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Top Ten Journals Publishing on COVID-19: A Scientometric Analysis

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Article Info

Abstract

Background:
Trends in research on COVID-19 have been increased from its outbreak onwards. As a research field for describing knowledge status and research patterns in scientific fields, scientometrics uses quantification for evaluating the scientific production made by an author, institute, journal, country, region, etc.

Aim: This study aimed at identifying and visualizing the scientometric indicators of top ten highly productive journals publishing documents on topics related to COVID-19.

Methods: on April 4, 2021, using 36 COVID-19 keywords derived from MeSH retrieved all relevant global publications indexed in Scopus. Then, all studies were limited to top 10 highly productive journals in this field. An Exploratory and descriptive analysis of bibliographic data (number of publication/citations, journals, highly cited documents, highly cited/productive authors/countries, co-occurrence map of keywords, and co-citation map of sources) by using Microsoft Excel and VOS-viewer software packages were performed..

Results: The top ranked journals in publication numbers belonged to the International Journal of Environmental Research and Public Health (N=1304, 16.2%), Plos One (N=1158, 14.4%) and BMJ (997, 12.4%), respectively. The Lancet (N=69983), JAMA (N=42553) and the Journal of Medical Virology (19089) ranked first to third as to received citation numbers, respectively. Mahase, E (N=180, 2.23%), Lacobucci, G (N=126, 1.56%) and Rimmer, A (N=82, 1.01%) were ranked first to third as highly-productive authors, respectively. However, the highest-ranked authors in their citations/document indicator were Cheng, Z (3691), Gu, X (2736.25) and Xia, J (2269.66), respectively. First to third ranked countries in receiving citations were China (94776), United States (51621) and United Kingdom (32339), respectively. Out of top 10 contributing countries in producing documents, United States (1976; 24.5%), United Kingdom (1372; 17%) and China (894; 11.1%) ranked first to third, respectively. Keywords co-occurrence and clustering showed that clinical manifestation and dissemination of the disease as well as its epidemiology have been heavily considered.

Conclusion: This study offers important quantitative information on journals working on the disease. Identifying most productive journals can help potential researchers collaborate with researchers from pioneering journals and contribute to top journals for making influential works on COVID-19 and consequent knowledge on the control and treatment of the disease.

Introduction

Scientometrics or bibliometrics is an evolving interdisciplinary field. Scientometric indicators are important for evaluating scientific agents, such as authors, institutes, journals and papers (1, 2). Researchers tend to publish their researches in influential journals (3). Scientific publications indexed in known abstracting/indexing databases are of main items for conducting scientometric analyses in different areas of knowledge (4), including among others medical fields (5, 6).

As a research field for describing knowledge status and research patterns in scientific fields, scientometrics uses quantification for evaluating the scientific production made by an author, institute, journal, country, region, etc., it helps in research and development (7, 8), recognize and explain the research trends (9), and decreasing mistakes in science policy-making (10-12). The field helps in identifying knowledge gap in research topics (13). Bibliometric analyses is conducted with applying some techniques such as scientific mapping and visualization (14), co-word analyses, keyword co-occurrences (15), citation analyses (16), etc.

As an outbreak originated from Wuhan, China, COVID-19 was recognized as a worldwide concern by WHO (17, 18). This disease caused higher contamination in high-population regions (19), deficiencies in world economy (20), damages in mental health and social performance (21). Scientific community encounters deep information poverty on the disease and tries to get more data about the control, prevention and treatment of it. This deficiency motivated researchers to produce much evidence on the disease (22). In addition, high contamination and mortality (23), negative effects on human life (24) and heavy pressure on the health system of countries worldwide fired the fuel for producing more data about the disease (25, 26).

After the outbreak of COVID-19, some scientometric studies have been conducted on it during the years 2019-2021, considering the disease from different perspectives, e.g. (22, 27-40). However, top 10 highly productive journals publishing on COVID-19 have not been deeply investigated and visualized from a comprehensive scientometric perspective. This study aimed at analyzing and visualizing these journals from a scientometric perspective.

