

Preparedness of Dentists and Dental Operatories during and Post COVID-19 Pandemic

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ABSTRACT

Context: Among various healthcare workers, dental professionals are at higher risk of getting infected from coronavirus disease-2019 (COVID-19) infections, provided they make changes and take necessary precautions for the safety of both doctors and patients in the dental clinic.

Aim and objective: Assessment of the knowledge, attitude, and practices of Indian dentists in the dental clinic during the COVID-19 pandemic.

Settings and design: A questionnaire-based online cross-sectional survey was conducted among Indian dentists.

Materials and methods: The questionnaire comprised of 18 closed-ended questions distributed in four sections on demographics, knowledge, attitude, and practices.

Statistical analysis used: Responses were summarized as frequencies and percentages. Intergroup comparisons were made using the Chi-square test, one-way ANOVA test, and independent Student's *t*-test.

Results: A total of 304 responses from dentists all over India were received. Among MDS, 64.9% of dentists showed sufficient knowledge, while only 42.5% had sufficient knowledge among BDS. The findings were statistically significant ($p = 0.001$). Sixty-eight percentage of MDS showed a positive attitude, whereas only 46.3% of BDS and 41.4% of MDS came under the category of dentists with high-level practice. Although the findings related to attitude ($p = 0.056$) and practices ($p = 0.360$) were not statistically significant.

Conclusion: The study concluded that despite having sufficient knowledge and a positive attitude, the level of practice of dentists in their dental setup with this changing scenario needs refinement.

Keywords: Attitude, Coronavirus disease-2019, Dental clinic, KAP survey, Knowledge, Practice, Questionnaire survey.

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INTRODUCTION

The world currently grapples with the insidious coronavirus disease-2019 (COVID-19) virus that accounts for the COVID-19 pandemic, also called coronavirus pandemic. Coronavirus disease-2019 or coronavirus disease is caused by severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2), a strain from the coronavirus family. It is a causative agent of a potentially fatal disease which is currently of great global public health concern.¹

According to the World Health Organization (WHO), about 37 million COVID-19 cases have been reported globally (<https://covid19.who.int/>) which has emerged as a worldwide concern, while confirmed cases in India exceed 7 million. These coronaviruses are zoonotic and transmitted among animals, humans, and also from animals to humans, and occur mainly between family members, relatives, and friends who come into intimate contact with patients or incubation carriers. The clinical manifestations of "2019-nCoV" infection vary individually from no clinical symptoms (asymptomatic), or mild to severe respiratory illness.² Human immunity is important in the control and resolution of COVID infections, but it can also lead to immunopathogenesis or an out-of-control immunological reaction.³ The new virus has been entitled SARS-CoV-2 by the International Committee on Virus Taxonomy.⁴

Healthcare services, being a prerequisite for society, are rarely closed in a pandemic situation. Dental practitioners, in particular, are exposed to aerosol and droplets splashing out of patients' oral cavities as they work near patients.⁵ However, due to the inability to

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maintain an interpersonal distance of >1 m, dentists are particularly exposed to SARS-CoV-2 infection. Their exposure to body fluids like saliva and blood during various dental procedures can potentially spread the infection to their peers, families, and other patients.⁶ Therefore, the objective of the present study was to assess the knowledge, attitude, and practices of Indian dentists in the dental clinic with changing scenario in the light of COVID-19 pandemic, to evaluate how the dentists prepare and respond to COVID-19 in their dental facilities, and the take of dentists toward the infection control and prevention practices during and after the pandemic.

MATERIALS AND METHODS

Study Characteristics and Data Collection

A cross-sectional, prospective study was conducted through an online questionnaire survey with Google Forms. This study was conducted among Indian dentists, including postgraduates, general and specialist dentists working in private, government, and other health sectors within the framework of the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines. The Institutional Ethical Committee granted ethical approval for the research. All targeted participants were contacted with a corresponding link to the questionnaire through emails, text messages, and social media outlets from September 2020 to October 2020 with repeated three reminders in 7 days. The consent to participate in the study (inclusion criteria) was included in the corresponding link for the questionnaire. Submissions with incomplete responses were excluded from the study. The sample size was estimated using nMaster Software (version 2, CMC, Vellore). With an absolute precision of 5% and a 95% confidence interval, a sample size of 288 was found to be sufficient (anticipating 25% prevalence of knowledge, attitude, and practices of dentists in India toward their preparedness during and post COVID-19 pandemic). Also, anticipating a refusal to participate or non-response, the link was sent to a total of 450 dentists (Fig. 1).

