COVID 19 Awareness and its Impact on Periodontal Practice among Dental Care Professionals in Southern States of India- A Cross Sectional Survey

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Abstract

Background: COVID 19 pandemic has nevertheless gripped our nation with its unshackled spread, varied disease characterization posing a real threat to health care workers and a high risk to dental professionals necessitating the publishing of guidelines to help dentists continue to provide optimum health services with safety. This cross-sectional survey aims to assess the awareness of the disease, knowledge of infection control and impact of COVID-19 pandemic on periodontal practice. **Methods**: The survey was conducted among 250 participants. The study instrument was a structured questionnaire that was grouped into four sections, namely demographic characteristics; awareness of the COVID pandemic, employment of infection control measures in combating COVID-19 pandemic; and the impact of COVID on periodontal practice. Statistical analysis was carried out using SPSS software and the data was presented as percentages. **Conclusion**: A total of 206 responses were considered as complete submissions which included 71.1%from the red zone, 12.5 % from the orange zone and 16.4% from the green zone. In conclusion, our study revealed that periodontists from Southern states of India were well acquainted regarding the pandemic. It is recommended that dentists should update themselves with the changing norms and adhere to follow national and international guidelines.

***Key Words**: COVID 19 pandemic; dental care professionals; infection control; periodontists; survey*

Introduction

The novel Corona virus disease COVID 19 emerged in the city of Wuhan, China in December 2019 and henceforth, witnessed unrestrained spread across the globe.[1] The Chinese Center for Disease Control and Prevention identified the pathogen responsible of this viral pneumonia to be novel coronavirus (2019-nCOV) whereas,[2] the international Committee on Taxonomy of Viruses (ICTV) named it as "SARSCoV-2" owing to the similarity in the genomic sequence of this novel coronavirus with other beta-coronaviruses such as SARS-CoV and MERS-CoV.[3,4] World Health Organization declared the novel viral pneumonia as a pandemic on March 11, 2020.

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The term "corona" is derived from the latin word, crown denoting the spherical shape and surface projections of these enveloped viruses. Coronaviruses are divided into four groups: alphacoronavirus and betacoronavirus which target the respiratory, gastrointestinal and central nervous system of humans and mammals, while gamma coronavirus and deltacoronavirus primarily target the birds.[5-8] 2019-nCoV belongs to the family *Coronaviridae* of the order *Nidovirales*, B-lineage of the Betacoronavirus genus which are considered to be zoonotic and can be transmitted from animals to humans.

ACE2 (human angiotensin-converting enzyme 2) is the host cell receptor mediating infection by both SARS-CoV and SARSCoV-2.[9] ACE2+ cells are demonstrated to be abundantly present throughout the respiratory tract and epithelium of salivary gland ducts, hence act as early targets of SARSCoV infection.[10] Due to the high binding affinity of SARSCoV-2 with ACE-2 and evidence of surge in the number of cases along with

sustained human-to-human transmission, 2019-nCoV virus is by far considered the most contagious among the other counterparts(SARS-CoV and MERS-CoV).[11-13]

Incubation period of COVID ranges from 2 to 14 days, with a mean of 5 or 6 days.[14,15] 14 days is considered as the globally implemented duration for medical observation and quarantine of potentially exposed persons.[16,17] Around 80% of infected cases are asymptomatic carriers who may serve as potential reservoirs for infection transmission.[18,19] Patients with COVID-19 may present with an array of symptoms ranging from fever, dry cough, myalgia, fatigue, nasal congestion to other atypical symptoms such as nausea, diarrhoea, confusion, headache, hemoptysis, stomach pain, dizziness, hyposmia and dysgeusia.[20] The infection can progress to cause severe respiratory distress with a fatality rate around 3 % in India.

