

Content available at: <https://www.ipinnovative.com/open-access-journals>

International Journal of Oral Health Dentistry

Journal homepage: www.ijohd.org

Original Research Article

Assesment of relationship between perceived stress and knowledge among oral health care workers during COVID-19 pandemic: A cross- sectional study

Randhir Singh¹, Abir Sarkar², Vaibhav Jain^{3,*}

¹Dept. of Prosthodontics, Military Hospital, Meerut, Uttar Pradesh, India

²Dept. of Prosthodontics, Army Dental Clinic, Meerut, Uttar Pradesh, India

³Dept. of Prosthodontics, INDC Danteshwari, Mumbai, Maharashtra, India



ARTICLE INFO

Article history:

Received 17-06-2021

Accepted 19-07-2021

Available online 24-09-2021

Keywords:

COVID-19. Perceived stress.

Knowledge. Dental Practitioners.

ABSTRACT

Aim: The lack of knowledge and stress towards COVID-19 can lead to unfavorable dentist's attitude towards the practice making them reluctant and fearful in dental operatory. The purpose of this cross-sectional study was to assess the knowledge, attitude and perceived stress among dental practitioners during current COVID-19 outbreak.

Materials and Methods: In this study, a total of 459 dental practitioners involving both general practitioners and specialists from different types of practice completed a questionnaire for assessment of knowledge and attitude towards COVID-19 and stress perceived by them. The association of perceived stress for gender, age, designation and type of practice was analyzed using Chi-square tests with Statistical significance set at 5% level.

Results: total of 459 individuals participated in study with 51.0% males and 49.0% females, of them 54.7% were specialists and 45.31% general dental practitioners, working at different types of practices. More than 90% were aware of mode of transmission and were following current guidelines. Similar results were observed for attitude towards COVID-19. Majority of participants had total PSS scores in the study sample ranged from 0-38, with total mean scores of 17.08 (± 7.8). Men demonstrated significantly lower values PSS scores when compared to females ($p < 0.05$), similar results were observed for age.

Conclusions: Covid-19 pandemic has led to increased level of stress among dental practitioner's despite of possessing high level of knowledge and positive attitude.

This is an Open Access (OA) journal, and articles are distributed under the terms of the [Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License](https://creativecommons.org/licenses/by-nc-sa/4.0/), which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: reprint@ipinnovative.com

1. Introduction

On January 5th 2020, World Health Organization has published its first news on Disease Outbreak of a new virus which was later declared as Public Health Emergency of International Concern on 30 January 2020 and then a global pandemic on March 11, 2020.¹ It is caused by SARS-CoV-2, and mode of spread is thought to be primarily by respiratory droplets.² The virus has been shown to survive in aerosols for hours and on some

surfaces for days.³ The use of rotary instruments like air rotor, scaler and air water syringes in dental practice creates a visible spray containing large particle droplets of water, saliva, blood, microorganisms, and other debris. As saliva is rich in COVID-19 viral load and many patients could be asymptomatic carriers, resulting in high risk of cross-infection to dentists, auxiliaries as well as patients undergoing dental procedures.⁴ The standard protective measures in daily clinical work are not effective enough to prevent the spread and changes are required for infection control and associated armament aria which will involve extreme financial implications. This has led to

* Corresponding author.

E-mail address: drvaibhav40@gmail.com (V. Jain).

overwhelming fear and anxiety among dental practitioner about their own and loved one's health. Currently, there is no specific antiviral treatment and fully effective vaccine, however there are practical guidelines recommended by the Centers for Disease Control and Prevention (CDC) and American Dental Association (ADA) for dental practitioner to control the spread of COVID-19.⁵⁻⁷ In addition, certain guidelines and reports have provided useful information about the signs and symptoms of the disease, ways of transmission, and referral mechanisms to increase dentist's knowledge.⁷ Hence, these guidelines are recommended for declining the spread of infection and responding to the challenges during the epidemic. Despite all these, many of the dentists may not be still aware of recent guidelines. This lack of knowledge and fear of contracting the infection during the course of treatment could have a striking/unfavorable impact on the dentist's attitude towards patients making them to be more reluctant and fearful in dental operatory. Thus, the present study was conducted to assess the knowledge and attitude of dental practitioners about COVID-19 outbreak. In addition, the study also aimed at identifying the level perceived stress among dentists and its association with socio-demographic characteristics.

