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Knowledge, Attitude and Practice of Dental Practitioners towards COVID-19 Situation: A Systematic Review

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ABSTRACT

Background: *COVID-19 has surged up as one of the deadliest crisis across the world and stranded the normal human life bringing it to a standstill. During this crisis, dental professionals, unlike others, have faced difficult times both in terms of delivery of safe dental healthcare and receiving a trustworthy response from the patients.* ***Aims and objectives:*** *This systematic review aims to put forth the knowledge, attitude and practice of dentists during COVID-19, to help government and public bodies devise guidelines if required for the betterment of the situation.* ***Materials and methods:*** *After a thorough literature search of the relevant articles, 6 cross-sectional studies were included in the review.* ***Results:*** *It was observed that highest knowledge proportion (90%) and attitude/awareness proportion (90%) was found in a multinational study, however, the practice and precautionary measures undertaken by the dentists in the study were not satisfactory. Furthermore, despite poor knowledge and not very acceptable level of attitude/awareness among the Turkish and the Jordanian dentists, it was found that they adopted the most acceptable practice/precautionary measures. On the other hand, despite an acceptable level of attitude/awareness of the dentists in the Vidarbha region of Maharashtra, India, toward the COVID-19 situation, they, along with a poor knowledge, exhibited the least acceptable practice/precautionary approaches.* ***Conclusion:*** *The authors of all the studies included in the review reported notable deficiencies in the knowledge, attitude and practice of dentists during COVID-19 and opined that national and international guidelines should be sent by the regional and national dental associations to all registered dentists to deal with the pandemic.*

Keywords: Precautionary measures, Dental associations, Awareness, COVID-19, Knowledge, Attitude and practice

INTRODUCTION

Coronavirus disease (COVID-19) has taken a hold of the mother earth since past many months, terrifically affecting the human life and bringing it to a complete stand still. The presentation and the outcome of the cases affected by COVID-19 have been variable, from mild, at times, even unnoticed symptoms (asymptomatic cases) to severely debilitated and fatal events [1].

The timeline of this catastrophic event dates to 31st December 2019, when the World Health Organization (WHO) was first informed of the cases of "pneumonia of unknown origin" in the Wuhan city of China, followed by the temporarily naming of the disease as "2019-n-CoV" by the Chinese authorities on 7th January 2020. By 30th January

2020, the WHO had to declare the outbreak as a public health emergency of international concern. Furthermore, the WHO named the disease as COVID-19 on 11th February 2020 and the causative virus was named as Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2) by the international committee on taxonomy of viruses [2]. The disease has since then spreading its arms at a dreadfully rapid rate and by 26th July 2020, the number of affected cases has soared to 15,785,641 cases globally, with 640,016 deaths reported till the date [3]. The alarming levels of spread and severity of COVID-19 has proved the disease to be aptly characterized as a pandemic.

Substantial research now backs the routes of transmission of the COVID-19 virus, with respiratory droplets and contact surfaces being the primary amongst them [4-9]. The threat increases by many folds to healthcare personnel, especially dental practitioners, who need to work in settings that generate aerosols. Furthermore, with the possibility of body fluids like blood and saliva being able to carry the viral load the situation worsens for dental practitioners and other healthcare personnel [10-12].

With large number of reports of healthcare professionals acquiring the disease from their workplaces it has become a necessity to analyze the possible deficiencies and loopholes in the knowledge and awareness of the professionals about the COVID-19 situation [13,14]. The relatively prolonged incubation period of the disease 5.1 days or up to 14 days for some cases, before any symptoms can even be detected and the post-infection period make it challenging for the dental practitioners and staff at dental clinics to recognize the existence of COVID-19 infection, increasing the chances of transmission of the disease during these lay periods [15,16]. Thus, it is of utmost importance for dental practitioners to be thorough enough with their knowledge about the potential threats that they and the clinical staff might be exposed to and the necessary precautions to be undertaken in this time of COVID-19 crisis.

LITERATURE REVIEW

The literature on COVID-19 is swelling up fast. Likewise, the literature on the knowledge, attitude and practice of dental practitioners toward COVID-19 is developing and changing rapidly. We attempted to systematically review the existing literature on these aspects and contribute a summative data usable for rapid analysis and inspiration for future research.

Methodology

Protocol and registration: The review protocol was registered in the PROSPERO database with registration number CRD42020191592. This registration was done to avoid duplication of systematic review. This systematic review was in complete adherence with the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines.

