

REVIEW

Mental health status of dentists during COVID-19 pandemic: A systematic review and meta-analysis

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Abstract

Background: The effect of coronavirus disease-2019 (COVID-19) on the mental health status of dentists has been studied in various studies. The aim of this study was to review the mental health status of dentists during COVID-19 pandemic.

Methods: English databases including PubMed, Web of Science and Scopus were systematically searched till July 2021. Studies that examined the mental health status of dentists during COVID-19 pandemic were included. The heterogeneity of articles was assessed with the Cochran Test and I^2 statistics. The prevalence rates of anxiety, fear, sadness, concern, and anger were calculated using the random-effect model.

Findings: Of 560 initial searched articles, 15 articles were eligible to include. The prevalence of anxiety, fear of carrying the infection, fear of getting infected, fear of getting quarantined, and fear of dying people by COVID-19 were 64%, 92%, 85%, 61%, and 65%, respectively. The distribution frequency of light, moderate, and intense sadness was 22%, 25%, and 30%, respectively; light, moderate, and intense anger was 21%, 14%, and 23%, respectively; light, moderate, and intense concern was 30%, 30%, and 34%, respectively; light, moderate, and intense fear was 38%, 24%, and 15%, respectively.

Conclusion: Fear of COVID-19 and anxiety was very high among dentists. A significant proportion of dentists had moderate to intense COVID-19-associated sadness, concern, and anger. Providing educational content along with providing the necessary personal protective equipment and extensive vaccinations will help maintain the mental health of dentists and provide better quality services.

KEYWORDS

anxiety, COVID-19, dentists, fear, prevalence

1 | INTRODUCTION

Coronavirus disease 2019 (COVID-19) emerged in December 2019 in Wuhan, China. After that, it quickly spread around the world and became a pandemic.^{1,2} The virus that causes COVID-19 can be

transmitted in a variety of ways, including person-to-person contact, saliva, and aerosols. Dentistry is one of the high-risk jobs in the field of COVID-19 due to the close contact of the dentist with the patient and dealing with saliva and aerosols.²⁻⁴ In addition to the infection of many people in the world with COVID-19 and the relatively high

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mortality associated with that, this disease has also had many psychological effects on people all over the world, especially the medical staff and healthcare workers. In addition to the fear of infection with COVID-19 in the community, dentists are very afraid of transmitting it during dental procedures. Lack of personal protective equipment and the economic effects of COVID-19 on the dental profession due to the reduction in the number of patients and the reduction of working hours and the impossibility of elective dental treatments add to this fear and concern. The lack of definitive treatment for COVID-19 and the lack of comprehensive vaccination for the whole community has also raised concerns for all people, including dentists.^{4,5} Although mild fear and anxiety are somewhat natural and lead to protective behaviors, persistent and severe fear and anxiety can be a threat to dentists' mental health and can lead to unreasonable behaviors and decisions by them and affect the performance of dentists and the quality of dental services provided to patients.⁴ Therefore, the purpose of this systematic review and meta-analysis was to assess the psychological state of dentists during the COVID-19 pandemic to have a clear idea of the level of fear, concern, and anxiety of dentists.

2 | MATERIALS AND METHODS

PRISMA flowchart was used for the systematic selection of included articles (Figure 1). A systematic search was planned to find articles in the PubMed, Scopus, and Web of Science English databases.

The following MeSH terms were used as keywords to search for relevant articles in the above-mentioned databases:

"Mental Health," "Psychology," "Anxiety," "Fear," "Sadness," "Anger," "COVID-19," "SARS-CoV-2," "Dentists," and "Dentistry."

The search was done from June 2021 to July 2021; all articles from the onset of COVID-19 to July 2021 were included in this systematic review.

The searched articles were entered into Endnote software (Endnote X9, Clarivate Analytics) and duplicate articles were excluded. The relevant article were first chosen by evaluating the titles; second, by reading the abstract, relevant articles were selected; third by reading the full text of remaining articles from the previous step, the final package of articles according to the title and purpose of this systematic review was obtained. Articles without full text were excluded from the study.

