Original Article

Scientometric Analysis of the World Scientific Production on Tuberculosis Associated with COVID-19

Jorge Nieto-Chumbipuma[1], Luis Silva-Reategui[1], Alicia Fernandez-Giusti[2], John Barja-Ore[3], Yesenia Retamozo-Siancas[2], Frank Mayta-Tovalino[1]

[1]Academic Department, Faculty of Medicine, Universidad Científica del Sur, [2]Posgradute Department, Faculty of Medicine, Universidad Nacional Mayor de San Marcos, [3]Research Direction, Universidad Privada del Norte, Lima, Peru

Abstract

Background: Nowadays, tuberculosis and COVID-19 are the principal infections around the world. This study aimed to determine the global scientific production on COVID-19 associated to tuberculosis during the period 2019–2020. **Methods:** For the collection of metadata on COVID-19 associated to tuberculosis, the Scopus database was used, considering the period 2019–2020, with the last day of update being September 13, 2021. The main authors, countries, institutions, journal metrics, and documents were extracted. The Scival tool was used for the scientometric analysis of the data. **Results:** A total of 464 papers were retrieved where it was found that universities in South Africa, the United States, and England led the world's scientific production. The International Journal of Tuberculosis and Lung Disease was the journal with the highest production and The Lancet Global Health was the journal with the most citations per publication. On the other hand, most papers were published in Q1 journals, with infectious diseases within the area of medicine being the most addressed. **Conclusion:** South African universities lead the world in scientific output. Most of the research on this topic has been published in Q1 journals, with collaboration being largely national. Further analysis is needed in the aftermath of the pandemic.

Keywords: COVID-19, scientific production, scientometric, tuberculosis

Submitted: 09-Jun-2022 **Revised:** 17-Jul-2022 **Accepted:** 10-Aug-2022 **Published:** 12-Sep-2022

Introduction

Scientometrics is a tool used for the quantitative analysis of the bibliographic characteristics of a set of texts[1,2] within which variables such as the number of citations and publications that an author, research group, or institution has had in a certain period will be included.[3,4] In medicine, the application of bibliometrics allows the analysis of huge portions of publications according to the variables of interest.[1] The information obtained will be used to plan and manage resources allocated to research, since this analysis makes it possible to know the impact of scientific activity on society, as well as its performance in the scientific field.[5]

In recent years, COVID-19 has become one of the most important pathogens that mainly attack the respiratory system and threaten not only public health but also the economic, political, social, and academic areas.[6-10] Millions of COVID-19-confirmed cases have been reported, in addition to many deaths caused by it[11] and together with tuberculosis are among the main respiratory infections that cause the most deaths worldwide.[12] Because of this, the scientific community had to unite to respond quickly to the current situation caused by this new pandemic, increasing scientific production.

Despite the high mortality caused by both pathologies worldwide, there is no clear association between tuberculosis and the prognosis of COVID-19. Therefore, it is necessary to carry out more studies of higher quality in different countries[13] since it is important to quantify the worldwide scientific production in relation to both pathologies. The results of the

Access this article online

Quick Response Code:

Website: www.ijmyco.org

DOI: 10.4103/ijmy.ijmy_81_22

Address for correspondence: Dr. Frank Mayta-Tovalino, Postgraduate Department, Universidad Cientifica Del Sur, Av. Paseo De La República 5544, Miraflores 15074, Lima, Peru.
E-mail: fmaytat@cientifica.edu.pe

ORCID:
Frank Mayta-Tovalino: http://orcid.org/0000-0002-3280-0024

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: WKHLRPMedknow_reprints@wolterskluwer.com

How to cite this article: Nieto-Chumbipuma J, Silva-Reategui L, Fernandez-Giusti A, Barja-Ore J, Retamozo-Siancas Y, Mayta-Tovalino F. Scientometric analysis of the world scientific production on tuberculosis associated with COVID-19. Int J Mycobacteriol 2022;11:249-55.