Eligibility criteria: The systematic review included studies conducted on knowledge, attitude and practice of dental practitioners regarding the COVID-19. Study selection was based on following inclusion criteria: 1) Studies conducted as cross-sectional, observational and questionnaire based surveys; 2) Studies evaluating the knowledge, attitude and practices of dental practitioners regarding the COVID-19 and 3) Studies published in english language or available as english translation. The exclusion criteria of the systematic review were as follows: 1) Review articles; 2) Studies not evaluating the knowledge, attitude and practices of dental practitioners regarding the COVID-19; 3) Duplicate studies and 4) Unpublished data.

Information sources: The PubMed (*via* MEDLINE) and Google scholar were used as the information sources for our review.

Search strategy: A systematic search was conducted to identify the relevant articles published from January 2020 till May 2020, using the following keywords: COVID-19 or SARS-CoV-2 and knowledge and attitude and practice and dentist.

Article selection: Screening of titles and abstracts of the retrieved articles and selection of the articles relevant to our review were conducted by the authors independently. For articles lacking abstracts, a full-text assessment was performed to include or exclude the articles from our review. Any conflicts among the authors were resolved by discussion and a consensus was reached. Various combinations of key words were also made using “and” and “or” as Boolean operators. We identified 750 papers with these methods. Wherever possible, all terms were included as full text, with truncation used where possible to capture variation in the terminology. Finally, six articles were selected for inclusion in the review.

Data collection and analysis: After the screening of titles and abstracts of the included articles, a careful full-text assessment was performed. In case of doubts that persisted after full-text evaluation, efforts were made to contact the relevant authors for clarification. Two authors (NM and PJ) extracted data independently using a customized data extraction form. Any disagreement was resolved by interaction between the two authors and if required it was resolved by the third author (SG). Reviews were not included, though their reference lists were searched in turn for any studies not retrieved by the electronic search. For the remaining studies, full text articles were recovered that met the inclusion criteria. Selected studies were screened using STROBE checklist for observational cross-sectional studies.

Data extraction form

Contents:

- Title of article
- Author name
- Year of publication
- Journal of publication
- Language of article
- Country of study
- Study design
- Duration of study
- Sample size of study
- Ethical approval acquisition
- Informed consent acquisition
- Details of inclusion and exclusion criteria in the study group
- Knowledge regarding COVID-19 infection
- Attitude regarding COVID-19 infection
- Practice regarding COVID-19 infection

Quality assessment and control of bias assessment: The major aim of quality assessment was to determine the potential for selection bias (eligibility criteria, sampling strategy, sample size, generalizability, etc.). This is especially important in cross-sectional studies that aim to report knowledge and awareness levels. A total of nine domains were assessed. A score of one was given for fulfilling conditions in each domain, 0.5 for partial fulfillment and zero otherwise. The maximum possible score was 9 and a study scoring 6 or more was classified as high quality study and low quality study otherwise. The quality assessment of the studies was done based on guidelines set forth by PRISMA and STROBE checklist. Two of the authors (TG and AS) independently used a predetermined data collection form to extract information on following nine domains: (1) Title of the study, (2) Clear objectives, (3) Study setting, (4) Sample size adequacy, (5) Study design, (6) Eligibility criteria, (7) Sampling strategy, (8) Completeness of reporting information regarding COVID-19 and (9) Discussion of generalizability. Any kind of disagreement regarding article screening and extraction was sorted out by other author (PK). Corresponding authors of selected studies were also contacted through e-mails for obtaining full text of included studies and missing or unclear data whenever deemed essential. When all criteria were met, the overall plausible risk of bias was estimated as low.

RESULTS

Study selection and characteristics: A total of 750 articles were identified through screening databases PubMed *via* MEDLINE (n=8) and Google Scholar (n=742). After removal of duplicates, 742 articles were screened for titles and abstracts. Of these, 18 relevant full-text articles were assessed, six of which were finally included in the review (Figure 1). Twelve studies were excluded with reasons listed in Table 1. Among the six included articles, three each were retrieved from the PubMed database and the Google scholar (Table 2).

