How to Cite:
Awasthi, R., Singh, D. K., Kumar, S. P., Baral, S., Pathi, J., & Jalauddin, M. (2022). Impact of the COVID-19 pandemic on periodontal health practice by dental health professionals in Eastern India: A questionnaire survey. *International Journal of Health Sciences*, *6*(S1), 2287–2300. https://doi.org/10.53730/ijhs.v6nS1.5166

Impact of the COVID-19 Pandemic on Periodontal Health Practice by Dental Health Professionals in Eastern India: A Questionnaire Survey

Riddhi Awasthi
Final Year Post Graduate Student, Department of Periodontics & Oral Implantology, Kalinga Institute of Dental Sciences, KIIT Deemed to be University, Bhubaneswar

Dhirendra Kumar Singh
Professor, Department of Periodontics & Oral Implantology, Kalinga Institute of Dental Sciences, KIIT Deemed to be University, Bhubaneswar

Smriti P Kumar
Final Year Post Graduate Student, Department of Periodontics & Oral Implantology, Kalinga Institute of Dental Sciences, KIIT Deemed to be University, Bhubaneswar

Subhalaxmi Baral
Second Year Post Graduate Student, Department of Periodontics & Oral Implantology, Kalinga Institute of Dental Sciences, KIIT Deemed to be University, Bhubaneswar

Jugajyoti Pathi
Reader, Department of Oral & Maxillofacial Surgery, Kalinga Institute of Dental Sciences, KIIT Deemed to be University, Bhubaneswar

Md Jalauddin
Professor, Department of Periodontics & Oral Implantology, Kalinga Institute of Dental Sciences, KIIT Deemed to be University, Bhubaneswar

***Abstract*---** This cross-sectional study was conducted to investigate the possible factors and challenges associated with the perception of the impact of the COVID-19 pandemic on the periodontal practice by dental surgeons in Eastern India. A total of 150dental health practitioners practicing periodontics participated in the survey. Data werecollected through an online questionnaire and the dependent variable was the perceived impact of the pandemic on periodontal

International Journal of Health Sciences ISSN 2550-6978 E-ISSN 2550-696X © 2022.
***Corresponding author**: Singh, D.K.; Email: dr.dhirendra27@gmail.com*
Manuscript submitted: 18 Nov 2021, Manuscript revised: 09 Feb 2022, Accepted for publication: 27 March 2022

health practitioners'clinical routines. Odds ratios were assessed by logistic regression analysis. The present professional status was seen to have a risk estimate of 1.955. The gender distribution had a risk estimate of 1.979 and also the minimally invasive and conservative procedures had a risk estimate of 2.282. These factors were shown to have a major effect on the regular practice of the professionals. Other factors including attending awareness programs (0.518), practice type (0.346), practice setting (0.093), patients treated regularly (0.931) and replacement of intra-oral imaging (0.384) was seen to affect the practice comparatively lesser. The financial impact of the pandemic was significantly associated with a perceived severe impact of the pandemic on their routines. The pandemic is associated with a negative impact on the practice of periodontal health practitioners of eastern India, especially those working in public sectors and academic institutions.

***Keywords*---**COVID-19 Pandemic, Epidemiology, Dental Surgeons, Periodontal Medicine.

Introduction

The coronavirus disease 2019 (COVID 19) was declared a pandemic by WHO in the year 2020.[1] The infection was observed to be highly infectious and communicable. This contagious infection has created a difficult challenging situation for dental professionals and has increased precariousness regarding the future of the field in the public and private sector.[2-4] The accelerated rate of spread of the SARS-CoV-2 virus is mainly due to its mode of transmission i.e, inhalation. It is well recognized that dental surgeons are highly exposed to small airborne particles from aerosols and droplets in their routine practice.[5] Along with the mode of transmission of disease, the detection of the virus in the saliva of infected patients[6] has increased the risks encountered by dentists.[7] Among dental surgeons, periodontists are at a greater risk because of their frequent use of ultrasonic and polishing devices and other surgical instruments that generate aerosols.[8] Pathogenic microorganisms may be transmitted in dental settings through inhalation of airborne micro-organisms that can stay trapped in the air for long periods[9]; direct contact with blood, oral fluids, or other patient materials[10]; contact of the conjunctival, nasal, or oral mucosa with droplets and microorganism-containing aerosols produced from an infected person and propelled by coughing and talking at a short distance without a mask[11,12] or using high-pressure irrigation systems such as the hand-piece or ultrasonic scalers; and indirect contact with contaminated instruments and/or environmental surfaces.[13] These factors were found to be major contributors in increasing the COVID-19 related fear and anxiety among periodontal health practitioners.[27] Therefore, it is crucial for dental professional teams to practice preventive measures against SARS-CoV-2 infection by complying with the measures for infections control recommended by the World Health Organization (WHO)[2] and the Centers for Disease Control and Prevention (CDC). Restrictions on routine dental services during the first wave were done to compensate for the protective equipment shortage and to prevent the spread of the infection. Urgent care was