Dental clinical settings invariably possess high risk for spread of 2019-nCoV infection due to the unique nature of dental interventions which, involves face-to-face communication with patients, aerosol generation, handling of sharps, proximity of the dentist to the patient's oropharyngeal region, frequent exposure to saliva, blood, and other body fluids. Infection transmission in the dental offices can potentially be carried out in one of these routes,[21] (i) Airborne transmission - Intrinsic nature of dental procedures such as high-speed handpiece or ultrasonic instruments in infected patients make their secretions, saliva, or blood aerosolize to the surroundings.[22] Virus- laden aerosols are small enough to stay airborne for an extended period before they settle on environmental surfaces or enter the respiratory tract through inhalation. (ii) Contact transmission may be either through direct contact with infected patient's body fluids (blood, oral fluids), nasal/ oral mucosa loaded with droplets and aerosols containing microorganisms or indirect contact with dental apparatus which get contaminated following treatment of infected individuals.[23,24] (iii) Surface transmission through contaminated environmental surfaces like metal, glass or plastic that are frequently contacted by dental care personals.[25,26]

Life threatening COVID-19 infection is currently impacting India in an unprecedented manner ever since its first case was reported on 30th January 2020, making India currently the third worst affected nation in the world. As an effective step in controlling the ferociously spreading COVID-19 pandemic, it is essential to assess the awareness and existing knowledge gaps among the Indian dentists and formulate best practice guidelines against COVID-19 spread. Among the specialties of dentistry, Periodontics deals with procedures incurring high aerosol production during ultrasonic scaling as well as involves prolonged exposure with patient's oral fluids and blood during surgeries. Hence, the present study was undertaken with the aim to assess the awareness of the disease, knowledge of infection control and impact of COVID-19 pandemic on periodontal practice.

Materials & Methods

This observational cross-sectional study was designed following STROBE guidelines and was approved by the ethical committee and institutional review board of SRM university (SRMU/M&HS/SRMDC/2020/S/020). The study instrument was developed after reviewing pertinent literature, international and national guidelines,[27-30] and was distributed via google forms which is available at: https://docs.google.com/forms/d/e/1FAIpQLScEbYDtYqFOvV37c0AheAU1FSr6emZTla5cU6BcvEGRj_FcMw/viewform?usp=sf_link. The questionnaire was formulated in English and comprised of 37 questions based on the four categories - demographic characteristics; their awareness of the COVID pandemic; employment of infection control measures in combating COVID-19 pandemic; and the impact of COVID on periodontal practice. The questions were mostly multiple choice or yes/no in nature with less than three open ended questions.

Study population consisted of subjects primarily practicing clinical periodontics i.e., individuals pursuing master's program in periodontology and also specialists who completed their master's program in Periodontology &oral implantology. Clinicians specialized in other fields of dentistry and general practitioners were excluded.

This survey was conducted between 1st and 20th of June 2020. Convenience sampling methodology was employed and the questionnaire was distributed to 250 participants personally via e-mails as well as posted on various social media platforms like Facebook and WhatsApp (Figure 1). The dentists' consent to participate in the study was inferred when they voluntarily agreed

to respond to the questionnaire. Among 250 participants, 44 were excluded owing to incomplete submissions and a total of 206 responses were recorded. Only the principal investigators had access to the data and no personal details (phone number, name, etc.) were required as a part of sample collection.

