

**Endodontic practice during COVID-19: Questionnaire based assessment among Endodontist practicing in Gujarat, India**

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**Citation of this Article:** Patel Mahendra H., Shah Khyati P., Kesharani Pooja R., Anada Rahil S., Chaudhry Harshvardhan R., Sheth Shirali, “Endodontic practice during COVID-19: Questionnaire based assessment among Endodontist practicing in Gujarat, India”, IJDSIR- February - 2021, Vol. – 4, Issue - 1, P. No. 438 – 447.

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**Type of Publication:** Review Article

**Conflicts of Interest:** Nil

**Abstract**

**Objective:** Survey was aimed to assess the knowledge and attitude of Endodontists and Post graduate endodontic students of Gujarat, India, regarding to endodontic practice during COVID-19 Pandemic

**Methods:** A questioner was created constituting of 32 questions and distributed in month of May 2020. Initial 6 Question were intended to gather demographic details of the respondents. Remaining 26 question were fabricated to judge knowledge and attitude of respondents regarding endodontic practice in the course of COVID-19 Pandemic.

Questioner was distributed among 170 dentists who met the criteria of our study. Student T test and chi square test were employed for statistical analysis and level of significance was set at  $P < 0.05$ .

**Result:** One hundred and twenty-six responses ( $n=126$ ) were received at response rate of 74.1%. The data was analysed to obtain mean knowledge score (8.17) and attitude score (9.06). Scores were compared according to gender, age of respondents and their experience in dental practice. There was no significant difference of scores among gender and years of experience. However

significant difference among attitude scores of respondents above 50 years (mean attitude score  $7.33 \pm 2.251$ ) and that of age between 30-50 years (mean attitude score  $8.86 \pm 1.53$ ) was obtained. ( $p=0.038$ ). Result shows incompetent knowledge of respondents regarding safe dental practice in the time of COVID-19 pandemic.

**Conclusion:** The survey demonstrates lack of knowledge and appropriate attitude among Endodontist and Post-graduate endodontic students of Gujarat state, India. Continuous upgradation of knowledge regarding this disease is must for safe dentistry.

**Keywords:** COVID-19, coronavirus, endodontic, safe dentistry, Gujarat, survey.

### Introduction

On December 31<sup>st</sup>, 2019, in Wuhan city (Hubei province) in China, nearly 27 cases of pneumonia of unknown etiology were hospitalized.[1] After multiple testing, Chinese Centre for Disease Control and Prevention was able to isolate causative agent which was later termed as COVID-19 (Corona Virus Disease of 2019) by World Health Organization (WHO).[2] The 2019 coronavirus is different from severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), but it has the same host receptor: human angiotensin-converting enzyme 2 (ACE2). The WHO declared the outbreak a Public health emergency of international concern on 30 January 2020 and a Pandemic on 11 March 2020.[3]

Based on the genetic and epidemic research it was found that the COVID 19 outbreak started from animal to human transmission followed by sustained human to human spread. It is now believed that its interpersonal transmission occurs mainly through direct spread in form of cough, sneeze, droplets inhalation and contact with oral, nasal and eye mucus membranes.[4] This led to the recent recommendation of social distancing to minimize community spread of the disease. Besides, there exists a

risk for faecal-oral with the pathogen being found in faeces of the patient in United States.[5]

Right now, sources of transmission are deemed to be the patients which are infected with COVID-19. Both symptomatic and asymptomatic patients and patients in their incubation period are considered to be the carriers for SARS-CoV-2. This epidemiologic feature of COVID-19 has made its control extremely challenging. [6,7]

According to the National Health Commission of China, the majority of patients experienced fever and dry cough while some also had shortness of breath, fatigue, and other atypical symptoms, such as muscle pain, confusion, headache, sore throat, diarrhoea, and vomiting.[8,9] The Chest computed tomography showed bilateral pneumonia, with ground glass opacity and bilateral patchy shadows being the most common patterns.[10] Very young and older age patients as well as patients with any other existing underlying conditions (e.g. diabetes, hypertension, and cardiovascular disease) are considered to be associated with poor prognosis.[11]

