REVIEW ARTICLE

Scientometric Research Mapping of OMICRON for Scientific Production: A Global Perception Analysis

Satish S[1], Sylvia Grace J[2*], Vasna Joshua[3], Prabakaran M[4]

[1,3]ICMR, National Institute of Epidemiology, Ayapakkam, Chennai, India
[2]Satyabamma Institute of Science & Technology, Chennai, India
[4]Vivekananda College, Tiruvedakam West, Madurai, India

DOI: 10.55489/njcm.140320232593

ABSTRACT

Background: South Africa reported a new variant of SARS-CoV-2, named 'Omicron,' to the World Health Organization on November 24, 2021. Scientometric analysis quantify all currently available written communication, the authors of that communication, and their citation analysis. The study's goal was to use the Scopus and Web of Science databases to look at the research metrics of Omicron publications published between January 1965 and March 2020.

Methods: All scientific research outputs with the word 'Omicron' in the title were retrieved from the Web of Science (January 1965 to March 2022) and Scopus (January 1896 to March 2022) databases on April 10, 2022. The data was analyzed based on year-wise publications; leading authors; predominant journals in publishing, highly cited articles with citations; type of publications; subject classification, frequently used keywords, geographical distribution of publication, language, and more contributed institutions.

Results: There were 1229 research outputs for WoS and 655 from Scopus. The number of publications for WoS increased from 22 in 1965 to 265 in 2022, while Scopus increased from 1 in 1896 to 356 in 2022. Both the databases identified the author Yuen KY as the highest contributor; Journal of Virology and Nature as the predominant journals; the Lancet as highly cited journal; majority as original articles; frequently used keywords as 'SARS-CoV-2'; the United States of America as the most productive country; majority publication in English. The publications were mainly on the subjects Chemistry and Medicine by WoS and Scopus, respectively. The most productive institute was the 'University of California Systems' by WoS and the 'University of Hong Kong' by Scopus.

Conclusion: The term 'Omicron' first appeared in the domain of Chemistry in the late 18th century. The growth pattern of publication was not consistent. The above research metrics will be helpful to researchers in the coming days.

Keywords: Omicron, Coronavirus, Scientometric, Scopus, Covid-19, Web of Science

ARTICLE INFO

Financial Support: None declared
Conflict of Interest: None declared
Received: 23-11-2022, **Accepted**: 06-02-2023, **Published**: 31-03-2023
***Correspondence:** Sylvia Grace J (Email: ssylviagrace@gmail.com)

How to cite this article:
Satish S, Grace JS, Joshua V, Prabakaran M. Scientometric Research Mapping of OMICRON for Scientific Production: A Global Perception Analysis. Natl J Community Med 2023;14(3):187-193. DOI: 10.55489/njcm.140320232593

www.njcmindia.com | pISSN09763325 | eISSN22296816 | Published by Medsci Publications

Introduction

SARS-CoV-2, the virus that causes COVID-19, has a new variant renamed Omicron[1,2] by WHO on November 26, 2021. On November 8, 2021, the first sample was collected in South Africa.[3] Later, on November 22, 2021, Botswana laboratories discovered the novel variant Omicron based on samples collected between November 11 and November 16, 2021.[4,5] On November 11, 2021, a person arriving in Hong Kong from South Africa via Qatar and another arriving in Belgium from Egypt via Turkey were the first known samples on other continents.[6] On November 24, 2021, South Africa reported the variant to the World Health Organization (WHO) for the first time.[7] Because the variant had been identified in more than 90 countries, the World Health Organization designated Omicron as a 'variant of concern,' stating that the global risks were 'very high.' Over the last few months, the Omicron variant has spread faster than any previously known Coronavirus.[8] It has grown to be a significant global public health issue. Scientometric studies are used to quantify all written communication that is currently available and the authors of those communications through citation analysis.[9] Scientometric analysis of the Omicron can help to outline the literature produced on the topic, compiled and organized information sources, and to improve research collaborations. The objective of the study was to examine the research metrics of Omicron articles published between January 1965 and March 2020 using the Scopus and Web of Science databases.

Methodology

We retrieved data for the study from two databases, Thomas Reuters Web of Science (WoS) and Scopus, using the title's keyword search strategy 'OMICRON'. The data for the study was limited to the upper bound of March 2022 and was extracted on April 10, 2022.