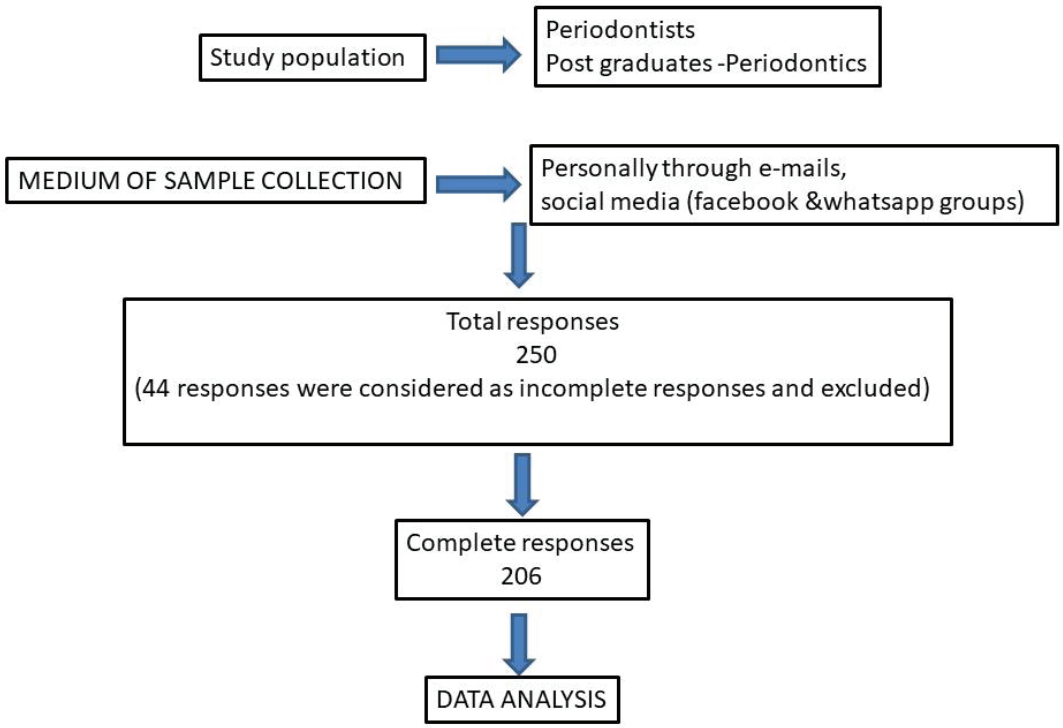

Figure 1 – Study design

Data were analyzed using SPSS (IBM SPSS Statistics for Windows, Version 26.0) with a significance level of 5% ($\alpha = 0.05$). Kruskal Wallis test was performed to compare values between zones, Bonferroni adjusted Mann Whitney test was used for multiple pairwise comparison and Chi-Square test was applied to compare proportions. Categorical data were described in terms of percentage.

Results

This study included a total of 206 (70.1%female and 29.9% male) participants, forming a response rate of about 58.8% (206 out of 350 invited participants). The sociodemographic characteristics are shown in Table 1. Out of 206 respondents,71.1% resided in the red zone with majority of the population having 1 to 5 years of clinical experience (63.8%). Among the subjects,65.05% were periodontists and the remaining were pursuing

Masters in Periodontics (34.95%).

Table 1 – socio-demographic data of the respondents

VARIABLE	CHARACTERISTIC	n(%)
Age group distribution(in years)	21-30	48.1
	31-40	36.5
	41-50	13.5
	51 and above	1.9
Gender	Male	29.9
	Female	70.1
Zone distribution	Red zone	71.1
	Orange zone	12.5
	Green zone	16.4
Years of clinical practice	1-5	63.8
	5-10	11.2
	Greater than 10 years	25
Mode of Practice	Periodontist	65.05
	Post Graduate	34.95

In Figure 2, the questions pertaining to the awareness of the pandemic were correlated with the years of practice of the participants. All participants were aware that every patient could be a potential asymptomatic carrier of the disease.85.4% of respondents agreed that telephonic staging is a reliable approach which was statistically significant ($p<0.05$) with a unanimous positive response from the 5-10 year group.95.1% of the participants were acquainted about all the precautions to be followed at the reception desk.66.0% were displaying visual alerts in their clinic to educate patients, which was also statistically significant ($p<0.05$). Alarmingly only 37.9% were aware of the types of reusable respirators (Filtering facepiece and Powdered air-purifying respirators) with a fairly similar response of 38.9%, 36.4% and 35% in the 1-5, 5-10 and > 10 years groups respectively. Around 50% of the study population prefer to adjust the facemask after performing hand hygiene, however only 15.5% were aware of the recommended guidelines of adjusting facemask both before and after performing hand hygiene and this question showed statistical significance ($p<0.05$).

