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SYSTEMATIC REVIEW

Clinical Dental Care Epidemiology, Prevalence, Symptoms and Routes of Transmission of Coronavirus Disease 19: A Systematic Review of Literature and Meta-Analysis

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ABSTRACT

Objective: To evaluate the epidemiological evidence, symptoms, and transmission routes of Coronavirus Disease 19 for clinical dental care. **Material and Methods:** PubMed, Embase, ISI, Scopus, Medicine have been used to search for articles until October 2020. Therefore, EndNote X9 was used to manage electronic resources. A 95% confidence interval (CI) effect size, random effect model, and the REML method were evaluated. Forty-one articles were found. In the first step of selecting studies, 40 studies were selected to review the abstracts. Finally, six studies were selected. **Results:** The effect size of symptoms of COVID-19 was fever: 92% (ES = 0.92, 95% CI 0.79-1.06), cough: 73% (ES = 0.73, 95% CI 0.59-0.88), headache: 8% (ES = 0.8, 95% CI 0.06-0.22), myalgia 13% (ES = 0.13, 95% CI 0.01-0.27) and nasal congestion 22% (ES = 0.22, 95% CI 0.06-0.39). The following recommendations are appropriate during COVID-19 for dental emergency management: personal protective equipment and hand cleanliness practices, personal protective equipment (PPE), preprocedural mouth rinse, single-use (disposable), cone-beam computed tomography (CBCT) and periapical (PA) radiography, Rubber dam, sodium hypochlorite for root canal irrigation, disinfect inanimate surfaces, ultrasonic scaling instruments and airborne infection isolation. **Conclusion:** Fever should be used as the first sign in the diagnosis; dentists should measure the fever of all patients at the time of arrival and before any procedure and then ask about other symptoms.

Keywords: Dental Care; SARS-CoV-2; Coronavirus; COVID-19.

Introduction

Since the development of the novel 2019 coronavirus infection (2019-nCoV) in Wuhan, China, in December 2019, it has rapidly advanced into a public health crisis and spread to several other countries [1]. Corona Virus Disease (COVID-19) [2] was declared by the World Health Organization (WHO) on February 11, 2020. The previously temporarily named 2019-nCoV has now been renamed severe acute respiratory syndrome coronavirus-2, SARS-CoV-2 [3] by the international committee on virus taxonomy. Reported early studies transmitted from animals to humans, but studies have illustrated through droplets or direct contact, human-to-human transmission of the covid-19 [4,5]. So far, the 2019-nCoV has affected more than 43,150,456 reported cases, according to a new report from the University of Johns Hopkins (JHU) center for science and engineering in systems (CSSE) (October 26, 2020) (Figure1).

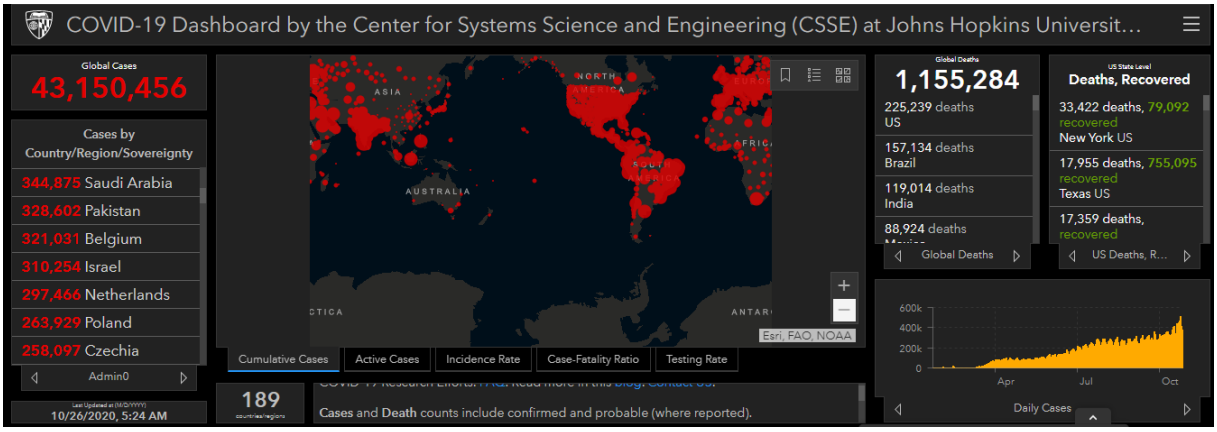

Figure1. Screenshot of global COVID-19 statistics by the Johns Hopkins University (JHU) Center for Systems Science and Engineering (CSSE). https://coronavirus.jhu.edu/map.html.