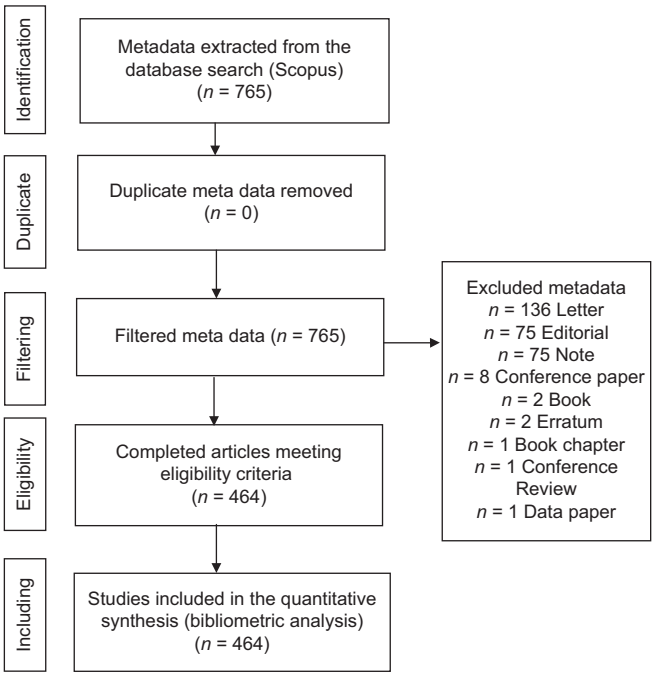


Figure 1: Flow chart

present bibliometric study will allow us to elucidate the state of worldwide research on these two diseases.

Therefore, our objective was to determine the global scientific production on tuberculosis associated with COVID-19 during the period 2019–2020 in Scopus.

Methods

Study design

A descriptive, cross-sectional, retrospective, cross-sectional, scientometric study that evaluated secondary data published in the Scopus database, whose search date was September 13, 2021, where a total of 464 metadata corresponding to tuberculosis associated with COVID-19 were found [Figure 1].

Search strategy

The metadata collection was performed using the Scopus database (Elsevier, USA), the subsequent analysis and calculation of metrics, was executed using SciVal software. An advanced search strategy was used, with keywords and all their variants extracted from Embase and Medical Subject Headings. The search was limited to manuscripts of the article, review, short surveys, systematic reviews, and clinical trials type. Sources such as conference papers, editorials, book chapters, notes, and erratums were excluded, as well as results from 2021, since it is a current year, and those before 2019 since no data were found before that year [Supplementary Material 1].

Bibliometric indicators

The authors, universities, journals, and medical specialties with more scientific production on tuberculosis associated with COVID-19 were evaluated. We also measured the impact, according to quartiles, in scientific journals, looking at how many publications were in Q1 (top 25%), Q2 (top 26%–50%), Q3 (top 51%–75%), and Q4 (top 76%–100%).

Research collaboration with respect to scientific article production was analyzed according to: International Collaboration (Research conducted by several authors, universities and/or institutions from different countries), National Collaboration (Research conducted by several authors, universities, and/or institutions from the same country), Institutional Collaboration (Research conducted by authors from the same university and/or institution), and No Collaboration (Single authorship. It is added so that the percentage of all categories adds up to 100%).

Data analysis

The data obtained were exported to SciVal software in .CSV format and then downloaded to Microsoft Excel. Information such as year, subject area, language, and publication type were directly extracted from Scopus. Citation analysis was performed using the following concepts and metrics: Source-Normalized Impact per Paper (SNIP), Field-Weighted Citation Impact (FWCI), SCImago Journal Rank (SJR), CiteScore, and H-index.

The SNIP is defined as the quotient of two other indicators, which are the average number of citations received by the articles of a journal. which are the average number of citations received by the articles of a journal article for 3 years divided by the citation potential of the scientific field of the journal.[14] So it is based on the comparison of publications within their subject fields, accounting for the frequency with which authors cite other papers and the immediacy of the citation impact.

The next indicator used was the FWCI, which is mathematically defined as the quotient between the citations received per publication in the year of publication, in addition to the following 3 years, and the expected number of citations per publication received in the same period for similar publications,[15] the expected value being unity, if the citations received are equal to what is expected for that area.