Sabino-Silva et al. suggested three pathways for COVID-19 to present in saliva: first, from COVID-19 in the lower and upper respiratory tract that enters the oral cavity with the liquid droplets frequently exchanged by respiratory and upper alimentary tracts. Secondly, COVID-19 present in the blood can access the mouth via the gingival crevicular fluid. Finally, COVID-19 enters the oral cavity by major and minor salivary gland infection which are then secreted in the saliva.[12,13,14] Dentists, especially endodontists, possess higher risk because of the specificity of their procedures which involve face to face communication with patients, aerosol generating procedures, frequent exposure to saliva, blood and body fluids and handling of sharp instruments.[15]

Therefore, the aim of these questionnaire-based study is to evaluate response of practicing endodontists as well as

post-graduate endodontic students, in state of Gujarat, India regarding their knowledge and attitude towards endodontic practice in this time of Pandemic.

### **Material and Method**

**Subjects and Sampling:** This survey was cross-sectional study carried out in the Month of May, 2020. This survey was carried out for assessment of knowledge and attitude regarding clinical endodontic practice during the COVID-19 pandemic. A sample size of 170 was selected, which included Clinically practising Endodontists and Post Graduate students of the same fraternity, of Gujarat State, India. Dentists, who are not clinical practitioners, who are from speciality other than Endodontics and from out of Gujarat, were excluded from the study.

The Study was carried out by Dental Practitioners affiliated with College of Dental Sciences and Research Centre, Ahmedabad, Gujarat, India.

A self-designed questionnaire was prepared with the help of Google forms, and circulated amongst the practitioners under the inclusion criteria. The survey forms were circulated in soft-copy through internet due to the scenario of Pandemic disease and Lockdown situation. After the participants had filled the forms they submitted back through the same software.

**The Questionnaire Design:** As mentioned above it was a self-designed questionnaire, comprising of 32 questions in total. The questionnaire was divided into two sections. Section 1 was 'General section' which was aimed to collect socio-demographic and professional details of the participants (gender, age, educational qualification, type of practice, and clinical experience). Section 2 comprised of 26 questions pertaining to knowledge and attitude regarding Endodontic practice during COVID-19.

The survey questions aimed at assessing the knowledge about the virus causing COVID-19, type of diagnostic procedures to be undertaken, type of endodontic treatment

to be undertaken, preventive and protective measures to be taken by the practitioners during treatment, details of these precautionary measures, prophylactic measures for patient before the treatment, general awareness about any prophylaxis for COVID-19, Disinfection and Sterilization protocols, criteria of the patient to be considered before undertaking the procedure, usage of type of instruments and amount chargeable.

Each correct answer was designated a score and then the resultant data was calculated based on the response obtained.

**Statistical Analysis:** The statistical analysis was done with statistical package for the social sciences version 23 (SPSS, Chicago, USA) to produce a descriptive and cross regulation statistics. Chi square test was used for qualitative and student t-test and ANOVA were used for quantitative analysis. Statistical significance was set up at  $p < 0.05$ .

### **Result**

The Questionnaire form of this survey were circulated to total 170 Endodontists and post graduate endodontic students of Gujarat, India, out of which we got responses from 126 participants thus overall response was at 74.1%. Knowledge and attitude score were evaluated and data were collected.

The demographic characteristics of survey respondents are shown in Table 1. Among 126 Dentists, 54(42.50%) were post graduate endodontic students and 72(57.50%) were Endodontists. Male to female ratio was approximately 0.8:1(49.5%:53.5%). Out of total 126 responses, 79(62.2%) were below 30 years, 42(33.1%) were between 30 to 50 years and 6(4.70%) were more than 50 years of age. Among 72 practicing endodontists, 24(33.33%) were practicing for less than 5 years, 35(48.61%) were practicing for 5-10 years and 13(18.05%) were practicing since more than 10 years.

