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Research Article

Dental treatment in post -Covid-19

A Survey on the Patients' Outlook Towards Dental Treatment During the Post-Covid-19 Pandemic Period.

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Abstract: The COVID -19 pandemic has disrupted daily lives and affected the entire healthcare system, including dental treatment. Efforts have been taken to formulate ways to counter the pandemic. Dental practices have adopted modifications of dental protocols with the incorporation of preventive measures. The aim of this survey was to study the patient outlook towards dental treatment and the awareness of patients about the preventive measures provided by their dentists in the post-Covid era. Hence a cross-sectional study was conducted on patients wanting to undergo dental treatments in the US, UK and India with a total of 121 participants per country during post covid pandemic. The study was conducted using a questionnaire prepared by the researcher, which consisted of 22 questions. The results showed that pain was the main reason for dental visits in all three countries. In the US and UK, a large percentage of people preferred video and teleconsulting even in the post-covid period, while in India, the majority preferred personal dental visits. The trend of avoiding dental treatment was widespread in India, displaying the level of ignorance and financial constraints among them. It indicates the need for better awareness about the importance of oral health and the inclusion of dental insurance schemes.

Keywords: SARS-CoV-2, Pandemic, Dental treatment, Infection, Fumigation, Dental insurance.

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1. INTRODUCTION

The end of 2019 marked the first case of an unknown etiological agent causing pulmonary diseases in Wuhan, China. In March 2020, the World Health Organization declared a pandemic caused by this pathogen throughout Europe and worldwide. Initially, this virus was called 2019-nCoV, which, through airborne transmission and direct contact, caused acute respiratory symptoms due to which the virus was renamed SARS CoV (fig. 1). Sometimes asymptomatic, this virus causes interstitial bacterial pneumonia, which is often lethal. [1-3] Nearly around 1,98,000 dental specialists in the USA had to shut down their dental clinics due to the outbreak of COVID-19[4]. Infective routes of the virus can occur through droplet release by sneezing, coughing, speech or exhalation. Direct infection occurs by touching contaminated surfaces and then subsequently contacting the nose, eyes or mouth (fig. 2) Saliva plays a key role in the transmission of the virus by either indirect or direct routes. Most dental procedures generate aerosol causing direct transmission of infections to patients and the dental staff. In case of emergency, dental treatment was provided with advice on strict personal protection thereby reducing the production of aerosols with the help of high-volume aspiration[5]. Direct exposure to blood or saliva puts dental practitioners at high risk of contracting COVID-19.[6] Patients are also at high risk of contracting infections due to cross-contamination and aerosols in the dental operatory. Initial treatment protocols only focused on emergency procedures; however, with time, all dental treatments are being carried out. There is however a difference in the methods of infection control adopted by different practitioners in different countries mainly due to the difference in resource availability and expensive equipment. The COVID -19 pandemic has caused widespread disruptions in normal life, financial trajectories and healthcare with efforts being undertaken by people from various spheres of academic and non-academic life to understand and formulate protocols to help counter and cope with the pandemic[7]. Various infection control measures like a limitation of the number of accompanying people, social distancing in waiting areas, hand disinfection and mouth rinses were adopted by dental practitioners to control the spread of infection and to "flatten the curve" during the first and second outbreaks of the pandemic right from the time the patient enters the clinic till treatment completion[8]. Even in the post-Covid era, dental practices worldwide are still adopting the added infection control measures recommended by the dental governing bodies (Fig. 3). The added protective measures have a marked financial impact on dentists and patients[9]. With the world caught in a vice-like grip by the COVID-19 pandemic, a prerequisite is to gather as much data as possible from various perspectives and different age groups to acquire a holistic understanding of the problem. Therefore, the following survey was undertaken to help gain data-driven insight into the outlook of patients' requirements to undergo dental treatment in 3 countries (United Kingdom, United States of America and India) and safety precautions practised by dental facilities.