In the case of journals, the SJR indicator was used, which establishes the scientific publications quality based on the number of citations obtained by each publication. This index is calculated by counting the citations received number, weighting the journals importance from which these citations originate. It is based on the calculation of the citations received by the journals in 3 years, giving greater weight to citations from prestigious journals, which have high citation rates and low self-citations.[16] On the other hand, the CiteScore measures the list of citations per published article, calculating all the document citations of a specific year in all the articles published in the 3 previous years. Then, it is divided by the number of articles indexed in Scopus published in those same years, being very useful for the comparison of journals.[16,17] Finally, the h-index is defined as the maximum value of h; such that, the author has published h articles and each of these has been cited at least h times. In

Table 1: Top 10 most productive authors in Scopus on tuberculosis associated with COVID-19

Name	Scholarly output	NCit	Cpd	FWCI	H-index
Migliori, Giovanni Battista	10	395	39.5	6.3	70
Goletti, Delia	7	328	46.9	7.7	58
Tiberi, Simon	6	255	42.5	6.4	33
Centis, Rosella	6	317	52.8	9.4	48
Green, Robin John	5	8	1.6	0.3	17
Visca, Dina	5	268	53.6	9.8	21
Codecasa, Luigi	5	214	42.8	6.5	28
Spanevello, Antonio	5	302	60.4	10.2	49
Madhi, Shabir A.	5	25	5	0.7	70
Zar, Heather J.	5	11	2.2	0.5	58

Source: Scopus/SciVal database. NCit: Citations, Cpd: Citations per document, FWCI: Field-weighted citation impact

other words, h is the number of articles greater than h that have at least h citations. for example, an h-index of 10 means that the author has at least 10 articles each of which has 10 or more citations.[18] The collaboration networks were constructed using the VOSviewer software, which consists of a series of nodes representing the countries that collaborated in the research, as well as the links that connect them to each other. These links, depending on their thickness, indicate the intensity of the collaborations with respect to the number of documents.[19]

Ethical aspects

Since this is a study that used open access secondary data published in Scopus, there are no ethical implications.

Results

In Table 1, the most productive authors of the association of tuberculosis and COVID-19 are presented, where Migliori, Giovanni Battista tops the list with 10 publications, followed by Goletti, Delia with 7 publications. However, the researcher with the most citations per article is, Spanevello Antonio, who presents 60.4 citations per publication, also presenting the highest Field-Weighted Citation Impact of 10.2.

The universities and institutions with the highest production worldwide are those listed in Table 2. South African institutions such as the University of Cape Town, the University of Stellenbosch, and the University of the Witwatersrand were the three with the most publications. Despite this, the most influential institutions in tuberculosis associated with COVID-19 were the University of Oxford and University College London with 568 and 530 citations, respectively.

According to the percentage of publications by journal quartile by CiteScore percentile, of all publications on COVID-19-associated tuberculosis, it is observed that the highest number of scientific publications were produced with 249, 181, 131, and 44 articles in the Q1 (25%), Q2 (26%–50%), Q3 (51%–75%), and Q4 quartiles (76%–100%), respectively, which are presented in Table 3.

In Table 4, National collaboration (n = 189, 31.2%) occupies the first place, followed by international collaboration (n = 181, 29.9%), only international collaboration (n = 149, 24.6%). However, if we refer to impact, we obtain that international collaboration (2980 citations; 16.5 citations per publication) outperforms both national collaboration (2488 citations; 13.2 citations per publication) and institutional collaboration (978 citations; 6.6 citations per publication). The remaining data correspond to the category of noncollaboration or single authorship (n = 86; 14.2%).

The 10 scientific journals with the highest production on tuberculosis associated with COVID-19 are shown in Table 5. The top three journals were the International Journal of Tuberculosis and Lung Disease, South African Medical Journal, and European Respiratory Journal with 38, 28, and 17 publications, respectively. However, the European Respiratory Journal has the highest number of citations with 402 (23.6 citations per publication), followed by The Lancet Global Health with 331 (25.5 citations per publication) and the International Journal of Tuberculosis and Lung Disease with 298 (7.8 citations per publication). Finally, according to the score obtained by CiteScore 2020 and SJR, The Lancet Global Health (CS = 91.5, SJR = 13.1) is the most prestigious journal that has published regarding tuberculosis associated with COVID-19.