2. Materials and Methods

This is a cross-sectional, observational study carried out using an online survey. An online self-reporting questionnaire was designed using Google forms and sent to a total of 600 contacts from 6 different states of north India, explaining the purpose of study. The link of the questionnaire was sent through email and other social media platforms to all the dental practitioners. The participants were encouraged to further circulate the survey to as many people as possible. Surveys with incomplete responses were excluded from the entire study. Finally, 459 participants completed the questionnaire giving the response rate of 76.5%. The participants included both general dental practitioners and specialists of various fields, working in Government College, private college and private practice. The questionnaire was comprised of 4 sections; socio-demographics data such as age, gender, designation (general dental practitioner and specialist) and type of practice, as it is well-known to have influence on the perception of stressful event.⁸ Second section focused on knowledge among dental professionals regarding COVID-19 outbreak in accordance with the Centers for Disease Control and Prevention (CDC) and is comprised of 12 close-ended questions. The third section gathered information regarding attitude towards fear about getting infected with COVID-19 using 8 close-ended questions. Both of these sections have previously been validated and utilized⁹

Fourth part of questionnaire assessed the participants experience during past month about the concerned topic using a 10-item perceived stress scale (PSS)¹⁰ Each item

was ranked on a five-point Likert-type scale (0 = Never, 1 = Occasionally, 2 = Sometimes, 3 = Often to 4 = very often). Out of ten, six items were considered to be negative while the four items were positively worded representing perceived helplessness and self-efficacy, respectively. The possible PSS scores were obtained by reversing responses to four positively-stated items and then summing across all scale items. Thus, the total PSS-10 scores ranged from 0 to 40, with higher scores indicating greater stress in performing functions and vice-versa. The data was analyzed using Statistical Package for Social Sciences, IBM Corporation, SPSS Inc., Chicago, IL, USA version 21 software package (SPSS). Descriptive statistics using mean and standard deviation were computed. Statistical significance was set at the 5% level. A p-value less than 0.05 (typically ≤ 0.05) is statistically significant. It indicates strong evidence against the null hypothesis, as there is less than a 5% probability the null is correct (and the results are random).

3. Results

A total of 459 individuals participated in study with demographic characteristics as presented in Table I. There were 234 (51.0%) males and 225 (49.0%) females, of them 251 (54.7%) were specialists and 208 (45.31%) general dental practitioners, working at either govt. hospital 276 (60.13%) private hospital 38 (8.3%) or private clinic 145 (31.6%). The majority of participants were in age group of 31-40 yrs. 224 (48.80) and least in > 50yrs 06 (1.30%), while 176 (38.34%) were 21-30 yrs. and 53 (11.55%) were 41-50 yrs.

The knowledge of COVID-19 among dental care professionals is summarized in Table II. Among all 98.03% knew about mode of transmission and 91.28% were aware and updated with the current guidelines for cross-infection control. In terms of patient evaluation, 96.7 % of the participants asked about patients travel history but only 64.5% recorded body temperature prior dental treatment, 93.5% preferred deferring treatment for those showing suspicious symptoms. It is noteworthy that only 7% believed surgical mask to be enough to prevent cross-infection. Even though 93.02% favored the use of N-95 masks routinely, only 65.6% reported having worn N-95 mask while treating a patient and 79.9% did not use rubber dam isolation. Majority of the participants, (72.8%) recommended using universal precautions of infection control routinely, only 42.7% percent of participants used high-volume suction, and 74% got patients mouth rinsed before dental treatment. 98.9 % practiced hand hygiene with either soap and water or sanitizer before and after treatment of patients, and only 77.8% of participants were aware of the proper authority to contact if they came across a patient with a suspected COVID-19 infection.

