

# The Impact COVID-19 Pandemic Had on the Dental Practitioners in the City of Bengaluru: A Cross-Sectional Study

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## Abstract:

**Objective:** To understand the significant impact COVID-19 had on dental practices.

**Methods:** This study is a report-based questionnaire survey that was conducted among dentists in the city of Bengaluru, India. The survey included dentists from nine different fields of specialization irrespective of the fact that their practice was a private or public-funded setup. An initial pilot study was done to validate the questionnaire among 20 dentists, post which links were sent to 150 doctors of whom 132 responded to the survey. The questionnaire was designed in a way to assess the impact of the strain caused by the pandemic. In a broader spectrum, each question allowed us to critically analyze important variables such as the financial strain, patient flow, investments, and changes brought about by the practitioners during this period and helped us to gauge the need for changes to be brought into the field of dental practice.

**Results:** Among the participating doctors, 40.91% were part of private hospital practices, while another 39.39% of them owned their private clinics, and 19.09% were from public or government-funded practices. Most of them adapted by bringing several changes in their practice units. Many practitioners relied on telephonic conversations to guide their patients. 78.63% of the practitioners among them associated with various telemedicine applications, and 22.9% of the dentists started using web portals connecting their practice setups to web pages. As there was a gradual shift in the paradigm, over 79.55% treated cases on a first-hand preference i.r.t acute pulpitis, dental abscess, or acute pain which accounted for about 80% of the emergency cases. We found out that most of the dentists over 84.09% completely agreed that the fear of the pandemic was a major factor in the reduction of the patient inflow. Moreover, around 39.39% of them spent anywhere between 50,000 INR to 75,000 INR in redeveloping their clinical setups. With reduced patient inflow and an increase in the stagnancy of income, it was clear that most of these dentists had serious financial strains looming over them, more than 98% of the total practicing dentists believed the pandemic was a source of major financial setback.

**Conclusion:** Not only does our study emphasize majorly the impact the SARS-CoV-2 virus had on the dental healthcare system, but also serves as an eye-opener on the missing links and trails of knowledge this pandemic left on us. Through our study, we have tried and highlighted the close triad of association between healthcare professionals, policymakers, and the patients involved. Also, in our study, there is a bi-directional association between the availability of required treatment-involved resources and their demand, which in turn created a vacuum in the market not allowing the dentists at the grass-roots level to procure them. It also tries to emphasize the principles of increased investments in the backdrop of the pandemic, all of which indirectly resulted in the massive breakdown and collective financial strain within the dental care framework.

**Keywords**– COVID-19, coronavirus, infection control, dental management workflow, preventive measures

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## I. Introduction

On March 24, 2020, when the number of COVID-19 cases in India was scaling, the Government of India decided to impose its first 21 days of lockdown. Little did anyone know that those 3 weeks of lockdown would change the way we perceived healthcare and its peripherals. However, little or no attention was paid to the dental infrastructure of our country. Occupational Safety and Health Administration (OSHA) published a report stating the four levels of risk assessment, the very high-risk exposure level contained a detailed description of occupations that included health workers involved in aerosol-generating situations<sup>[1-2]</sup>. It was clear that dentists had higher chances of being impacted, as the profession demanded doctors to perform routine procedures with tools like high-speed turbines, air rotors, micro-motors, and other several piezoelectric scalers. Consequently, by the mid of April, most of the dental clinics both private and the ones associated with colleges

declared lockdowns due to mismanagements and a general chaotic fear/anxiety among the professionals in the given field<sup>[3-4]</sup>. As the following months unfolded, so did the escalation of problems with it. While some dentists resumed their practices under strict guidelines, others revamped their practice set-ups adapting to the changed circumstances. In the present study, we aim to evaluate and study the impact caused by the SARS-CoV-2 virus and the resultant pandemic on dental practitioners, while analyzing carefully the financial investments, practice set-up changes, causes of reduced patient inflow, change in the practice attitudes among dentists, with the understanding of how can we combat such conditions in the future via learning from the pandemic.

## II. Methods

### 2.1 Study Design-

This study is based on the reports collected via a questionnaire survey conducted between October 2020- December 2020 among dentists from different fields of specialization regardless of their working in private or public-funded practice set-ups in the city of Bengaluru, Karnataka. A total of 132 dentists voluntarily participated in the study. The dentists were asked to participate via an invitation and were e-mailed the required survey questionnaire.

### 2.2 Questionnaire-

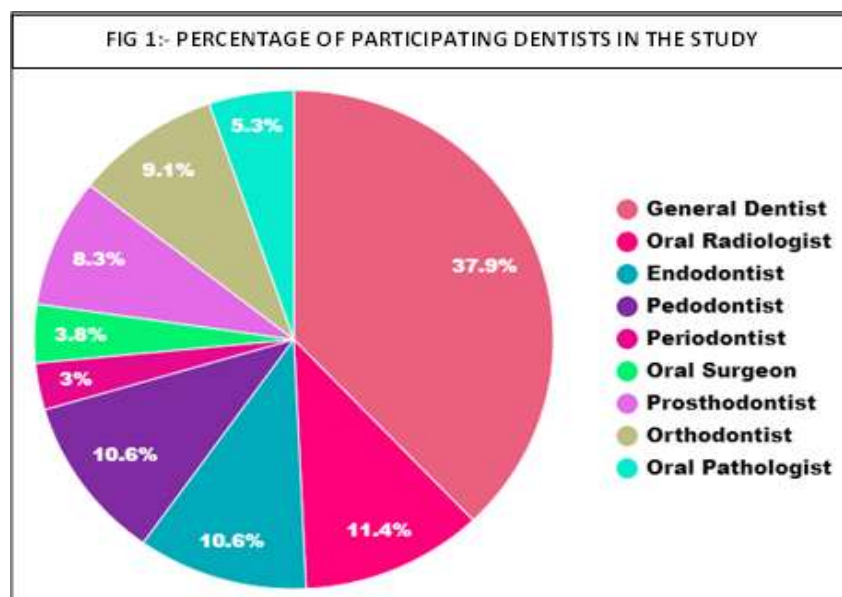
The initial draft of the questionnaire was designed based on recommendations by the Department of Public Health Dentistry at NSVK Sri Venkateshwara Dental College. Moreover, the validity of the content, concepts, and ideas was agreed upon in presence of expert statisticians. At the same time, before rolling out the questionnaire, an initial pilot study was done which included 20 dentists from different specializations all of whom were selected randomly to verify the study and provide us with information regarding the same. The main survey included 19 questions. The initial part of the questionnaire helped us take into account the basic demographic details of the dentists participating, followed by questions that reviewed the detailed understanding of patient inflow, the general attitude dentists had over handling emergency cases, their consultations, understanding the different investments made by them in revamping their practice spaces and how much of a financial strain was it, the final part of the questionnaire also highlighted the quality of dental services for the patient.

