

Scholarly Output on Dentistry and COVID-19: A Global Bibliometric Analysis

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ABSTRACT

Background: Bibliometric studies help in quantifying the pattern of research published in a particular area of interest to get the measure of research productivity. In this context, we analyzed the dental and COVID-19 research papers published from December 2019 to January 2021 globally.

Method: The articles were retrieved from the PubMed and WHO COVID -19 databases using MeSH terms and keywords. The data downloaded as excel and extracted bibliometric information's and analyzed using Epi-info (7.2) software.

Result: We obtained 800 research articles after removing duplicates and non-relevant articles from 1,823 articles from these two databases. The articles were published by 475 institutions in 62 countries. Among the listed countries, more publications were done by the United States of America (USA) (n=135;16.8%). The majority of the papers were published in June 2020 (n=114). The King's College London had the most number of publications (n=15; 1.9%). The majority of the articles were original articles (n=592; 74%).

Conclusion: The study reports a gradual increase in publications over the months and a slowing down at the end of the year. The countries such as the USA, England, Italy, and China published more articles and this correlates with the number of covid-19 cases.

Keywords: Bibliometrics, COVID-19, Dental, Dentistry

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INTRODUCTION

The ongoing COVID-19 pandemic has put global healthcare systems under tremendous pressure and stressed other systems beyond their manageable level. Responding to this public health emergency and minimizing its impact requires every health resource to be leveraged.¹ The second wave has devastated many countries globally, and there are 157 million confirmed cases and more than three million confirmed deaths as of May 2021 globally.² The SARS-CoV-2 virus causes COVID-19 and it is transmitted from one person to the other. The primary source of infection is aerosols when they cough, sneeze, speak, or even breathe heavily. These droplets or aerosols containing the virus may get into the mouth, nose, or eyes of the uninfected person when they are in direct and close contact of less than a meter with an infected person.³

Like other health professionals, dental professionals also face an increased risk of COVID-19 during this pandemic. Many countries organized dental professionals in the fight against COVID-19 also.⁴ The major concern of dental practitioners was to restrict routine care of patients due to the fear of spreading COVID-19 among their patients but they were also concerned about financial consequences.³ Dental services carry the risk of COVID-19 infection due to the involvement of procedures by face-to-face communication with patients, sharp instruments handling, as well as contact with blood, saliva, and other body fluids.^{5,6} The economic, social, ethical, and professional concerns were the major consideration for dental and oral healthcare workers in the coronavirus pandemic era.⁷ Therefore, healthcare workers, especially dental professionals who work close to the patients, are at higher risk of contracting infections.⁸ Dentists were classified in the very high-risk group for COVID-19 in March 2020 by the Occupational Safety and Health Administration(OSHA).⁹

Scientific research publications are essential to generate evidence that helps to combat the pandemic. Globally, researchers from different domains, including the dental professional involving various research studies on coronavirus. The results of these studies were published in various peer-reviewed journals and utilized for decision-making and policy changes. In the scientific community, the influence of publication is effectively measured by bibliometric analysis.⁹

Furthermore, bibliometric studies help in quantifying the pattern of research published in a particular area of interest to get the measure of research productivity in the specific field. Many bibliometric studies were published in the COVID-19 field to understand the scientific output recently.¹⁰⁻¹² In this context, we analyzed the research papers published in the dental field and COVID-19 from December 2019 to January 2021 globally.

METHODOLOGY

Data source: We abstracted dental and COVID-19 data from December 2019 and January 2021 using the WHO COVID-19 database and PubMed database. The WHO Global literature on coronavirus disease database. This WHO database collects all the internationally published COVID-19-related articles regularly.¹³ PubMed Central (PMC) is a free repository that provides open access to full-text articles that have been issued in biomedical and life sciences journals and maintained by the National Center for Biotechnology Information.¹⁴

We used the following keywords for WHO COVID-19 and PubMed database: "Dentist" "Dentistry", "Dentists", "Dental Care", "Oral Hygiene", "Orofacial", "Oral Oncology", "Teledentistry", "Dental Practice", "Dental Office", "Dental Profession", "Oral Surgical Procedures", "Oral Health", "Oral Care", "Dental Treatment", "Dental Hygiene", "Saliva" and "Oral Cavity" Coronavirus "COVID-19" and "Sars CoV-2