Table 1: Frequency distribution of socio-demographic characteristics among study participants demographic description:

Variable		N (%)
Total		459
Gender	Male	234 (51.0%)
	Female	225(49.02%)
Age	21-30	176 (38.34%)
	31-40	224 (48.80%)
	41-50	53 (11.55%)
	>50	06 (1.30%)
Designation	Specialists	251 (54.7%)
	General dental practitioners	208 (45.31%)
Nature of Hospital	Govt. Hospital	276 (60.13%)
	Private hospital	38 (8.3%)
	Private clinic	145 (31.6%)

Attitude and fear of the dental practitioners towards COVID-19 is shown in Table II. In this study 73.63% were afraid of getting infected with from either a patient or co-worker, while 85.62% were anxious of patients with cough, and 58.39% felt nervous while talking to patients in close vicinity. 66.45 % were in favor of closing practice till number of COVID-19 cases start declining. Concern about carrying infection back to families was present in 92.9%, while only 42.70 % were afraid of getting quarantined if infected. Regarding the cost of treatment if got infected results were almost equally distributed as 33.8 % stating yes and 47% stating no, while 19.17 % were unsure. 71.24% participants were afraid of COVID-19 related deaths.

The total PSS scores in the study sample ranged from 0-38, with total mean scores of 17.08 (± 7.8) among the study participants (Table IV). The means for each socio-demographic variable were calculated, and a statistical test determined significant differences among the questions. Statistically significant association (0.005*) was found between gender and total PSS scores, with mean value of 15.71 (7.4) and 18.52 (7.9) among male and female participants respectively. Among the age groups, those belonging to 21-30 age group had highest mean PSS scores followed by 41-50 yrs. and then 31-40. > 50 yrs. age group had lowest scores. The differences in mean scores were found to be significant for age. However, the difference between general dental practitioners and specialists was not found to be statistically significant. Similarly, the mean scores were not significantly different for nature of practice among dental practitioners.

4. Discussion

Park defined pandemic as an epidemic affecting a large proportion of the population, occurring over a wide geographic area such as a section of a nation, the entire nation, a continent or the world.¹⁰ Epidemics and pandemics are a periodic phenomenon which can lead to heightened levels of stress and anxiety as response to any stressful situation among the community during such

periods. Lack of awareness often leads to an unconcerned attitude, which may adversely affect the preparedness to meet these challenges.¹¹ Currently world is facing a COVID-19 pandemic crisis and healthcare workers including physicians, pharmacists, nurses and dentists all over the globe are putting up their efforts to fight against it. Being on the list of high-risk professions as it involves the use of instruments, such as handpieces or ultrasonic scalers and air-water syringes, which create a visible spray containing, saliva, blood, microorganisms, and other debris,¹² dentists are very much expected to develop severe anxiety about the current pandemic situation. Thus, the present study was conducted to assess the knowledge, attitude, anxiety, and perceived stress among dental practitioners in Indian population during the COVID-19 pandemic. For this purpose, a well-constructed close-ended questionnaire was designed.^{9,13} The online survey link was circulated through social media and an e-mail to dental professionals and received a response through an online survey submission. Questionnaire-based studies are proven for gathering information regarding preferences, attitudes, opinions, and experiences of participants; however, careful data collection and interpretation is required¹⁴

There are various reports which quote on risk of transmission of COVID-19 infection during dental procedures, most of the report shows high risks due to the close contact with patient from airborne spread, contact spread, and various contaminated surface spread during aerosol generating procedure.¹⁵ However, it is imperative to stay updated with current guidelines. In the present study, it was observed that majority of the practitioners were aware of mode of transmission and were updated with current CDC guidelines of prioritizing most critical services, proactive communication, systemic assessment of patients, Knowledge of the steps to be taken if a symptomatic patient is encountered.¹⁶ As per those guidelines, dentists should ask for travel history, recent contact with known case and record temperature as a routine measure. Among them 96.7% reported asking for travel history while only

Table 2: Knowledge of COVID-19 among dental care professionals.