### 2.3 Data Gathering and Analysis-

A trained and expert statistician who was unaware of the names and the associated degrees i.r.t the participants were instructed to gather the data via our survey questions. While excel sheets were used to analyse and store the gathered results, specific software was used to formulate and tabulate graphs and other required plots. Later, the data was analyzed by the statistician, the authors confirmed the significance of the data statistically.

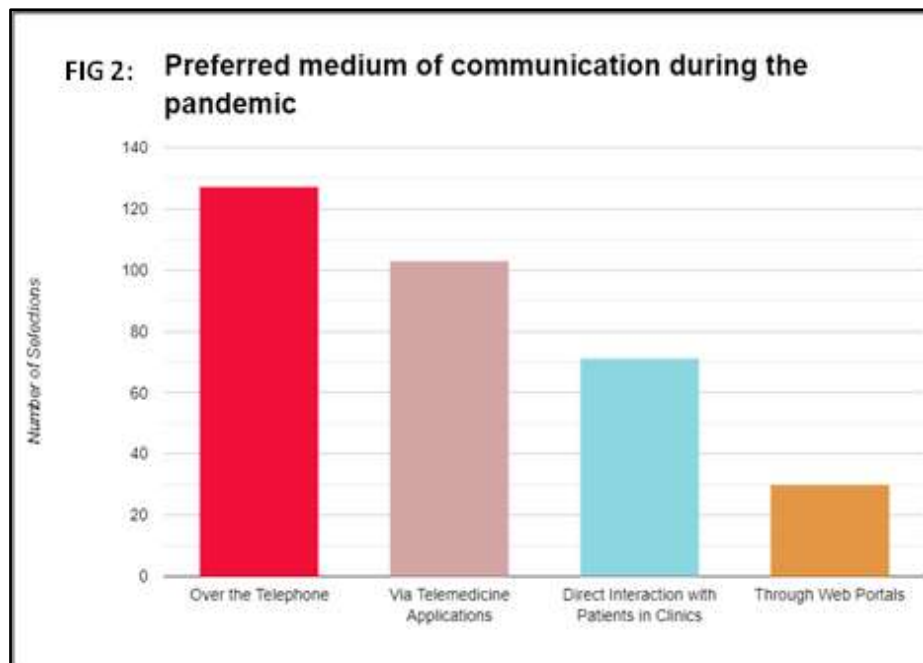
## III. Results

A total of 132 dentists from 8 different fields of specialization had voluntarily taken part in the study (**Fig: 1**).

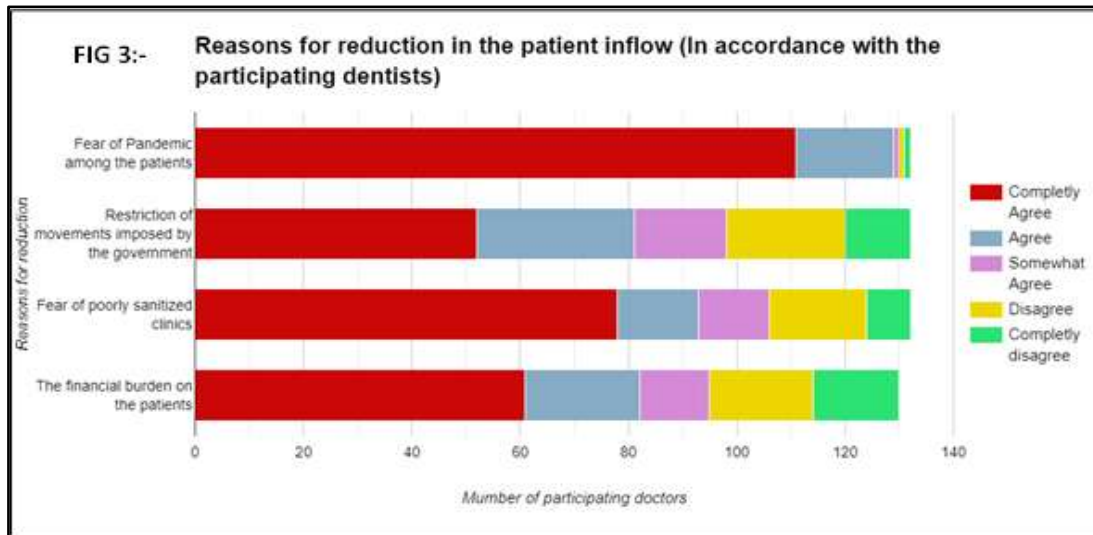


The participant's ages ranged from 23-52 years, with a mean age of 36.05 years. Out of the total number of participants, the number of females and males was equal, with a count of 66 dentists in each case. The mean age of experience was noted to be 12.32 years. A total of 40.91% of the dentists were a part of private hospital practices while another 39.39% of them owned their private clinics. To study the impact even in the public sector we had over 19.09% of the dentists from public or government-funded practices. Under the Govt. of India's protocols, we based our demographic details of practice setups i.r.t three zones (Table 1).