Search Strategy: We used the following search strategy:

WHO COVID-19 database: "Dentist" OR "Dentistry" OR "Dentists" OR "Dental Care" OR "Oral Hygiene" OR "Orofacial" OR "Oral Oncology" OR "Teledentistry" OR "Dental Practice" OR "Dental Office" OR "Dental Profession" OR "Oral Surgical Procedures" OR "Oral Health" OR "Oral Care" OR "Dental Treatment" OR "Dental Hygiene" OR "Saliva" OR "Oral Cavity"

PubMed database: (("dental" [Title/Abstract] OR "dentist" [Title/Abstract] OR "dentistry" [Title/Abstract] OR "dentists" [Title/Abstract] OR "dental care" [Title/Abstract] OR "oral hygiene" [Title/Abstract] OR "orofacial" [Title/Abstract] OR "oral oncology" [Title/Abstract] OR "maxillofacial" [Title/Abstract] OR "teledentistry" [Title/Abstract] OR "dental practice" [Title/Abstract] OR "Dental office" [Title/Abstract] OR "Dental profession" [Title/Abstract] OR "oral surgical procedures" [Title/Abstract] OR "oral health" [Title/Abstract] OR "oral care" [Title/Abstract] OR "dental treatment" [Title/Abstract] OR "dental hygiene" [Title/Abstract] OR "saliva" [Title/Abstract] OR "oral cavity" [Title/Abstract])) AND "Corona virus" [Title/Abstract] (("covid 19" [MeSH Terms] OR "sars cov 2" [MeSH Terms]))

Study selection and data management: We downloaded the data as an Excel file. The two independent reviewers reviewed the articles. The reviewers carefully evaluated the dental and COVID-19-related studies and included them for analysis. The third reviewer solved if any differences between these two reviewers.

Eligibility criteria: We included only English language articles published in the study period and related to dental and COVID-19. We included all types of research articles such as original papers, review papers, and commentary related to the dental field

and COVID-19. We excluded other coronavirus-related articles such as Severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS).

Data extraction: We extracted bibliometric details from the selected articles for analysis. We collected primary author names, number of authors, primary authors' institutions, primary authors' country, type of research articles, and publication month. We also collected top-cited articles and their journals' names and citations using Google scholar. We also collected

the publisher's name, Impact factor of the journal, country of the journal published, and frequency of journal and theme of the journal for the highly published journals (Figure 1).

Data Analysis: We used Epi-info (7.2) software for analysis.¹⁵ We analyzed data based on the type of research articles, primary author's affiliation, primary author's country, institutions with the highest publication, and publication date. We also analyzed the top published journals and most cited articles.