Question	Response	N (%)
Are you aware of the mode of transmission of COVID-19?	Yes	450 (98.03%)
	No	0 (0%)
	Maybe	09 (1.96%)
Are you updated with the current CDC or WHO guidelines for cross-infection control regarding COVID-19?	Yes	419(91.28%)
	No	05(1.09%)
	Maybe	35(7.62%)
Are you currently asking every patient's travel history before Performing Dental Treatment	Yes	444 (96.7%)
	No	06 (1.30%)
	Maybe	09 (1.96%)
Are You currently Taking every Patient's Body Temperature before Performing Dental Treatment?	Yes	296 (64.5% 123)
	No	(26.8%)
	Maybe	40 (8.71%)
Are You Deferring Dental Treatment of Patients Showing Suspicious Symptoms?	Yes	429 (93.5%)
	No	11 (2.4%)
	Maybe	19 (4.14%)
Do You Think Surgical Mask is enough to Prevent Cross-Infection of COVID 19?	Yes	32 (7.0%)
	No	400 (87.14%)
	Maybe	27 (5.9%)
Do You Think N-90 Mask should be Routinely Worn in Dental Practice due to the Current Outbreak?	Yes	427 (93.02%)
	No	12 (2.61%)
	Maybe	20 (4.35%)
Have You Ever Worn an N-90 Mask while Treating a Patient in Your Dental Practice?	Yes	301 (65.6%)
	No	143 (31.15%)
	Maybe	15 (3.26%)
Do You Routinely Follow Universal Precautions of Infection Control for Every Patient?	Yes	334 (72.8%)
	No	60 (13.07%)
	Maybe	61 (13.3%)
Do You Use Rubber Dam Isolation for Every Patient?	Yes	54 (11.8%)
	No	367(79.9%)
	Maybe	38 (8.3%)
Do You Use High-Volume Suction in Your Practice for Every Patient?	Yes	196 (42.7%)
	No	208 (45.31%)
	Maybe	55 (11.9%)
Do You Ask Every Patient to Rinse His/Her Mouth with Anti-Bacterial Mouthwash before Treatment?	Yes	318 (69.3%)
	No	84 (18.3%)
	Maybe	57 (12.41%)
Do You Wash Hands with Soap and Water/Use Sanitizer Before and After Treatment of Every Patient?	Yes	454 (98.9%)
	No	02 (0.43%)
	Maybe	03 (0.65%)
Are You Aware of which Authority to Contact if You Come Across a Patient with Suspected COVID-19 Infection	Yes	357 (77.8%)
	No	72 (15.7%)
	Maybe	30 (6.53%)

Table 3: Attitude and fear of COVID-19 among dental care professionals.

Question	Response	N (%)
Are You Afraid of Getting Infected with COVID-19 from a Patient and Co-Worker?	Yes	338 (73.63%)
	No	34 (7.40%)
	Maybe	87 (19.0%)
Are You Anxious When Providing Treatment to a Patient who is Coughing or Suspected of being Infected with COVID-19?	YES	393 (85.62%)
	No	32 (7.0%)
	Maybe	34 (7.40%)
Do You want to Close Your Dental Practice until the Number of COVID-19 Cases Starts Declining?	Yes	305 (66.45%)
	No	49 (10.7%)
	Maybe	105 (23.0%)
Do You Feel Nervous when Talking to Patients in Close Vicinity?	Yes	268 (58.39%)
	No	129 (28.10%)
	Maybe	62 (13.50%)
Do You have Fear that You Could Carry the Infection from Your Dental Practice back to Your Family?	Yes	426 (92.9%)
	No	13 (2.83%)
	Maybe	20 (4.35%)
Are You Afraid of Getting quarantined if get Infected?	Yes	196 (42.70%)
	No	213 (46.40%)
	Maybe	50 (10.9%)
Are You Anxious about the Cost of Treatment if You Get Infected?	Yes	155 (33.8%)
	No	216 (47.06%)
	Maybe	88 (19.17%)
Do You feel Afraid when you Hear that People are Dying Because of COVID-19	Yes	327 (71.24%)
	No	50 (10.9%)
	Maybe	82 (17.7%)