Questionnaire Design

The survey's design was based on the latest literature resources on the COVID-19. The online questionnaire consisted of 18 close-ended questions with a brief overview, including the objective, declarations of confidentiality and anonymity, and notes for filling the questionnaire. The questionnaire comprises four sections. The first section included the demographic information of the dentists, i.e., their email address, dental degree, a specialty of practice, and whether or not they are currently practicing. The second section of the questionnaire evaluated the dentists' practices in the dental clinic owing to the infection control protocols and basic hygiene practices followed by them during the COVID-19 pandemic in their dental operatory. The third section consisted of questions targeting the dentists' attitude toward treating suspicious patients. Furthermore, the last section assessed the knowledge of dentists regarding dental treatment protocols and necessary

changes required in the dental office attributed to the COVID-19 pandemic. The reliability of the questionnaire for each scale was calculated to assess the quality of data. The Cronbach's alpha values for all scales were as follows: knowledge scale (0.653), attitude scale (0.608), and practice scale (0.674), and the overall scale value was estimated to be 0.743. The questionnaire was distributed online to thirty dentists in a pilot test to validate it.

Scoring

Correct and incorrect responses were used to determine the outcome. Correct responses were worth two points, while incorrect and ambiguous responses were worth zero. Therefore, the total score ranged from 0 to 10 in the knowledge section, with a higher score depicting better knowledge regarding new dental operatory protocols during the COVID-19 pandemic. Based on median value, the scores of dentists were divided into two groups, i.e., the dentists who scored >7 had sufficient knowledge, while those who scored <7 had insufficient knowledge. Similarly, in the attitude section, the scores were based on a "5-point Likert scale" ranging from 0 up to 4. Thus, the scores of dentists were divided into two groups, i.e., the dentists who scored >11 showed a positive attitude while those who scored <11 showed a negative attitude toward the dental office preparatory during the COVID-19 pandemic. In the practice section, "yes" was given two points, "sometimes" was given one, and "no" was given zero points. Points were added, and a score for each category (knowledge, attitude, and practice) was calculated. Thus, the total score ranged from 0 to 20 in the practice section and 0 to 12 in the attitude section. Those dentists who scored >17 signified high-level practice while those with less scores signified low-level practice. The criteria for correct and wrong responses were based on the latest guidelines given by the WHO and CDC.

Statistical Analysis

Data analysis was done using a statistical package for social sciences (SPSS version 21). Categorical variables, i.e., demographical variables and responses to various items of the questionnaire were summarized as frequencies and percentages. Continuous variables, i.e., the number of correct and desirable responses to various items were summarized in terms of mean and standard deviation. Intergroup comparison of categorical variables was made using the chi-square test. Intergroup comparison of the mean number of correct responses was made using independent Student's *t*-test and one-way ANOVA test. The level of significance was set at 0.05. The graphs were prepared on Microsoft Excel.

RESULTS

There were a total of 304 responses from the dentist across India. Among dentists, the majority were females and MDS, as per the education level. The details of the basic demographic are represented in Figure 1. The findings concerning the knowledge of dentists were found to be highly significant ($p = 0.001$) and represented in Figure 2. However, the findings related to attitude ($p = 0.056$) and level of practices ($p = 0.360$) were not statistically significant as given in Figures 3 and 4, respectively. The frequency distribution and percentages of responses on knowledge, attitude, and practice sections are depicted in Tables 1 to 3, respectively. Table 4 shows the correlation between knowledge, attitude, and practice sections. Table 5 shows the intergroup comparison of mean knowledge, attitude, and practice score with gender and level of education.