There were in total 26 questions in our questionnaire, 13 question for each, knowledge and attitude assessment regarding endodontic practice in COVID-19 pandemic. Four scoring criteria were decided i.e. poor (0-3), average (4-8), good (9-12) and excellent (13) for both knowledge and attitude scores. The overall mean knowledge score was 8.17 (range 3-12, SD 2.0). 1.58%, 52.38% and 46.03% exhibited poor, average and good knowledge of COVID-19 respectively. (figure 1)

Out of total 126 respondents, 105(82.7%) knew that the average incubation period of COVID-19 virus is 14 days and same number of respondents also knew that they can go for emergency endodontic treatment during this time of pandemic. Regarding to the knowledge of N-95 mask, 55(43.3%) respondents knew that N-95 mask can filter particles of size greater than 0.3 microns. Majority of respondents i.e. 113(89%) correctly answered question regarding use of equipment to prevent cross-infection of COVID-19 in dental clinic. 35(25.2%) of total respondents were able to answer correctly that the size of GSM of PPE kit used by a dentist during the COVID-19 pandemic should be 180 GSM. 45(35.7%) of individual were aware about Arbat safety box and only 10(7.9%) were able to answer correctly that it cannot be used for endodontic practice.

The overall mean attitude score was 9.06 (range 4-13, SD 1.8). Out of total response, majority of respondents 122(9.10%) believed that Rubber Dam and High-Volume Ejector plays a role in prevention of COVID-19 cross-infection in dental clinic. 101(79.5%) believed that if a patient had a history of COVID-19 infection they should be treated after 14 days once they test negative for the same. In their practice 99(78%) individual preferred to use Disposable PPE kits instead of autoclavable. Regarding method to determine working length, 78(60.6%) respondents preferred to use apex locator only and

17(13.4%) preferred to used apex locator with intra oral x-rays. On the subject of handpiece with anti-retraction valve, 77(60.6%) agreed that it helps in prevention of COVID-19 cross infection. Total 74(58.30%) respondents were willing to opt for Anti-viral, anti-malarial and AYUSH therapy as a prophylactic measure before practicing dentistry.

Mean Knowledge score of male and female participants were 7.98(SD 2.0) and 8.34(SD 1.9) respectively. Mean Knowledge Score of Endodontists and PG student were 8.03(SD 1.9) and 8.37(SD 2.1) respectively. Mean knowledge score of practicing endodontist for <5 years, 5-10 years and >5 years was 8.12 (SD 1.65), 8.15 (SD 2.04) and 7.54 (SD 2.06) respectively. (Table 2)

Mean Attitude score of male and female participants were 9.15 (SD 2.04) and 8.99 (SD 1.65) respectively. Mean Attitude Score of Endodontists and PG student were 8.79 (SD 1.89) and 9.43(SD 1.72) respectively. Mean knowledge score of practicing endodontist for <5 years, 5-10 years and >5 years was 8.96(SD 1.53), 8.97(SD 2.06) and 8 (SD 2) respectively. (Table 3)

## Discussion

In the past two decades, the humankind has experienced the outbreak of three coronaviruses that have alarmed the global health. The number of people infected by COVID-19 is more than previous two coronaviruses. On 16<sup>th</sup> March 2020, ADA (American Dental Association) proposed to postpone all dental non-emergency procedures in an attempt to curtail the spread of this disease to lighten the burden on hospitals as well as to prevent cross-contamination of virus in society. Thus, we planed this survey for the same.

In this study the questions were divided into two categories to evaluate knowledge and attitude of endodontists regarding COVID-19 and preventive measures to be adapted in Endodontic practice. SARS-

CoV-2 is a novel strain that has not been identified previously in humans, thus there is very less knowledge regarding this virus among health care professionals including dentists. Thus, the knowledge based questions were designed such that we can access the underlying level of understanding and awareness amongst endodontists regarding virus as as regarding various guidelines issued from time to time by IDA(Indian Dental Association), ADA, MOHFW(Ministry of Health and Family Welfare), WHO and various other medical bodies to prevent the spread of virus and more importantly the measures to be taken to practice safe dentistry.