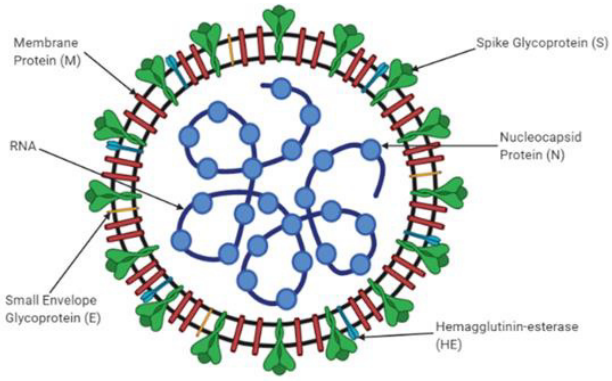

Fig 1: Structure Covid -19 Virus

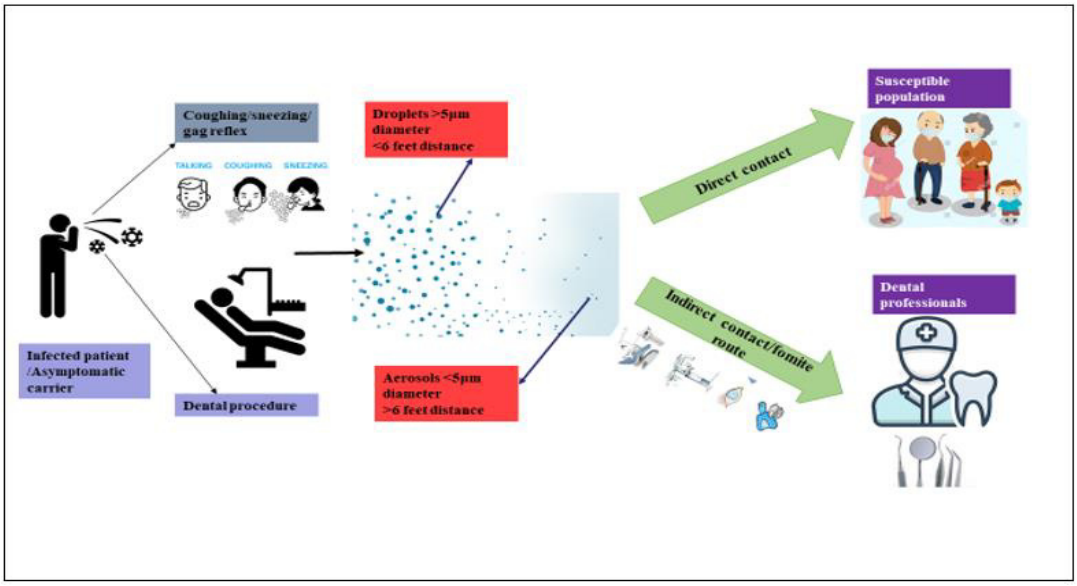

Fig 2: Routes of Covid -19 transmission in dental Practice

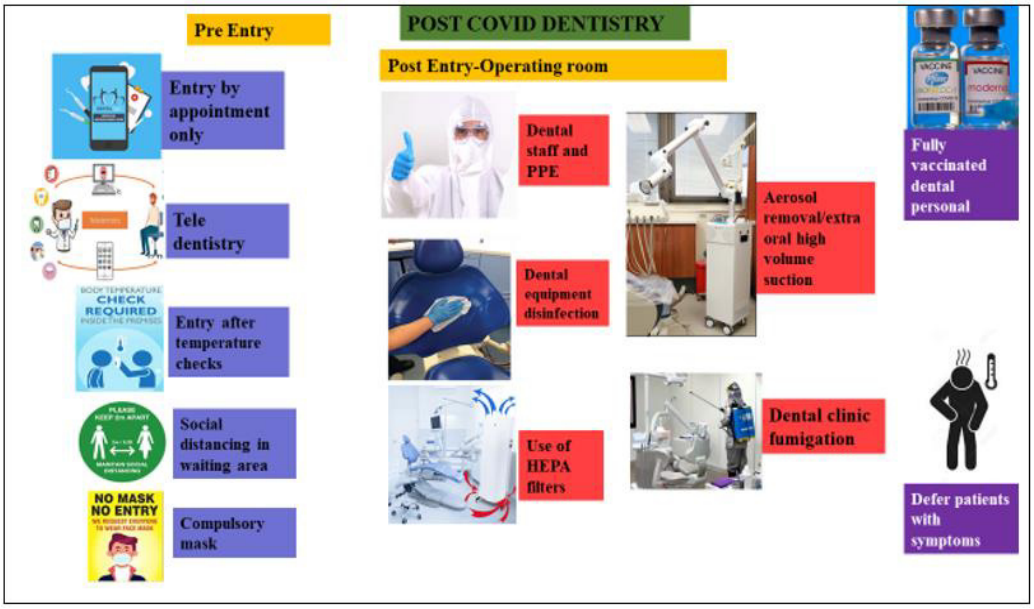

Fig 3: Post-Covid Dentistry.

