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Awareness among Covid-19 precautions among patients visiting dental hospital

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ABSTRACT

Background: The Coronavirus 2 syndrome (SARS CoV 2) or COVID-19 pandemic's rapid and widespread reach has become a major cause of concern to the dental health-care profession. The aim of this study is to assess the level of public knowledge, attitude and practice regarding COVID19 and infection control when visiting a dental hospital.

Materials and Methods: An online questionnaire was created. Convenient sampling method was used for data collection. The sample population was 104 patients aged between 10-80 years. The data was entered, and analyzed using SPSS 20.0 version. Descriptive statistics, frequencies, and percentages were used to summarize the data. Chi square test was used to determine the association of study disciplines among the patients. P >0.10 was considered statistically not significant.

Results: A total of 104 responses were obtained. All respondents had heard about coronavirus. Over 90% were aware of the severeness of the pandemic. 90% of the patients wear masks every time they visit a dental hospital. Over 80% disposed their masks after their visit to the dental hospital .About 88% were

taking precautions. Over 90% were interested in knowing more about the disease and the necessary precautions to be taken while visiting a dental hospital. Comparison of the overall sections among various groups showed a nonsignificant result although some individual questions showed a statistically significant result.

Conclusion: Dental health professionals need to conduct regular educational activities and training programs on infection prevention practices with respect to COVID-19 infection to serve their patients, not just their own practice but also to help the patients know about the severity of not taking precautions while visiting a dental clinic.

Keywords: *awareness, COVID-19, precautions, patients, dental hospital*

INTRODUCTION

There was an emergent pneumonia outbreak in Wuhan city, China, towards the end of December 2019. Its cause was then unknown. Later it was identified as a viral disease and was named as COVID-19. The outbreak was declared a Public Health Emergency of International Concern on 30 January 2020, by the World Health Organization. On 11th of March 2020, the disease was characterized as a pandemic (1). As on 19th of April 2020, the pandemic has rapidly spread affecting 210 countries world-wide. The virus has affected approximately 24,07,467 people and has so far claimed about 1,65,074 lives (2).Risk of complications due to COVID-19 disease are more in the immunocompromised, old aged and medically compromised patients, especially patients with lung related diseases. The symptoms of COVID-19 are cough, cold, breathing problems very similar to flu. It is reported by the doctors that a person infected by COVID-19 recovers within 14 -16 days because the incubation period of novel coronavirus is fourteen days. The spread of the disease can be prevented by social distancing, washing hands frequently, avoiding touching the mouth, nose, and face (3) In India, the first case of COVID-19 was reported on 30 January 2020, in Thrissur, Kerala originating from China. Over a period of two and a half months, this disease spread in almost all parts of the country.

At present, total cases are over 15,273 among whom 2,463 are recovered and about 521 deaths reported (4). Since 30th January 2020, there have been 401 cases diagnosed till 19th of April 2020. (5)

A large number of medical staff were reported to have acquired the disease while working with the infected individuals. Health-care workers, in daily physical contact with patients, face an elevated risk of exposure to COVID-19. Among health-care personnel, dentists seem to be those at highest risk. It is necessary to ensure their safety, not only to protect patient health, but also to safeguard themselves from the viral infection and to avoid viral transmission.(1,2))

In this setting, dental procedures, in which a large number of droplets and aerosols, containing microorganisms from an infected individual, could be generated, are at high risk of cross-infection between patients and dentists.(7)

There are many problems a dentist might face. Asymptomatic (carrier) patients as well as patients with an acute respiratory illness may present for dental treatment at outpatient dental settings. (3)The growing fear of cross-infection, and the possible role of dental practice in spreading the infection, has obliged dentists to step aside and to confine themselves in home quarantine similar to other non health-care sectors of the population as well as reports of loss of livelihood, as many dentists rely on their dental clinics for financial support.(4)

In addition, there has been an increased demand for personal protective equipment (PPE), which consists of garments to protect health-care workers or any other persons to get infected. Although regular dental care is not to be used in patients diagnosed with COVID-19, there will be emergencies, and close contact is unavoidable. (5) Moreover, it is difficult to identify the presence of pathogens, which can increase the spread of a lay disease during the relatively long incubation period (the median incubation period was reported to be 5.1 days, 95% confidence interval: 4.5–5.86 or up to 14 days for some cases before some signs could be detected) and the postinfection period.(6) There is also a major threat to dentists and other members of the dental team for patients diagnosed with COVID-19, not displaying any symptoms. (7)