Dentists are at high risk and may be carriers of the disease, according to several published reports on the health care provided by SARS-CoV-2 [5,6]. Therefore, appropriate measures should be taken to identify, prevent, and manage this crisis [7]. It can attribute these risks to the type of dental intervention. In addition, if not cautious enough, patients will be exposed to contaminants at the dental clinic [8]. Given the global statistics and the fact that this disease is evolving day by day, dental procedures should be aimed at recognizing the symptoms, identifying suspected patients, infected patients, as well as knowledge of epidemiology and how to perform dental procedures to be done. So far, studies have not been conducted to examine the symptoms, how dentists are involved, epidemiology in dental offices, so other studies were used to present the study to evaluate the symptoms and epidemiology in the meta-analysis, so that at least useful solutions for dentists can be provided with better understanding.

The present systematic literature review and meta-analysis aim were to evaluate the epidemiological evidence, symptoms, and transmission routes of Coronavirus Disease 19 for clinical dental care.

Material and Methods

Search Method

The PubMed, Embase, ISI, Scopus, Medicine have been used to search for articles until October 2020. EndNote X9 software used to manage electronic resources. PubMed Searching was performed using mesh terms: ("severe acute respiratory syndrome coronavirus 2" [Supplementary Concept]) OR "COVID-19"

[Supplementary Concept]) AND "Dental Care"[Mesh]) AND ("Epidemiology"[Mesh] OR "epidemiology" [Subheading])) OR "Prevalence"[Mesh]) AND ("Diagnosis"[Mesh] OR "diagnosis" [Subheading] OR "Signs and Symptoms"[Mesh])) AND "Fever"[Mesh]) AND "Cough"[Mesh]) AND "Respiration"[Mesh]) AND "Headache"[Mesh]) AND "Dental Health Services"[Mesh].

The inclusion criteria were randomized controlled trials, controlled clinical trials, prospective and retrospective cohort studies, and cross-sectional studies. In vitro studies, case reports, case studies, and reviews were excluded from the present article.

Quality, Data Extraction and Statistical Analyses Methods

The Newcastle-Ottawa score was used to assess the non-RCT studies included in the present systematic review and meta-analysis [9]. The scale scores for low risk was 1 and for high and unclear risk was 0, scale scores range from 0 to 8, and a higher score means higher quality for data extraction, two reviewers blind and independently extracted data of studies that included. The effect size of symptoms with a confidence interval (CI) of 95%, the random effect model, the REML method were calculated. In order to deal with potential heterogeneity, random effects were used, and I2 showed heterogeneity. I2 values above 50% signified moderate-to-high heterogeneity. The Meta-analysis was evaluated using the statistical software Stata/MP v.16 (The fastest version of Stata).

Results

In the initial search with keywords, 41 articles were found. In the first step of selecting studies, 40 studies were selected to review the abstracts. Then, studies that did not meet the inclusion criteria were excluded from the study. In the second step, the full text of 25 studies was reviewed. Finally, six studies were selected (Figure 2).

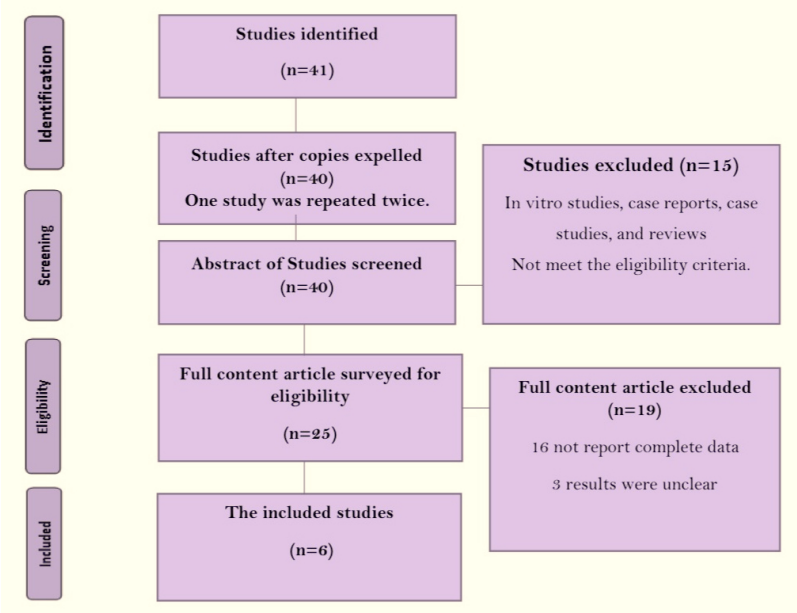

Figure 2. Flow chart.

