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Original research article

Bibliometric analysis of the 100 most-cited dental articles on COVID-19

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Abstract

Objective: This study aimed to bibliometrically characterize the top 100 most cited (T100) dental articles about COVID-19.

Materials and Method: In the present study, the Web of Science core collection database was used to identify the T100 dental articles on COVID-19 in the category of "Dentistry, Oral Surgery and Medicine" on May 19, 2021. Among the included top most cited articles, the following parameters were recorded and bibliometrically analyzed as article title, publication date, authorship, institution and country of origin, journals, with its impact factor (IF) and quartile, number of citations, study design, study topic, and level of evidence (LOE).

Results: The mean citation count of the T100 dental articles on COVID-19 was 32.77 ± 97.31. The T100 dental articles were published in 43 different journals. The number of citations was positively correlated with journal IF ($p<0.05$; Spearman's rank test). Four papers were cited more than 100 times. Although 521 authors from 32 different countries contributed to the articles, only 28% had international collaborations. The most productive countries were the USA and China. Of the T100 articles, 50% were of LOE VII and 32% LOE V. The most common study type was narrative reviews (n=38) followed by cross-sectional studies (n=26).

Conclusion: This bibliometric analysis of the T100 dental articles on COVID-19 presents the current status, relationships between disciplines, and popular research trends. According to our analysis, the majority of the published articles are of low level of evidence. The establishment of further international cooperation between researchers may improve the scientific quality of future dentistry articles on COVID-19.

Keywords: Bibliometric analysis; coronavirus; dentistry; SARS-CoV-2

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Introduction

Coronavirus disease 2019 (COVID-19), caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) virus, was initially identified in Wuhan city of China in December 2019.[1] This highly contagious disease spread around the world, and on 11 March 2020, the World Health Organization declared a pandemic.[1]

Researchers quickly responded against this new condition, and a significant amount of information, recommendations, and articles in the field of dentistry on COVID-19 have been published since the beginning of the disease. However, it is very difficult for readers to rapidly identify the most influential articles among this large amount of publications.

Citation analysis is a bibliometric analysis method of evaluating the impact of an article in a particular field.[2] The bibliometric analysis combines science with statistical and mathematical methods to provide reliable and objective information for analyzing the quality of scientific research and investigates future directions of research that can help to create specific public healthcare plans.[3]

Bibliometric methods have been widely used in the field of dentistry.[2,4] However, to date, a study of the top-cited dental articles on COVID-19 has not been published. Therefore, the aim of this study was to identify the bibliometric characteristics of the top 100 most cited (T100) dental articles on COVID-19 and to discover popular trends for future studies.

Materials and Method

Search strategy and data analysis

To examine the T100 dental articles on COVID-19, an electronic literature search was performed by the Web of Science Core Collection (WoSCC) database (Clarivate Analytics, Philadelphia, PA, USA) on 19 May 2021. The keywords used for the search were "COVID-19" OR "SARS-CoV-2" OR "coronavirus disease-19" OR "2019-nCoV" OR "coronavirus disease 2019" OR "covid-19" AND "dental" as the "topic" (title, abstract, author's keywords, and KeyWords Plus). The search was further refined by publication years "2019 OR 2021", research area "dentistry oral surgery medicine", and document type "article OR review article" with no limitation on languages. Letters, editorials, commentaries, technical notes, opinions, news, or perspectives were excluded from this research. Thus, 519 articles were obtained, and by using the option "Times Cited" in the WoS, the results were ranked in descending order based on their citation counts. Two researchers screened the data simultaneously, but did not evaluate the results independently (title, abstract, and full text of each article) and selected the T100 dental articles among these results. The final lists of the articles were compared and in case of discrepancy, the full-text of the articles were jointly evaluated, and a consensus was reached after discussion. Only 6 articles were excluded based on the exclusion criteria. Those articles were replaced by the following one to keep a sample size of 100. The overall search and data download was completed on the same day to prevent discrepancies between daily database updates.