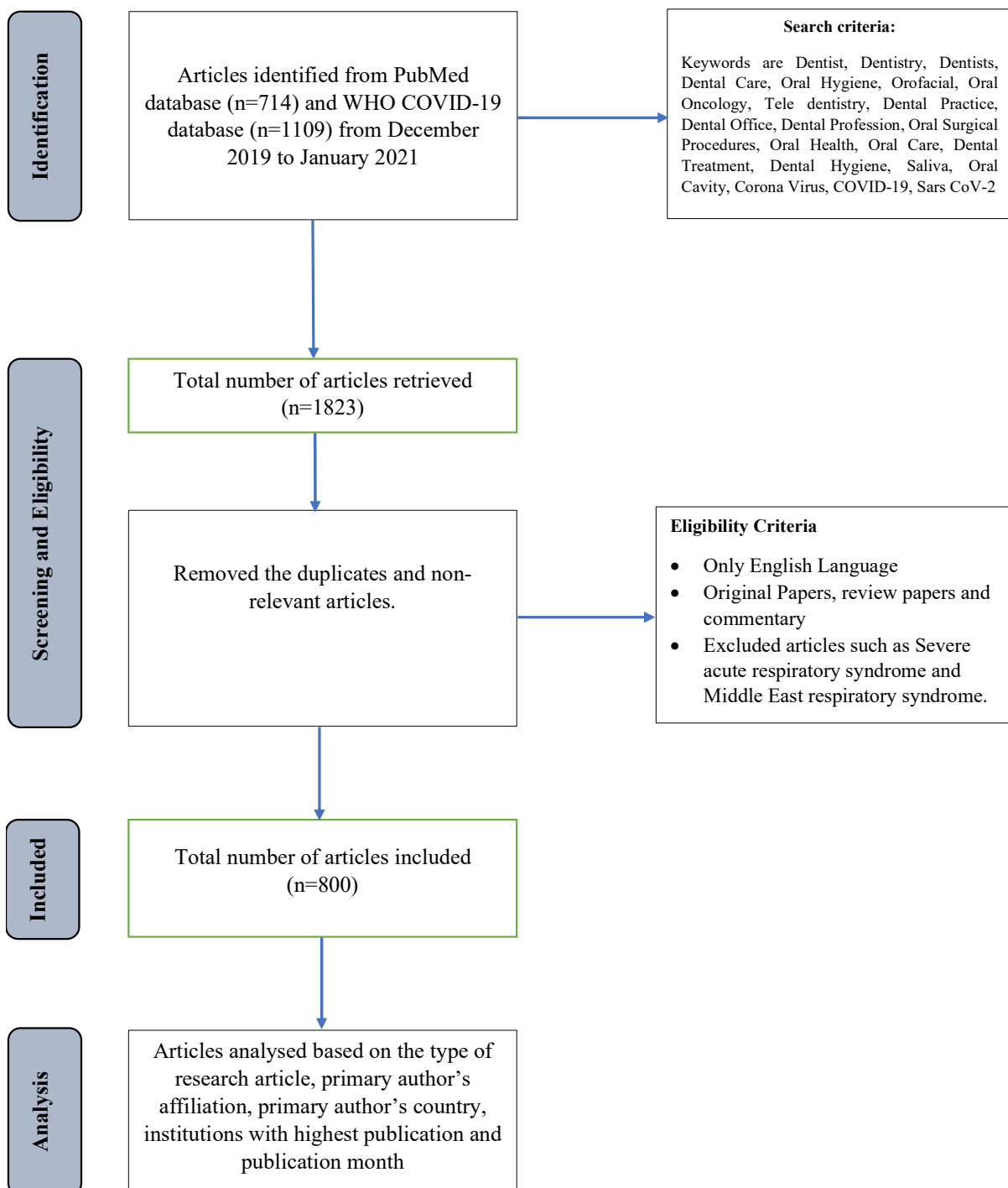


Figure 1: Flow diagram highlighting the selection process of articles for the study

RESULTS

We collected 714 articles from the PubMed database and 1109 articles from the WHO COVID-19 database. We obtained 800 research articles after removing the duplicates and non-relevant articles. The majority of the papers were issued in June 2020 (n=114) followed by September (n=99) and August (n=89) of 2020, when the pandemic was at a peak worldwide (Figure 2). These 800 articles were published from 475 institutions in 65 countries. Among the listed countries, the United States of America (USA) had published more research papers (n=135; 16.9%), followed by England (n=85; 10.6%) and Italy (n=84; 10.5%) and the listed top 10 countries published more than two-thirds of the total publications (n=589; 73.6%) (Figure 3). The King's College London had the most number of publications (n=15; 1.9%) followed by the University of São Paulo (n=12; 1.5%) and The University of Hong Kong (n=12; 1.5%) (Table 1).

Table 1: Top 10 institutions published research articles on Dental and COVID-19 from December 2019 and January 2021

Rank	Institution	Publications	Proportion
1	King's College London	15	1.9
2	University of São Paulo	12	1.5
3	The University of Hong Kong	12	1.5
4	University of Pennsylvania	11	1.4
5	Sapienza University of Rome	10	1.3
6	University of Texas	9	1.1
7	Tehran University of Medical Sciences	8	1.0
8	University of Manchester	8	1.0
9	Imam Abdulrahman Bin Faisal University	8	1.0
10	Wuhan University	8	1.0
11	Others	687	85.9
	Total	800	100