In order to resolve and monitor its spread, dentists should ideally maintain a high degree of competence and honesty. (8)The Centers for Disease Control and Prevention (CDC), the American Dental Association (ADA), and the WHO are providing specific recommendations for dentists to control the spread of COVID-19.(9) Such precautions include PPE, washing of hands, patient assessment, proper usage of rubber dam, anti-retraction handpieces, oral rinsing before the procedure, and clinic disinfection. (10)Furthermore, some guidelines and publications have provided valuable information about the symptoms and signs, methods of communication, and referral processes of dentists in order to improve their awareness and preventive practices so as to contribute to disease prevention at community level.(11,12))

Apart from the basic infection control in their clinical practice, dental health profession, armed with data and connected to science-based sources of information about such an infection, can serve the community in case of disproportionate distribution of doctors and patients in various areas. (11)

The aim of this study is to assess the level of knowledge, attitude and practice regarding COVID19 and infection control among patients when visiting a dental hospital.

MATERIALS AND METHODS

The study was a cross-sectional questionnaire-based survey. The target population was the patients visiting the out-patient department of Saveetha dental college and hospitals, Tamil Nadu in India. A prefabricated validity tested questionnaire was devised for use in the study. An online questionnaire was prepared and circulated among the patients. This questionnaire was prepared using google docs. The questionnaire consists of 12 questions. The sample size for the study was 104. It was an online setting where two reviewers are involved in this study for the validity checking of the questionnaire.The data was collected, verified, tabulated and analysed. All statistical analysis was done using SPSS by IBM.The statistical chi square test was done, where if the p value is found out to be less 0.05, it is statistically significant. The data was imported to SPSS and the descriptive statistics with frequency analysis was done. The obtained data were represented graphically as bar charts. The dependent variables considered for the study are dentists, patients, gender and the independent variable is age of the patient.

RESULTS

The overall response for each question and the percent analysis were calculated for each question. Date was mentioned through the questionnaire online form. 72.3% of the patients were aged between 20 and 40, 12.3% were aged between 10 and 20 and 15.2% of the patients were aged between 40 and 60. 89.5% of the patients were aware of the severity of COVID 19 if precautions weren’t followed properly.

Only 10.4% did not realise the severity of COVID 19 and its precautions. 94.2% of the patients wore masks every time they visited a dental hospital whereas 5.7% only don't wear masks [Figure 2] when they visited a dental hospital. 92.3% of the patients sanitise hands immediately after they leave the dental hospital. 36.1% of the patients used a hand sanitiser 2-4 times inside a dental hospital, 47.6% of the patients used a hand sanitiser 4-6 times inside a dental hospital, 12.3% of the patients used a hand sanitiser less than 2 times inside a dental hospital and only 3.8% of the patients do not use a hand sanitiser at all during their visit to a dental hospital. [Figure 3] 7.6% of the population do not sanitise hands after visiting a dental hospital. 71.4% of the patients are not okay with dentists treating them with a protective gear, whereas 8.5% of the population are okay with dentists treating them without a protective gear. 44.76% of the population prefer hand sanitiser whereas 55.3% preferred washing hands with soap as they think it is the best method to sanitise hands. The patients also specifically mentioned that they're comfortable with any medium to sanitise their hands as long as they do it in regular intervals and properly as the availability also matters. Association was done using Chi Square correlating age and few responses (p value <0.05 was considered statistically significant) as shown in Figure 4-7.