Table 4: Comparison of pss scores and socio-demographic characteristics among study participants. The total PSS scores in the study sample ranged from 0-38, with total mean scores of 17.08 (7.8) among the study participants.

Variable		N (%)	Mean (SD)	P-value
Total		459	17.08 (7.8)	
Gender	Male	234 (51.0%)	15.71 (7.4)	<0.005*
	Female	225(49.02%)	18.52 (7.9)	
Age	21-30	176 (38.34%)	20.66 (7.5)	<0.005*
	31-40	224 (48.80%)	14.64 (7.1)	
	41-50	53 (11.55%)	15.85 (7.1)	
	>50	06 (1.30%)	14.00 (7.0)	
Designation	Specialists	251 (54.7%)	16.7 (8.3)	0.23
	General dental practitioners	208 (45.31%)	17.56 (7.0)	
Nature of hospital	GOVT. hospital	276 (60.13%)	16.60 (7.8)	0.40
	Private hospital	38 (8.3%)	20.74 (7.6)	
	Private clinic	145 (31.6%)	17.04 (7.6)	

* Statistically significant

64.5% would take the temperature before performing dental treatment.¹⁷

As there are higher chances of transmission of pathogenic microorganisms in dental settings through coughing and talking without a mask and indirect contact with contaminated instruments and/or environmental surfaces, thus adhering to various preventive strategies for infection control such as hand hygiene, personal protective measures including face shields and respirators, mouth rinse before dental procedures, rubber dam isolation, anti-retraction hand piece is recommended.¹⁵ 93.02% practitioners believed that N-95 mask should be routinely used during current outbreak, but only 65.6% have used N-95 mask while treating a patient ever, displaying the cautious approach of dentists towards treating patients in COVID scenario. This is further substantiated by the fact only 72.8% accepted following universal precautions of infection control for every patient. It was surprising to notice that only 11.8 % of the participants were using rubber dam, when considered in view of 54.7 % responders being specialists and 45.3% were not using high volume suction in the operatory. More than half of the population (77.8%) knew whom to contact in a situation of suspected COVID-19 patient. Dentists had good knowledge about current viral outbreak in present study and these results were consistent with the studies conducted among Iranian nurses¹⁸ and healthcare workers of Ho Chi Minh City.¹⁹ The use of saliva ejectors with low or high volume Although the population seems to have quite knowledge of the pandemic and were updated with preventive measures, there still is the scope for awareness programs and proper training as only few used rubber dam, high volume suction and their use can reduce the production of droplets and aerosols as per recent guidelines.¹⁶

As there is no evidence of specific treatment for COVID-19 so far¹² and management is mainly preventive in form of controlling source of infection, reducing transmission, early diagnosis, isolation and supportive care.²⁰ This has led to a change in behavioral attitude of dental practitioners making them to be more fearful and anxious towards patients while treating them. The same is pointed out in our study where 73.6% are afraid of getting infected from a patient and co-workers and is supported by others as well over dental as well as other fields of health care workers.²¹ Huang and Zhao et al in their study also found high levels of anxiety among healthcare workers compared to others.²² The majority of the dentists are fearful of providing treatment to any patient reporting suspicious symptoms. Since COVID-19 has rapidly infected such a large number of individuals in almost every country, the fear of getting infected by a patient is justified. Governments all over globe have imposed restrictions mostly in the form of social distancing, lockdown and restricting dental practice to essential emergency procedures thus deferring

