Available online on 15.11.2021 at http://jddtonline.info

Journal of Drug Delivery and Therapeutics

Open Access to Pharmaceutical and Medical Research

Open Access Full Text Article

Research Article

Bibliometric Visualisation of Research Performance of Post COVID -19 and Mucormycosis: Where Do We Stand?

Mallikarjun Kappi[1,*], Mallikarjun B[2], Vidyashree T[3]

[1] *Research Scholar, Department of Library and Information Science, Kuvempu University, Shankaraghatta, Karnataka, India*

[2] *Research Scholar, Department of Library and Information Science, Kuvempu University, Shankaraghatta, Karnataka, India*

[3] *Asst. Professor, Government First Grade College, Jagalur, Davanagere Dist, Karnataka, India*

Article Info:

Article History:

Received 11 September 2021
Reviewed 19 October 2021
Accepted 24 October 2021
Published 15 November 2021

Cite this article as:

Kappi M, B M, T V, Bibliometric Visualisation of Research Performance of Post COVID -19 and Mucormycosis: Where Do We Stand?, Journal of Drug Delivery and Therapeutics. 2021; 11(6):31-39

DOI: http://dx.doi.org/10.22270/jddt.v11i6.5127

*Address for Correspondence:

Mallikarjun Kappi, Research Scholar, Department of Library and Information Science, Kuvempu University, Shankaraghatta, Karnataka

ORCID ID: *https://orcid.org/0000-0003-1964-3498*

Abstract

Purpose: The second wave of the covid-19 pandemic has impacted global healthcare tremendously and mucormycosis associated with coronavirus disease is one of the deadly fungi that hit India in April 2021. An increasing number of research papers are upcoming with mucormycosis associated with coronavirus research and this paper aims at performing a bibliometric visualisation of all the available research on post covid-19 and mucormycosis.

Method: The Scopus database was selected and the search query (ALL (novel coronavirus 2019 OR coronavirus 2019 OR COVID 2019 OR COVID 19 OR nCOV OR SARSCoV2 OR COVID19) and (black fungus or white fungus or yellow fungus or mucormycosis) was developed on 25 May 2021 to retrieve all the bibliographic records on the domine of interest. VOSviewer software tool was used to constructing and visualising bibliometric networks to measure co-authors, countries, and institutions document citation, keyword metrics.

Results: A total of 154 documents were retrieved in the search, these were authored by 3,806 authors and published in 133 sources (journals, books, etc.). USA, India, and UK ware contributed the highest papers. Journal of Fungi (4), Heliyon (3), International Journal of Molecular Sciences (3), and Phytotherapy Research (3) are the journals that published the highest papers. Author per document was 24.7; Documents per author were 0.0405 and collaboration index was marked 26.5 during the period.

Conclusion: this bibliometric visualisation presents the qualitative and quantitative metrics for post-covid-19 and mucormycosis research and provides evidence that research in this domine is more in-depth than before. It is hoped that this well-directed research in different countries will provide new avenues for understanding diseases caused by mucormycosis associated with coronavirus.

Keywords: Bibliometric Visualisation; Post-Covid-19; Mucormycosis; Annual Growth Rate; Research Performance; India

1. INTRODUCTION

Covid-19 has killed millions of people around the world, but it is not the end of the story for those who are lucky enough to survive: Injury is a deadly fungal disease that occurs after the virus. To make matters worse, long before the outbreak of the epidemic, most of the countries were unable to cope with some serious illnesses [1,2]. The second wave of Covid-19 has hit India hard, based on daily records it reached a peak level in mid of May 2021, after that, it becomes declined. Despite recent reports, India still contributes an estimated 26 percent of the world's detected, and 78000 deaths worldwide as of 30 May 2021 [3].