delivered using PPE, and additional precautions, including taking patients' recent travel history, recording patients' body temperature, using 1% hydrogen peroxide as a pre-procedural mouth rinse, using a rubber dam and high-volume suction, and frequent cleaning and disinfection of public contact areas such as door handles, chairs and washrooms, were implemented.[14] The reduced availability of dental care has increased demands on already-burdened hospital emergency departments, with potential adverse impacts on oral health and quality of life. Moreover, the closure of dental practices has raised concerns among dentists about the financial implications of this measure.[15,16] Reports show that the economy of the dental and other healthcare sectors was virtually halted because of the pandemic.[16-18] This challenging scenario has led to drastic changes in the clinical routines of periodontal health practitioners, including enacting strict practices against cross-infection, enhancing the management of minimally invasive procedures that generate fewer aerosols, reducing the number of patient visits and developing protocols for teleodontology services.[19,20] Recent studies have indicated that the COVID-19 pandemic has had not only negative economic consequences but also increased the levels of fear and anxiety among the dental workforce.[2,4,21-24] With time, periodontal health practitioners have incorporated the changes in their clinical practice in various ways to reduce the transmission of SARS-CoV-2. In response to the rapid spread of COVID-19, dentists around the world were initially instructed to stop their activities in mid-March 2020 and to treat patients only in cases of urgency or emergency and to focus on increasing cross-contamination control measures.[14] The return to elective activities has been carried out gradually since August 2020 and has been varied in its degree in India depending on the number of COVID-19 cases, hospital bed capacity levels, and COVID-19-related deaths in each state. Despite the rapid growth of the COVID-19 pandemic and the large number of publications covering this event, data on the impact of the pandemic on the clinical practice of periodontal health practitioners remain scarce.

Aim of the study

A cross-sectional study was conducted to investigate the factors possibly related to the impact caused bythe COVID 19 pandemic in the practice of periodontal health practitioners in Eastern India.

Objective of the Study

To investigate the possible factors and challenges associated with the perception of the impact of the COVID-19 pandemic on the periodontal practice by dental surgeons in Eastern India.

Materials and Methods

The online cross-sectional questionnaire survey was carried out after getting approval from the Research Ethics Committee Board (KIDS/RES/029/2021) dated 10.09.2021 of Kalinga Institute of Dental Sciences, KIIT Deemed to be University, among dental surgeons practicing clinical periodontics in eastern India. A minimum sample size of 150 participants was determined for this survey using an estimated population proportion of 50%, a margin of error of 5%, a

confidence interval of 95%, and 26% of no participation.A questionnaire was prepared in English and shared via google form links among the periodontal health professionals. An average time of 5 minutes was needed to complete the questionnaire. Questionnaires were shared with the subjects who consensually participated in the survey. The questionnaire consisted of 30 closed-ended questions. Questionnaire validation was done by specialists in sampling and questionnaire design. Reliability was confirmed by conducting a pilot survey among 25 dental surgeons. The survey was conducted from October 2021 to December 2021 via the online platform. The questionnaire consisted of the demographic section along with 3 other domains. Sociodemographic data comprised of 6 questions about their age, sex, dental degree, areas of living and working, working status during the pandemic. The first section comprised 4 questions with responses based on a nominal scale (yes/no). The questions were specific to the vaccination of the clinician and clinical staff, self-assessment and remote assistance during the pandemic. The second section was regarding the management of the dental office which further consisted of three domains. All the responses were based on a nominal scale (Yes/no). The first domain comprised of 7 questions which were regarding patient management in the clinic. The set comprised of questions such as no. of patients in a day, temperature measurement on their arrival, patients vaccination certificate, hand and oral cavity disinfection with alcohol sanitizer and povidine-iodine mouthwash respectively. The second domain comprised 5 questions regarding PPE and the sanitization method. The third domain comprised 5 questions regarding changes in the periodontal procedures. The questionnaire was shared by google forms link via Whatsapp, the largest Indian social media platform inviting the practitioners to fill in the questionnaire. IP address restriction technology was adopted to ensure users with the same IP address could complete the questionnaire only once.

Statistical analysis

The total scores of a particular domain were presented as mean ± standard deviation (SD), and the results of categorical measurements were presented as numbers and percentages. The collected data were imported to the Statistical Package for the Social Sciences (SPSS) 23.01 program. The change in domain scores was assessed using paired and unpaired t-tests appropriately. $P \leq 0.05$ was considered statistically significant.

Results

A total of 150 participants were included in the present study. Descriptive statistics were computed using frequency-percentage or mean and Standard deviation based on the type of variable.

