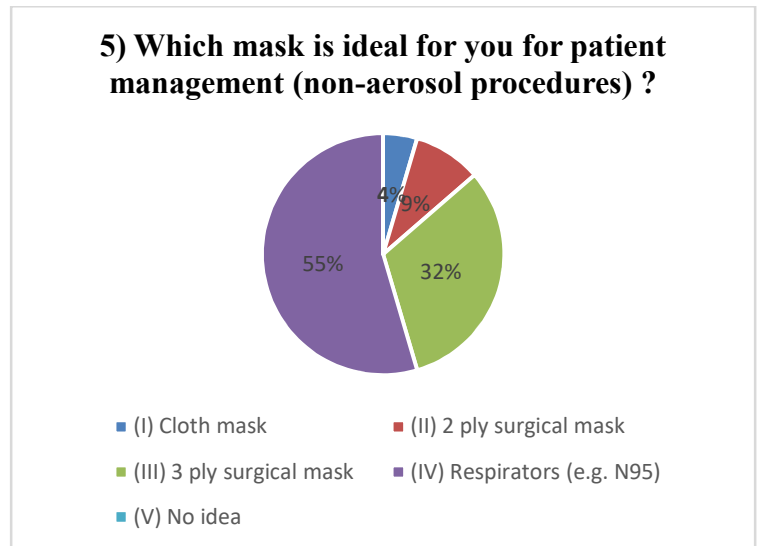
**Graph No 17:** What type of elastic cords/ tie bands does your mask have?



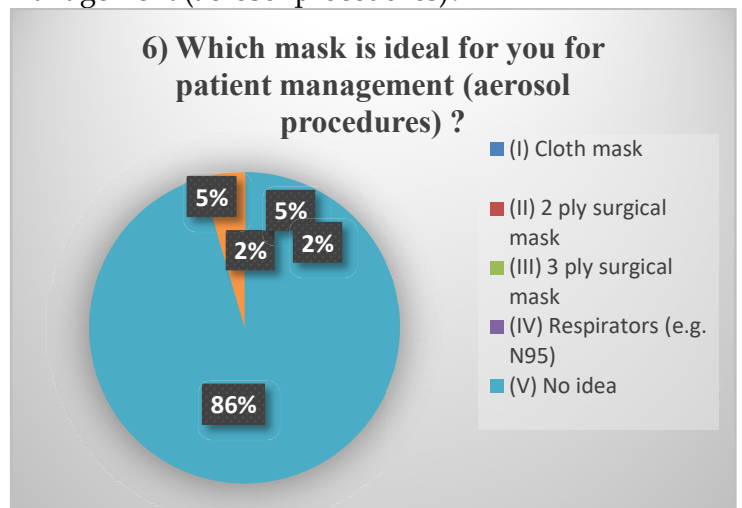
**Graph No 18:** If you are using Ear loop Mask, does it lead to discomfort to your ears?



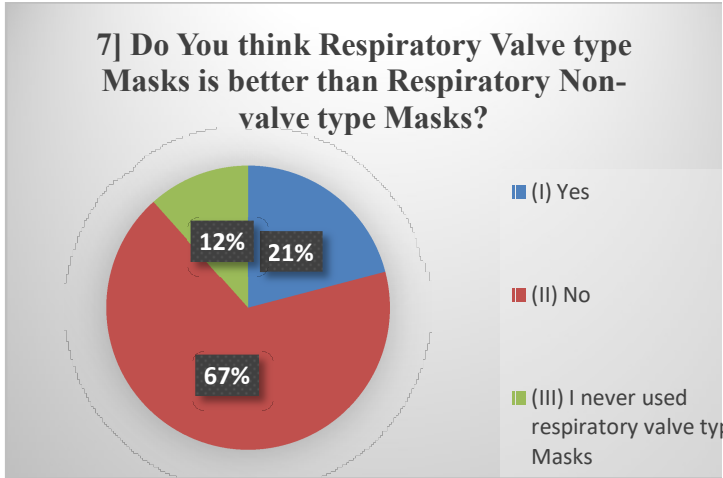
**Graph No 19:** Which mask is ideal for you for patient management (non-aerosol procedures)?



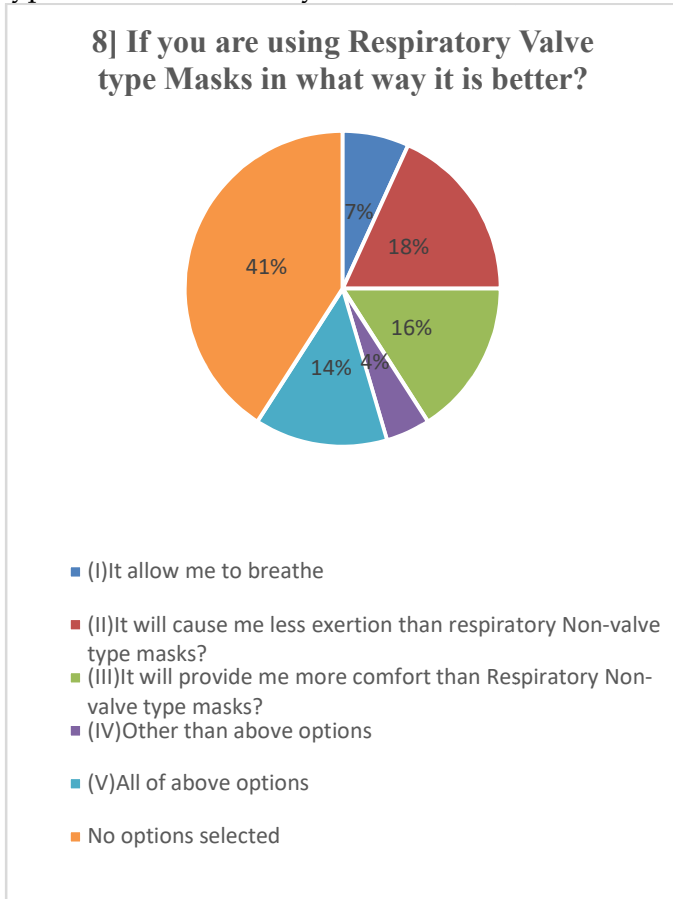
**Graph No 20:** Which mask is ideal for you for patient management (aerosol procedures)?



**Graph No 21:** Do you think Respiratory Valve type masks is better than Respiratory Non-valve type masks?



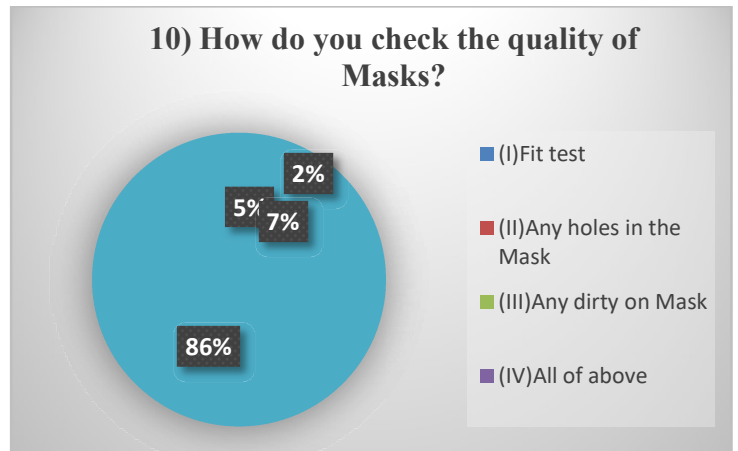
**Graph No 22:** If you are using Respiratory Valve type masks in what way it is better?



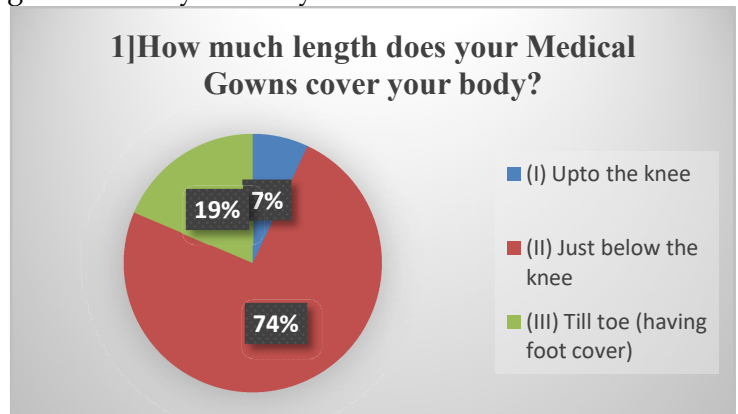
**Graph No 23:** Do you check the quality of mask before you buy them?



**Graph No 24:** How do you check the quality of masks?

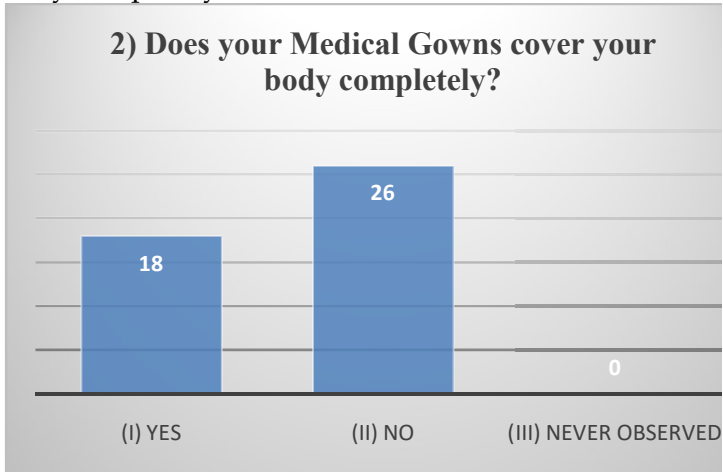


**Graph No 25:** How much length does your medical gowns cover your body?

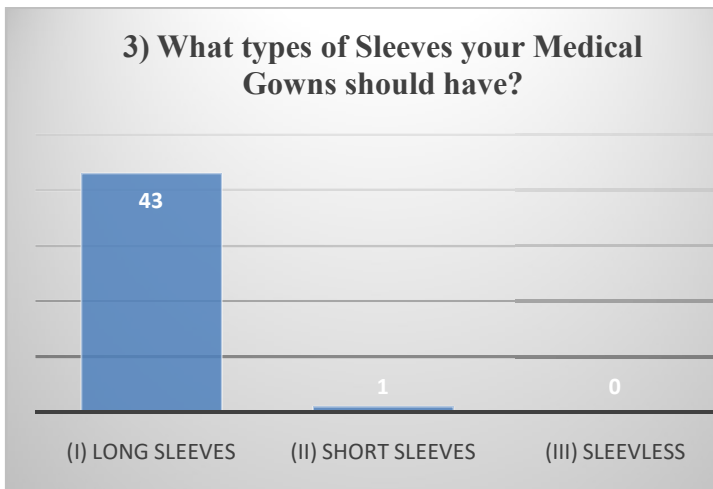




**Graph No 26:** Does your Medical Gowns cover your body completely?



**Graph No 27:** What types of Sleeves your Medical Gowns should have?



# Awareness, Attitude, Anxiety and Infection Control related to COVID-19 among Oral Pathologists- A Web-based Survey.

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## Abstract:

**Background:** Infection prevention and control measures are critical to prevent the possible spread of Coronavirus disease 2019 (COVID-19). Oral pathology forms a crucial link between basic dental sciences and clinical dental sciences. Here, questionnaire study aimed to assess the awareness, attitude, anxiety, and infection control amongst oral pathologists in Maharashtra state.

**Materials and Methods:** A web based Cross-sectional survey study was conducted amongst the oral pathologists in Maharashtra state.

**Results:** 96% of the oral pathologists were aware of the exact pathogenesis of COVID-19 in Maharashtra. Practicing oral pathologists were found to have better knowledge. Within the limits of the study, we can conclude that there is good awareness regarding the pathogenesis of COVID19 among practicing oral pathologists.

**Conclusion:** In today's scenario it is extremely important for oral pathologists to assess the risk of transmission and clinical outcomes based on the pathological course of the disease. An in-depth understanding of the pathogenesis will also help in developing novel treatment protocols to combat the pandemic.

**Keywords:** Awareness, Coronavirus, Oral Pathologists, Infection control.

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## INTRODUCTION:

Coronavirus disease 2019 (abbreviated as "COVID- 19") is an emerging respiratory disease caused by a novel coronavirus. It was first detected in December 2019 in Wuhan; COVID-19 is an increasing public event being a rapid pandemic.<sup>[1]</sup> Two main unique features of the virus are its low pathogenicity and high transmissibility that

distinguishes it from other members of the coronavirus family such as SARS-CoV (*Severe Acute Respiratory Syndrome*) and MERS-CoV (*Middle Eastern Respiratory Syndrome*).<sup>[2]</sup> COVID-19 is spread by human-to-human transmission through the droplet, feco-oral, and direct contact and has an incubation period of 2-14 days.<sup>[3]</sup> These routes of transmission increase the concern of transmission for COVID-19 in

the dental setting. The disease is highly infectious, and its main clinical symptoms include fever, dry cough, fatigue, myalgia, and dyspnea.<sup>[4]</sup> To date, no antiviral treatment or vaccine has been unequivocally recommended for COVID-19. Therefore, applying preventive measures to control COVID-19 infection is the most critical involvement.<sup>[5]</sup>

The WHO initiated several online training sessions and materials on COVID-19 in various languages to strengthen infection control strategies, including raising awareness and training in preparedness activities. Despite the availability of prevention guidelines and recommendations on infection control, many dental practices lack the minimum infection control requirements.<sup>[6]</sup> Oral pathology forms a crucial link between basic dental sciences and clinical dental sciences. As research into COVID-19 continues, many facts keep on changing, and many myths are also prevalent in the oral pathologists regarding the prevention and management of the infection. A questionnaire study aimed to assess the awareness, attitude, anxiety, and infection control amongst oral pathologists in Maharashtra state.

### Material and Methods:

This cross-sectional study would be conducted among Maharashtra state oral pathologists to know the awareness, attitude, anxiety, and infection control regarding COVID 19 among oral pathologists of Maharashtra state. The study was conducted using a self-administered questionnaire. This study obtained Ethical Clearance from the Institutional review board of MIDSR Dental College. The survey questions were validated, and an online form ([https://docs.google.com/forms/d/e/1FAIpQLScK4R-8crPTXH15EjRWpA1vxAVT4IA2yyjAYk3M-WyAoRTmGg/viewform?usp=sf\\_link](https://docs.google.com/forms/d/e/1FAIpQLScK4R-8crPTXH15EjRWpA1vxAVT4IA2yyjAYk3M-WyAoRTmGg/viewform?usp=sf_link)) of the questionnaire was sent to oral pathologists at various places of Maharashtra. The period of the survey was from May 20, 2020, to July 20, 2020. Nearly 81 respondents completed the survey.

### Data collection:

A Snowball sampling technique was used. An online questionnaire consisted of the first part as

demographic data such as age, sex, name, and region. And the second part is awareness, attitude, anxiety, and infection control of COVID-19 related questionnaire using Google forms, with a consent form. The link of the survey questionnaire was sent through emails, what's-App, and other social media. These questions were answered like yes, no, and don't know.

### RESULTS:

A web survey related to awareness, attitude, anxiety, infection control related to covid-19 among oral pathologists community in Maharashtra state during the corona pandemic was conducted in the Indian population. A total of 81 responses were recorded. The mean age of the survey participants was 29.09±8.83 years. Among the participants, 61.2 % were females, and 38.6 % were males.

#### Part I: awareness about COVID-19

A considerable number of responders were aware of the disease's basic elements, as shown in Table. 1. Out of the total participants, 96% of participants answered "yes" to the question, "The main clinical symptom of covid-19 is fever, fatigue, dry cough & myalgia" Most participants, 72%, acknowledged that ordinary residents could wear general medical masks to prevent the infection by the covid-19". Only 18.2 % regarded fever as a symptom of COVID-19, which is known to be a major symptom. For the question, "The covid-19 VIRUS spreads via respiratory droplets of infected individuals?". 96% of the participants answered "yes."

#### Part II: Attitude towards COVID-19

As shown in Table.2, more than 50 % of the participants agreed that COVID-19 would finally be successfully controlled. 68% of the participants answered no, 20% yes, and 12% said they don't know the answer to the question, "Now a day, you feel like your chronic condition, if any, is worsening day by day?". Most (64 %) of the participants thought it was the right decision of the government to give preference to the economy than rising cases by unlockdown. 72% of the participants answered yes, 24% no, and 4% don't know to the question," In

recent days, have you worn PPE kit while doing patients?". 64% of the participants answered no, 32% yes, and 4% don't know to the question, "Have you received any biopsies during this COVID-19 pandemic?"

### Part III: Anxiety towards the COVID-19

Drawing from the data given in Table.3, more than 64 % of the participants were feeling, dizzy light-headed, or faint when they read or listened to news about the coronavirus. Approximately 80 % of the participants were feeling trouble falling or staying asleep because of thinking about coronavirus. About 56 % of participants reported being depressed and irritated due to Social media, news & other information sources on covid-19. Approximately 64 % of the participants had reported the symptoms, heart races, or palpitates when they think about getting covid-19. In our study, 72 % of the oral pathologists affirmed, find it difficult to concentrate these days.

### Part IV: Infection Control towards the COVID-19

As shown in Table 4, 96% of the participants agreed that prevention and infection control remains the main methods of addressing covid-19. 100% of the participants admitted that clinical management includes prompt implementation of recommended infection prevention and control measures and supportive management of complications. And No specific treatment for Covid -19 is currently available. Also, 100% of the participants agreed to implement respiratory hygiene and cough etiquette and have a separate, well-ventilated space that allows waiting for symptomatic patients to be separated by 6 or more feet. 64% of the participants reported that they usually put on a facemask to protect themselves from the risk of infection?". For the question, "Hand washing and social distancing are the main barriers to the adaption of key behaviors of Covid -19 infection?". 60% of the participants answered, yes.

### DISCUSSION:

Epidemics and pandemics are a periodic phenomenon. People in the community face several challenges during such periods. Lack of awareness

often leads to an unconcerned attitude, which may adversely affect the preparedness to meet these challenges. Impacts of these epidemics and pandemics are often intense, which may adversely affect a given population's mental well-being. The fear and anxiety related to outbreaks and pandemics also influence oral pathologists' behavior in the health-care community. Hence, this study attempted to evaluate the awareness, attitude, anxiety, and infection control in oral pathologists in Maharashtra.

**Rubin et al.**<sup>[7]</sup> had conducted a similar study during the swine flu outbreak in the United Kingdom. They had conducted the survey telephonically over four days in the native population who heard the term "swine flu" and was able to speak English. There is much similarity like illness between swine flu and COVID-19 infection. Both diseases are viral in origin, involving the respiratory system and spreading by droplet infection. Similar precautions are often recommended for the prevention of swine flu and COVID-19 infection. Unfortunately, there is no specific treatment or vaccine available for COVID-19 infection, whereas both treatment and vaccines are present for swine flu.