WoS generated data from January 1965 to March 2022, while Scopus generated data from January 1896 to March 2022. All search results were saved as text files and then imported into Microsoft Office. WoS had 1229 research outputs, and Scopus had 655. Thomson Reuters Journal citation reports were used to calculate the Journal impact factor. The following software was used: Microsoft Office, Word Cloud Generator[10], and ArcGIS 10.1[11]. It was investigated based on year-wise publication productivity, the author-wise contribution of publication, leading productive authors, journal-wise distribution of publications, most cited articles with citations, document type of publications, subject-wise classification, frequently used keywords, geographical distribution, and production of research published, language-wise contribution, and institution-wise distribution of the publication.

Results

Year-wise Omicron publication productivity

The growth rate in research output has no discernible pattern, but it has increased during the COVID-19 period (2021-2022). Figure 1 depicts the annual growth pattern of research publications. Observing the WoS database, it increased from 22 publications in 1965 to 265 in 2022, whereas Scopus was one in 1896 to 356 publications in 2022 and oscillated during the intermediate years.

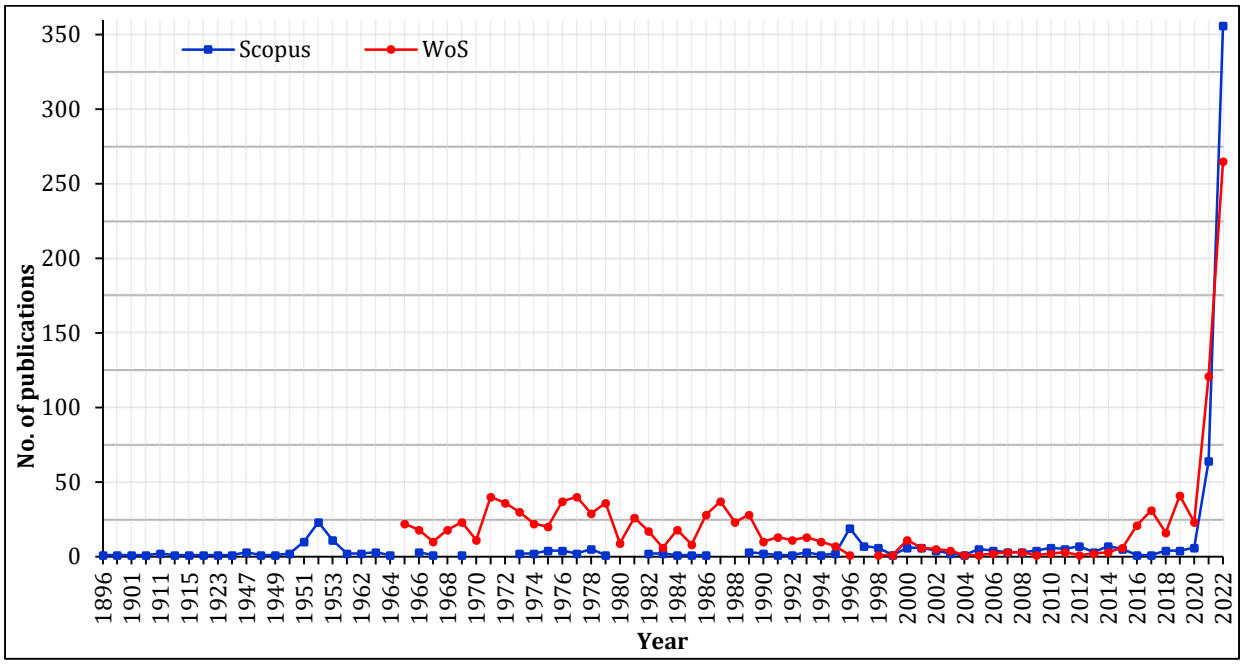

Figure 1: Year-wise publication of research articles on Omicron by Scopus, and WOS, from inception to March 2022

Table1: Author-wise publication of articles on Omicron, WoS, and Scopus, from inception to March 2022