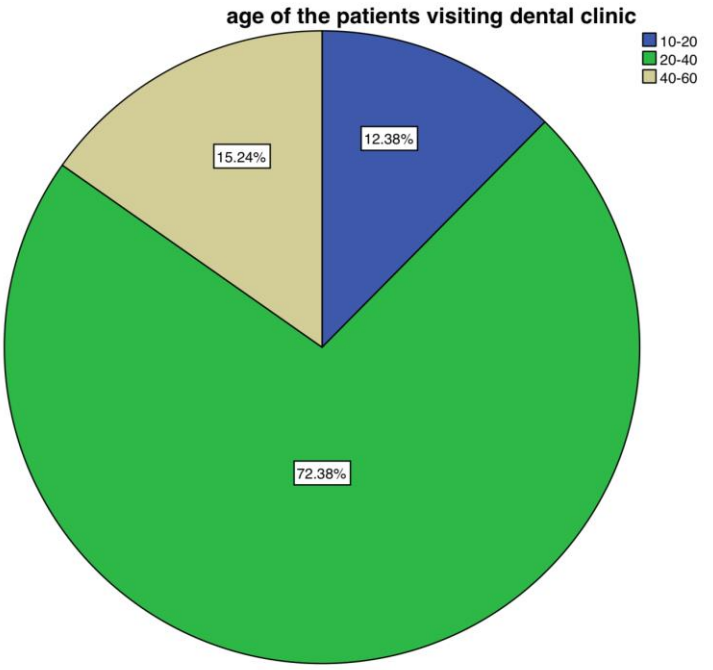

FIG 1: shows the age distribution among the sample population. 12.38% participants are 10-20 years old, 72.38% of the participants are 20-40 years old and 15.24% of the participants are 40-60 years old. Blue denotes the participants who are 10-20 years old, Green denotes the participants who are 20-40 years old, Yellow denotes the participants who are 40-60 years old,

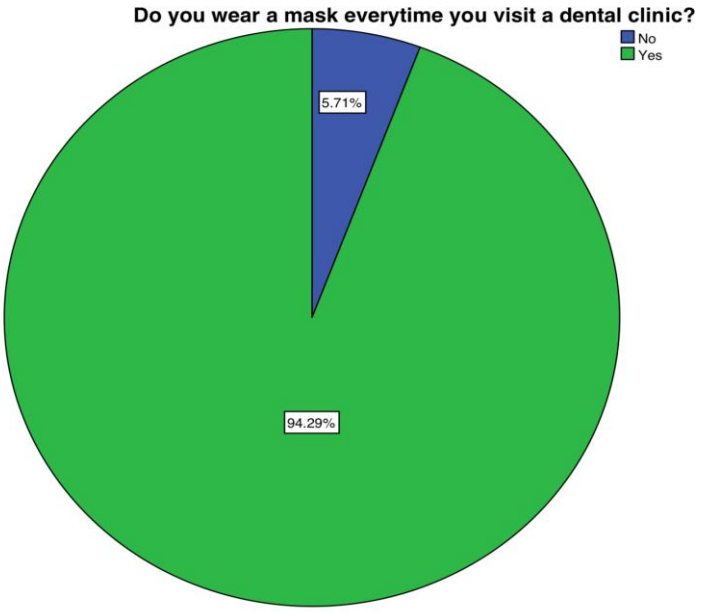

FIG 2: shows the response of patients if they wore a mask every time they visit a dental clinic. 94.29% participants wear masks and 5.71% of the participants do not wear masks. Blue denotes the participants who do not wear masks and Green denotes the participants who wear masks.

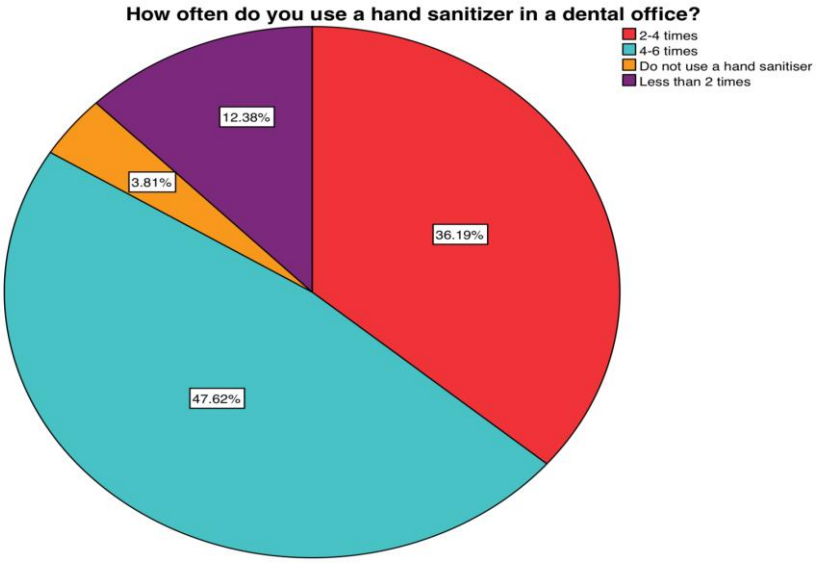

FIG 3: shows the response of patients of the number of times the patients use hand sanitizer in a dental hospital. 36.19% participants use hand sanitiser 2-4 times, 47.62% participants use hand sanitiser 4-6 times, 12.38% participants use hand sanitiser less than 2 times, and 3.81% participants do not use hand sanitiser. Red denotes the participants who use hand sanitiser 2-4 times, Blue denotes the participants who use hand sanitiser 4-6 times, Purple denotes the participants who use hand sanitiser less than 2 times, Orange denotes the participants who do not use hand sanitiser