All epidemics and pandemics have their unique characteristics in terms of causality, progression, and control measures. It is crucial to provide health education and create awareness during such situations to prevent disease spread.<sup>[8]</sup> The participants in our study were oral pathologists. The participants had a moderate level of awareness regarding the mode of spread, symptoms, and adequate awareness about preventive measures. It was possibly due to the government and media emphasizing more on the preventive measures. Also, webinars and articles provide a sufficient source of information regarding Covid-19 infection. Educated and especially healthcare people, i.e., oral pathologists, get more sensitized by this information. **Deblina Roy et al.**<sup>[9]</sup> had conducted a similar study to assess the knowledge, attitude, anxiety experience, and perceived mental healthcare need among the adult Indian population during the COVID-19 pandemic. An online survey was conducted using a semi-structured questionnaire. Study results showed that the responders had a moderate level of knowledge about the COVID-19

infection and adequate knowledge about its preventive aspects.

Our survey study, the attitude towards COVID-19 showed oral pathologists' willingness to follow government guidelines on lockdown. Our study stated that most Oral pathologists are aware of this infection, possible preventive measures, the importance of social distancing, and government initiatives to limit disease spread during this coronavirus pandemic. Similar study results of **Bao-Liang Zhong et al.**<sup>[10]</sup> stated that Chinese residents of a relatively high level of socioeconomic status, in particular women, have had good knowledge, optimistic attitudes, and appropriate practices towards COVID-19 during the rapid rise period of the COVID-19 outbreak.

In our study, we found approximately 80 % of people reporting sleep difficulties. More than 56% of participants said themselves worried after seeing posts about the COVID-19 pandemic on various social media platforms. And approximately 64 % of participants worried about getting covid-19 and symptoms like heart races or palpitates and difficulties in concentration. This indicates that a significant proportion of participants in the survey, despite having adequate awareness about coronavirus infection, are primarily influenced by media information. Media affects mental well-being and adds to the level of anxiety. The swine flu pandemic of 2009–2010, which resulted in high mortality worldwide, also significantly caught global media attention and evoked anxiety among the public.<sup>[11]</sup> It has been seen in a previous study that health professionals often have better awareness, positive attitudes towards epidemics/pandemics, and they often experience low levels of anxiety.<sup>[12]</sup> However, there are increased worries and apprehensions among the public regarding acquiring the COVID-19 infection. People have higher perceived needs to deal with their mental health difficulties. There is a need to intensify the awareness program and address people's mental health issues during this COVID-19 pandemic.

Prevention and infection control remains the main methods of addressing covid-19. In our survey study, 100% of participants stated that implementing recommended infection prevention and control

measures is more important to avoid complications. As no specific treatment for covid -19 is currently available. Sensitization and awareness about COVID-19 are reflected significantly in their behavior and attitude as most of the participants agreed with social distancing, avoiding travel, self-quarantine, and adequate hygienic measures. A similar study by **Modi P D et al.**<sup>[13]</sup> showed the awareness of COVID-19 disease and related infection control practices among healthcare professionals and students in the Mumbai Metropolitan Region. Their study showed adequate awareness of COVID-19 in the healthcare setting, with an overall percentage of 71% correct answers. This study shows a strong need to implement periodic educational interventions and training programs on infection control practices for COVID-19 across all healthcare professions.

#### CONCLUSION:

During this coronavirus pandemic, oral pathologists are aware of this infection, possible preventive measures, the importance of social distancing, and government initiatives were taken to limit the spread of infection. However, there are increased worries and apprehensions among the oral pathologists regarding acquiring the COVID-19 infection. They have higher perceived needs to deal with their mental health difficulties. There is a need to intensify the awareness program and address oral pathologists' mental health issues during this COVID-19 pandemic.

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### LIST OF TABLES

**Table 1: Represents the awareness of Oral Pathologists about Covid-19**

Sr. No	Questions	Yes (%)	No (%)
1	The main clinical symptoms of Covid-19 are fever, fatigue, dry cough and myalgia.	96%	4%
2	Ordinary residents can wear general medical masks to prevent the infection by the Covid-19.	72%	28%
3	The Covid-19 virus spreads via respiratory droplets of infected individual.	96%	4%
4	Does webinars and articles provides sufficient source of information regarding Covid-19 infection.	68%	24%
5	In recent days, have you gone through any training related to Covid-19 pandemic?	80%	20%

**Table 2: Represents the attitude of Oral Pathologists about Covid-19**

Sr. No	Questions	Yes (%)	No (%)	Don't know (%)
1	Do you agree that COVID-19 will finally be successfully controlled?	50%	16%	32%
2	Now days, you feel like your chronic condition, if any is worsening day by day?	68%	20%	12%
3	Do you believe that it was a right decision of government to give preference to economy than rising cases by unlockdown?	64%	32%	4%
4	In recent days, have you worn PPE kit while doing patients?	72%	24%	4%
5	Have you received any biopsies during this COVID-19 pandemic?	60%	32%	8%

**Table 3: Represents the anxiety of Oral Pathologists about Covid-19**

Sr. No	Questions	Yes (%)	No (%)	Don't know (%)
1	You feel, dizzy light headed or faint when you read or listened to news about the corona virus?	64%	32%	4%
2	I feel trouble falling or staying asleep because I was thinking about coronavirus	80%	20%	0%
3	Does Social media, news & other Information source on covid-19 makes you depressed and irritate you?	56%	40%	4%

4	My heart races or palpitates when I think about getting covid-19?	64%	28%	8%
5	These days, you find it difficult to concentrate?	72%	28%	0%

**Table 4: Represents the knowledge of Oral Pathologists about infection control in Covid-19.**

Sr. No	Questions	Yes (%)	No (%)	Don't know (%)
1	Prevention and infection control remain the main methods of addressing covid-19?	96%	0%	4%
2	Clinical management includes prompt implementation of recommended infection prevention and control measures and supportive management of complications. No specific treatment for Covid -19 is currently available?	100%	0%	0%
3	Implement respiratory hygiene, and cough etiquette and have a separate, well - ventilated space that allows waiting symptomatic patients to be separated by 6 or more feet.	100%	0%	0%
4	I usually put a facemask to protect myself from the risk of infection.	64%	12%	24%
5	Hand washing and social distancing are the main barriers to adaption of key behaviors of covid-19 infection.	60%	16%	24%

# Knowledge, attitude, practices regarding COVID-19 among dental students of MIDSR Dental College of Latur city: A Cross-Sectional survey

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## Abstract:

### **BACKGROUND:**

Knowledge and awareness of mode of disease transmission, basic hygiene principles and measures in public health crisis are vitally important for developing effective control measures. The World Health Organization declared COVID-19 as a pandemic on the 11th of March 2020. Since then, many efforts are being carried out to contain the virus.

**OBJECTIVE:** The aim of the current cross-sectional study is to Knowledge, attitude, practices regarding COVID-19 among dental students of MIDSR Dental College of Latur city

**METHODS:** In this cross-sectional, self administrated questionnaire study, conducted among the dental students regarding the KAP of the students about COVID-19 was asked, and participants' demographic characteristics and source of information regarding COVID-19 were recorded and analyzed.

**RESULTS:** The present study revealed a good knowledge, practice and a high attitude among the study population towards COVID-19.

**CONCLUSION:** Our findings demonstrated good knowledge, positive attitudes, and practice regarding COVID-19 among dental students during the outbreak.

**Keywords:** - COVID-19, fatigue, World Health Organization, mode of transmission.

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## INTRODUCTION:

COVID-19 is an emerging respiratory disease caused by a novel coronavirus and was first detected in

December 2019 in Wuhan, China.<sup>1</sup> The disease is highly infectious, and its primary clinical symptoms include fever, dry cough, fatigue, myalgia, and dyspnea.<sup>1</sup> The infection rapidly spreading throughout many countries, so the World Health

Organization (WHO) declared that the COVID-19 infection was a Public Health Concern.<sup>1</sup>

At present, there is no specific antiviral treatment and preventive vaccine available for COVID-19. Therefore, the guidelines are recommended to reduce infection and respond to the epidemic's challenges. As CDC recommends, coronavirus spreads mainly from person-to-person by close contact (within about 6 feet) with infected people via respiratory (coughs or sneezes) or transmitted by touching a surface or object that the Virus on it.<sup>2</sup> The COVID-19 infection is more prominent in older people with underlying diseases. The clinical symptoms of COVID-19 include fever, cough, malaise, and acute respiratory distress syndrome in a few patients, and in serious conditions to death of the patients.

Healthcare professionals (HCPs) of all levels and kinds are primarily involved in catering to patients of this highly transmittable pathogen. COVID-19 has posed a serious occupational health risk to the HCP owing to their frequent exposure to infected individuals<sup>3</sup>. Protection of HCPs and prevention of intra-hospital transmission of infection are essential aspects of epidemic response. This requires that students have updated knowledge regarding the source, information, symptoms, and preventive measures. Literature suggests that a lack of knowledge and misunderstandings among HCPs leads to delayed diagnosis, disease spread, and poor infection control practice.<sup>3</sup>

Although educational campaigns have awareness regarding COVID-19, it remains unclear to what extent this knowledge can be put into practice and how it reduces COVID-19 infection spread. Knowledge, attitude, and practice survey provide a suitable format for evaluating existing programs and identifying effective strategies for behavior change in society.<sup>2</sup>

Therefore, the present study was conducted to identify the current status of knowledge, attitude, and practices regarding COVID-19 among MIDSAR Dental College Latur, dental students.

### **Aims or objectives**

This study was conducted to assess the Knowledge, Attitude, and Practice regarding COVID 19 among MIDSAR dental college students in Latur city.

### **Material and Methods**

This cross-sectional study would be conducted among 422 dental students at MIDSAR Dental College. The study was conducted by sending a self-administered questionnaire to the students, and their responses were recorded. The Ethics Committee of MIDSAR Dental College and Hospital, Latur, approved our study protocol and informed consent was taken before conducting the survey.

Participants had to confirm their willingness to participate voluntarily. After confirmation, participants were directed to complete the self-report questionnaire.

### **Inclusion criteria**

Students who are willing to participate

### **Exclusion Criteria**

Students who are not willing to participate

### **Data collection**

The study will be carried out using a standardized Performa. The questionnaire consisted of two parts: demographics and KAP. Socio-demographic data such as age, sex, college, year of study, and complaints about health-related problems. In KAP, the Knowledge part includes data on the most important symptoms of COVID-19. The practice part contains measures that the participant follows to prevent the infection, and the Attitude part contains questions reflecting his/her attitude toward preventive measures. These questions were answered on a true, false and "I don't know" option.

The questionnaire was initially structured in English; after that, the content was validated by microbiology and public health experts. To check the validity of questionnaires, it was piloted among 30 students by online sending the performa.

The knowledge section comprises 12 items, and each question was answered as true, false, and I don't know. The attitude section includes 10 items, and the response of each item was responded as true, false, and I don't know. The practice section had 9 items, and each item was also similarly responded as true, false, and I don't know.



### Sample size calculation and Statistical analysis:

The sample size (n) was calculated by using OpenEpi, Version using Kish formula 15 for sample size estimation at a 95% significance level and a 5% error margin; the representative sample size is 384. Considering the non-response rate, 10% of the sample size was added.  $384 \times 10\% = 38.4$ . So, the total sample size becomes  $384 + 38.4 = 422$ .

The data obtained will be tabulated, and analysis will be done using SPSS Package. The percentage of correct knowledge answers and various attitudes and practices would be assessed.

### Results

A cross-sectional study was conducted during the month of March 2020, after the lockdown to implement social distancing to avoid the spread of a pandemic. A total of 422 students have participated in the study, Survey was started on 1 March 2020, and response acceptance was closed (15-April 2020) when the required sample size was achieved. The participants' variables are shown in Table 1.

**Table 1. Distribution of study participants according to gender and year of studying**

VARIABLE	NUMBER	PERCENTAGE
<b>Gender</b>		
Female	292	69%
Male	130	31%
<b>Year of studying</b>		
First year	89	21%
Second year	87	20%
Third year	96	24%
Final year	86	20%
Interns	64	15%

In the present study, 69% of the participants were females, followed by 31% were males. 24% of the students who responded to the questionnaire were studying in the third year, 21% were the first year, 20% were second year as well as final year followed by 15% were interns as mentioned in Table 1.

**Table 2. Distribution of study participants according to their knowledge (those who answered correctly by choosing "true")**

Sr.No	Total respondents (n = 422)	Number %
1	The main clinical symptoms of COVID-19 are fever, fatigue, dry cough, and myalgia.	358(85%)
2	The common cold, stuffy nose, running nose, and sneezing are less common in persons infected with the COVID-19	267(63%)
3	There is no cure for COVID-2019, but only symptomatic and supportive treatment can help most of the patients recover from the infection.	412(97%)
4	Not all persons with COVID-2019 will develop severe cases. Only those who are elderly, have chronic illnesses, and are obese are more likely to be severely affected	318(75%)
5	Eating or contacting animals would result in getting the infection by the COVID-19 Virus.	297(70%)
6	Persons with COVID-2019 cannot transmit the Virus to others person when a fever is not present	289(68%)
7	The COVID-19 Virus spreads rapidly through respiratory droplets of infected individuals.	389(92%)
8	People should wear medical masks to prevent the infection by the COVID-19 Virus.	287(68%)
9	It is not mandatory for children and young adults to take measures to prevent the infection by the COVID-19 Virus	112(28%)
10	To prevent the infection by COVID-19, most of the students have stopped going	412(97%)



	to crowded places such as malls, PVR and avoid taking public transportations.	
11	Isolating and providing treatment of people who are infected with the COVID-19 Virus are effective ways to reduce the spread mode of the Virus.	392(93%)
12	People who came contact with someone infected with the COVID-19 Virus should be immediately isolated in a proper place to prevent other people to infect. The observation period is 14 days.	386(91%)

Most of the students in this study had knowledge about Covid-10; 97% of the students responded that to prevent infection by COVID-19 should avoid going to crowded places such as train stations and avoid taking public transportations. 97% of students think that as there is of now no effective treatment for COVID-2019, but providing early symptomatic and supportive treatment can help most patients recover from the infection.

92% of the students had the knowledge that the COVID-19 Virus spreads via respiratory droplets of infected individuals; 85% of students believe that the main clinical symptoms of COVID-19 are fever, fatigue, dry cough, and myalgia. The majority of the present study students had knowledge about the mode of transmission, early symptoms, and believe they can prevent themselves infected if they avoid going to crowded places, as mentioned in Table 2.

**Table 3. Distribution of study participants according to their attitude (those who answered correctly by choosing "true")**

Sr.No	Total respondents (n = 422)	Number %
1	Hand washing is necessary for the prevention of infection.	383(90%)
2	The face mask can prevent viral transmission.	354(84%)
3	Antibiotics will not prevent	318(75%)

	infection.	
4	The Virus is not a stigma, and I should not hide my infection.	389(92%)
5	Early detection of COVID-19 can improve treatment and outcome.	413(97%)
6	COVID-19 is a curable disease	343(81%)
7	Whether COVID-19 disease results in death in all cases?	189(44%)
8	Authorities should restrict travel to and from COVID-19 disease areas to prevent contamination	397(94%)
9	Authorities should quarantine COVID-19 patients in special hospitals.	289(64%)
10	If the number of COVID-19 cases increases, authorities should be ready to lockdown and quarantine the city	386(91%)

Regarding the attitude of the students about COVID-19, 97% of the students believe that early detection of COVID-19 could improve treatment and outcome, followed by 94% think that the higher Authorities should restrict travel to prevent disease transmission from COVID-19 contamination, 92% had the attitude that the Virus is not a stigma, and they should not hide about infection. 91% of students, if the number of COVID-19 cases increases, authorities should be ready to lock down and quarantine the city. And 90% of the student's frequent hand washing is necessary for the prevention of infection. In the present study most of the students had a positive attitude of frequent hand washing can prevent the infection, anyone should not hide about their infected and also the higher should take precautions to prevent the spreading of infections by restricting the people to travel and also to lock down and quarantine the city as mentioned Table 3.

**Table 4.** Distribution of study participants according to their practice (those who answered correctly by choosing “true”)

Sr. No	Total respondents (n = 422)	Number %
1	To prevent contracting and spreading COVID-19, I avoid going out of my home	418(99%)
2	To prevent contracting and spreading COVID-19, I avoid unnecessary vacations.	386(91%)
3	To prevent contracting and spreading COVID-19, I avoid consuming outdoor food.	315(74%)
4	To prevent contracting and spreading COVID-19, I avoid handshaking, hugging.	399(94%)
5	To prevent contracting and spreading COVID-19, I avoid public transportations (taxi, bus, subway, plane, train)	386(91%)
6	To prevent contracting and spreading COVID-19, I avoid going to work.	319(75%)
7	To prevent contracting and spreading COVID-19, I frequently wash my hands.	378(89%)
8	To prevent contracting and spreading COVID-19, I pay more attention to my personal hygiene than usual.	316(74%)
9	To prevent contracting and spreading COVID-19, I use disinfectant and solutions.	289(68%)

Majority of the students, 99% in the present study to prevent contracting and spreading COVID-19 avoid going out of their home, 94% of students to prevent contracting and spreading COVID-19 avoid handshaking, hugging, 91% of students to protect themselves from contracting and spreading COVID-

19 they were avoiding public transportation like taxi, bus, subway, plane, train. So in the present study, most of the students were aware of how they can get infected what they should do to protect themselves and their families, as mentioned in Table 4.

## DISCUSSION

The Knowledge, Attitude, and Practices for a infectious disease can be influenced by various factors, namely, the severity of the illness, the mode of its spread, and the mortality rate. After announcement of COVID-19 as a pandemic by the WHO, the knowledge, attitude, and practices toward COVID-19 have been growing day by day.

There has been no evidence-based specific treatment for COVID-19, and management of COVID-19 has been largely supportive. The current approach to COVID-19 is to control the source of infection, use infection preventive measures to lower the risk of transmission, and to provide early diagnosis, isolation, and supportive care for affected patients. This fact was reflected in the response of participants. In this cross-sectional study, we provided an insight into the knowledge, preventive measures, and attitude of the students towards COVID-19.

The study resulted that the overall knowledge about the symptoms and unavailability of vaccine or specific antiviral treatments against COVID-19 was good, where 85% participants have knowledge about the symptoms, and above 97% participants were aware about the unavailability of vaccine and treatment. This could be due to various factors such as the seriousness of the disease as published by various association and health sectors after being declared as a pandemic by the WHO.