In Table 6, we observe that all the articles reviewed were in the area of medicine; furthermore, it is shown that a large part of the published papers were not within any specific subcategory (n = 609), the area with the most publications was infectious diseases (n = 168), followed by general medicine (n = 154), pulmonary and respiratory medicine (n = 105) and finally public health (n = 74), it is worth mentioning that several articles were included in more than one subcategory, so the sum of these does not represent the total number of articles.

Discussion

Publications about COVID-19 have increased considerably and it has been the center of attention in recent years, attracting many more new authors and even more than other infectious diseases (HIV, TB, Ebola, H1N1, Zika); therefore, investigating the association with tuberculosis would be of scientific interest since both are diseases that affect the respiratory system.[20] Therefore, the present research constitutes the first study that analyzes the worldwide scientific production of tuberculosis associated with COVID-19, emphasizing indicators according to authors, universities, scientific journals, thematic areas, and impact indicators according to scientific interest, type of collaboration, and collaborative networks.

For this bibliometric, Scopus was selected because its database is the most extensive with respect to high-quality sources, citations, abstracts, and a variety of coverage of biomedical journals. This positions it as one of the databases with a great source of information for bibliometric studies.[21,22]

Table 2: Top 10 most productive universities in Scopus on tuberculosis associated with COVID-19

Institution	Country	Scholarly output	NCit	Authors	Cpd	FWCI
University of Cape Town		25	172	71	6.9	2.3
University of Stellenbosch		21	172	62	8.2	1.7
University of the Witwatersrand		20	82	36	4.1	0.6
London School of Hygiene and Tropical Medicine		20	250	40	12.5	2.1
Imperial College London		16	331	69	20.7	4.4
Johns Hopkins University		16	253	34	15.8	2.8
Harvard University		14	302	58	21.6	4.1
University College London		13	530	20	40.8	13.4
University of Oxford		13	568	33	43.7	8.9
University of Pretoria		11	22	16	2.0	0.4

Source: Scopus/SciVal database. NCit: Citations, Cp: Citations per document, FWCI: Field-weighted citation impact

Table 3: Frequency of publications by journal quartile found in Scopus

CiteScore quartile	Overall	2019	2020
Q1 (top 25%)	249	0	249
Q2 (top 26%-50%)	181	0	181
Q3 (top 51%-75%)	131	0	131
Q4 (top 76%-100%)	44	0	44
Total	605	0	605

Source: Scopus/SciVal database

In this analysis, it was found that between 2019 and 2020 the scientific production on tuberculosis associated with COVID-19, according to the authors, Migliori Giovanni Battista has 10 publications and 395 citations occupying the first place within the top 10 authors with the most research work. On the other hand, research was conducted separately on the topics of COVID-19 and Tuberculosis, where within the top 10 publications by COVID-19, Shi Zl occupies the first place with 10 publications and Wiwamitkit V with 26 publications: In April and June 2021, respectively.[23] On the other hand, within the top 14 most productive authors on tuberculosis, Dick van Soolingen is in first place with more than 250 publications.[24] This difference, apart from being because separate studies were conducted for both topics, is also due to the time during which the publications were made, as in the case of tuberculosis, which used a much greater range of years (1925–2018), resulting in a higher rate of publications per author, unlike the present study.