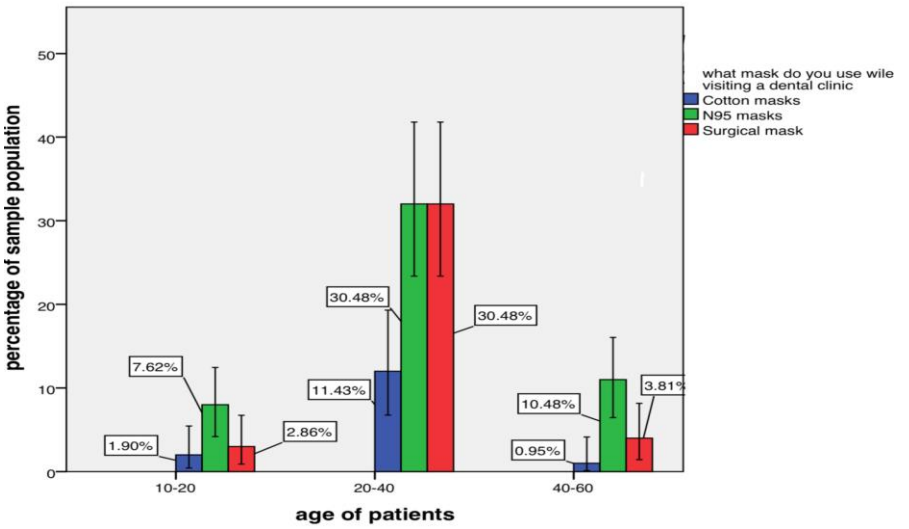

FIG 4: The bar graph represents the association between the age of patients and the type of masks they use. X axis represents the age of the patient and Y axis represents the percentage of the sample population. Blue denotes the patients who use cotton masks, Green denotes patients who use N95 masks and Red denotes patients who use surgical masks while visiting a dental clinic. Chi square test was done and the association was found to be statistically not significant. Pearson chi square value : 5.132, df:4, p value: 0.274 ($p>0.05$). Hence, not statistically significant ,although all age groups preferred N95 masks for their visit to a dental hospital. Majority of the patients in the age group of 20-40 wore N95 masks and surgical masks to a dental hospital.

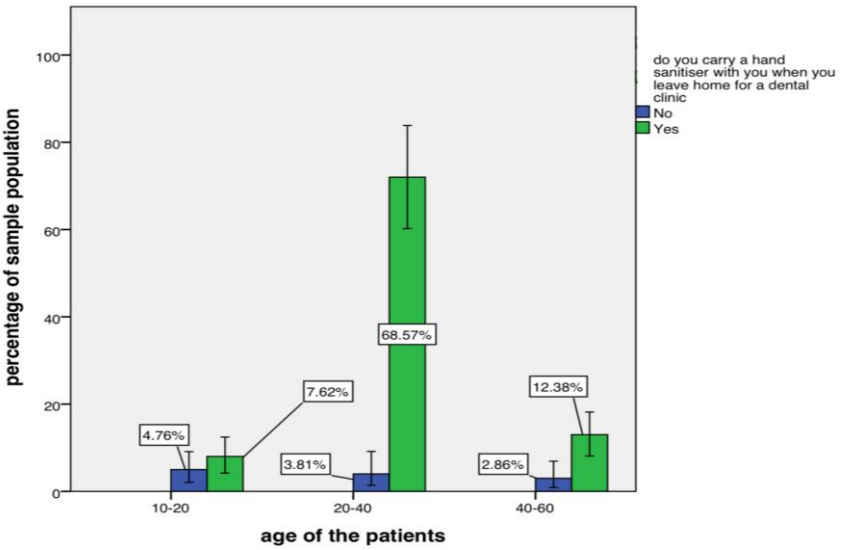

FIG 5: The bar graph represents the association between the age of patients and if they carried a hand sanitiser every time they visited a dental hospital. X axis represents the age of the patient and Y axis represents the percentage of the sample population. Blue denotes the patients who do not carry a hand sanitiser, Green denotes patients who carry a hand sanitiser every time they visit a dental hospital. Chi square test was done and the association was found to be statistically not significant. Pearson chi square value : 13.087, df:2 , p value: 0.01 ($p < 0.05$). Hence, statistically significant , all age groups carried a hand sanitiser with them when they visit a dental hospital. Majority of the patients in the age group of 20-40 always carried a hand sanitiser with them when they visit a dental hospital.