Methods

Research design

Our key goal and quest strategy was to use a quantitative method to perform an exploratory and descriptive bibliometric analysis and visualization of scientific publications relevant to COVID-19 that were published in Scopus highly productive Journals. In comparison to PubMed and Web of Science, Scopus has a larger number of journals (41) and more non-English research journals than Web of Science. As a result, it was a better choice than other citation databases because our study focused on journals without any refinement filters (such as language, fields of knowledge, document type, or countries). In addition, Scopus is the world's largest multidisciplinary and citation database (42), and it is one of the most important data points for bibliometric researches (43-45).

Data sources and search strategy

On April 4, 2021, a systematic search was performed to collect data from the Scopus database. The "COVID-19" keyword was used to identify search strategies in the managed vocabulary database (Medical Subject Headings (MeSH)) to check the performance of descriptors relevant to COVID-19, as the main research concept. Data collection was performed by searching the advanced search part of Scopus. Then, results were limited to the first top 10 highly productive journals during 2019-2021. The search strategy was as

follows: TITLE-ABS-KEY ("COVID-19" OR "COVID 19" OR "COVID-19 Virus Disease" OR "COVID 19 Virus Disease" OR "COVID-19 Virus Diseases" OR "Disease,COVID-19 Virus" OR "Virus Disease, COVID-19" OR "COVID-19 Virus Infection" OR "COVID 19 Virus Infection" OR "COVID-19 Virus Infections" OR "Infection, COVID-19 Virus" OR "Virus Infection, COVID-19" OR "2019-nCoV Infection" OR "2019 nCoV Infection" OR "2019-nCoV Infections" OR "Infection, 2019-nCoV" OR "Coronavirus Disease-19" OR "Coronavirus Disease 19" OR "2019 Novel Coronavirus Disease" OR "2019 Novel Coronavirus Infection" OR "2019-nCoV Disease" OR "2019 nCoV Disease" OR "2019-nCoV Diseases" OR "Disease, 2019-nCoV" OR "COVID19" OR "Coronavirus Disease 2019" OR "Disease 2019, Coronavirus" OR "SARS Coronavirus 2 Infection" OR "SARS-CoV-2 Infection" OR "Infection, SARS-CoV-2" OR "SARS CoV 2 Infection" OR "SARS-CoV-2 Infections" OR "COVID-19 Pandemic" OR "COVID 19 Pandemic" OR "COVID-19 Pandemics" OR "Pandemic, COVID-19"). AND (LIMIT-TO (EXACTSRCTITLE, "International Journal Of Environmental Research And Public Health") OR LIMIT-TO (EXACTSRCTITLE, "Plos One") OR LIMIT-TO (EXACTSRCTITLE, "BMJ") OR LIMIT-TO (EXACTSRCTITLE, "Journal Of Medical Virology") OR LIMIT-TO (EXACTSRCTITLE, "BMJ Clinical Research Ed") OR LIMIT-TO (EXACTSRCTITLE, "Lancet") OR LIMIT-TO (EXACTSRCTITLE, "International Journal Of Infectious Diseases") OR LIMIT-TO (EXACTSRCTITLE, "JAMA Journal Of The American Medical Association") OR LIMIT-TO (EXACTSRCTITLE, "Sustainability Switzerland") OR LIMIT-TO (EXACTSRCTITLE, "Science")).

Data processing analysis and visualization

Both literature retrieval and data download were done on the same day to prevent bias triggered by regular database renewal. CSV (comma-separated values) format was used to export the entire metadata article. Analysis of bibliographic data was completed using the Scopus tools; Microsoft Excel to provide informative tables, charts, diagrams; and VOSviewer (46) for designing the networks and maps. The bibliometric parameters used to analyze the publications were number of publication/citations, journals, highly cited documents, highly cited/productive authors/countries, co-occurrence map of keywords to map and cluster terms extracted from analyzed collection and co-citation map of sources.

Results

Top ten publishing journals

Out of 133,903 papers on COVID-19, 8051 papers (6.01%) were published in top ten highly-publishing journals with total 190,050 received citations (Citations/Document=23.60).

