



## Scientific Research Report

## A Scientometric Analysis of Scholarly Output on COVID-19 and Dentistry

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## ARTICLE INFO

## Article history:

Received 22 March 2022

Received in revised form

4 April 2022

Accepted 7 April 2022

Available online 14 April 2022

## Key words:

COVID-19

Scholarly output

Scientometrics

## ABSTRACT

**Introduction:** Scientometrics is a discipline that allows the analysis of the characteristics of publications in each field of knowledge using different indicators. The aim of this research was to analyse world scientific publication as to COVID-19 related to dentistry.

**Methods:** A specialised search strategy was used to obtain all the documents published in journals indexed in the Scopus database between December 2019 and February 2022. The study variables were exported and analysed in SciVal (Elsevier).

**Results:** In all, 2071 documents were retrieved; of those, *Oral Diseases* has the highest impact with an average of 12.3 citations per publication, and the *British Medical Journal* was identified as the journal with the highest scientific output (107). India (292) and the UK (287) were the countries with the most published papers. The Universidade de São Paulo in Brazil was the institution with the highest number of published papers (61) and with the highest impact.

**Conclusions:** During the pandemic, scientific publications on dentistry and COVID-19 have been increasing considerably. International collaboration has the highest percentage of publications whilst India and the UK are the countries with the highest scientific production.

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## Introduction

In 2020, the World Health Organisation declared COVID-19 a pandemic, and to date it has had a great impact worldwide,<sup>1,2</sup> infecting more than 420 million people and generating more than 5 million deaths around the world.<sup>3</sup> In addition, it has generated a great economic and social crisis and has especially affected the health systems of all the countries in the world.<sup>2,4,5</sup> For the same reasons, attempts have been made to

identify the means of contagion, finding that COVID-19 is transmitted through different mechanisms such as direct transmission, by contact, and by air through aerosols; in turn, it has been identified that viral excretion occurs in the respiratory tract, stool, urine, and salivary secretions.<sup>6,7</sup>

The latter is of particular interest in the dental setting because of its relationship with saliva and transmission routes. Previous studies have reported that saliva may not only serve as a noninvasive specimen with potential for the diagnosis, follow-up, and monitoring of patients with COVID-19<sup>8,9</sup> but also increase the possibility of infection during interventions that result in the spraying of saliva particles into the air and that special care should therefore be taken.<sup>10,11</sup> In

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<https://doi.org/10.1016/j.identj.2022.04.007>

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addition to this, COVID-19 is also important in the dental area due to the proximity of personnel to the main areas of contagion such as the mouth and respiratory tract.<sup>11,12</sup> All these relationships of COVID-19 within the dental field have generated new research opportunities and new frontiers of knowledge.<sup>13,14</sup> Thus, an analysis of scientific production, impact, and other indicators such as collaboration or number of documents is necessary with respect to trends in research on COVID-19 and the dental field.

Bibliometric studies make it possible to analyse trends in publications on a specific topic or institutions,<sup>15</sup> to measure the quality of publications, and to establish plans for better development.<sup>16</sup> This type of study has become more relevant due to the continuous growth of scientific production in the world.

Therefore, the aim of this bibliometric study is to analyse world scientific production in dentistry related to COVID-19 in Scopus in recent years (2020-2022).

## Materials and methods

### Study design

We performed a bibliometric analysis of all COVID-19-related papers in the area of dentistry that were published in the Scopus database between December 2019 and February 2022, without language restriction. The sample size of our study was the data generated during that period.

### Data collection

On February 10, 2022, a bibliographic search was performed using the controlled MeSH (Medical Subject Headings) and free terms related to "COVID-19" and "Dentistry"; in addition, the Boolean operators "OR" and "AND" were used, and the title, abstract, and keywords of each publication were used as search fields (Supplementary material 1).

### Scientometric analysis

The results obtained were exported to SciVal (<https://www.scival.com/>), which comprises 4 sections for information analysis, namely: general, comparative evaluation, collaboration, and trends. With this system, it was possible to analyse

the following variables: number of publications, fields of study, institutions, countries, type of collaboration, keywords, and authors with the highest scientific production. These data are described through absolute values and percentages in descriptive tables. In turn, frequencies and percentages were calculated for each study variable.

Finally, VOSviewer (Leiden University) was used to visualise collaborative networks in scientific production worldwide. This software allows the co-occurrence of collaborations to be plotted.

No ethics committee approval was required since the data are publicly accessible in the Scopus database and no humans are involved.

## Results

A total of 2071 documents were collected during the study period. Most of these documents were in the following subcategories (more than 100 publications): general dentistry (1281 publications), oral surgery (410), and dentistry (miscellaneous) (123).

### Bibliometric indicators of production and impact

*British Dental Journal* is the journal with the highest production, followed by *Oral Oncology* and *Journal of Dental Education* with 107, 87, and 85 papers, respectively. However, of the 10 journals with the highest production, *Oral Diseases* has the highest impact, with an average of 12.3 citations per publication (Table 1).