The attitude of the participants regarding practices reflects the right way to prevent the infection by various means namely hand washing, avoiding hand shaking and taking precautions during coughing and sneezing. More than 97% of the students agree that early detection of COVID-19 can improve treatment and outcome. 94% of participants to control the pandemic the higher authorities should restrict travel to and from COVID-19 disease areas to prevent contamination

Based on the knowledge attitude and practices scores of the participants, an overall correct rate of 90% and

85%, demonstrated that the majority of participants are knowledgeable about COVID-19. Our results were similar to a previous study regarding the KAP towards COVID-19 in China which also showed an overall correct rate of 90% knowledge among the Chinese population.<sup>1</sup>

## CONCLUSION

As a conclusion the present study revealed a good knowledge, practice and a high attitude among the study population towards COVID-19. Such response reflects the effect of its announcement as pandemic declared by the WHO and efforts made by the local health authorities to sensitize a wide spectrum of the public about the COVID-19. The findings of this study might prove as the baseline for planning awareness campaigns between students and publics and helpful in directing the efforts and plans of the health authorities of the country for better containment of COVID-19 and its further spread. The study might be fruitful in conducting further research of its kind.

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# EFFECTIVENESS OF ONLINE LECTURES AND WEBINARS ON INDIAN DENTAL STUDENTS DURING COVID 19 OUTBREAK - A CROSS SECTIONAL STUDY

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## Abstract:

### Objectives -

To determine the effectiveness of online lectures & webinars, to investigate advantages & Disadvantages of online lectures, to investigate student's perception towards online lecture Compared to traditional lecture and the drawbacks of online lectures & webinars on Indian Dental students during COVID 19 Outbreak.

**Materials and Methods** - 15 closed ended questions were prepared and organized by Google form application and those questions were circulated online to dental students all over the India. A total of 516 participants from 22 different dental institutions nationwide submitted the completed questionnaire. Data was calculated online in Google form application.

### Results -

The results reveal that, the dental students were not that contented with online learning education. 79.3% people found traditional lecture is a better learning tool compared to online lectures. 18% participants found online lectures & webinars extremely helpful in understanding the subject. 57% somewhat helpful, 19.1% not so helpful while 5.9% students found it not at all helpful.

**Keywords:** Dental student, e-learning, COVID 19, online learning.

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## INTRODUCTION:

In December 2019, the corona virus disease 2019 (COVID-19) broke out in Wuhan, the capital city of Hubei Province in China.<sup>1</sup> The cause of the disease was a highly contagious novel corona virus (SARS-CoV-2) that rapidly spread worldwide and in March

2020 was declared a global pandemic by the world health organization (WHO). Along with all other sectors, this disease has also shaken up the education sector, and this fear is likely to resonate across the education sector globally.<sup>1</sup> subsequently, the outbreak forced many schools and colleges to remain

closed temporarily. Several areas are affected worldwide, and there is a fear of losing this whole ongoing semester or even more in the coming future. Various schools, colleges, and universities have discontinued in-person teaching.<sup>2</sup>

According to some researchers, it is uncertain to get back to normal teaching anytime soon as social distancing is preminent at this stage, which is impossible to follow in traditional lectures. Hence, the academic units struggled to find options to deal with this challenging situation. These circumstances made people realize that scenario planning is an urgent need for educational institutions.<sup>3</sup> In dentistry, it was not possible to conduct practical's on patients during COVID 19 period. Also, there is an urgent need to protect and save students, faculty, academic staff, communities, societies, and the nation as a whole during this pandemic. As the online mode of learning is easily accessible and can even reach rural and remote areas, the government has decided to start online lectures in colleges & schools.<sup>3</sup> Online lectures & Webinars helped dental students to attend theory lectures while maintaining the social distancing at the same time. However, how the online education has affected the lives of dental students and teachers has not been thoroughly researched.<sup>4</sup>

There are many benefits of online lectures and drawbacks too. This survey aims to identify the effectiveness of online lectures & webinars in dental undergraduate & postgraduate students across India during the Covid 19 period.

#### METHODOLOGY:

The present cross-sectional study was conducted using an online survey questionnaire from 15th June 2020 to 27th October 2020; as it was not feasible to do a community-based national sampling survey during this difficult period, we decided to collect the data online. For this purpose, a well-constructed questionnaire was designed and circulated through WhatsApp & e-mails and received a response through online survey submission. The questionnaire was comprised of 15 close-ended questions related to online lectures. A bi-weekly reminder strategy was

used to inform the participants who had not completed the survey.

The study is based on quantitative data collected from postgraduate & undergraduate dental students. Consent is taken from all individuals before participating in the study. Out of 525 individuals to whom the survey was circulated, 516 were ready to participate in the study. A total of 516 participants from 22 different institutions participated and submitted the questionnaire. Statistical analysis was done on SPSS version 25. Data were calculated online in the Google form application.

#### RESULTS:

A total of 516 participants from 22 different institutions nationwide submitted the completed questionnaire with 15 questions. The responses were recorded from 22 institutions as follows: MIDSR Dental college Latur, YMT Dental College and Hospital Navi Mumbai, GDC Aurangabad, GDC Mumbai, M. A. Rangoonwala College of dental sciences and research center Pune, Terna dental college Navi Mumbai, Bharati Vidyapeeth Pune, Dr. D.Y Patil dental college Pimpri, SRM dental college, Ramapuram Chennai, PMNM dental college Bagalkot, CSMSS Dental College Aurangabad, SMBT dental college Sangamner, Triveni Dental College Bilaspur, Hitkarini dental college Jabalpur, RDC, PMT, PIMS Loni, MGVS KBH dental college Panchvati Nashik, YCMM & RDF's Dental college and hospital Ahmednagar, SDKS dental college Nagpur, Surendra dental college and research institute, Aditya dental college Beed, Hitkarini dental college Jabalpur.

Sr. No	Questions	Options	Respon ses (%)
1	Are you attending online lectures or webinars?	a. Yes b. No	91.2% 8.8%
2	How many	a. 1 to 5	64.1%



	online lectures or webinars do you attend weekly?	b. 6 to 10 c. 11 to 15 d. >15	20.1% 10.5% 5.3%				
3	Which a is better learning tool?	a. Traditional lectures. b. Online video conferencing	79.3% 20.7%	7	What are the advantages of online lectures and webinars for academics during Covid 19 crisis?	a. Time & cost efficient. b. Better communication c. Helping continuation of academics by making it safer with social distancing. d. All of the above	7.7% 2.4% 47.2% 42.7%
4	When are the online lectures and webinars more effective?	a. If the host's audio & video is on. b. If the host's audio is on but video is off. c. If both the host's & audience's video is on. d. If the speaker's video is on.	66% 7.7% 26.1% 3.2%	8	What are the disadvantages of online lectures and webinars?	a. Technical problems. b. Less personal interaction. c. Participants get easily distracted. d. All of the above	20.7% 3.9% 3.9% 71.5%
5	How helpful are the webinars & online lectures for learning and understanding of the subject?	a. Extremely helpful. b. Somewhat helpful. c. Not so helpful. d. Not at all helpful.	18% 57% 19.1% 5.9%	9	Are the online practical demonstrations helping you to improve practical skills?	a. Yes b. No	84.3% 15.7%
6	Do online lectures reduce your anxiety as compared to traditional lectures?	a. Yes b. No	53.6% 46.4%	10	Are the online practical/ demonstrations helping you to improve practical skills?	a. Yes b. No	27.6% 72.4%

11	Are you of the opinion that online lectures should be carried in the way along with traditional practical's post pandemic?	a. Yes b. No	58.4% 41.6%
12	Which conferencing app do you prefer for online meetings?	a. Zoom cloud b. Cisco Webex. c. Say Namaste d. Google meet. e. Google hangouts. f. Any other.	66.5% 3.9% 2% 21.7% 2% 3.9%
13	Do you think taking online exams will help to assess your practical and theoretical progress?	a. Yes b. No	37.2% 62.8%
14	How interactive are the online lectures?	a. 25% b. 50% c. 75% d. 100%	39.6% 39.8% 17.4% 3.2%
15	Are you facing any physical distress while attending online lectures?	a. Eye strain b. Headache c. Backache d. all of the above	35.8% 8.2% 4.9% 51.1%

19. Therefore many cities have turned into phantom cities, and its effects can be seen in schools, colleges, and universities. The Corona Virus has made institutions to go from offline mode to online mode of pedagogy. With the help of online teaching modes, teachers can sermonize many students at any time and in any part of the country.<sup>5</sup> during this outbreak, dental students, were not able to undergo any practical education performed on patients. Technology has permitted to conduct of online lectures at the institution level so that at least theory lectures can be conducted. During this challenging time, the concern is not about whether online teaching-learning methods can provide quality; rather, academic institutions will be able to adopt online learning in such a massive manner to help continue academics.<sup>6</sup>

Online learning is considered to be a relatively cheaper mode of education in terms of the lower cost of transportation, accommodation, and the overall cost of institution-based learning.<sup>7</sup> Flexibility is another interesting aspect of online learning; a learner can schedule or plan their time to complete courses available online. Combining face-to-face lectures with technology gives rise to blended learning; this type of learning environment can increase students' learning potential. Students can learn anytime and anywhere, thereby developing new skills in the process.<sup>8</sup> At the same time, there are certain drawbacks associated with online lectures. Accessibility, affordability, flexibility, learning pedagogy, Technical problems, Less personal interaction, Participants get easily distracted are some of the arguments related to online lectures; the issue of availability of learning resources has also come out strongly as one of the drawbacks.<sup>9</sup> In a situation where the students are not allowed to go to school & colleges, the alternative is to move from traditional to online education. In this case, the essential parts are internet coverage, computers, or smart phones in the population. In this survey, we have collected data from dental students to identify online lectures & webinars' effectiveness of undergraduate & postgraduate dental students across India.<sup>10</sup>

### DISCUSSION-

The major part of the world is on quarantine due to the serious outbreak of this global pandemic, Covid-

A total of 516 students have participated in the survey. Out of which maximum respondents were postgraduate students, 27.4%. 98% were from the age group of 20-30, while only 2% were from the 30-40 age group. Most of the respondents were female. Twenty-two different colleges have participated in the survey from other states of the country. Among the participants, only 5.3% of students were able to attend more than 15 webinars weekly. Maximum participants, around 64.1%, were attending 1-5 webinars per week. Maximum people (79.3%) found Traditional lecture is a better learning tool than online video conferencing. The online lecture would also be more effective & interactive if the host's audio & video is on. 18% of participants found online lectures & webinars extremely helpful in the understanding of the subject. 57% somewhat beneficial, 19.1% not so beneficial, while 5.9% of students found it not at all helpful. Students are less anxious while attending online lectures when compared to traditional lectures. There are many advantages of online lectures like time & cost-efficient, Good communicating tools, participants do not have to travel from their place. Therefore, it helps maintain social distancing, hence helping to continue academics during the COVID 19 pandemics. There are many disadvantages of online webinars & lectures, among which technical problems like sudden stoppage of electricity and disturbances in network connectivity are some of the major drawbacks. Also, there is no personal interaction; Participants easily get distracted while lessening; it is not an efficient learning tool for lessons. 84.3% of participants feel that pandemic will hinder their practical skills.

Due to fear of corona already, the patient flow is less & dental practitioners, dental students are also hesitating to perform all the dental procedures. The treatment has been focused more on emergency cases. 72.4% of students think that only practical demonstrations are not helping students to improve their practical skills. Instead, 58.4% of students are of the opinion that online lectures should be carried along with traditional practicals after the pandemic. Practical's will help students implement their knowledge, and online lectures help to save time,

anxiety, and fear among the students. For online meetings, 66.5% of students have preferred the Zoom cloud app, followed by Google meet by 21.7%. Other apps have also been used by students like Cisco Webex, Say Namaste, Google hangouts. The Indian government planned to schedule online theory and practical exams to avoid & minimize the spread of COVID 19. But, 62.8% of participants think that taking online exams will not assess their practical & theoretical progress. Only 3.2% found online lectures, 100% interactive. Due to a continuous seated position at one place & long time computer, laptop, mobile use caused Eye strain, Headache, and Backache in most students.

#### CONCLUSION-

In conclusion, most of the respondents belonged to 20-30 years of age, with all pursuing bachelors & masters in dentistry. The survey found out that the learners were not content with online learning education provided by dental Institutions. Based on the findings, it is clear students believe that online lectures should be carried along with traditional practicals after the pandemic period despite the few challenges identified. Under these circumstances, education had to adapt and evolve and must continue to do so. The process leaves behind traditional teaching methods and implements modern ones, such as e-learning, Web-based video platforms, webinars, and virtual reality learning and surgical simulators.

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# ORAL CAVITY- A MAJOR TARGET OF COVID-19: PART-1

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## Abstract:

Since ages several viruses have been studied and said to be transmitted through saliva, such as herpes simplex virus, cytomegalovirus, etc. They are capable of infecting and replicating in the oral mucosa, leading to painful oral ulcers. Newer studies have described the oral manifestations of coronavirus disease 2019 (COVID-19). There is growing evidence that angiotensin-converting enzyme 2 (ACE2), the main host cell receptor of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), is highly expressed on the epithelial cells of the tongue and of the salivary glands. With this knowledge, it is important to understand if SARS-CoV-2 can infect and replicate in oral keratinocytes and fibroblasts, causing oral ulcerations and superficial necrosis. In this review of the available literature regarding different oral manifestations of COVID-19 and the role of ACE2 in SARS-CoV-2 cellular entry is described, thus bringing in new insights into oral keratinocytes and minor salivary glands as potential targets.

**Keywords:** ACE2, COVID-19, Oral Manifestations, SARS COV 2, Target organ in host.

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## INTRODUCTION:

The global pandemic burden has recently emerged by the human-to-human transmission of the novel coronavirus disease (COVID-19). Since its outbreak in December 2019, COVID-19 has affected more than 8,87,82,137 people worldwide as of 9th January 2021. (World Health Organization, 2020). The mode of infection spread, the resulting severe acute respiratory syndrome, and the global death toll. Coronavirus disease 2019 (COVID-19) has had a massive impact on health, wealth, and social aspects worldwide. Since the identification of this novel airborne infectious microorganism named severe acute respiratory syndrome coronavirus 2 [SARS-CoV-2] in Wuhan, China, millions of cases have been

diagnosed worldwide, with mortality rates ranging from 3% to 12%.<sup>1</sup>

Most of the cases of COVID-19 are mild (80%), whereas in 20% of cases, patients may develop severe disease, and 5% may become critically ill and develop pneumonia or acute respiratory distress syndrome that requires mechanical ventilation and intensive care unit hospitalization for the patient.<sup>1</sup> The most common symptoms of the disease are fever and dry cough and, in some cases, shortness of breath, dysosmia, and dysgeusia.<sup>2</sup> In addition to fever, fatigue, dry cough, myalgias, sore throat, breathing difficulties, and respiratory complications that often deteriorate to a severe acute respiratory syndrome, some patients infected by SARS-CoV-2



have developed a myriad of other local and systemic complications. They can be acute cardiac damage, acute renal failure, gastrointestinal complications, dysgeusia, anosmia, and rarely neurologic symptoms like Guillain-Barre syndrome.<sup>3-4</sup>

Some authors in Italy reported cases with the dermatologic implication in patients who suffered from SARS-CoV-2 infection.<sup>5</sup> Since then, there have been more reports describing dermatologic involvement, including lesions ranging from hands and feet to vasculitis, rash, urticaria, and varicella-like lesions.<sup>6</sup> Although SARS-CoV-2 is detected in saliva and oropharyngeal secretions, its routes of infection remain elusive, and little is known about the routes of transmission through the oral mucosa. Thus, more clinical evidence and research are needed to confirm the ability of SARS-CoV-2 to infect the oral tissues, and its pathogenic mechanisms in the oral and oropharyngeal mucosae need to be explored.

Hence, this review provides a comprehensive summary of oral manifestations in patients with COVID-19 by reviewing the relevant studies (PubMed, SAGE, IJOS, Oral Diseases, OOOO Journals, and some individual case reports) recently published concerning oral manifestations of COVID-19 to answer questions like:

### **What is the nature of the oral signs and symptoms in patients with COVID-19? Could the oral cavity be a target organ of COVID-19?**

Current research indicates that coronavirus invades human cells via the receptor angiotensin-converting enzyme 2 (ACE2) through scRNA-seq data analyses.<sup>7</sup> Therefore, cells with ACE2 receptor distribution may tend to become host cells for the virus<sup>8</sup> and cause an inflammatory response in related organs and tissues, such as the tongue mucosa and salivary glands.<sup>9</sup> SARS-CoV-2 interaction with ACE2 receptors has also been shown to impair taste bud sensitivity, which could induce dysfunctional gustatory responses.<sup>10</sup>

Some of the oral signs and symptoms related to COVID-19 are taste disorders, unspecific oral ulcerations, desquamative gingivitis, petechiae, and co-infections like candidiasis, as reported by some of the case reports.<sup>11</sup> However, it is still not sure

whether these manifestations could be a typical clinical pattern resulting from the direct SARS-CoV-2 infection or a systemic consequence due to the possibility of co-infections, impaired immune system, and adverse reactions of medical treatment of the disease itself.<sup>11</sup> Since the prevalence of clinical manifestations is still unknown, the range of COVID-19 presentations on the oral cavity as the virus's target is considered as broad and of current interest in this review.

### **Oral manifestations can be broadly divided into three groups:**

1. Oral mucosal lesions.
2. Oral osseous lesions.
3. Taste disorders.

### **ORAL MUCOSAL LESIONS**

Several viruses are transmitted through saliva, such as herpes simplex virus, cytomegalovirus, and Zika virus, which are capable of infecting and reflecting in the oral mucosa, leading to painful oral ulcers. Though the virus is said to be "Novel Coronavirus," a few impactful studies have described the oral manifestations of this coronavirus disease 2019 (COVID-19). There is also growing evidence that angiotensin-converting enzyme 2 (ACE2) is the primary host cell receptor of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). It is highly expressed in the epithelial cells of the tongue and of the salivary glands. This may explain the development of dysgeusia in patients with COVID-19. Hence, it is vital to recognize whether SARS-CoV-2 can infect and replicate in oral keratinocytes and fibroblasts, causing oral ulcerations and superficial necrosis. SARS-CoV-2 binds to the angiotensin-converting enzyme 2 (ACE2) receptor, which is also detected in the cell membrane of numerous other human organs and tissues. These may include the lungs, kidneys, liver, epithelial cells of the tongue and salivary glands, upper respiratory tract, nervous system, and skeletal muscle.<sup>7</sup>

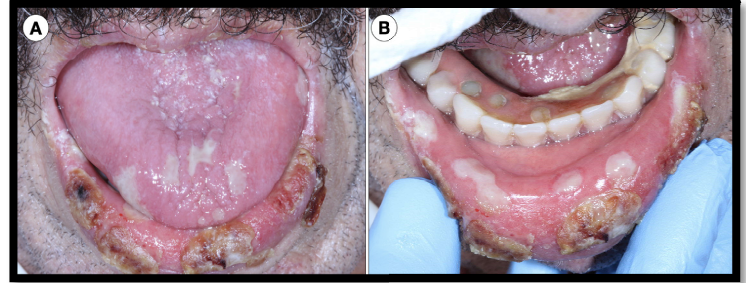
Although SARS-CoV-2 can be detected in saliva and oropharyngeal secretions, its routes of infection remain elusive, and very little is known about the routes of its transmission through the oral

mucosa. Thus, more clinical evidence and research are needed to confirm the ability of SARS-CoV-2 to infect the oral tissues and its pathogenic mechanisms in the oral and oropharyngeal mucosae. Hence in this review, we have tried to describe different presentations of Covid-19 in the oral environment by compiling other cases from various case reports and case series available in the recent literature on Covid-19.