Table 1 shows the scientometric features of these journals. They are all Q1 and Q2. Of the papers in these journals, 1 (0.01%), 5455 (67.76%) and 2595 (32.23%) belonged to 2019, 2020 and 2021, respectively. The first to third ranks in publication numbers belonged to the International Journal of Environmental Research and Public Health (N=1304, 16.2%), Plos One (N=1158, 14.4%) and BMJ (997, 12.4%), respectively. The Lancet (N=69983), JAMA (N=42553) and the Journal of Medical Virology (19089) ranked first to third as to received citation numbers, respectively.

Highly-productive authors

39442 authors contributed to these papers. Table 2 shows top 10 highly productive authors with publishing at least 49 documents. These top authors published 813 documents (10.07% of total published documents on COVID-19 in the studied journals) with 162154 received citations. Mahase, E (N=180, 2.23%), Lacobucci, G (N=126, 1.56%) and Rimmer, A. (N=82, 1.01%) were ranked first to third in this regard, respectively.

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Considering citations/document, the first to third ranks belonged to Liu, Y (375.58), Wang, Y (339.77) and Zhang, Y (259.50).

Table 1. Top 10 Highly Productive Journals on COVID-19

Rank	Source Title	Documents (N=8051)		Citations (N=190050)		H-Index 2019	SNIP 2019	SJR 2019	Q
		n	%	n (R)	C/D				
1st	International Journal of Environmental Research and Public Health	1304	16.2	8545 (7)	6.55	92	1.248	0.739	Q2
2nd	Plos One	1158	14.4	4258 (8)	3.67	300	1.205	1.023	Q1
3rd	BMJ	997	12.4	12268 (5)	12.3	412	3.999	2.049	Q1
4th	Journal of Medical Virology	928	11.5	19089 (3)	20.57	111	0.780	0.855	Q2
5th	BMJ Clinical Research Ed	753	9.4	3792 (9)	5.03	N/A	N/A	N/A	N/A
6th	Lancet	657	8.2	69983 (1)	106.51	747	21.313	14.554	Q1
7th	International Journal of Infectious Diseases	623	7.7	9185 (6)	14.74	79	1.426	1.437	Q1
8th	JAMA (Journal of The American Medical Association)	573	7.1	42553 (2)	74.26	654	11.131	5.913	Q1
9th	Sustainability Switzerland	546	6.8	1518 (10)	2.78	68	1.165	0.581	Q1
10th	Science	512	6.3	18859 (4)	36.83	1124	7.521	13.110	Q1

Table 2. Top highly productive authors in publishing papers on COVID-19

Rank	Author name	Documents		Citations	
		Number	%	Number	Citation/Document (Rank)
1st	Mahase E.	180	2.23	1173	6.51 (6)
2nd	Iacobucci G.	126	1.56	372	2.95 (8)
3rd	Rimmer A.	82	1.01	151	1.84 (10)
4th	Wang Y.	79	1	26842	339.77 (2)
5th	Li Y.	72	0.89	12741	176.95 (5)
6th	Wise J.	68	0.84	198	2.91 (9)
7th	Zhang Y.	57	0.7	14792	259.50 (3)
8th	Liu Y.	50	0.62	18779	375.58 (1)
8th	Dyer O.	50	0.62	183	3.66 (7)
9th	Wang X.	49	0.6	9963	203.32 (4)
Total	-	813	10.07	162154	-

Highly cited authors

Table 3 shows top ten highly cited authors publishing in the studied journals. They were published totally 260 documents (3.18% of all documents published in the studied journals). They received 234,851 citations. The highest-ranked authors in receiving citations were Wei, Y with 13 documents and 27,711 citations, Wang, Y with 79 documents and 26,842 citations and Wang, J with 48 documents and 26,205 citations, respectively. The highest-ranked authors in their citations/document indicator were Cheng, Z (3691), Gu, X (2736.25) and Xia, J (2269.66), respectively.

Highly productive and highly cited countries

Top ten highly productive countries published 6,569 documents (81.4%) that received 227,109 citations in total. Out of top 10 contributing countries (Table 4), United States (1976; 24.5%), United Kingdom (1372; 17%) and China (894; 11.1%) ranked first to third, respectively. Other 7 countries contributed in publishing 2,327 documents (28.8%). First to third ranked countries in receiving citations were China (94776), United States (51,621)

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and United Kingdom (32,339), respectively. Considering the citations per document indicator, China with 106.01 ranked first.