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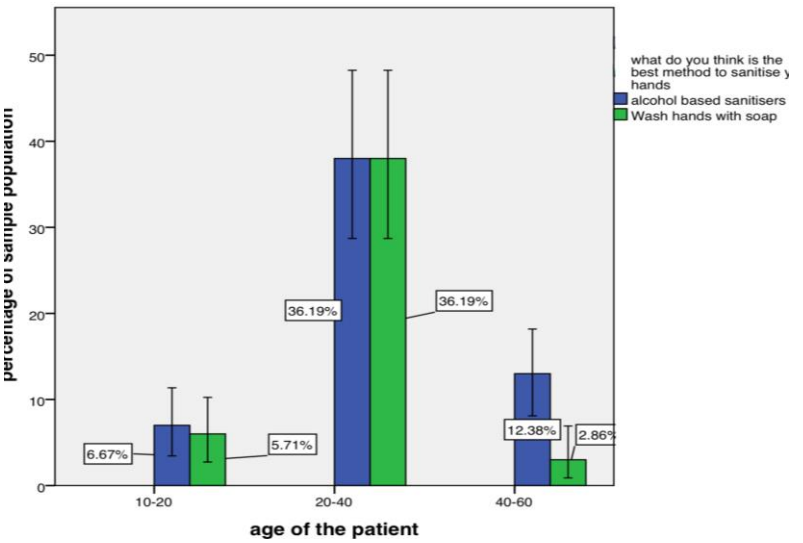

FIG 6: The bar graph represents the association between the age of patients and which method they think is the best method to sanitise your hands. X axis represents the age of the patient and Y axis represents the percentage of the sample population. Blue denotes the patients who use alcohol based hand sanitisers, Green denotes patients who wash hands with soap every time during their visit to a dental hospital. Chi square test was done and the association was found to be statistically not significant. Pearson chi square value :5.232 , df:2 , p value: 0.073 (p >0.05). Hence, not statistically significant , although all age groups preferred a hand sanitiser with them when they visit a dental hospital. Majority of the patients in the age group of 20-40 preferred alcohol based sanitisers and soap to sanitise their hands.

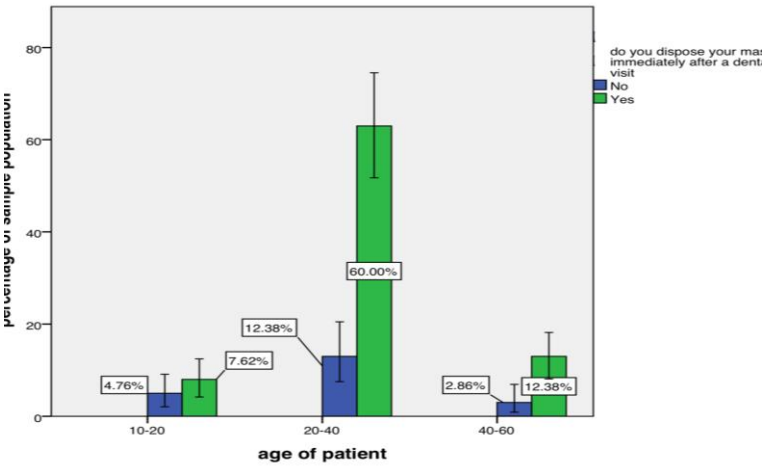

FIG 7: The bar graph represents the association between the age of patients and if they sanitise they dispose their masks immediately after their visit to the dental hospital. X axis represents the age of the patient and Y axis represents the percentage of the sample population. Blue denotes the patients who do not dispose their masks. Green denotes patients who dispose their masks every time after their visit to a dental hospital. Chi square test was done and the association was found to be statistically not significant. Pearson chi square value :3.183 , df:2 , p value: 0.204 (p >0.05). Hence, not statistically significant , although all age groups preferred to dispose their masks after their visit to a dental hospital. Majority of the patients in the age group of 20-40 preferred to dispose their masks immediately after a visit to the dental hospital.