Bibliometric analysis

The following bibliometric parameters from WoSCC of each article were extracted: publication title, publication date, journal title, authorship, institution (as defined by the corresponding author), type of institution (public health service, university, private practice), country of the origin of the study (as defined by the corresponding author), funding status (funded or not funded), journal quartile (Q) and impact factor (IF) (from the current Clarivate journal citation reports 2019), WoSCC citation count, language, and author keywords.[2] Each full text of an article was further reviewed for the study design and level of evidence (LOE) as described by Jacimovic *et al*.[5] An internal pilot study was carried out to calibrate researchers in assessing LOE. The researchers independently determined randomly selected articles in rounds of 15, until a significant agreement was reached (weighed kappa statistics, $\kappa \geq 0.81$) and the rest of the articles were scored by one researcher.[6]

Finally, WoSCC data of the T100 articles were imported into the VOSviewer software (version 1.6.10) (Centre for Science and Technology Studies, Leiden University, Leiden, Netherlands), for bibliographic coupling, co-authorship, and co-occurrence analyses.[7] The names of the countries were manually normalized to remove transcription errors for specific terms. Publications were further reclassified from Taiwan to China, and from England, Scotland, and Wales to the United Kingdom (UK).

Statistical analysis

Descriptive statistics were presented with percentage, frequency, mean (and standard deviation, SD), percentage, or median (range). The normality assumption was checked with the Shapiro-Wilk Test. Spearman's rank correlation coefficient was used to determine the correlations. All calculations were performed in IBM SPSS Statistics, Version 23.0 (IBM Corp., Armonk, NY, USA). The significance level was set to $p < 0.05$.

Results

The T100 dental articles on COVID-19 were published between February 2020 and April 2021. The total citations of these articles were 3277 times with average citations per document of 32.77 ± 97.31 (median 9.5; range 4–750). There were 65 original articles and 35 reviews with the total number of citations 30.77 ± 103.28 (median 8; range 4-750) and 36.49 ± 86.45 (median 8; range 4-504), respectively. There were no significant differences in the total citations between original articles and reviews ($p>0.05$). Table 1 shows a list of the top ten most-cited dental articles on COVID-19. The top most-cited article, a cross-sectional study, with 750 citations was "High expression of ACE2 receptor of 2019-nCoV on the epithelial cells of oral mucosa" by Xu *et al*.[8] which was published in the "International of Journal of Oral Science" in February 2020. All T100 articles were published in English and funding was reported in 26 articles.

Authors

A total of 521 authors contributed to the T100 articles. The number of authors on each highly cited article varied from 1 to 30 authors with a mean of 5.53 ± 3.73 (median 5). The number of publications per author ranged from 1 to 4 with a mean number of 1.06 ± 0.27. Four articles were written by a single author and nine by two authors. The most productive author was Samaranayake LP (n=4), followed by Liu X (n=3) and Tan J (n=3). In terms of the total citation count, the most cited authors were Chen Q *et al*. who received 750 citations. Of the 521 authors, only 134 (28%) had international collaborations. Cascone P, from Italy was the author who had the most partnership with other authors (n=33).

Countries

According to the institutional address of the corresponding author, the T100 articles were published from 32 countries (Table 2). Among these, the United States of America (USA) (n=24) and China (n=18) contributed to the majority of the publications. Fourteen countries had only one publication and five had two publications. In terms of citations, China had the highest

number of citations (1965 citations) followed by the USA (529 citations). Of the T100 articles, only 24% have international collaborations. From these articles, the highest level of international collaboration was achieved only in two papers with authors from seven countries, while fourteen were the result of cooperation between two countries. The international collaboration network between 32 of 26 countries based on the number of articles produced by the country is shown in Figure 1. Analysis of international collaborations showed that the USA had the highest number of cooperations followed by China and Italy.