## CLINICAL PRESENTATION OF ORAL MUCOSAL LESIONS

### CASE PRESENTATION 1:-

An 81-year-old man reported with cough and progressive chest tightness present for ten days. The patient had a medical history of well-controlled hypertension and chronic obstructive pulmonary disease. The patient had signs of dysgeusia, chills, and fever. The patient also developed a dry cough and mild dyspnoea afterward and was treated using azithromycin and ceftriaxone for seven days. The diagnosis of COVID-19 infection was made on real-time Reverse Transcriptase-Polymerase Chain Reaction (rRT-PCR) amplification of the viral DNA from a collected pharyngeal sample. Head and neck examination did not identify any asymmetries, swellings, or enlarged cervical lymph nodes. Still, the oral examination revealed multiple shallow aphthous-like ulcers of varying sizes and irregular margins covered with mucopurulent membrane, suggesting superficial necrosis in the upper and lower lip mucosa as well as the anterior dorsal tongue (*Figures 1A and 1B*). The lesions were painful on palpation. Herpes simplex virus (HSV-1) was detected in the saliva sample by PCR. The patient was immediately started on intravenous acyclovir 250 mg/m 3 times a day for ten days, but there was no clinical improvement. To manage the pain associated with the oral ulcers, a trained dentist administered daily photobiomodulation therapy (PBMT) for ten consecutive days. After 16 days in the intensive care unit (ICU) and 14 additional days in a critical care unit, the patient's clinical course and respiratory status showed an improvement, so he was discharged.<sup>12</sup>



**Fig. 1. A, Clustered ulcers 1 to 1.5 cm in diameter covered with crusts occurring on the lower lip (vermilion). Ulcerative painful lesions with superficial necrosis affecting the anterior dorsal tongue. B, Lower lip mucosal ulcers covered with a mucopurulent membrane and the so-called aphthous-like pattern.**

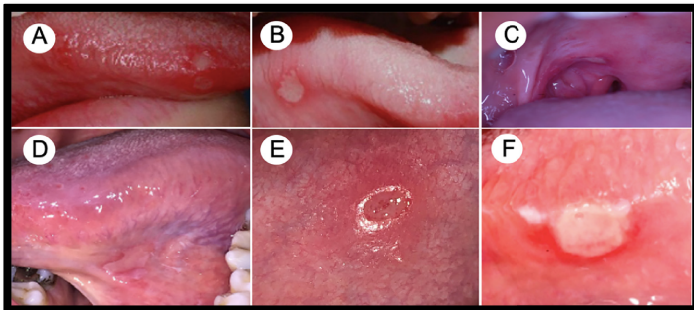
### CASE PRESENTATION 2:-

An 83-year-old female patient reported for abdominal distension and mild dyspnea. Her past medical history was significant for obesity, Parkinson's disease, hypertension, pancreatitis, and chronic obstructive pulmonary disease. Lung CT showed discrete hyperdense areas in both lungs. rRT-PCR for SARS-CoV-2 yielded positive results, and the patient was placed in an isolation ward. Head and neck examination results were negative. The intraoral examination identified a 1.5 X 1.5 cm ulcer on the right lateral border of the tongue and a discrete area in the anterior hard palate affected by a petechia and a shallow necrotic area (*Figures 2A and 2B*). Both lesions were painful and developed simultaneously to hospital admission. PCR of saliva was negative for HSV-1. The patient started receiving PBMT according to the standard protocol of the hospital. Complete pain control was achieved after five days of light therapy. Because of the mild respiratory symptoms, the patient was placed in a critical care unit and showed improvement after ten days of hospitalization.<sup>12</sup>



**Fig. 2. A: Painful ulcer on the right lateral border of the tongue. B: Focal erythema/petechia and a shallow necrotic area on the anterior hard palate.**

Several other similar presentations have been reported in the literature. (Fig. 3)<sup>12</sup>



**Fig. 3. Lesions are presenting an aphthous-like pattern. A, B, Patient presenting with multiple shallow ulcers at the tongue's apex and anterior lateral border. C. Patient with an isolated peritonsillar major aphthous-like ulcer. D. Patient showing solitary, painful ulcer in the ventral portion of the tongue. E. Patient with ulcerated lesion with slightly elevated and a marked erythematous halo. F, Patient has an aphthous-like ulcer covered by a necrotic membrane on the tongue's lateral border.**

#### APHTHOUS ULCERATIONS AND DESQUAMMATIVE GINGIVITIS DURING COVID PANDEMIC (Cases courtesy- Dr. Om Baghele)

It has been observed by some of the authors that, the incidence of major aphthae and desquamative gingivitis-like lesions was higher during the lockdown period because of Covid-19, especially during the month of April to August 2020. This was the period when even dental clinics were closed apart from urgent case management. Many calls for telephonic consultations were regarding oral

ulcerations may or may not be associated with pharyngeal inflammation. Many of these cases refused to undergo Covid testing for obvious apprehensions. We also found it is difficult to follow up such cases (telephonic consultations) for pre- or post-covid exposures. We asked for photographs to be taken with their mobile phones, whenever possible and submit for further diagnosis and management. Many of these patients were experiencing these ulcerations for the first time. When there is no corroborative Covid history these patients were treated with regular established management for aphthous ulcerations and desquamative gingivitis.

Although we can't say whether these lesions were because of SARS CoV-2 infections, definitely there prevalence has increased during the lockdown period. The tension and uncertainty of Covid, job losses or reduced pay packages, restrictions on activities and increased cost of living may have triggered forced behavioural changes leading to stress. Both these disorders are found to be positively associated with stress, nutritional deficiencies and immunocompromised states.



**Fig 4: Few photographs sent through telephonic consultations are presented here, few are also showing pre- and post-treatment clinical picture. (Photographs courtesy- Dr Om Baghele)**

The living systematic review aimed to summarize evidence on the prevalence of oral signs and symptoms in patients with COVID-19 was reviewed. Oral mucosal lesions showed various clinical aspects, varying in localization, size, color appearance, and quantity. Patients presented blisters, ulcers, erosion, macule, and plaques. Four patients showed oral mucosal lesions in a localized area, while the lesions were diffuse in 3 patients, and data were not



reported for one patient. Tongue mucosa was affected in 5 cases, while injuries on the lips and palate were reported in 3 points each, and buccal mucosa and gingiva were described once in different patients (Table 1).

**Table 1. Oral Lesion Characterization in Patients with COVID-19 (n = 7 Studies)<sup>13</sup>**

Study	Oral Signs and Symptoms	Location on Oral Mucosa	History of Appearance	Duration and Recovery	Reported Diagnosis
<b>Amorim dos Santos (2020), Brazil</b>	1) White plaque. 2) Multiple pinpoint yellowish ulcers. 3) Nodule. 4) Severe geographic tongue + fissured tongue. 5) Extremely viscous saliva	1) Tongue dorsum 2) Tongue dorsum. 3) Lower lip	On the 24th day of hospitalization, the white plaque was persistent and associated with yellowish ulcers. Two weeks later, severe geographic tongue was observed	14 d after the first oral examination, the lesions on the tongue dorsum resolved almost completely. Severe geographic tongue improved to moderate within approximately 17 days after its appearance	1) Fungus infection. 2) Herpetic recurrent oral lesion. 3) Fibroma. 4) Geographic tongue. Authors suggested that oral lesions, coinfections, and secondary manifestations may be due to systemic condition of the patient
<b>Ansari (2020), Iran</b>	Several painful ulcers, with irregular margins and varying sizes in red and nonhemorrhagic background	Case 1: Hard palate. Case 2: Anterior region of the tongue	Case 1: 5 d after the onset of symptoms. Case 2: 1 week after hospitalization	Approximately 7 d of duration until complete recovery	Diffuse edema with desquamation, granulation, and ulceration under the mucosa, with invasion of mononuclear and neutrophilic cells, indicating a secondary bacterial infection. Negative serologic tests for herpes simplex virus type 1 and 2. Authors suggested that oral lesions are due to COVID-19
<b>Cebeci Kahraman (2020), Turkey</b>	1) Largely erythematous surface. 2) Few petechiae. 3) Numerous pustular enanthema (1 to 3 mm in	1) Oropharynx and hard palate. 2) Palate midline. 3) Near soft palate border, more prominent on the left side	10 d after the onset symptoms	After a few days of therapy	Diffuse oropharyngeal erythema, petechia, and pustule formation. Authors suggested that oral mucosal may be involved in COVID-19 symptoms

	diameter)				
<b>ChauxBodard (2020), France</b>	Irregular ulcer	Dorsal side of the tongue	First symptom: a painful inflammation of a tongue papilla. 24 h later: erythematous macula. After, the lesion turned to an irregular and asymptomatic ulcer	10 days of duration until complete recovery	COVID-19 is associated with inflammatory reactions, such as vascular inflammation. The ulcer observed after a macular erythematous lesion could be explained by vasculitis. Authors suggested that these oral ulcers could be an inaugural symptom of COVID-19
<b>Martin Carreras-Presas (2020), Spain</b>	1) Pain. 2) Small blisters. 3) Desquamative gingivitis	1) Tongue. 2) Internal lip mucosa. 3) Gingiva	1) With first symptoms. 2 and 3) 1 mo after first symptoms	3 days of duration and treatment until recovery	Suggestive of erythema multiforme. Authors suggested that SARS-CoV-2 may provoke exanthematic lesions
<b>Putra (2020), Indonesia</b>	Stomatitis aphthous	Not reported	7 d after the first symptom (fever)	3 days of duration until recovery	Stomatitis aphthous. Authors suggested a diagnosis of hand, foot, and mouth disease
<b>Soares (2020), Brazil</b>	1) Painful ulceration. 2) Multiple reddish macules of different sizes	1) Buccal mucosa. 2) Scattered along the hard palate, tongue, and lips	Not reported	21 days of duration until complete recovery	Diffuse chronic inflammatory infiltrate with focal areas of necrosis and hemorrhage in the lamina propria. Intense lymphocytic infiltration in adjacent minor salivary glands. Negative IHC reactions against HHV-1, HHV-2, CMV, treponema pallidum, and EBV. Authors suggested that oral mucosal may be involved in COVID-19 symptoms

CMV: Cytomegalovirus; EBV: Epstein-Barr virus; HHV: Human herpesvirus; IHC: Immunohistochemical.

In the 2 cases, first oral manifestations developed in association with the initial systemic symptoms (Chaux-Bodard et al. 2020; Martin Carreras-Presas et al. 2020). Also, patients with severe COVID-19 infection developed late lesions

between the 7th and 24th day after symptom onset (Amorim dos Santos et al. 2020; Ansari et al. 2020; Cebeci Kahraman and Caşkurlu 2020; Martin Carreras-Presas et al. 2020; Putra et al. 2020). In all patients, the lesions healed within 3 to 21 d through topical treatments, by oral hygiene, or spontaneously. Two patients presented negative serological test results for herpes simplex virus type 1 and 2 antibodies (Ansari et al. 2020), and 1 showed negative immunohistochemical reactions against herpes simplex virus types 1 and 2, cytomegalovirus, *Treponema pallidum*, and Epstein-Barr virus (Soares et al. 2020). However, other infectious, inflammatory, and autoimmune disorders could not be excluded from the diagnosis. Therefore, oral mucosal lesions seemed to develop as secondary manifestations and co-infections related to the patients' weakened systemic condition.

## DISCUSSION

This review presented several cases of SARS-CoV-2 infection, with oral manifestations developing during the infectious period of the disease. Of importance, the oral presentations appeared concomitant with the loss of taste and smell. The oral lesions were more severe and widespread in older patients with more severe COVID-19 infection. The observed lesions presented two well-defined and distinct patterns, one resembling aphthous-like ulcers in young patients with mild cases of COVID-19 and another with more widespread patterns resembling HSV-1 necrotic ulcers in the more severe and immunosuppressed older individuals<sup>14</sup> (Table 2).

**Table 2. Clinical features of the oral ulcers in patients with COVID-19**

Patient	Gender	Age	COVID-19 severity	Anosmia	Dysgeusia/Ageusia	Oral lesion	Time to onset (days)	Duration
1	M	81	Severe	No	Yes	Aphthous-like + necrosis	5	11
2	F	71	Severe	No	Yes	Hemorrhagic ulcerations with necrotic areas	4	> 15
3	F	83	Mild	No	No	Aphthous-like + necrosis	2	5
4	M	72	Mild	No	No	Aphthous-like + necrosis	5	7
5	F	32	Mild	Yes	Yes	Aphthous-like	10	5
6	M	35	Moderate	Hyposmia	Yes	Aphthous-like	6	8
7	M	29	Mild	Yes	Yes	Aphthous-like	8	5
8	M	28	Mild	Yes	Yes	Aphthous-like	8	6

COVID-19, coronavirus disease 2019; M, male; F, female.

The recently published tropism of SARS-CoV-2 to the tongue and salivary gland epithelium are essential, suggesting that the virus may target the

oral mucous membrane. This leads us to speculate that the development of oral manifestations in these patients may be directly associated with the COVID-19 infection. Whether the lesions are caused directly by the virus or are an associated manifestation resulting from the patient's severely compromised state remains to be determined. Nevertheless, considering that the distribution of ACE2 receptors may determine the route of SARS-CoV-2 infection, the presence of ACE2 receptors on the tongue and salivary glands, as recently described, suggests that the epithelial cells of the tongue and the salivary glands may be involved in COVID-19 infection and the dysfunction caused by it. This could lead to the development of dysgeusia and oral mucosal ulcerations, and necrosis. Thus, the interaction between SARS-CoV-2 and ACE2 might disrupt the function of oral keratinocytes and the epithelial lining of salivary glands ducts, resulting in painful oral ulcers. Therefore, understanding the pathogenesis of COVID-19 infection is vital for developing robust infection control in dental offices and hospitals. After infection of the oral keratinocytes/glandular tissues, there is an increase in the cell walls' permeability to foreign pathogens and viral replication in the cells lining the oral mucosa, leading to ulcers and necrosis.

Unlike taste disorders, oral mucosal lesions were described in only a few case reports, to understand whether this type of condition is directly caused by SARS-CoV-2 or represents secondary manifestations disorderly taste responses is inconclusive. Thus, it is important to carry out clinical oral examination of patients with infectious diseases in the intensive care unit, given the need for support, pain control, and quality of life in Covid-19 patients.

## CONCLUSION

Oral symptoms are not frequently described in clinical studies related to COVID-19. This review suggests a new etiopathogenic mechanism between ACE2 and SARS-CoV-2 may exist in the oral cavity. Hence additional clinical and epidemiologic data are required to validate this hypothesis. Awareness of such oral manifestations is essential because the lesions may precede the typical respiratory



symptoms by several days, and the oral lesions' worsening may precede a more serious clinical scenario. Additional studies need to investigate whether SARS-CoV-2 infection directly causes oral ulcerations or whether oral lesions are a coincidental event with COVID-19 progression. Dentists working in the hospital setting or ICUs should perform careful oral and oropharyngeal examinations and document suspicious oral lesions in patients with COVID-19, especially in those who complain of loss of taste and smell.

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# PARADIGM SHIFT IN PROSTHODONTIC PRACTICE DURING COVID-19

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## Abstract:

The COVID-19 virus has been circulating rapidly across world in recent months. WHO declared COVID-19 as a pandemic due to the alarming levels of spread and severity. It spread by transmission various routes such as air-born, contact spread, by contaminated surface. The dental health workers are the most frequently getting affected during dental procedure as dentist are in close contact to saliva, blood, and oral cavity. During this, Prosthodontist are more susceptible to COVID-19 virus because of aerosols during tooth preparations, implant placement. There are many standard operative protocols given by various institute for safety of doctors. This study provides brief details on the potential source of COVID-19 spread in the setup of Prosthodontics for patient care and clinical strategies.

**Keywords:** COVID-19, Pandemic, Dentistry, Aerosols, Transmission, Prosthodontics

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## INTRODUCTION:

A new human coronavirus, also referred to as Extreme Acute Respiratory Syndrome Corona Virus 2 (SARS-CoV-2), was announced by the Chinese Centre for Disease and Prevention in January 2020 as the causative microorganism of the COVID-19 outbreak.<sup>1</sup> The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was declared a pandemic in March 2020 by the World Health Organization. This spread rapidly and globally, affecting the health of people. COVID-19 related mortality is mild, with high propagating capacity. Symptoms of COVID-19 include fever, fatigue, dry cough, and dyspnoea.<sup>2</sup> Most infected people show mild to moderate respiratory illness. People with underlying systemic diseases such as Diabetes Mellitus, heart diseases, and respiratory disease are at higher risk of mortality.<sup>3,4</sup>

Currently, there are no specific vaccines or other therapies developed for COVID-19 until now. In the current COVID-19 pandemic, Dentists,

auxiliaries, and patients undergoing the dental procedure are at a high risk of cross-infection.<sup>5</sup> During dental treatment procedures, contact occurs mostly with the patient's saliva, oral cavity, blood. Saliva is rich in COVID-19 viral load.<sup>6,7</sup> and of which, many patients are asymptomatic, which are carriers and spread viral infection mostly. Hence, during dental treatment and patients visiting the dental office must be treated with care and precautions. Prosthodontics, which is a specialty of dentistry that deals with services to the mature age group in the form of Complete Denture, Removable Denture, Implant-supported Prosthesis, and Crown and Bridge to replace missing teeth.

The challenge to a Prosthodontist is much more because of the high concentration of copious saliva in trays & dentures, exposure to blood during pre-prosthetic surgeries and implant placement, and exposure to aerosols during tooth preparation for crown and bridge. Prosthodontics mostly requires more than one appointment to complete treatment.

The Prosthodontics treatment undergoes multiple human chains like a patient, doctor, assistant, lab technician, etc. So Prosthodontics should take proper care of the COVID-19 virus during the treatment.