ZONE	ABOUT	PARTICIPATING DENTISTS
<b>RED-ZONE</b>	<i>Sizeable number of cases detected/areas considered as hot spots</i>	<b>29</b>
<b>ORANGE-ZONE</b>	<i>Where only a few cases were found in the past with no increase in the positive cases.</i>	<b>83</b>
<b>GREEN-ZONE</b>	<i>No COVID-19 cases recorded</i>	<b>20</b>

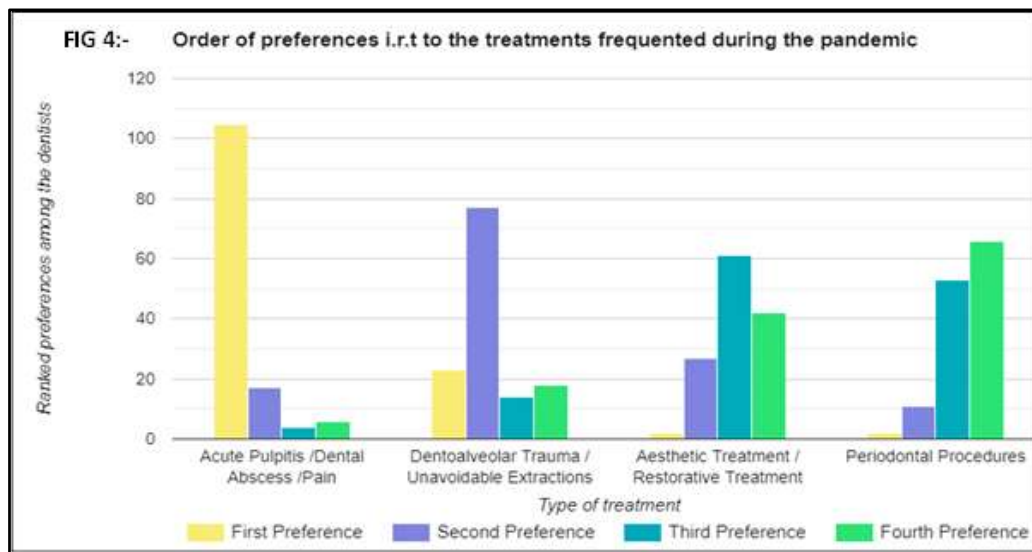


All the zones mentioned in our study were pre-determined as per the government records indicating the cases of COVID-19 in the given areas. Many of the privately-owned dental practices resumed their clinics mostly during the third and fourth phase of unlocking (i.e., August-September) this accounted for 46.21% of the dental practices while another 43.18% of the dentists resumed only in October. There was a total of 10.61% of dentists who continued the practice even during the lockdown. Among these, 10.61% of the practitioners most of them i.e., around 78.23% of them were either practicing in areas of orange or green zones. To combat the current situation, these practitioners adopted various methods of communication with their patients (Fig 2). While most of the practitioners relied on telephonic conversations to guide their patients, 78.63% among them associated with various telemedicine applications. Another interesting finding was, 22.9% of the dentists started using web portals connecting their practice setups to web-pages. Around 54.20% of them still relied on direct communication, however, all the practitioners in this last group had their practices in green zones and only started them post the 4<sup>th</sup> unlock phase. Among the participating dentists, it was noted that on an average each dentist was frequented with around 20 patients per day during the pre-pandemic time i.e., before March 2020. However, this number shrunk to below 5-6 patients per day during the pandemic. On trying and understanding why was there a reduction in the number of patients (Fig 3),

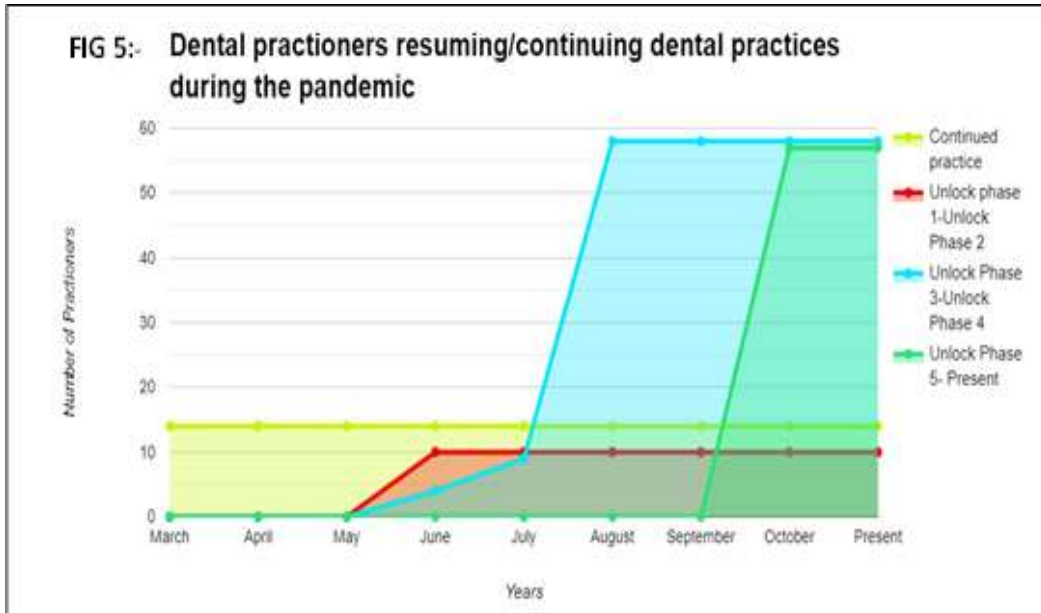


we found out that over 84.09% of the dentists completely agreed that the fear of the pandemic was a major driving factor. At the same time, 59.09% of them agreed that the inherent fear of a poorly sanitized clinic could also be a major reason. Another interesting fact that was seen was how 46.21% of the dentists felt that the pandemic was a huge financial burden on the patients, thereby prompting reduced oral-hygiene care, resulting in less frequent clinics.