Institutions

Among 218 institutions, the greatest contribution was made by the Sichuan University (China), the University of Hong Kong (China), the University of São Paulo (Brazil), and the University of Sharjah (United Arab Emirates) each with four publications. According to total citation counts, the Sichuan University (1336 citations) and Wuhan University (425 citations) from China were the most cited institutions. The majority of included articles were conducted in universities (64%) and followed by public health services (18%). When concerning the collaboration type, 26 articles came from independent institutions, 19 from inter-institutional collaborations within the same university, 31 from multi-university collaboration within the same country, and 24 articles were the product of international collaborations. For the analysis of social relationships of institutions of the 218 institutions, only 10% had international collaborations.

Journals

The T100 articles were published in 43 journals (Table 3). The number of publications per journal varied from 1 to 10 with a mean of 2.3 ± 2.3. Twenty-four (56%) journals contributed only a single article and nine (21%)

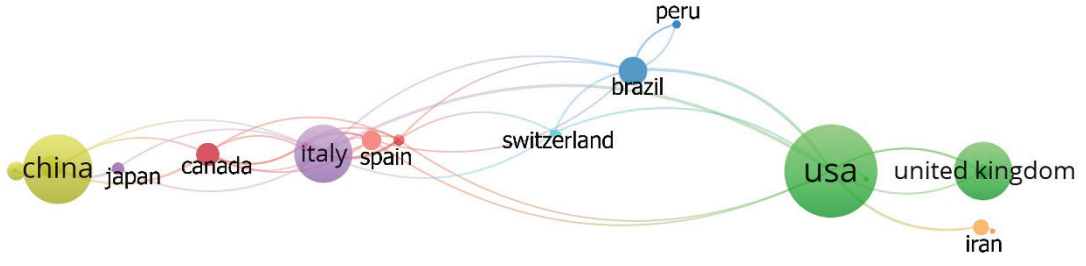

Figure 1. *The co-authorship analysis of the countries The size of each node indicates the number of documents produced by the country. The links between nodes reflects the international collaborations between countries. The thickness of each link indicates the strength (or frequency) of the collaboration relationship between two countries. The color of lines and nodes represent different clusters.*