Authors	Publications
In WoS (n= 1229)	
Yuen, K.Y.	9
Dhama, K.	8
Mahase, E.	8
To, K.K.W,	8
Lu, L.	7
Zakharkin, L.I.	7
Kupferschmidt, K	6
Andeweg, S.P.	5
Backer, J.A.	5
Callaway, E.	5
Chu, H.	5
Desingu, P.A.	5
Eggink, D.	5
In Scopus (n=655)	
Yuen, K.Y.	11
Mahase, E.	9
Dhama, K.	7
To, K.K.W.	7
Lu, L.	6
Callaway, E.	5
Desingu, P.A.	5
Freiser, H.	5
Islam, M.R.	5
Kupferschmidt, K.	5
Maes, P.	5

Table 2: Journal wise distribution of publication on Omicron, WOS and Scopus, from inception to March 2022

Journals	Publications
WoS (n=1299)	
Journal of medical virology	36
Nature	35
BMJ British Medical Journal	32
Journal of the American Chemical Society	26
Journal of Organometallic Chemistry	18
New England Journal of Medicine	17
Astrophysical Journal	16
Bull. of the Academy of Sciences of the USSR Division of Chemical Science Carbohydrate Research	15
Scopus(n=655)	
Nature	42
Journal Of Medical Virology	35
Journal Of the American Chemical Society	34
BMJ Clinical Research Ed	25
Acta Crystallographica Section C Crystal Structure Communications	19
BMJ British Medical Journal	14
Bunseki Kagaku	12
Journal Of Organic Chemistry	12
New England Journal of Medicin	11

Prolific Author contribution of publication identified by WoS and Scopus

The distribution of contribution of primary authors by WoS and Scopus showed in Table 1. Thirteen primary authors have contributed at least five articles across the globe identified by the WoS database, whereas it was only 11 primary authors. The author Yuen KY has contributed the highest by both the databases.

Journal wise distribution of omicron publication

The Omicron research outputs were published in several periodicals. The first nine journals identified by WoS and Scopus are shown in Table 2. Journal of Virology and Nature was considered to be the first two predominant journals identified by WoS and Scopus. WoS identified 36and 35 articles, whereas it was 42 and 35 by Scopus; more details are shown below.

Top five cited articles on Omicron publications by WoS and Scopus

The article "Omicron SARS-CoV-2 variant: a new chapter in the COVID-19 pandemic" published in the journal '*The Lancet*' by Karim SSA et al. in the year 2021, was cited the maximum number of times by WoS (n=81) and Scopus (n=84) followed by other articles (Table 3A,3B).

Distribution of document type of publications by WoS and Scopus

Out of1229 publications,68% of the publications were original articles followed by letters. Abstract 6.58%. Review, short survey, and erratum were published with less than 1 percent (Table 4).

Omicron articles by subject-wise classification

The broad research areas of classification of Omicron research output by WoS and Scopus are shown in Table 5. The majority of the articles were from Chemistry (n=397; 32.3%), followed by Biochemistry Molecular Biology with (n=108; 8.8%) in the case of WoS, whereas it was Medicine (n=275; 42%), followed Immunology and Microbiology (n=111; 16.9%), and so on.

Keywords used

The author's keywords were almost similar using WoS and Scopus databases, it is visualized (Figure 2) by downloading the freely downloadable software WordItOut. The larger the font size, the greater the magnitude of the keyword used. The authors most frequently used keywords identified by the databases were "SARS-CoV-2" followed by "COVID-19".

The other keywords were COVID-19 Vaccination, Vaccination, Virus strain, SARS-CoV-2 Lineage-B.1.1.529, Coronavirus Disease 2019, Severe Acute Respiratory Syndrome, Genetics, Coronavirus Spike Glycoprotein, Immunology, Omicron, etc.

Geographical distribution of Omicron publications

Geographical distribution of articles published in Omicron is shown in (Figure 3A, 3B) map on a global scale. The map was created with the ArcGIS 10.1 software. The absence of color indicates that there was no publication. The United States was the coun-

try with the highest number of articles published both by WoS (289) and Scopus(n=155); the next highest was the Peoples Republic of China with (WoS=84; Scopus= 98), the United Kingdom with (WoS=82; Scopus=56), and India with (WoS=51; Scopus=43).