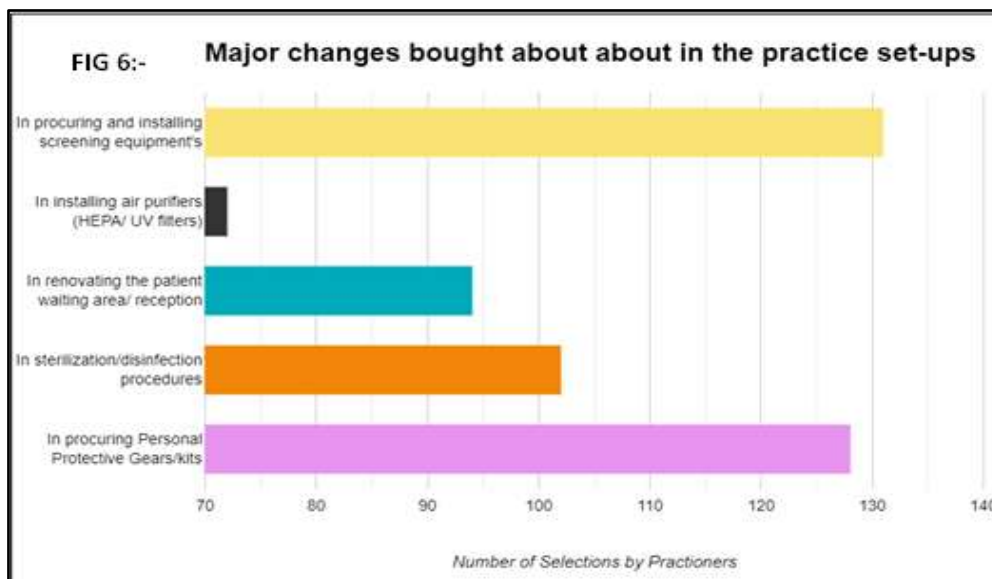
As there was a gradual shift in the paradigm, the idea of multiple treatments in the practice setups also ceased to prevent viral transfer within the setup. As a result, practitioners only focused on considering emergency cases for treatment. (Fig 4) explains the preferences i.r.t emergency and non-emergency cases.



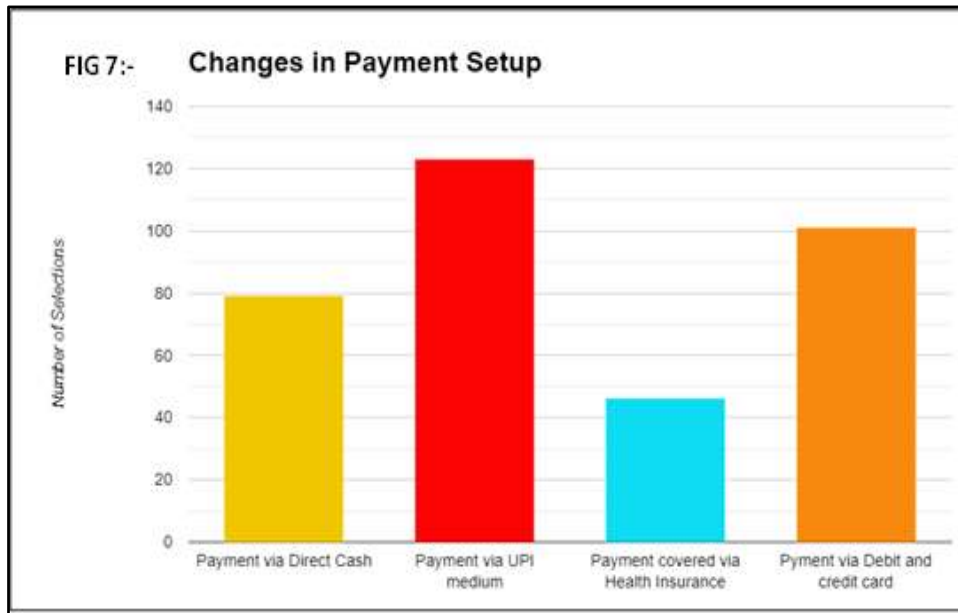
For the study, the practitioners were asked to rank the cases they were frequented or had considered treating during the pandemic. Over 79.55% dentists treated cases on first-hand preferences i.r.t acute pulpitis, dental abscess, or acute pain. Another 58.33% considered treating dentoalveolar trauma and performed unavoidable extractions. While only a few had considered treating non-emergency cases such as aesthetic treatments or periodontal procedures during this time, these cases were the least preferred and were widely considered as non-emergency cases. As the unlock period began, there was a surge in the opening of dental practice set-ups, as only a few were practicing during the government-issued lockdown. (Fig. 5) clearly explains the status of dental practices during the pandemic.



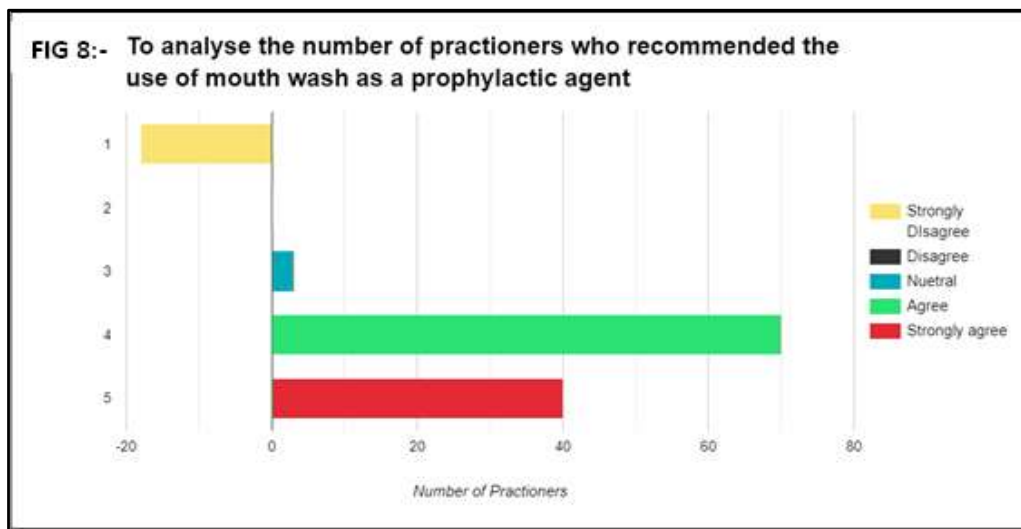
However, for the 80.25% of the dental practitioners who resumed their practices post the unlock phase, there were massive changes required in their clinical arrangements. Moreover, these changes were supposed to be made keeping in mind the protocols and rules laid down by the World Health Organisation (WHO).