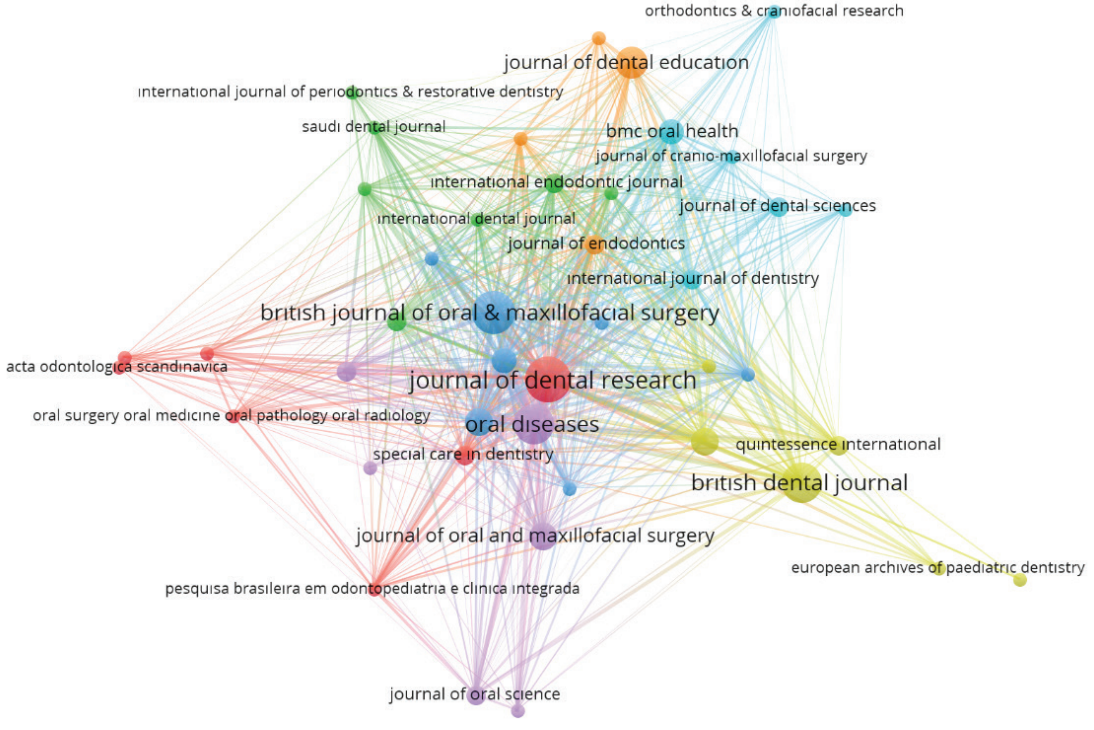

Figure 2. *Bibliographic coupling analysis of the 43 journals on COVID-19 The line between two nodes in the figure represents that two journals had established a similarity relationship. The thicker the line, the closer the link between two journals.*

contributed two articles. Journal of Dental Research has the most publications (n=10), which is followed by the British Journal of Oral & Maxillofacial Surgery (n=9). According to citations, articles published in the International Journal of Oral Science (n=3, citations 1,314) and Journal of Dental Research (n=10, citations 537) had the highest number of average citations. The number of citations was positively correlated with journal IF (r=0.241, p<0.05). Of the 43 journals, twelve had no IF and were listed on the Clarivate Analytics' Emerging Sources Citation Index. According to the quartile scores of the journals, 37% of the articles were published in Q1, 9% in Q2, 14% in Q3, and 28% in Q4. The bibliographic coupling analysis of 43 journals is presented in Figure 2. The top two core journals with large total link strength (TLS) were Journal of Dental Research (TLS=1,079 times) and Oral Diseases (TLS=915 times).

Study design and level of evidence

The study design of the T100 articles is summarized in Table 4. There were no significant differences between the study design groups in terms of the mean of citations (p>0.05). Of the T100 articles, only one article was LOE I (systematic review of randomized controlled clinical trials), 50 articles were LOE VII (narrative literature reviews, systematic review of narrative reviews), 32 articles were LOE V (cross-sectional studies, case reports, systematic reviews of cross-sectional studies), and 17 LOE 0 (*in vitro* and simulation studies, short communications, mathematical modeling).

Keywords

Research hot topics for the T100 articles were obtained from the author-keywords. Keywords that occurred more than two times in the WoSCC were enrolled in the final analysis. Of the 212 keywords, 51 met the threshold. The keywords that appeared most were "COVID-19" (n=51, TLS=126), "Sars-cov-2" (n=26, TLS=75), "coronavirus" (n=21, TLS=67), "dentistry" (n=11, TLS=35), "pandemic" (n=11, TLS=32), and "saliva" (n=8, TLS=23). A network map of the trend topics according to the frequency of appearance of the keywords is presented in Figure 3.

Discussion

The present study is the first that comprehensively evaluated the characteristics of the T100 dental articles on COVID-19. The most important finding of this study is that although 521 authors from 32 countries and 218 different institutions have contributed to T100 articles, their international scientific cooperation is weak (28%). While universities acted as the main force participating in these publications, analysis of international collaborations between institutions showed that only 10% of institutions had collaborations. Given the global scale of the problem, collaborations between researchers are crucial for the prevention and control of the epidemic.[9]

The present study showed that the majority of T100 articles originate from the USA (Table 2). This is in line with similar bibliometric studies published in medical science.[10,11] In terms of total citation frequency, the highest number of citations originate from China followed by the USA. This finding is not surprising, given that China, especially Wuhan, is the country where the virus originated[1]; therefore, the researchers in China probably started research earlier than the rest of the world.