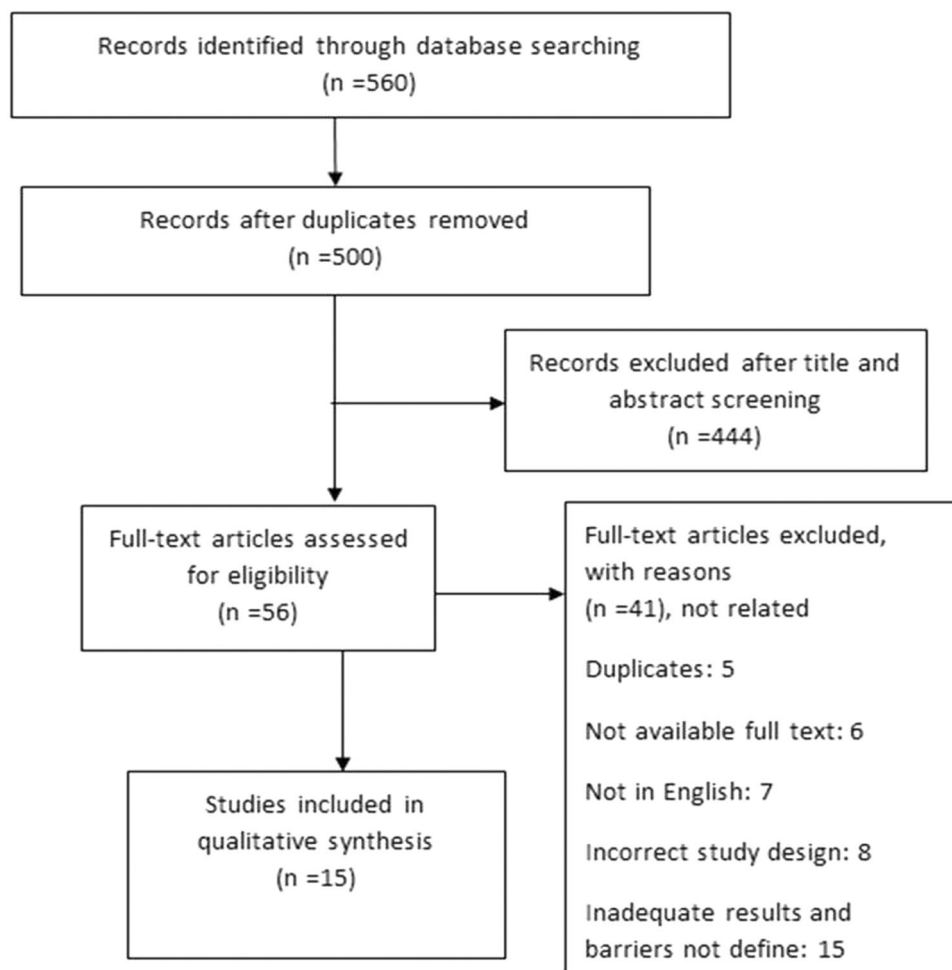


FIGURE 1 Flow Chart of included article in the review.

Inclusion criteria included: Evaluation of mental health status including anxiety, fear, sadness, concern, and anger; dentists as one of the studied groups; original cross-sectional or case-control studies; English language articles. Exclusion criteria included: Evaluation of mental health disorders such as behavioral and emotional disorders, Bipolar affective disorders, depression, dissociation, and dissociative disorders, obsessive-compulsive disorders,

and paranoia; study on other healthcare professionals except for dentists; study on other dental staff and workers except for dentists including dentistry students and dental assistant; articles in languages other than English; studies done before the onset of COVID-19; studies examining the effect of other pandemics on dentists' mental health; studies examining the effect of other viruses of coronavirus family except for COVID-19 on the mental health of