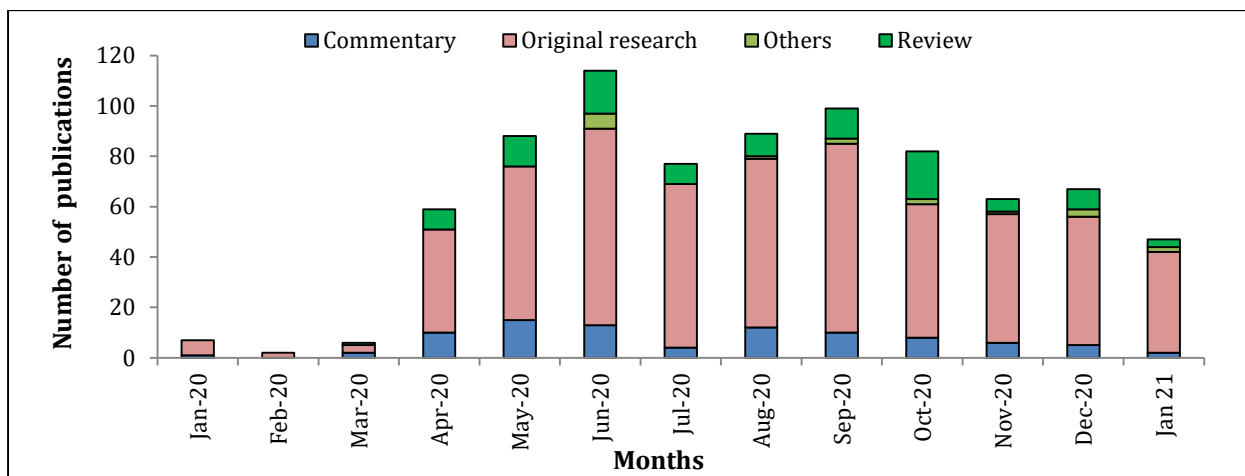


Figure 2: Month-wise analysis of Dental and COVID-19-related articles published between December 2019 and January 2021

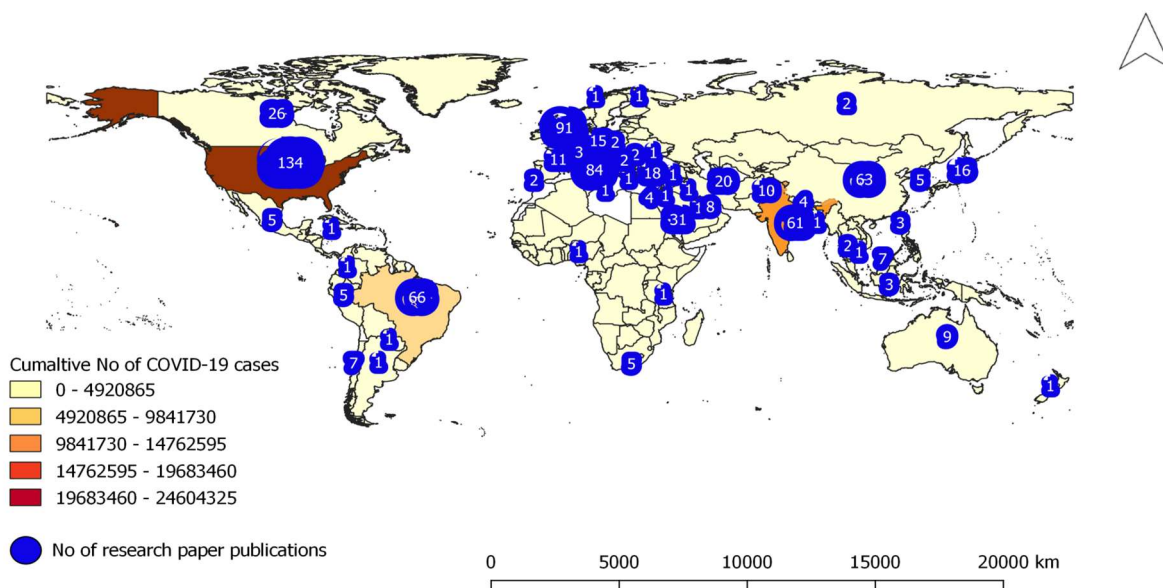


Figure 3: Global distribution of the articles published on Dental and COVID-19 from December 2019 and January 2021