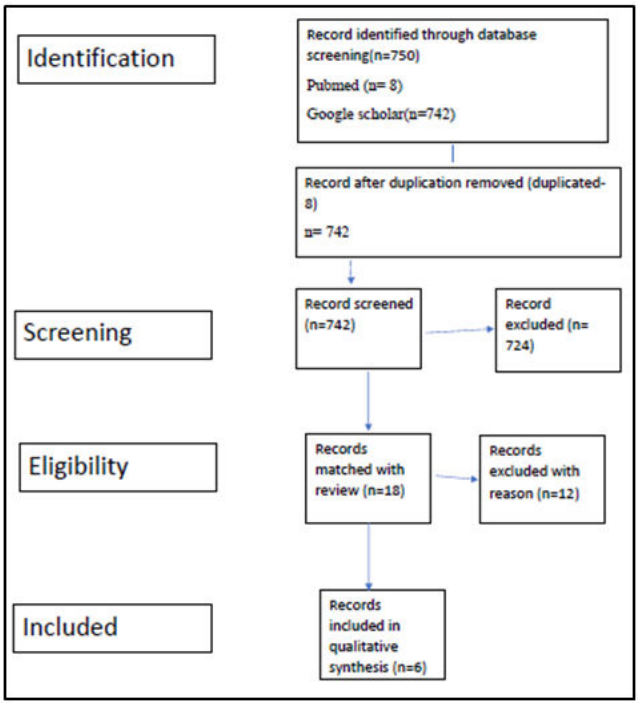

Figure 1 Study selection algorithm

Table 1 Excluded studies with the reasons for exclusion

Sr. no	Reason	Studies
1	Unpublished data	Khan AM, et al.
2	Evaluation of anxiety	Ahmed MA
3	Evaluation of mental health	Shacham M, et al.
4	Evaluation of mental health and objective was not clear	Consolo U, et al.
5	Pilot study	Ahmed EF, et al.
6	Study including interns, dental auxiliaries	Quadri MF, et al.
7	No Questionnaire mentioned and study included interns	Indu M, et al.
8	Unpublished data	Kinariwala N, et al.
9	Questionnaire not designed properly	De Stefani A, et al.
10	Letter to editor	Zhao B, et al.
11	Unpublished data	Putrino A, et al.
12	Study involved under graduate students	Almohaimede AA, et al.

Table 2 Search results from databases.

Database	Results	Selected
PubMed	8	3
Google Scholar	742	3

Risk of bias in the included studies: The risk of bias was evaluated using the cochrane collaboration's risk of bias tool.

Description of included literature

Cross-sectional studies: All the studies included were cross-sectional studies. Khader included 368 dentists aged 22-73 years in their study, of which, 112 (30.4%) dentists had completed a master or residency program in dentistry, 195 (53.0%) had received training in infection control in dentistry and 28 (7.6%) had attended training or lectures regarding COVID-19. Although, most dentists were aware of COVID-19 symptoms and ways of identifying patients at risk, modes of transmission of the disease and measures for preventing transmission in dental clinics, only 133 (36.1%) of them knew that the incubation period for the disease was 1-14 days. However, a large proportion of them (74.7%) believed it necessary to ask patients to sit away from each other, wear masks while in the waiting room and wash hands before getting in the dental chair to decrease disease transmission. The authors thus concluded that Jordanian dentists were aware of COVID-19 symptoms, mode of transmission and infection control measures in dental clinics, however, had limited comprehension of the extra precautionary measures needed to protect the dental staff and other patients from COVID-19 [17].

Waghmare R, in their study on 173 dental health professionals, found that about 72.8% of them were aware that COVID-19 spreads through direct transmission, contact transmission and aerosols and 43.9% of them agreed that it can spread only by the secretion of the infected patients. Also, 42.8% of them strongly agreed that mask should be changed in every 8 hours and 69.4% of them agreed that washing hands or using alcohol based sanitizer before and after screening should be recommended. The authors concluded that most of the study participants exhibited preparedness for future regarding COVID-19 spread and were ready to take necessary preventive measures [18].

Gambhir R assessed knowledge, awareness and hygiene practices regarding COVID-19 among 215 private dental practitioners practicing in Tricity (Chandigarh, Panchkula and Mohali) in India and found that 87% of them correctly knew the symptoms of COVID-19 and 82.5% of them knew the primary mode of transmission of the disease. However, one-third of them were not aware about Personal Protective Equipment (PPE) to be used while rendering dental treatment. It was found that less than one-third of the subjects (30.2%) reported high knowledge scores and education level and health sector profile of the subjects were significantly associated with the mean scores [19].

