

Bibliometric Analyses of Global Scholarly Output in Dentistry Related to COVID-19

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ABSTRACT **Objective:** The aim of this study was to evaluate the bibliometric profile of dental scientific production related to coronavirus disease-2019 (COVID-19) in Scopus (2019–2020). **Materials and Methods:** This was a descriptive, observational, comparative, and retrospective study. All manuscripts on COVID-19 in dentistry were published between December 2019 and December 2020. The variables were measured objectively through Scopus (SciVal). For the extraction of the manuscripts, the following keywords were used: “Covid-19” and “Dentistry” with its multiple MeSH terms using the Boolean operators “OR” and “AND”. On June 14, 2021, 843 manuscripts corresponding to the period January 2019 to December 2020 were downloaded, normalized, and refined through metadata analysis. **Results:** The largest number of manuscripts was published in the *International Journal of Current Research and Review, Oral Oncology, Oral Diseases, British Dental Journal, and Journal of Dental Education* with 54, 50, 49, 48, and 44 manuscripts, respectively. These are the most productive indexed scientific journals on COVID-19. The most productive institutions were Saveetha University, *Universidade de São Paulo*, and King’s College London, with 42, 33, and 27 manuscripts, respectively. In 2019, there were only two scientific publications on COVID-19. In 2020, the largest amount, 228 manuscripts, were published in Q1 journals, followed by 210 manuscripts in Q3 journals, and only 194 manuscripts were published in Q4 journals. **Conclusions:** Currently, there is a notable increase in global academic production in Scopus on the impact of COVID-19 in dentistry, whereas Brazil is the only South American country with three highly productive universities.

KEYWORDS: *Bibliometric analysis, COVID-19, dentistry*

INTRODUCTION

The city of Wuhan in China has been the scene of the beginning (December 2019) of the appearance of a new disease that mainly affects the respiratory system.^[1] Researchers have identified that the virus responsible for this pandemic is severe acute respiratory syndrome coronavirus 2 (SARS CoV-2).^[2] Later, in 2020, the World Health Organization declared coronavirus disease-2019 (COVID-19) a pandemic. This disease has killed approximately 4,959,112 people and infected 244,210,069 worldwide.^[3-5] Coronavirus

disease is a rapidly spreading viral infection and is more contagious than SARS.^[6] The suggested route of transmission from person to person is through microdroplets in the air, and it is also spread when interacting with a person or a contaminated surface among other transmission routes such as the saliva. These transmission routes are alarming, as they

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are routes of COVID-19 infection in the dental environment.^[7]

A bibliometric analysis is needed that quantitatively examines some indicators of production, impact, and collaboration, such as number of documents, number of citations, collaboration rates, and co-authorship rate in order to offer a comprehensive evaluation based on trends of scientific research on COVID-19 in dentistry.^[8-10] The bibliometric study is important given the accelerated and continuous growth of the academic production of articles in the world. This approach allows the analysis of an emerging topic or field in the global panorama of knowledge and the evaluation of the evolution of research over time. In addition, it provides critical ideas on the most prolific authors, affiliations, countries, and institutions, within the field of interest.^[11-14]

Therefore, the purpose of this bibliometric study was to evaluate the bibliometric profile of the world scientific production in dentistry related to COVID-19 in Scopus (2019–2020).

MATERIALS AND METHODS

STUDY DESIGN

The study was a descriptive, observational, comparative, and retrospective study. The unit of analysis was composed of each scientific publication that appears in the Scopus database. All manuscripts on COVID-19 in dentistry published between December 2019 and December 2020 were selected for this reason, and it was not necessary to calculate a statistical sample. The variables were measured objectively using Scopus (Scival).

SEARCH STRATEGY

For the extraction of the manuscripts, the keywords were used: “Covid-19” and “Dentistry” with its multiple MeSH terms using the Boolean operators “OR” and “AND”. In the search fields, the title, abstract, and keywords were used to search all the manuscripts globally in these databases to raise bibliometric indicators.