TABLE 1 Characteristics of included studies

First author, year	Field	Country	Number of participants (dentists)	Overall quality score*
Ahmed, 2020 ⁴	Fear of carrying infection/fear of getting infected/fear of getting quarantined/ Fear of dying by COVID-19	Pakistan, Saudi Arabia United Arab Emirates, USA United Kingdom, France, Malaysia Australia, New Zealand, South Africa, Hungary, Bahrain Denmark, Ireland Switzerland, China, Canada, Egypt, Kuwait, Italy, Romania, Finland, Mexico, Republic of Congo, Bulgaria, Israel, Germany, Poland, India, Turkey	650 from 30 different countries	7 Good
Suryakumari, 2020 ⁷	Fear of carrying infection/fear of getting infected/fear of getting quarantined/ Fear of dying by COVID-19	India	307	6 Good
Mahdee, 2020 ⁸	Fear of carrying infection/fear of getting infected/anxiety	Iraq	435	6 Good
Aly, 2020 ⁹	Fear of carrying infection/fear of getting infected/fear of getting quarantined/ Fear of dying by COVID-19	Egypt	216	7 Good
Balwani, 2020 ¹⁰	Fear of carrying infection/fear of getting infected/fear of getting quarantined/ fear of dying by COVID-19	India	1000	6 Good
Baskaran, 2020 ¹¹	Fear of carrying infection/anxiety	India	133	5 Fair
Uhlen, 2021 ¹²	Fear of carrying infection/fear of getting infected/Fear of getting quarantined/ fear of dying by COVID-19	Norway	1237	7 Good
Chakraborty, 2020 ¹³	Fear of getting infected	India	335	7 Good
Atas, 2020 ¹⁴	Fear of getting infected	Turkey	90	5 Fair
Consolo, 2020 ¹⁵	Fear/concern/anger/sadness	Italy	356	6 Good
Bellini, 2020 ¹⁶	Anxiety/fear/concern/anger/sadness	Italy	1109	7 Good
Ranka, 2021 ¹⁷	Anxiety	United Kingdom	123	6 Good
Aly, 2021 ¹⁸	Anxiety	Egypt	58	5 Fair
Al-Amad, 2021 ¹⁹	Anxiety	United Arab Emirates	403	6 Good
Salehiniya, 2021 ⁵	Anxiety	Iran	320	7 Good

Abbreviation: COVID-19, coronavirus disease 2019.

dentists including SARS and MERS; case report articles, reviews, and letters to the editors.

Three items were checked for quality assessment: (1) Methodology, (2) accuracy, and (3) external validity. We used the Newcastle–Ottawa Quality Assessment checklist for evaluating the quality of the articles. All included articles were scored for clear criteria.⁶

The heterogeneity of articles was assessed with the Cochran Test and I^2 statistics. The prevalence rates of anxiety, fear, sadness, concern, and anger were calculated using a random-effect model for studies with significant heterogeneity. Subgroup analysis was used to deal with heterogeneity between studies. All analyzes were done using comprehensive meta-analysis software.

3 | RESULTS

Of 560 initial searched articles, 15 articles were eligible to include (Figure 1). Table 1 shows the characteristics of the studies included in this systematic review (Table 1).

A total of 12 studies had a good quality score, and three studies had a fair quality score by Ottawa quality Scale.

Characteristics of the studies included in this systematic review.

Due to heterogeneity (Cochran's Q test, $p < 0.001$; $I^2 = 99.1$), random effect model used for "anxiety" analysis. The prevalence of anxiety among dentists during the COVID-19 pandemic was 64%, 95% confidence interval [CI] (41%–82%) (Figure 2).

Due to heterogeneity (Cochran's Q test, $p < 0.001$; $I^2 = 95.93$), random effect model used for "fear of carrying COVID-19 infection" analysis. The prevalence of fear of carrying COVID-19 infection among dentists during the COVID-19 pandemic was 92%, 95% CI (86%–96%) (Figure 3).

Due to heterogeneity (Cochran's Q test, $p < 0.001$; $I^2 = 96.36$), a random effect model used for "fear of getting infected with COVID-19" analysis. The prevalence of fear of getting infected with COVID-19 among dentists during the COVID-19 pandemic was 85%, 95% CI (79%–90%) (Figure 4).

Due to heterogeneity (Cochran's Q test, $p < .001$; $I^2 = 99.47$), random effect model used for "fear of getting quarantined due to COVID-19" analysis. The prevalence of fear of getting quarantined due to COVID-19 among dentists during COVID-19 pandemic was 61%, 95% CI (26%–88%) (Figure 5).

Due to heterogeneity (Cochran's Q test, $p < 0.001$; $I^2 = 99.65$), a random effect model used for "fear of dying by COVID-19" analysis. The prevalence of fear of dying of COVID-19 among dentists during the COVID-19 pandemic was 65%, 95% CI (28%–90%) (Figure 6).

The prevalence of light fear among dentists during the COVID-19 pandemic was 38%, 95% CI (36%–41%); moderate fear was 24%, 95% CI (22%–26%); and an intense fear was 15%, 95% CI (13%–17%), respectively.