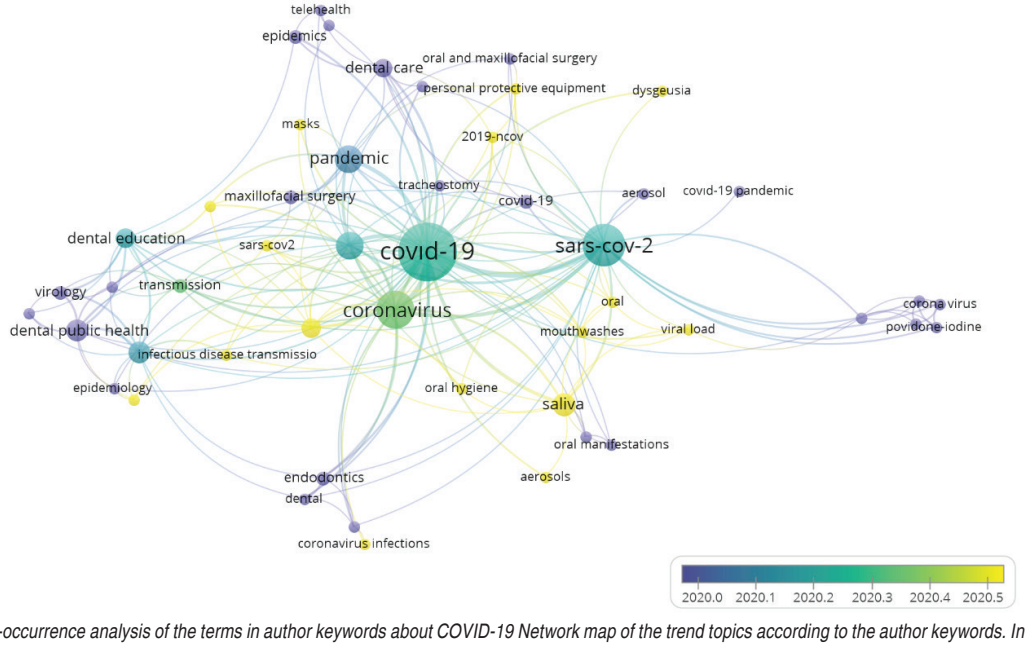

Figure 3. *Co-occurrence analysis of the terms in author keywords about COVID-19 Network map of the trend topics according to the author keywords. Indicator shows the current publications from purple to yellow.*

Table 1. *The top 10 most cited dental articles on Covid-19*

Rank	First author	Title	Journal name	Quartile	IF	C	Study Design	LOE
1	Xu, H *et al.*	High expression of ACE2 receptor of 2019-nCoV on the epithelial cells of oral mucosa	Int J Oral Sci	Q1	3.047	750	Cross-sectional	V
2	Peng, X *et al.*	Transmission routes of 2019-nCoV and controls in dental practice	Int J Oral Sci	Q1	3.047	504	Narrative review	VII
3	Meng, L *et al.*	Coronavirus Disease 2019 (COVID-19): Emerging and Future Challenges for Dental and Oral Medicine	J Dent Res	Q1	4.914	399	Narrative review	VII
4	Ather, A *et al.*	Coronavirus Disease 19 (COVID-19): Implications for Clinical Dental Care	J Endod	Q1	3.118	149	Narrative review	VII
5	Izzetti, R *et al.*	COVID-19 Transmission in Dental Practice: Brief Review of Preventive Measures in Italy	J Dent Res	Q1	4.914	84	Systemic review of narrative reviewers	VII
6	Guo, HQ *et al.*	The impact of the COVID-19 epidemic on the utilization of emergency dental services	J Dental Sci	Q4	1.034	78	Short coımunication	0
7	Iyer, P *et al.*	Impact of COVID-19 on dental education in the United States	J Dent Educ	Q4	1.322	60	Narrative review	VII
8	Xu, RS *et al.*	Saliva: potential diagnostic value and transmission of 2019-nCoV	Int J Oral Sci	Q1	3.047	60	Narrative review	VII
9	Carreras-Presas, CM *et al* .	Oral vesiculobullous lesions associated with SARS-CoV-2 infection	Oral Dis	Q1	2.613	55	Short coımunication	0
10	Zimmermann, M *et al.*	Approaches to the management of patients in oral and maxillofacial surgery during COVID-19 pandemic	J Cranio-MaxilloFac Surg	Q3	1.766	48	Systemic review of narrative reviewers	VII