### Documents published according to CiteScore Quartile

During the study period, there was a higher number of documents in Q3 journals, whilst during 2021, there was a higher count in Q2 journals (Table 2).

### Top 10 countries publishing

India was the country with the highest number of published papers (292), followed by the UK (287) and the US (270); however, it is China that presents the highest number of citations (20.36) and therefore has the highest impact worldwide with a field-weighted citation impact (FWCI) of 38.82 (Table 3).

**Table 1 – Bibliometric indicators of production and impact on journals.**

Rank	Journals	Quartile	Scimago journal rank	Documents	Citations	Citations per document	CiteScore 2020
1	<i>British Dental Journal</i>	Q3	0.4	107	458	4.3	1.4
2	<i>Oral Oncology</i>	Q1	1.6	87	791	9.1	6.8
3	<i>Journal of Dental Education</i>	Q2	0.4	85	567	6.7	2.3
4	<i>British Journal of Oral and Maxillofacial Surgery</i>	Q2	0.8	81	525	6.5	2.0
5	<i>International Journal of Current Research and Review</i>	Q3	0.1	56	22	0.4	0.2
6	<i>Oral Diseases</i>	Q1	1.0	51	628	12.3	4.6
7	<i>Journal of Oral and Maxillofacial Surgery</i>	Q2	0.8	51	242	4.7	2.8
8	<i>Dental Update</i>	Q3	0.2	48	40	0.8	0.5
9	<i>Journal of the American Dental Association</i>	Q2	0.5	45	203	4.5	4.2
10	<i>BMC Oral Health</i>	Q1	0.9	40	184	4.6	3.2

**Table 2 – Documents published according CiteScore Quartile.**

CiteScore Quartile	2019	2020	2021	2022*	Total No. (%)
Q1	0	198	267	22	487 (23.5)
Q2	0	161	278	12	451 (21.8)
Q3	1	235	232	9	477 (23)
Q4	1	189	130	5	325 (15.7)

\* Data updated as of February 10.

### Top 10 authors publishing

Lakshman Samaranayake, Peter Brennan, and Shankargouda Patil were the authors with the highest production with 23, 19, and 17 publications, respectively. However, Paulo Bonan was the author with the highest impact (11.9 citations per paper) with 9 publications. It should be noted

that 4 of the 10 authors with the highest production were Brazilian (Table 4).

### Top 10 productive institutions

The Universidade de São Paulo in Brazil was the institution with the highest number of published papers (61) and the highest impact, with 592 citations and 9.7 citations per paper. It should be noted that, of the 10 most productive institutions, 2 are Brazilian (Universidade de São Paulo and Universidade Estadual de Campinas) and 2 are North American (University of Pennsylvania and Harvard University) (Table 5).

### Discussion











The COVID-19 pandemic has had a great impact on all fields of scientific knowledge, including dentistry. This topic has

**Table 3 – Top 10 countries publishing on COVID-19 and dentistry.**

Rank	Countries/regions	Scholarly output	View count	Citation count	FWCI
1	India 	292	3542	2	744
2	United Kingdom 	287	4015	3.59	1663
3	United States 	270	5689	5.8	2500
4	Brazil 	167	3953	5.02	1342
5	Italy 	132	3679	6.67	1335
6	Saudi Arabia 	105	1738	2.91	548
7	China 	62	3861	20.36	3882
8	Canada 	49	1108	8.09	649
9	Spain 	49	1258	8.05	522
10	Iran 	46	1321	3.4	335

FWCI, field-weighted citation impact.

**Table 4 – Top 10 authors publishing on COVID-19 and dentistry.**

Rank	Author	Documents n (%)	Total citations	Citations per document	h-Index	FWCI	Country
1	Samaranayake, Lakshman Perera	23 (1.1)	134	5.8	56	3.0	
2	Brennan, Peter A.	19 (0.9)	158	8.3	35	4.8	
3	Patil, Shankargouda	17 (0.8)	51	3.0	18	1.4	
4	Martelli-Júnior, Hercílio	16 (0.8)	113	7.1	27	2.2	
5	Sarode, Sachin Chakradhar	15 (0.7)	27	1.8	20	0.8	
6	Sarode, Gargi Sachin	15 (0.7)	27	1.8	19	0.8	
7	Machado, Renato Assis	15 (0.7)	112	7.5	10	2.2	
8	Da Cruz Perez, D.E.	9 (0.4)	71	7.9	21	1.6	
9	Bonan, Paulo Rogério Ferreti	9 (0.4)	107	11.9	16	3.1	
10	Fakhruddin, Kausar Sadia	8 (0.4)	58	7.3	9	2.4	











FWCI, field-weighted citation impact.

had a steady increase in publications during the pandemic that need to be reviewed and updated. By means of a comprehensive bibliometric analysis, the aim of the present study was to collect characteristics of published papers, as well as

institutions, authors, countries, and journals during the COVID-19 pandemic.<sup>1-4</sup>

Bibliometric studies allow a global analysis of the scientific production of a specific topic. Regarding the topic of COVID-