In various ways, COVID-19 affects various people. Most people are infected with mild to moderate disease and recover without hospitalization. Fever, cough, tiredness, and less common symptoms are the most

common symptoms: pains and aches, diarrhea, sore throat, conjunctivitis, headache, loss of taste or smell, skin rash, or finger toe discoloration. Moreover, most importantly, serious symptoms need special attention: shortness of breath or trouble breathing, pain, or pressure in the chest, lack of voice or movement.

A total of 6 studies were included in the present article, with 437 patients (Table 1). The symptoms of COVID-19 was fever: 92% (ES = 0.92, 95% CI 0.79-1.06), cough: 73% (ES = 0.73, 95% CI 0.59-0.88), headache: 8% (ES = 0.8, 95% CI 0.06-0.22), myalgia 13% (ES = 0.13, 95% CI 0.01-0.27) and nasal congestion 22% (ES = 0.22, 95% CI 0.06-0.39) (Figures 3 to 7).

Table 1. Details of selected studies.

Studies	Study Design	Number of Patients	Case-fatality Ratio	Sex		Mean of Age	Quality Assessment Score
				Male	Female		
Chang et al. [10]	Retrospective	13	0.0%	77.0%	23.0%	34.8	13
Huang et al. [11]	Retrospective	41	14.6%	73.0%	27.0%	49.7	13
Wang et al. [12]	Prospective	138	4.3%	54.3%	45.7%	55.8	13
Chen et al. [13]	Retrospective	99	11.0%	68.0%	32.0%	56.0	12
Liu et al. [14]	Retrospective	137	11.7%	44.5%	55.5%	56.9	10
Zhang et al. [15]	Retrospective	9	0.0%	55.6%	44.4%	36.0	10

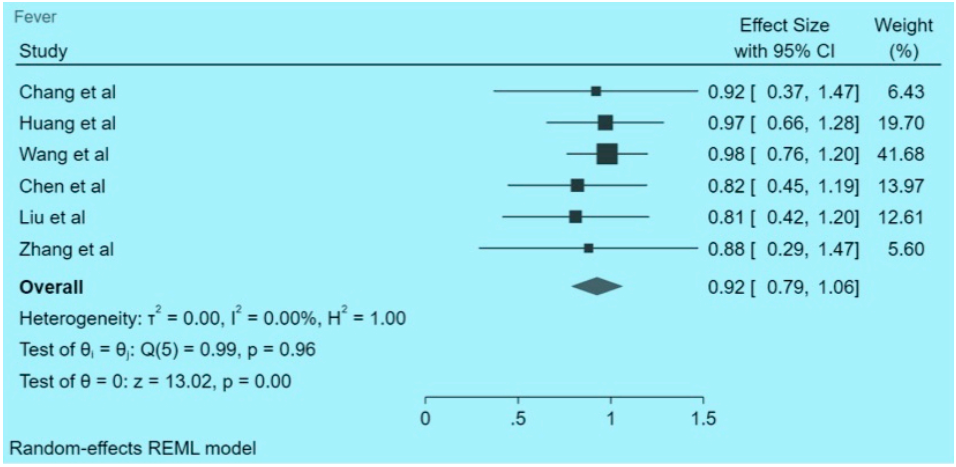

Figure 3. Forest plot showed the effect size of fever. (Effect Size = Mean, Standard Errors).