IF: journal impact factor (2019; C: Citation number by WoSCC, LOE: Level of evidence

Table 2. *Countries of origin of the 100 most cited dental articles on Covid-19*

Country	Number of documents	WoSCC citations
USA	24	529
China	18	1965
United Kingdom	15	127
Italy	15	212
Brazil	7	62
Canada	6	61
India	6	76
Spain	5	110
United Arab Emirates	5	58
Saudi Arabia	4	65
Iran	4	87
France	3	23
Japan	3	14
Germany	2	28
Netherlands	2	33
Pakistan	2	19
Peru	2	14
Switzerland	2	15
Austria	1	48
Belgium	1	11
Colombia	1	7
Greece	1	11
Mexico	1	7
Poland	1	18
Qatar	1	6
South Africa	1	11
South Korea	1	28
Sri Lanka	1	7
Sweden	1	8
Thailand	1	5
Ireland	1	5
Israel	1	14

When we summarize the study design of the T100 articles, the majority of them were narrative reviews (38%) (Table 4). This could be due to the current limitation in our understanding of the disease. Following narrative reviews, there were 26 cross-sectional studies, of which more than half were surveys. Although surveys are not the highest source of evidence, they gather expeditious baseline data and may be important to identify trends. There were also 11 short communications mainly consisting of case reports and retrospective clinic evaluations. The high prevalence of COVID-19 and virus-related unknowns may have prompted researchers to select short communication as the fastest way to disseminate scientific information.

According to our results, the overall LOE of the T100 articles on COVID-19 is low. This result is in line with Jacimovic *et al*.[5] Most of the included articles of this study were LOE VII followed by LOE V. There were no randomized controlled trial studies. This result is likely due to insufficient time and availability of clinical data to design such trials within the early phase of the pandemic and it is in line with the results presented by Fidahic *et al*.[12]

Interestingly, the top four articles of the present study had a citation count of greater than 100, making them citation classics.[13] However, citations are known to be time-dependent,[14] so the rapid increase of citations of publications included in this study during a relatively short period of time can be explained by the unprecedented focus of researchers around the world on a single topic. Furthermore, there was a weak but significant association between citation counts and journal impact factors ($r=0.241$) ($p<0.05$). Gai *et al*.[15] also reported that the pandemic-related articles have different impact metrics and article characteristics as compared to non-COVID studies.

Table 3. *Journals in which the 100 most cited dental articles on Covid-19 were published*

Journal name	Number of articles	WoSCC citations
Journal of Dental Research	10	537
British Journal of Oral and Maxillofacial Surgery	9	77
British Dental Journal	8	68
Oral Diseases	8	178
Journal of Dental Education	5	87
Clinical Oral Investigations	4	70
Journal of Oral and Maxillofacial Surgery	4	31
Oral Oncology	4	109
BMC Oral Health	3	20
International Journal of Oral Science	3	1314
Journal of Dental Sciences	2	83
Journal of Dentistry	2	32
Journal of Endodontics	2	171
Journal of Oral Science	2	9
Journal of Prosthodontics: Implant, Esthetic, and Reconstructive Dentistry	2	59
Quintessence International	2	19
Special Care in Dentistry	2	16
International Endodontic Journal	2	19
International Journal of Dentistry	2	13
Acta Odontologica Scandinavica	1	8
American Journal of Dentistry	1	16
American Journal of Orthodontics and Dentofacial Orthopedics	1	11
Angle Orthodontist	1	12
Chinese Journal of Dental Research	1	21
Clinical and Experimental Dental Research	1	5
Dental and Medical Problems	1	39
European Archives of Paediatric Dentistry	1	8
European Journal of Dental Education	1	7
European Journal of Paediatric Dentistry	1	5
Giornale Italiano di Endodonzia	1	5
Journal of Cranio-Maxillofacial Surgery	1	48
Journal of Oral Rehabilitation	1	6
Journal of Stomatology, Oral and Maxillofacial Surgery	1	5
Journal of the American Dental Association	1	17
Maxillofacial Plastic and Reconstructive Surgery	1	28
Molecular Oral Microbiology	1	22
Oral Surgery, Oral Medicine, Oral Pathology and Oral Radiology	1	13
Orthodontics and Craniofacial Research	1	10
Pesquisa Brasileira em Odontopediatria e Clinica Integrada	1	5
Saudi Dental Journal	1	44
International Dental Journal	1	12
International Journal of Oral and Maxillofacial Surgery	1	12
International Journal of Periodontics and Restorative Dentistry	1	6