The following formula was used in Scopus: (TITLE-ABS (“COVID 19” OR COVID-19 OR sars-cov-2 OR “sars cov-2” OR “sars cov 2” OR 2019-ncov OR “2019 ncov” OR “Coronavirus Disease-19” OR “Coronavirus Disease 19” OR “2019 Novel Coronavirus Disease” OR “2019 Novel Coronavirus” OR “SARS Coronavirus 2” OR “Severe Acute Respiratory Syndrome CoV 2” OR nCov-2019) OR AUTHKEY (“ COVID 19” OR COVID-19 OR sars-cov-2 OR “sars cov-2” OR “sars cov 2” OR 2019-ncov OR “2019

ncov” OR “Coronavirus Disease-19” OR “Coronavirus Disease 19” OR “2019 Novel Coronavirus Disease” OR “2019 Novel Coronavirus” OR “SARS Coronavirus 2” OR “Severe Acute Respiratory Syndrome CoV 2” OR nCov-2019)) AND SUBJAREA (dent) AND (LIMIT-TO (PUBYEAR, 2019) OR LIMIT-TO (PUBYEAR, 2020))

Inclusion criteria

1. Manuscripts on COVID-19 in journals indexed in Scopus
2. Manuscripts about COVID-19 in any language in Scopus
3. Manuscripts on COVID-19 of any methodological design in Scopus

Exclusion criteria

1. Manuscripts on COVID-19 in databases such as EMBASE, Web of Science, Scielo, PubMed.
2. Manuscripts on COVID-19 in areas that do not compromise dentistry
3. Manuscripts on COVID-19 in dentistry in years prior to 2020

DATA COLLECTION

For the elaboration of the descriptive analysis, the Microsoft Excel program was used where the means, standard deviation, and percentages of the numerical and categorical variables expressed in tables and graphs are tabulated. Scopus search tools were used for bibliometric calculations. On June 14, 2021, 843 manuscripts corresponding to the period January 2019 to December 2020 were downloaded, and refined through metadata analysis. The publications included article designs (413), letters (170), reviews (126), editorials (85), notes (39), errors (5), short surveys (3), and conference papers (2) [Figure 1].

STATISTICAL ANALYSIS

The search strategy was developed based on the individual profiles of each Peruvian institution that has a dental school or faculty. It was evaluated according to the AF-ID of each of the institutions in the Scopus database during the period 2019–2020. In addition, the information provided by the SciVal tool from Scopus was used, from which all statistical data corresponding to scientific production in dentistry in Peru were extracted. For data processing, the SciVal (Elsevier) system was used, which uses four different sections for the analysis of information, which include generalities, comparative evaluation, collaboration, and trends, within which the following sections could be analyzed: countries, institutions (academics, industry, government, hospitals, and others), authors, publications, subject fields, and magazines and