Table 3. Top 10 highly cited authors in papers published in highly productive journals on COVID-19

Rank	Author's Name	Documents		Citations	
		Number	% of Total	Number	Citation/Document (Rank)
1st	Wei Y.	13	0.16	27711	2131.61 (4)
2nd	Wang Y.	79	0.98	26842	339.77 (10)
3rd	Wang J.	48	0.59	26205	545.93 (9)
4th	Xu J.	23	0.28	22584	981.91 (6)
5th	Cao B.	12	0.14	22546	1878.83 (5)
6th	Li H.	33	0.4	22517	682.33 (8)
7th	Cheng Z.	6	0.07	22146	3691 (1)
8th	Zhang L.	29	0.36	21983	758.03 (7)
9th	Gu X.	8	0.09	21890	2736.25 (2)
10th	Xia J.	9	0.11	20427	2269.66 (3)
Total	-	**260**	**3.18**	**234851**	-

Table 4. Top ten highly-cited/most-productive countries in publishing papers on COVID-19

Rank	Country	Documents		Citations	
		Number	% of Total	Number	Citation/Document (Rank)
1st	United States	1976	24.5	51621 (2)	26.12 (4)
2nd	United Kingdom	1372	17	32339 (3)	23.57 (5)
3rd	China	894	11.1	94776 (1)	106.01 (1)
4th	Italy	648	8	13300 (4)	20.52 (7)
5th	Spain	403	5	3864 (10)	9.58 (10)
6th	Germany	315	3.9	7151 (6)	22.7 (6)
7th	Canada	261	3.2	5317 (8)	20.37 (8)
8th	France	247	3.1	4351 (9)	17.61 (9)
9th	Australia	242	3	7720 (5)	31.9 (2)
10th	Switzerland	211	2.6	6670 (7)	31.61 (3)
Total	-	**6569**	**81.4**	**227109**	-

Highly cited documents

Table 5 shows the bibliographic information of top 10 highly cited documents with having at least 2,202 citations. These documents were mainly original articles (N=9). Entitled as "clinical features of patients infected with 2019 novel coronavirus in Wuhan, China", the highest-cited paper was authored by Huang, C et al. in 2020. The paper was published in the *Lancet* and received 13,378 citations.

Keyword co-occurrences

20,081 keywords were used in the studied papers. Figure 1 depicts the top 20 highly frequent keywords and their total link strength. The top five most-occurred keywords were human, humans, coronavirus disease, pandemic and COVID-19, respectively.

By determining 200 as the minimum number for word-occurrence, 91 highly frequent co-occurred keywords were extracted and depicted in Figure 2. Consisting of three main subject clusters, the map shows 7,078 links and total link strength amounted to 834,348. As Figure 2 depicts, the first cluster (in red) as the greatest one included 40 items in which 3 top highly-frequent items were human/humans (with 11,175 frequencies), coronavirus disease 2019 (with 5,050 frequencies), and pandemic (with 4,238 frequencies), respectively. The cluster focused on the dissemination, features and general characteristics and manifestations of the disease. The second cluster (in green) with 37 items included top ones such as Covid-19 (with 3,770 frequencies)

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emphasizing the effect of the disease on different age and sex groups. The third cluster (in blue) had 14 items such as epidemiology (with 1,058 frequencies) and viral disease (with 1,032 frequencies) considering the main psychological and local issues associated with the disease.