Table 4. *Study design and the number of citations of the 100 most-cited dental articles on COVID-19*

Study design	n	Mean ± standart deviation
Narrative review	38	43.16 ± 101.72
Cross-sectional	26	37.77 ± 145.45
Systematic reviews of narrative literature reviews	12	19.83 ± 23.43
Short communication	11	22.73 ± 23.75
Systematic review of cross-sectional studies	4	11 ± 5.35
Mathematical modeling	3	10 ± 8.72
In vitro study	2	29.50 ± 7.78
Case report	2	10 ± 4.24
Systemic review of randomized controlled clinical trials	1	8
Simulation study	1	6

When research hot topics of the T100 articles were analyzed, as expected, the initial studies mainly focus on the epidemic transmission dynamics, prevention, and control measures of COVID-19 during dental procedures. Attention was also paid to the psychological state of dental practitioners, students, and patients. A retrospective clinical study from China reported that the COVID-19 outbreak significantly affected the behavior of patients seeking dental care and greatly altered the distribution of dental disorders.[16]

Due to the continuous increase in scientific progress in understanding SARS-CoV-2, the keywords mouthwashes, viral load, saliva, oral health, and dental education have become more popular topics after March 2020 (Figure 3). For example, as Xu *et al*.[8] provided data on the presence of the angiotensin-converting enzyme 2 (ACE2) host cell receptor for SARS-CoV-2 in the oral tissues in February 2020. Eight articles of this study focused on the viricidal activity of oral rinses that target the lipid envelope of SARS- CoV-2 (mainly hydrogen-peroxide and povidone-iodine) to reduce the viral load and transmission of the virus during dental procedures. A comprehensive systematic review with meta-analysis published in July 2020 reported that the use of pre-procedural chlorhexidine mouth rinse was the most effective strategy to reduce the bacterial load during aerosol-generated dental procedures.[17]

Saliva and its diagnostic efficiency is the other most popular topic evaluated in nine articles of this study published after March 2020. In a short communication, Azzi *et al*.[18] reported two patients with COVID-19 showing positive salivary samples but negative throat swabs at the same time. More recently, a systematic review consisting of evidence from the clinical trials suggested that further studies with larger cohorts are needed during different stages of COVID19 infection to confirm the accuracy of COVID-19 diagnosis with saliva.[19] Due to the limitations of the existing evidence, saliva and possibly other biological fluids may become one of the main focus areas of research in the near future.

The clinical characteristics of oral manifestations in patients with COVID-19 have also attracted the attention of researchers. Three case series of this study reported ulcerative and vesiculobullous lesions on the oral mucosa in patients with COVID-19.[20-22] However, the authors highlighted the need for further studies to assess whether oral manifestations are common in COVID-19 patients or if the emotional distress of the situation itself could trigger such lesions.[20]

Since ACE2 is expressed in epithelial cells of the tongue and salivary glands, loss of taste (dysgeusia hypogeusia, ageusia), an early symptom involved with SARS-CoV-2 infection,[23] is another topic investigated. A recent systematic review with meta-analysis reported that taste alterations were the most prevalent reported oral manifestation than oral symptoms.[24] The possible impact of oral health and periodontal disease on COVID-19 complications was also discussed in five articles of this study. Future studies may also focus on the pathogenic and immunologic effects of SARS-CoV-2 and possibly the medications used in this disease on oral tissues. Additionally, six articles of this study also reported limitations and suggestions to improve dental education during the lockdown of institutions due to COVID-19. Researchers may also consider strategies to fill the gaps in dental education for future studies.