Table 1
Demographic characteristics of the study population

		Frequency	Percentage	Chi Square	P Value
Gender	Male	107	71.3	27.307	<0.0001*
	Female	43	28.7		
State	Arunachal Pradesh	7	4.7	20.098	<0.0001*
	Assam	5	3.3		
	Bihar	12	8.0		
	Jharkhand	11	7.3		
	Meghalaya	7	4.7		
	Odisha	83	55.4		
	West Bengal	25	16.7		
Current Professional status	Periodontal practice with General dentistry	142	94.7	119.707	<0.0001*
	Periodontal practice	8	5.3		
Experience	1 to 5 years	51	34.0	94.120	<0.0001*
	<1 year	1	.7		
	>5 years	98	65.3		
Attended Awareness program	Yes	98	65.3	14.107	<0.0001*
	No	52	34.7		
Practice Type	Hospital	77	51.3	0.107	0.744
	Clinic	73	48.7		
Practice Setting	Urban	143	95.3	123.307	<0.0001*
	Rural	7	4.7		
Use of remote assistance during pandemic	Yes	83	55.3	62.920	<0.0001*
	No	61	40.7		
	Maybe	6	4.0		
Use arogyasetu app	Yes	100	66.7	16.667	<0.0001*
	No	50	33.3		
Vaccination status of doctors	Fully	150	100	-	-
	Not fully	0	0		
Vaccination status of the staffs	Yes	136	90.7	27.740	<0.0001*
	No	0	0		
	Maybe	14	9.3		

*Statistically Significant

The distribution of the patient management by the dental surgeons was shown in Table 2. Most of the study participants treated 11 to 20 patients regularly (87). Among the different patient management methods, it was seen that temperature measurement and hand sanitization were practiced by all the participants. 129

participants asked for a vaccination certificate. There were 50 of them who disinfected mats and 110 of them who rinsed their mouth using Chlorhexidine. A total of 136 of them cleaned the surfaces in between consultations. There was a statistically significant difference between the groups for all the variables. The distribution of the demographic characteristics was shown in Table 1. There were 107 male and 43 female participants in the study. The majority of the participants belonged to Odisha (83). 142 subjects were practicing general dentistry with periodontology while 8 of them had periodontal practice. The majority of the study participants had >5 years of experience. 98 participants attended the awareness program. A total of 77 participants practiced in the hospital whereas there were 73 of them with clinical practice. There were 143 of them practicing in the urban setting. There were 83 of them who used remote assistance during the pandemic. Only 100 of them used the arogyasetu app. All the study participants were completely vaccinated while there were 136 of them with vaccinated staff. Except for the practice type, all other variables showed a statistically significant distribution.

Table 2
Patient management by the dental surgeons

Patient management		Frequency	Percentage	Chi Square	P Value
Patients treated on regular basis	≤10 patients	63	42.0	3.840	0.05*
	11 to 20 patients	87	58.0		
	>=20 patients	0	0		
Temperature measurement	Yes	150	100	-	-
	No	0	0		
Ask for vaccination certificate	Yes	129	86.0	77.760	<0.0001*
	No	21	14.0		
disinfectant mats with sodium hypochlorite concentrations	Yes	50	33.3	16.667	<0.0001*
	No	100	66.7		
Sanitize hands	Yes	150	100	-	-
	No	0	0		
Rinse mouth with CHX or H2O2	Yes	110	73.3	32.667	<0.0001*
	No	40	26.7		
Clean surfaces between consultations	Yes	136	90.7	99.227	<0.0001* *Sig.
	No	14	9.3		

The distribution of the PPE and Sanitization methods by the dental surgeons were shown in Table 3.89 participants replaced their N95 masks every 8 hours of use. There were 143 of them who covered the N95 mask with a surgical mask. All the participants replaced the surgical mask after each aerosol-generating procedure. A total of 122 participants used PPE during aerosol-generating procedures. There were 136 of them who sanitized their room and dental chair. A statistically significant distribution was noted for all the variables. The distribution of the periodontal procedures by the dental surgeons was shown in Table 4. It showed

that 122 of the study participants used high-volume suction. There were 97 of them who preferred doing minimally invasive and conservative procedures. There were 136 of them who re-inforced disinfection, sterilization and protection of all contaminated surfaces. There were 74 of them who replaced intro oral radiographic techniques with extraoral techniques. There were 96 of them who used sutures with removable threads. There was a statistically significant difference in the presentation except for the replacement of intraoral radiographic techniques.