most of the non-essential and elective dental procedures for which only 66.45 % were in favor.^{20–25} The high level of anxiety was reflected as a large proportion of dentists wanted to close down their practices which may have significant economic implications for dentists and dental healthcare workers. The virus has been proved to stay for variable period of time on different surfaces and has long incubation period and it's possible to carry the virus from practice to family.²⁶ Our study shows that 92.9% of participants were fearful of carrying virus back to families making quarantine absolutely necessary so as to avoid transmission. So, if someone suspected too came in contact with virus it is absolutely necessary to follow quarantine for a prescribed amount of time²⁷ It is also observed that only 33.8% were anxious about the cost of treatment if they get infected showing that practitioners have positive attitude towards getting quarantine an getting treatment done in spite of being fearful of the disease. Thus, it is crucial in this pandemic that psychological coping mechanisms and strategies are practiced in order to remain calm and function efficiently. The fear that dentists have regarding getting infected from COVID 19 could be greatly curtailed if dentists and dental healthcare workers meticulously follow the relevant recommendations issued by the regulatory authorities.⁹

Dentistry is recognized as a stressful job and a recent survey among Israeli dentists have shown association of COVID-19 factors and psychological factors with elevated psychological distress among dental staff.²⁸ In our study, an attempt was made to assess the level of stress among dentists using a 10-item Perceived stress scale. The gender-wise comparison revealed mean scores of 17.08 for total population with females having higher scores (18.52) as compared to males (15.71). Newer practitioners face various challenges in terms of patient's expectations, increased responsibility, establishing professional relationships and preparedness.²⁹ This is clearly evident in the present study where newer practitioners (age 21-30) had maximum stress while those having vast experience in field (age >50 years) had minimum stress levels, showing the importance of experience in the field for handling current pandemic like situations. Other two age groups reported values between these two and the differences among the age group were statistically significant. Studies have reported higher rates of stress among general dental practitioners than specialists.³⁰ Our study reported lower values for specialists as compared to general dental practitioners, but the differences were not significant. In this study 8.3% of the participants worked in private hospital. Herein, this group perceived less stress as compared to those working in either government hospital or private clinic. However, our study did not report any significant differences among three groups.

Despite having high standards of knowledge and practices, dental practitioners around the globe are in a state of anxiety and fear while working in their respective fields due to the COVID-19 pandemic impact on humanity. Currently, the effects of COVID-19 around the globe are worsening day by day so adherence to universal precautions and follow-up of current infection control guidelines is recommended. Use of preoperative antimicrobial mouth rinse could reduce the number of microbes in the oral cavity and 4-handed technique could be beneficial for controlling infection. Procedures that are likely to induce coughing should be avoided (if possible) or performed cautiously. Aerosol-generating procedures, such as the use of a 3-way syringe, should be minimized as much as possible. Intraoral x-ray examination can stimulate saliva secretion and coughing thus, extra oral dental radiographies, such as panoramic radiography and cone beam CT, can be considered as appropriate alternatives during the COVID-19 outbreak¹². Despite all the efforts, there were certain limitations such as small sample size limiting the generalizability of the study. Future studies on a national level are recommended to estimate the knowledge and attitude of HCWs on a larger scale to be able to design appropriate interventions. The data collection was done at a concise duration of time, keeping in mind the rapid effect this outbreak on knowledge, practice and psychology of dental health practitioners. It may be argued that the attitudes and knowledge of dentists may alter with the emerging research and possible treatment of COVID-19.

5. Conclusion

During this Covid-19 pandemic, whole dental community is in state of uncertainty related to current scenario and shift in paradigm of dental practice. This has undoubtedly caused stress among the dental practitioners around the globe. Female practitioners perceived more stress than males, while young practitioners reported more stress when compared to experienced ones. The awareness among population related to the mode of transmission and current guidelines of preventive measures was satisfactory. However, there was increased anxiety among themselves of getting infection from dental setting and carrying it to family. They were not afraid of getting quarantined and increased cost of treatment. It is required to address the mental health issues of practitioners, by keeping them informed and recommendations be made regarding patient's management approaches. Central as well as regional associations need to conduct exercises pertaining to the current situation and make practitioners ready for the future course.