Table 5. Top 10 highly cited papers published in top 10 highly productive journals on COVID-19

| R	Authors	Title	Year	Source title, Volume (Issue)	Cited by	Paper Type
1st	Huang C. et al.	Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China	2020	Lancet, 395 (10223)	13378	Article
2nd	Wang D. et al.	Clinical characteristics of 138 hospitalized patients with 2019 novel coronavirus- infected pneumonia in Wuhan, China	2020	JAMA- Journal of The American Medical Association, 323(11)	7546	Article
3rd	Zhou F. et al.	Clinical course and risk factors for mortality of adult inpatients with covid-19 in Wuhan, China: a retrospective cohort study	2020	Lancet, 395(10229)	7480	Article
4th	Chen N. et al.	Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study	2020	Lancet, 395(10223)	6548	Article
5th	Wu Z. and Mcgoogan J.M.	Characteristics of and important lessons from the coronavirus disease 2019 (covid-19) outbreak in China: summary of a report of 72314 cases from the Chinese center for disease control and prevention	2020	JAMA- Journal of The American Medical Association, 323(13)	5184	Article
6th	Lu R. et al.	Genomic characterization and epidemiology of 2019 novel coronavirus: implications for virus origins and receptor binding	2020	Lancet, 395(10224)	3580	Article
7th	Chan J.F.-W. et al.	A familial cluster of pneumonia associated with the 2019 novel coronavirus indicating person-to-person transmission: a study of a family cluster	2020	Lancet, 395(10223)	3126	Article
8th	Mehta P. et al.	Covid-19: consider cytokine storm syndromes and immunosuppression	2020	Lancet, 395(10229)	2891	Article
9th	Brooks S.K. et al.	The psychological impact of quarantine and how to reduce it: rapid review of the evidence	2020	Lancet, 395(10227)	2434	Review
10th	Richardson S. et al.	Presenting characteristics, comorbidities, and outcomes among 5700 patients hospitalized with covid-19 in the new york city area	2020	JAMA- Journal of The American Medical Association, 323(20)	2202	Article
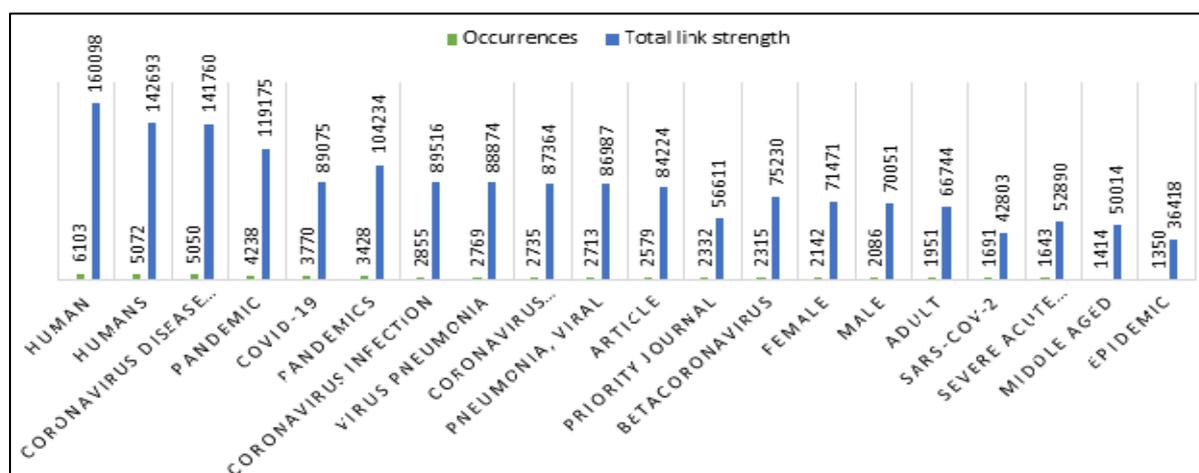
Figure 1. The most important keywords used in the studied documents based on the frequency of word occurrence.
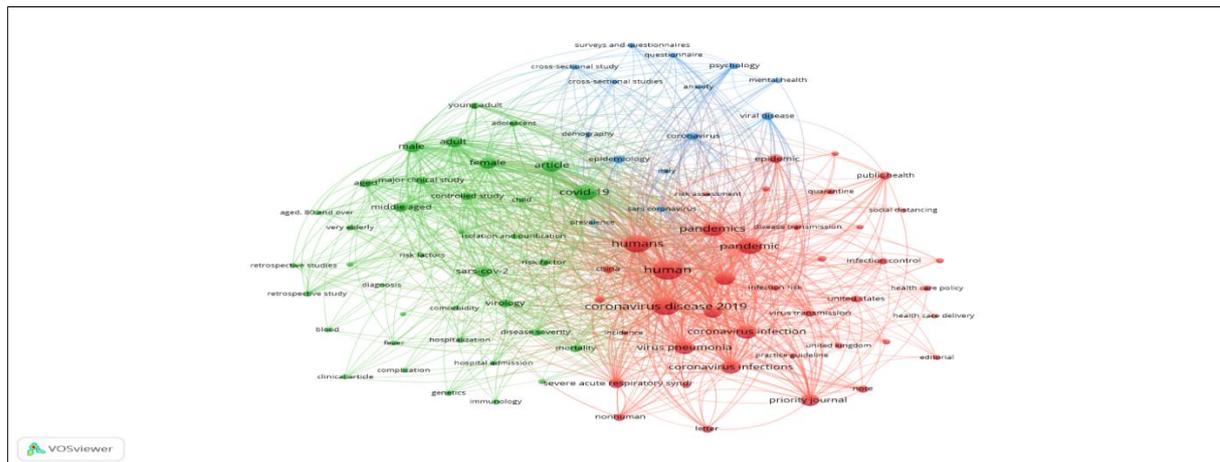
Figure 2. Co-occurrence map of keywords used in the studied documents