Table 3A: Top five cited articles on Omicron publications by WoS from inception to March 2022

Rank	Publications by Scopus	Total Citations WOS
1	"Omicron SARS-CoV-2 variant: a new chapter in the COVID-19 pandemic", Karim, Salim S Abdool et al. The Lancet, 2021 Volume 398, Issue 10317, 2126 – 2128.	81
2	"Broadly neutralizing antibodies overcome SARS-CoV-2 Omicron antigenic shift". Cameroni, E., Bowen, J.E., Rosen, L.E. *et al. Nat ure* 602, 664–670 (2022).	56
3	"Heavily mutated Omicron variant puts scientists on alert" Callaway E. Nature 600 (7887) pp21	50
4	"mRNA-based COVID-19 vaccine boosters induce neutralizing immunity against SARS-CoV-2 Omicron variant", Ilfredo F. Garcia-Beltran, et al., Cell, Volume 185, Issue 3, 2022, Pages 457-466.e4.	43
5.	"Striking antibody evasion manifested by the Omicron variant of SARS-CoV-2". Liu, L., Iketani, S., Guo, Y. et al. Nature 602, 676–681 (2022).	39

Table 3B: Top five cited articles on Omicron publications by Scopus from inception to March 2022

Rank	Publications by Scopus	Total Citations Scopus
1	"Omicron SARS-CoV-2 variant: a new chapter in the COVID-19 pandemic", Karim, Salim S Abdool et al. The Lancet, 2021 Volume 398, Issue 10317, 2126 – 2128.	84
2	"Heavily mutated Omicron variant puts scientists on alert". Callaway E. Nature 600(7887) pp21.	57
3	"Striking antibody evasion manifested by the Omicro n variant of SARS-CoV-2". Liu, L., Iketani, S., Guo, Y. *et al.* Nature 602, 676–681 (2022).	43
4	"mRNA-based COVID-19 vaccine boosters induce neutralizing immunity against SARS-CoV-2 Omicron variant", Ilfredo F. Garcia-Beltran, et al., Cell, Volume 185, Issue 3, 2022, Pages 457-466.e4.	43
5	"Considerable escape of SARS-CoV-2 Omicron to antibody neutralization". Planas D, Saunders N, et al., Nature. 2022 Feb;602(7898):671-675.	41

Table 4: Type of publication by WoS and Scopus from inception to March 2022

Document type	Articles in WoS (%)	Articles in Scopus (%)
Article	836 (68)	221 (33.7)
Letter	97 (7.9)	87 (13.3)
Early accesses	89 (7.2)	-
Note	89 (7.2)	47 (7.2)
Editorial	80 (6.5)	36 (5.5)
News	52 (4.2)	-
Meeting abstract	45 (3.7)	-
Review	20 (1.6)	22 (3.4)
Proceeding paper	7 (0.6)	-
Book reviews	3 (0.2)	-
Short Survey	6 (0.5)	6 (0.9)
Erratum	2 (0.2)	2 (0.3)

Publication of Omicron research article by languages

The majority of the author's publications were in the English language (WoS=91%; Scopus= 92%), followed by German (WoS and Scopus=2.0%), other languages are shown in (Table 6).

Table 5: Foremost broad research areas on Omicron, WOS & Scopus from inception to March 2022

Research areas	Articles
	In WoS
Chemistry	397 (32.3)
Biochemistry Molecular Biology	108 (8.8)
Physics	85 (6.9)
General internal medicine	83 (6.8)
Science technology	76 (6.2)
Classics	69 (5.6)
Astronomy	66 (5.4)
Virology	46 (3.7)
Cell biology	44 (3.6)
Immunology	42 (3.4)
	In Scopus
Medicine	275 (42)
Immunology and Microbiology	111 (16.9)
Biochemistry, Genetics, and Molecular Biology	82
Multidisciplinary	50
Pharmacology, Toxicology and Pharmaceutics	26 (12.5)
Social Sciences	20 (7.6)
Environmental Science	19 (4)
Health Professions	17 (3.1)
Chemistry	11 (2.9)
Computer Science	7 (2.6)

Figure in parenthesis indicates percentage.

