

Impact of Covid -19 on the Awareness, Knowledge, Attitude and Clinical Practice of Dental Professionals: A Review

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ABSTRACT

Background: The rapid and extensive spread of the COVID-19 pandemic has become a major cause of concern for the healthcare profession. Dental professionals are at a very high risk of getting exposed to the coronavirus from an asymptomatic patient. This was also highlighted by a New York Times article "The Workers Who Face the Greatest Coronavirus Risk."⁸ Direct transmission through cough, sneeze, droplet inhalation and contact transmission through oral, nasal, and mucous membranes have been proposed to be the most common routes of transmission of the virus. Due to the characteristics of dental settings, the risk of cross infection may be high between dental practitioners and patients. For dental practices and hospitals in countries/regions that are potentially affected with COVID-19, strict and effective infection control protocols are urgently needed. This article is based on the various studies conducted in order to know about the awareness, experience and relevant guidelines and research, introduces the essential knowledge about COVID-19 and nosocomial infection in dental settings and provides recommended management protocols for dental practitioners and students in potentially affected areas.

Methodology: A literature search was performed to retrieve research articles regarding COVID-19 and clinical dentistry using PUBMED and google scholar. No attempt to exclude any information was performed, to capture all the possible data. Out of 32 articles present on the searching sites 4 Indian research articles were evaluated for the awareness and clinical practice in a Indian clinical setting.

Results: Among the 4 studies selected in relation to awareness, knowledge and attitude of dental practitioners in India towards COVID'19 ;it can be seen that the maximum of 93% dental practitioner were aware about the global pandemic disease .A maximum of 90.3% of dentist were aware regarding the incubation period of 21 days. Almost 87% of the dentists were aware regarding the symptoms of this global pandemic disease. According to the study by **Gambhir et al** 86.7% of dentist agree by the fact that proper sterilization protocol may aid in decrease in infection spread. Whereas according to the study by **Kinariwala et al** and **Gambhir et al**, hand hygiene can reduce the disease spread from dentist to the patient and vice -versa by 94.8% and 94.2% respectively.

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Conclusion: Dental professionals being the frontline warriors during the dental emergency treatment should be able to protect themselves from such diseases. Cross-infection control measures should be applied meticulously at all times, and social distancing should be adopted in the practice unless advised otherwise. Dentists should give drug prescription particular attention.

Keywords: COVID'19, pandemic, Co-morbidities, UVGI.

INTRODUCTION

Corona Virus disease 2019 (COVID-19) is a highly contagious viral pandemic affecting more than one million people in more than 200 countries around the globe. It was declared as a public health emergency of international concern (PHEIC) by WHO in Jan' 2020. It is caused by a new strain of novel coronavirus (SARS COV-2) and was first reported in December 2019 in the Chinese province of Wuhan.⁶ Two main unique features of the virus are its low pathogenicity and high transmissibility that distinguish it from other members of the coronavirus family such as SARS-CoV (*Severe Acute Respiratory Syndrome*) and MERS-CoV (*Middle Eastern Respiratory Syndrome*). The main route of human-to-human transmission is through respiratory droplets (coughing and sneezing). It is also transmitted from contact (shaking hands) with an infected person or a contaminated surface and transferring it to the mouth, nose or eyes.² COVID-19 has an extended incubation period of 2-14 days³, with variable severity from asymptomatic to life threatening symptoms among different individuals.⁴ Infected individuals can be asymptomatic, therefore not just making the diagnosis difficult but preventing the transmission of the disease an arduous challenge.

It is a highly infectious disease and its clinical symptoms include fever, dry cough, myalgia and fatigue and severe cases progressing to acute respiratory distress syndrome leading to bleeding and coagulation dysfunction due to the lung substance damage and edematous changes caused by the virus in leading to shock and death in some cases. The mortality rate range is 0.8 to 4.3% based on the early data from different regions. A majority of middle to elderly patients with co-morbidities including, tumor, cirrhosis, hypertension, coronary heart disease and diabetes are reported dead as a result of COVID-19 infections. However, the data available regarding risk factors of COVID-19 is still preliminary⁶. The risk of increased severity is noticed in the elderly and individuals with

underlying chronic diseases. Human-to-human transmission of the virus is occurring through airborne droplets, contact or touch of an infected person or from a contaminated surface.

Regarding the immunopathogenesis of the viruses, three different settings have been described⁸:

1. Paucisymptom patient: Patients with high viral titer in nasopharyngeal secretions as well as faeces.
2. Decompensation phase: Low viral titre compared in nasopharyngeal secretions
3. Progression and death: Persistent viremia and high viral titres in upper and lower respiratory tract.