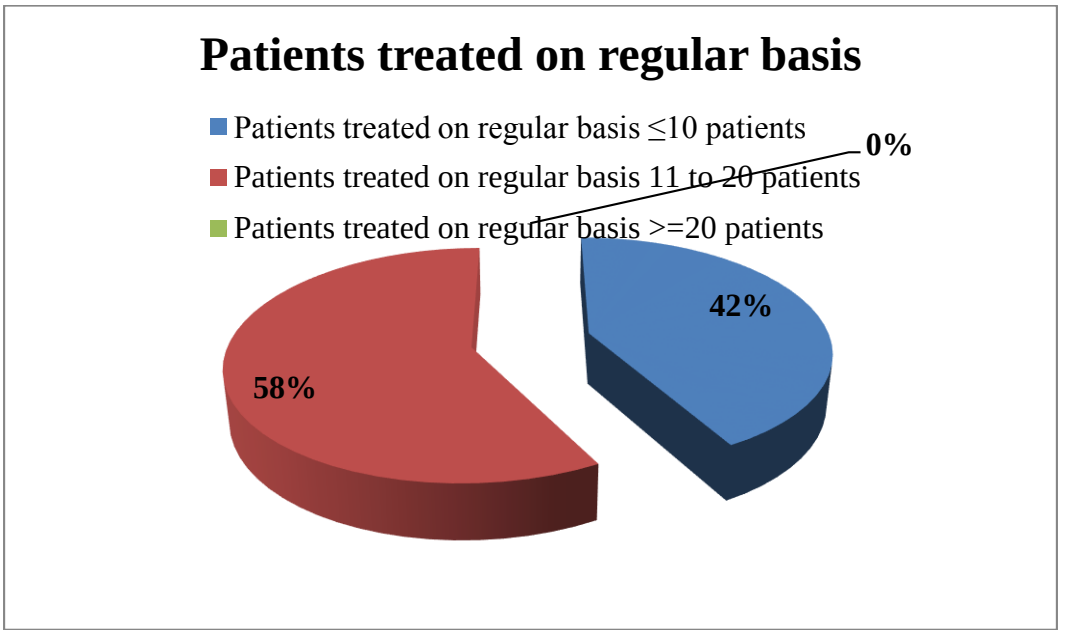

Figure 1. Graphical representation of the patients treated on a regular basis

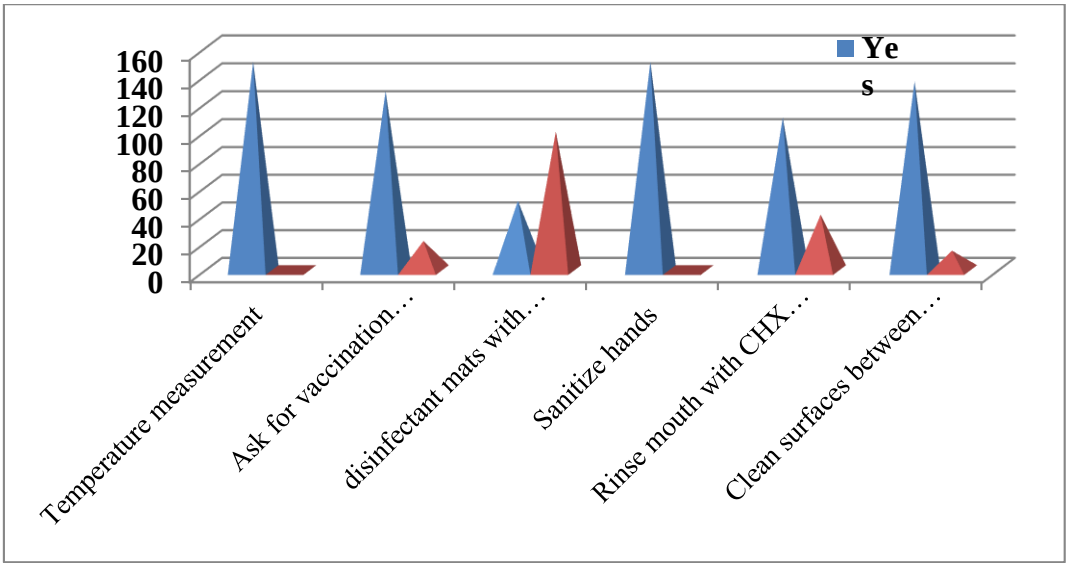

Figure 2. Graphical representation of the patient management by the surgeons

Table 3
PPE and sanitization methods by the dental surgeons

PPE and Sanitization Methods		Frequency	Percentage	Chi Square	P Value
replace N95 mask every 8 hours of use	Yes	89	59.3	5.227	<0.0001*
	No	61	40.7		
cover N95 mask with a surgical mask	Yes	143	95.3	123.307	<0.0001*
	No	7	4.7		
replace your surgical mask after each aerosol-generating procedure	Yes	150	100	-	-
	No	0	0		
PPE during aerosol-generating procedure	Yes	122	81.3	58.907	<0.0001*
	No	28	18.7		
sanitize room and dental chair	Yes	136	90.7	99.227	<0.0001*
	No	14	9.3		*Sig.