The overall prevalence of sadness among dentists during the COVID-19 pandemic was 25%, 95% CI (24%–29%). The prevalence of light sadness was 22%, 95% CI (20%–24%); moderate sadness was

25%, 95% CI (23%–27%); and intense sadness was 30%, 95% CI (27%–32%), respectively.

The overall prevalence of anger among dentists during the COVID-19 pandemic was 20%, 95% CI (19%–22%). The prevalence of light anger was 21%, 95% CI (20%–24%); moderate anger was 14%, 95% CI (23%–27%); and intense anger was 23%, 95% CI (27%–32%), respectively.

The overall prevalence of concern among dentists during COVID-19 pandemic was 30%, 95% CI (28%–32%). The prevalence of light concern was 30%, 95% CI (24%–37%); moderate concern was 30%, 95% CI (28%–32%); and intense concern was 34%, 95% CI (22%–47%), respectively.

4 | DISCUSSION

According to the results of this meta-analysis, fear of COVID-19 and anxiety among dentists during the COVID-19 pandemic were very high. A significant proportion of dentists had moderate to intense COVID-19-associated sadness, concern, and anger.

Previous studies have shown a higher prevalence of mental health problems among healthcare workers than the general population, which may be due to close and frequent contact with patients, longer working hours than usual, and working under a stressful condition which is associated with disease transmission.¹⁸

Research on similar infectious diseases outbreaks such as severe acute respiratory syndrome (SARS) has shown a variety of causes that lead to psychological harm to healthcare workers, including fear of becoming infected while treating an infected person or fear of transmitting the disease to a family member.^{20,21}

As mentioned in the introduction, small amounts of fear and anxiety are normal in the face of the highly contagious and life-threatening virus COVID-19, as it will lead to protective behaviors against the virus and reduce the risk of transmitting the virus. But the high level of fear and anxiety seen by dentists during the COVID-19 pandemic can have negative consequences, behaviors, and decisions.⁹ For example, severe fear can cause dentists to refuse to even provide emergency dental treatment to patients. Therefore, in practice, the system of providing services to dental patients with dental emergency conditions will be disrupted. This extreme fear can even affect the quality of services provided, as dentists may not spend the time required for dental treatment to reduce the risk of infection. Prolongation of the COVID-19 pandemic and the consequent prolongation of the fear, anxiety, sadness, and concern associated with this pandemic can have a negative impact on dentists' mental health and quality of their life will lead to psychiatric disorders. Excessive anger associated with this pandemic can increase violence in dentists' families, which will also have a negative impact on the well-being of dentists and their spouses and children.^{4,5}

To reduce the fear, anxiety, and concern of dentists during the COVID-19 pandemic, we must first know the sources and causes of these fears and worries to take steps to eliminate and reduce them

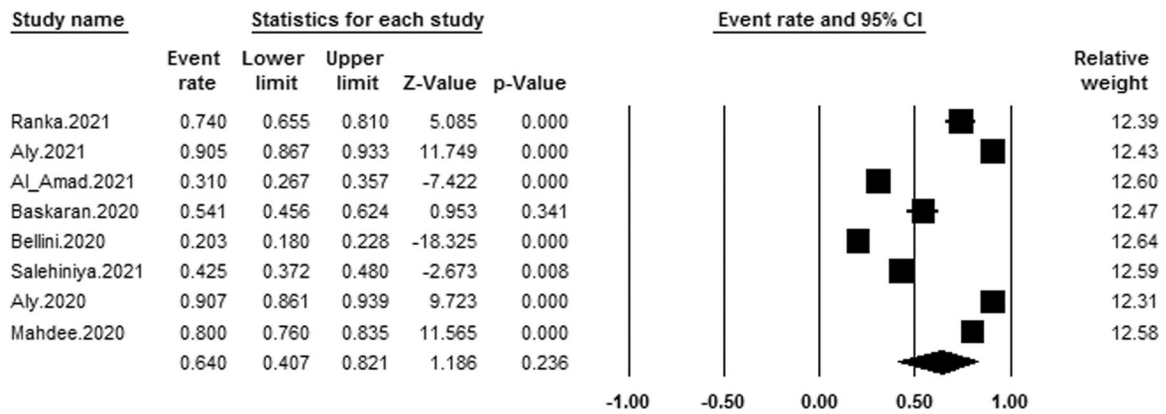


FIGURE 2 Prevalence of anxiety among dentists during COVID-19 pandemic. CI, confidence interval; COVID-19, coronavirus disease 2019