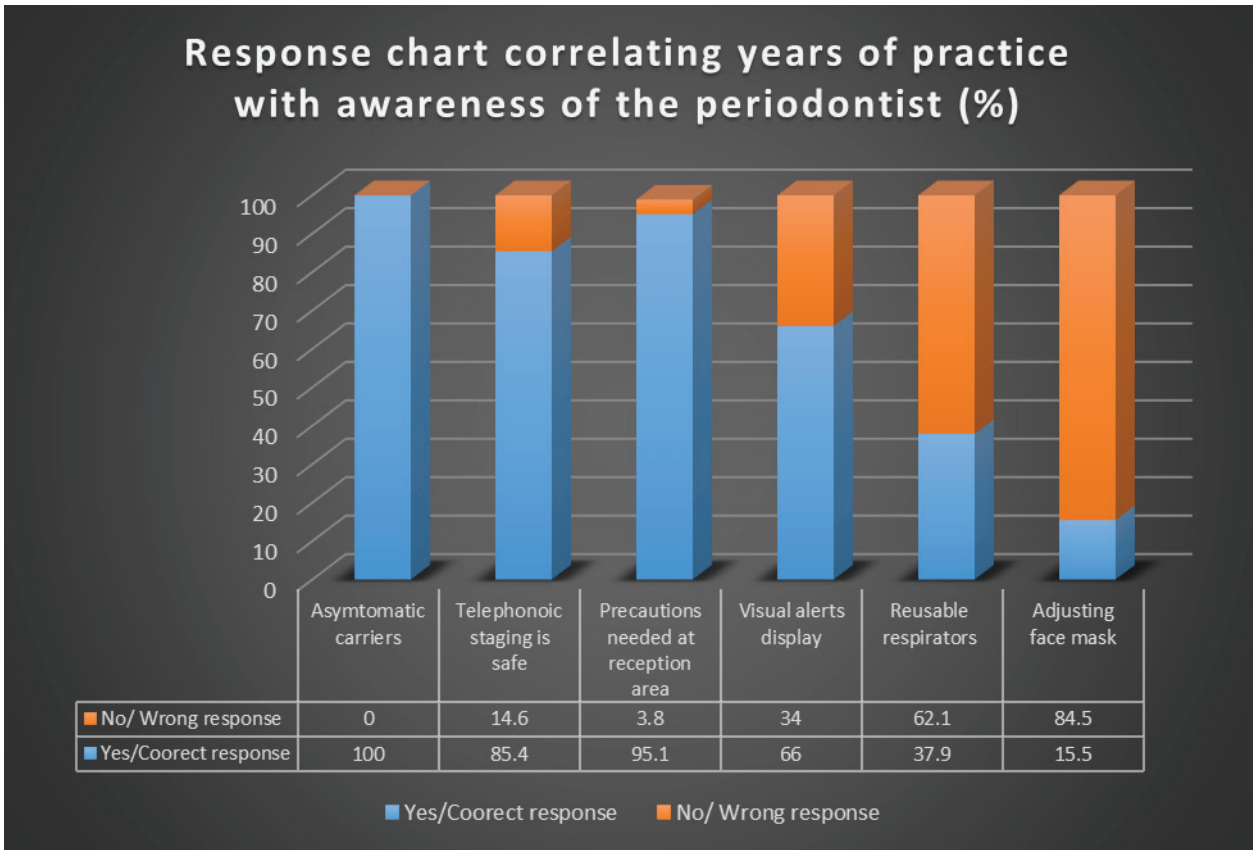

Fig 2 - Response chart correlating years of practice with awareness of the periodontist

Table 2 depict the response chart comparing mode of practice with employment of infection control strategies. 82.5% of the respondents believed in designating separate areas for aerosol and non-aerosol procedures with a nearly even distribution of responses from both the periodontists and the postgraduates. With regards to the type of ventilation that is contraindicated, 37.3% of periodontists and 38.9% of postgraduates gave the right response.85.4% of participants affirmed that chemically treating the water reservoir reduces infection transmission. Statistical significance was observed in the question on the most suitable method of operatory floor disinfection with 83.6% of periodontists and 61.1% of the postgraduates giving the right response ($p<0.05$). 96.1% of the respondents reported that disinfecting dental chair in between every patient is necessary. Around 70% of periodontists and postgraduates chose surface wiping with hospital grade disinfectants as the best mode of dental chair disinfection.76.9% of periodontists and 63.9% of post graduates considered 90 GSM of PPE and above to be ideal for reuse (Table 3 B). Statistical significance was exhibited among the responses favouring 1% povidone iodine as the most effective preprocedural mouth rinse. However, the post graduates showed a preference to use 0.2% CHX (44.4%) in contrast to the periodontists who opted for povidone iodine (52.2%). In accordance to DCI guidelines, only 33% of the study population abided to scrubbing with isopropyl alcohol prior to dental procedures.

