
DENTAL PROFESSIONALS KNOWLEDGE, ATTITUDE, AND PRACTICE TOWARDS TO COVID-19: SYSTEMATIC REVIEW AND META-ANALYSIS

Amare Teshome^{1*}, Kirubel Derese¹, Biruk Girma¹, Aynishet Adane², Anteneh Ayelign³, Hailu Aragie³, Sileshi Ayhualem³, Yonas Akalu⁴, Meseret Derbew⁵, Abebe Muche³

¹ Department of Dentistry, School of Medicine, College of Medicine and Health, science, University of Gondar, Gondar, Ethiopia.

² Department of Internal Medicine, School of Medicine, College of Medicine and Health, science, University of Gondar, Gondar, Ethiopia

³. Department of Anatomy, School of Medicine, College of Medicine and Health, science, University of Gondar, Gondar, Ethiopia.

⁴ Department of Physiology, School of Medicine, College of Medicine and Health, science, University of Gondar, Gondar, Ethiopia.

⁵ Department of Biochemistry, School of Medicine, College of Medicine and Health, science, University of Gondar, Gondar, Ethiopia.

Correspondence

Amare Teshome; Associate Professor of Dentistry, Department of Dentistry, School of Medicine, College of Medicine and Health Science, University of Gondar, Gondar, Ethiopia.

Email: teferaden@gmail.com

Tel: +251-910-517002

Abstract

Background: Dental professions are at high risk of contracting novel corona virus (COVID-19) infections during the dental procedure due to the droplets and aerosols generated during various dental procedures on infected patients. To prevent and avoid the cross-infection of the infection to dental professionals or the patients attending the dental clinic, good knowledge of the infection and its prevention mechanisms is mandatory among the professionals. Until to date, there is no pooled estimate on the knowledge,attitude and practice (KAP) of dental professionals

to COVID-19 in the globe. Hence, this study aimed to determine the pooled estimate of KAP of dental professionals in this pandemic disease.

Methods: Article search was done electronically using Medline, Scopus, Web of Science, EMBASE, SciELO and Google Scholar from June 1, 2020 to August 20, 2020. All studies that assessed the KAP of dental professionals to COVID-19 were searched and included in this review after passing the inclusion criteria. The pooled analysis of their knowledge (sign and symptom, mode of transmission and prevention mechanisms), attitude (their concern, intention to treat suspected patients) and practice (face mask usage, hand washing and alcohol based hand rub usage, handshaking practice, deferred procedures and checkup of patients temperature) was computed using RevMan 5.3 and random effect model was used. The presence of publication bias was assessed using the funnel plot.

Results: Twelve articles with a total of 5,362 study participants were included in this study. The pooled estimate revealed that 59.91% of the dental professionals had good knowledge of the signs and symptoms of COVID-19. Two-third of dental professionals know the prevention mechanisms of the infection, and 70.13% had enough knowledge of the transmission modalities of the infection. The professional attitude revealed that only 36.43% of the participants had intention to treat a patient with cough or suspected COVID-19 (36.43%, 95%CI: 8.57, 64.29). Moreover, 47.85% of the dentists were concerned about their life, and the fate of their profession due to this pandemic disease (47.85%, 95%CI: 26.74, 68.97). The pooled analysis showed only 50.86% (95%CI: 18.64, 83.09) of the study participants worn face mask and 52.63% (95%CI: 10.54, 94.71) had avoided handshaking practice during this pandemic period. Non-emergency dental procedures were canceled by 83.98%.

Conclusion: The dental professional KAP is not optimal. Thus, dental professionals should be aware of the recently updated knowledge about COVID-19 and practice according to the standards of treatment guidelines, and the recommended infection control measures in dental settings. Moreover, as saliva and droplets are the major sources of infection, dentists should follow essential protocols to regulate droplet and aerosol contamination in the dental practice.

Keywords: KAP; Dental professionals; COVID-19; Pandemic; risk of infection, SARS-CoV-2

Background

The novel coronavirus (COVID-19) was first observed in the city of Wuhan, China in December 2019, and become a global public health problem, promoting the world health organization (WHO) to declare it as a pandemic disease on March 11, 2020(1,2). The newly occurred virus was initially named “new coronavirus” (nCoV) (3), and finally, the pathogen has been called SARS-CoV-2 (3,4).