6. Source of Funding

None.

7. Conflict of Interest

None.

References

1. WHO Director-General. WHO Director-General's opening remarks at the media briefing on COVID-19: 11; 2020. Available from: <https://www.who.int/director-general/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020>.
2. Chan JF, Yuan S, Kok KH, To KK, Chu H, J Y. A familial cluster of pneumonia associated with the 2019 novel coronavirus indicating person-to-person transmission: a study of a family cluster. *Lancet*. 2020;395(10223):514-23. doi:10.1016/S0140-6736(20)30154-9.
3. Doremalen NV, Bushmaker T, Morris DH, Holbrook MG, Gamble A, Williamson BN, et al. Aerosol and surface stability of SARS-CoV-2 as compared with SARS-CoV-1. *Engl J Med*. 2020;382(16):1564-71. doi:10.1056/NEJMc2004973.
4. Meng L, Hua F, Bian Z. Coronavirus disease 2019 (COVID-19): emerging and future challenges for dental and oral medicine. *J Dent Res*. 2020;99(5):481-7. doi:10.1177/0022034520914246.
5. Centers for Disease Control and Prevention. 2020 Mar 27. CDC recommendation: postpone non-urgent dental procedures, surgeries, ; 2020. Available from: <https://www.cdc.gov/oralhealth/infectioncontrol/statement-COVID.html>.
6. The American Dental Association. 2020 Mar 27. Coronavirus frequently asked questions ; 2020. Available from: <https://success.ada.org/en/practice-management/patients/coronavirus-frequently-askedquestions>.
7. List of Emergency and Urgent Dental Procedures; 2019. Available from: <https://www.mohfw.gov.in/pdf/DentalAdvisoryF.pdf>.
8. Atkinson JM, Millar K, Kay EJ, Blinkhorn AS. Stress in dental practice. *Dent Update*. 1991;18(2):60-4.
9. Ahmed MA, Jouhar R, Ahmed N, Aftab AS, Zafar M, S M. Fear and practice modifications among dentists to combat novel coronavirus disease (COVID-19) outbreak. *Int J Environ Res Public Health*. 2020;17(8):2821. doi:10.3390/ijerph17082821.
10. Park K. Park's textbook of preventive and social medicine; 2015. Available from: <https://www.amazon.in/Parks-textbook-preventive-social-medicine/dp/B07P9J4FRC>.
11. 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 Psychiatry*. 2020;51:102083. doi:10.1016/j.ajp.2020.102083.
12. Centres for Disease Control and Prevention. Guidance for Dental Settings Interim Infection Prevention and Control Guidance for Dental Settings During the COVID-19 Response; 2019. Available from: <https://www.cdc.gov/coronavirus/2019-ncov/hcp/dental-settings.html>.
13. Cohen S, Kamarck T, Mermelstein R. A global measure of perceived stress. *J Health Social Behav*. 1983;24(4):385-96. doi:10.2307/2136404.
14. Synodinos NE. The "art" of questionnaire construction: some important considerations for manufacturing studies. *Integrated manufacturing systems*. *Integr Manufacturing Syst*. 2003;14(3):221-37.
15. 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*. 2020;12(3):1-6.
16. CDC recommendation: postpone non-urgent dental procedures, surgeries, and visits Centers for Disease Control and Prevention; 2020. Available from: <https://www.cdc.gov/oralhealth/infectioncontrol/statement-COVID.html>.
17. Clinical management of severe acute respiratory infection (SARI) when COVID-19 disease is suspected: interim guidance; 2020. Available from: <https://apps.who.int/iris/handle/10665/331446>.
18. Nemati M, Ebrahimi B, Nemati F. Assessment of Iranian nurses' knowledge and anxiety toward COVID-19 during the current outbreak