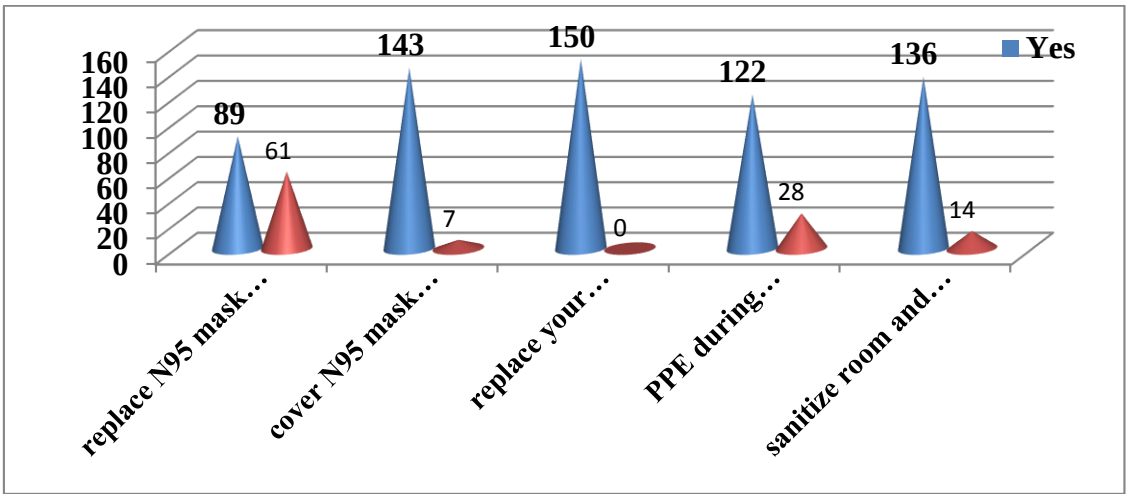

Figure 3. Graphical representation of PPE and sanitization methods by dental surgeons

Table 4
Changes in periodontal procedures by the dental surgeons

Changes in periodontal procedures		Frequency	Percentage	Chi Square	P Value
high-volume suction	Yes	122	81.3	58.907	<0.0001*
	No	28	18.7		
prefer doing minimally invasive and conservative procedures	Yes	97	64.7	12.907	<0.0001*
	No	53	35.3		
reinforce disinfection, sterilization, and protection of all potentially contaminated surfaces	Yes	136	90.7	99.227	<0.0001*
	No	14	9.3		

replaced intra-oral radiographic techniques by extraoral techniques	Yes	74	49.3	0.027	0.870
	No	76	50.7		
sutures with resorbable threads	Yes	96	64.0	11.760	0.001*
	No	54	36.0		*Sig.

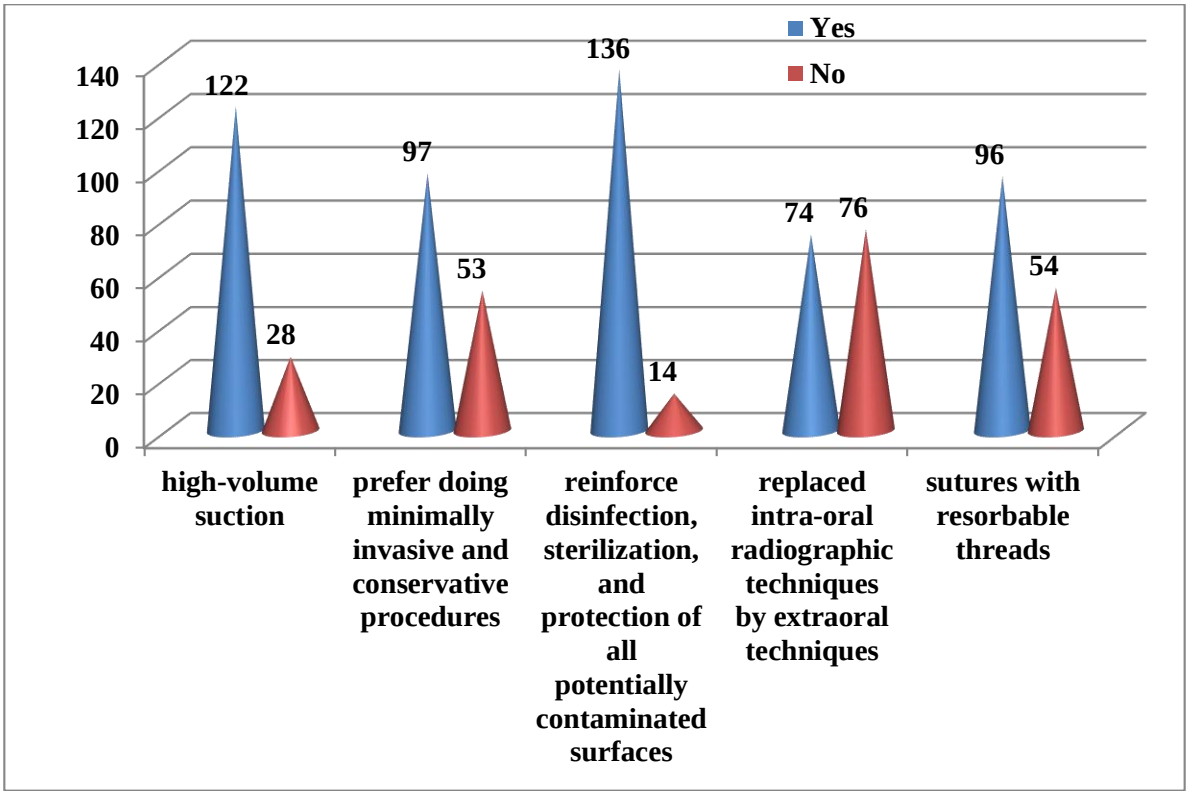

Figure 4. Graphical representation of the changes in periodontal procedures by the dental surgeons