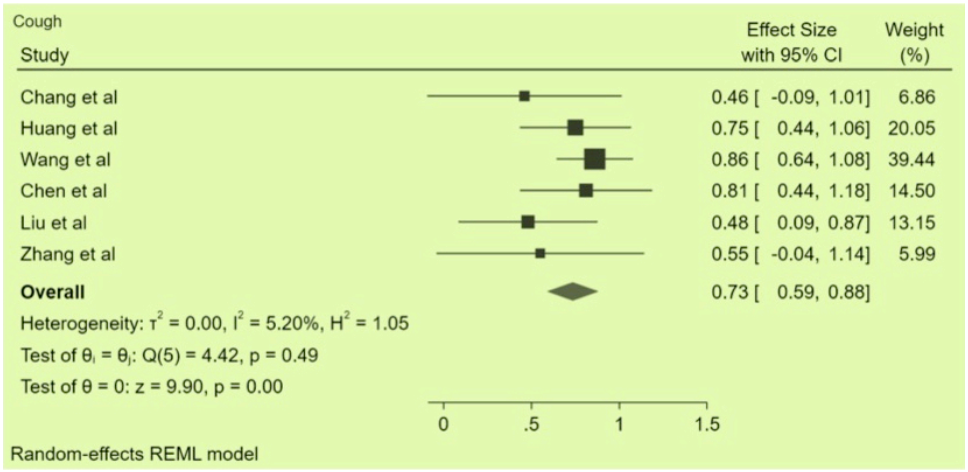

Figure 4. Forest plot showed the effect size of cough. (Effect Size = Mean, Standard Errors).

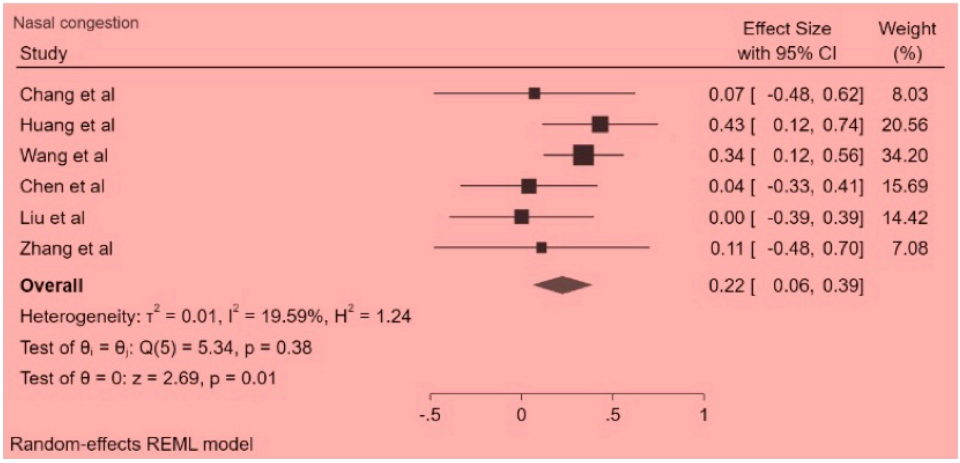

Figure 5. Forest plot showed the effect size of nasal congestion. (Effect Size = Mean, Standard Errors).

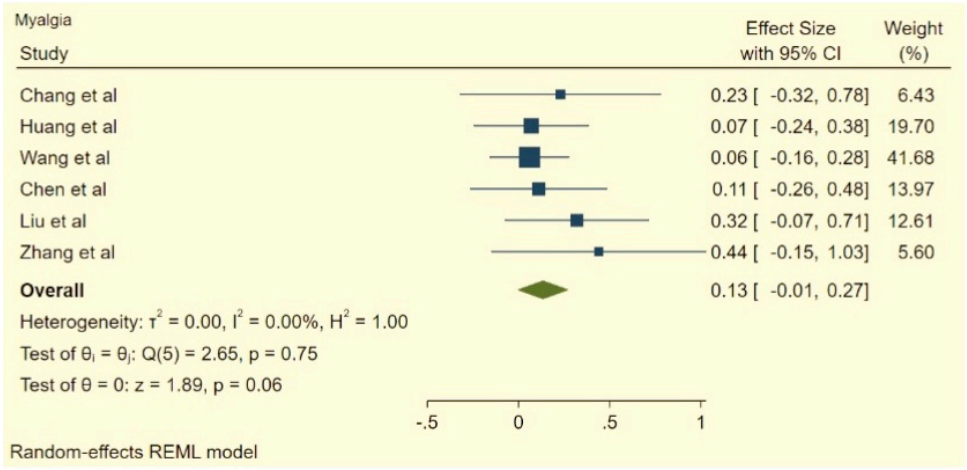

Figure 6. Forest plot showed the effect size of myalgia. (Effect Size = Mean, Standard Errors).