## 1. TRANSMISSION ROUTES OF COVID-19<sup>2,8</sup>

### A. Air-born:

The microorganism can be transmitted through the air by cough, sneezing, or talking without the mask that can remain suspended in the air for long periods. This is the most common route of transmission of microorganisms. In dentistry aerosols (a suspension of fine particles or liquid droplets in air or another gas) are most commonly seen.

### B. By contact spread:

In dentistry, frequently direct or indirect contact with human fluid, contaminated instruments and patient's material may be a possible way to spread microorganisms.

### C. By contaminated surface:

During the dental procedure, a large number of aerosols are produced from the oral cavity spread across the environment and settle down on different objectives when a healthy person contacts the same object, the chances of transmission of microorganism increases.

## STANDARD OPERATIVE PROTOCOL

### Protocols for patient:<sup>9,10</sup>

1.	Initial tele-screening of dental patients to identify suspected COVID-19 carriers
2.	Considering recently recovered patients as potential virus carriers for at least 30 days after the recovery confirmation by a laboratory test.
3.	Proper record, address, contact details are of paramount importance, as incubation period of SARS-CoV-2 may extend over 2 weeks, a positive response any of the above queries mandates deferring the appointment for at least 2 weeks and should motivated for self quarantine at isolated place for minimum 2 weeks <sup>7,11,12</sup> .

4.	Those patient who are fit for appointment should instructed to wear a surgical mask, be instructed to arrive on time of appointment, and should come alone.
6.	The waiting area should be properly ventilated with at least 2-3 feet space between each seating position without any paper, magazines, toys or any material
7.	Schedule appointment such that it minimizes possible contact with other patients in the waiting room.
8.	Contactless thermal screening and pulse oximeter should be used and allow only patient who have more than 90% oxygen saturation.
9.	Patients should be instructed for hand sanitization and proper hand washing as soon as he/she enters the clinic.
10.	Make sure to motivate patient for minimize the appointment as possible as.
11.	Encourage and educate the patients to pay the fees by Digital routes
12.	After treatment is done ask patient to hand sanitization again to avoid spread.

### Protocols for Doctors and Clinic Operator:<sup>2,7,13,14</sup>

1.	All doctors and staff should wear complete PPE kit and should be trained for sanitization and infection control.
2.	While consulting patient, use separate screening or apply the barrier between doctor and patient with transparent plastic.
3.	Use minimal staff with proper alternative to them with a good rest so that symptoms can detect earlier if someone get infected.
4.	Covid related posters or videos should display or shown in clinic or work place.
5.	Before doing patient a proper hand sanitization should be done
6.	After every splatter related /aerosol generating treatment, strict fumigation needs to be done.
7.	Hand pieces, burs, diagnostic instruments, etc., have to be stringently autoclaved, in sealed pouches.
8..	Used burs should be soaked in a proper disinfectant solution after scrubbing prior to

	autoclaving or dispose it if possible.
9.	Before beginning the procedure, patient should also be covered with a full length drape, head cap and goggles.
10.	After clinical procedure if impression is taken it should be properly disinfected in various disinfectant like 2% Glutaraldehyde or Chlorine compounds for 10 minutes.
11.	Ensure suction pumps are flushed with chemical cleaning solution as per manufacturer's instructions.
12.	Prepare a checklist to assess and complete the closure of dental practice at the end of the day
13.	If not an emergency advice the treatment from home itself.

#### **Protocols for Prosthodontic emergencies:**

As 'emergency' may not apply to Prosthodontic treatment in the true medical sense, there are many situations in which Prosthodontist attention is required urgently. Urgent care is needed for the patient so that he can carry his normal function without any disturbance.

1.	Denture fracture due to dental trauma and repair of broken denture.
2.	Ill fitting denture.
3.	If ulceration due to the sharp edge of prosthesis or teeth.
4.	Final crown/bridge repair or cementation if the temporary restoration is lost or broken.
5.	Problem with implant and implant supported denture.
6.	The need for temporary or immediate dentures.

#### **Protocols for Laboratory Technician**<sup>1,5,7,8,11,12</sup>

1.	Practice social distancing.
2.	Routine temperature checks as well as the pulse oximeter readings should be done.
3.	Staff should be minimum as required for the work.
4.	Hand sanitizers are to be placed at vantage points and hand should be washed frequently by using soap and water after every case and avoid touching to eyes and face.
5.	The protective garment, mask and eyewear

	should be wearing in the laboratory.
6.	While using the trimmers and buff the fragments are sucked out using a high vacuum suction.
7.	All lab personnel without exception should observe the proper infection control protocols, including wearing personal protective equipment.

#### **Protocols for disinfection of laboratory:**

1.	All the dental impressions, casts, prosthesis or appliances should be thoroughly disinfected prior to handling both at the clinic or operatory, on acceptance of the work at the lab and prior to delivery.
2.	Laboratory surfaces can be disinfected using the disinfectant spray or surface wipes
3.	The dental laboratory should be fumigated on a regular basis.
4.	The lathe machine should be cleaned and disinfected daily.
5.	Pumice must not be used for more than one case.
6.	Non-sterilizable instruments such as some face bow components must be cleaned with soap.
7.	Articulators can be disinfected by spraying with a hospital-level disinfectant.
8.	Separate polishing attachments should be kept for all cases coming in the lab.

#### **Hand hygiene and Personal Protective Equipment (PPE) instructions:**<sup>7,8,10,14</sup>

The importance of hand hygiene for both the practitioner and the associated staff is crucial.

Hand hygiene procedure should be done before and after the following procedure:

- Before and after the removal of PPE.
- Following the washing of dental instruments.
- Before contact with instruments that have been steam-sterilized.
- After cleaning or maintaining decontamination devices used on dental instruments.
  1. Mild soap should be used when washing hands. Ordinarily, the hand-wash rubbing



action should be maintained for about 20 seconds.

2. Prevent recontamination of washed hands; disposable paper towels should be used for drying the hand.
3. Fingernails should be kept clean, short, and smooth. Dental procedures staff should not wear nail varnish and false fingernails.
4. Before carrying out hand hygiene, rings, bracelets, and wristwatches should not be worn by staff undertaking clinical.

#### Management of Medical Waste:<sup>2,9,12,15</sup>

1. Before any inappropriate accumulation, dental office waste should be routinely transported to the institution's temporary storage facility.
2. Dental waste resulting from suspected patient's treatment is considered medically infectious waste strictly disposed of under the official instructions using double-layer yellow medical waste package bags.
3. Follow all OSHA and the local municipal guidelines for biohazard waste.
4. Treat waste contaminated with blood, body fluids, secretions, and excretions as clinical waste, under local regulations. Discard single-use items properly.

#### Conclusion:

The rapid spread of the COVID-19 pandemic is associated with an increased possibility of the clinician getting exposed to COVID-19 from infected patients. Each patient should undergo proper screening of symptoms before the treatment. There is no such universal safety protocol for the dentist and dental auxiliaries in this pandemic situation. Various committees give different guidelines for dental hospitals and private practitioners for safety precautions. This can help to reduce transmission and break the chain of transmission of infection. So it is more important for dental professionals to take all precautions in their routine practice and additional safety measures during treatment.

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# RISING INCIDENCE OF MUCORMYCOSIS DURING COVID 19: A REVIEW

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## Abstract:

During this pandemic of COVID-19, we discover that patients with COVID-19 are at increased menace of fungal infections. As this novel disease spreads worldwide, new challenges arise in the clinical practice with the growing risk of co-infections is a significant threat not only to the health systems but also to patient's lives. Although there is still not enough published statistical data, co-infections in COVID-19 patients found that a significant number of patients hospitalized with COVID-19 developed secondary systemic mycoses that led to sever complications and even death. This review will discuss incidence of rising cases of mucormycosis during pandemic.

**Keywords:** COVID-19, Gastrointestinal, Mucormycosis, Pandemic & Pneumonia.

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## INTRODUCTION:

The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is causing the pandemic covid-19. This current global issue is associated with a wide range of disease patterns, ranging from mild to life-threatening pneumonia.<sup>1</sup> The existence of a wide range of fungal co-infections may be related to preexisting morbidity (diabetes mellitus, lung disease) or may develop as a hospital-acquired infection such as ventilator-associated pneumonia.

Pandemic has rapidly spread to 212 countries and caused nearly 5 million laboratory-confirmed cases and more than 310,000 deaths globally.<sup>2</sup> COVID-19 patients always have immunosuppression with a decrease in CD4 +T and CD8 +T cells.<sup>3</sup> Critically ill patients admitted to the intensive care unit (ICU) with more extended stays were more likely to develop fungal co-infections.<sup>4</sup> It is crucial to notice that COVID- 19 patients can develop fungal infections.<sup>5</sup>

Mucormycosis or Zygomycosis, also called Phycomycosis, is an uncommon, aggressive, invasive, rapidly progressive, and life-threatening fungal infection. According to Paltauf (1885), it has a high mortality. Imaging techniques are not typically diagnostic. Even their cultures are not reliable. The histological examination obtains a definitive diagnosis. Treating underlying diseases and aggressive medical and surgical management is insufficient, leading to an extension of the infection and death.<sup>6</sup>

Due to the rich vascularity of anatomy in the maxillofacial region, there are a few incidences of opportunistic infections.<sup>7</sup> Mucormycosis can evade this defense mechanism because of their potential virulence.<sup>8</sup> Attributable risk factors are uncontrolled diabetes mellitus, Acquired Immune Deficiency Syndrome (AIDS), long-term steroid therapy, hematological conditions like leukemia and lymphomas, renal failure.<sup>9</sup> Mucormycosis can gain entry into the body through the nose, breached skin, and tooth extraction sockets. Primary infection sites

include the skin, ears, gastrointestinal tract, and there could be disseminated forms involving multiple locations like pulmonary and rhino-orbito-cerebral.<sup>10</sup> Depending on the site of infection and underlying predisposing factors, mortality rates may vary from 10% to 100%.<sup>7</sup> Early diagnosis and immediate intervention are essential for such patients. Treatment includes control of the underlying risk factors, antifungal therapy, surgical debridement, supportive therapy, and surgical or prosthetic rehabilitation. It is essential to the restoration of quality of life to the pre-morbid state.<sup>11</sup> In this article, we will review the incidence of the rise of mucormycosis cases in covid-19 positive patients.

#### **METHOD:**

We did the literature search in PubMed and Google Scholar to analyze the reported cases of mucormycosis during Covid-19. Publications with relevant information based on their abstracts and, or full text are included in this article. Only reported cases of Mucormycosis during pandemic were included. Cases with other fungal infections and case reports before the pandemic were excluded.

#### **RESULTS:**

We reviewed literature on the subject (MUCORMYCOSIS COVID-19) over the past one year (December 2019-current date). There were case reports of mucormycosis with orbital compartment syndrome, rhino-orbital mucormycosis, gastrointestinal mucormycosis, pneumonia, and a middle cerebral artery infarct.

Salil Mehta, Abha Pandey reported a 60-year-old male patient's history of severe breathlessness, pyrexia, tachypnea, and generalized malaise with longstanding diabetes (> 10 years) on oral anti-hypoglycemic tablets. The relevant physical examination revealed bilateral crept at the lung bases with a normal cardiovascular and neurological exam; a positive nasopharyngeal swab was confirmed by chest CT scan. He also presented with Bilateral lid edema with right eye prominence. MRI of the brain showed orbits, paranasal sinuses, a soft tissue swelling in the right malar, premaxillary, and retrobulbar regions, preliminary diagnosis of right orbital cellulitis was made. After ophthalmic

evaluation, clinical and MRI findings suggested invasive fungal infection, likely mucormycosis. It started with antifungal therapy, but this ventilated patient continued to deteriorate. Despite all preventive measures, he died on day six of this admission.<sup>11,12</sup>

Epifanio Silvino do Monte Junior et al. have reported a case of an 86-year-old male patient with a history of arterial hypertension who was admitted to the emergency room with acute diarrhea, cough, dyspnea, and fever that started five days before admission. The collected throat swab from the patient confirmed COVID-19. The patient presented melena and severe anemia with mild abdominal tenderness within five days of ICU admission. Two giant gastric ulcers with dirty debris and a deep hemorrhagic base without active bleeding located in the greater and lesser curvature. Pathological examination confirmed mucormycosis. Unfortunately, the patient dies one week following hospitalization, 36 hours after the EGD, and before a diagnosis was established.<sup>13</sup>

Hanley et al. reported a case of a 22-year-old male with COVID-19 pneumonia and a middle cerebral artery infarct. This disseminated mucormycosis involving the lungs and brain was discovered during a postmortem study.<sup>14</sup>

Werthman-Ehrenreich reported the case of a female 33-year-old who showed signs of left-sided ptosis and proptosis with altered sensorium. She also had underlying diabetic ketoacidosis with a positive COVID-19 nasopharyngeal swab. Facial imaging showed maxillary and ethmoidal sinus mucosal thickening. The brain MRI showed multiple areas of infarction and ischemia. The nasal biopsy and subsequent culture showed mucor presence. All findings confirmed the diagnosis of the invasive mucor infection. The author concluded that early identification of fungal co-infections might significantly reduce morbidity and mortality.<sup>15</sup>

#### **DISCUSSION:**

Mucormycosis is a rare opportunistic fungal infection characterized by infarction and necrosis of host tissues resulting from the vasculature invasion by hyphae. This disease usually presents with signs of acute sinusitis, fever, nasal congestion, purulent

nasal discharge, and headache. Sinuses involvement with contiguous spread to adjacent structures such as the palate, orbit, brain results in clinical symptoms. It can spread from the ethmoid sinus to the frontal lobe results in obtundation. Clinical suspicion and early treatment with surgical debridement are vital in preventing the morbidity of this often-fatal condition. The clinical hallmark of mucormycosis is vascular invasion resulting in thrombosis and tissue infarction/necrosis. The most common clinical presentation of mucormycosis is a rhino-orbital-cerebral infection. It is believed to be secondary to inhalation of spores into the paranasal sinuses of a susceptible host. Predisposing mucormycosis factors are diabetes, systemic corticosteroid use, neutropenia, hematologic malignancies, stem cell transplant, and immunocompromised individuals. Seventy percent of rhino-orbital-cerebral mucormycosis cases have been found with diabetes mellitus. They also developed ketoacidosis at the time of presentation. The major diagnostic modalities for mucormycosis are histopathology, direct microscopy, and culture from clinical specimens.<sup>8</sup> A complex interplay of factors may lead to an increase in the incidence of secondary infections. Due to their impact on morbidity and mortality is being recognized.<sup>14</sup>

In a recent review, 8% of patients had secondary fungal infections during hospital admission with the widespread use of broad-spectrum antibiotics.<sup>15</sup>

In India, guidelines recommend intravenous methylprednisolone 0.5-1 mg/kg/day for three days in moderate cases. The dose needs to increase up to 1-2 mg/kg/day for three days in severe cases.<sup>16</sup> The National Institute of Health recommends the use of dexamethasone (6 mg per day for a maximum of 10 days) in ventilated patients or require supplemental oxygen, excluding milder cases.<sup>17</sup> There are specific pathophysiologic features of COVID-19 that may permit secondary fungal infections to cause widespread pulmonary disease and the following alveoli-interstitial pathology. That may advance the risk of invasive fungal infections.<sup>18</sup> The immune dysregulation associated with COVID-19 may show reduced numbers of T lymphocytes- CD4+T and CD8+T cells. This leads to alteration in innate immunity.<sup>19</sup> New Delhi (India) reported 15 admitted

patients with COVID-19 infection developed bloodstream candida infections. Out of which 10 had a fungal infection.<sup>20</sup> White et al. screened 135 adults with COVID-19 illness and reported an incidence of invasive fungal infections of 26.7% (commonly aspergillosis (14.1%), or yeast, usually candida (12.6%). Patients with invasive fungal diseases had higher mortality (53% with vs. 31% without). This was significantly reduced by appropriate therapy. Corticosteroid therapy with a history of chronic pulmonary disease was associated with a higher risk of invasive fungal infection.<sup>21</sup> Similarly, high incidences have been noticed in Pakistan (23/147, 15.6%) and Italy (30/108, 27.7%). The authors suggested that the development of invasive fungal infections alters the natural history of the disease.<sup>22, 23</sup> Song et al. have presented a procedure for the early diagnosis and management of common invasive fungal infections (aspergillus, candidiasis, cryptococcosis, and mucormycosis).<sup>24, 25</sup>

The incident rate of mucormycosis varies from 0.005 to 1.7 per million population.<sup>26,27</sup> The global mucormycosis case fatality rate is 46%.<sup>28</sup> Mucormycosis is challenging to diagnose. Early diagnosis and treatment are essential. A delay of even six days is associated with a doubling of 30-day mortality from 35% to 66%. Despite early diagnosis and aggressive combined surgical and medical therapy, the prognosis for recovery from mucormycosis is poor. High suspicion must be considered in immunocompromised patients. It shows unilateral facial pain or swelling, orbital swelling, or proptosis in high-risk individuals. Tissue necrosis is a hallmark of mucormycosis. This may be consequential from angioinvasion and vascular thrombosis. Once the diagnosis is considered, empiric antifungal treatment should be started. A prompt surgical opinion should also be sought. Orbital compartment syndrome (OCS) results from an expansile process within the closed compartment of the orbit leading to increased orbital pressure. This may result in ischemia and vision loss. It is an ophthalmologic emergency that requires lateral canthotomy and inferior cantholysis to decompress the orbit. Delay in care can lead to permanent blindness. This diagnosis should be suspected in patients presenting with acute proptosis, elevated

intraocular pressure, rapid vision loss, ophthalmoplegia, fixed dilated pupil, or afferent pupillary defect. OCS causes can be retrobulbar hemorrhage (from trauma, vascular malformations, tumors), cellulitis, orbital malignancy, or previous orbital surgery.<sup>29</sup>

#### SUMMARY AND CONCLUSION:

The COVID-19 is associated with a significant incidence of secondary infections, both bacterial and fungal, probably due to deterioration of immunity. The extensive use of steroids/monoclonal antibodies/broad-spectrum antibiotics as part of COVID-19 treatment may lead to fungal diseases. Clinicians should be aware of the possibility of invasive secondary fungal infections in patients with COVID-19 infection, especially in patients with preexisting risk factors. They should enable early diagnosis and treatment with the subsequent reduction of mortality and morbidity. Monitoring the use of therapeutic agents to achieve a therapeutic effect at the lowest dose and shortest durations. The use of broad-spectrum antibiotics, especially in the absence of infection, should be re-evaluated. This article reviews the data available on various platforms. A further detailed review of the published and unpublished cases should understand better mucormycosis associated with Covid-19

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# ORTHODONTIC MANAGEMENT DURING COVID 19 PANDEMIC

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## Abstract:

Since the start of 2020, coronavirus disease 2019 (COVID-19) was caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2; first named as the 2019-novel coronavirus 2019-nCoV) has rapidly spread throughout the inhabited world and led to unparalleled significant health, humanitarian, and financial predicaments. In several such efforts, performing elective tasks, including orthodontic treatment, were required to be suspended on orders of the centralized, regional/state, and local and public health or regulatory bodies. Since orthodontic treatment is a lengthy and continuous process, millions of patients throughout the world were already undergoing orthodontic treatment when planned care was abruptly suspended. It has been nine months since the first lockdown in India and six months since the unlock of the same began. However, still consolidated information and guidelines for patients' clinical orthodontic management during the COVID-19 pandemic are lacking. This review aims to provide an all-inclusive summary of the implications of SARS-CoV-2 and COVID-19 on orthodontic treatment and to discuss the contingency management and provision of orthodontic care, using currently available data and literature.