Table 5 states the risk estimate for the affected dental practice for all the periodontists. The present professional status was seen to have a risk estimate of 1.955. The gender distribution had a risk estimate of 1.979 and also the minimally invasive and conservative procedures had a risk estimate of 2.282. These factors were shown to have a major effect on the regular practice of the professionals. Other factors including attending awareness programs (0.518), practice type (0.346), practice setting (0.093), patients treated regularly (0.931) and replacement of intra-oral imaging (0.384) was seen to affect the practice comparatively lesser.

Discussion

COVID-19 pandemic led dentists to adopt new approaches for patient care. These approaches were important to limit the spread of the disease and protect clinicians and patients. This cross-sectional survey was conducted to investigate

the factors related to the impact caused by COVID-19 pandemic on periodontal health practice by dental health professionals in eastern India. It demonstrated that the changes made in their clinical practice had a significant impact on their financial status. Total 289 participants agreed to participate in the survey of which, 52% (150) subjects were practicing periodontal surgeries. And among 150 subjects 94.7% (142) were practicing general dentistry with periodontal practice and only 5.3% (8) subjects were practicing only periodontal surgeries. It was observed that an effective level of control of the spread of SARS-CoV-2 was not attained in either of the mentioned states and a long interruption of services with added prevention aids might have generated an imminent economic crisis for dental surgeons and inappropriate or inadequate patient care. Similar results were observed in the study conducted in Brazil, United States, Canada, European and Middle-eastern countries.[25-27]

Table 5
The risk estimate for affected dental practice

	95% Confidence Interval		Odd's Ratio	P Value
	Lower	Upper		
Current professional status	0.232	16.497	1.955	0.380
Gender	0.751	5.217	1.979	0.093
Length of experience of practicing periodontal surgeries.	-	-	-	0.035*
Have you attended any awareness program for managing patients during COVID-19 era?	0.234	1.147	0.518	0.611
Practice type.	0.151	0.795	0.346	0.537
Practice setting	0.017	0.506	0.093	0.217
Do you use remote assistance used during the pandemic. (WhatsApp, Email, Telephone call, Video conference)	-	-	-	0.028*
Of patients treated daily on average.	0.420	2.059	0.931	0.389
Intra oral imaging replaced by extra oral imaging	0.167	0.880	0.384	0.160
Minimally invasive and conservative procedures	0.913	5.703	2.282	0.843

In the present study, only 65.3% of periodontal health practitioners attended awareness programs. Despite attending the awareness programs of guidelines by the BSP (British Society of Periodontology) and AAP (American Academy of Periodontology), practitioners surveyed here did report a lack in following proper patient management by not using disinfectant mats, not asking the patient to rinse mouth with chlorhexidine or povidine iodine solution before checkup, not disinfecting surfaces between consultations during the pandemic. The study also reports that most dental surgeons are still abstaining from minimally invasive

surgeries and conservative procedures. Most of them have preferred using intra-oral radiographic techniques over extra-oral radiographic techniques and non-resorbable sutures over resorbable sutures. During the survey sudden rise of cases was also observed in the zone which could be related to the lack of responsibility of practitioners as well as patients. Similar results were observed in the study conducted in Brazil and United States.[27] To provide safe dental care, dental surgeons should meticulously follow preventive Covid-19 guidelines including the use of personal protective equipment, establishing changes in work routine and periodontal procedures. Most of the periodontal health practitioners have also reported following these practices in the eastern part of the country (Tables). It is supposed that such measures may have financial implications, as was previously reported by a Brazilian studyof 2020.[28]Furthermore, the difficulty in acquiring common personal protective equipment due to its scarcity and exorbitant cost on the market, as demonstrated recently by Chamorro-Petronacci et al. 2020; Consolo et al., 2020 and reported by 66.1% of the periodontists in this study, is another negative factor to take into consideration in securing clinical practice after the pandemic.[29,30]