With respect to periodontal practice, the highest incidence of particle transmission is noted with ultrasonic/ sonic instrumentation and this response (66.7% of periodontists and 83.3% of post graduates) had statistical significance ($p<0.05$). 73.8% of the respondents felt that treatment efficiency may get reduced by hand instrumentation, if opted as an alternative to ultrasonic scaling.

Table 2 Response chart comparing positive accurate responses between mode of practice with infection control & clinical practice

QUESTION	MODE OF PRACTICE			p-value
	Periodontist	Postgraduates	Overall	
Separate Clinical areas	83.6%	80.6%	82.5%	0.585
Type of ventilation contraindicated	37.3%	38.9%	37.9%	0.199
Chemical treatment of water reservoir	88.1%	80.6%	85.4%	0.145
Operatory floor disinfection	83.6%	61.1%	75.7%	0.001*
Frequency of disinfecting dental chair	97.0%	94.4%	96.1%	0.243
Best mode of disinfecting dental chair	71.6%	69.4%	70.9%	0.914
GSM of reusable PPE	76.9%	63.9%	72.3%	0.098
DCI recommendation prior to dental procedure	35.8%	27.8%	33.0%	0.266
Hand instrumentation reduces Treatment efficiency	70.1%	80.6%	73.8%	0.105
Highest incidence of particle transmission	66.7%	83.3%	71.9%	0.025

*- denotes statistical significance $p<0.05$

Figure 3 shows responses correlating the zone of clinical practice and impact of COVID-19 on periodontists. 5.9%, 15.4%, 23.3% of periodontists residing in the green, orange and red zone respectively had difficulties in bio medical waste disposal. An overall statistical significance ($p<0.05$) was noted in the question regarding possession of fumigator (71.8%) wherein, alarmingly only 20.5% of dentists from the red zone owned a fumigator. Across all zones, 90.3% of practitioners believed that OPG was the most ideal diagnostic radiograph amidst the pandemic contributed by 97.3%, 69.2% and 76.5 % of red, orange and green zone respondents respectively which was found to be statistically significant ($p<0.05$). 56.3% of the participants preferred four handed dentistry.

93.2% considered pain associated with periodontal abscess/ tooth mobility as the true periodontal emergency that was statistically significant ($p<0.05$). Moreover, 23.5%,38.5%,21.9% of the respondents from the green, orange and red zone respectively had attended emergencies donning a PPE. 11.8%,7.7% and 9.6% of practitioners from the green, orange and red zone respectively continued to perform aerosol generating procedures. However, 83.5% of the periodontists had refrained themselves from performing non-emergency periodontal procedures. 58% of the periodontists specified that they did not practice periodontics during this period. However, 1% of the entire study population stated a good periodontal practice despite the pandemic challenges (Figure 4).