Figure 2: Authors' keywords in Omicron research articles, Scopus, since inception- March 2022

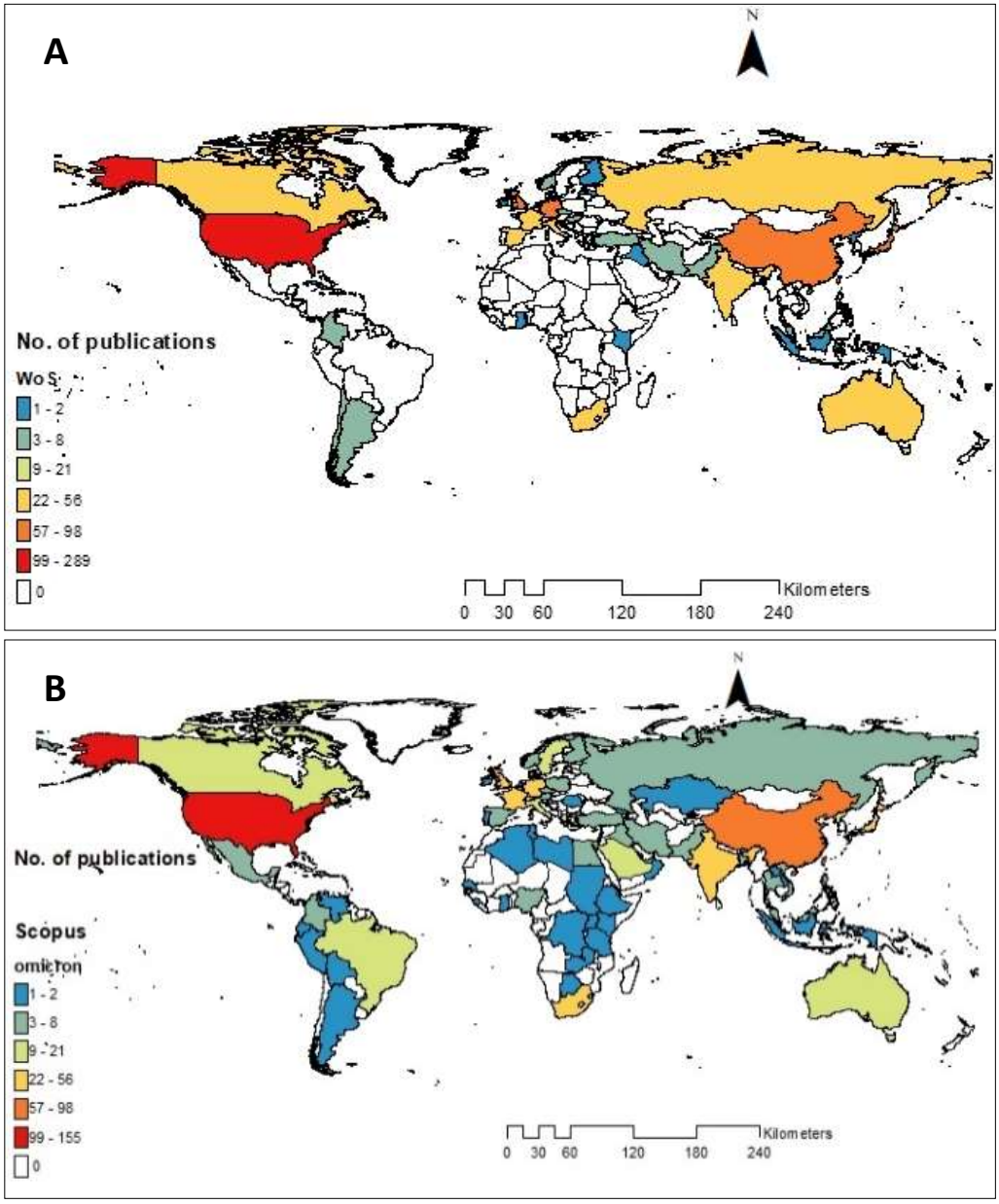

Figure (3A,3B) Geographical distribution of Omicron publications, WoS and Scopus, since inception- March 2022

Table 6: Research article published in Omicron by languages, WOS and Scopus

Language	WoS Articles (%)	Language	Scopus Articles (%)
English	1118 (91)	English	605 (92.4)
German	24 (2)	German	13 (2)
Japanese	22 (1.8)	Chinese	10 (1.5)
Russian	21 (1.7)	Greek	7 (1.1)
Italian	14 (1.1)	French	6 (0.9)
French	13 (1.1)	Italian	4 (0.6)
Spanish	12 (1)	Spanish	4 (0.6)

Institution wise distribution of publication of Omicron research articles

Figures 4A (WoS) and Figure 4B (Scopus) depict the world's leading institutions/organizations contributing to Omicron research. As per WoS publications, the University of California Systems was the most productive institute (n=36), followed by the Russian Academy of Sciences (n=25) and the University of London (n=23).