So far, with no vaccine available, few drugs like Hydroxychloroquine, Liponavir, Oseltamivir, Ribavirin, Remdesivir are under clinical trials. Hospitals are providing supportive care comprising of oxygen and ventilator to the affected individuals.¹² The disease is managed with appropriate symptomatic treatment (antipyretics, analgesics) and supportive care along with training for prevention and control with isolation, and disinfection. The best prevention is to avoid being exposed to the virus⁶.

Infection preventive and control (IPC) measures that may reduce the risk of exposure include use of face masks; covering coughs and sneezes with a flexed elbow; regular hand washing with soap or disinfection with hand sanitizer containing at least 70% alcohol; maintaining a distance of 1.5 to 2 meters from humans; and refraining from touching eyes, nose, and mouth with hands.

According to recent reports, The World Health Organization (WHO) has recently announced it to be pandemic, as the number of people suffering from the Coronavirus disease (COVID-19) has increased globally. COVID-19 positive cases have crossed 4.5 Lakhs in India, taking the total number

of deaths to 14,500. However, still there is no community transmission of the virus in India as per reports of the Health Ministry barring a few places of virus cluster designated as hot spots. The entire country has undergone 5 lockdown so far as of now with no places open and no monetary funds and food available and the government is continuously issuing advisories for its citizens particularly regarding delivery of essential health services and various protective measures to be taken to guard oneself from getting infected; the most important being in no contact with any individual and staying at home (Isolation and Social-Distancing)¹⁰. Dental practices, which were limited to only emergency care, will resume addressing the issues of a huge number of patients in near future. This brings us to a question "How to avoid the risk of transmission in dental clinics?"

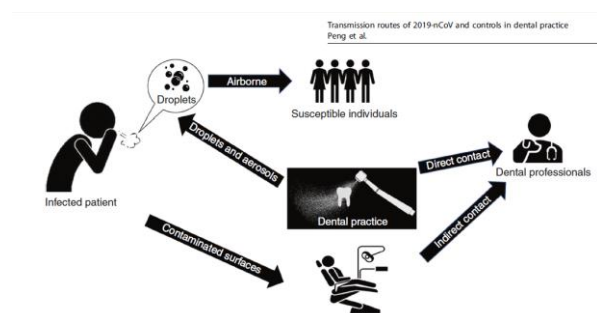


Fig 1: Transmission routes OF 2019-nCoV in dental Clinics and Hospitals.

Risk to dental professionals

Dental professionals are at a very high risk of getting exposed to the coronavirus from an asymptomatic patient. This was also highlighted by a New York Times article "The Workers Who Face the Greatest Coronavirus Risk."⁸ Direct transmission through cough, sneeze, droplet inhalation and contact transmission through oral, nasal, and mucous membranes have been proposed to be the most common routes of transmission of the virus.

The possible transmission routes in dental practice come from:

1. Direct contact with the asymptomatic/symptomatic patient:

Contact transmission via eye, oral and nasal mucous membranes. Studies have proven that SARS-CoV-2(2019- nCov), like SARS, use AEC2 as receptors to

invade cells and that may promote human to human transmission. These AEC2 cells are abundantly found in respiratory tract as well as in cells compatible with salivary gland duct epithelium in the mouth. A study had reported that on average sampling day, SARS-CoV RNA could be detected in both throat wash and saliva.¹⁴

2. Transmission via cough, sneeze, and droplet inhalation

As in other regions of the World, front line health care workers in India appear to be disproportionately impacted by COVID-19 and dentists, in particular, are likely to be exposed to SARS-CoV-2 (2). This is mainly due to their work in close proximity to the patients, and the intrinsic nature of dentistry entailing high-speed instrumentation, and the likelihood of aerosolizing saliva and virus-laden aerosols in inadequately ventilated clinical settings. Due to the characteristics of dental settings, the risk of cross infection may be high between dental practitioners and patients. For dental practices and hospitals in countries/regions that are (potentially) affected with COVID-19, strict and effective infection control protocols are urgently needed. This article, based on the various studies conducted in order to know about the awareness, experience and relevant guidelines and research, introduces the essential knowledge about COVID-19 and nosocomial infection in dental settings and provides recommended management protocols for dental practitioners and students in (potentially) affected areas.

Methodology

A extensive literature search was performed to retrieve research articles regarding COVID-19 and clinical dentistry using PUBMED and google scholar. No attempt to exclude any information was performed, to capture all the possible data. Thus, no strict inclusion criteria were applied. Data are then presented by focusing on the documented clinical experience, the measures of professional prevention described, and the various management skills for COVID-19 diffusion in the dental setting. Out of 32 articles present on the searching sites 4 Indian research articles were evaluated for the awareness and clinical practice in a Indian clinical setting.