Bibliometric studies have mapped the various disciplines of the study to identify their research trends, knowledge creations and monitor research performance at the global, national, institutional, and author levels. These studies also analysed the global research on various metrics of quality (performance) and quantity (output) and describe the relationships between research networks, co-authors, organizations, and countries using relevant indicators. In recent years, bibliometrics has been used to provide in-depth insight into several subject areas associated with Covid-19 research. However, most of these bibliometric studies on COVID-19 research are based on different data sets covering the publication period. To date, not a single study has been conducted that attempts to comprehensively assess the status after Covid-19 and mucormycosis research by collecting publication data from coronavirus-associated mucormycosis to date. Therefore, this bibliometric visualisation will provide meaningful insights for future research in the context of post-covid-19 and mucormycosis.

2. INDIA'S STATUS QUO OF THE POST COVID – 19 AND MUCORMYCOSIS

As India continues to achieve stability on the status quo, another emerging threat has emerged as a challenge to India in the form of mucormycosis associated with coronavirus disease. This group of infections is caused by 'fungal spores known as mucormycosis', and is commonly known as a black fungus. These are common in soil and mineral waste, including leaves, fruits, vegetables, and manure. They are generally harmless, but their bone marrow can cause disease in people with weak immune systems. The incidence of mucormycosis increased rapidly during the second wave compared to the first wave of Corona in India, with at least 14,872 cases as of May 31, 2021. The state of Gujarat alone contributes to the largest number of cases, with at least 3726 cases of mucormycosis in patients [4,5]. Figure 1 geographic heat map shows the state-wise mucormycosis cases. According to the literature published from December 2019 to April 2021, patients with COVID-19 in India accounted for about 71% of the global cases of mucormycosis.