Co-citation map of cited sources

49,207 individual sources were cited. Figure 4 depicts the highly cited sources. As Figure 3 shows, out of top 20 highly publishing sources, 9 were highly-cited too (but BMJ Clinical Research Education). Top three journals in receiving citation were the Lancet (4,790), JAMA (3,299), and New England Journal of Medicine (2,715), respectively.
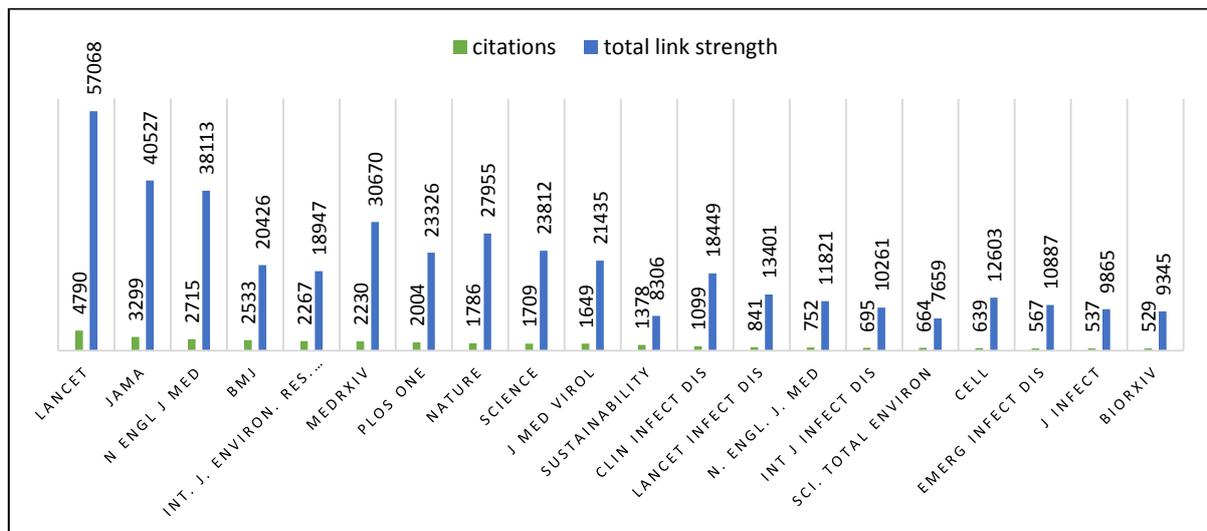

Figure 3. The top most-cited sources

With determining 150 citations per source as a threshold, 95 most-cited sources were included in co-citation map (Figure 4).

The map consists of three main clusters with 3,440 interlinks and total link strength that amounted to 342281. The first cluster (in red) included 40 items with the Lancet (4,790), JAMA (3,299), New England Journal of Medicine (2,715), as top three ones, respectively. With 36 sources, the second cluster (in green) included International Journal of Environmental Research and Public Health (2,267 citations), Plus One (2,004) and Sustainability (1,378), respectively.