This study has some limitations. First, the authors searched only one scientific database. However, the WoSCC is one of the main databases of literature searches and bibliometric analysis.[25] Secondly, limitations used in the search strategy of this study may narrow the view of publication landscapes. However, such a focus may provide a more comprehensive understanding of the trends in research taking place and identify the gaps in these aspects. Lastly although not a methodological limitation, the database updates continuously and the number of citations will change over time. However, this limitation is present in all bibliometric analyses.[2]

Conclusion

Within the limitations, the present study is the first bibliometric analysis of the T100 dental articles on COVID-19. According to the results of this study, the co-authorship network of the T100 dental articles on COVID-19 is not sufficiently strong. The establishment of international collaborations among researchers may improve the level of evidence of research on COVID-19 and can be beneficial in policy setting for preventive and control measures in dental practices for future public health crises.

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COVID-19 ile ilgili en çok atıf alan 100 dental makalenin bibliyometrik analizi

Özet

Amaç: Bu çalışmada, COVID-19 ile ilgili en çok atıf alan 100 dental makalenin bibliyometrik olarak karakterize edilmesi amaçlandı.

Gereç ve Yöntem: Çalışma kapsamında değerlendirilecek olan COVID-19 ile ilgili en çok atıf alan 100 dental makale, 19 Mayıs 2021 tarihinde, Web of Science Core Collection veri tabanındaki "Diş Hekimliği, Ağız Cerrahisi ve Tıp" kategorisi taranarak belirlendi. Araştırmaya dahil edilen 100 dental makale; makale başlığı, yayın tarihi, yazar sayısı, ait olduğu kurum ve ülkesi, yayımlandığı dergi ismi, derginin etki faktörü ve çeyrek dilimi, atıf sayısı, çalışma tasarımı, çalışma konusu, ve kanıt düzeyi açısından bibliyometrik analiz yöntemi ile değerlendirildi.

Bulgular: COVID-19 ile ilgili en çok atıf alan 100 dental makalenin ortalama atıf sayısı 32.77 ± 97.31 idi. Bu makaleler 43 farklı dergide yayınlanmıştı. Makale başına atıf sayısı ve dergi etki faktörü arasında pozitif bir korelasyon vardı ($p<0.05$; Spearman's rank testi). Dört makalenin atıf sayısı 100'den fazla idi. Otuz-iki ülkeden, 521 farklı yazar makalelere katkı sağlamış olsa da, makalelerin sadece %28'sinde uluslararası işbirliği vardı. En fazla yayın sayısı olan ülkeler ABD ve Çin olarak tespit edildi. Makalelerin %50'si VII ve %32'si V kanıt düzeyine sahipti. En fazla çalışma tasarımının geleneksel derleme (n=38), ve kesitsel çalışmalar (n=26) olduğu belirlendi.

Sonuç: COVID-19 ile ilgili en çok atıf alan 100 dental makalenin bibliyometrik olarak incelendiği bu çalışma; mevcut durumu, farklı disiplinler arası ilişkileri ve popüler araştırma eğilimlerini sunmaktadır. Analizimize göre, yayınlanan makalelerin çoğunluğu düşük kanıt düzeyine sahiptir. Araştırmacılar arasında daha fazla uluslararası işbirliğinin kurulması, COVID-19 ile ilgili gelecekteki diş hekimliği makalelerinin bilimsel kalitesini arttırabilir.

Anahtar Kelimeler: Bibliyometrik analiz; diş hekimliği; koronavirus; SARS-CoV-2