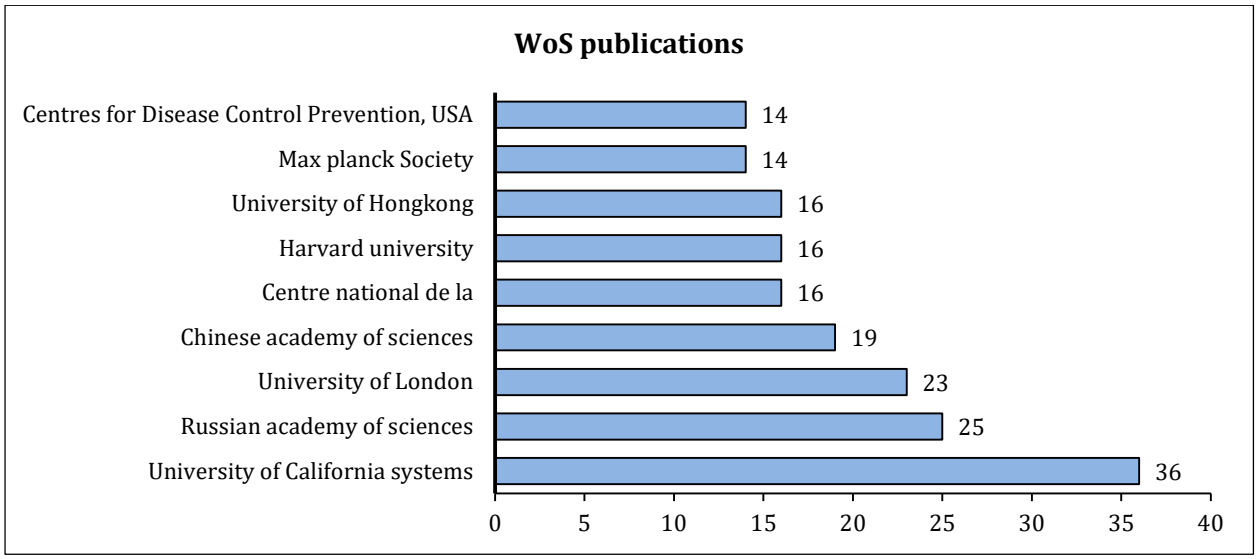

Figure 4A: **Leading productive institutes in publishing Omicron articles, WoS from inception - to March 2022**