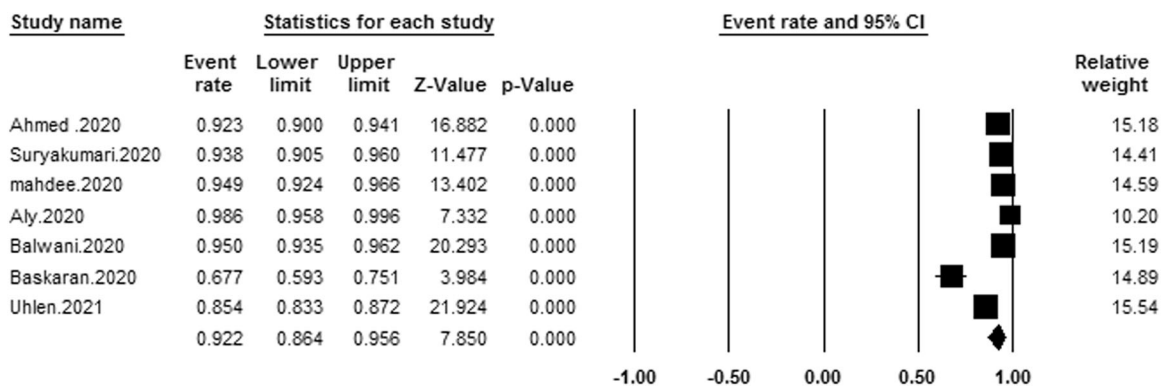


FIGURE 3 Prevalence of fear of carrying COVID-19 infection among dentists during COVID-19 pandemic. CI, confidence interval; COVID-19, coronavirus disease 2019

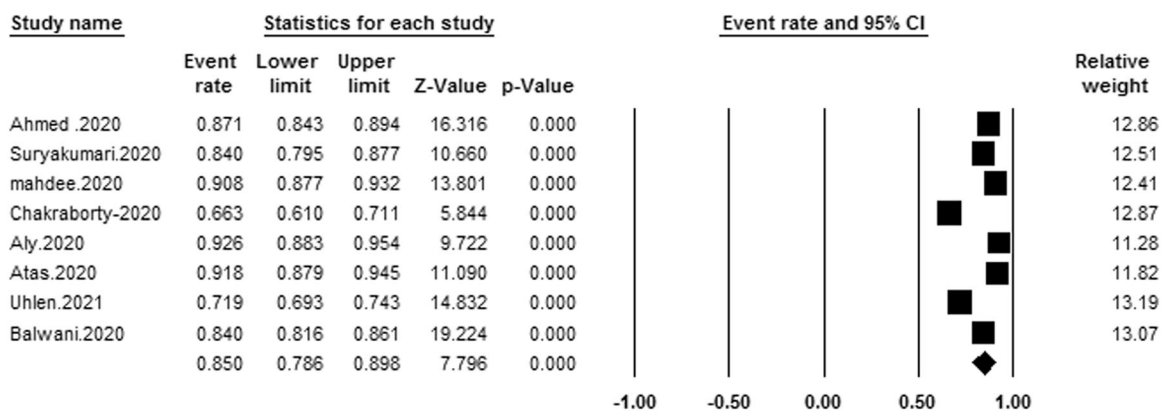


FIGURE 4 Prevalence of fear of getting infected with COVID-19 among dentists during COVID-19 pandemic. CI, confidence interval; COVID-19, coronavirus disease 2019

and help the mental health status of dentists. The following reasons may play a role in creating and increasing these fears and concerns; the rapid spread of the COVID-19 virus and the involvement of millions of people around the world, along with the fear of being quarantined and the fear of death from the virus, can bring considerable psychological stress and fear to all people, including dentists.^{4,5} Given that the main route of transmission of COVID-19

virus is person-to-person contact, and given that there is close contact between the patient and the dentist in the dental setting, this close contact increases the risk of transmitting COVID-19 infection; similarly, it increases the fear of transmitting the disease or becoming infected with COVID-19. On the other hand, dentists' dealings with aerosol-producing procedures and patients' saliva and blood, all of which are among the routes of transmitting the