Duruk G investigated the kind of precautions 1,958 Turkish dentists took in dental clinics during the COVID-19 pandemic. Of the dentists included, 1,274 (65.1%) were general dentists and 684 (34.9%) were specialists. Of these dentists, 69.8% were aware of COVID-19 according to their self-assessed knowledge scores, however, only 26.7% of them attended an informational meeting on COVID-19. Moreover, although more than 90% of them were concerned about themselves and their families, only 12% wore an N95 mask. Thus, the authors found that although Turkish dentists took few precautionary measures, they did not take enough precautions to protect themselves, the dental staff and other patients from COVID-19 [20].

Cagetti M conducted a study among 3,599 dentists in Lombardy, Italy, of which, 502 participants had suffered one or more symptoms referable to COVID-19, 31 were positive to the virus SARS-CoV-2 and 16 developed the disease. Surprisingly, only 2% of them were confident of avoiding infection; though, dentists working in low COVID-19 prevalence areas were more confident than those working in the Milan area and high prevalence area. The level of awareness was statistically significantly higher in the Milan area than in the other areas. Thus, the survey by these authors added the fact that dentists in the COVID-19 highest prevalence area, albeit reported to have more symptoms/signs than the rest of the sample, were the ones who adopted several precautionary measures less frequently and were the more confident of avoiding infection [21].

Kamate S collected 860 responses from various continents (Asia, Americas-North and South, Europe, Africa and other Australia and Antarctica) toward similar objectives and the largest number of responses came from the Asian continent (30.7%), with most dentists holding a master's degree (35.0%), followed by the ones holding a bachelor's degree (32.8%) and DDS (Doctor of Dental Surgery) (26.3%). High/good knowledge and practice scores were

observed among 92.7% and 79.5% of the dentists, respectively. The good knowledge scores were significantly associated with qualifications and years of practice; while, the good practice scores were associated with qualifications only. The authors thus found that the dentists had good knowledge and practice scores, crucial to combat COVID-19 [22].

Comparative analysis of knowledge among the dental professionals about the COVID-19: Upon a comparative analysis of all the studies included in the systematic review, it was found that the maximum knowledge proportion (90%) was found in the study conducted by Kamate S, while the lowest was found in the studies conducted by Duruk G (33%) and Waghmare R (30%) (Figure 2).

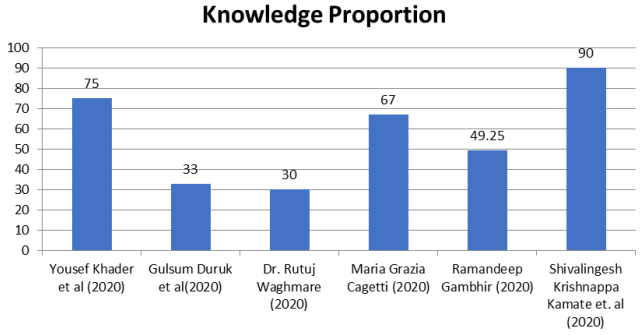

Figure 2 Comparison of knowledge of dentists about COVID-19 among all the studies

Comparative analysis of attitudes/awareness of dental professionals toward the COVID-19: Upon a comparative analysis of all the studies included in the systematic review, it was found that the maximum attitude/ awareness proportion (90%) was found in the study conducted by Gambhir R, followed by Kamate S (80%) and an almost equal proportion in the studies conducted by Waghmare R (73%), Cagetti M (72%) and Duruk G (70%); the least was found in the study conducted by Khader Y (36.1%).

Comparative analysis of practice/precautionary approaches among dental professionals during the COVID-19 crisis: On a comparative analysis of all the studies included in the systematic review, it was found that best practice and precautionary approaches were adopted by the professionals in the study conduct by Duruk G (90%) and Khader Y (88%), followed by those in the study conducted by Kamate S (79%). The lowest proportion of the practice and precautionary approaches were found in the study conducted by Waghmare R (19.68%) (Figure 3).