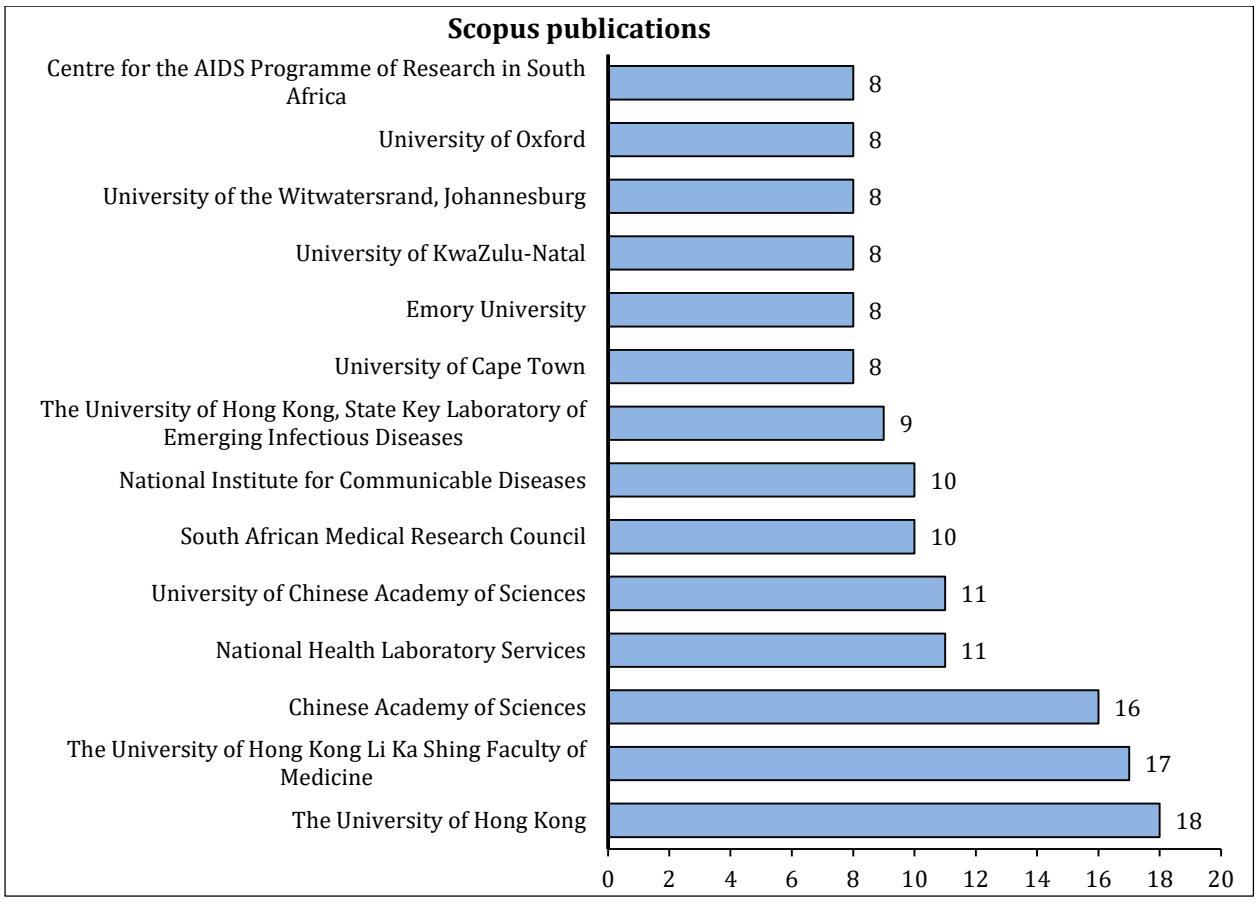

Figure 4B: Leading productive institutes in publishing Omicron articles, Scopus from inception - to March 2022

Among the most productive institutes from the Scopus database, the University of Hong Kong came out on top (n=18), followed by HKU Li Ka Shing Faculty of Medicine (n=17), Chinese Academy of Sciences (n=16) articles, and National Health Laboratory Services (n=11) articles. Among the most productive institutes in Scopus, the University of Hong Kong came out on top (18 articles), followed by HKU Li Ka Shing Faculty of Medicine.

Discussion

The outbreak of the Omicron variant in November 2021 was reported in South Africa, and the outbreak has created an alarming sign to health authorities. Currently, WHO collaborates with a community of researchers worldwide to fully understand the variant Omicron. Studies that are now or soon underway include evaluations of transmissibility, infection severity (including symptoms), vaccine and diagnostic test performance, and treatment effectiveness. WHO encourages countries to participate in collecting and sharing hospitalized patient data via the WHO COVID-19 Clinical Studies Platform to quickly describe clinical features and outcomes for patients.[12] The current Scientometric analysis of Omicron's research outputs using two databases describes an outset picture of the pattern of scientific publication growth has changed over time. Even though the word Omicron was used in research articles in 1896 in the field of chemistry, only during the recent years of 2021 and 2022 the growth was higher. This analysis illustrates how researchers from around the globe are advancing in their research and raising awareness of the variant through research papers, letters, notes, and editorials. Both the databases reflected only a small number of authors are responsible for the most significant works. The primary author Yuen, K.Y of the University of Hong Kong, has contributed more research outputs. The growth of research publications was reflected in nearly 100 different periodical journals demonstrating that it spread quickly and widely in a short period. The researchers generally preferred the 'Journal of Medical Virology' and the journal 'Nature'. Original articles constituted the majority of research outputs, followed by letters. They were mainly classified under the subject of Chemistry and Medicine. The authors preferred the usage of the keyword "SARS CoV-2" followed by COVID-19. The United States of America had the highest number of published articles. The University of Hong Kong and the University of California System were the most productive institutions. The research articles were written in 10 different languages, mostly in English followed by German.