DISCUSSION

The COVID-19 pandemic has had a widespread effect worldwide since its outbreak in 2019 in Wuhan. The alarming number of cases worldwide can be attributed to transmission via airborne droplets and to touching or contacting an infected surface.(13) The epidemic of viral respiratory infections such as SARS and COVID-19 demonstrated the importance of effective infection management procedures along with the difficulties faced during the epidemic by health-care professionals. (14)The quick spread of the COVID-19 pandemic has resulted in a significant number of fatalities and has stretched the health-care infrastructure of even the most developed countries.

89.52% of the patients are aware of the COVID 19 pandemic. This was due to many sources of information like newspapers, social media and and government sources. 10.48% of the patients were not properly aware of the COVID 19. This was common among population of 40-60 year old patients mainly due to improper access to the above resources [Figure 1]. 94.29% of the population wear masks every time they visit a dental hospital. This positive response was because many of them were aware that one of the main places COVID could easily spread is a hospital, so in order to protect themselves, they choose to wear a mask every time they visit a dental hospital. Only 5.71% of the patients choose not to wear a mask because they feel uncomfortable while wearing one.[Figure 2]. 48.57% of the patients choose to wear an N95 mask. This is because they're aware that they are more safer than cloth masks and surgical masks because of their better filters. 37.14% of the patients choose to wear a surgical mask because of its easy accessibility whereas 14.29% of the population choose Cotton masks because of its convenience and cheap availability and reusable property[Figure 4]. 92.38% of the patients prefer to sanitise their hands before they enter a dental hospital.

They stated that this was possible due to many sanitiser stations available in the hospital. Only 7.62% of the patients do not use hand sanitiser before altering a dental hospital. This was because some patients were not aware of a hand sanitiser and it's uses and benefits and some did not notice the hand sanitiser stations present in the hospital. While 88.57% of the patients prefer to carry their own hand sanitisers because they think that it reduces the number of contact surfaces than a hand sanitiser stations and can be used at their own convenience multiple times whereas only 11.43% of the patients do not carry a hand sanitiser with them before they visit a dental hospital. 47.62% of the patients use hand sanitiser around 4-6 times and this can be mainly seen in age groups between 20 and 40. 36.19z of the patients use hand sanitiser 2-4 times and12.38% of the patients use hand sanitiser less than two times. They are mostly people who do not carry their own sanitiser and are provided by the dental hospital. 3.81% of the patients do not use hand sanitiser at all because they aren't aware of the hand sanitiser and it's benefits[Figure 3]. Around 80% of the patients prefer to dispose their masks immediately after a dental visit. This was also mainly seen in the age group between 20-40 and this was also seen in people who wear cloth masks and N95 masks. 20% of the patients do not dispose masks immediately after their visit to a dental hospital because they prefer to sterilise it again and re use it, and these were mostly patients with cotton masks[Figure 7]. 87.62% of the patients are okay with visiting a dental hospital during a pandemic only if they think they're in pain and if they're adequately precautious enough. The other 12.38% of the population do not think it's wise to visit a dental hospital in the middle of a pandemic. 71.43% of the patients are not okay with the dentists treating them without them wearing protective gear also known as PPE.

Because they highly fear the spread of COVID can be possible without the protective gear. (11,12) 28.57% of the patients are not aware of the protective gear and it's purposes. 55.24% of the patients prefer alcohol based hand sanitiser to sanitise their hands. This is mainly because the availability of soap and water cannot be always possible. Whereas 44.76% of the patients prefer washing hands with soap and water. This mainly was found to be in the population between 40 and 60 aged patients [Figure 6].

Patients are at high risk of being exposed to COVID-19 cross-infection due to the complexity of the transmission. The emergence of this pandemic has thus further illustrated the importance of appropriate methods for managing infections. Failure to follow infection control practices may be due to lack of information and understanding of the existing policies, low rates of workers' commitment to adhere to the existing policies, or ignorance of the danger presented by occupational exposure to infectious diseases.

Dental schools are responsible for providing appropriate measures for the prevention of diseases, imparting proper training of dental students to protect patients, and ensuring healthier working conditions. Dental education may play an important role in training dentists by encouraging them to develop correct information and attitudes about procedures for managing infections.