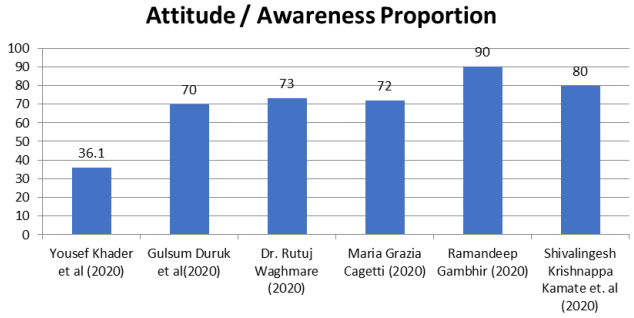

Figure 3 Comparison of attitude of dentists toward COVID-19 among all the studies

DISCUSSION

The focus of the present systematic review was on the knowledge, attitude and practice of dental professionals during the alarming COVID-19 crisis. The review utilized various parameters to provide systematic information on the approach of dental professionals toward COVID-19. All the six studies included in this review were questionnaire-based studies and were conducted among dental professionals. However, the educational level of the dental professionals varied among the studies from undergraduate dental students and dental auxiliaries to postgraduate private practitioners. Likewise, the geographical areas of the studies varied widely. From a multinational perspective, as reflected in the study conducted by Kamate S, it was found that the knowledge and attitude was quite acceptably good among the dental professionals. On the other hand, it was found that dental

professionals from Turkey and the Vidarbha region in India had a poor knowledge about the disease, however, having an acceptable attitude/awareness towards the crisis. Likewise, it was found that although the dental professionals from the Tricity of India had a poor knowledge about COVID-19, their attitude/awareness towards it was quite acceptable.

Surprisingly, despite poor knowledge and not very acceptable level of attitude/awareness among the Turkish and the Jordanian dentists, it was found that they adopted the most acceptable practice/precautionary measures. On the other hand, despite an acceptable level of attitude/awareness of the dentists in the Vidarbha region of Maharashtra, India, toward the COVID-19 situation, they, along with a poor knowledge, exhibited the least acceptable practice/ precautionary approaches.

Overviewing the data, it was found that results of the multinational study were far better than studies that involved populations of dental practitioners from a limited geographical area.

In all the studies, the authors reported notable deficiencies in the concerned areas and opined that national and international guidelines should be sent by the regional and national dental associations to all registered dentists during a crisis, including the COVID-19 pandemic, to make sure that dentists are well informed and aware of best practices and recommended disease management approaches. Furthermore, the authors strongly proposed that the dentists be advised to follow the Centers of Disease Control and Prevention and World Health Organization guidelines in their clinics and sensitize their staff so that no stone is left unturned in defeating this pandemic (Figure 4).

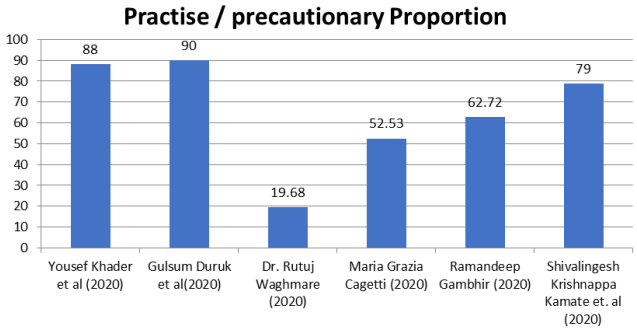

Figure 4 Comparison of practice of dentists during COVID-19 among all the studies

This systematic review had certain limitations. The review included studies conducted in different geographical areas, at different times and by different researchers. Therefore, the generalizability may be inaccurate. Moreover, the review could discuss and compare only the aspects regarding the knowledge, attitude and practices of dental professionals during COVID-19 that were common in all the included studies, as it was not practically possible and justifiable to discuss and compare dissimilar characteristics of every study. Moreover, the educational level of the study population was not uniform, which could have been a reasonable justification for the differences found in the knowledge, attitude and practice approaches among the populations. Furthermore, this systematic review was conducted on a burning topic, i.e. COVID-19, that came into picture in the recent past and thus, not enough data was available to be searched for the relevant literature. Moreover, there is a possibility of not including the studies or literature that are still under consideration for publication or yet to be published and be accessible. This could have accounted for some publication bias and any important information might have been undoubtedly overlooked.

CONCLUSION

The results of the present review showed that knowledge and awareness level of dental professionals toward COVID-19, when seen from a global perspective are quite acceptable, however, at the ground level or in restricted geographical areas, the scores are not very acceptable. Awareness and educational programs are needed to be conducted for dental professionals of every educational grade and their practice and precautionary approaches need to be monitored and modified if required. We recommend more similar studies in different states and geographical areas for future decision-making by the government and private bodies at improving the safety of dental healthcare delivery and controlling the spread of this devastating COVID-19.

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