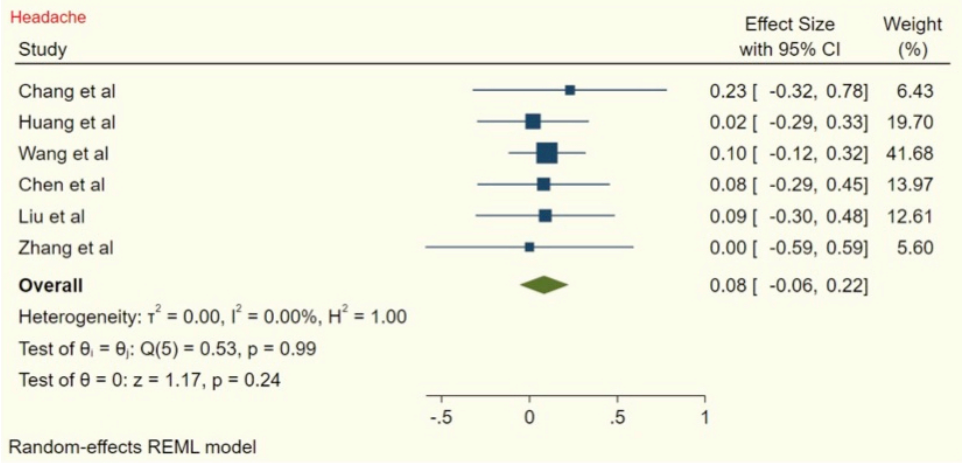

Figure 7. Forest plot showed the effect size of the headache. (Effect Size = Mean, Standard Errors).

A funnel plot showed a publication bias (Figure 8). About 92% of patients have a fever. As a result, patients' fever should be checked in dental care before any procedure, then ask patients for other symptoms. It

should be noted that some patients are carriers and have only mild symptoms (carriers). It takes an average of 5-6 days for a person to get the virus to show symptoms, but it can take up to 14 days.

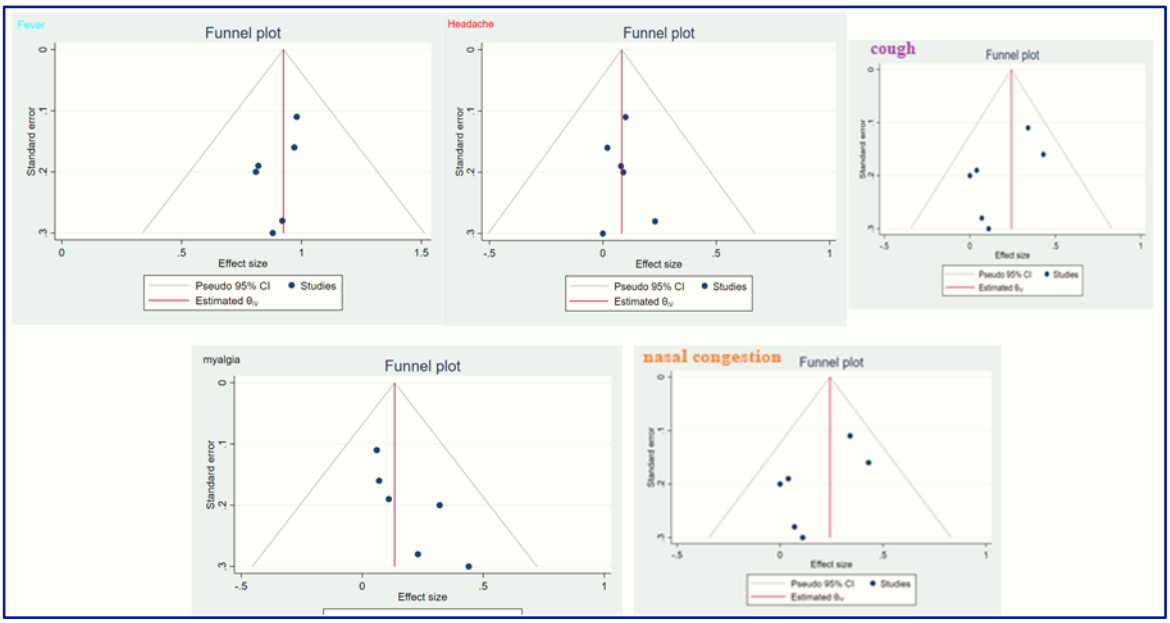

Figure 8. Funnel plot showed the publication bias of studies.