**Keywords:** COVID19, Orthodontic Management, Pandemic.

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## INTRODUCTION:

Since the beginning of 2020, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2; first named as the 2019-novel coronavirus or 2019-nCoV) causes coronavirus disease 2019 (COVID-19) has speedily spread all over the inhabited world and led to unparalleled significant health, humanitarian, and financial predicaments. Thus, efforts have been made to contain the spread of the disease led to major disturbances, compelling local and, in most cases, national emergencies and lockdowns, leaving only essential services to continue. In several such efforts, performing elective tasks, including orthodontic treatment, were required to be suspended on orders

of the centralized, regional/state, and local and public health or professional regulatory bodies. Since orthodontic treatment is a lengthy and continuous process, millions of patients are already undergoing orthodontic treatment when planned care was abruptly suspended. The coronavirus disease 2019 (COVID-19) pandemic has therefore posed a threat to public health around the world that even when we have managed to defeat the infection through effective treatment and by developing vaccination. Dramatic and long-lasting changes are anticipated to affect the way we live, work, and relate to each other. Thus, this pandemic will continue to directly impact all social settings and professions, and orthodontics

will be no exception. It has been nine months since the first lockdown in India and six months since the unlock of the same began. However, still consolidated information and guidelines for the clinical orthodontic management of patients during the COVID-19 pandemic are lacking.

This review aims to provide an all-inclusive summary of the implications of COVID-19 on dentistry in general and orthodontic treatment in specific and to discuss the contingency management and provision of orthodontic care, using currently available data and literature.

### Background

Coronavirus-19 (COVID-19) is believed to have originated from the country of China in the city Wuhan and is caused due to SARS-CoV-2. Structurally, the COVID-19 virus is a single-stranded RNA virus that belongs to a family called Coronaviridae, which includes the known severe acute respiratory syndrome coronavirus (SARS-CoV) 2002 and even the Middle East respiratory syndrome coronavirus (MERS-CoV) that was seen in 2012. It has been identified that bats are the primary source of the SARS-CoV-2 coronavirus, and therefore COVID-19 is a cross-species viral-mediated disease. The disease is said to be zoonotic, thus suggesting it is a disease that usually occurs in animals but can infect humans and spread from animals to people, or, more specifically. The virus's genomics was mapped, and it was found to share 79.5% of the genomic sequence with the SARS-CoV virus.<sup>1,2</sup>

### Symptomatology and Source of Transmission

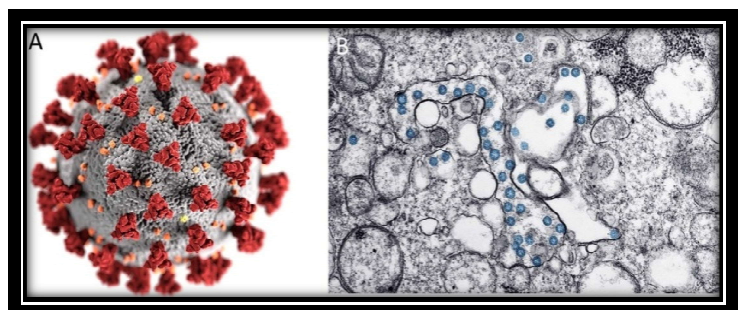
On average, for symptoms to develop in a person is exposed to the virus, it usually takes 5-6 days. But it can also be found that it can take up to 14 days and, rarely, even longer.<sup>3,4</sup>

COVID-19 affects in different ways to different people. The most common symptoms are similar to very much that of the seasonal flu. Patients experience a rising fever, tiredness or shortness of breath and dry cough. Some patients have even been recognized as having joint pains, headache, loss of taste or smell, sore throat, rashes, and diarrhoea. Some asymptomatic patients can act as "carriers" and act as a pool of infection.<sup>5</sup>

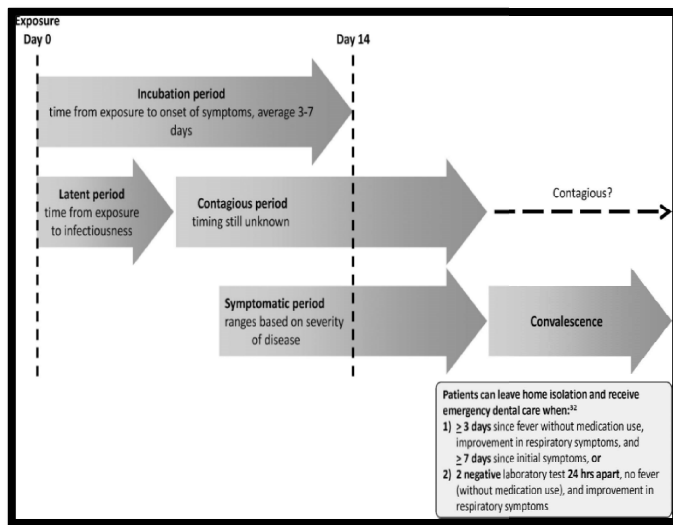
Chest radiography studies show ground-glass opacities in patients with progressed infections. Most patients with no comorbidities and good immunity get over these symptoms with time by developing the necessary antibodies. Development of complications like severe respiratory distress or pneumonia, and the downward spiral into the disease is seen in patients who have a compromised state.<sup>2,6</sup>

SARS-CoV-2 is seen to bind with the human angiotensin-converting enzyme-2 receptors. These receptors are in abundance in the salivary glands of humans. Thus, there is a high possibility for the spread of COVID-19 via respiratory droplets in the air, which can quickly spread to a radius of no less than 4 to 6 feet and thus can enter the body directly through the nose, eyes, ears, or the mouth. On average, a person touches their face 23 times an hour and then some of the other items around. The virus can survive for up to 2-3 days on such objects and surfaces and the spread of the virus can also occur in this way. The incubation period is known to last for 1 to 2 weeks.<sup>6,7</sup>

At the time of inscription this article, no human vaccine exists to cure this deadly virus, though numerous expedited trials are underway.



**Figure 1. (A) Diagram of the ultrastructure of the coronavirus (Centers for Disease Control and Prevention, CDC); (B) Transmission electron micrograph image of an isolate from the first U.S. case of COVID-19 showing the viral particles (blue) (CDC, Bullock HA, Tamim A).**



**Figure 2. Incubation, latency, symptomatic, and contagious periods of COVID-19.<sup>5</sup>**

### Populations at Risk

People of all ages are vulnerable to being infected with SARS-CoV-2. The age dispersion of COVID-19 may differ among nations. Based on currently available evidence, individuals with certain risk factors are at higher risk of developing severe illness from SARS-CoV-2. These include older age (particularly individuals aged 65 years and older), presence of pre-existing medical conditions in individuals of any age (e.g., moderate-to-severe asthma, heart disease with complications, diabetes, chronic lung disease hypertension, renal failure, liver disease, immunocompromised), and close contact with a person detected with COVID-19. Although the symptoms usually are less severe in children with COVID-19, young children, predominantly infants, were shown to be more susceptible and also likely to manifest as harsh or critical cases.<sup>8</sup>

### The implication of COVID-19 on dental practice

All dental professionals, as well as orthodontists, may be at risk of contracting COVID-19 through multiple transmission routes, including the following:

(1) Respiratory droplets from sneezing and coughing or generated during dental practice.

(2) Indirect contact where viral droplets fall on a surface that the dental professional or Orthodontist later contacts,

(3) Aerosols created during dental or orthodontic procedures,

(4) Treating patients who may have had indirect contact from removing and replacing aligners, appliances, and rubber bands

(5) Coming in contact with multiple such persons, including those who accompany the patients.<sup>9</sup> As SARS-CoV-2 has also been detected in the saliva of infected individuals,<sup>10</sup> and this poses an additional risk for dental professionals and their patients.<sup>11</sup>

Dental care procedures may also spread viral particles from saliva during treatment in the same way as coughing and sneezing. Dental aerosol-generating procedures (AGPs) are associated with the use of ultrasonic instruments, air/water syringes, and handpieces.<sup>12</sup> They have been seen to be responsible for the transmission and infection for healthy patients, but at the same time, they also pose a high risk for the dental health care personnel (DHCP).

AGPs can produce droplets having a diameter ranging from 0.1  $\mu\text{m}$  to 900  $\mu\text{m}$ . Liu Y et al. classified the droplets into five groups, with the largest group ranging from 0.25  $\mu\text{m}$  to 1  $\mu\text{m}$ .<sup>13</sup> The particles with this diameter can spread to the alveolus. Droplets < 0.25  $\mu\text{m}$ , with pathogenic microorganisms, can reach up to 20 feet,<sup>14</sup> so the 1-2-meter distance is recommended by WHO is not always enough to prevent cross-infection between DHCP and patients. The minimal aerosol viral load needed for infection is still unknown; however, in vitro experiments show that aerosol contains viable viruses for up to 16 hours.<sup>15</sup> Infectiveness of aerosol of COVID-19 has shown to cause an outburst in conference rooms and buses.<sup>16</sup> Treatment sittings on the dentist chair should be separated into two groups: without AGP and with AGP. Each of them must be managed with proper Personal Protective Equipment (PPE).<sup>14</sup> The Centres for Disease Control and Prevention (CDC) recommends using N95 respirators and not surgical face masks, whenever AGPs are performed.<sup>17</sup> Moreover, if AGP is required for patients who are suspected of being infected with COVID-19, airborne precautions should be strictly followed in a room



with negative pressure and with adequate PPE and, relative to the surrounding area, becomes mandatory.<sup>18</sup> Unfortunately, there is no reliable and efficient test to identify asymptomatic carriers; therefore, everybody should be suspected to be infective.

Orthodontists must be especially aware of the latest updated evidence to deliver a safe setting for themselves and also their patients, and the entire orthodontic team.

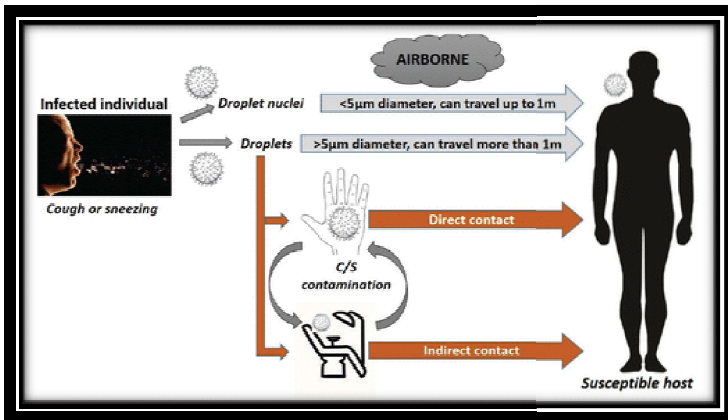


Figure 3 SARS-CoV-2 Virus Route of Transmission in Dental/Orthodontic Care Setup<sup>19</sup>

**Orthodontic practice in this new reality of COVID-19**

The pandemic has affected more than 66 million people all over the world, and India is the second most affected nation after the United States of America has close to 10 million confirmed cases with more than a hundred and thirty-five thousand lives lost to the deadly virus in India as reported until December 5, 2020.



Figure 4: A Snapshot of the COVID-19 Map of the Global Cases<sup>20</sup>

Although most of the confirmed cases are asymptomatic but contagious, it is crucial to schedule priority triage in appointments. As proposed by Aziz S and Kapoor P, for patient management in orthodontic emergencies, minimal in-person contact, as well as ensuring regular maintenance a customized orthodontic triage is projected.<sup>21</sup> (Table 1)

Orthodontic treatment can broadly be grouped under emergency, urgent, delayed, and minimal treatment needs, as per severity.<sup>21</sup>

**Table 1 Orthodontic Issues or Emergencies Based on Urgent Treatment Need**

Emergency	Urgent	Delayed	Minimal
<ul style="list-style-type: none"> <li>Accidental swallowing</li> <li>Chances of inhalation of foreign body</li> <li>Abscess</li> </ul>	<ul style="list-style-type: none"> <li>Severe pain</li> <li>Broken band that cannot be seated back</li> <li>Broken appliance; embedded in gingiva</li> <li>Protruding wire impinging mucosa</li> </ul>	<ul style="list-style-type: none"> <li>Finished or broken elastics</li> <li>Appliance activation</li> <li>Finished or broken aligners</li> <li>Use of functional orthopedic appliances</li> </ul>	<ul style="list-style-type: none"> <li>Loose modules</li> <li>Debonded bracket attached to archwire</li> <li>Broken band which can be seated back</li> </ul>

Source: The classification in the Table is original but the various orthodontic emergencies were compiled from online resources available from American Association of Orthodontist, British Orthodontic Society, and Royal College of Surgeons of England.

**Virtual Assistance**

A virtual triage using pictures, videos, and video-calling can be of immense aid to separate and order the actual orthodontic emergency that needs immediate care in the clinics from the problem that can be self-managed by a home remedy and delayed without reporting to the clinic. A proper dental emergency is one with intractable pain, bleeding, infection, swelling, trauma to teeth or the bones. As concerns, orthodontic emergencies are severe pain or disease that arises due to the embedment of an orthodontic appliance into the gingiva, situations



associated to dental trauma, or a condition in which a lack of intervention that leads to patient injury should be attended.<sup>22,23</sup>

Several messenger apps and video-calling apps are accessible currently. A dental clinic or hospital can use a smartphone messenger with a video-calling facility to connect with patients. If an orthodontic emergency emerges when the patient is at home, it is suggested that discussion occurs over the phone or using a video-calling service along with the Orthodontist. It is advisable to obtain electronically signed or verbal consent to provide the advice in this way and saved as a record. It is a professional duty to counsel and direct the patient on handling minor orthodontic emergencies at home.

**Table 2: Orthodontic Emergency Scenarios and Its Short-Term Management at Home by the Patient under the Guidance of Treating Orthodontist<sup>5</sup>**

Orthodontic Emergency	Advice and Guidelines
Ulcer and/or soreness on the lip/check from the orthodontic brackets and wire	<ul style="list-style-type: none"> <li>A small portion of rolled soft orthodontic relief wax is placed over the bracket/wire, which is causing the soreness or discomfort.</li> <li>The area is swabbed with a small amount of topical anesthetic gel.</li> <li>The antibiotic gel is applied on the ulcer 3-4 times/day for a week.</li> <li>Avoid oily and spicy food for a week or until the time ulcer has healed.</li> </ul>
Loose or broken brackets, bands, and wires	<ul style="list-style-type: none"> <li>Band or the bracket is broken, but it is still attached to the wire; it is better to leave like that if it is not causing any discomfort until the next orthodontic visit.</li> <li>In case it causes irritation/discomfort to the adjacent soft tissue, put relief on the bracket.</li> <li>Do not put any elastic to the broken band or brackets.</li> <li>If the bracket or the band is broken off, keep it at a safe place and bring it to the orthodontic clinic in the next appointment.</li> </ul>
Elastic "O" rings/ligature came out during brushing or having food	<ul style="list-style-type: none"> <li>Elastic "O" ring/ligature can be placed back on the bracket, using a clean tweezer.</li> <li>They can also be removed with the help of a tweezer if the patient thinks he/she cannot place it back.</li> </ul>
Stainless steel ligature become loose and/or irritate the soft tissues	<ul style="list-style-type: none"> <li>Loose ligature can be removed with a clean tweezer. If it does not come out, then use a nail clipper—it can be cut and taken out.</li> </ul>
Loose/broken elastic (e) chain	<ul style="list-style-type: none"> <li>It can be taken out with a clean tweezer or cut with a nail clipper.</li> </ul>
Food caught between the teeth and brackets or soft tissue, leading to discomfort	<ul style="list-style-type: none"> <li>The patient is advised to maintain optimal oral hygiene.</li> <li>Interproximal brushes or toothpick or Waterpik can be used to dislodge food, which has been caught between the teeth and bracket or soft tissue.</li> </ul>
Poking/protruding wire at the end of the brackets	<ul style="list-style-type: none"> <li>The wire can be pushed from the back with a clean tweezer to make the wire in flush with a band/bracket.</li> <li>If it is due to slipping away from the wire, then, using a clean tweezer, the wire is repositioned making sure it is equally and symmetrically positioned.</li> <li>In case the wire causes extreme discomfort, it can be cut with a clean nail clipper; before cutting the wire, a small clean gauze is placed near the area to minimize accidental swallowing or soft tissue piercing.</li> </ul>
The patient has swallowed the piece of the band/bracket/orthodontic appliance accessories	<ul style="list-style-type: none"> <li>If the orthodontic accessory is small and swallowed, assure the patient that it will pass through the gastrointestinal tract, and there is nothing to worry.</li> <li>In case it has been swallowed, the patient should make sure there are no acute respiratory symptoms associated with it (such as a cough) or acute abdominal pain/colic. If such symptoms are present, patient is advised to visit an emergency department of a hospital for clinical examination or, if required, radiological assessment.</li> </ul>
Broken bonded lingual/palatal (BLR) retainers	<ul style="list-style-type: none"> <li>If BLR has come out from one or two teeth with resin pads or without resin pads, it should be trimmed or cut with a clean nail clipper.</li> <li>In cases where whole BLR is loose, and the patient is unable to come to orthodontic clinics, it is advised to take the whole BLR out carefully. In both the abovementioned scenarios, the patient is advised to use the removable retainers, if provided, until the next appointment.</li> </ul>
Broken/loose-fitting transpalatal arch (TPA), lower lingual holding arch (LLA), and maxillary expanders	<ul style="list-style-type: none"> <li>If the TPA becomes loose or broken and still in the patient's mouth close to its original position, and the patient cannot visit the orthodontic clinic, it should be placed back. For expander, no further activation/expansion is advised until the next visit to the orthodontists.</li> <li>If the TPA, LLA, or the expander has fallen out completely, patient should keep it safe and bring it to the orthodontic clinic at the next visit.</li> </ul>
Orthodontic appliance embedded in the soft tissue leading to severe pain and infection	<ul style="list-style-type: none"> <li>This is one of the true emergencies; ideally, the patient is seen by the orthodontist provided the patient has cleared the triage questionnaire with respect to the COVID-19, and proper infection control protocols have to be followed while treating the patient by the orthodontists and his team.</li> <li>In case the patient is unable to be personally seen by the orthodontist at the clinic, then the patient or home-care provider is advised to use a clean and sterile clipper and cut the orthodontic wire if it is attached to the broken or loose part and remove the broken part of the orthodontic appliance from the mouth using the clean tweezer. If required, tell the patient to send the photos through WhatsApp. If needed, an antibiotic and analgesic can be prescribed to the patient digitally, and the same should be saved in his treatment file.</li> </ul>
Poking edges of the aligner	<ul style="list-style-type: none"> <li>If patients feel that the aligner margin is biting on the gum, it can be smoothened with a nail file or by using the previous set of the aligner.</li> </ul>
Broken removable retainer/functional appliance or non-fitting of the same	<ul style="list-style-type: none"> <li>Avoid using the broken/distorted appliance.</li> <li>Keep the broken removable functional appliance in water.</li> </ul>
Fixed functional appliance	<ul style="list-style-type: none"> <li>The patient is advised to send the photos every 3 weeks.</li> <li>Asymptomatic—nothing to do</li> <li>Mild pain/discomfort—warm saline rinses 3-4 times/day for a week.</li> <li>Mild analgesic</li> <li>Moderate to severe—emergency care at the orthodontic clinic.<sup>6</sup></li> </ul>

It seems that the concept of normality in orthodontics, as in many other areas, will never be the same, and only the professionals who manage to adapt to the new scenario will be able to go ahead. Thus, Orthodontics has to adjust to the ongoing scenario to continue its journey in treating patients and creating better smiles and at the same time, be safe from the deadly virus.