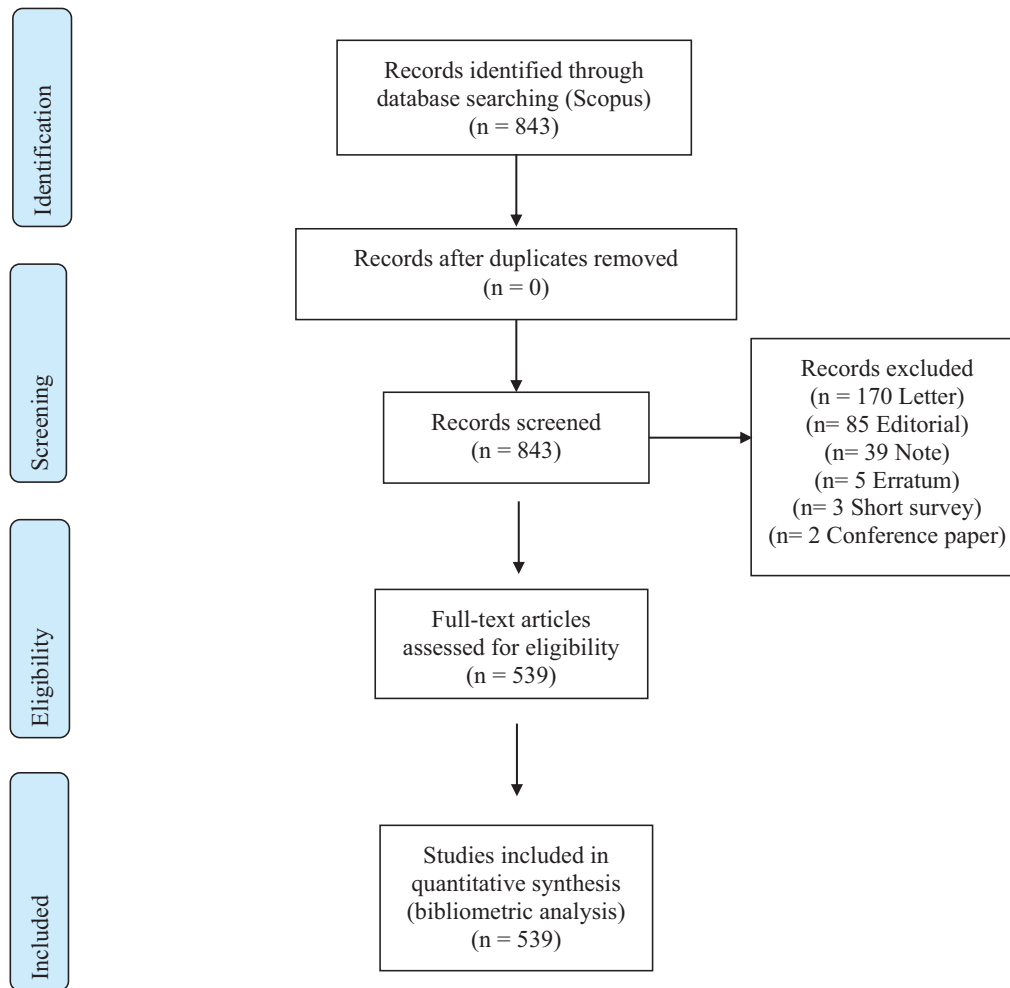


Figure 1: Flow diagram

the Microsoft Excel 2019 program. In addition, collaborative networks in scientific productions were analyzed using VOSviewer. Finally, descriptive statistics were performed to calculate frequencies and percentages for each study variable.

RESULTS

The *Journal of Dental Research* and the *Journal of Endodontics* had the highest impact with an average of 60.4 and 55 citations for each publication, respectively, as they are the most productive indexed scientific journals in COVID-19 in dentistry. Regarding the number of authors, *Oral Oncology*, *Oral Diseases*, *British Journal of Oral and Maxillofacial Surgery*, *Journal of Dental Education*, and *International Journal of Current Research and Review* were found to condense the highest number with 222, 218, 170, 140, and 116 researchers, respectively. However, according to the number of citations per publication, it revealed that *Journal of Dental Research*, *International Journal of Oral Science*, and *International Journal of Paediatric*

Dentistry had the highest number of citations per publication with 60.4, 57.3, and 31.5, respectively [Table 1].

The institutions with the highest number of citations per publication were Queen Mary University of London and the University of São Paulo with an average of 13.9 and 7.1 citations per publication. On the contrary, the most productive institutions were Saveetha University, Universidade de São Paulo and King's College London, with 42, 33 and 27 manuscripts, respectively. It is worth noting that three Brazilian universities were among the 10 institutions with the highest scientific production [Table 2].

Authors Martélli-Júnior, Hercílio and Machado, Renato Assis had the highest number of citations per publication with an average of 6.9 and 6.7, respectively. On the contrary, the most productive author was Patil, Shankargouda, who published 14 manuscripts, followed by Samaranayake, Lakshman Perera, and Machado, Renato Assis, who had 12 and

Table 1: Top 50 of scholarly output of dentistry schools in Scopus (2019–2020)