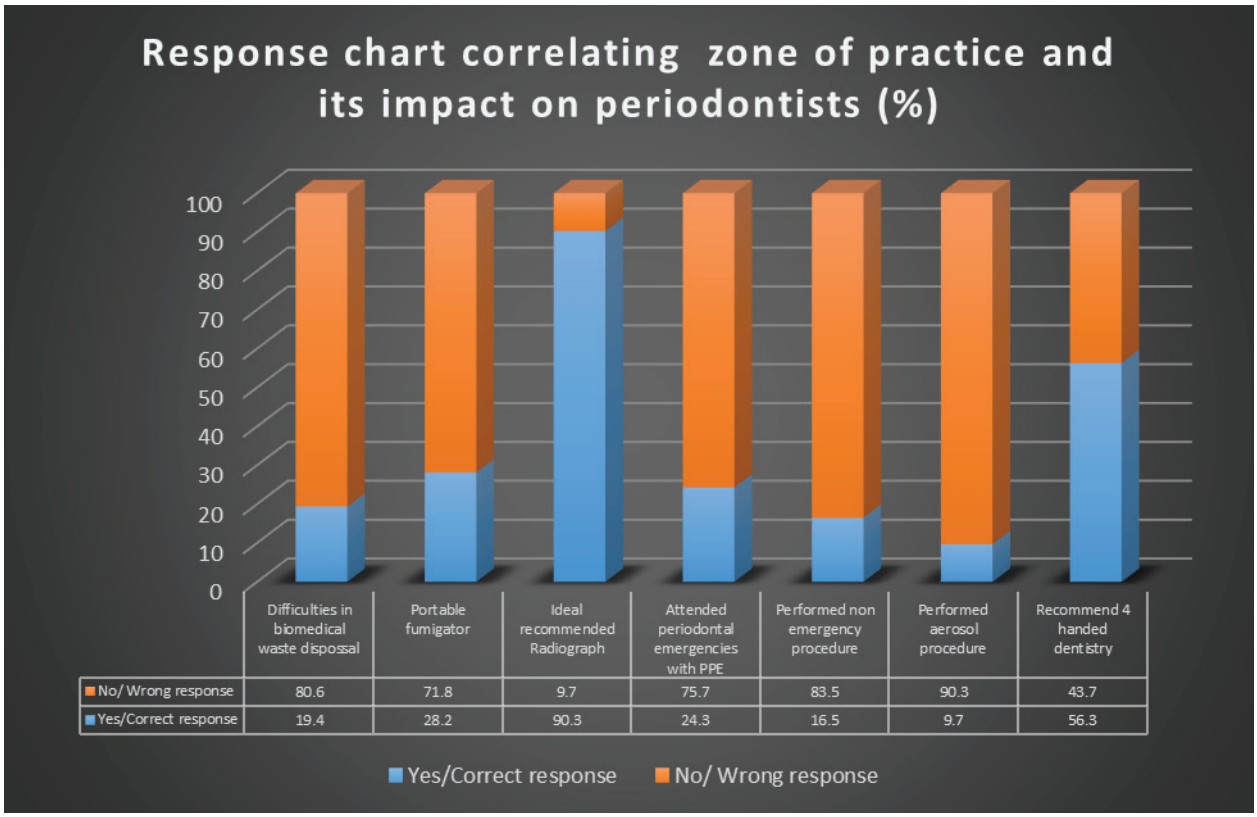

Figure 3 - Response chart correlating zone of practice and its impact on periodontists