2. MATERIALS AND METHODS

An institutional-based cross-sectional study was conducted on patients wanting to undergo dental treatments in the US, UK and India in the post-Covid era from April 2022 to September 2022. As a result, approval from the institutional ethics committee was obtained. (Ref No. ETHICS/ABSMIDS/139/2021).

2.1. Sample size

The sampling method used in the study was easy sampling. A total of 121 participants with an equal male-to-female ratio per country were included in the study. The sample size was calculated using N=Zα2 pq/ d2, where Zα =1.96 at 95% confidence level p=proportion q=1-p. By taking 10% non-response error, the sample size reached 121.

2.2. Inclusion and Exclusion Criteria

The sample was selected from an urban population with participants having at least a secondary school education. Patients with no history of systemic diseases in the age group between 45-60 years had consent to participate in the study, and only one family member was included. Questionnaires completed with incomplete information were excluded from the study. Patient information sheets were provided in the first section of the questionnaire, and consent was taken.

2.3. Questionnaire

The study was conducted using a questionnaire prepared by the researcher. The questionnaire was divided into 3 sections and had a total of 21 questions. The 1st part (5 questions) included socio-demographic and background information (age, sex, educational level, country of residence and so on). In contrast, the 2nd section consisted of 6 questions to assess the dental visits and the reason for not visiting the dental clinic as frequently as in the pre-COVID time, and 3rd section consisted of 10 questions to assess the awareness of the preventive measures available at the dental clinic during the COVID pandemic. (Fig. 4)

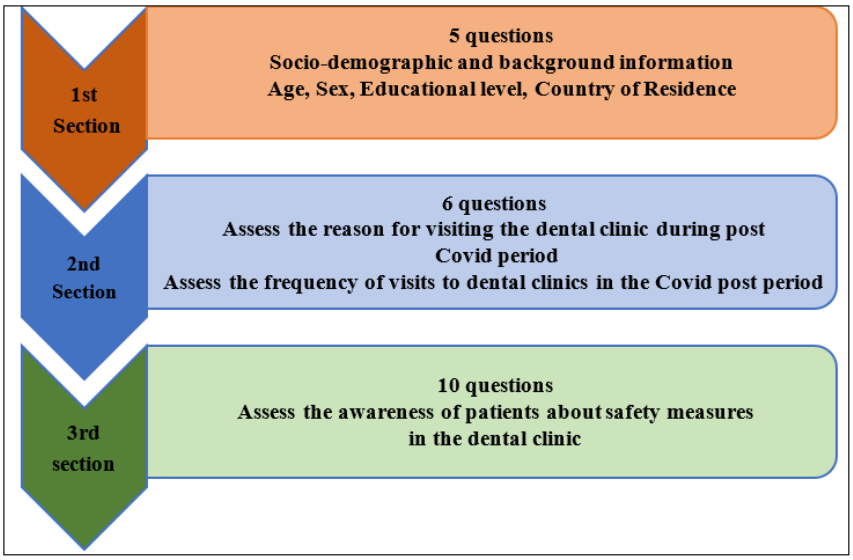

Fig 4: Questionnaire outline

3. STATISTICAL ANALYSIS

After data collection, analysis was done by descriptive statistics. The Chi-square test was used to determine the relationships between kinds of variables. A statistical package, SPSS software version 23.0, will be used to do the analysis. The significance level of the tests was considered when $p<0.05$.

4. RESULTS

Table 1: Last visit to the dental office by patients from different countries

Country		When was your last visit to the dental office?			Total
		last 6 months	past 1yr	more than a year	
USA	Count	55	45	21	121
	% within country	**45.5%**	37.2%	17.4%	100.0%
UK	count	39	48	34	121
	% within country	32.2%	39.7%	28.1%	100.0%
India	count	21	32	68	121
	% within country	17.4%	26.4%	**56.2%**	100.0%
Total	count	115	125	123	363
	% within country	31.7%	34.4%	33.9%	100.0%

Pearson Chi-Square= 47.3, P < 0.001

Table I shows 45.5% of patients from the USA have visited the dental office in the past six months, which shows their desire to maintain their oral health. However, 56.2% of patients evaluated in India last visited a dentist over a year ago, indicating their probable neglect or fear of visiting a dentist even post the COVID-19 pandemic.