Table 1: Socio-demographic and professional profile of study subjects.

Studies by	Total no. of dentist	No. of male%	No. of female%	Qualification BDS	MDS
Kinariwala et al	403	49.9	50.1	55.8	44.2
Kashid et al	560	-	-	100	-
Bhokadia et al	100	-	-	100	
Gambhir et al	215	61.8	38.2	55.8	44.2

Table 2: Awareness regarding the spread, incubation period and symptoms(in percentage).

	Kinariwala et al	Kashid et al	Bhokadia et al	Gambhir et al
1) Awareness regarding the global pandemic disease spread in 2020 "COVID19"?	90.3	32.7	93	61.5
2) Incubation period of COVID 19 positive patient?				
3) Symptoms of COVID 19 infections	90.3	N/a	22	67.5
4) Proper sterilization may prevent COVID 19 infection?	58.8	54.8	N/a	87
5) HAND HYGIENE can prevent infection	- N/a 94.8	-N/a - N/a	- N/a -N/a	86.7 94.2

N/a= no data available

Table 3: Knowledge Scores

Mean Knowledge score	Minimum	Maximum	Mean
KASHID et al	3	24	12.67
bhokadia et al	- N/a	- N/a	- N/a
Kinariwala et al	- N/a	- N/a	- N/a
Gambhir et al	38.1	30.2	31.6

RESULTS

Among the four studies selected in relation to awareness, knowledge and attitude of dental practitioners in India towards COVID'19 ;it can be seen that the maximum of 93% dental practitioner were aware about the global pandemic disease .A maximum of 90.3% of dentist were aware regarding

the incubation period of 21 days. Almost 87% of the dentists were aware regarding the symptoms of this global pandemic disease. According to the study by RK Gambhir et al 86.7% of dentist agree by the fact that proper sterilization protocol may aid in decrease in infection spread. Whereas according to the study by Kinariwala et al and Gambhir et al, hand hygiene can reduce the disease spread from

dentist to the patient and vice –versa by 94.8% and 94.2% respectively .

Kashid et al and Gambhir et al compared the knowledge scores regarding the awareness of COVID 19 and found the mean knowledge score of dentist to be 12.67 and 31.6 respectively.

Whereas the studies of other authors suggest that the dental professionals participated in the study showed average knowledge and positive attitude toward corona virus.¹⁶. Kinariwala et al demonstrated that the Indian dentists have relatively reasonable knowledge about awareness and the mode of transmission ²⁵. However, the other authors suggest that using 70% alcohol for surface disinfection and fumigation may aid preventing infection.

DISCUSSION

This global pandemic condition of COVID'19 is not unknown to the people any longer. People have gain some knowledge through media, digital platforms as well as newspaper. So as all the individuals and health care workers are aware and have gained some knowledge regarding the disease spread and infection. Almost all individuals are practicing wearing masks and social distancing but still the disease is unable to stop its spread. Almost all health care workers are at risk for their safety from this COVID 19 but according to the various studies and media it was evaluated that dentists are at the highest risk of occupational exposure due to COVID' 19.²⁴ This is mainly due to their work in close proximity to the patients, and the intrinsic nature of dentistry entailing high-speed instrumentation, and the likelihood of aerosolizing saliva and virus-laden aerosols in inadequately ventilated clinical settings²⁵ To the best of our knowledge, the present study is first of its kind in the among Indian authors examining the knowledge and awareness of dental health professionals regarding this deadly disease. Our study aims at presenting the awareness, knowledge and attitude of various dental professionals during COVID 19 and the various challenges the dental professionals are dealing with due to this global pandemic.

SYMPTOMS OF COVID 19

Crucial measures for early detection of infected subjects to allow for their early isolation and early treatment include the following:

1. Mandatory monitoring of fever in fever clinic (Body temperature ≥ 37.3 °C) and early warning of key populations;
 2. Increased screening efforts in all medical-dental institutions;
- Symptoms of a cough, runny nose, fatigue, etc.;
 - A history of travel or residency in epidemic areas, or contact with any person who has a fever or has been to epidemic areas within the past 2 weeks;
3. Encouraging enterprises and institutions to test for COVID-19 nucleic acid in all essential workers who reside in epidemic areas and who need to return to work. ⁴

A study by Kinariwala et al suggests that the participants knowledge and awareness of major transmission portals of covid-19, and key features of its prevention and control were relatively high as 97.0%, 98% and 94.8% were aware Of main source of infection transmission, infected body fluids as a source of infection transmission, And the crucial importance of hand-hygiene in prevention and control measures, respectively