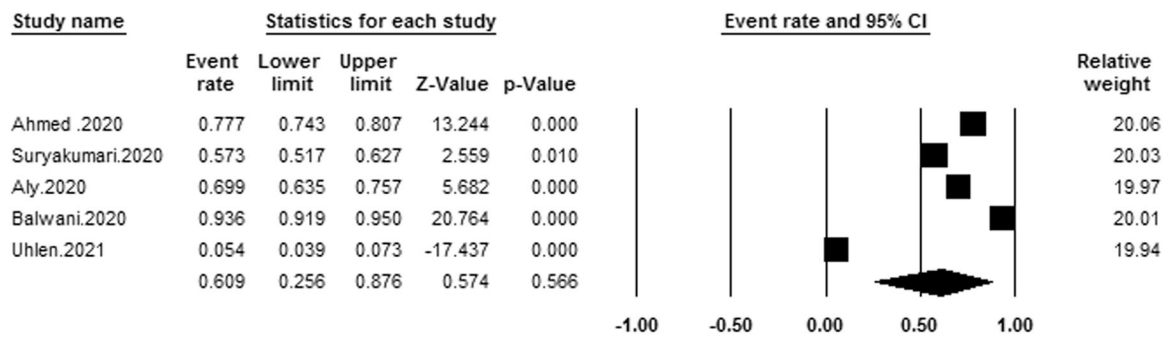


FIGURE 5 Prevalence of fear of getting quarantined due to COVID-19 among dentists during COVID-19 pandemic. CI, confidence interval; COVID-19, coronavirus disease 2019

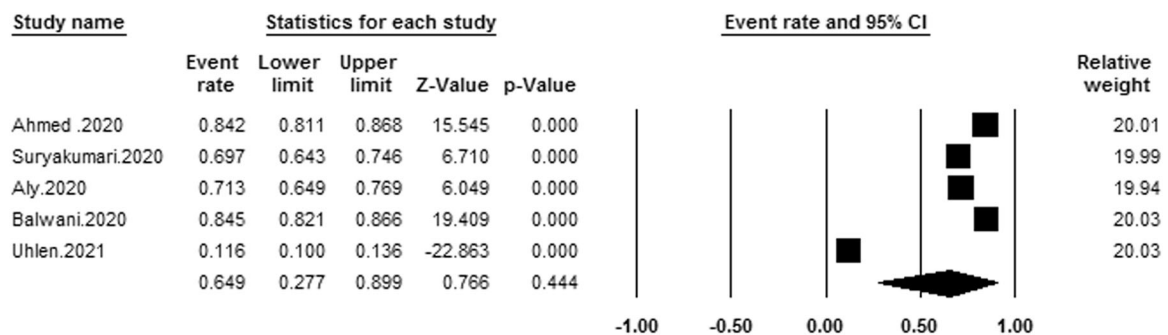


FIGURE 6 Prevalence of fear of dying by COVID-19 among dentists during COVID-19 pandemic. CI, confidence interval; COVID-19, coronavirus disease 2019

COVID-19, add to the depth of this fear and concern.^{4,5,9} One of the reasons for the concern and fear of dentists, especially in the early onset of COVID-19 disease, was the lack or inadequate access to personal protective equipment, which occurred due to increased demand.^{5,18} Many governments limited the provision of dental services to emergency dental services due to the risk of disease transmission in the dental environment, and dentists were not able to provide elective treatment during the COVID-19 epidemic. This has reduced the number of patients in dental offices and clinics, which in turn reduces the income of dentists, and this economic pressure due to reduced income has led to psychological effects such as anxiety and concern. Also, as a result of the fear of getting infected with COVID-19 disease, the patients' own visits to offices and dental centers have decreased. Reducing dentists' working hours as a result of the above and their stay at home can lead to psychological problems such as constant sadness and depression.^{4,5} One of the main concerns of dentists is the fear of becoming infected with the virus and transmitting it to other first-class acquaintances such as parents, spouses, and children.⁴ In addition to all of the above, dentists, like other people, are constantly afraid of transmitting the disease or becoming infected with COVID-19 in dental setting due to the lack of definitive treatment for COVID-19 disease and the lack of adequate access to vaccines in many countries.^{4,10} Dentists' dependence on receiving medical and health information from social media can be another cause of anxiety for

dentists, as a wealth of unsubstantiated and unscientific information is published in these media.¹⁹

There is virtually no solution to reduce the fear and anxiety caused by close contact between dentists and patients, except that by following the health instructions related to COVID-19 by dentists and using personal protective equipment and well-ventilated space, the risk of disease transmission between patients and dentist minimize and thus reduce this fear.^{2,11}