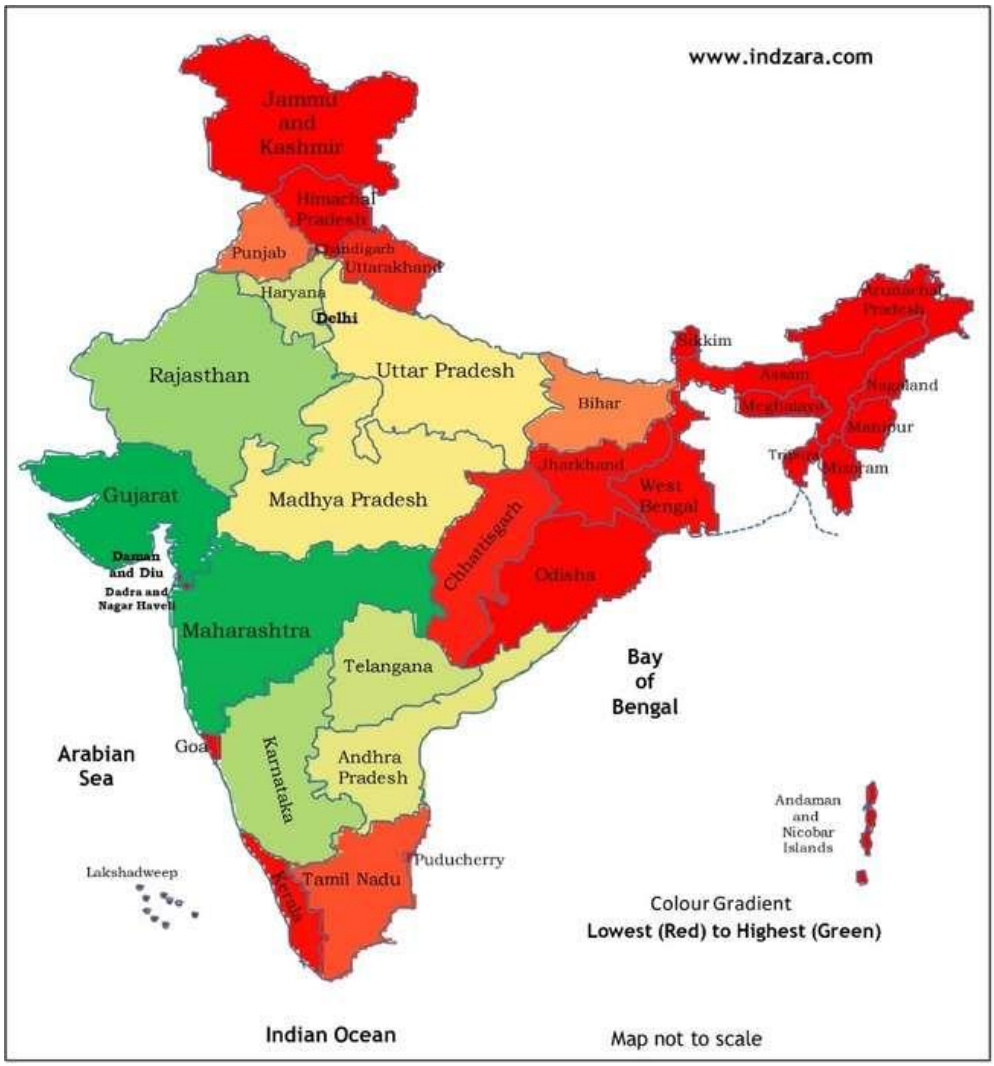

Figure 1: Geographic heat map of the state-wise mucormycosis cases (as of 31 May 2021)

3. DATA SOURCE AND METHODOLOGY

The study obtained publications and citation data related to post-covid-19 and mucormycosis from the Scopus database on May 25, 2021. The Scopus database is the most widely used abstract and citation database in the peer-reviewed scientific literature; it was decided to use it as a bibliometric resource to obtain data for the present study. A comprehensive search was conducted using an " All fields "In the Scopus database. The search retrieved a total of 154 results. The primarily downloaded data is the related domain post covid - 19 and mucormycosis, including titles, author information, keywords, references and sources information, etc. Excel tool is used to statistically analyze the total publications on a range of bibliographic variables. Visualization plays an important role in 'execution of bibliometric analysis because it can describe the structure and progress of a certain research area [6]. VOSviewer is a tool of highly effective series of keywords (ALL (novel coronavirus 2019 OR coronavirus 2019 OR COVID 2019 OR COVID 19 OR nCOV OR SARSCoV2 OR COVID19) and (black fungus or white fungus or yellow fungus or mucormycosis) marked as scientific mapping, developed by Van Eck and Waltman [7]. It has been applied in the field of bibliometrics to obtain visual information. VOSviewer is used to view the prolific authors, organizations, countries, keywords, and references cited in the field of research on covid-19 and mucormycosis. The summary search results are shown in Table 1.

Table 1: Summary of the Information

Description	Results
MAIN INFORMATION ABOUT DATA	
Timespan	2007:2021
Sources (Journals, Books, etc)	133
Documents	154
Average years from publication	0.838
Average citations per documents	5.143
Average citations per year per doc	2.363
References	56936
DOCUMENT TYPES	
article	41
book	9
book chapter	3
conference paper	1
note	2
retracted	1
review	96
short survey	1
DOCUMENT CONTENTS	
Keywords Plus (ID)	2034
Author's Keywords (DE)	653
AUTHORS	
Authors	3806
Author Appearances	4019
Authors of single-authored documents	11
Authors of multi-authored documents	3795
AUTHORS COLLABORATION	
Single-authored documents	11
Documents per Author	0.0405
Authors per Document	24.7
Co-Authors per Documents	26.1
Collaboration Index	26.5