(Fig 6) explains the major changes we found in our study that the practitioners bought about in their practice setups. 99.4% of dentists changed their fundamental screening procedures in compliance with government protocols. 96.9% of the practice owners also invested in procuring personal protective equipment (PPEs) and of which 77.27% of them also brought about changes in their sterilization procedures. However, a very small percentage of the clinic owners i.e., 54.55% of them bought major changes in air purifying machines. There were major changes bought about in the payment setups that we found in our study (Fig 7).

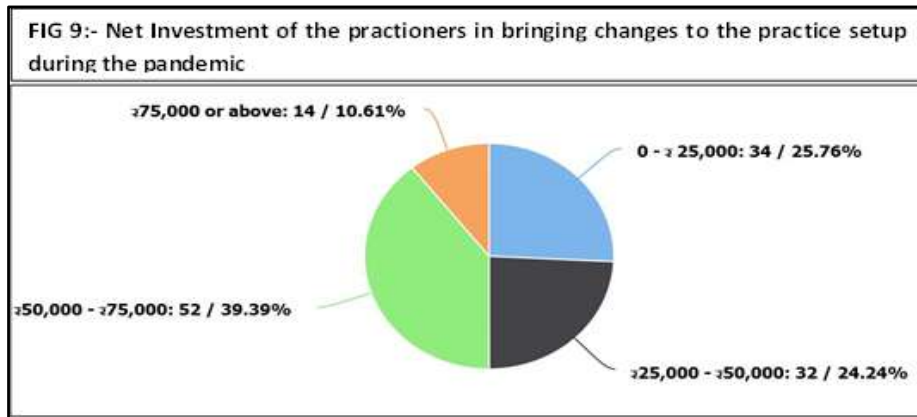


On carefully studying (Fig 7), we can see how there is a greater focus on cashless transactions, with over 93.18% of the clinic owners switching to other options such as UPI or via card system. A major reason for this change could be the practitioners trying to minimize human contact/interaction to as little as possible. We also asked the practitioners what was their opinions on using mouthwashes as pre-prophylactic rinses.

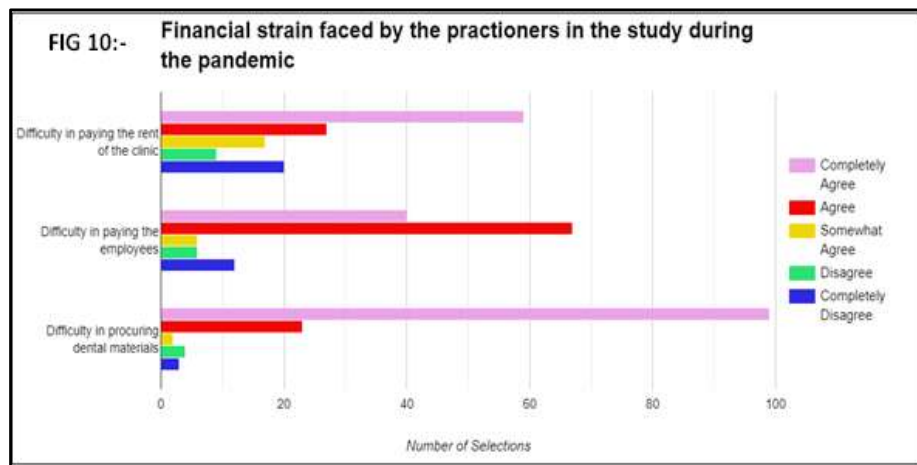


(Fig 8) explains the number of dentists who agreed or disagreed with the idea of using mouthwashes. The divergent stacked graph in (Fig 8) clearly shows the percentage of individuals who agreed upon using mouthwashes as pre-prophylactic agents were more than six times the ones who strongly disagreed on using them for the same.

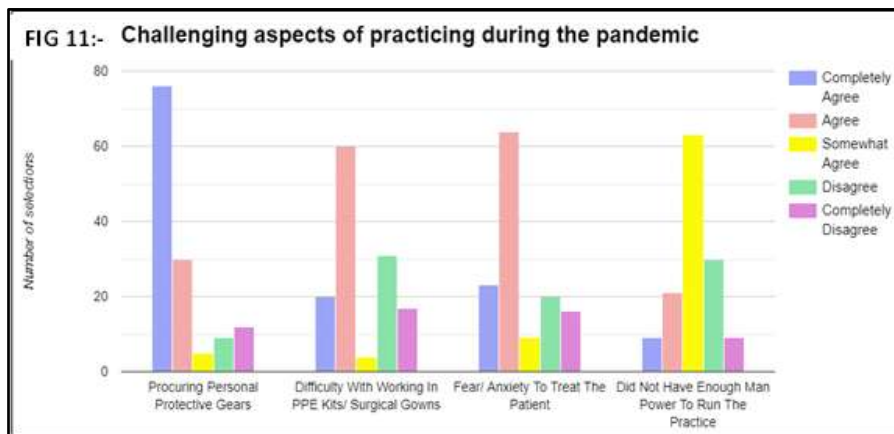
On further analysis, we found that the changes the participating practitioners brought about in their respective set-ups, resulted in a huge amount of capital investment from their end (Fig 9).



It was seen that most of the dentists around 39.39% of them spent anywhere between 50,000 INR to 75,000 INR in redeveloping their clinical set-ups. 25.24% of them spent in the range of 0-25,000 INR to 50,000 INR respectively to re-develop the practice set-up under the government guidelines. Moreover, 10.61% of them spent more than 75,000 INR on the re-development program. With reduced patient flow and an increasingly stagnant income, it was clear that the practitioners were going through serious financial strains (**Fig 10**), we found out that the spectrum of financial strains experienced by these participating practitioners extended anywhere between the difficulty in paying rent for the clinic to difficulty in paying the fellow employers and procuring materials for the practice.