It should be noted that these bibliometric reviews did not take into consideration the Field-Weighted Citation Impact

Table 4: Production of scientific articles according to collaboration

Metric	Percentage	Scholarly output	NCit	Cpd	FCWI
International collaboration	29.9	181	2980	16.5	3.6
Only national collaboration	31.2	189	2488	13.2	2.5
Only institutional collaboration	24.6	149	978	6.6	1.5
Single authorship (no collaboration)	14.2	86	772	9.0	3.8

Source: Scopus/SciVal database. NCit: Citations, Cpd: Citations per document, FWCI: Field-Weighted Citation Impact

Table 5: Top 10 most productive journals in Scopus on tuberculosis associated with COVID-19

Scopus source	Publications	NCit	Authors	Cpd	SNIP	CiteScore 2020	SJR
International Journal of Tuberculosis and Lung Disease	38	298	208	7.8	1.0	4.2	1.1
South African Medical Journal	28	94	136	3.4	0.8	2	0.5
European Respiratory Journal	17	402	161	23.6	2.9	15.3	4.0
Pan African Medical Journal	13	16	61	1.2	0.5	0.8	0.3
The Lancet Global Health	13	331	119	25.5	10.0	32.1	8.0
Indian Journal of Tuberculosis	12	62	34	5.2	0.8	1.3	0.4
The Lancet	11	183	39	16.6	23.6	91.5	13.1
Frontiers in Immunology	11	149	55	13.5	1.6	8.1	2.6
Emerging Infectious Diseases	8	147	107	18.4	2.4	9.8	2.5
American Journal of Tropical Medicine and Hygiene	7	33	45	4.7	1.1	4	1.0

Source: Scopus/SciVal database. NCit: Citations, Cpd: Citations per document, SNIP: Source-normalized impact per paper, SJR: SCImago journal rank

Table 6: Top 10 most productive subject areas in Scopus on tuberculosis associated with COVID-19 period 2019-2020

Subcategory	Scholarly output	NCit	Authors	Cpd	FWCI
Infectious diseases	168	1972	957	11.7	1.9
General medicine	154	1625	692	10.6	2.0
Pulmonary and respiratory medicine	105	1114	603	10.6	1.7
Public health, environmental, and occupational health	74	766	409	10.4	2.8
Microbiology (medical)	49	910	349	18.6	3.0
Immunology and allergy	36	719	185	20	3.5
Epidemiology	27	276	222	10.2	1.9
Pharmacology (medical)	24	497	147	20.7	4.6
Health policy	19	174	110	9.2	4.3

Source: Scopus/SciVal database. NCit: Citations, Cpd: Citations per document, FWCI Field-weighted citation impact

indicator[22,23] and that, in the present work, they do. Since the purpose is to measure the impact of citations with respect to the publications given, Spanevello Antonio occupies the 7th position, within the top 10 authors with more publications, and despite this, he presents an impact per citation of 10.2 unlike those who occupy the first positions; Miglori Giovanni and Goletti Delta with 6.2 and 7.7, respectively.

On the other hand, South Africa is one of the countries with more articles on tuberculosis published within the African continent in the last decade; the universities University of Cape Town, University of Stellenbosch, University of the Witwatersrand, and University of Pretoria are in the top five universities with the largest collaborative networks[24-26] and are precisely those in the top 10 universities with the highest scientific production on tuberculosis associated with COVID-19. However, in the world scientific production, the University of Cape Town and the University of Stellenbosch are in 2nd and 3rd place, respectively, below the CDC.[24] Despite having a wider range of years, South African institutions coincided with our results since South Africa is part of the BRICS countries, which account for 49% of the world's tuberculosis cases.[26]

In the case of COVID-19, we note that the institution with the most publications is Huazhong University of Science and Technology and the one with the highest number of citations is Wuhan University, which is an expected result given that it is the place where the pandemic started. However, within the top 10 is also Harvard Medical School and in previous studies,[27] we can also find it within the top 20;[28] as well as the London School of Hygiene and Tropical Medicine, University College London and University of Oxford, coinciding with the results of this study. It is worth mentioning that these are not the only universities in the top.

The journals that present more publications in isolated studies are Journal of Medical Virology.[27] and the International

Journal of Tuberculosis and Lung Disease[29] in COVID-19 and Tuberculosis, respectively; which coincides in the analysis with the International Journal of Tuberculosis, which presents more publications; due to the fact that it is a specific journal of tuberculosis; besides being in conditions of a research boom due to the COVID-19 pandemic.[20] However, the highest number of citations belong to the European Respiratory Journal ($n = 402$) and The Lancet Global Health ($n = 331$). On the other hand, according to the score obtained by CiteScore 2020, The Lancet Global Health is the most prestigious journal that has published on tuberculosis associated with COVID-19.