Table II: Reasons to visit the dental clinic

Country		Reasons to visit the dental clinic				Total
		Routine checkup	Pain	Cosmetic intervention	No visit till the end of the pandemic	
USA	Count	0	113	0	8	121
	% within country	0.0%	**93.4%**	0.0%	6.6%	100.0%
UK	count	15	95	3	8	121
	% within country	12.4%	**78.5%**	2.5%	6.6%	100.0%
India	count	1	99	0	21	121
	% within country	0.8%	**81.8%**	0.0%	17.4%	100.0%
Total	count	16	307	3	37	363
	% within country	4.4%	84.6%	0.8%	**10.2%**	100.0%

Pearson Chi-Square= 43.256, P=0.001

Table II shows no patients from the USA clinic for a routine dental checkup. The major cause for dental visits in all three countries was pain, with 93.4%, 78.5% and 81.8% patients from the USA, UK and India. 10.2% of patients from all countries refused to visit the dental office post the pandemic.

Table III: Preference for dental consultation

Country		Type of consultation with a dentist			Total
		Video	Telephone	Personal clinic visit	
USA	Count	63	23	35	121
	% within country	**52.1%**	19.0%	28.9%	100.0%
UK	count	26	88	7	121
	% within country	21.5%	**72.7%**	5.8%	100.0%
India	count	0	67	54	121
	% within country	**0.0%**	**55.4%**	44.6%	100.0%
Total	count	89	178	96	363
	% within country	24.5%	49.0%	26.4%	100.0%

Pearson Chi-Square= 139.6, P=0.001

Table III shows that 52.1 % of patients in the USA preferred video consults, and 19% preferred telephone consults. In the UK, 72.7% preferred telephone consults. Compared to the USA and UK, only a very few patients preferred video and telephone consultations in India. The probable reason for this could be the widespread availability of video conferencing consult facilities in the UK and US compared to India. Another reason could be better awareness of technology among the US or UK population. In

India, 44.6 % of patients prefer visiting dental offices. This may be due to personal preference or inability/ unawareness to use advanced technologies.

Table IV: Use of Personal Protective Equipment (PPE)

Country		Use of personal protective equipment			Total
		Yes	No	Don't know	
USA	count	121	0	0	121
	% within country	100.0%	0.0%	0.0%	100.0%
UK	count	121	0	0	121
	% within country	100.0%	0.0%	0.0%	100.0%
India	count	64	29	28	121
	% within country	**52.9%**	**24.0%**	**23.1%**	100.0%
Total	count	306	29	28	363
	% within country	84.3%	8.0%	7.7%	100.0%

Pearson Chi-Square= 135.235, P < 0.001

Table IV shows that 100% of dentists treating patients in the USA and UK use personal protective equipment. In India, 52.9% of doctors use PPE, whereas 24% do not use personal protective equipment. 23.1% of patients in India are unaware of the PPE used by their dentists

Table V: Use of HEPA filters

Country		HEPA filter			Total
		Yes	No	Don't know	
USA	count	39	3	79	121
	% within country	32.2%	2.5%	65.3%	100.0%
UK	count	24	0	97	121
	% within country	19.8%	0.0%	80.2%	100.0%
India	count	0	0	121	121
	% within country	0.0%	0.0%	**100.0%**	100.0%
Total	count	63	3	297	363
	% within country	17.4%	0.8%	**81.8%**	100.0%

Pearson Chi-Square= 51.827, P<0.001

Table V demonstrates whether the patients are aware of the use of HEPA filters in the dental operatory. More than 50% of the patients were unaware of HEPA filters in dental operatories, with almost none of the patients interviewed in India being aware of the use of HEPA filters.

Table VI: Fumigation in the dental clinic

Country		Fumigation adopted in the dental operatory			Total
		Yes	No	Don't know	
USA	Count	0	0	121	121
	% within country	0.0%	0.0%	**100%**	100.0%
UK	count	57	2	62	121
	% within country	41.1%	1.7%	**51.2%**	100.0%
India	count	0	0	121	121
	% within country	0.0%	0.0%	**100.0%**	100.0%
Total	count	57	2	304	363
	% within country	15.7%	0.6%	**83.7%**	100.0%

Pearson Chi-Square= 140.901, P<0.001

Table VI shows that a significant number of patients from the USA, UK and India are unaware of fumigation as a precautionary measure to control the spread of infection in the dental operatory, with almost 100 per cent of the patients interviewed in India unaware of the same.