On studying the responses in (**Fig 10**), we can see that most of the participating practitioners agree to the idea that paying clinic rent, employees, and procuring dental materials for the practice set-up was a major financial strain to them.



Another fact (Fig 11) was that, despite the above changes, investments, and safety precautions, the whole idea of working during the pandemic was challenging in various aspects. While 57.58% of the participating dentists completely agreed that procuring PPE kits was difficult due to its excess demand, 45.54% of them agreed that it was difficult to work on patients with PPE kits and surgical gowns. Moreover, there was an inherent fear and anxiety to treat patients especially knowing the circumstances among 48.48% of them.

#### IV. Discussion

The cross-sectional study presents a significant report, discussing the impact pandemic had on dentists in the city of Bangalore. Not only did we aim to report the anxiety and the fear of dentists but were also successful in obtaining an in-depth report corresponding to a wide spectrum in the sphere of dental practices such as finance, key architectural changes, changes in treatment preferences, changes in general practice attitudes, etc.

It had been documented in various studies that the virus had a definite common transitory route which included droplets of diameter around 5 micrometers<sup>[5-7]</sup>. There are ample studies to prove that saliva acted as one of the main carriers of the micro-organism<sup>[6-9]</sup>. Such findings, eventually put the healthcare workers including the dentists, under the scanner for being tagged with “high-risk exposure individuals” making it more significant to initiate change. If one observes the pathophysiology of the virus, one could appreciate as to why dentists were the first in hand recipients of the menaces of the virus<sup>[10-14]</sup>. As new challenges brought new resolutions, across the world of medicine, the pandemic was a huge boost to the development of AI. Even dentistry was not far behind, from Tele dentistry<sup>[15]</sup> to the use of human algorithms<sup>[16]</sup> in computing robots, the need of the hour gave ample space for technology to creep into this profession. Telemedicine applications also stood the test of time, providing an ample base for practitioners to associate themselves with their patients.

However, the crux of the situation eventually limited the number of patients per dentist and this meant that the dentists had to eventually do a detailed risk assessment before inviting the patient to the clinic. (Tables 2-4) describe the detailed risk assessment of various procedures performed in a dental clinical set-up i.r.t the pandemic.

<b>TABLE 2:- EMERGENCY DENTAL PROCEDURES</b>			
<b><u>Procedure/Condition</u></b>	<b><u>Risk Level- Very High</u></b>	<b><u>Risk Level- High</u></b>	<b><u>Risk level- Moderate</u></b>
<i>Fast spreading infections of facial spaces/ Acute Trismus.</i>	<input checked="" type="checkbox"/>		
<i>Uncontrolled bleeding of dental origin.</i>	<input checked="" type="checkbox"/>		
<i>Severe uncontrolled pain of dental origin and not responding to routine dental measures.</i>		<input checked="" type="checkbox"/>	
<i>Trauma involving the facial structure and facial bones.</i>	<input checked="" type="checkbox"/>		
<i>Radiographs, required in medico-legal cases of facial trauma in conditions such as PNS/OPG/CBCT.</i>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

In our study, we found that although anxiety preceded fear in dealing with patients, the inherent psychological concerns hazed within the spectrum of loss of income options due to the lowering of patient numbers coupled with the fear, of whether they would eventually become a source of infections for their own family. These psychological concerns majorly impacted less established practices, between the age group of 25-35 years. However, the sudden drop in income was not the first trigger, our study carefully outlined how the drop in the patient number was like a domino for these practitioners. No patients meant that the revenue of the clinics had dropped, and difficulty in paying staff and maintaining practices in urban centers were proving expensive. Moreover, doctors both younger and established ones had to now invest in revamping their practice setups. From revamping clinical spaces to investing hugely into screening equipment, it proved to be difficult as eventually, the earnings were low.



**TABLE 3:- URGENT DENTAL PROCEDURES**

<u>Procedure/Condition</u>	<u>Risk Level- Very High</u>	<u>Risk Level- High</u>	<u>Risk level- Moderate</u>
<i>Acute pulpitis/Dento-alveolar trauma/Pain of cavitation in children</i>	<input checked="" type="checkbox"/>		
<i>Dental abscess and unavoidable dental extraction in children</i>	<input checked="" type="checkbox"/>		
<i>Severe uncontrolled pain pulpal origin and not controlled by advice/analgesics or antibiotics</i>		<input checked="" type="checkbox"/>	
<i>Dental abscess of pulpal/periodontal/endo-perio origin</i>		<input checked="" type="checkbox"/>	
<i>Broken restoration/fixed prosthesis causing sensitivity of the vital tooth thereby endangering it to pulpitis</i>		<input checked="" type="checkbox"/>	
<i>Already prepared tooth/implant abutments to receive crowns/repair of broken prosthesis/implant prosthesis</i>		<input checked="" type="checkbox"/>	
<i>Peri-implantitis/Pericoronitis/Operculectomy/ Large standing cysts or tumours/Candidiasis</i>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Oral mucous lesions requiring biopsy/oral cancer need of biopsy</i>		<input checked="" type="checkbox"/>	
<i>Completion of on-going root canal treatment</i>		<input checked="" type="checkbox"/>	
<i>Trigeminal neuralgia/ sharp teeth/orthodontic wire or appliances impinging on the oral mucosa.</i>			<input checked="" type="checkbox"/>
<i>Orthodontic treatment causing iatrogenic effect/delivery of clear aligners/patients on skeletal anchorage</i>			<input checked="" type="checkbox"/>

A study in the South Sulawesi area of Indonesia pointed out the fact that there existed prejudicial knowledge among the general masses during the pandemic which made them doubt their visits to the dentists<sup>[18]</sup>. Moreover, the reduced per capita household income among many Indian middle-class families during the pandemic also meant that as a society the emphasis on oral health was extremely limited.