Scopus source	Citations per publication	Citations	Scholarly output	Authors	Citescore 2020	SCImago Journal Rank (SJR)
<i>Journal of Dental Research</i>	60.4	906	15	71	9.9	1.979
<i>Journal of Endodontics</i>	55	275	5	15	7.1	1.85
<i>Clinical Oral Investigations</i>	31.6	316	10	52	5	1.088
<i>Journal of Prosthodontics</i>	23.8	95	4	10	4.1	0.902
<i>Journal of Dental Sciences</i>	18.9	170	9	32	2.2	0.296
<i>International Endodontic Journal</i>	12.8	115	9	36	7.6	1.988
<i>Oral Oncology</i>	10.8	538	50	218	6.8	1.623
<i>European Journal of Dental Education</i>	9.1	91	10	63	2.5	0.583
<i>JDR Clinical and Translational Research</i>	8.4	59	7	17	3.2	0.86
<i>Journal of the American Dental Association</i>	8.4	42	5	18	4.2	0.52
<i>Journal of Oral Medicine and Oral Surgery</i>	8.4	42	5	12	0.3	0.115
<i>Journal of Oral and Maxillofacial Surgery</i>	8.1	130	16	47	2.8	0.752
<i>British Journal of Oral and Maxillofacial Surgery</i>	7.3	323	44	170	2	0.793
<i>British Dental Journal</i>	6.1	294	48	122	1.4	0.381
<i>Pesquisa odontologica brasileira</i>	6.1	147	24	94	3.4	0.847
<i>Journal of Dental Education</i>	5.8	256	44	140	2.3	0.53
<i>International Journal of Dentistry</i>	5.8	23	4	17	2.8	0.61
<i>BMC Oral Health</i>	5.5	60	11	63	3.2	0.868
<i>Quintessence International</i>	5.4	38	7	24	2.6	0.646
<i>American Journal of Orthodontics and Dentofacial Orthopedics</i>	5.3	48	9	43	3.6	1.183
<i>Journal of Stomatology, Oral and Maxillofacial Surgery</i>	5.3	32	6	19	1.1	0.408
<i>Journal of Stomatology</i>	5	25	5	19	0.4	0.141
<i>International Journal of Oral and Maxillofacial Surgery</i>	4.7	33	7	23	3.9	1.02
<i>Journal of Oral Biology and Craniofacial Research</i>	4.5	36	8	28	2.1	0.454
<i>Special Care in Dentistry</i>	4.4	70	16	55	1.3	0.328
<i>Evidence-Based Dentistry</i>	4.1	77	19	27	0.6	0.205
<i>Journal of International Society of Preventive and Community Dentistry</i>	4	16	4	5	2.3	0.476
<i>European Journal of Paediatric Dentistry</i>	3.6	18	5	15	3.5	0.698
<i>Oral Diseases</i>	3.3	164	49	222	4.6	0.953
<i>European Journal of Dentistry</i>	3.3	91	28	126	3.5	0.625
<i>Oral Surgery</i>	3	15	5	17	0.6	0.156
<i>Journal of the World Federation of Orthodontists</i>	3	12	4	8	0.8	0.32
<i>Journal of Maxillofacial and Oral Surgery</i>	2.9	23	8	33	1.7	0.293
<i>Pesquisa Brasileira em Odontopediatria e Clinica Int</i>	2.5	40	16	78	1.3	0.185
<i>Oral Radiology</i>	2.5	10	4	16	1.6	0.434
<i>Minerva Stomatologica</i>	2.3	9	4	16	1.5	0.318
<i>Open Dentistry Journal</i>	1.8	24	13	32	2.3	0.428
<i>Brazilian Dental Science</i>	1.3	8	6	26	1.3	0.153
<i>Indian Journal of Dental Research</i>	1.3	5	4	1	2.2	0.277
<i>Khyber Medical University Journal</i>	1.2	7	6	11	0	-
<i>Revista Cubana de Estomatologia</i>	1	11	11	18	0.2	0.124
<i>International Journal of Clinical Pediatric Dentistry</i>	0.9	7	8	36	0	-
<i>Journal of Contemporary Dental Practice</i>	0.8	11	14	60	1.3	0.3
<i>Dental update</i>	0.7	23	35	70	0.5	0.211
<i>Journal of International Oral Health</i>	0.7	8	11	19	1.1	0.177
<i>Dental Cadmos</i>	0.6	6	10	35	0.3	0.12
<i>Brazilian Journal of Oral Sciences</i>	0.5	2	4	19	0.2	0.125
<i>International Journal of Current Research and Review</i>	0.2	11	54	116	0.2	0.112
<i>Journal of Oral Research</i>	0.2	2	10	30	0.4	0.127
<i>Operative Dentistry</i>	0	0	3	2	4	0.965

Table 2: Top 10 universities of scholarly output of dentistry schools in Scopus (2019–2020)











Institution	Country/region	Citations per publication	Citations	Scholarly output	Authors
Queen Mary University of London		13.9	167	12	21
Universidade de São Paulo		7.1	233	33	58
University of Rome La Sapienza		6.7	101	15	50
University of Toronto		6.6	79	12	23
Universidade Federal da Paraíba		6.2	80	13	21
Universidade Estadual de Campinas		5.2	99	19	26
King's College London		4	108	27	59
Jazan University		2.3	48	21	11
The University of Hong Kong		2.2	35	16	8
Saveetha University		0.1	4	42	82

Table 3: Top 10 authors of scholarly output of dentistry schools in Scopus according to gender (2019–2020)