Conclusion

The current study shows that there were research outputs with the title including the terminology Omicron even in the late 18th Century in the field of Chemistry. The growth patterns of research publications oscillated and peaked in 2021-2022. The United States of America and the University of Hong Kong made significant contributions to Coronavirus[13] has also contributed to Omicron research.

The above research metrics about Omicron would be helpful for researchers in the alarming process of seeking treatment, prevention and vaccination, which is still under investigation.

References

1. Meyer, David. What's Omicron? Here's what we know and don't know about the new COVID variant that's roiling markets and air travel. Fortune [Internet] 2021.[cited 2021 Dec 21] Available from: https://fortune.com/2021/11/26/nu-covid-variant-who-south-africa-markets-oil-crypto-air-travel/
2. B.1.1.529 declared COVID-19 'variant of concern', renamed Omicron. The Hindu, November [Internet] [cited 2022 Feb 21] 27, 2021, Available from: https://www.thehindu.com/sci-tech/health/who-declares-b11529-covid-19-variant-of-concern-renamed-omicron/article37710387.ece
3. Dyer O. Covid-19: South Africa's surge in cases deepens alarm over omicron variant. BMJ (2021) BMJ ;375;n3013 doi:10.1136/bmj.n3013
4. SARS-CoV-2 Sequencing South African National Institute for Communicable Diseases. [Internet] December 1 2021[cited 2021 Dec 21]. Available from: https://www.nicd.ac.za/wp-content/uploads/2021/12/Update-of-SA-sequencing-data-from-GISAID-1-Dec-Final.pdf
5. Implications of the further emergence and spread of the SARS-CoV-2 B.1.1.529 variant of concern (Omicron) for the EU/EEA – first update. [Internet] [cited 2021 Dec 25] Available from: https://www.ecdc.europa.eu/sites/default/files/documents/threat-assessment-covid-19-emergence-sars-cov-2-variant-omicron-december-2021.pdf
6. Philip Whiteside. COVID-19: how the spread of Omicron went from patient zero to all around the globe. Sky News. [Internet] Available from : https://news.sky.com/story/covid-19-how-the-spread-of-omicron-went-from-patient-zero-to-all-around-the-globe-12482183
7. Classification of Omicron (B.1.1.529): SARS-CoV-2 Variant of Concern. World Health Organization. [Internet] [cited 2021 Nov 26]. Available from: https://www.who.int/news/item/26-11-2021-classification-of-omicron-(b.1.1.529)-sars-cov-2-variant-of-concern
8. Xiong D, Zhao X, Luo S, Cong Y, Zhang JZH, Duan L. Immune Escape Mechanisms of SARS-CoV-2 Delta and Omicron Variants against Two Monoclonal Antibodies That Received Emergency Use Authorization. J Phys Chem Lett. 2022 [cited 2022 July 25] 6064-6073. doi: 10.1021/acs.jpclett.2c00912
9. Scientometricss, Citation and Citation Analysis. http://shodhganga.inflibnet. ac.in/bitstream/10603/18612/8/ 08_chapter%203.pdf
10. Worditout. [Internet] [cited 2022 Aug 27] Available from : https://worditout.com/word- cloud/create
11. Environmental Systems Research Institute, Inc. ArcGIS desktop: Release 10. Redlands, CA, USA: ESRI, 2010 Inc. [Internet}] Available from: https://www.scirp.org/(S(czeh2tfqyw2orz553k1w0r45))/reference/ReferencesPapers.aspx?ReferenceID=1102852
12. Update on omicron. [Internet] Available from: https://www.who.int/news/item/28-11-2021- update-on-omicron
13. Joshua V, Sivaprakasam S. Coronavirus: Bibliometric analysis of scientific publications from 1968 to 2020. Med J Islam Repub Iran. 2020;34:64. DOI:10.34171/mjiri.34.64