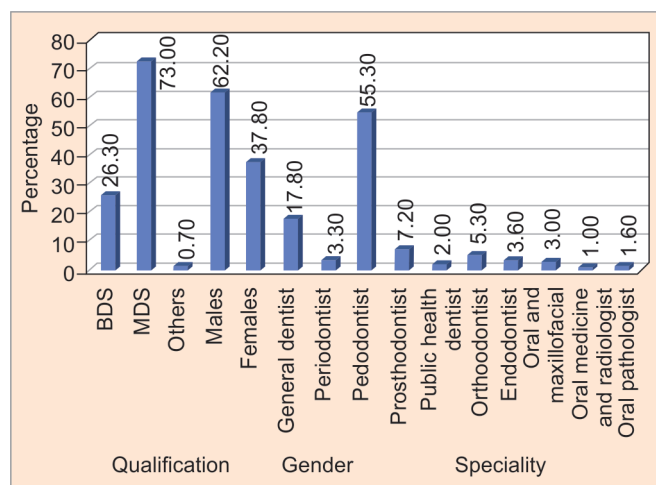


Fig. 1: Graph depicting demographic characteristics of participants

DISCUSSION

The debilitating COVID-19 is an emerging challenge that has undergone intense investigation as a consequence of its high mortality rate.⁷ According to the Centre for Disease Control, SARS-CoV-2 transmits primarily between people who come in contact with the respiratory droplets including coughs, sneezes, or talks, produced by an infected person. Dentistry involves the use of surgical instruments, such as, handpieces, ultrasonic scalers, air-water syringes, and rotary instruments which create a visible spray containing water droplets, blood, microorganisms, saliva, and other debris. Surgical masks give protection from droplets spatter, but they do not completely protect mucous membranes of the nose and mouth against inhalation of infectious agents.⁸ The WHO also recommended that disinfectants such as 0.1% sodium hypochlorite,⁹ 0.5% hydrogen peroxide, or 62–71% ethanol be used to clean and disinfect surfaces and wastes in order to reduce virus load.

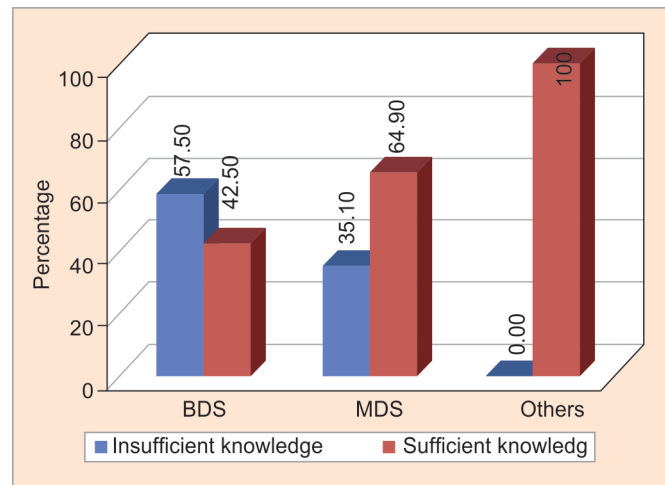


Fig. 2: Frequency distribution of knowledge levels among dentists

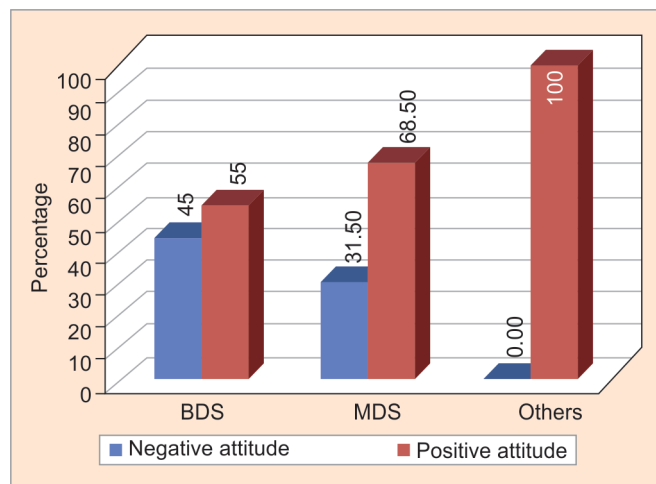


Fig. 3: Frequency distribution of attitude levels among dentists

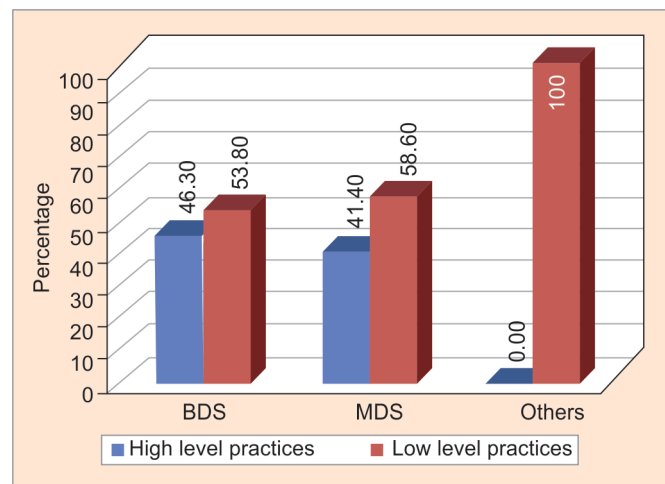


Fig. 4: Frequency distribution of practice levels among dentists

Table 1: Perceived knowledge of the Indian dentists regarding dental office preparatory during COVID-19