Name	Citations per publication	Citations	Scholarly output	Field-weighted citation impact	Total
Martelli-Júnior, Hercílio	6.9	69	10	3.32	20
Machado, Renato Assis	6.7	67	10	3.07	9
Samaranayake, Lakshman Perera	2.4	29	12	1.28	53
Sarode, Sachin Chakradhar	2.3	16	7	1.38	17
Patil, Shankargouda	1.6	22	14	1.01	15
Preetha, S.	0.3	2	8	0.14	3
Brundha, M. P.	0.1	1	10	0.02	16
Gayathri, R.	0.1	1	8	0.07	11
Prathap, Lavanya	0.1	1	8	0.07	2
Kavitha, S.	0	0	8	0	4

10 manuscripts published. The other authors only had less than 10 scientific publications on COVID-19 in dentistry during 2019–2020 [Table 3].

The institution with the highest scientific production of COVID-19 in dentistry was Saveetha University with 42 manuscripts. On the contrary, India was the most productive country, with 133 manuscripts published in Scopus. The author Patil, Shankargouda was the most productive, with 13 scientific publications. Finally, the *International Journal of Current Research and Review* was the journal that condensed the most with 53 manuscripts [Table 4].

In 2019, there were only two scientific publications on COVID-19 in dentistry. In 2020, the largest with 228 manuscripts were published in Q1 journals, followed by 210 manuscripts in Q3 journals, and only 194 manuscripts were published in Q4 journals [Table 5].

With a minimum number of three documents and three citations from the journal, there were six clusters that condensed the citation force of all publications. The

most representative journals were the *International Journal of Current Research and Review*, *Oral Oncology*, *Oral Diseases*, *British Dental Journal*, and *Journal of Dental Education* [Figure 2].

With two documents per country and with a minimum of one citation, nine clusters were found, where the citation force was mainly represented by India, Brazil, Italy, the United Kingdom, and the United States as the main countries [Figure 3].

With a minimum number of five occurrences per keyword, 3,262 words were represented in five large clusters: COVID-19, pandemic, coronavirus, dentistry, and cancer, which were interrelated with all the keywords in dentistry [Figure 4].

DISCUSSION

In the present bibliometric study, the aim of the study was to evaluate the bibliometric profile of the world scientific production in dentistry related to COVID-19 in Scopus (2019–2020). To identify researchers, sources,

Table 4: Comparison of the top 5 of the main institutions, countries, authors and journals

Institutions	Scholarly output
Saveetha University	42
Universidade de São Paulo	30
King's College London	25
Jazan University	19
Universidade Estadual de Campinas	17
Countries/regions	Scholarly output
India	133
United Kingdom	131
United States	111
Brazil	91
Italy	67
Authors	Scholarly output
Patil, Shankargouda	13
Samaranayake, Lakshman Perera	12
Brundha, M. P.	10
Machado, Renato Assis	9
Martelli-Júnior, Hercílio	9
Scopus sources	Scholarly output
<i>International Journal of Current Research and Review</i>	53
<i>Oral Oncology</i>	48
<i>Oral Diseases</i>	46
<i>British Journal of Oral and Maxillofacial Surgery</i>	44
<i>Journal of Dental Education</i>	42

Table 5: Scientific production of COVID-19 on dentistry in Scopus by quartile of the journal

CiteScore quartile	2019	2020	Overall
Q1 (top 25%)	0	228	228
Q2 (top 26%–50%)	0	191	191
Q3 (top 51%–75%)	1	210	211
Q4 (top 76%–100%)	1	194	195
Total	2	823	825

and research institutes, citations and mapping of their scientific activities on COVID-19 in dentistry should be conducted.

It has been shown that the number of COVID-19 publications has increased notably in the last two years. According to the search strategy presented in the methodology, an average of 843 manuscripts have been found worldwide in one of the most important databases, such as Scopus. The methodology of this study can be extrapolated to deepen the state of research on COVID-19 in other fields of knowledge.^[15]

Although the United States and China are two world powers in research, the United Kingdom and India are countries with the highest number of scientific productions on COVID-19 in dentistry. This can be a

bit contradictory as it is assumed that the initial boat was in China; therefore, Chinese academics should be leaders in publishing numerous manuscripts from the early phases of the pandemic.^[16]