The virus is transmitted from human to human through air droplets of the respiratory secretions from the infected patients and direct contact with contaminated surfaces or individuals (5). COVID-19 can live on the surface of materials or skin for a few hours to days (6). Even if peoples of all age groups are affected by this infectious disease, individuals who are in close contact with COVID-19 patients, health care staff, and other patients in hospitals are at higher

risk of acquiring the infection(7). Due to the nature of the dental treatment, procedures that produce aerosols and flashes that containing a large amount of blood and saliva from the patients increase the risk of transmission of the virus to the dentist(8). Dentists may be unknowingly providing direct dental care to infected patients that are not yet diagnosed COVID-19 or considered to be suspected cases for surveillance(9).

Many ongoing clinical trials are going to search the vaccine for this fatal virus since its occurrence. However, there is no confirmed antiviral drug or vaccine to date. As a matter of fact, preventive measures such as; applying a face mask, hand washing, maintain social distance, and several other measures were applied by WHO and different countries in the world(10,11). The disease is managed with a symptomatic treatment such as analgesics and antipyretics and supportive care. Avoiding exposure to the virus is the best prevention (12).

A meta-analysis done on the knowledge, attitude and practice (KAP) of participants towards COVID-19 revealed 46% (95%CI: 15, 77) of the participants had positive perceptions towards COVID-19. More than half of the health care workers (56.6%, 95%CI: 45.9-67%) had poor knowledge about COVID-19(13). A clinical audit done in hospitalized patients with COVID-19 in China found that 29% of the cases were health care workers(14).

Health care professionals, including nurses, physicians, Dentists, and other hospital staffs are playing a critical role in combating, preventing, and managing patients affected by COVID-19(12). In the last months, multiple reports of COVID-19 infection have been reported throughout the globe, which is of grave concern(12). Of the total health care workers death report 8% were dentists (15). Due to the reported infection rates, it was hypothesized that the KAP of healthcare professionals towards COVID-19 will be poor. To decrease COVID-19 infection among the health care professional, the first step should be to increase their KAP to the infection. Therefore the present systematic review and meta-analysis focused to estimate the pooled effect on KAP of dental professionals on COVID-19.

METHODS

This systematic review and meta-analysis were conducted according to the preferred reporting items for systematic review and meta-analysis guidelines (PRISMA) (16).

INCLUSION AND EXCLUSION CRITERIA

Studies, which meet the following inclusion criteria, would be included in the study;

- **Populations:** Dental professionals involved in the studies conducted to assess the KAP of them towards to COVID-19
- **Study design:** all types of observational studies that assess the KAP of dental professionals to COVID-19
- **Outcome:** the outcome of the studies would be knowledge, attitude, and practice of dental professionals to COVID-19
- **Language:** There was no language barrier

DATA SOURCE AND SEARCH STRATEGY

Article search was done using five databases (Medline, Scopus, Web of Science databases, EMBASE, SciELO) and manual search with Google scholar to explore all relevant studies that assessed the KAP of dental professionals on COVID-19 from June 1, 2020, to August 20, 2020. The following key terms were used to search all the relevant articles; KAP of dental professionals to COVID-19, perception of dental professionals to COVID-19.

ARTICLE SELECTION

Five authors (KD, BG, AT, AA and AM) searched the studies electronically using four databases and manually using Google scholar. Papers identified in the initial article search were exported to Endnote and duplicates were removed by one reviewer (AT). After the duplicates were removed, the remaining articles were screened based on the abstract and titles and then, the full text of the screened articles was evaluated thoroughly and papers that didn't meet the inclusion criteria would be excluded from the study. Finally, eligibility and availability of all the necessary data were evaluated by two reviewers independently. Any disagreement between these two reviewers was solved by the involvement of a 3rd reviewer.

DATA EXTRACTION

All relevant data were extracted by three reviewers using the pre-designed checklist. The following variables would be extracted from the selected articles; first author's name, study country, study year, study design, sample size, qualification, experience, and the outcome of the study (knowledge, attitude, and practice).

RISK OF BIAS ASSESSMENT

The quality of the included studies was assessed using the Joanna Briggs institute reviewers manual (JBI) tools for a systematic review of prevalence and incidence studies (17). Two reviewers critically appraised the quality of the studies based on sample representativeness, participants recruitment, sample size estimation, reliability of the measurement, and the analysis of the outcomes. Accordingly, articles were given scores and the studies that scored 7 and 8 were considered as very good quality, 4-6 as good, and below four were designed as poor quality. All studies with a quality of >50% would be included in the review.