The fact is that despite that the dental profession is one of the riskiest jobs in the field of COVID-19 due to close contact with patients and contact with aerosols and blood and saliva, the prevalence of COVID-19 in dentists and their assistants is very low and the severity of the disease in most cases is mild³; this low prevalence of dentists can be the result of compliance with health instructions in the dental environment and the use of personal protective equipment by dentists. As this fact has been proven by numerous research works, the results of these studies should be properly explained to dentists by the medical and dental associations and by governments and the media, which is an effective step toward reducing stress, fear, concern, and anxiety in dentists.³

Providing training materials for dentists and dental assistants will help them learn the proper way to follow the health guidelines related to COVID-19 and use personal protective equipment. Learning these guidelines correctly will definitely help reduce the fear and anxiety of dentists in the face of the COVID-19.⁵

Holding classes and workshops to deal with the psychological effects of COVID-19 by psychiatrists seems to be essential for dentists to be able to maintain their mental health in the transition from this pandemic and learn how to deal with the fear, concern, and anxiety associated with the COVID-19 pandemic.⁵ Also, teaching these psychological issues can be done in the form of educational content such as pamphlets, multimedia clips, and so forth. More widely, these training can be broadcast through mass media such as television, and so forth. Governments and trade unions can also identify dentists whose mental health is at risk by conducting psychological tests and questionnaires, and prioritize their treatments and psychological training over more vulnerable dentists.⁵

Governments must also do their part to adopt appropriate policies to reduce the incidence of COVID-19 and reduce the burden of the disease by working to provide more comprehensive vaccinations and up-to-date treatments. Certainly, as the burden of this disease decreases, the stress and anxiety associated with this disease will decrease in all sections of society, especially dentists.³

Controlling the quality of medical and health information published on social media and preventing the spread of lies, along with encouraging dentists to obtain information from reputable sources, can help reduce dentists' anxiety during pandemics like COVID-19.¹⁹

It seems that with the prolongation of the COVID-19 pandemic worldwide, the strategy of limiting dental treatment to purely emergency treatments has failed. It is suggested that governments, instead of restricting dental treatment, oversee the observance of health guidelines in dental settings and the screening of patients with suspected COVID-19 disease. This both prevents the spread of COVID-19 disease and increases the number of patients and the number of working hours of dentists, and while reducing the long economic pressure on dentists, helps maintain the dentist's mental health and provides proper quality services by them.

5 | CONCLUSION

The high level of fear and anxiety observed in dentists during the COVID-19 pandemic, as well as their significant percentage of moderate to severe sadness, concern, and anger, can negatively affect the mental health status of dentists and the amount and quality of dental services provided by them. So, providing educational content to reduce their fear and anxiety along with providing the necessary personal protective equipment and extensive vaccinations will help to maintain the mental health status of dentists during the COVID-19 pandemic and help to provide better quality services.

6 | LIMITATION

The number of studies was low and there was heterogeneity between studies and a random effect model was used to analyze the data.

AUTHOR CONTRIBUTIONS

Hamid Salehiniya, Sare Hatamian, and Hamid Abbaszadeh have made substantial contributions to conception and design of the study. Hamid Salehiniya, Sare Hatamian, and Hamid Abbaszadeh have been involved in data collection and analysis. Hamid Salehiniya, Sare Hatamian, and Hamid Abbaszadeh and have been involved in data interpretation and drafting the manuscript. Hamid Salehiniya, Sare Hatamian, and Hamid Abbaszadeh have critically revised the manuscript. All authors have given final approval of the version to be published. All authors have read and approved the final version of the manuscript. Hamid Abbaszadeh had full access to all of the data in this study and takes complete responsibility for the integrity of the data and the accuracy of the data analysis.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

CONSENT TO PARTICIPATE

This study does not involve intervention on human or animal specimens and does not require informed consent.

ETHICS STATEMENT

This study does not involve intervention on human or animal specimens and does not require ethical approval.

TRANSPARENCY STATEMENT

The Hamid Abbaszadeh affirms that this manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned (and, if relevant, registered) have been explained.

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How to cite this article: Salehiniya H, Hatamian S, Abbaszadeh H. Mental health status of dentists during COVID-19 pandemic: a systematic review and meta-analysis. *Health Sci Rep.* 2022;5:e617. doi:10.1002/hsr2.617