Bibliometric evaluation is a powerful statistical strategy that presents the structures of a certain field of knowledge. For this reason, bibliometrics has been used in order to show solid data mainly in the biomedical field; for instance, there are some recent manuscripts of COVID-19 mainly in the middle area; however, a bibliometric evaluation of COVID-19 in world dentistry.^[17-22]

For example, Iranian researchers have notably contributed to COVID-19 research with an average of 405 generally original manuscripts, most of which were published in high-impact biomedical journals with an average of 1507 citations from different journals. Despite their variety, the contributing authors and research institutions were not nationwide. Saberi *et al.*^[22] described that the distribution of highly productive, influential authors was mainly affiliated with Tehran, whereas in our research, the most productive countries were India and the United Kingdom. This research is of theoretical importance because it seeks to explain the impact of this disease on dentistry; therefore, it is relevant to develop this research. In addition, it will contribute to the knowledge of the contribution to the scientific community and society. Scientific publications in the field of dentistry have not yet been investigated.

Therefore, little is known about bibliometric studies in dental literature. In addition, there is little evidence regarding this bibliometric issue in relation to Peruvian and world dentistry that establish validated protocols for dental care; therefore, a line of research will be opened to improve decision-making in the profession. This bibliometric study^[23] has some limitations. First, only the Scopus database was evaluated, which could omit the recovery of studies published in other important databases such as Web of Science. Second, bias can also occur because of the omission of studies published in languages other than English, such as Chinese, Arabic, and German. Third, the omission of recently published articles outside the cut-off period, such as manuscripts that have recently been accepted and have not yet been published. However, we consider that the findings obtained from the Scopus database provide robust evidence.^[23]

This study is important because currently, little is known about the impact of COVID-19 in dentistry; therefore, this bibliometric study contributes to the knowledge of the current state of worldwide research related to dentistry and care protocols.