4. BIBLIOMETRIC ANALYSIS OF THE POST COVID – 19 AND MUCORMYCOSIS

In the summary of the data in table 1, the status quo of the post-covid-19 and mucormycosis area can define, as well as the timespan, sources, documents, types of documents, journals, keywords, authors, and authors collaborations. Table 2 illustrates the growth of covid-19 and mucormycosis literature and citations in different years during the study period. The first publication was published in 2007, then there were no papers published till 2011, in 2012 one paper was published, as in 2015 and 2017, 2 and 1 papers were published respectively. From 2019 to 2021 (31 May 2021) the trend of publishing shows a slight growth. This may be due to the outbreak of 'severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)' in December 2019 and become a serious epidemic in 2020 and a serious threat to public health and economic stability worldwide [8,9]. The second wave of COVID-19 associated mucormycosis is affecting most people in the world and the situation in India is very dire [10,11]. As of 31 May 2021, 11,800 cases of mucormycosis or black fungus have been reported in India, with Gujarat, Maharashtra, and Andhra Pradesh having the highest number of cases, according to the latest figures from the Government of India [12]. Thus, an increase in the number of specialists and researchers focus on the domain after these epidemic emergences. Meanwhile, the novel crisis and re-emerging infectious diseases have increased scientific discipline regularly, leading to many publications in the domain. Thus, it is clear that the overall trends in the number of publications and the number of citations are increasing. Overall, 97% of papers have been published in the last 3 years (2019 to May 2021). The exceptional growth in 2021 is quite evident as post-covid-19 and mucormycosis has now become a major concern of the nation to develop a treatment for covid-19 and mucormycosis or to develop various tools and techniques to prevent covid-19 and mucormycosis outbreak and spread. However, it is important to note that although other strains of the virus, such as SARS-COV-1 or MERS-COV-2, caused human casualties in 2004 and 2014, little research has been done on this domain. The attention of global researchers in this field in later years [13].

Table 2: Number of publications and citations of covid-19 and mucormycosis

Year	TP	CTP	AGR	TC
2007	1	1	0	1
2012	1	2	0	5
2015	2	4	1	12
2017	1	5	-0.500	33
2019	14	19	13.000	44
2020	62	81	3.429	224
2021	73	154	0.177	473
	154		**2.448**	**792**

TP=Total Publications; CTP=Cumulative Total Publications; AGR= Annual Growth Rate; TC= Total Citations

Annual Growth Rate (AGR): The highest annual growth rate of the post-covid-19 and mucormycosis publications was recorded in the year 2019 i.e., 13, followed by 3.429 in 2020. For AGR is calculated by using the below formula. This formula was suggested by Kumar and Kaliyaperumal, 2015 [14].

$$AGR = \frac{End\ Value - First\ Value}{First\ Value} \times 100$$

4.1. Collaborative Co-Authors Network Analysis

In an analysis of 159 publications in the relevant domain, it was found that research on 'post-covid-19 and mucormycosis' has primarily intranational or international collaboration. Only 7.143% of papers have been published by a single author. To identify the pattern of collaboration, the authors used the network visualization method. This feature was applied to examine the collaboration among authors, organizations, and countries publishing articles in this domain. Figure 2 indicates the co-authorship network of 3806 authors of 154 publications.

Of the total authors, while identifying authors with at least one publication, it was found that 855 authors were on the threshold. The collaboration network in Figure 2 is shown by 3 different clusters of 3 different colours. In these clusters, the red circle represents cluster 1, which has 22 authors, including Chen H; Chen N; Chen P; Dai H and so, when the green circle represents cluster 2, which has 7 authors, including Abdelshef AM; Belwal T, Li D, etc. The blue circle represents cluster 3, with 5 authors including Li X, Li Y, Lu L, Wang Q, and Wang R, the total link and link strength is displayed for highly productive authors vs. highly cited authors.

As shown in Figure 2, not all highly productive authors are highly cited. However, most productive authors have strong collaboration networks and as a result, they have strong link strengths. But the more cited authors have worked with different groups of co-authors in most of their publications as a result these co-authors do not appear in networks.