The coronavirus is large, ranging from 60-140 nm in diameter, enveloped, positive-stranded RNA virus.[16] It is crucial for any practicing endodontist to know the incubation period of virus in a human body. On an average the incubation period of COVID-19 has been estimated to be at 5 to 6 days but there is evidence to suggest that it could be as long as 14 days [17,18]. According to our survey, the knowledge amongst endodontists about the details of virus structure was not that sound. However, they very well knew about the incubation period and required time for isolation/quarantine of the patient.

The knowledge of incubation period allows a dentist or an endodontist for correct patient selection for their practice and protect oneself from infection as well as to prevent cross-infection in dental clinic. Thus, if on consultation any patient appears to be the potential carrier of virus and requires dental treatment then one must be advised to wait for a period of 14 days or to go for a COVID-19 test to ensure the safety of the medical professionals and their patients.[7]

According to recent guidelines by IDA as well as ADA dentist should first perform screening and consultation through teledentistry by using audio as well as video calls

to reach the patients and provide pharmacological management for patient's complaints as well as preventive measure to delay or to avoid dental emergencies. Pharmacological management with anti-inflammatory and antibiotics relieves patients' symptoms for time being and provides sufficient time to dentist to either refer the patient to specialist or deliver emergency dental care with all appropriate measures in place to prevent the spread of infection. [19,20] In our study, majority of endodontist opted for tele-consultation and opted to perform only emergency care procedures and avoid elective endodontic procedures.

For an endodontist, emergency treatments include severe pain of pulpal and periapical origin, swelling, trauma, broken restorations, uncontrolled bleeding, cyst or tumors etc. (according to recent guidelines) these procedures should be carried out only after teleconsultation, tele-triage, consent and through pre-fixed appointment only.[21]

As per the MOHFW guidelines dated 22/03/2020, all asymptomatic workers in care of patients are advised to take hydroxy-chloroquine prophylaxis after medical consultation. Other prophylaxis therapy has also been suggested including various anti-viral drugs and therapy by Ministry of AYUSH (Ayurveda, Yoga and Naturopathy, Unani, Siddha and Homeopathy). [21,26] In our study, majority of endodontist knew about this prophylactic therapy and opted to go for all of the above-mentioned procedures for their protection.

Regarding the Zones and dental clinics, MOHFW guidelines states that all dental clinics shall remain closed in containment zones but a dentist can provide emergency dental care in red, orange and green zones after complete tele-screening of the patients.[21]

Before proceeding with emergency care, patients should be advised to use povidone iodine or hydrogen peroxide



based mouthwash for 30 seconds, studies have proved their effectiveness against SARS-CoV-2 as it may reduce the viral load in dental aerosols. Commonly used mouthwash like chlorhexidine have not been proved effective against this virus.[22,23] Dentist should wear protective equipment, complete PPE kit including N-95 or FFP3 masks (N-95 masks authenticated by the National Institute for Occupational Safety and Health or FFP2 and FFP3 -standard masks set by the European Union), eye ware or face shields and gloves. It is recommended that dentist should wear PPE kit of 70 GSM or more. 180 GSM PPE kit are best suited as they are meant to be worn, by doctors who come in direct contact with patients' body fluids. PPE kits should be changed between the treatment of each patient and if using autoclavable PPE kit, it should be heat sterilised before re-use. In our study, majority of endodontists preferred to use disposable kits and changing them after treating each patient.[24]

For the sterilization of dental clinic, it is recommended to use automatic hand dispensers, HEPA (High Efficiency Particulate Air) filters, Plasma air sterilizer and/or fogger machine. These devices help in effective prevention of cross-contamination in clinical space. Common standards require that a HEPA air filter must remove from air at least 99.95% (European Standard) of particles whose diameter is equal to or greater than 0.3 $\mu$ m that passes through the filter to achieve airborne isolation environment. A fog machine or smoke machine emits a dense vapour that appears similar to smoke that can be helpful for sterilization of the clinic space. They should be used with sodium hypochlorite for effective sterilization. [25,26]