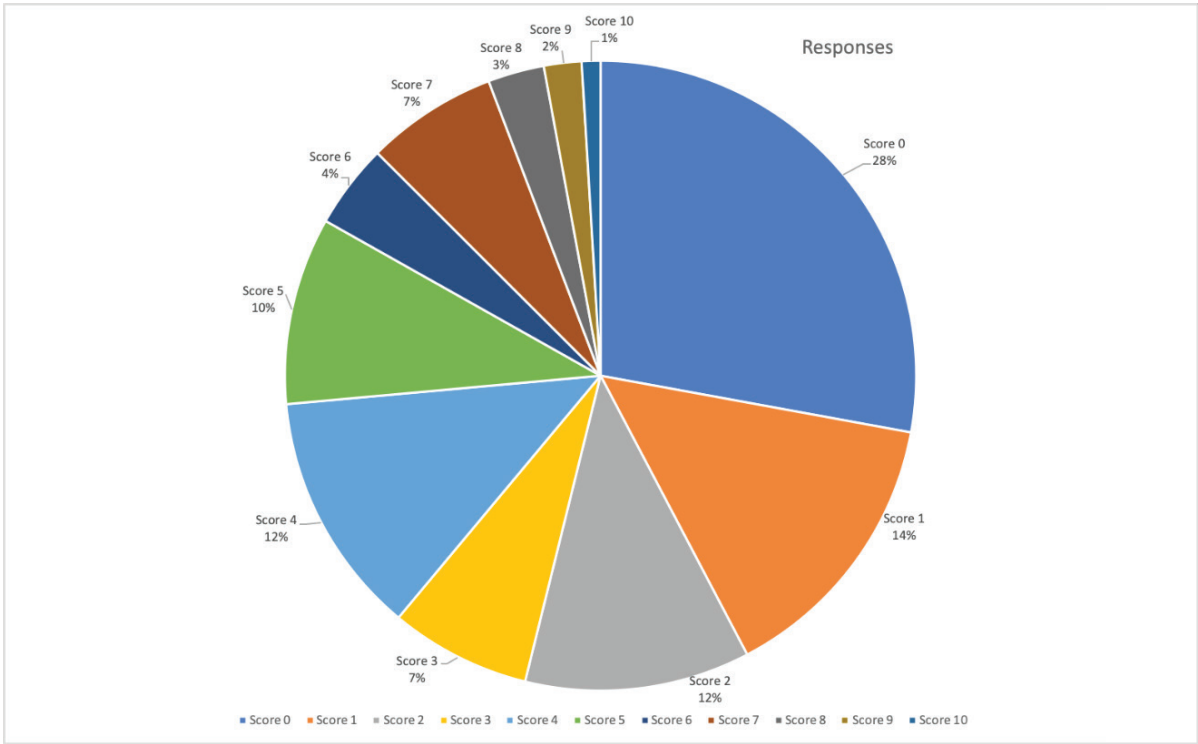

Figure 4 - The impact of the pandemic on the overall periodontal practice

Discussion

The rampant spread of SARSCoV-2 across the nation has increased the likelihood that dental care professionals may treat the subset of patient population harbouring the virus. In response to this challenging pandemic, the WHO, Center for Disease Control and Prevention (CDC), American Dental association (ADA), the National Health Service (NHS), as well as other health regulatory bodies have instituted standardized, professional guidelines to help regulate dental services and provide measures for prevention, identification and management for appropriate mitigation of further spread of COVID-19 disease. Since SARSCoV-2 virus is abundantly present in saliva and nasopharyngeal secretions of patients once it gets into the body and reports claiming almost 90% chances of infectivity are evident for dentists among the health care providers, dental professionals are at maximum risk for transmission and contraction of nosocomial infection and can become potential carriers of the COVID-19 disease.[31] All these facts can have serious implications in the routine dental practice and if adequate precautions are not taken, the dental clinics and hospitals can potentially lead to cross contamination.

To evaluate the readiness among professionals to steer through this pandemic, the questionnaire was targeted at their understanding of the disease presentation, identification of patients with 2019-nCoV infection, knowledge of infection control measures, treatment modifications and adoption of other protective measures. This also helps the dentists in early detection of disease and upgradation of past preventive strategies if the COVID-19 reverberates into the future and the second wave of the disease transpires.

To the best of our knowledge, this is the first study that evaluates the awareness of COVID-19 among periodontists in South India. The section on awareness consisted of six questions and their responses were compared with the years of professional practice. According to national and international guidelines, telephonic staging of patients could be a safe method of grouping the patients according to their required level of dental care into emergency, urgent and elective care, thereby prioritizing the dental services and reducing the risk of cross infection, to which 100% of the practitioners with 5-10 years' experience were in concordance.[32]

Indian Dental Association recommends posting visual alert icons on hand hygiene, respiratory hygiene, and cough etiquette in the reception area to educate the patients.[33] With regards to the question on visual alerts, positive response was noted from 90% of practitioners with 5-10 years of experience suggesting that this group were more updated with the current national guidelines. As the need for continuous respiratory protection arose with the uncertainty of SARSCoV-2 virus transmission and the fact that coronaviruses lose their viability significantly after 72 hours ,[34] we assessed the knowledge on reusable respirators.