This survey was conducted during the period when most of the periodontal health practitionersin the eastern state had resumed dental activities due to decreased case counts with precautionary provisions in place. The fear of contamination, social distancing measures have led to reduced demand for dental care by the population and reduced working hours of dental surgeons. These factors harmed the short and long-term financial stability of the dental practice and the quality of life of dental surgeons.[27]The implementation of precautionary protocols has also contributed to the same. The results of the study indicated that a financial impact was felt by periodontal health professionals practicing periodontology in the eastern states of India, with a significantly higher negative impact on the current routine and with consideration of the future of the clinical practice reported by those in other countries. It was also concluded that the perception of a significant impact of the COVID-19 pandemic in clinical practice was related to the financial impact suffered.[27,28] The changes in clinical routines adopted by periodontists in this study following the onset of the pandemic were similar to those reported in other studies.[14,25] Changes that helped avoid the spread of the virus and reduced the risk of contamination for both, the patients and the health care professionals were observed to follow the guidelines put forward by various health organizations.[31]It must be noted that a majority of periodontists belonging to an eastern state declared that they followed most of the COVID-19 related recommendations put forward by the AAP and BSP for a dental practice, which were based on the suggestions put forth by the Centre for Disease Control, the World Health Organization and the American Dental Association (Tables 2 and 3). These recommendations included the screening of patients and visitors, especially those with a history of international travel and patients demonstrating symptoms of acute respiratory illness, which included fever, difficulty in breathing and cough, recording patient temperature, using PPE and high-speed evacuation equipment for all procedures generating aerosols. These recommendations also included advising patients to rinse with 1% hydrogen peroxide immediately before their appointments, motivating ill employees to isolate themselves, promoting the use of telemedicine for patients who could be taken care of adequately without

them needing to visit clinics, spreading awareness regarding self-assessment tools on the dentist's private website or social media pages.[19,20]

A statistically significant difference was demonstrated using univariate analyses between periodontists who adapted their setup to render it safer and those who made conscious changes to their clinical routines to lessen aerosol generation as opposed to the periodontists who did not (p=0.017 and p=0.026 respectively). However, in the multivariate analysis, the perception of a significant impact of the COVID-19 pandemic on clinical practice was not related to the adjustment of periodontal clinical procedures. As a result, it appears that most periodontists did not give priority to altering procedures to minimize aerosol dispersion. Periodontal health practitioners who incorporated the necessary changes in clinical routinedemonstrated a greater chance of reporting a significant impact of COVID-19 on their clinical practice. Disinfection and rigorous hand-washing at frequent intervals have gained prime importance to reduce the spread of SARS-CoV-2. Hence, the implementation of meticulous hand washing protocols, especially during clinical practice was found to be the most prompt and outstanding change in clinical practice observed by periodontists across eastern India upon the onset of the COVID-19 pandemic. Although the findings in the study were relevant, certain limitations were also present. Because of the cross-sectional structure of the study, only the association between the individual factor and perception of the impact was assessed but no causal relationship was evaluated. Another limitation was the low response rate even after the survey was conducted through a virtual platform. This led to a smaller convenience sample. As the self-applied online questionnaire was used, it could have caused a possible degree of bias in the recruitment of participants. Likewise, it is not confirmed for sure that the demographic data of the population that responded to the survey is representative of the general population of dental surgeons from eastern India. Despite these limitations, the important factors related to the COVID-19 impact on the clinical practice of dental practitioners in eastern India were identified. Moreover, the factors which affected the practice strongly were also discussed.

Conclusion

The COVID-19 pandemic has led to significant changes in the clinical routine of periodontal health practitioners in eastern India. The factor which had the major impact was the financial effect due to the pandemic and the intensification of following precautionary protocols. Such consequences were impactful for practitioners working in both public sector and academic institutions but less for the practitioners with a dental set-up in rural areas.

References

1. Zhu N, et al. A novel coronavirus from patients with pneumonia in China. N Engl J Med. 2020;382:727–33.
2. Ahmed MA, Jouhar R, Ahmed N, Adnan S, Aftab M, Zafar MS, & Khurshid Z. Fear and practice modifications among dentists to combat novel coronavirus disease (COVID-19) outbreak. Int J Environmental Res Public Health 2020;17(8):2821.