During endodontic practice, aerosol generating procedure such as the use of a 3-way syringe and dental handpiece, should be minimised as much as possible.[28] Routinely intraoral x-ray examination is the most common

radiographic technique in dental imaging; however, it can stimulate saliva secretion and coughing. Therefore, extraoral dental radiographies such as panoramic radiography and CBCT are relatively safer and more appropriate alternatives during the outbreak of COVID-19. For working length determination, one should go for use of apex locator instead of intraoral radiography. In our study, majority of endodontist agreed to the same. [27,28] Rubber dam and high-volume saliva ejectors can help to minimize aerosol and spatter in dental procedure. Alternatively, patients could be treated in an isolated and well-ventilated room or negatively pressured rooms, if available. [23,28] Dentists can also opt for use of handpiece with anti-retraction valve as it prevents aspiration of saliva and debris into handpiece and thus prevent cross contamination. These valves are designed to stop retraction of resilient pathogenic bacteria in oral fluids. Endodontic files if needed to be used, one should opt for new files for each patient.

Recently Dr. Sameer Arbat from Nagpur, India designed a safety box for performing difficult bronchoscopy procedures in suspected or confirmed COVID-19 patients. It was named Arbat safety box, it helps in prevention of aerosol transmission from patients to doctor and other healthcare workers. Use of this box in endodontic practice is still to be tested.[26]

According to recent MOHFW guidelines, after the patient is discharged, disinfection of all the surfaces including dental chair should be performed with 1% sodium hypochlorite. Handpiece should be cleaned to remove debris followed by autoclaving. [19,20,21]

In this situation, dentists are one of the most at risk to the COVID-19 infection and can also potentially become carriers and spreaders of the disease if they fail to take proper preventive measures, thus also putting their patients at peril. In spite of all these risks, it's their moral

as well as ethical duty to provide emergency dental procedure to patients in need. In our study, we inquired with the endodontists about the cost of dental treatments in such conditions. Majority of dentists have opted for increased treatment charges. This can be attributed to the increased costs incurred by them with respect to all the protective equipment and devices required to prevent cross contamination in dental clinic.

### Conclusion

The findings of this study reveal inadequate knowledge and awareness regarding safe dental as well as endodontic practice to prevent COVID-19 infection, among endodontists and post-graduate endodontic students of Gujarat, India. The rational vindication for this can be attributed to the fact that COVID-19 is a novel virus and is continuously under research yielding new findings regularly. It's very important for a practicing endodontist to constantly upgrade their knowledge regarding COVID-19 virus, thus providing safe dental care to their patients and to maintain one's own safety.

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### Legend Tables

**Table 1 - Socio-demographic and professional profile of study participants**

		No (%)
Gender	Male	59 (46.5)
	Female	68 (53.5)
Age	Below 30 years	79 (62.2)
	30 to 50 years	42 (33.1)
	More than 50 years	6 (4.7)
Qualification	Post graduate student	54 (42.5)
	Endodontist	73 (57.5)
Duration of practice for practicing Endodontist	Less than 5 years	57 (54.3)
	5 to 10 years	35 (33.3)
	More than 10 years	13 (12.4)

**Table 2 - Knowledge Score and its distribution**

		N	Mean±SD	p-value
Gender	Male	59	7.98±2.08	0.312
	Female	67	8.34±1.94	
Qualification	Endodontist	72	8.03±1.90	0.345
	PG student	54	8.37±2.13	
Age	Below 30 years	78	8.27±2.02	1*2-0.965 1*3-0.331 2*3- 0.414
	30-50 years	42	8.17±2.03	
	More than 50 years	6	7.00±1.41	
Duration of practice for practicing endodontist	Less than 5 Years	26	8.12±1.65	1*2-1.000 1*3-0.871 2*3- 0.835
	5-10 Years	33	8.15±2.04	
	More than 10 Years	13	7.54±2.06	