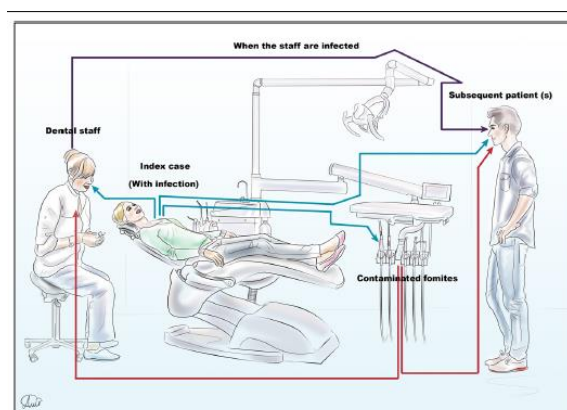


Fig 2: 2019-nCoV transmission dynamics in dental care settings.

AWARENESS REGARDING CLINICAL PRACTICE DURING COVID 19-

ASKING FOR DETAILED CASE HISTORY TO THE PATIENT The asymptomatic incubation period for individuals infected with SARS-CoV-2 is variable

but can be protracted. It has been confirmed that those without symptoms can still spread the virus. This makes it extremely difficult to identify those individuals that pose a risk⁷. Owing to the contagious nature of the disease, while we take a history and carry out an examination of the patient and assess for urgency of dental need, an asymptomatic patient could have acted as a potent source of infection for others.

MAINTAINANCE OF STERILISATION

RECOMMENDED DISINFECTION AND STERILIZATION PROTOCOLS

FOR DENTAL CLINICS TEATING PATIENTS DURING COVID-19 PANDEMIC

A. Treatment area/patient care area

- All critical, heat resistant semi critical instruments and handpieces should be cleaned and sterilized after each use or discarded.
- Heat sensitive semi-critical items can be processed with high-level disinfection eg. 2% Gluteraldehyde.
- High touch/clinical surfaces that are difficult to clean must be covered using a physical barrier for every patient or disinfected between patients. (Eg: 1 % Sodium hypochlorite or 70% alcohol)
- Use moistened wipe / cloth to clean all surfaces with freshly prepared disinfectant solution. (Eg: 1 % Sodium hypochlorite or 3% hydrogen peroxide). Always Discard remnant diluted solution

Floor - Use Wet Moping- Multi Bucket Technique :

(i) Water followed by

(ii) Detergent followed by

(iii) Low Level Disinfectant like 3% hydrogen peroxide, 1% Sodium hypochlorite or EPA approved agents

Mop heads and cleaning cloths must be decontaminated regularly by Laundering (heat disinfection) with detergent and drying at 80 °c and

changed frequent. Do not perform disinfectant fogging

B. Reception and patient waiting area

- Avoid sweeping with broom
- Use wet moping with warm water and detergent or hospital disinfectant (eg. 1 % Sodium hypochlorite).
- High touch surfaces must be cleaned more frequently with detergent/ disinfectant.

Ultraviolet germicidal irradiation (UVGI)

a. Operating rooms are disinfected with UVGI for 1 hour in the morning prior to room opening, at noon, and at the end of the day.

b. Consultation rooms are disinfected for 15 min between patients.

Ultraviolet germicidal irradiation (UVGI) uses short-wavelength ultraviolet light (UVC, ~3.6 J/cm² fluence). This light can destroy the nucleic acids of microorganisms and disrupt their DNA, and thereby impair vital cellular functions and result in inactivation or death of microorganisms, including COVID-19. o N95 masks can withstand 10 cycles of treatment with a small degradation of chemical bonds and a small impact on the bacterial infiltration efficiency. However, the process may impact the strength and fit of the respirator ⁴

WASTEMANAGEMENT

Medical and domestic waste should be marked and disposed in accordance with the Biomedical Waste Management and Handling Rules 2016, 2018

USE OF PPE KITS

The CDC has provided Interim Infection Prevention and Control Recommendations for Patients with suspected or confirmed coronavirus disease 2019 (COVID-19) in Healthcare Settings for PPE¹⁷The use of PPE, including protective eyewear, masks, gloves, caps, face shields, and protective outerwear, is strongly recommended for all healthcare givers in theclinic/hospital settings during the COVID-19 pandemic ¹⁹.

a. A **triple-layered surgical mask** can be worn by all health care providers when within

1–2 meters of patient.

b. **Particulate respirators** (N-95 masks authenticated by the National Institute for

Occupational Safety and Health or FFP2-standard masks set by the European Union)

are recommended for routine dental practice^{12,17}

c. If available an **FFP3-standard mask** should be used and in COVID-19 positive

patients this would be considered essential.