The majority of the articles were original articles (n=592; 74%) followed by Review (n=102; 12.8%) and commentary (n=89; 11.1%). The pilot study (n=1; 0.1%) and Clinical trials (n=2; 0.3%) were the least published type of articles (Figure 2). Among the 800 research articles, 114 articles were published by single authors and 306 articles were published by more than 5 authors (Table 2). The number of publications was from the British Dental Journal and International Journal of Environmental Research and Public Health (n= 47; 5.9%) followed by BMC Oral Health (n=19; 2.4%) and Brazilian Oral Research (n= 18; 2.3%). More than one-fourth of the articles were published in the top listed 10 journals. Among 10 publishers, 4 were from Elsevier, and most of the Journals were published Monthly (4/10) (Table 3). The “High expression of ACE2 receptor of 2019-nCoV on the epithelial cells of oral mucosa” was a highly cited article with 1374 citations from the Journal of Evidence-Based Dental Practice journal. The first three articles had more than 1000 citations. The article published in the Journal of Evidence-Based Dental Practice, PLoS One, and Journal of Dental Research journals had more than 1000 citations. (Table 4).

Table 2: Author contribution on Dental and COVID-19-related articles from December 2019 and January 2021

Number of authors	No. of papers	Proportion
1	114	14.3
2	88	11.0
3	93	11.6
4	103	12.9
5	96	12.0
>5	306	38.3

DISCUSSION

Many dental-related articles on COVID-19 are being published about the safety, epidemiology, prevention, and dental treatment despite the pandemic situation. The present study focused on papers published in the dental field and COVID-19. We collected 800 research articles from WHO COVID-19 and PubMed databases. The current analysis of data shows different dimensions of COVID-19 research. The USA, Italy, and England are the top three countries that published more papers. The majority of the papers were from primary research. More than one-third of the papers were published by more than 5 authors. The top ten journals published more than one-fourth of the papers and half of the journal that published more papers were from the USA.

Public health professionals and organizations have responded almost as quickly as the spread of this virus to increase awareness of this condition among the population.¹⁶⁻¹⁸ Also, the publications on COVID-19 were rapidly increasing.¹⁹ Globally, the first wave of this pandemic was peak in the second half of the year in many of the worst-affected countries, includ-

ing the USA and England. Our study observed that more than half of the publications were from between May to October months of the year. A similar trend was reported in the COVID-19 bibliometric study in which it observed that more papers from May onwards.¹⁶ We observed that the USA, Italy, and England contributed more publications. The USA alone published around one-fifth of the publications. A similar result was also published in the recently published article.¹⁷ The earlier literature report that China was a more productive country and published more COVID-19-related publications.^{18,19} This is due to the initial spread being from China. We observed from our study that the number of publications shifted from China and Italy to USA and England and Brazil as infections were spread.

The top listed organizations that contributed more publications also from the most affected countries such as the USA and England. The University of Pennsylvania, The University of Texas, and the University of Manchester were three of the Top 10 highly productive organizations which belong to the USA. There were also rising publications from Italy, England, Brazil, China, and India due to high research facilities and high prevalence.²⁰ Contrary to previously published dental bibliometric paper,²⁰ we observed that more than two-thirds of the publications were original research papers. Another study reported similar results, which mention that half of the research papers were primary research papers.¹⁶ Even though we found more primary research and reviews, higher-level evidence will be synthesized from systematic reviews and randomized controlled studies. We found no systematic reviews and few RCT protocols from our study.

Many medical and dental researchers have been focused on COVID-19 research globally for the past year. Publication in high-quality journals benefits the authors and scientific community. During the pandemic period, it is necessary to publish to take critical decisions and improve the knowledge of the field. In our study, we listed the top 10 journals which published more research publications. The journals had more than one impact factor and belong to reputed publishers like Elsevier. The themes of the journals were dentistry and half of them were USA-based publishers. More high-evidence documents have been published in high-quality peer-reviewed journals such as the British Dental Journal, International Journal of Environmental Research and Public Health, and BMC Oral Health.