STATISTICAL ANALYSIS

The primary outcome of the study was the KAP of dental professionals towards COVID-19. The pooled analysis was done using RevMan 5.3 software. The heterogeneity between the selected articles was assessed using the I^2 test. Moreover, the publication bias was evaluated using the funnel plot.

RESULTS

Article Search

A total of 53 studies was retrieved from the databases and during a manual search for the analysis. During title and abstract screening for duplicates and non-relevant studies, 27 articles excluded. Twenty six articles were screened for full text review and 14 studies were excluded as they did not meet the inclusion criteria. Finally, 12 studies meet the inclusion criteria and included in the systematic review and meta-analysis (**Figure 1**).

STUDY CHARACTERISTICS

All the selected 12 studies in this review were cross-sectional studies collected using online questionnaires' and self-administered questionnaire conducted in India (18–23), Italy (24), Pakistan (25), Saudi Arabia(26), Jordan(27) and Turkey(28). The sample size of the studies ranged from 132(20) to 1128 (21) dental professionals. The main characteristics of the selected studies are summarized in table 1.

RESULTS OF INDIVIDUAL STUDIES

The study includes dental, dental students, general dental practitioners and dental specialists both in governmental and private practice. A total of 5,362 study participants was involved in the studies included in this systematic review and meta-analysis.

A cross-sectional study done in Turkey on dental students on their KAP to COVID-19 revealed that 45% had enough knowledge of the spread and the protection mechanism of the infection. While only 35.2% of them have intention to treat the Covid patient. The study also showed only 40.5% of the study participants had trust on personal protective equipments on dental procedures(28). A similar study in India on Dentists found only 29.9% of the dental professionals had higher knowledge(23).

Singh and his colleagues revealed that the use of face masks among the dental professionals in India was very low (7.56%) and only 13.2% of the participants practiced frequent hand washing practice. Moreover, 13.3% of the study participants applied stay at home practice during the pandemic(21). Putrino, in Italy, found 50.5% of dental professionals are concerned about COVID-19 and 69% of them took safety and prevention measures. However, only 26% of the study participants applied all safety measures(24) (table 1).

Risk of Bias within Studies

The quality of the included studies for the systematic review and meta-analysis was assessed by JBI critical appraisal checklist and studies with a quality assessment score of 50% and above were included in the review(Table 2).

STUDY RESULTS AND META-ANALYSIS

Dental professional's knowledge about COVID-19

This pooled analysis tried to show the knowledge of dental professionals to the mode of transmission, sign and symptoms and prevention mechanism of the infection. The pooled analysis showed that dental professional knowledge of the prevention mechanisms of COVID-19 was 64.37% (95%CI: 44.14, 84.61; $p < 0.00001$) with a heterogeneity of (I^2) 100% (**Figure 2**). Moreover, 59.91% of the study participants had good knowledge of the sign and symptoms of the infection (59.91%, 95%CI: 32.32, 87.51) (**Figure 3**). The participants' knowledge of the mode of transmission was 70.13 % (40.51, 99.75; $P < 0.00001$) (**Figure 4**).

Attitude of dental professionals to COVID-19

The study showed only 36.43% of the dental professionals involved have intention to treat a patient with cough or suspected COVID-19 (36.43%, 95%CI: 8.57, 64.29) (**Figure 5**). Almost

half of the study participants were bothered by the pandemic of the infection and the fate of their profession (47.85%, 95%CI: 26.74, 68.97; $P<0.00001$) (**Figure 6**). The study also revealed that 70.41% of the study participants fear the risk of acquiring infection during dental procedures (**Figure 7**).

Practice of dental professionals during COVID-19

The pooled estimate revealed that 50.86% of the study participants had worn face mask during their dental procedure (50.86, 95%CI: 18.64, 83.09, $P=0.002$) (**Figure 8**) and 52.63% had avoided handshaking practice during this pandemic period (52.63, 95%CI: 10.54, 94.71) (**Figure 9**). Moreover, 46.62% (95%CI: 1.99, 91.26; $P=0.04$) of the dental professionals checked their patient's body temperature in the triage office (**Figure 10**), and 83.98% of them deferred patients suspected of COVID-19 or had a cough (83.98, 95%CI: 69.30, 98.66; $P<0.00001$) (**Figure 11**). Besides, 62.82% of the study participants washed their hand after each procedure (**Figure 12**). The funnel plot demonstrated there was no publication bias in any of the 12 studies analyzed (**Figure 13**).