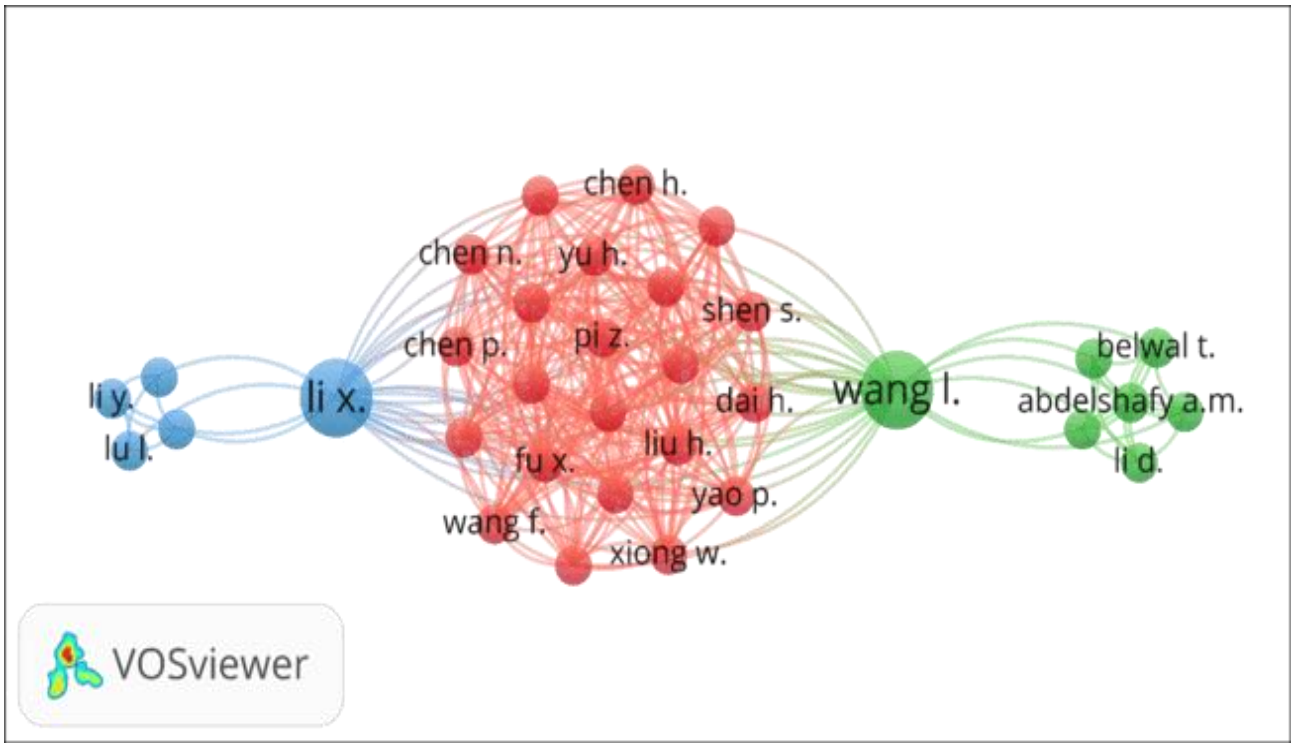

Figure 2: Author's co-authorship network visualization of post-covid-19 and mucormycosis publications.

4.2. Collaborative Countries Network Analysis

Based on data extracted from the Scopus database, Figure 3 shown the countries' co-authorship visualization map. For selection criteria, minimum of one publication has been taken for a country, out of the total 79 countries, 63 countries meet the thresholds. Based on the visualization map, these countries can be classified into different clusters to identify in various colours. As indicated in Figure 3, 10 different colours refer to the 10 countries researching post-covid-19 and mucormycosis, table 3 shows their rankings according to publications are the USA 46, India 26, UK 22, China 20, Italy 18, Australia 14, Canada 13, Iran 13, Brazil 12, and Germany 11 respectively. Cluster 1 is shown in red colour, India (n = 25, Link 27, Link Strength 41) China, Bangladesh, Egypt, South Korea, Saudi Arabia, so on collaborated. Cluster 7 is shown in orange colour, USA (n = 45, Link 40, Link Strength 124), France, Finland, and Morocco have collaborated. Cluster 2 shown in green colour, Italy (n = 16, link 37, Link Strength 65), Iran, Albania, Portugal, Mali, and so on, have collaborated. Cluster 3 shown in blue colour, consists of countries as Australia (n = 12, Link 31, Link Strength 67), Brazil, Canada, Japan, New Zealand, Sri Lanka, etc. The thickness of the line connecting two countries indicates the strength of the relationship between them. The thicker the line, the stronger the cooperative relationship. It shows that geographical significance is not the primary aspect that affects the cooperative relationship.