C.S MOTT Children’s hospital, Michigan, conducted a poll in which they found out that 1 in every 100-parent felt that the pandemic made it harder for the children to receive their preventive dental treatment<sup>[19]</sup>. On interacting with the practitioners, we found that, while the investments in procuring screening and emergency gear had quadrupled, the major challenge with a limited income source was that, these equipments such as headgear, masks, and even sanitizers were then been sold at exaggerated prices. For many new-age private practitioners, this was the source of major anxiety, merely 3 months into the pandemic had left a huge dent in them financially, causing major anxiety and succumbing to depression<sup>[20]</sup>.

**TABLE 4:- PATIENTS WITH MEDICAL CONDITIONS**

<u>Procedure/Condition</u>	<u>Risk Level- Very High</u>	<u>Risk Level- High</u>	<u>Risk level- Moderate</u>
<i>Diabetic patients requiring treatment to periodontal causes</i>		<input checked="" type="checkbox"/>	
<i>Cardiac patients requiring dental surgery</i>	<input checked="" type="checkbox"/>		
<i>Hospitalized patients requiring dental treatment for acute causes</i>	<input checked="" type="checkbox"/>		
<i>Patients requiring dental treatment for radiotherapy</i>	<input checked="" type="checkbox"/>		
<i>Organ transplantation cases requiring acute dental treatment</i>	<input checked="" type="checkbox"/>		

Other financial investments also had to be done, one of them majorly was installing air purifiers. The health ministry had vehemently focused on the importance of aerosolized salivary particulates and emphasized how there was an incessant requirement to create clinic spaces with proper air quality<sup>[21-25]</sup>. OSHA, WHO, and other senior practitioners had already voiced their concerns regarding the same. A recent study indicated that the presence of the virus was highly positive in conditions i.r.t aerosol productions<sup>[23]</sup>. Most of our study pupils had chosen HEPA filters. This was also followed by purchasing screening equipment for retaining initial patient

reports which included pulse oximeters, and body temperature detecting equipment among others. To an extent, there was also a change brought about in the patient reception areas keeping in mind the need to maintain “social distancing”. Moreover, there were serious investments done to ensure sterilization and disinfection procedures were maintained. Some dentists spent as much as INR 2 lakhs on upgrading their clinical setup.

Our research, also hinted towards the fact that “Mouthwashes could be considered as a pre-prophylactic measure to curb the overall viral load in the oral cavity”. Among all, most researchers suggested that Povidone-Iodine was the most effective<sup>[26]</sup>. There was also an eventual shift towards more cashless transactions within the clinics. Across the globe, dental insurance did hit a bump as the loss of jobs and unemployment meant that most individuals lost their Employer-Sponsored Dental Insurance (ESDI)<sup>[27-28]</sup>.

With these investments and changes kept in mind and considering the fact of low-income generation due to a lack of patients, one can easily fathom the depths of the financial burden the dentists were subjected to. In our study, we learned that, of the total subjects who had participated, the ones having private practice setups were the most affected by this crisis. While some had to indefinitely shut their clinics, others levied the extra charge for protective gear as additional costs to treatment bills, thereby increasing the total treatment charges inadvertently.

## V. Conclusion

During our study, while we interacted with several practitioners, everyone had a different perception of learning from the cascade of events. While one of them stated that the pandemic, although unfortunate, was successful in instilling into the masses, the importance of self-sanitation and sterilization, another young clinician mentioned how the pandemic helped him to understand the importance of having a strong financial base. On a whole, the pandemic served as an eye-opener on the missing links and trails within the healthcare industry. Although unfortunate at its peak, it left its trail promising a better future with intensive AI-based operations in the field of healthcare. Also in our study, there is a bi-directional association between the availability of treatment-involved resources and their demand which in turn created a vacuum in the market not allowing the dentists at the grass-roots level to procure them. On a whole, this vacuum and a lack of a strong public healthcare structure is a reason that led to this devastation in the first place.

## References

- [1]. Occupational Safety and Health Administration Official Website. Worker Exposure Risk to COVID-19.
- [2]. Available online: <https://www.osha.gov/Publications/OSHA3993.pdf> (accessed on 20 April 2020)
- [3]. WHO. Infection Prevention and Control of Epidemic and Pandemic Prone Acute Respiratory Infections in Health Care; WHO: Geneva, Switzerland, 2014
- [4]. COVID-19 outbreak and its monetary implications for dental practices, hospitals and healthcare workers. Farooq I, Ali S. Postgraduate Medical Journal. 2020;postgradmedj-2020-137781
- [5]. Practical recommendations for critical care and anesthesiology teams caring for novel coronavirus (2019-nCoV) patients. Wax RS, Christian MD. Canadian Journal of Anesthesia/Journal canadien d'anesthésie. 2020:1-9.
- [6]. nCoV transmission through the ocular surface must not be ignored. Lancet. Lu, C.-W.; Liu, X.-F.; Jia, Z.-F. 2019-2020, 395, e39.
- [7]. Ocular tropism of respiratory viruses. Microbiol. Mol. Biol. Rev. 2013, 77, 144-156. Belsler, J.A.; Rota, P.A.; Tumpey, T.M.
- [8]. In India, population density a challenge as COVID-19 cases surge, July 8, 2020—K. “Vish” Viswanath <https://www.hsph.harvard.edu/news/features/covid19-challenges-india/>
- [9]. Arslan M, Xu B, Gamal El-Din M. Transmission of SARS-CoV-2 via fecal-oral and aerosols-borne routes: Environmental dynamics and implications for wastewater management in underprivileged societies. Sci Total Environ. 2020; 743:140709. doi:10.1016/j.scitotenv.2020.140709
- [10]. From SARS and MERS to COVID-19: a brief summary and comparison of severe acute respiratory infections caused by three highly pathogenic human coronaviruses Zhu, Z., Lian, X., Su, X. et al. . Respir Res 21, 224 (2020). <https://doi.org/10.1186/s12931-020-01479-w>
- [11]. Upper Respiratory Tract Levels of Severe Acute Respiratory Syndrome Coronavirus 2 RNA and Duration of Viral RNA Shedding Do Not Differ Between Patients With Mild and Severe/Critical Coronavirus Disease 2019 Aylin Yilmaz, Emelie Marklund, Maria Andersson, Staffan Nilsson, Lars-Magnus Andersson, Magnus Lindh, Magnus Gisslén, , The Journal of Infectious Diseases, Volume 223, Issue 1, 1 January 2021, Pages 15-18, <https://doi.org/10.1093/infdis/jiaa632>
- [12]. High expression of ACE2 receptor of 2019-nCoV on the epithelial cells of oral mucosa Xu H, Zhong L, Deng J, et al.. Int J Oral Sci. 2020;12(1):8. Published 2020 Feb 24. doi:10.1038/s41368-020-0074-x.
- [13]. Understanding SARS-CoV-2 endocytosis for COVID-19 drug repurposing. - Glebov OO FEBS J. 2020;287(17):3664-3671. doi:10.1111/febs.15369
- [14]. COVID-19 cytokine storm : targeting the appropriate cytokine. - Randy Q Cron ; Published- Feb 3, 2021, Lancet
- [15]. [The Lancet.com/journals/lanrhe/article/PIIS2665-9913\(21\)00011-4/fulltext#:~:text=As%20of%20January%2C%202021%2C%20nearly,hospital%20with%20COVID-19%20pneumonia.](https://www.thelancet.com/journals/lanrhe/article/PIIS2665-9913(21)00011-4/fulltext#:~:text=As%20of%20January%2C%202021%2C%20nearly,hospital%20with%20COVID-19%20pneumonia.)
- [16]. Teledentistry from a patient perspective during the coronavirus pandemic. Rahman, N., Nathwani, S. & Kandiah, T. Br Dent J (2020). <https://doi.org/10.1038/s41415-020-1919-6>
- [17]. “Teledentistry during COVID-19 pandemic.” Diabetes & metabolic syndrome vol. 14,5 (2020) Ghai, Suhani.: 933-935. doi:10.1016/j.dsx.2020.06.029