Patients visiting dental hospitals should be informed about the latest protocols in place during the current pandemic. Therefore, this questionnaire-based cross-sectional study was conducted among patients. The questionnaire was divided into sections to assess the awareness with respect to the facts, diagnostic aspects of the disease, and its importance in dental treatment.(15)

Our team has extensive knowledge and research experience that has translate into high quality publications (16–25)

CONCLUSION

Within the limits of the study, the survey highlights the high level of awareness about COVID 19 and its precautionary measures to be taken before visiting a dental hospital among patients visiting Saveetha dental college and hospital in Chennai District, during the weeks of outbreak. Newspapers, government sources and social media were the most common sources of awareness. More awareness should be created among patients on the awareness with respect to the facts, diagnostic aspects of the disease, and its importance in dental treatment. Similar studies on large populations should be done in order to get the relevant results. This study will act as a guide to understand the awareness of precautions of COVID 19 taken before visiting a dental clinic among patients.

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CONFLICTS OF INTEREST

None declared Source of Funding : Self Ethical Clearance: It is taken from "Saveetha Institute Human Ethical Committee" (Ethical Approval Number- SDC/SIHEC/2020/DIASDATA/0619-0320)

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REFERENCES

1. Modi PD, Nair G, Uppe A, Modi J, Tuppekar B, Gharpure AS, et al. COVID-19 Awareness Among Healthcare Students and Professionals in Mumbai Metropolitan Region: A Questionnaire-Based Survey. Cureus [Internet]. 2020 Apr 2;12(4):e7514. Available from: http://dx.doi.org/10.7759/cureus.7514
2. Khader Y, Al Nsour M, Al-Batayneh OB, Saadeh R, Bashier H, Alfaqih M, et al. Dentists' Awareness, Perception, and Attitude Regarding COVID-19 and Infection Control: Cross-Sectional Study Among Jordanian Dentists. JMIR Public Health Surveill [Internet]. 2020 Apr 9;6(2):e18798. Available from: http://dx.doi.org/10.2196/18798
3. Chang D, Xu H, Rebaza A, Sharma L, Dela Cruz CS. Protecting health-care workers from subclinical coronavirus infection [Internet]. Vol. 8, The Lancet Respiratory Medicine. 2020. p. e13. Available from: http://dx.doi.org/10.1016/s2213-2600(20)30066-7
4. Meng L, Hua F, Bian Z. Coronavirus Disease 2019 (COVID-19): Emerging and Future Challenges for Dental and Oral Medicine. J Dent Res [Internet]. 2020 May;99(5):481–7. Available from: http://dx.doi.org/10.1177/0022034520914246
5. Sabino-Silva R, Jardim ACG, Siqueira WL. Coronavirus COVID-19 impacts to dentistry and potential salivary diagnosis. Clin Oral Investig [Internet]. 2020 Apr;24(4):1619–21. Available from: http://dx.doi.org/10.1007/s00784-020-03248-x
6. Peng X, Xu X, Li Y, Cheng L, Zhou X, Ren B. Transmission routes of 2019-nCoV and controls in dental practice. Int J Oral Sci [Internet]. 2020 Mar 3;12(1):9. Available from: http://dx.doi.org/10.1038/s41368-020-0075-9
7. Ibrahim NK, Alwafi HA, Sangoof SO, Turkistani AK, Alattas BM. Cross-infection and infection control in dentistry: Knowledge, attitude and practice of patients attended dental clinics in King Abdulaziz University Hospital, Jeddah, Saudi Arabia. J Infect Public Health [Internet]. 2017 Jul;10(4):438–45. Available from: http://dx.doi.org/10.1016/j.jiph.2016.06.002
8. Zemouri C, de Soet H, Crielaard W, Laheij A. A scoping review on bio-aerosols in healthcare and the dental environment. PLoS One [Internet]. 2017 May 22;12(5):e0178007. Available from: http://dx.doi.org/10.1371/journal.pone.0178007
9. Website [Internet]. [cited 2021 May 19]. Available from: https://tinyurl.com/s23yv4p.
10. Centers for Disease Control and Prevention [Internet]. Encyclopedia of Behavioral Medicine. 2020. p. 409–409. Available from: http://dx.doi.org/10.1007/978-3-030-39903-0_100268
11. Gardner JM, Willem L, Van Der Wijngaart W, Kamerlin SCL, Brusselaers N, Kasson P. Intervention strategies against COVID-19 and their estimated impact on Swedish healthcare capacity [Internet]. Available from: http://dx.doi.org/10.1101/2020.04.11.20062133
12. COVID-19 Frequently Asked Questions [Internet]. [cited 2021 May 19]. Available from: https://success.ada.org/en/practice-management/patients/coronavirus-frequently-asked-questions
13. Roy D, Tripathy S, Kar SK, Sharma N, Verma SK, Kaushal V. Study of knowledge, attitude, anxiety & perceived mental healthcare need in Indian population during COVID-19 pandemic. Asian J Psychiatr [Internet]. 2020 Jun;51:102083. Available from: http://dx.doi.org/10.1016/j.ajp.2020.102083
14. Watkins RE, Wynaden D, Hart L, Landsborough I, McGowan S, Speed G, et al. Perceptions of infection control practices among health professionals. Contemp Nurse [Internet]. 2006 Jul;22(1):109–19. Available from: http://dx.doi.org/10.5172/conu.2006.22.1.109