- in Iran. *Archives of Clinical Infectious Diseases*. 2020;15:19. doi:10.5812/archcid.102848.
19. Huynh G, Nguyen TN, Vo KN, Pham LA. Knowledge and attitude toward COVID-19 among healthcare workers at District 2 Hospital. *Asian Pac J Trop Med*. 2020;13(6):260–5. doi:10.4103/1995-7645.280396.
 20. Wang D, Hu B, Hu C, Zhu F, Liu X, Zhang J. Clinical characteristics of 138 hospitalized patients with 2019 novel coronavirus-infected pneumonia in Wuhan. *JAMA*. 2020;323(11):1061–9.
 21. Shacham M, Hamama-Raz Y, Kolerman R, Mijiritsky O, Ben-Ezra M, Mijiritsky E. COVID-19 factors and psychological factors associated with elevated psychological distress among dentists and dental hygienists in Israel. *Int J Environ Res Public Health*. 2020;17(8):2900. doi:10.3390/ijerph17082900.
 22. Huang Y, Zhao N. Generalized anxiety disorder, depressive symptoms and sleep quality during COVID-19 outbreak in China: a web-based cross-sectional survey. *Psychiatry Res*. 2020;288:112954. doi:10.1016/j.psychres.2020.112954.
 23. Meng L, Hua F, Bian Z. Coronavirus disease 2019 (COVID-19): Emerging and Future Challenges for Dental and Oral Medicine. *J Dent Res*. 2020;99(5):481–7. doi:10.1177/0022034520914246.
 24. Guidelines on the measures to be taken by ministries/ departments of Government of India, State/ Union territory governments for containment of COVID-19 epidemic in the country; 2020. Available from: https://www.mohfw.gov.in/pdf/Annexure_MHA.pdf.
 25. Madarati A, Abid S, Tamimi F, Ezzi A, Sammani A, Shaar M. Dental-Dam for Infection Control and Patient Safety during Clinical Endodontic Treatment: Preferences of Dental Patients. *Int J Environ Res Public Health*. 2012;15:9. doi:10.3390/ijerph15092012.
 26. Doremalen NV, Bushmaker T, Morris DH, Holbrook MG, Gamble A, Williamson BN. Aerosol and surface stability of SARS-CoV-2 as compared with SARS-CoV-1. *Engl J Med*. 2020;382:1564–7. doi:10.1056/NEJMc2004973.
 27. Streit BN, Mayr V, Dobrescu AI, Chapman A, Persad E, Klerings I. Quarantine alone or in combination with other public health measures to control COVID-19: a rapid review. *Cochrane Database Syst Rev*;8(4):4. doi:10.1002/14651858.CD013574.
 28. Ali K, Tredwin C, Kay E, Slade A. Transition of new dental graduates into practice: a qualitative study. *Eur J Dent Educ*. 2016;20(2):65–72. doi:10.1111/eje.12143.
 29. Davidovich E, Pessov Y, Baniel A, Ram D. Levels of Stress among General Practitioners, Students and Specialists In Pediatric Dentistry during Dental Treatment. *J Clin Pediatr Dent*. 2015;39(5):419–22. doi:10.17796/1053-4628-39.5.419.
 30. Shacham M, Hamama-Raz Y, Kolerman R, Mijiritsky O, Ben-Ezra M, Mijiritsky E. COVID-19 factors and psychological factors associated with elevated psychological distress among dentists and dental hygienists in Israel. *Int J Environ Res Public Health*. 2020;17(8):2900. doi:10.3390/ijerph17082900.

Author biography

Randhir Singh, Dental Officer

Abir Sarkar, Graded specialist,
Prosthodontics and Crown & Bridge

Vaibhav Jain, Graded specialist,
Prosthodontics and Crown & Bridge

Cite this article: Singh R, Sarkar A, Jain V. Assessment of relationship between perceived stress and knowledge among oral health care workers during COVID-19 pandemic: A cross-sectional study. *Int J Oral Health Dent* 2021;7(3):172-179.