Table VII: Reasons for not visiting dental clinic frequently in the Post COVID Era

Country		Reason for no-show at Dental Clinic			Total
		Fear of contacting COVID-19	Financial Reasons	Others	
USA	Count	83	22	16	121
	% Within COUNTRY	**68.6%**	18.2%	13.2%	100.0%
UK	Count	76	38	7	121

	% Within COUNTRY	**62.8%**	31.4%	5.8%	100.0%
India	Count	44	69	8	121
	% Within COUNTRY	36.4%	**57%**	6.6%	100.0%
Total	Count	203	129	31	363
	% Within COUNTRY	55.9%	35.5%	8.5%	100.0%

Pearson Chi-Square= 44.05, P<0.001

Table VII shows that many patients from the USA and UK did not visit the dental clinic due to fear of contracting COVID. In contrast, in India, the main reason for not visiting the dental clinics post the pandemic was financial constraints.

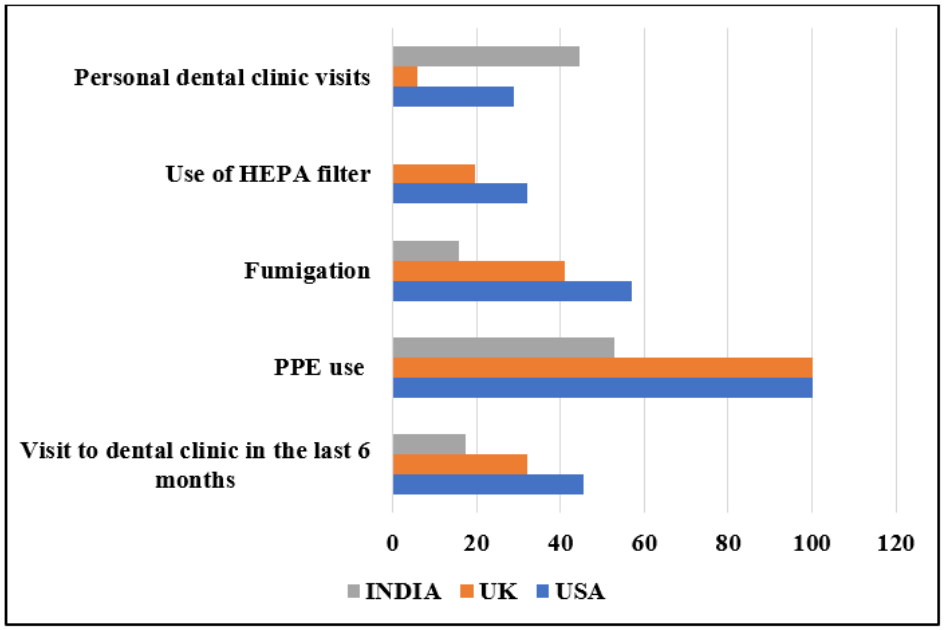

Fig 5: Various infection control measures

5. DISCUSSION

Although various survey studies have been conducted to study the patient's outlook towards dental treatment in Covid-19 pandemic, this was the first survey to compare the outlook of patients undergoing dental treatment in 3 countries (United Kingdom, United States of America and India) in the post-Covid era. In this study, we included patients aged 45 to 60 yrs. Protective measures adopted in a dental setting are divided into three categories a) before treatment, b) during treatment, and c) after treatment[10]. In the pre-COVID era, patients would visit the dental clinic for routine dental checkups; however, due to the COVID-19 pandemic, their decisions to visit the dental clinic have been affected. One of the study's main objectives was to evaluate the reasons for the decrease in dental visits among patients in the USA, UK, and India posts the COVID pandemic. Around 45.5% of patients from the USA visited the dental office six months before the study was undertaken, compared to 17.4% from India, indicating better awareness among the US population about the need for dental treatments. In India, 56.2% of patients evaluated had not visited a dentist for over a year, showing probable neglect and apprehension about dental treatments after the COVID-19 pandemic. The discrepancy in the dental visits between the US and UK population and India is a concern. According to our study, *'Pain'* (84.6%) remains the major reason patients visit dental clinics in all three countries. However, 10.2 % of patients evaluated refused to seek dental treatment. The probable reasons for this could be fear of contacting the COVID-19 infection; due to patients' own existing systemic conditions, financial constraints or fear of inadequate safety measures adopted by dental clinics during the pandemic [11]. In developed countries such as the USA and UK, patients' preference for dental help includes video consultations and telephones. India, despite being technologically advanced, the patients who were chosen for the study in the given age group preferred personal visits to the dental clinic over video or telephonic consults [12] In populated countries, a measure that could be adopted to prevent the spread of infection by many people inside a dental clinic is dental visitation only on a prior appointment basis[13]. According to our study, this Practice was adopted by the USA and UK. However, 79.3% of patients in India visited clinics without any prior appointment. During dental treatment, guidelines recommended to control infection and prevent cross-contamination include offering an antimicrobial mouthwash to patients, adequate hand hygiene, use of high-volume saliva ejectors, use of rubber dams, extra oral instead of intra-oral radiographs, one-visit treatments, preventing and control of aerosols during dental procedures and disinfection and cleaning of dental operatory environment in between dental procedures.[14] Most dental offices in UK, USA and India have followed the guidelines to prevent the spread of infection. The difference lies in using high-efficiency particulate air filters (HEPA), which remove small, harmful, irritating particles from the air. During aerosol-generating procedures, a contaminated droplet can spread up to 6 feet before falling from the air [15]. HEPA filters are designed to trap these particles that are 0.3 microns. Coronavirus droplets are believed to be roughly 0.1 microns and too small for the mesh. However, experts believe that respiratory droplets and aerosols containing COVID-19 are large enough to become trapped by HEPA filters,