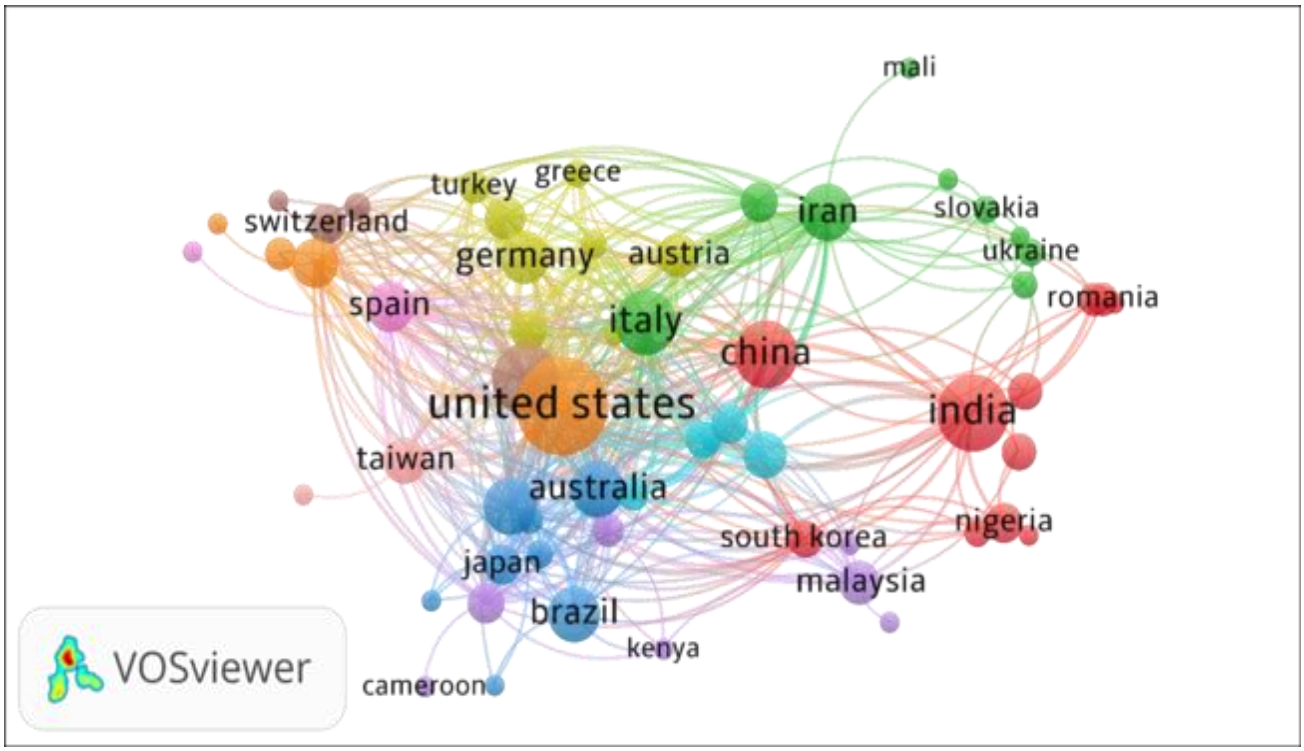

Figure 3: The country co-authorship network of post-covid-19 and mucormycosis publications

Table 3: Top 10 collaborative countries publications in post-covid-19 and mucormycosis.

Country	Documents	Citations	Total Link Strength
USA	45	452	124
India	25	162	41
UK	21	197	90
China	18	73	39
Italy	16	248	65
Canada	12	179	62
Australia	12	130	67
Iran	12	73	59
Brazil	11	12	29
Germany	10	165	44