There are some shortcomings in this study. First, there is a data limitation to the publications that were retrieved from Elsevier's Scopus; although it is known for its enormous amount of data with high precision and retrieval, 98.1% and 94.4%, respectively.[20] The use of this may have a certain bias favoring mainly natural sciences, engineering, and biomedical research. On the other hand, it is necessary to be careful when making comparisons with respect to institutions, countries and/or languages since it tends to overvalue the English language with respect to the others.[30] Second, the Web of Science database may have provided us with different records on the search but, in our bibliometric study, no such comparison was made.[27]

One of the strengths of the research work is that it is the first bibliometric study that focuses on COVID-19-associated tuberculosis between 2019 and 2020. Two bibliometric articles were used in the development of this study.[4,31] It is recommended that this work continues to be ongoing because, with the passage of time, it will allow us to know in more depth the number of publications and their impact. On the other hand, other databases should be used to broaden the search for scientific articles. Similarly, the following bibliometric analyses should be carried out comparing current findings with those found at the end of the pandemic.

Conclusion

Within the limitations of the study, it is concluded that the universities of South Africa lead the world in scientific production, despite this, the universities of the United Kingdom present more impact. Most of the research has been published in Q1 journals, with a collaboration that is largely national. Further analysis is recommended after the pandemic to get a more accurate picture of scientific output.

Limitation of the study

The data on the impact of author citations by publication are too early to be evaluated with confidence because they are very fickle, and with a small change in the number of citations, the impact will be altered**.** Second, the low rate of publications as well as collaborations in a country should not suggest that scientific research is of low quality.

Ethical clearance

Not applicable.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. Kokol P, Blažun Vošner H, Završnik J. Application of bibliometrics in medicine: A historical bibliometrics analysis. Health Info Libr J 2021;38:125-38.
2. Franchignoni F, Özçakar L, Negrini S. Basic bibliometrics for dummies and others: An overview of some journal-level indicators in physical and rehabilitation medicine. Eur J Phys Rehabil Med 2018;54:792-6.
3. Casado-Aranda LA, Sánchez-Fernández J, Viedma-Del-Jesús MI. Analysis of the scientific production of the effect of COVID-19 on the environment: A bibliometric study. Environ Res 2021;193:110416.
4. Mayta-Tovalino F, Pacheco-Mendoza J, Diaz-Soriano A, Perez-Vargas F, Munive-Degregori A, Luza S. Bibliometric study of the national scientific production of all Peruvian schools of dentistry in scopus. Int J Dent 2021;2021:5510209.
5. Mayta-Tovalino F. Bibliometric analyses of global scholarly output in dentistry related to COVID-19. J Int Soc Prev Community Dent 2022;12:100-8.
6. Rothan HA, Byrareddy SN. The epidemiology and pathogenesis of coronavirus disease (COVID-19) outbreak. J Autoimmun 2020;109:102433.
7. Zyoud SH. The Arab region's contribution to global COVID-19 research: Bibliometric and visualization analysis. Global Health 2021;17:31.
8. Lapostolle F, Petrovic T, Goix L, Adnet F. Impact of COVID-19 pandemic on non-COVID-19 publications. Resuscitation 2021;162:102-3.
9. Paes-Sousa R, Millett C, Rocha R, Barreto ML, Hone T. Science misuse and polarised political narratives in the COVID-19 response. Lancet 2020;396:1635-6.
10. Klingelhöfer D, Braun M, Brüggmann D, Groneberg DA. The pandemic year 2020: World map of coronavirus research. J Med Internet Res 2021;23:e30692.
11. Pathania AS, Prathipati P, Abdul BA, Chava S, Katta SS, Gupta SC, *et al.* COVID-19 and cancer comorbidity: Therapeutic opportunities and challenges. Theranostics 2021;11:731-53.
12. Natarajan A, Beena PM, Devnikar AV, Mali S. A systemic review on tuberculosis. Indian J Tuberc 2020;67:295-311.
13. Gao Y, Liu M, Chen Y, Shi S, Geng J, Tian J. Association between tuberculosis and COVID-19 severity and mortality: A rapid systematic review and meta-analysis. J Med Virol 2021;93:194-6.
14. Leydesdorff L, Opthof T. Scopus's source normalized impact per paper (SNIP) versus a journal impact factor based on fractional counting of citations. J Assoc Inf Sci Technol 2010;61:2365-69.
15. Purkayastha A, Palmaro E, Falk H, Baas J. Comparison of two article-level, field-independent citation metrics: Field-weighted citation impact (FWCI) and relative citation ratio (RCR). J Informetr 2019;13:635-42.
16. Villaseñor-Almaraz M, Islas-Serrano J, Murata C, Roldan-Valadez E. Impact factor correlations with Scimago Journal Rank, Source Normalized Impact per Paper, Eigenfactor Score, and the CiteScore in Radiology, Nuclear Medicine and Medical Imaging journals. Radiol Med 2019;124:495-504.
17. Baker DW. Introducing CiteScore, our journal's preferred citation index: Moving beyond the impact factor. Jt Comm J Qual Patient Saf 2020;46:309-10.
18. Dinis-Oliveira RJ. The H-index in life and health sciences: Advantages, drawbacks and challenging opportunities. Curr Drug Res Rev 2019;11:82-4.
19. Perianes A, Waltman L, Eck N. Constructing bibliometric networks: A comparison between full and fractional counting. J Informetr 2016;10:1178-95.
20. Ioannidis JP, Salholz-Hillel M, Boyack KW, Baas J. The rapid, massive growth of COVID-19 authors in the scientific literature. R Soc Open Sci 2021;8:210389.