preventing the spread of germs.[16] According to our study, 81.8 % of patients were unaware of the use of HEPA filters in dental clinics, with none of the patients interviewed in India knowing HEPA filters. Hand hygiene and PPE should be given attention at dental offices at all times, even in the absence of patients. Hand hygiene practices are regarded as controlling protocols to decrease the infection outbreak. The dentist's hands are in close contact with the patient's mouth fluids and aerosols; an antiseptic pretreatment mouth rinse is of great importance. Ethanol solutions of above 70% are usually suitable for dental procedures.[17] Aerosols can also be transmitted through the eyes, so eyewear/face shields are recommended. According to our study, USA, UK and Indian practitioners routinely used these safety measures in their clinics to control infection spread. This study showed a significant fear among patients in the UK and India contact with COVID-19 infection compared to the USA. The main reason for patients not visiting dental clinics in India post-COVID -19 pandemic was financial reasons and fear of contracting the virus. While in the US and UK, as most patients were being covered by dental insurance, the main concern for them was contacting the virus. The main reason for the probable fear in the Indian population could be the large number of patients visiting a dental clinic and the lack of proper preventive measures at the dental facility. There is a definite need to improve dental awareness among the Indian population. The Dental community in India should start promoting video and teledentistry. Cognizant actions like compulsory use of PPE, HEPA filters and other ways to control the spread of the virus should be implemented strictly at dental clinics in India. This study could be done with a larger population incorporating different age groups to understand the level of awareness among younger and older populations. The female and male populations can also be separately compared to understand the difference in awareness among both sexes.

6. CONCLUSION

Post-pandemic, patients are reluctant to visit dentist offices all over the world. They do not view dental diseases as significant problems requiring immediate attention. To offer the best patient care and safety, there should be enough time between consultations and suitable disinfection and decontamination techniques should be used. Telemedicine is now a feasible alternative in dentistry due to the epidemic. In the wake of the COVID-19 epidemic, practitioners can adopt precise protocols by doing thorough and rigorous clinical studies. However, the general public will continue to be wary and put off getting non-emergency dental care and attend dental offices only when they are in severe pain until the Covid-19 pandemic risk fades. Dental practices must quickly accept the new norm and establish a multidisciplinary strategy that considers patient safety and revenue management.

7. AUTHORS CONTRIBUTION STATEMENT

Dr Sowmya M Kumar and Dr Payal Kapse designed the study format and questionnaire. Dr Payal Kapse collected data for the study. Dr Minu Anoop helped in the statistical analysis. Dr Minu Anoop, Dr Suhael Ahmed, Dr K M Veena and Farah Demeri took the lead in manuscript writing. All the authors have contributed to proofreading and the final preparation of the complete manuscript.

8. CONFLICT OF INTEREST

Conflict of interest declared none.

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