An interesting outcome of this study is the impact attained by the dental COVID-19 articles. In the scientific community, the total count of citations is regarded as an estimate of the impact, scientific outcomes, and quality of the articles. We also noticed that the majority of the most-cited articles had been released in high-impact journals. For example, the article titled “High expression of ACE2 receptor of 2019-nCoV on the epithelial cells of oral mucosa” received the highest citations among the listed articles.

Table 3: Top 10 journals published Dental and COVID-19-related articles from December 2019 and January 2021

Rank	Journal with maximum Publications	Publisher Name	Impact Factor	Publication Country	Frequency of Journal Publication	Main Theme of the Journal	Number of Publications	Proportion
1	British Dental Journal	Springer Nature	1.306	United Kingdom	Bimonthly	Dentistry	47	5.9
2	International Journal of Environmental Research and Public Health	MDPI	2.849	Switzerland	Semimonthly	Environmental Science and Public Health	47	5.9
3	BMC Oral Health	BioMed Central Ltd	1.911	England	Not Provided	Dentistry	19	2.4
4	Brazilian Oral Research	Sociedade Brasileira de Pesquisa Odontológica	1.223	Brazil	Quarterly	Dentistry	18	2.3
5	Journal of Evidence-Based Dental Practice	Elsevier	2.426	USA	Quarterly	Dentistry	17	2.1
6	Medical Hypotheses	Elsevier	1.375	USA	Monthly	Medicine	17	2.1
7	British Journal of Oral and Maxillofacial Surgery	Elsevier	1.061	Scotland	Bimonthly	Oral and Maxillofacial Surgery	16	2.0
8	Journal of Dental Research	Sage Publication	5.125	USA	Monthly	Dentistry	16	2.0
9	Journal of Endodontics	Elsevier	2.886	USA	Monthly	Endodontics	15	1.8
10	Journal of Infection	Saunders	4.603	USA	Monthly	Infection	13	1.6

Table 4: Top 10 highly cited published articles on Dental and COVID-19 from December 2019 and January 2021

Rank	Title of the Article	Corresponding Author	Name of the Journal	Citations
1	High expression of ACE2 receptor of 2019-nCoV on the epithelial cells of oral mucosa.	Li, Taiwen	Journal of Evidence-Based Dental Practice	1374
2	Transmission routes of 2019-nCoV and controls in dental practice.	Xuedong Zhou	PLoS One	1241
3	Consistent Detection of 2019 Novel Coronavirus in Saliva.	Kelvin Kai-Wang	Journal of Dental Research	1173
4	Enteric involvement of coronaviruses: is faecal-oral transmission of SARS-CoV-2 possible?	Danson Yeo	International Dental Journal	530
5	The airborne lifetime of small speech droplets and their potential importance in SARS-CoV-2 transmission.	Anfinrud, Philip	Otolaryngol Head and Neck Surg	422
6	Coronavirus Disease 19 (COVID-19): Implications for Clinical Dental Care.	Amber Athe	Journal of Oral and Maxillofacial Surgery	419
7	Coronavirus COVID-19 impacts to dentistry and potential salivary diagnosis.	Walter L	Journal of Dental Research	394
8	Saliva is a reliable tool to detect SARS-CoV-2.	Azzi L	BMC Oral Health	299
9	Possible aerosol transmission of COVID-19 and special precautions in dentistry	Yan-Zhen Zhang	International Journal of Environmental Research and Public Health	259
10	Dentistry and Covid-19 pandemic: operative indications post-lockdown.	Coulthard, Paul	European journal of dentistry	228

LIMITATIONS

The limitation of this study is that we have analyzed only the articles retrieved from PubMed and WHO COVID-19 databases and did not include SCOPUS or Web of Science databases hence the generalizability of the findings may be affected. Also, our study is limited to analysis of publications till January 31, 2021, from December 1, 2019. Another limitation is that we have not analyzed the publications for the author keywords and the publication subject.

CONCLUSION

The study reports a gradual increase in publications over the months and a slowing down at the end of the year. The countries and their institutes affected more by COVID-19, such as the USA, England, Italy, and China were published in more research articles. Half of the highest number of articles published in journals were from the USA and all top journals have more than one impact factor. It can be seen that many dental articles are being published in the context of COVID-19 and this may increase evidence synthesis in the dentistry field.

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