4.3. Collaborative Institutions Network

Figure 4 helps to assess the features of collaborative organizations in the domain of post-covid-19 and mucormycosis. On selecting a minimum threshold of one publication and a citation of an institution, out of 635 institutions, 331 institutions were under the threshold. But out of 331 institutions are not connected. The largest network is consisting of 23 institutions. These are A.J. Drexel Nanomaterials Institute (USA), Cancer Research Department (Qatar), Center For Neurotrauma (USA), Dalla Lana School of Public Health (Canada), Department of Biomedical Engineering, Ankara University (Turkey), Department of Biomedical Sciences, University of Padua (Italy), Department of Chemical And Biomolecular Engineering, Rice University (USA), Department of Chemical And Pharmaceutical Sciences, University of Trieste (Italy), Department of Materials Science And Nanoengineering, Rice University (USA), Department of Materials, Imperial College London (UK), Department of Neurology, University of Pennsylvania (USA), Department of Plastic Surgery (USA), Division of Inflammation Biology (USA), ICREA (Spain), Institute of Biological And Chemical Systems, Karlsruhe Institute of Technology (Germany), Institute of Materials (Switzerland), Interfaculty Bioengineering Institute (Switzerland), Nanobioelectronics and Biosensors Group (Spain), One Health Center of Excellence, University of Florida (USA), Orthopedics And Sports Medicine (USA), Stem Cell Institute, Ankara University (Turkey), and Université Grenoble Alpes (France). All the 23 institutes are in 23 clusters. It clearly shows the result that all the Institutes have the same collaboration relationship. According to Table 2, it can be found that these organizations are mainly from the USA and followed by India. Therefore, it is further explained that there are many professional scientific research institutions about the post-covid-19 and mucormycosis domain in the USA and India.

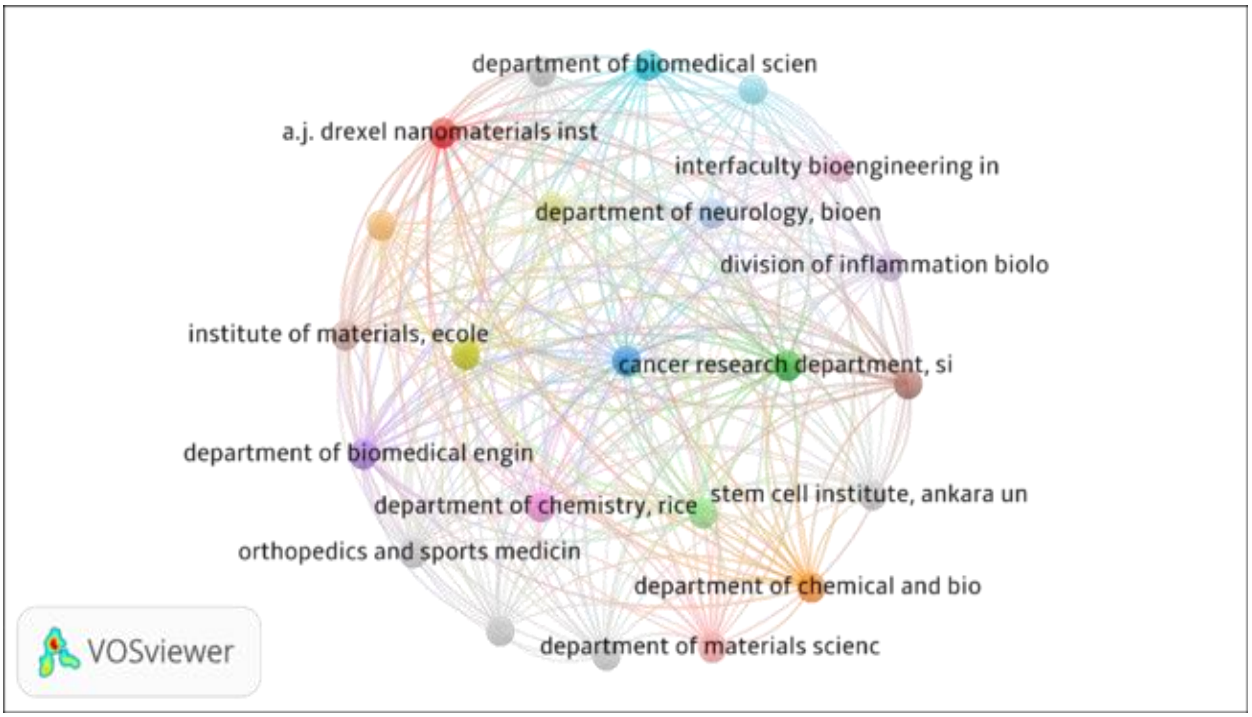

Figure 4: Institute's collaboration network in the domain of covid-19 and mucormycosis