### History recording and patient evaluation

A thorough and detailed COVID-19 screening questionnaire, including social history, gatherings, meetings, medical history, and travel history to assess the emergency, is reported as soon as a patient visits the clinic. Trained dental staff must measure the patient's body temperature, using a non-contact infrared thermal sensor.<sup>24,25</sup> As suggested by Center for Disease Control and Prevention (CDC) guidelines, persons exposed to an individual with COVID-19 or a patient reporting with fever (99.32°F/37.4°C or higher), and any high-risk patient suspected as answered in the questionnaire should wear a mask to cover cough and be offered separate space to wait.<sup>26</sup>

Suspected patients are informed about checking their health regularly, recording it daily and self-quarantining. Based on the evaluation of the nature of the emergency, clinicians should select the true extent of the dental condition in severity, which might be helpful by either accepting the patient or deferring immediate dental care.<sup>23,26</sup> Further, the patient should be motivated to make a payment for the related orthodontic services and consultation over online mode only, as the exchange of currency notes might act as a potential source for the spread of the SARS-CoV-2 virus.

**INFORMED CONSENT FORMAT FOR ORTHODONTIC TREATMENT DURING COVID 19 OUTBREAK**

Name: \_\_\_\_\_ Age/Sex: \_\_\_\_\_ Date: \_\_\_\_\_  
 Address: \_\_\_\_\_ Occupation: \_\_\_\_\_  
 Mobile No: \_\_\_\_\_ Email Id: \_\_\_\_\_

1.	Do you have any symptoms like fever, body pain, cough, sneezing, sore throat, difficulty in breathing?		
2.	Have you or any of your cohabitants travelled outside state/country in the past one month?		
3.	Any of your family members have history of fever, body pain, cough, sneezing, sore throat, Difficulty in breathing?		
4.	Have you visited the general physician if your answer is yes for question 1?		
5.	Do you have any medical issues (if yes mention the details)?		
6.	Do you belong to Covid 19 sensitive area or have visited one such place in past one month?		
7.	Have you come into contact with a patient with confirmed 2019-nCoV infection within the past 14 days?		
8.	Have you recently participated in any gathering, meetings, or had close contact with many unacquainted people?		

I,..... have come to the \_\_\_\_\_ Dental Clinic/Hospital for Orthodontic treatment. The Orthodontist reserves right to **TREAT /DEFER /REFER** me accordingly. If I happen to be an asymptomatic carrier or an undiagnosed patient with covid19 disease, I suspect it may endanger Dentist and clinic staff. It is my Duty and responsibility to take appropriate precautions and follow the protocols prescribed by them. I also know and understand that I may already be an asymptomatic carrier/ undiagnosed COVID-19 positive patient/ may get infected due course of time after my visit to the dental clinic and I will not hold the doctors or the staff of the clinic responsible for any future diagnosis of COVID with me or my accompanying person. The above terms and conditions have been read by me / have been explained to me in my native language to my complete satisfaction. I agree to all terms and conditions mentioned above. I verify, confirm and agree to be held accountable, regarding the details given by me which I state are true to the best of my knowledge.

Patient's signature /Thumb Impression: \_\_\_\_\_ Parent/Guardian Signature (if minor) \_\_\_\_\_

Patients accompanying person's signature: \_\_\_\_\_

Name of the Dentist with Signature: \_\_\_\_\_

**Figure 5. Informed Consent Form for Orthodontic Treatment During COVID-19 Outbreak<sup>19</sup>**

It is a given that the COVID-19 pandemic will have a long-lasting impact on orthodontic practice the essential adaptations concern four areas of the orthodontist practice

- ✓ Microbiologic control measures
- ✓ Social distancing
- ✓ New ergonomics
- ✓ Bioethical considerations
- ✓ Microbiologic control measures
- ADA recommended antibacterial mouth rinses and thus the orthodontic patient is asked to

perform an oral rinse with 1% solution of H<sub>2</sub>O<sub>2</sub> (1 part of 10 vol 30% and two parts of water) or with 0.2% povidone-iodine for 30-45 seconds prior the orthodontic procedure to decrease the viral count in the patient's saliva as viruses are sensitive to structural lysis and oxidation by these agents. It has been observed that SARS-CoV-2 virus is not sensitive to routinely used oral chlorhexidine rinse<sup>27</sup> and hence 1.5% hydrogen peroxide is recommended before treatment, to reduce the viral load. Mouth rinses containing  $\beta$ -cyclodextrins combined with flavonoids agents have been proposed for COVID-19. Children should rinse only under adult supervision.<sup>28</sup>

○ Extended use of personal protective equipment (PPE)

In our regular practice, orthodontists and clinical staff use gloves, surgical masks, and gowns, but as a result of the pandemic, the routine use of complete personal protective equipment may be advisable, not only when required by the health authorities in each country, but also because of an increase in demand moved by a traumatized society experiencing the effects of COVID19.<sup>29</sup> The COVID-19 virus is chiefly spread via the oronasal route, as the viral load is mostly in the nasopharyngeal region of the diseased person. Therefore, it is necessary to take actions to avoid the spread of infection from one patient to another by dental instruments and equipment; it is thus recommended to add a layer of airborne contact safety measures to the routine orthodontic practice, minimizing the risk of virus transmission. The drawback of this is that it hinders psychological interaction with the patient—a fundamental tool in the treatment of children and adults.

**Table 3: Recommended PPEs for Orthodontic and Dental Setup<sup>19</sup>**

Face shield and goggles	Contamination of mucous membranes of the eyes, nose, and mouth can occur due to droplets generated by cough, sneeze of an infected person, or during aerosol-generating procedures carried out in a clinical setting. The flexible frame of goggles should provide a good seal with the skin of the face, to cover the eyes and the surrounding areas, and even to accommodate the prescription glasses.
Masks/respirators	SARS-CoV-2 viruses target mainly the upper and lower respiratory tracts. Hence, protecting the airway from the particulate matter generated by droplets/aerosols prevents human infection. The hand which has been contaminated with the virus can allow the virus to enter the host when it touches the eyes, nose, or mouth. Hence, the droplet precautions/airborne precautions using masks are crucial while dealing with a suspected/ confirmed case of COVID-19 during the performance of an aerosol-generating procedure. Masks are of different types. The type of mask to be used is related to particular risk profile of the category of personnel and his/her work. There are two types of masks, which are recommended, for various categories of personnel working in hospital or community settings, depending upon the work environment: <ol style="list-style-type: none"> <li><b>Triple-layer surgical mask:</b> A triple layer surgical mask is a disposable mask, fluid-resistant, and provides protection to the wearer from droplets of infectious material emitted during coughing/ sneezing/talking.</li> <li><b>N95 Respirator:</b> An N95 respirator mask is a respiratory protective device with high filtration efficiency to airborne particles. To provide the requisite air seal to the wearer, such masks are designed to achieve a very close facial fit. Such a mask should have high fluid resistance, clearly identifiable internal and external faces, good breathability (preferably with an expiratory valve), and duckbill/cup-shaped structured design that does not collapse against the mouth.</li> </ol>
Gloves	Nitrile gloves are preferred over latex gloves because they resist chemicals, including certain disinfectants such as chlorine. There is a high rate of allergies to the latex and contact allergic dermatitis among health workers. Non-powdered gloves are preferred to powdered gloves.
Surgical gown	Surgical gowns are designed to protect the torso of health-care providers from exposure to the virus. By using appropriate protective clothing, it is possible to create a barrier to eliminate or reduce the contact and droplet exposure, known to transmit COVID-19, thus protecting health-care workers working in close proximity (within 1 m) of suspected/confirmed COVID-19 cases or their secretions.
Shoe covers	Shoe covers should be made up of impermeable fabric to be used over shoes to facilitate personal protection and decontamination.
Headcovers	Ideally, anyone using gowns should use a headcover that covers the head and neck, while providing clinical care for patients. Hair and hair extensions should fit inside the headcover.
Source: Based on the recommendation of various health and dental care regulatory authorities like CDC, ADA, AAO, EU, and MOHFW-GOI.	



**Table 4: Rationale for using PPEs in Orthodontic and Dental setup<sup>19</sup>**



**Figure 6. Sequence for Putting on and Removal of PPEs<sup>30</sup>**

Setting	Activity	Risk	Recommended PPE	Remarks
Triage	Triaging patients Provide a triple-layer mask to the patient	Moderate risk	N95 mask Gloves	Patients get masked
Screening area help desk/ registration counter	Provide information to patients	Moderate risk	N95 mask Gloves	
Temperature recording station	Record temperature with the handheld thermal recorder	Moderate risk	N95 mask Gloves	
Waiting area	Nurses/paramedic interacting with patients	Moderate risk	N95 mask Gloves	A minimum distance of 1 m needs to be maintained
Orthodontist/dentist chamber	Clinical management (doctors, nurses)	Moderate risk	N95 mask Gloves	No aerosol-generating procedures should be allowed
Sanitary staff	Cleaning frequently touched surfaces/floor/ cleaning linen	Moderate risk	N95 mask Gloves	
Visitors accompanying young children and elders	Support in navigating various service areas	Low risk	Triple-layer medical mask	No other visitors should be allowed to accompany patients in OPD settings. The visitors thus allowed should practice hand hygiene

Source: Based on the recommendations of various health and dental care regulatory authorities like CDC, ADA, AAO, FLL and MOHFW-GOI

After the end of clinical procedures, it is equally important to remove and appropriately dispose of the PPEs to prevent environmental and cross infection. In this aspect, the CDC has stated clear guidelines that must be strictly followed.

**Minimize the use of aerosol-generating procedures**

Many orthodontic procedures such as the bonding and debonding of brackets and attachments generate a substantial number of aerosols which, in turn, pose potential risks of infection transmission. Depending on the size of the office, it will be advisable to designate an isolated and adequately equipped space to carry out those procedures that require the use of rotary instruments as handpieces or ultrasonic

scalers and, if possible, concentrate these appointments when organizing the agenda.<sup>31</sup> If the orthodontic procedure includes the use of rotary instruments such as airtor and water, then negative pressure should be regulated in the operator; this will minimize the spread of aerosol. This is for the reason that long-distance transmission is likely when viral particles become suspended in the air, and they may persist in aerosols for up to 3 hours.<sup>8</sup> Organizational changes in the dental operator are advised, whenever acceptable. It is recommended to get consultation of a professional before venturing for the same. Additional to this, air change per hour should be kept at least 8 to 10 times for effective removal and to improve the quality of air in the operator; also, it minimizes the hazard exposure to the dental surgeon and supporting the team. High-efficiency particulate air (HEPA) filters should be thought of in a situation where regulated negative pressure operator is not possible. In addition to this, a suitable humidity level must be maintained, i.e. in the range between 40% to 60%. Judicious use of low-volume and high-volume evacuators (HVEs) should be done throughout dental procedures. A reduction of aerosols in the dental operator of up to 90% is observed when using the HVEs.<sup>32,33</sup> If space is not a limitation, then it is advisable to perform aerosol-generating procedure in a closed space/room with negative pressure airflow, high airflow rate, and with optional Ultraviolet-C (UV-C) lamps for irradiation after each procedure to keep the operator safe for the next procedure.

**Treatment considerations**

Intraoral imaging (IOPA) should be avoided due to excessive salivation and gag reflex, and thus extraoral radiographs like the orthopantomogram (OPG) should be used.<sup>34</sup> If a local anaesthesia application is required, the gel form of local anaesthetics is preferred over the spray type as it might generate the aerosol; this might cause the potential spread of the virus in the air. Disposable, single-use instruments and devices should be preferred whenever possible to reduce the cross-infection risks.<sup>35</sup>

Various hands-free intraoral lower vacuum evacuators along with HVE and external mobile suction units with appropriate face masks and PPEs must be used during the AGPs like bonding and debonding. Prior to the initial bonding is carried out, the patient must be asked to rinse his/her mouth with 1% H<sub>2</sub>O<sub>2</sub> or 0.2% povidone-iodine for at least 30 seconds. Tooth surfaces must be cleaned with pumice and then rinsing with water, followed by blot drying using a cotton roll. Increased viscosity should be present in the etchant so that it should not spread to the nearby area, thus increasing effort into cleaning it.<sup>36</sup> Before curing the resin, an excess flash of it should be removed using hand instruments. Care should be taken to reduce the generation of aerosol during debonding. To remove the composite resin, the tungsten carbide burs should be used with adequate water spray and HVEs. Anti-retraction valves should be present in the handpiece to prevent the backflow of water, thus reducing the risk of contamination.<sup>37</sup> Additional to this, external mobile aerosol suction units, which can be positioned near the area of operation during the dental procedure, should be used to reduce the aerosol in the dental operatory further.

The COVID-19 pandemic has brought many challenges to the Orthodontist, and changes in the view regarding the various aspects of treatment planning and its execution. For mild-to-moderate malocclusion, the aligner treatment can be considered as an alternate option. The treatment outcome for aligner treatment is similar to the conventional fixed orthodontic treatment with satisfactory clinical results. They decrease the number of follow-up visits for patients to the Orthodontist. Such treatments can improve the practice of social distancing in these challenging situations.<sup>36,38</sup>

#### **New cleaning and sterilization procedures**

In addition to the thorough cleaning and sterilization of instruments and other supplies, which are routinely carried out in dental offices, during the pandemic it has been considered paramount to implement other systematic cleaning protocols between patients regarding the waiting room furniture, toilets, floors, and other surfaces. These

new protocols will probably continue to be applied, at least partially, in the future, even if they slow down the pace of practice. Orthodontic practices must follow rigorous and strict disinfection protocols, after the end of an elective or emergency treatment, to reduce spread via fomites. Between consecutive patients in the operatory area and the waiting room, natural fresh air is always allowed. The means to achieve this: first, by opening a window, which allows the influx of fresh air (if there is provision for a window) and, second, by using a medical-grade purifier with appropriate air filters. Appliance parts and steel wires that are cut or removed should be treated as highly infected medical waste and disposed of as a medical hazard. All surfaces should be carefully sanitized using disinfectants like sodium hypochlorite.<sup>35</sup>

Numerous studies have recommended that sodium hypochlorite at 0.1% to 0.2% concentration is an effective disinfectant against the SARS-CoV-2 virus when the time of contact is kept at 1 minute compared to the quaternary ammonium compounds.<sup>39</sup> Sodium hypochlorite is generally used in the dental operatory as a disinfectant for its broad-spectrum activity against capsulated and non-capsulated viruses, bacteria, and other microorganisms; they are prepared, and they can dissolve the organic materials that come into their contact.<sup>40</sup> Yet, its major drawback is that it causes corrosion of the carbon steel part of the orthodontic appliance and its smell after regular use.<sup>41</sup> Quaternary ammonium compounds are also believed to be a potential disinfectant, but their potency for the SARS-CoV-2 virus is less than sodium hypochlorite.<sup>36</sup> They are comparatively expensive and need more time compared to sodium hypochlorite for sanitizing the inanimate surfaces. The operatory room can be done effectively decontaminated with hydrogen peroxide vapour.<sup>42</sup>

Dental waterlines remain a worry for a potential source of contamination and thus causing microbial colonization. A valve to stop the backflow of water containing the microorganisms in the modern water systems. However, they can be a probable source and spread of infection in the dental operatory. The waterline system should be adequately purged following the use to prevent a backflow of



pathogens, which can reside in the plastic tubing. The instruments should be appropriately disinfected and sterilized immediately. All used, as well as unused items that were within the exposed area of the operatory, should be presumed to be infected and disposed of as infected medical waste. An earlier study demonstrated that the SARS-CoV-2 virus might become resuspended in the air during the removal of contaminated PPE or from the floor, by the movement of healthcare providers.<sup>43</sup> Therefore, the clinician and the assistant must remove the PPE in a separate closed area.

After the completion of clinical procedures of the day, all surfaces must be wiped with 0.1% bleach solution. If any surface is soiled, then it is first cleaned with detergent and water, dried, and wiped with 1,000 ppm of bleach solution. Further, the operatory should have high-efficiency filters for purification of operatory air and, regular checks are essential. Formaldehyde solution is used for the fumigation of the clinic at the end of the working day, and the area should be closed for 2 hours at least. After thorough air ventilation, the next day's operation should be commenced.<sup>43</sup>

Dental office waste must be routinely disposed of as standard regulated medical waste (RMW) with colour-coded bins/bags/containers. The CDC RMW Guidelines should be strictly adhered, and it states the follows:

- A single, leak impervious biohazard bag is usually adequate for the containment of RMW wastes, provided the bag is sturdy, and the waste can be discarded without contaminating the bag's exterior.
- All bags should be tightly closed for disposal.
- Contamination or puncturing of the bag requires placement into a second biohazard bag.<sup>43</sup>

Dental waste produced from the treatment of an emergency of confirmed COVID-19 patients are considered as medically hazardous waste and must maintain proper exclusion and must be strictly disposed of. For this, double-layer medical waste package bags, ensuring adequate strength without leaks. Compulsory labelling of "COVID-19" to store COVID-19 waste and separating them in the temporary storage room is carried out before handing them over to the authorized staff of the

common biological waste (CBW) treatment facilities' collection vans.<sup>44</sup>

Of all the PPEs, N95 face mask must be used for a prolonged time up to 7-8 hours and limited re-use up to five times under acceptable circumstances as per the CDC guidelines, following their appropriate decontamination.