3. Goswami M, Sharma S, Kumar G, Gogia M, Grewal M, Garg A, Bhardwaj S, Vignesh RP, Narula V & Bidhan R. Dealing with “coronavirus pandemic”: A dental outlook. Int J Clin Pediatric Dent 2020;13(3):269–278.
4. Sharma S, Parolia A & Kanagasingam S. A review on COVID-19 mediated impacts and risk mitigation strategies for dental health professionals. Eur J Dent 2020;14(S01):S159–S164.
5. Chen J. Pathogenicity and transmissibility of 2019-nCoV-A quick overview and comparison with other emerging viruses. Microbes and Infection 2020;22(2):69–71.
6. To KK, Tsang OT, Yip CC, Chan KH, Wu TC, Chan JM, et al. Consistent detection of 2019 novel coronavirus in saliva. Clin Infect Dis. 2020;71(15):841–3.
7. Meng L, Hua F, & Bian Z. Coronavirus disease 2019 (COVID-19): Emerging and future challenges for dental and oral medicine. J Den Res. 2020;99(5):481–7.
8. Holloman JL, Mauriello SM, Pimenta L & Arnold RR. Comparison of suction device with saliva ejector for aerosol and spatter reduction during ultrasonic scaling. J Am Dent Assoc. 1939;146(1):27–33.
9. Kampf G et al. Persistence of coronaviruses on inanimate surfaces and their inactivation with biocidal agents. J Hosp Infect. 2020;104:246–51.
10. Chen J. Pathogenicity and transmissibility of 2019-nCoV-A quick overview and comparison with other emerging viruses. Microbes Infect. 2020;22:69–71.
11. Cleveland JL et al. Transmission of blood-borne pathogens in US dental health care settings: 2016 update. J Am Dent Assoc. 2016;147:729–38.
12. Harrel SK, Molinari J. Aerosols and splatter in dentistry: a brief review of the literature and infection control implications. J Am Dent Assoc. 2004;135:429–37.
13. Liu L et al. Epithelial cells lining salivary gland ducts are early target cells of severe acute respiratory syndrome coronavirus infection in the upper respiratory tracts of rhesus macaques. J Virol. 2011;85:4025–30.
14. Ather A, Patel B, Ruparel NB, Diogenes A, Hargreaves KM. coronavirus disease 19 (COVID-19): implications for clinical dental care. J Endod.2020;46:584–95.
15. Wu M, Chang YC. COVID-19 and its implications in the management of resource infrastructure. J Dent Sci. 2020;15:225.
16. Coulthard P. Dentistry and coronavirus (COVID-19)—moral decision making. Br Dent J. 2020;228:503–5.
17. COVID Survey— The Larry A. Green Center. 2020. https:// www. greencenter. org/ covid- survey. Accessed 17 Feb 2021.
18. Coulthard P, Thomson P, Dave M, Coulthard FP, Seoudi N, Hill M. The COVID-19 pandemic and dentistry: the clinical, legal and economic consequences— part 2: consequences of withholding dental care. Br Dent J. 2020;229:801–5.
19. Jamal M, Shah M, Almarzooqi SH, Aber H, Khawaja S, El Abed R, Alkhatib Z & Samaranayake LP. Overview of transnational recommendations for COVID-19 transmission control in dental care settings. Oral Diseases. 2020;27(S3):655-64.

20. Maret D, Peters OA, Vaysse F & Vigarios E. Integration of telemedicine into the public health response to COVID-19 must include dentists. Int Endodont. J 2020;53(6):880–881.
21. Ali S, Farooq I, Abdelsalam M & Al Humaid J. Current clinical dental practice guidelines and the financial impact of COVID-19 on dental care providers. Eur J Dent. 2020;14(S 01):S140–S145.
22. Nibali L, Ide M, Ng D, Buontempo Z, Clayton Y & Asimakopoulou K. The perceived impact of Covid-19 on periodontal practice in the United Kingdom: A questionnaire study. J Dent. 2020;102:03481.
23. Schwendicke F, Krois J Gomez J. Impact of SARS-CoV2 (Covid-19) on dental practices: Economic analysis. J Dent. 2020;99:03387.
24. Chaudhary FA, Ahmad B, Ahmad P, Khalid MD, Butt DQ, Khan SQ. Concerns, perceived impact, and preparedness of oral healthcare workers in their working environment during COVID-19 pandemic. J Occupational Health. 2015;62(1):e12168.
25. Farooq I & Ali S. COVID-19 outbreak and its monetary implications for dental practices, hospitals and healthcare workers. Postgraduate Med J. 2020;96(1142):791–792.
26. Nicola M, Alsafi Z, Sohrabi C, Kerwan A, Al-Jabir A, Iosifidis C, Agha M & Agha R. The socio-economic implications of the coronavirus pandemic (COVID-19): A review. Int J Surg (London, England). 2020;78:185–193.
27. Rocha-Gomes G, Flecha OD, Miranda TS et al. Impact of the coronavirus disease 2019 pandemic on periodontal practice: A questionnaire survey. J ClinPeriodontol. 2021;00:1–9.
28. Cavalcanti YW, Silva ROD, Ferreira LDF, Lucena EHGD, Souza AMLBD, Cavalcante DD FB, Meneghim MDC, Pereira AC. Economic impact of new biosafety recommendations for dental clinical practice during COVID-19 pandemic. PesquisaBrasileiraemOdontopediatria e ClínicaIntegrada. 2020;20(supp1):1–9.
29. Chamorro-Petronacci C, Martin Carreras-Presas C, Sanz-Marchena A, A Rodríguez-Fernández M, María Suárez-Quintanilla J, Rivas-Mundiña B, Suárez-Quintanilla J & Pérez-Sayáns M. Assessment of the economic and health-care impact of COVID-19 (SARS-CoV-2) on public and private dental surgeries in Spain: A pilot study. Int J Environmental Res Public Health. 2020;17(14):5139.
30. Consolo U, Bellini P, Bencivenni D, Iani C, Checchi V. Epidemiological aspects and psychological reactions to COVID-19 of dental practitioners in the Northern Italy districts of Modena and Reggio Emilia. Int J Environmental Res Public Health. 2020;17(10):3459.
31. Barabari P, Moharamzadeh K. Novel Coronavirus (COVID-19) and Dentistry-A Comprehensive Review of Literature. Dent J (Basel). 2020;8:1-7.