The third and smallest cluster (in blue) consisted of 19 sources, including Nature (1,788) and Science (1,709) as top ranked journals, respectively.
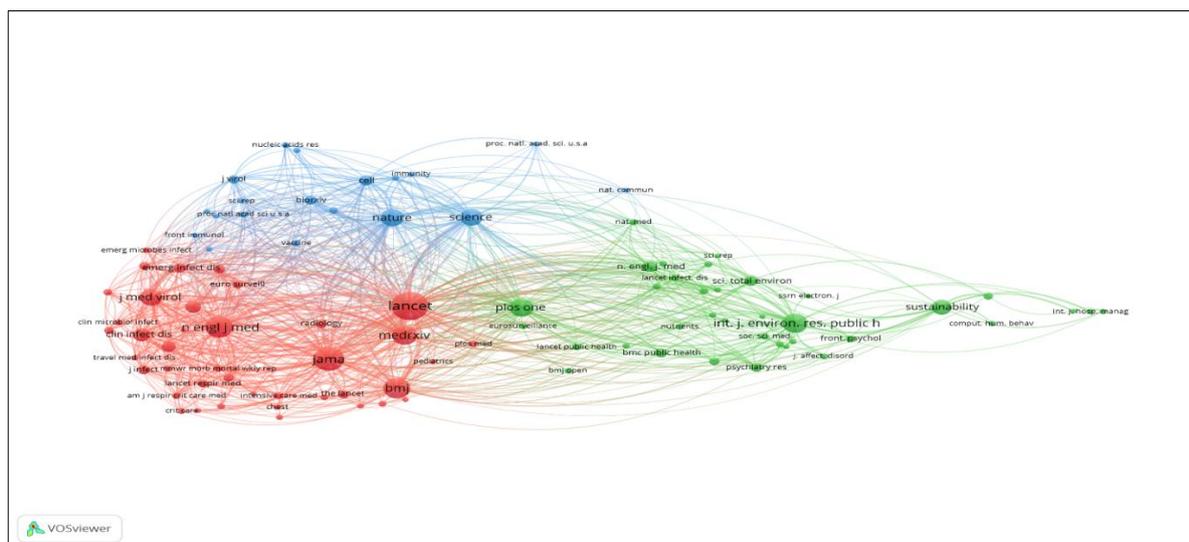
Figure 4. Co-Citation map of sources cited in papers published in top ten highly productive journals on COVID-19.

Discussion

Known and prestigious journals in different scientific fields are active in investigating COVID-19. Top publishing journals as well as highly cited ones on COVID-19 are of main highly influential journals in medical-related fields. Some of these journals have been found as more active journals in other previous studies about top highly published/cited papers on COVID-19, such as JAMA, Lancet, International Journal of Environmental Research and Public Health, and Journal of Medical Virology (47). China as the country of origin of the disease and the USA and UK as the two industrialized countries have published most documents in the top journals. Most highly productive and highly cited authors have a European origin as their countries of origin are mostly from European countries. It is needed that authors from other regions and countries worldwide are active in research on COVID-19 as it is necessary that local problems are detected and deeply investigated on the disease.

Top highly-cited documents mainly considered the clinical and epidemic features of the disease and however, treatment approaches and vaccination were not heavily considered as we have little knowledge on the disease. Such a finding was emphasized in other studies (47-49). This can be concluded from the keyword occurrence map and subject clustering depicted in our study in which the keywords mainly emphasize these clinical features, too.

This study offers important quantitative information on journals working on the disease. Identifying most productive journals can help potential researchers collaborate with researchers from pioneering journals and contribute to top journals for making influential works on COVID-19. Published and cited in different journals, the highly productive journals on COVID-19 reflect the complexity of the disease as well as the multidisciplinary nature of research on it.

Conclusion

To our knowledge, this study is the first scientometric study on the top 10 highly productive journals on COVID-19. In spite of some limitation, including database selection and citation-based biases, which are common in scientometric studies, this study can be a reference and platform for COVID-19 researchers and a guide for conducting other scientometric analyses for making a context for better knowing, identifying, controlling and treating the disease.

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