15. Wang D, Wang J, Jiang Q, Yang J, Li J, Gao C, et al. No Clear Benefit to the Use of Corticosteroid as Treatment in Adult Patients with Coronavirus Disease 2019 : A Retrospective Cohort Study [Internet]. Available from: http://dx.doi.org/10.1101/2020.04.21.20066258
16. Neelakantan P, Grotra D, Sharma S. Retreatability of 2 mineral trioxide aggregate-based root canal sealers: a cone-beam computed tomography analysis. J Endod [Internet]. 2013 Jul;39(7):893–6. Available from: http://dx.doi.org/10.1016/j.joen.2013.04.022
17. Aldhuwayhi S, Mallineni SK, Sakhamuri S, Thakare AA, Mallineni S, Sajja R, et al. Covid-19 Knowledge and Perceptions Among Dental Specialists: A Cross-Sectional Online Questionnaire Survey. Risk Manag Healthc Policy [Internet]. 2021 Jul 7;14:2851–61. Available from: http://dx.doi.org/10.2147/RMHP.S306880
18. Sheriff KAH, Ahmed Hilal Sheriff K, Santhanam A. Knowledge and Awareness towards Oral Biopsy among Students of Saveetha Dental College [Internet]. Vol. 11, Research Journal of Pharmacy and Technology. 2018. p. 543. Available from: http://dx.doi.org/10.5958/0974-360x.2018.00101.4
19. Markov A, Thangavelu L, Aravindhan S, Zekiy AO, Jarahian M, Chartrand MS, et al. Mesenchymal stem/stromal cells as a valuable source for the treatment of immune-mediated disorders. Stem Cell Res Ther [Internet]. 2021 Mar 18;12(1):192. Available from: http://dx.doi.org/10.1186/s13287-021-02265-1
20. Jayaraj G, Ramani P, Herald J. Sherlin, Premkumar P, Anuja N. Inter-observer agreement in grading oral epithelial dysplasia – A systematic review [Internet]. Vol. 27, Journal of Oral and Maxillofacial Surgery, Medicine, and Pathology. 2015. p. 112-6. Available from: http://dx.doi.org/10.1016/j.ajoms.2014.01.006
21. Paramasivam A, Priyadharsini JV, Raghunandhakumar S, Elumalai P. A novel COVID-19 and its effects on cardiovascular disease. Hypertens Res [Internet]. 2020 Jul;43(7):729–30. Available from: http://dx.doi.org/10.1038/s41440-020-0461-x
22. Li Z, Veeraraghavan VP, Mohan SK, Bolla SR, Lakshmanan H, Kumaran S, et al. Apoptotic induction and anti-metastatic activity of eugenol encapsulated chitosan nanopolymer on rat glioma C6 cells via alleviating the MMP signaling pathway [Internet]. Vol. 203, Journal of Photochemistry and Photobiology B: Biology. 2020. p. 111773. Available from: http://dx.doi.org/10.1016/j.jphotobiol.2019.111773
23. Gan H, Zhang Y, Zhou Q, Zheng L, Xie X, Veeraraghavan VP, et al. Zingerone induced caspase-dependent apoptosis in MCF-7 cells and prevents 7,12-dimethylbenz(a)anthracene-induced mammary carcinogenesis in experimental rats. J Biochem Mol Toxicol [Internet]. 2019 Oct;33(10):e22387. Available from: http://dx.doi.org/10.1002/jbt.22387
24. Dua K, Wadhwa R, Singhvi G, Rapalli V, Shukla SD, Shastri MD, et al. The potential of siRNA based drug delivery in respiratory disorders: Recent advances and progress. Drug Dev Res [Internet]. 2019 Sep;80(6):714–30. Available from: http://dx.doi.org/10.1002/ddr.21571
25. Mohan M, Jagannathan N. Oral field cancerization: an update on current concepts. Oncol Rev [Internet]. 2014 Mar 17;8(1):244. Available from: http://dx.doi.org/10.4081/oncol.2014.244