DISCUSSION

This review aimed to assess the KAP of dental professionals towards COVID-19. To the best of our knowledge, this is the first systematic review and meta-analysis on the topic.

A present meta-analysis on the KAP of health professionals on COVID-19 showed more than half of (56.6% (95%CI: 45.9-67%)) the health care workers (HCWs) had poor knowledge about COVID-19(13). This study supports the present meta-analysis of KAP of dental professionals to COVID-19 where 59.91% of the participants had good knowledge of the sign and symptoms of COVID-19 infections and 70.13% had good knowledge of the mode of transmission of the infection. Two-third of the study participants had enough knowledge of prevention mechanisms of COVID-19.

This review showed that 62.82% of the dental professionals practiced handwashing and alcohol based hand rub after each procedure, which is low compared with a finding on health care professionals (81.7%)(13). Moreover, only 50.86% (95%CI: 18.64, 83.09) of the dental professional's worn facemask in their daily activity which is lower compared with the previous study (73.4%)(13).

The raised number of COVID-19 cases affects the health system and the availability of dental care has been unprecedented. As the climax of the pandemic, 80% of dental professionals offered limited emergency services and 17% didn't give the dental service at all (29). A similar result was found in the present analysis where 83.98% of the professionals deferred non-emergency dental procedures (95%CI: 69.30, 98.66), and only 36.43% of the participants had the intention to treat suspected COVID-19 patients or patients with cough (Es=36.43%, 95%CI: 8.57, 64.29). This service limitation results in a significant economic loss for the dental sector and affects the oral health-related quality of the patients (30).

There is an obvious probability that dental professionals and members of the dental team are having a high risk of contracting and/or transmitting the novel coronavirus infection due to their contact with a high number of patients that require close contact with the patient and also the examination is taken place intra-orally(31–33). The present study found 47.85% (95%CI: 26.74, 68.97) of the study participants were concerned with the pandemic, and 70.41% of dental professionals fear the risk of acquiring COVID-19 infections during dental procedures. Dental professionals should take urgent action to protect the patients and the dental health care team from infection. The American Dental Association (ADA) and Centers for Disease Control and Prevention (CDC) have urged all dental professionals to defer, or at least postpone all elective procedures(34) and timely reassessment of the dental professionals involved in the dental emergencies is necessary(27,35).

CONCLUSION

The KAP of dental professionals is not optimal. Thus, dental professionals should be aware of the recently updated knowledge about COVID-19 and practice according to the standards of treatment guidelines and the recommended infection control measures in dental settings. Moreover, as saliva and droplets are the major sources of infection, dentists should follow nominal management protocols to regulate droplet and aerosol contamination in the dental clinic.

ABBREVIATIONS

- **ADA:** American Dental association
- **CDC:** Centers for Disease Control
- **HCW:** Health care workers

- **JBI:** Joanna Briggs institute
- **KAP:** knowledge, attitude and practice
- **nCoV:** new coronavirus
- **PRISMA:** preferred reporting items for systematic review and meta-analysis
- **WHO:** world health organization

DECLARATIONS

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Availability of data and materials

The data set used and analyzed during this study are available in the main manuscript.

Ethical approval and consent to participate

Not applicable

Consent to publish

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Competing interests

The authors declare that don't have competing interests

Author's contribution

Conception: AT and AM, KD, Database search, AT, KD, BG, AA³, HA,AS,YA and AM: Data extraction and Synthesis AT, BG, AA², MD, KD: Initial manuscript draft: AA²,BG,YA and AM. Critical revision of the manuscript: AT, BG, HA and AA². All authors read and approved the final version of the manuscript for submission.

Authors Details

¹ Department of Dentistry, School of Medicine, College of Medicine and Health, science, University of Gondar, Gondar, Ethiopia.

² Department of Internal Medicine, School of Medicine, College of Medicine and Health, science, University of Gondar, Gondar, Ethiopia

³. Department of Anatomy, School of Medicine, College of Medicine and Health, science, University of Gondar, Gondar, Ethiopia.

⁴ Department of Physiology, School of Medicine, College of Medicine and Health, science, University of Gondar, Gondar, Ethiopia.

⁵ Department of Biochemistry, School of Medicine, College of Medicine and Health, science, University of Gondar, Gondar, Ethiopia.

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