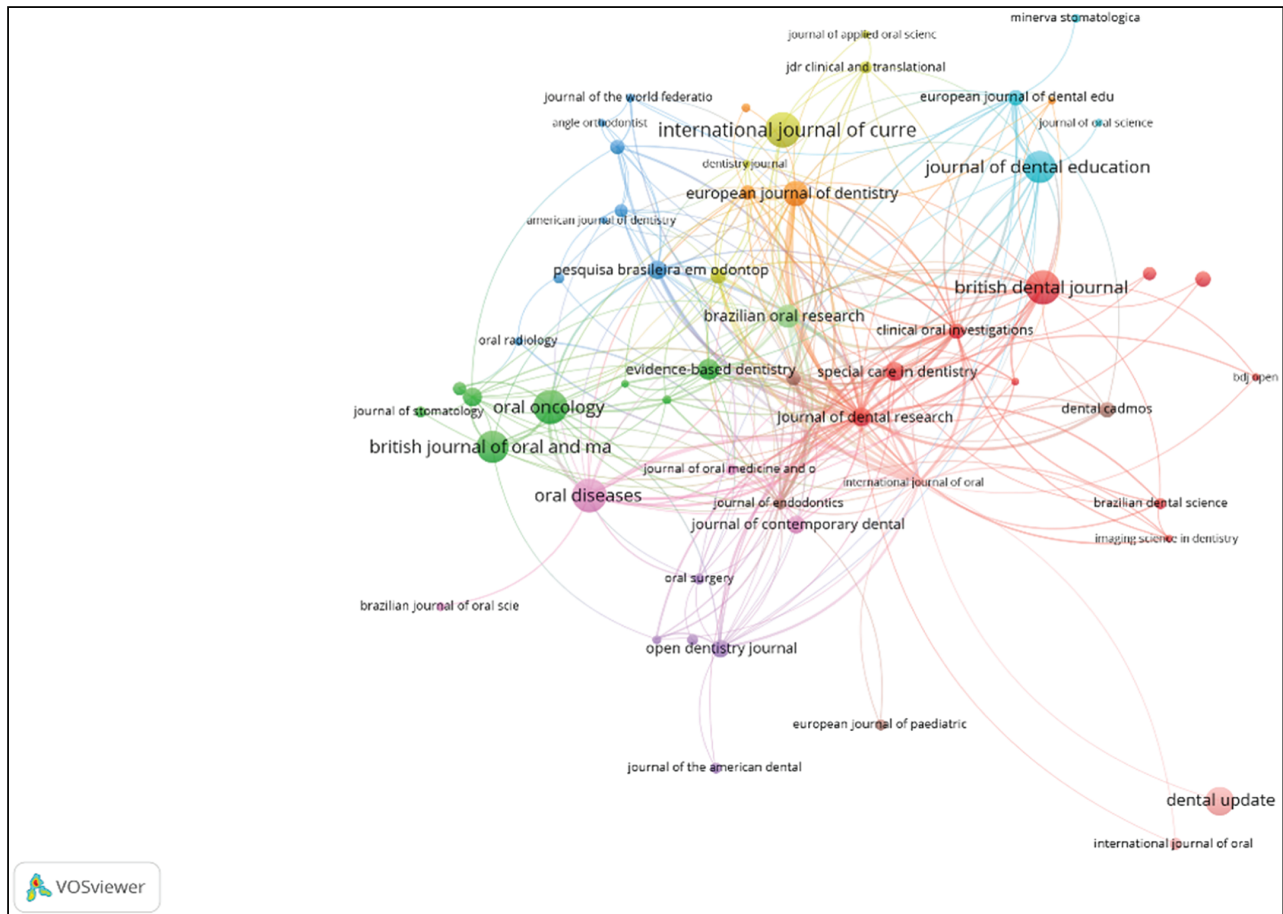


Figure 2: Citation by journal

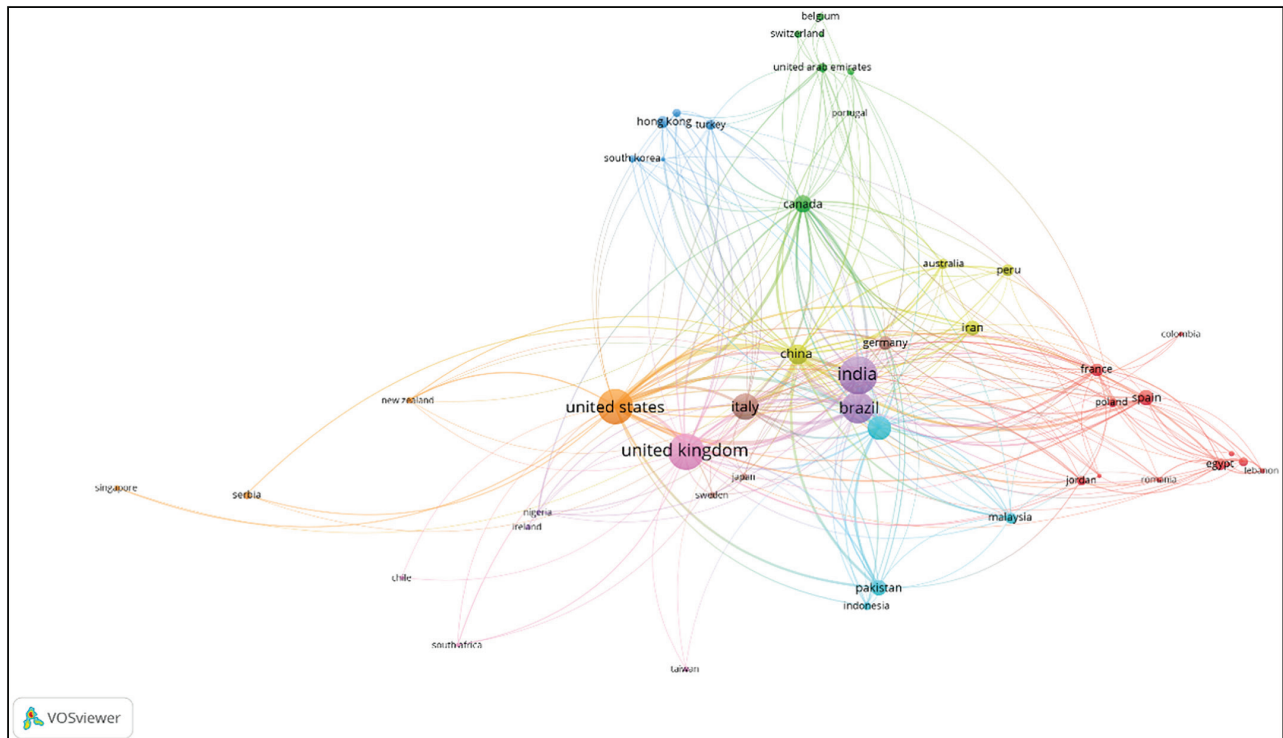


Figure 3: Citation by country

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