Questions	Options	Frequency (n)	Percent
1. Are you aware of current CDC guidelines for dental setup?	No	54	17.8
	Yes	250	82.2
2. Which type of disinfectant is preferred for environmental and surface cleaning?	Alcohol-based disinfectant only	189	62.2
	Any disinfectant	9	3.0
	Disinfectant without alcohol	6	2.0
	EPA approved disinfectant	100	32.95
3. During surgical procedures, which type of mask is preferred?	Cloth mask	10	3.3
	Non-valved	214	70.4
	Valved	80	26.3
4. Which mouth mask should be worn during dental treatment?	FFP1	1	0.3
	FFP2	12	3.9
	FFP3	9	3.0
	N95	240	78.9
	Surgical mask	42	13.8
5. Which type of hand sanitizer should be used?	Hand sanitizer with 10–20% alcohol	6	2.0
	Hand sanitizer with 30% alcohol	20	6.6
	Hand sanitizer with 60–90%	276	90.8
	Hand sanitizer without alcohol	2	0.7

Table 2: Attitude of the Indian dentists toward dental office preparatory during COVID-19

Questions		Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1. Visual alerts and instructions for COVID-19 should be displayed at entrance and in strategic areas (waiting area, elevators)?	(n) %	– –	2 0.7%	2 0.7%	40 13.2%	260 85.5%
2. Teledentistry with online e-payment for consultation fee should be considered for non-emergency treatments?	(n) %	– –	7 2.3%	31 10.2%	110 36.2%	156 51.3%
3. PPE should be removed before leaving the work area?	(n)	4	9	3	58	230

Table 3: Practices of the Indian dentists on dental office preparatory during COVID-19

Questions		No	Sometimes	Yes
1. Do you educate your staff about COVID-19?	(n)	16	27	261
	%	5.3%	8.9%	85.9%
2. Do you plan for cross-coverage with other health care professionals?	(n)	45	74	185
	%	14.8%	24.3%	60.9%
3. Do you have adequate medical supplies (e.g., IV solution, antivirals, antibiotics) in your clinic?	(n)	86	43	175
	%	28.3%	14.1%	57.6%
4. Do you wear same mouth masks for >1 patient	(n)	164	39	101
	%	53.9%	12.8%	33.2%
5. Perform hand hygiene after removing respirator/face mask?	(n)	8	3	293
	%	2.6%	1.0%	96.4%
6. Calling before arrival to know if the patient has any signs of respiratory infection and take appropriate preventive action?	(n)	30	18	256
	%	9.9%	5.9%	84.2%
7. Do you encourage social distancing practices in the waiting room?	(n)	4	5	295
	%	1.3%	1.6%	97.0%
8. Do you follow thermal screening and use of sanitizer during entry of all patients or hospitals?	(n)	3	6	295
	%	1.0%	2.0%	97.0%
9. Dental handpieces and other devices in your clinic are cleaned and heat sterilized?	(n)	11	7	286
	%	3.6%	2.3%	94.1%
10. Instrument packs are not used if mechanical or chemical indicators indicate inadequate processing?	(n)	33	33	238
	%	10.9%	10.9%	78.3%

Table 4: Correlation between knowledge, attitude, and practice sections

	Practice section and knowledge section	Practice section and attitude section	Knowledge section and attitude section
Spearman's correlation coefficient	0.08	0.078	0.139
p value	0.163	0.172	0.016*

*Significant result, Spearman's correlation

The assessment of the practice of participants in the dental office during COVID-19 showed that 85.9% of dentists educated their staff about COVID-19. About 60.9% planned cross coverage with other health care professionals. 57.6% of them have adequate medical supplies (e.g., IV solution, antivirals, antibiotics) in their clinic. 53.9% of dentists do not wear the same mouth mask for >1 patient. In the case of dental procedures on confirmed or suspected COVID-19 patients that involve the aerosol generation, Ti et al.¹⁰ advised using fit-tested N95 masks, gloves, surgical scrub, and face/eye protection. Most of them (96.4%) perform hand hygiene

after removing the respirator/face mask, which is in agreement with a similar study by Ahmed et al.⁵ which stated that 94% of dentists practiced handwashing before and after treatment of patients with soap and water or sanitizer. 84.2% call their patients before arrival to know if they have any signs of respiratory infection and so that they can take appropriate preventive action.

Most (97%) encourage social distancing practices in the waiting room and follow thermal screening and use of sanitizer during entry of all patients. Dental handpieces and other devices in the clinic are cleaned and heat sterilized by 94.1% of dentists. Results of the study reflected that 78.3% of dentists do not use instrument packs in case of inadequate sterilization as indicated by mechanical or chemical indicators. Proper protocols during sterilization and disinfection procedures should be implemented by dental teams to prevent infection control breaches.