The mean is significant at the 0.05 level

**Table 3 - Attitude Score and its distribution**

		N	Mean±SD	p-value
Gender	Male	59	9.15±2.041	0.058
	Female	67	8.99±1.656	
Qualification	Endodontist	72	8.79±1.891	0.055
	PG student	54	9.43±1.722	
Age	Below 30 years	78	9.31±1.685	1*2-0.428 1*3-0.038 2*3- 0.157
	30-50 years	42	8.86±1.945	
	More than 50 years	6	7.33±2.251	
Duration of practice for practicing endodontist	Less than 5 Years	26	8.96±1.53	1*2-1.000 1*3-0.489 2*3- 0.469
	5-10 Years	33	8.97±2.06	
	More than 10 Years	13	8.00±2.00	

The mean is significant at the 0.05 level

**Table 4 - Distribution of correct responses of knowledge-based question**

	Gender			Qualification			Experience in years			P-value
	Male	Female	P-value	Endodontist	PG Student	P-value	Less than 5 years	5-10 years	More than 10 years	
Average incubation period of the coronavirus patient is 14 days	86.4%	80.6%	0.319	80.6%	87.0%	.342	84.6%	78.6%	100%	0.562
Emergency endodontic treatment during COVID-19 spread is advisable	78.0%	86.6%	0.204	80.6%	85.2%	.498	82.2%	83.3%	83.3%	0.983
N95 mask can filter particles of size greater than 0.3 microns	37.3%	49.3%	0.011	43.1%	44.4%	.057	43.6%	47.6%	16.7%	0.023
size of GSM of PPE kit used by the dentist during the COVID-19 should be 180 GSM	25.4%	23.9%	0.574	25.0%	24.1%	.725	21.8%	31.0%	16.7%	0.691
Fumigation, HEPA filters, Plasma air sterilization and automatic hand sanitizer dispenser can be used in a dental clinic for the prevention of COVID-19 cross-infection	86.4%	91.0%	0.641	88.9%	88.9%	.896	91.0%	88.1%	66.7%	0.079
Arbit safety box cannot be used for endodontic practice	15.3%	13.4%	0.628	12.5%	16.7%	.698	11.5%	19.0%	16.7%	0.853

**Table 5 - Distribution of correct responses of attitude-based question**

	Gender		p-value	Qualification			Experience in years			p-value
	Male	Female		Endodontist	PG Student	p-value	Less than 5 years	5-10 years	More than 10 years	
If a patient has a history of COVID-19 infection, one should go for emergency endodontic treatment after 14 days if patient tests negative for COVID-19	74.60%	83.60%	0.401	69.40%	92.60%	.006	84.60%	73.80%	50.00%	0.042
Disposable PPE kit should be preferred for endodontic practice	74.60%	80.60%	0.417	76.40%	79.60%	.665	79.50%	78.60%	50.00%	0.243
Rubber Dam and High-Volume Ejector plays a role in the prevention of COVID-19 cross-infection in dental clinic.	94.90%	97.00%	0.547	95.80%	96.30%	.895	96.20%	97.60%	83.30%	0.244
Apex locator should be preferred for determination of Working Length to prevent COVID-19 cross infection.	59.30%	64.20%	0.781	61.10%	63.00%	.194	64.10%	64.30%	16.70%	0.062
Use of a handpiece with an anti-retraction valve prevents COVID-19 cross-infection in dental clinic.	54.20%	67.20%	0.137	48.60%	77.80%	.001	70.50%	50.00%	16.70%	0.007
Anti-malarial, anti-viral and AYUSH therapy drugs can be used as a prophylactic therapy for COVID-19	66.10%	50.70%	0.109	52.80%	64.80%	.108	55.70%	61.90%	66.70%	0.948