Previous studies have evaluated the awareness of COVID 19 among dental students and practitioners, but failed to differentiate the gap of knowledge between students and practitioners.[35,36] The following section of the questionnaire dealt with infection control strategies comprising nine questions and their responses were compared with the mode of practice (Periodontists, Post graduates). 112 periodontists and 58 post graduates were in confluence with performing aerosol generating procedures in separate negative pressure areas in the dental office, referred as Airborne Infection Isolation Room (AIIR).[30] In par with the CDC and DCI guidelines, questions on ventilation systems, floor disinfection and pre procedural mouth rinse were framed. To our surprise, the results suggested that neither the periodontists nor the post graduates had a clear insight into the infection control strategies depicted by the mixed responses that were received. This was in contrast to the previous study done among Indian undergraduate dental students who showed adequate knowledge on the disease origin, etiology, transmission, features, diagnosis and prevention.[35] However, the guidelines provided by the Indian government were not focused on their questionnaire and that could be the reason for variation in the results. The study done in Mumbai showed that a higher percentage of correct responses were from undergraduate medical students and the lowest was from non-clinical/administrative staff.[36]

According to the Guidelines for the Diagnosis and Treatment of Novel Coronavirus-Infected Pneumonia published by the National Health Commission of the People's Republic of China, it was observed that the

most commonly used chlorhexidine mouth rinse, had no effect against COVID-19. Instead, they suggested use of oxidative agents such as 1% hydrogen peroxide or 0.2% povidone whereas,[21] ADA and CDC considered hydrogen peroxide to be most superior.[30,37] Another study done among Turkish dentists suggested that although the practitioners had adequate protective measures, their attitude towards sustaining COVID preventions had not reached sufficient levels .[38] However, a multinational study showed that 79% dental practitioners followed the recommended preventive measures provided by the government.[39]

The last section of our study on impact on periodontal practice consisted of eleven questions out of which the responses of nine questions were compared with the zone of practice. The zones were categorized as per the government of India into Red, Orange and Green zones. Majority of the respondents were from red zone due to progressive involvement of a large part of the population in the pandemic. The dental clinics in the red zone faced difficulties in biomedical waste disposal owing to the stringent lockdown imposed. Despite guidelines advocating fumigation of dental operatory, 79.5% of dentists in the red zone neglected the use of fumigators. This could be possibly attributed to their preference towards Ultraviolet-C irradiation lamps since it is a quicker option especially between patients and rarely produces potentially dangerous by-products.[40] Previous study suggested that across the globe, among dental practitioners, 46% felt safe to perform dental procedures donning a PPE.[41] Irrespective of the residing zones, majority of the respondents agreed over the usage of OPG owing to the drawbacks of IOPA such as stimulation of saliva secretion and induction of coughing.[42]

Pain associated with periodontal abscess and tooth mobility was the most opted emergency that requires immediate dental care and one fourth of the participants attended periodontal emergency donning a PPE. It is recommended for periodontists and dental surgeons to adhere to the use of highest level of personal protective equipment (PPE) available which involves gloves, gown, head cover, shoe cover, eye protection including goggles or a disposable/reusable face shield that covers the front and sides of the face, and a N95 or higher level respirator.[43] Around 80% of the respondents deferred performing non-emergency periodontal procedures such as scaling, root planing and polishing in par with the guidelines. Hand instrumentation could be an alternative to aerosol generating ultrasonic instrumentation but its efficiency is a concern and three fourth of the participants sided to the fact of efficiency being hampered. However, if aerosol-generating procedure needs to be performed, it should be scheduled as the last appointment of the day and four-handed dentistry with high volume suction for aerosols should be implemented along with regular suction.[44]

At this hour of pandemic, dental professionals must be constantly aware of infectious threats that may challenge the current infection control regimen, act diligently and understand the importance of organized dental care provided with appropriate infection control measures such as personal protective equipment, detailed patient evaluation, handwashing, mouth rinsing before dental procedures and disinfection of clinic.[27,28]

Conclusion

In conclusion, our study revealed that periodontists from South India had adequate awareness regarding COVID 19 pandemic with a fairly moderate knowledge on infection control strategies, which can be further enhanced by updating and conforming to the current guidelines. On the other hand, periodontal practice was undoubtedly affected and faced a drastic fall. In order to strike a balance between the safety of dental care professionals and provision of optimum dental services, dentistry has to revolve itself.

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