On the assessment of participants' knowledge, it was found that 82.2% of dentists were aware of current CDC guidelines for dental setup. A similar study by Ahmed et al.⁵ found that many dentists follow cross-infection control in the dental practice and abide by the current guidelines issued by WHO and the Centers for Disease Control (CDC). About 67.1% of dentists lacked knowledge

Table 5: Intergroup comparison of mean knowledge, attitude, and practice score with gender and level of education

Gender	Practice score		Knowledge score		Attitude score	
	Mean	Std. deviation	Mean	Std. deviation	Mean	Std. deviation
Male	16.3915	2.35316	6.5714	1.72634	10.7831	1.33310
Female	16.7565	2.35302	6.7478	1.75141	10.9565	1.23111
<i>p</i> value*	0.191		0.397		0.259	
Level of education						
BDS	16.3250	2.40134	5.9125	1.82246	10.6750	1.29042
MDS	16.5901	2.34733	6.8784	1.62519	10.9009	1.29709
Others	18.0000	0.00000	9.0000	0.00000	12.0000	0.00000
<i>p</i> value	0.467		<0.001**		0.185	
Post hoc pairwise comparison	–		MDS > BDS		–	

*Independent Student's *t* test

**Highly significant results, one-way ANOVA test

on the type of disinfectant preferred for environmental and surface cleaning, which was in line with the study done by Sarfaraz et al.¹¹ which states that about half of the dentists were unaware of the surface disinfectant that was effective against COVID-19. 70.4% of dentists knew the type of masks preferred during surgical procedures. The CDC recommends using a respirator that offers a higher level of protection during aerosol-generating procedures such as the N95 respirator.

Only 3.0% of them were aware of the mouth mask worn during dental procedures. Based on filtering facepiece (FFP) parts, the European standard EN 149:2001 has established three levels of protection for respiratory masks which are divided into FFP1, FFP2, and FFP3, having particle filtration capacity of 0.3 µm of 80, 95, and 99%, respectively.¹² However, the majority of them knew the type of hand sanitizer to be used in dental setup during COVID times. As recommended by CDC, alcohol-based hand rub (ABHR) containing 60–94% alcohol is preferred over soap and water in most clinical situations in healthcare settings due to evidence of better compliance. In response to viruses that are genetically related to, and with similar physical properties as, the SARS-CoV-2, WHO formulations are recommended to be used by those countries with no access to commercially available ABHR.

The attitude of dental practitioners toward the changes required in the dental setup during and post-COVID times is an essential factor that may equally influence the health of dentists as well as patients. About 85.5% strongly agreed that visual alerts and instructions for COVID-19 should be displayed at the entrance and in strategic areas (elevators, waiting area). Similarly, the study by Tysiac Mista et al. states that patient flux should be well organized such that only one patient is present in the waiting room.¹³ A study by Krithikadatta et al.¹⁴ mentioned that dentists can also participate in national health education programs and refer suspected COVID-19 patients to government-authorized institutions. Half of the dentists (51.3%) agreed that teledentistry with online e-payment for consultation fees should be considered for non-emergency treatments, which is a useful aid in post-COVID times as well. Similarly, Arora et al., in their study, observed that 46.3% of respondents delayed dental treatment and decided to use teleconferences.¹⁵ Precheck triages are recommended as part of the standard practice in dental clinics, according to Krithikadatta et al., to measure and record the temperature of each patient.¹⁴ Around 75.7% of dentists strongly agreed that they should remove their

protective equipment before leaving the work area. Almost all patients pose a risk as potential asymptomatic carriers in dental settings. Dentists can follow the spread of COVID-19 by visiting the website of their respective Ministry of Health and Family Welfare.¹⁴ Healthcare workers are at a higher risk of infection due to their close contact with infected patients. Understanding the facts and following necessary guidelines is necessary to prevent potentially infected patients from spreading any disease and their precautionary management in dental practice during and post-COVID pandemic.¹⁶ The auxiliary staff should also be adequately sensitized as per the current CDC and WHO guidelines to combat the spread of disease.¹⁷ Although various studies have been conducted on dentists during the COVID-19 pandemic, this study also discusses the post-COVID aspects with possible solutions. The limitation of the current study was the small sample size due to the constraints and restrictions on the practice of dentists during the COVID-19 pandemic, thus does not rule out response bias.

CONCLUSION

Revised guidelines and policies that help dentists render the service safely as a primary goal are necessary. The current study shows that despite having sufficient knowledge and a positive attitude, the level of practice of dentists in their dental setup with this changing scenario needs refinement. The protocols laid down by various organizations need to be implemented appropriately to span the gap between current and requisite dental practices.

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