- [18]. "Fear and Practice Modifications among Dentists to Combat Novel Coronavirus Disease (COVID-19) Outbreak." Ahmed, Muhammad Adeel et al. International journal of environmental research and public health vol. 17,8 2821. 19 Apr. 2020, doi:10.3390/ijerph17082821
- [19]. "Relationship Knowledge Transmission of COVID-19 and Fear of Dental Care During Pandemic in South Sulawesi, Indonesia":- Burhanuddin D. Pasiga et.al. Hasanuddin University - Department of Dental Public Health, Jl. PerintisKemerdekaan Km 10, Makassar, Indonesia, Pesquisa Brasileira emOdontopediatria e ClínicaIntegrada 2021; 21:e0148 <https://doi.org/10.1590/pboci.2021.017> ISSN 1519-0501 / eISSN 1983-4632 <https://www.scielo.br/pdf/pboci/v21/1519-0501-pboci-21-e0148.pdf>.
- [20]. Pandemic-posed challenges to children's oral health February 15, 2021 | Volume 38 Issue [https://mottpoll.org/sites/default/files/documents/021521\\_DentalCare.pdf](https://mottpoll.org/sites/default/files/documents/021521_DentalCare.pdf)
- [21]. Sourcing Personal Protective Equipment During the COVID-19 Pandemic, Livingston E, Desai A, BerkwitsM.. JAMA. 2020;323(19):1912–1914. doi:10.1001/jama.2020.5317
- [22]. Knowledge, attitude and practice towards droplet and airborne isolation precautions among dental health care professionals in Shiraz, Iran. Askarian M, Mirzaei K, Honarvar B, Etninan M, Araujo MW J Public Health Dent. 2005 Winter; 65(1):43-7. [PubMed]
- [23]. The effectiveness of an air cleaner in controlling droplet/aerosol particle dispersion emitted from a patient's mouth in the indoor environment of dental clinics. Chen C, Zhao B, Cui W, Dong L, An N, Ouyang X J R Soc Interface. 2010 Jul 6; 7(48):1105-18. [PubMed]
- [24]. Aerodynamic analysis of SARS-CoV-2 in two Wuhan hospitals. Liu Y, Ning Z, Chen Y, Guo M, Liu Y, Gali NK, Sun L, Duan Y, Cai J, Westerdahl D, Liu X, Xu K, Ho KF, Kan H, Fu Q, Lan KNature. 2020 Jun; 582(7813):557-560. [PubMed]
- [25]. Using an air purifier as a supplementary protective measure in dental clinics during the coronavirus disease 2019 (COVID-19) pandemic [published online ahead of print, 2020 Jun 11]. Infect Control Hosp Epidemiol. 2020;1-2. Zhao B, An N, Chen C. doi:10.1017/ice.2020.292
- [26]. Guidelines for Dental Professionals in Covid-19 pandemic situation. <https://www.mohfw.gov.in/pdf/DentalAdvisoryF.pdf>
- [27]. Povidone Iodine Mouthwash, Gargle, and Nasal Spray to Reduce Nasopharyngeal Viral Load in Patients With COVID-19: A Randomized Clinical Trial. Guenezan J, Garcia M, Strasters D, et alJAMA Otolaryngol Head Neck Surg. Published online February 04, 2021. doi:10.1001/jamaoto.2020.5490
- [28]. 27. Modeling the Impact of COVID-19 on Dental Insurance Coverage and Utilization, Journal of Dental Research S.E. Choi, L. Simon, C.A. Riedy, and J.R. Barrow J Dent Res. 2021 Jan; 100(1): 50–57. Published online 2020 Aug doi: 10.1177/0022034520954126
- [29]. 28. Dentistry during the COVID-19 Epidemic: An Italian Workflow for the Management of Dental Practice :- International Journal of Environmental Research and Public Health , Matteo Peditto, Simone Scapellato, Antonia Marciandò, Paola Costa & Giacomo Oteri ( Postgraduate School of Oral Surgery, Department of Biomedical, Dental Sciences and Morphofunctional
- [30]. Imaging, University of Messina, 98125 Messina, Italy; mpeditto@unime.it (M.P.)) Received: 23 April 2020; Accepted: 8 May 2020; Published: 11 May 2020