**Table 5 – Top 10 productive institutions on COVID-19 and dentistry.**

Rank	Institution (country)	Documents n (%)	Total citation	Authors	Citations per document	FWCI
1	 Universidade de São Paulo (Brazil)	61 (3.2)	592	118	9.7	6.5
2	 King's College London (United Kingdom)	55 (2.7)	399	109	7.3	5.0
3	 Saveetha University (India)	43 (2.5)	36	92	0.8	0.5
4	 Jazan University (Saudi Arabia)	34 (2.2)	111	21	3.3	2.0
5	 The University of Hong Kong (Hong Kong)	32 (2.2)	187	19	5.8	3.3
6	 Universidade Estadual de Campinas (Brazil)	32 (2.0)	272	43	8.5	5.9
7	 University of Pennsylvania (United States)	24 (2.0)	91	39	3.8	2.4
8	 University of Rome La Sapienza (Italy)	21 (1.9)	184	45	8.8	6.5
9	 University of Sharjah (United Arab Emirates)	19 (1.7)	132	25	6.9	3.5
10	 Harvard University (United States)	19 (1.5)	197	43	10.4	10.6

FWCI, field-weighted citation impact.

19 and dentistry, some previous bibliometric studies have been reported. One of them only used the PubMed database for its analysis<sup>17</sup> and another used more than one database (Web of Science, Scopus, and PubMed).<sup>18</sup> A third bibliometric study similarly to ours performed an analysis only on the Scopus database.<sup>19</sup> However, all 3 studies only covered analyses of publications up to 2020 and, because the topic of COVID-19 is constantly changing, a more updated analysis is needed.

*Oral Diseases* is the journal with the highest impact, achieving 12.3 citations per paper. However, *British Dental Journal* has the highest number of publications. This agrees with a bibliometric study carried out through the Medline database regarding publications on dentistry during the period 2009 to 2019, where it occupied the second position of greatest production.<sup>20</sup> This could indicate that this journal is always updated and is considered by the authors for publication. With respect to the quartile of journals, an upwards progression is observed from Q3 in 2020 to Q1 in February 2022. This could show that research on the impact of the pandemic on dentistry is increasingly being considered.

Regarding the production of each country, India is the country with the highest number of publications; however, it is China that presents the highest number of citations, which could indicate a greater impact worldwide. Something relevant to mention is that although China is one of the leaders in COVID-19 research and its different topics,<sup>21-23</sup> this is not the case in the dental field. This is in line with a previous bibliometric study that reported that China did not have the highest output on the dental and COVID-19 topic between 2019 and 2020.<sup>19</sup> However, it also contradicts another study that does consider China as one of the leaders in dental and COVID-19 scientific literature research.<sup>18</sup> One explanation could be that the latter study considered more than one database in its search.

Lakshman Samaranayake and Peter Brennan were the authors with the highest scientific output. This is in line with another previous review that analysed between 2019 and 2020 and found that they were also the 2 authors with the highest output, although with the order reversed.<sup>18</sup> This higher output is evident in the most recent publications by both authors, which covered topics of protective equipment and COVID-19 control in dental care,<sup>24-26</sup> viral load in saliva,<sup>27</sup> and a possible relationship between periodontal disease and risk of COVID-19 infection.<sup>28</sup> In addition to this, Paulo Bonan was the author with the greatest impact in publications, since some of the most recent ones were published in Q2 journals,<sup>29,30</sup> which would indicate their high quality.

Regarding the most productive institutions, Brazilian and American institutions were the most prolific. The Universidade de São Paulo from Brazil was the institution with the highest number of published papers, citations, and citations per paper, which would indicate a greater impact worldwide. This is in line with 2 previous bibliometrics that identified it as one of the 3 most productive institutions between 2019 and 2020,<sup>18,19</sup> indicating that it has increased its output, making it to date one of the institutions at the forefront of global research in this field.

All this would be evidence that the topic of COVID-19 in dentistry has a global extension, and institutions have

productively researched between different countries.<sup>21,31</sup> International collaborations should be encouraged as they allow research priorities to be addressed from different perspectives, in addition to encouraging the exchange of relevant information between countries.<sup>32</sup>

Our study has some limitations. First, only the last 4 years were analysed, thus including the most recent publications (2019-2022), which represent the totality of publications available on the subject in Scopus. Second, only bibliometric information from the Scopus database was used, which does not reflect the totality of publications on the subject and therefore could have omitted publications from journals not indexed in Scopus. However, the high-quality standards that Scopus demands of its indexed journals should be kept in mind.<sup>33</sup>

## Conclusions

During the pandemic, scientific publications on dentistry and COVID-19 have increased. India and the UK were the countries with the highest scientific production in this thematic area. Finally, Samaranayake was the most productive author in this field of knowledge.

## Conflict of interest

None disclosed.

## Supplementary materials

Supplementary material associated with this article can be found in the online version at <https://doi.org/10.1016/j.identj.2022.04.007>.

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