## MEASURES TO INCREASE SOCIAL DISTANCING<sup>45</sup>

### Redistribution of spaces

Orthodontic clinics often have several chairs that are relatively close together in open spaces sharing common facilities. To achieve the appropriate physical distance, it may be necessary to rearrange chairs and place partitions between them. In many cases, this will require costly structural refurbishments, which can make it difficult for the Orthodontist and their staff to move around the clinical area.

### Decreasing the number of patients in the clinic

In orthodontics practice, it is common for the Orthodontist to treat several patients simultaneously, especially if they are children. The need to increase interpersonal distances may require changing this form of collaborative and dynamic work in addition to reducing the number of patients seen per day. This approach could potentially have a negative economic impact at a time when the expenses derived from adaptations hinder the survival of many practices.

### Reduce the number of companions

The adult patient should go to the office alone. Children should be accompanied by a single adult who, unless instructed to do otherwise, should remain in the waiting room. This change can be a problem for some parents who pick up the patient from school with one or more siblings and go directly to the Orthodontist's office. Moreover, many orthodontists prefer parents (or legal guardians) to be present during procedures to request and offer information and also to involve them in the decision-making process while increasing psychosocial interaction.

### NEW FORM OF ERGONOMICS<sup>45</sup>

Throughout its history, orthodontics has undergone many changes, some of them temporary, but a small number have been real milestones in its evolution, among them the advent of brackets, 3-dimensional radiology, skeletal anchorage, digitalization of records, or invisible orthodontics. The effects of the COVID-19 pandemic will accelerate another fundamental change: a new ergonomic approach to our line of work, 1 of those main objectives will be to reduce the number of face-to-face appointments and meetings. To do so, it will be necessary to do the following:

(1) Enhance internet communication, telemonitoring, and virtual assistance for managing continued and urgent patient care.<sup>30</sup> this new way of working necessitates learning and a change of attitude from the Orthodontist and his team. Creating and updating the messaging systems and Web sites according to the changing needs is time-consuming. If the professional lacks experience in this area, specialized help will be needed.

(2) Promote the use of appliances and supplies that require fewer changes and activations and avoid devices that can give rise to unscheduled appointments due to damage, debonding, injuries to the oral mucosa, etc. This strategy may compel the Orthodontist to change their habits and preferences concerning some appliances they have always trusted.

### NEW BIOETHICAL CONSIDERATIONS<sup>45</sup>

In orthodontics, as in all health professions, the biopsychosocial approach to the patient's pathology has always been critical. At present, and presumably more so in the future, this broad vision will be essential. Many families may be victims of unemployment and the financial repercussions of this pandemic that may extend over time. Orthodontists must consider these circumstances when deciding on issues regarding suitable times to begin treatments or the advisability of postponing them, or when assessing the cost-effectiveness of some treatments. Orthodontics is important for the patient and their family, but in the current circumstances, its importance is only relative in many cases, and orthodontists can never lose the

ethical perspective behind their speciality. In these difficult times and those to come, orthodontists must more than ever prioritize the psychosocial interests of patients and the community, while continuing to convey, without pressure, the role of oral health in society.

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# COVID 19 Impact and Exploring New Avenue for Dental Education

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## Abstract:

The corona virus (COVID-19) has challenged healthcare professionals and those in dental education, evoking various response methods worldwide. Due to the COVID-19 pandemic crisis, many dental schools and instructors are reevaluating the way they teach and interact with students. This article stated that the probable impacts of the outbreak of pandemic on dental education and its methodologies, clinical research, and its psychological impacts on students. New perspectives regarding a change in face-to-face activities, social isolation and the reformulation of clinical activities result in a transition toward e-learning and e-teaching methods. The COVID-19 crisis has also shown that there is a severe underestimation of the role of the amenities and advanced technologies for e-oral health education and services, as well as tele-dentistry.

**Keywords:** Corona virus, dentistry, oral health, eLearning, counseling, psychological impact, Communication.

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## Background

Originating in Wuhan in China in late 2019, COVID-19 is a novel disease that has spread to many countries worldwide.<sup>1,2</sup> COVID-19 pandemic has forced the world into a health and economic crisis. Various countries have established different quarantine forms, interrupting numerous ordinary routines and affecting work, free movement, trade, and education.<sup>3</sup> Novel coronavirus (severe acute respiratory syndrome coronavirus 2, SARS-CoV-2; formerly 2019-CoV) might leads to death due to alveolar damage and lung fibrosis that leads to progressive respiratory damage.<sup>4</sup> Similarly to other  $\beta$ -corona virus, SARS-CoV-2 was probably hosted by a bat and other Asian mammals and transmitted to humans.<sup>5</sup> World Health Organization declared a COVID-19 pandemic on 12 March 2020. At the time, COVID-19 symptoms include fever, cough, anosmia,

dysgeusia, and dyspnea. Clinical management is a mainly symptomatic treatment that might require respirational aid with organ support in the intensive care unit. No specific antiviral therapy available, but antiviral, antimalarial drug and biological drugs are having been administered in clinical trials.<sup>6,7</sup> Several authors described the impact of COVID-19 in dental practice, but Meng et al. provided dental education recommendations.<sup>8</sup> The most significant task concerns the measures to ensure dental education activities during the infection phase. Dental schools and allied hospitals are a potential contagion site. Regarding dentistry, it should be considered clinical training by dental professionals via protective and infection control elements. However, very little is known about how dental education and research are affected.<sup>9</sup>



## INTRODUCTION:

Due to the COVID-19 pandemic there was broke up in to direct teaching educational activities with dental students worldwide. Instructors are scrambling to adapt to social distancing. The duration of quarantine and social isolation are unpredictable, and some virtual alternatives are being used to continue teaching activities.<sup>10</sup> Dental school professors have continued to work from home and examinations as rebuilt graduation requirements.<sup>11</sup> Moreover, in many dental colleges, especially in low-income countries, dental students are more susceptible to infections, including COVID-19, due to more inadequate knowledge and insufficient infection prevention.<sup>12</sup> Well-known platforms like YouTube, email, Google educational tools, Skype, Facebook, Instagram, Telegram, and WhatsApp, are intensively used worldwide for theoretical contents and are now modify to this new resolution. At many institutions, recent classroom conferences and lectures using video conference systems like Zoom, Microsoft Teams, WebEx etc. were implemented.

### Electronic platforms for academic education during the COVID-19 era

The COVID-19 crisis revealed that we had underrated the e-oral health infrastructure and education role, including tele dentistry, which is incipient.<sup>11</sup> Electronic platforms, video conferencing networks are being used for theoretic purposes. Generally, students were found to have positive imitations despite technical problems and related stresses. While these platforms are helpful because they are already structured and universal, but they still require improvements, constant maintenance, and a quality internet connection. Open and paid media, such as Zoom or WebEx, are exciting alternatives to classroom settings, although they depend on a quality internet connection. Students had satisfactory adaptation and memorization. Virtual platforms' valuations were not altered significantly and facilitators easily adjusted to this new learning method. Although using physical means, indirect education is a more effective transmission modality for clinical case-based

discussions; internet-based discussions on virtual platforms create a more relaxed discussion atmosphere. At this point, the debate on new content and educational approaches could be unified. Other frequently used learning platforms are Microsoft Teams and Google Meet and its additional resources, Google Classroom, and Hangout.<sup>10</sup> Google Meet allows live activities with up to 250 simultaneous participants, with the possibility of sharing the presenter's screen by allowing various didactic actions. Besides, with the consent of all participants, the activity can be recorded and stored. Social media platforms, including Instagram, Facebook, WhatsApp, Telegram, and YouTube, are widely used as teaching substitutes.

### The psychological impact of COVID-19 on dental students

It should be known that throughout the COVID-19 pandemic crisis, students may suffer from depression and can be negatively affected by the fear of being infected. Therefore, the need for counseling and psychological help should increase following the COVID-19 pandemic. The initiative was taken based on moral judgment to cease all patient cares for undergraduate and postgraduate clinics to save the lives of students, staff, and patients which in turn prompted further discussion on this subject.<sup>13</sup> Inevitably, dental students were anxious due to the high viral exposure to front line medical personnel involved in disease rates and demises, mostly medical students. Doctors and the high volume of patients have put many dental students and the dental team in danger.

### Care for staff members, professors, and student's

Different degrees of proximity to COVID-19 create the need for social isolation and distancing, and uncertainties about the pandemic's outcome can significantly affect staff members and students' mental health. The pandemic's consequence can dramatically affect students' mental health and staff member's for students, concern about the delay in completing graduation, and post-graduation is an additional issue. This context can cause anxiety, poor sleep, short sleep duration, predisposing people to

depression and post-traumatic stress disorders.<sup>14</sup> Mental health disorders negatively impact learning and academic achievement.<sup>15</sup> Thus, monitoring of staff members and students by the direction of college is significant. Even in indecision, holding regular meetings, especially with students, can reassure them and decrease anxiety. There are also low-income students in private dental schools in smaller amounts. Considering this situation and the high financial cost of dental education, many students need a job to attain their goals. Thus, considering the continuing critical pandemic crisis, it is practical to hypothesize an increase in dropout rates in individual countries' dentistry courses. This aspect must also be cautiously considered by higher education institutions, administrations, both public and private.

### **Challenges and impact of COVID-19 on dental education**

After announcing the need for social distancing and reducing all face-to-face contacts such as teaching and training programs, the immediate impact of COVID-19 on dental education was observed quite early.<sup>8,16</sup> Worldwide, colleges have been facing the devastating pandemic outburst. Lockdowns in pre-clinics and clinics limited to no access to clinical education opportunities for students and no available treatment for patients are just some challenges faced in dental education. The list of difficulties further includes millions of losses in revenue sources; the economic instability, collapse of research programs and grants; suspension of academic conferences, graduation ceremonies, and ceremonies of convocation; and dramatic shifts in pre-planned projects and activities. Moreover, it influences recruiting new academics and scientists, causing psychological impacts on students and faculty.<sup>11</sup> Many dental schools have discontinued clinical practices except for emergencies, while others conduct social distancing in their laboratory pre-clinical simulation activities.

Direct and open communication with tutors, peers, and the relevant educational team has proven to increase trust and cooperation.<sup>16</sup> Also, they globally advised the higher education institutions to prioritize

the safety and well-being of their students and staff, ceasing all on-campus teaching. The American Dental Education Association (ADEA) led concerning teaching modalities such as online education and other creative teaching methods. It also connects faculty and administrators on the ADEA to share ideas and resources to implement during these times. Dental education is in fact a critical profession that requires many preparations on the part of educators, not only in various specialties of the discipline but also with specific teaching and learning methodologies.<sup>17</sup> Both dental schools and postgraduate teaching providers subsequently halted their daily face-to-face teaching, hands-on laboratory training, and clinical training under supervision. Therefore, they necessitated alternative presentation and assessment teaching modes through written online reports, multimedia workshops, problem-solving sessions, webinars, and computer-based exams.<sup>16</sup> Pre-clinical and clinical training is of the utmost importance for students. During this stage, the students learn various manual and cognitive skills that prepare them to enter the dental profession. Providing face-to-face activities with the students stand as a barrier. Therefore, all those methodologies requiring direct interaction with students are no longer valid. Using the internet allows the communication between academics and students through virtual libraries, emails, chatting, video conferencing, webinars, and telecommuting to provide a better-suited education. Dentistry around the globe have moved onto a virtual field. Developed innovative communication technologies were to educate and interact with staff and students about remote service and crisis-related strategies to sustain interconnections while improving mental health by minimizing the sense of isolation.

With modern technology, students have access from home to each lecture's contents, thus avoiding attendance to decrease infection risk. In some forms, e-learning facilitates self-learning among students and further adapts their style of informational acquisition.<sup>18</sup> The main aim of dental education is to train independent dentists to effectively and safely treat their patients. Outstanding manual dexterity and fine motor skills are skills that must be attained

by the students. But teaching these skills to the required level is problematic in that the time and resources available are limited. Virtual reality (VR) brings a range of educational opportunities in dental schools, offering continuous on-screen integrated feedback.<sup>16</sup>

Examinations and assessments, the lockdown has led dental schools to organize studies entirely online (50%), postpone formative assignments (46%), or defer summative assessments (42%). Some schools still wish to have some examination elements held in person (19%). However, most schools (72%) considered a postponing of evaluating required clinical competencies for the students. Changes in assessment schedules or extension of the program date, particularly about clinical hours, rather than reduce the clinical requirements to graduate are planned to provide efficiency and ease.<sup>19</sup>

It has resulted in a dental program that is entirely virtual. The virtualized curriculum plan is tied to be expected in COVID-19 duration. While dental clinics and schools plan to reopen immediately after their respective states have issued guidance. It is essential to recognize the potential need to broaden the virtual curriculum in some ways to accommodate the financial situation caused by the pandemic.<sup>12</sup>

### **Impact of COVID-19 on dental research**

The COVID-19 outbreak notably resulted in the cancellation of the national and international conference and dental research events. Due to compulsory government and institutional policies, limiting non-essential research activities, suspension of most laboratory-based dental research projects and postgraduate student research projects was unavoidable. Consequently, some dental researchers changed their focus to off-campus and electronic studying, such as conducting literature reviews and online surveys.<sup>16</sup>

### **Challenges and Impact of Covid-19**

Covid-19 has had a devastating impact on the dental industry. With the pandemic still on the growth curve, it is difficult to ascertain the extent and severity of its long-term implications at this point. The professional future of dental practitioners and

the sustenance of their practices is a serious concern. With most of India's courses failing to adhere to strict hygiene protocol, sanitization and sterilization at dental practices are widely absent, which further increased the risks in performing emergency dental procedures. Dentistry today needs a complete structural change to prevent doctors as well as patients from getting infected.<sup>13</sup>

### **The possible positive impact of COVID-19**

The rise in international and national interactions between universities and the growth of cooperation is substantial.<sup>4</sup> Dentistry faculty operate in educational and academic institutions and small hospitals and operating companies with high maintenance and service costs. The contributions they provide are significant to the community's health and well-being and the economy as a whole. Offering oral health care services and stimulating the economy by organizing students, educators, and workers, domestically and internationally, and helping industry and businesses thrive cannot ignore the impact of these faculties.<sup>16</sup>

The internet is a powerful resource for reaching millions of people in different geographical regions and serves as an engine to continue education. During this period of COVID-19 isolation, there is an opportunity for dental students and practitioners to build and retain theoretical and clinical dental expertise through many educational instruments.<sup>20</sup> Graduate and postgraduate students were banned from coming to the dental school and hospital. Administrative and secretarial activities were only accessible online. Examinations have shifted on the web: intermediate and summative examinations and graduation sessions have been performed online. The beginning of the new semester has been postponed.<sup>21</sup> Part of the clinical training activities of dental students will be carried out by presenting case reports to the tutors, reading and reviewing scientific articles, interactive learning tutorials based on clinical cases, and update training in cross-infection control.

Before resuming their clinical services, dental professionals should correctly use personal

protective equipment (PPE) to protect themselves and avoid a new infection spread.

After a month of distance education, it concludes our trial: •examinations conducted online are probably not the ideal way to evaluate students in health education, as it was possible to verify their skills only theoretically;

1. Students and professors appreciated the e-learning platform along with teacher-student interaction.

2. Remote activities cannot replace clinical training, and therefore, these assets will have to be recovered in the next session;

3. Distance learning has proven effective in limiting the spread of COVID-19 infections in universities.

Dentistry's field is facing its darkest hour yet, with the growth and spread of the COVID-19. Dentists are at the highest risk of contracting and transmitting the Coronavirus, along with nurses, paramedics, and other healthcare workers. With the spread of Coronavirus still on the growth curve, there is no hope of reviving with zero earnings by dental practitioners and staff at clinics.<sup>21</sup>

#### **Creating Awareness: The Communication need**

Communication has become prime essential in an era of information, as it overloads from various sources. Communication and education are required between dentists, allied health care professionals, and connection to patients and communities. The dental surgeon needs to find the right way of articulating knowledge and information to prevent fear-mongering among patients and create apprehension by being genuine and precise. Healthcare professionals can consider forming a digital hybrid learning platform to create awareness, regulate important information through social media platforms, or conduct webinars to influence more people positively. Also, there is a need for telemonitoring in dentistry to curb panic and fear and communicate facts. The pandemic has allowed us to educate them about preventive care, which was earlier considered a sidebar in treatment. One should also not miscalculate the patient's knowledge and ability and their right to seek all relevant information.<sup>21</sup>

#### **Post-COVID: A future perspective**

Considering our new reality, it is possible to continue educating theoretical content, keeping students' uneven access to quality internet, especially those with a low-income background. However, few adequate replacements are available to dental students today, considering pre-clinical and clinical scenarios. Moreover, dentistry will have to ensure a greater convergence with medicine.<sup>4</sup> We should re-evaluate our way of delivering classes and lectures and our curriculum with this new reality. The coronavirus pandemic highlights a need for further research in this area to educate our students more comprehensively. It should also stimulate our educational councils to formulate institutional policies that generate new options. They must also make significant investments in dental school, clinics to adapt to the new bio-safety reality of the post-pandemic period to return to clinical activities.<sup>9</sup> The government should come forward to cooperate with the dental and medical profession to ensure dental surgeons get all the help they need to tide through these extraordinary circumstances.<sup>21</sup>

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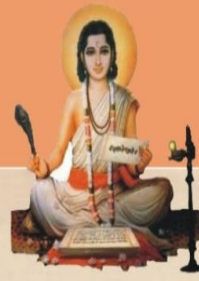
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तोषोनि मज द्यावे । पसायदान हे ॥१॥  
जे खळांची व्यंकटी सांडो । तयां सत्कर्मि रती वाढो ।  
भूतां परस्परें पडो । मैत्र जीवाचें ॥२॥  
दुरिताचें तिमिर जावो । विश्व स्वधर्मसूर्य पाहो ।  
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वर्षत सकळमंगळी । ईश्वरनिष्ठांची मांदियाळी ।  
अनवरत भूमंडळी । भेटतु भूतां ॥४॥  
चलां कल्पतरुंचे आख । चेतना चिंतामणीचें गांव ।  
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चंद्रमे जे अलांछन । मार्तंड जे तापहीन ।  
ते सर्वाही सदा सज्जन । सोयरे होतु ॥६॥  
किंबहुना सर्वसुखीं । पूर्ण होऊनि तिहीं लोकीं ।  
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तेथ म्हणे श्रीविश्वेश्वरावो । हा होईल दानपसावो ।  
येणे वरें ज्ञानदेवो । सुखिया झाला ॥९॥

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