Bias Assessment

According to NOS tools, three studies had a total score of 5/8, two studies had a total score of 4/8, and one study had a total score of 6/8. This outcome showed scores ranged from 6 to 8 were low risk of bias or high quality, and 3 to 5 were moderate risk of bias (Table 2).

Table 2. Risk of bias assessment.

Studies	Selection (4 Scores)	Comparability (1 Score)	Exposure (3 Scores)	Total Score
Chang et al. [10]	1	1	2	4
Huang et al. [11]	1	1	3	5
Wang et al. [12]	1	1	2	4
Chen et al. [13]	2	1	2	5
Liu et al. [14]	1	1	3	5
Zhang et al. [15]	2	1	3	6

Transmission Routes

1) Human to human by respiratory droplets [6,16].
2) Human to human by contact [6,16].
3) Cough or sneezing by a carrier (about 6 ft) [6].
4) Contact with an infected person[16].
5) Salivary particles, aerosol, and fomites [17-19].

According to the mentioned transmission routes, COVID-19 can spread to dental offices. As a result, hands should be washed regularly, all equipment and surfaces should be disinfected regularly, and personal protective equipment and preferably disposable items should be used.

Patient Screening

Identification of suspected patients or carriers of Covid-19:

1) Emergency dental care: using negative pressure rooms or rooms for isolation of airborne infection (AII).
2) Urgent dental care: pharmacological and phone tracking with video treatment.
3) Elective dental care: postpone of treatment for 14 days or/and initial screening via telephone.

Patient Assessment

As soon as the patient is scheduled for dental treatment, a comprehensive medical history, screening questionnaire for COVID-19, and true emergency questionnaire should be completed.

Items of COVID-19 screening questionnaire:

1. You or any household member have traveled through areas with known cases of covid-19 in the past 14 days?
2. Have you or a household member contacted in the past 14 days with a known COVID-19 patient?
3. Have you or any household member has a history of biological martial exposure to COVID-19?
4. Do you have any history of fever over the last 14 days?
5. Did you have any symptoms such as cough, trouble berating, diarrhea, nausea, and body cage, loss of smell, or loss of taste in the last 14 days?
6. Do you have uncontrolled dental or oral plans, infection, bleed ingot trauma, or swelling to your mouth?

Discussion

The present review showed that dentists or dental assistants should examine the patient's condition and fever upon arrival. According to the American Dental Association's recommendations, dentists can decide to provide or delay dental care after seeing the condition of the teeth. In case of an outbreak, dental priority is with emergency treatments [20].

The following recommendations are appropriate during COVID-19 for dental emergency management: personal protective equipment and hand cleanliness practices, personal protective equipment (PPE), preprocedural mouth rinse, single-use (disposable), cone-beam computed tomography (CBCT) and periapical (PA) radiography, rubber dam, sodium hypochlorite for root canal irrigation, disinfect inanimate surfaces, ultrasonic scaling instruments, and airborne infection isolation. Global precautions should be taken to minimize the prevalence of COVID-19.

Also, the precautionary measures examined in this study should be taken by dentists to prevent infection. Endodontists are in a special position as they can be called for in suspected or known patients with COVID-19 to treat and manage severe odontogenic pain, swelling, and dental alveolar trauma [21,22].

Dentists need to consider each patient as a carrier and take all patient precautions. Adequate training should be given to dentists and all persons involved in dental care. Also, by educating people in the community and avoiding unnecessary visits to dental offices, preventing further transmission of this virus and its spread is possible. Lack of studies in dentistry, asymptomatic people, small sample size, and the absence of a control group in some studies can be considered the limitations of the present study. The strengths of the present study are that the cohort studies have been selected for medium to high quality.

Conclusion

Fever should be used as the first sign in the diagnosis; dentists should measure all patients' fever at the time of arrival and before any procedure and then ask about other symptoms. The use of prevention and treatment protocols can be considered important for dentists and dental patients. Recommended, retrospective and prospective research is recommended in dental care associated with COVID-19, and more studies are requested in the future.

Authors' Contributions

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PM	https://orcid.org/0000-0002-6857-6482	Methodology, Writing - Original Draft and Writing - Review and Editing.
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All authors declare that they contributed to critical review of intellectual content and approval of the final version to be published.

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None.

Conflict of Interest

The authors declare no conflicts of interest.

Data Availability

The data used to support the findings of this study can be made available upon request to the corresponding author.

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