21. Corrales-Reyes IE, Hernández-García F, Vitón-Castillo AA, Mejia CR. Visibility, collaboration and impact of the Cuban scientific output on COVID-19 in Scopus. Heliyon 2021;7:e08258.
22. Guerrero-Bote VP, Chinchilla-Rodríguez Z, Mendoza A, de Moya-Anegón F. Comparative analysis of the bibliographic data sources dimensions and scopus: An approach at the country and institutional levels. Front Res Metr Anal 2020;5:593494.
23. Duan D, Xia Q. Evolution of scientific collaboration on COVID-19: A bibliometric analysis. Learn Publ 2021;8:10.1002/leap.1382. doi: 10.1002/leap.1382.
24. Garrido-Cardenas JA, de Lamo-Sevilla C, Cabezas-Fernández MT, Manzano-Agugliaro F, Martínez-Lirola M. Global tuberculosis research and its future prospects. Tuberculosis (Edinb) 2020;121:101917.
25. Igwaran A, Edoamodu CE. Bibliometric analysis on tuberculosis and tuberculosis-related research trends in Africa: A decade-long study. Antibiotics (Basel) 2021;10:423.
26. Castor K, Mota FB, da Silva RM, Cabral BP, Maciel EL, de Almeida IN, *et al.* Mapping the tuberculosis scientific landscape among BRICS countries: A bibliometric and network analysis. Mem Inst Oswaldo Cruz 2020;115:e190342.
27. Farooq RK, Rehman SU, Ashiq M, Siddique N, Ahmad S. Bibliometric analysis of coronavirus disease (COVID-19) literature published in Web of Science 2019-2020. J Family Community Med 2021;28:1-7.
28. DE Felice F, Polimeni A. Coronavirus disease (COVID-19): A machine learning bibliometric analysis. *In vivo* 2020;34:1613-7.
29. Nafade V, Nash M, Huddart S, Pande T, Gebreselassie N, Lienhardt C, *et al*. A bibliometric analysis of tuberculosis research, 2007-2016. PLoS One 2018;13:e0199706.
30. Mongeon P, Paul-Hus A. The journal coverage of web of science and scopus: A comparative analysis. Scientometrics 2016;106:213-28.
31. Quincho-Lopez A, Pacheco-Mendoza J. Research trends and collaboration patterns on polymyxin resistance: A bibliometric analysis (2010-2019). Front Pharmacol 2021;12:702937.