Besides being aware of the required PPE, it is also important to know the correct sequence of “donning and doffing” of PPE. The CDC sequence of donning a face mask is as follows: securing ties or elastic bands at the middle of head and neck, fitting the flexible band to the nose bridge, fit snug to face and below the chin, fit-check respirator²⁵

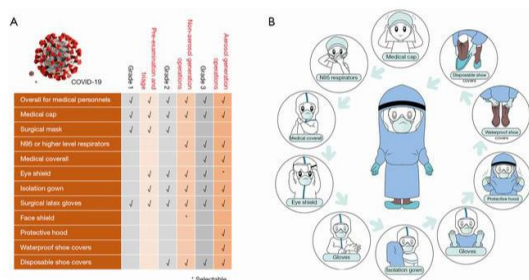


Fig 3: Occupational protection strategies.

AEROSOL CONTAMINATION

Droplet and aerosol transmission of SARS-CoV-2 are the most important concerns in dental clinics and hospitals. Most dental procedures involve the use of high-speed air rotors with water cooling; which generate large amounts of aerosol and droplet mixed with patient's saliva and even blood during dental practice¹⁷.

The virus can survive on hard surfaces and can remain viable for up to 3 days, aerosol generating procedures should be limited to those procedures associated with delivery of essential dental care only.¹² Aerosol generating procedure such as use of high speed handpieces, airtors, ultrasonic scalers, air abrasions equipment generate certain amount of aerosols that may become a carriers for the disease spread or a nosocomial infection such as

sneezing, flu, fever to spread among dentists as well as patients. it is therefore suggested either to delay the procedure or in certain cases of emergency conditions use of pre-procedural mouth rinses either by chlorhexidine 0.2% or povidone iodine mouth rinse should be implied along with the use of slow speed hand pieces such as micromotors without water spray or hand instrumentation for temporary relief is advisable¹².

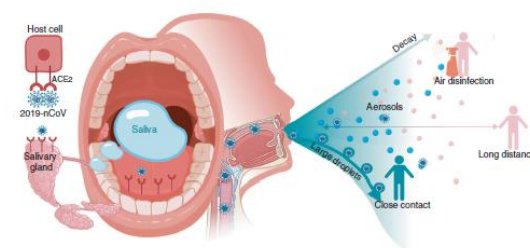


Fig 4: Potential diagnostic value of saliva and transmission of 2019-nCoV.

According to the study by Amber et al extra-oral imaging such as panoramic radiograph or CBCT should be used to avoid the gag reflex or cough that may occur with intraoral imaging. When intraoral imaging is mandated, sensors should be double barriered to prevent perforation and cross-contamination It is also suggested to minimize the use of intra- oral radiographs as they tend to increase salivation and therefore may induce coughing¹⁷.The use of three-way syringes should be avoided.

In most dental clinics, working under negative air pressure is not possible. Sufficient ventilation in the room (Meng et al., 2020a) will dilute the virus load (Stockwell et al., 2019). On the one hand, mechanical ventilation, possibly enhanced, can significantly increase the expulsion of air. On the other hand, natural ventilation can be improved by active ventilation and, if possible, create a draught through the room.¹

CONCLUSION

Practicing dentists should ensure that all members of the oral healthcare team are well acquainted to the COVID-19 transmission and preventive measures. Provision of dental services should take

into consideration the availability of PPE, and that only emergency cases are admitted for treatment.

Cross-infection control measures should be applied meticulously at all times, and social distancing should be adopted in the practice unless advised otherwise. Dental procedures in general are categorized into two groups according to aerosol generation. Most dental procedures generate aerosol; preparing cavities for fillings, use of rotary instruments for root canal treatment, scaling and polishing of teeth, dental implantation, and surgical removal of teeth are only some examples.

Asymptomatic COVID-19 patients may present for emergency dental treatment. These patients are expected to have saliva contaminated with the virus and they are a confirmed source of infection. Moreover, the conjunctiva mucosa and upper respiratory tract are connected by the nasolacrimal duct, and they share ACE2 on the cell membrane. This exposes dental healthcare personnel to the risk of infection via direct exposure of conjunctiva (eyes) to droplets from patients during dental treatment. It would be wise for dentists to rely more on non-aerosol generating procedures for treatment of their patients. Excavation of caries rather than drilling and conventional root canal treatment rather than rotary instruments, for example, should be the mainstay of treatment at this point of time. Dentists should give drug prescription particular attention and patients should be advised against using antibiotic self-medication to relieve dental pain.

CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interests regarding this article.

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