4.4. Highly Cited Paper's and Citation Analysis

Table 4 shows the 15 highly cited papers with a minimum of 9 citations in the field of covid-19 and mucormycosis, these are highly cited papers in terms of authors, year, title, journal, citations, and JIF (SJR 2019). After reading these papers, the study found that many papers are co-authored. The problem is likely difficult to solve, which requires the ingenuity of many specialists and researchers in the field of covid-19 and mucormycosis. Among these 15 highly cited papers, the first published paper placed 12th rank with 19 citations. In addition, it has been clear that most of the excellent papers have high JIF, highly cited papers have a strong correlation between impact factors, which can help maintain journal quality. Of the total 792 citations, these top 15 papers got 69.32% (549) citations, all these papers are published in different journals. The paper "Toward nanotechnology-enabled approaches against the covid-19 pandemic" by Weiss C and et al (2020) ranks first with 99 citations. "The 2019-2020 novel coronavirus (severe acute respiratory syndrome coronavirus 2) pandemic: a joint American College of the academic international medicine-world academic council of emergency medicine multidisciplinary covid-19 working group consensus paper" by Stawicki S and et al. (2020) placed the second position with 72 citations.

Table 4: Top 15 highly cited papers in covid-19 and mucormycosis

Rank	Author/Year	Title	Journal	TC	TCpY	IF (SJR 2019)
1	Weiss C and et al. (2020)	Toward nanotechnology-enabled approaches against the covid-19 pandemic	ACS Nano	99	49.500	6.131
2	Stawicki S and et al. (2020)	The 2019-2020 novel coronavirus (severe acute respiratory syndrome coronavirus 2) pandemic: a joint american college of academic international medicine-world academic council of emergency medicine multidisciplinary covid-19 working group consensus paper	Journal of Global Infectious Diseases	72	36.000	0.54
3	Moradian N and et al. (2020)	The urgent need for integrated science to fight covid-19 pandemic and beyond	Journal of Translational Medicine	58	29.000	1.474
4	Verweij PE and et. Al. (2020)	Review of influenza-associated pulmonary aspergillosis in icu patients and proposal for a case definition: an expert opinion	Intensive Care Medicine	49	24.500	3.473
5	Gogineni V; Schinazi RF; Hamann MT (2015)	Role of marine natural products in the genesis of antiviral agents	Chemical Reviews	47	6.714	20.847

6	Wu G (2020)	Important roles of dietary taurine, creatine, carnosine, anserine and 4-hydroxyproline in human nutrition and health	Amino Acids	40	20.000	0.921
7	Gupta GS; Gupta A; Gupta RK (2012)	Animal lectins: form, function and clinical applications	NA	29	2.900	
8	Hao DC; Gu XJ; Xiao PG (2015)	Medicinal plants: chemistry, biology and omics	NA	25	25.000	
9	Klionsky DJ Et. Al. (2021)	Guidelines for the use and interpretation of assays for monitoring autophagy (4th edition)	Autophagy	25	3.571	3.541
10	Yinda CK (2019)	Gut virome analysis of cameroonians reveals high diversity of enteric viruses, including potential interspecies transmitted viruses	mSphere	24	8.000	2.267
11	Samson R; Navale GR; Dharne MS (2020)	Biosensors: frontiers in rapid detection of covid-19	3 Biotech	22	11.000	0.543
12	Brssow H (2007)	The quest for food: a natural history of eating	NA	19	1.267	
13	Peng X and et al. (2019)	A chromosome-scale genome assembly of paper mulberry (broussonetia papyrifera) provides new insights into its forage and papermaking usage	Molecular Plant	16	5.333	4.219
14	Kumar N and et al. (2020)	Host-directed antiviral therapy	Clinical Microbiology Reviews	13	6.500	
15	Schiavon M and et al. (2020)	Selenium biofortification in the 21st century: status and challenges for healthy human nutrition	Plant and Soil	11	5.500	1.208

Figure 5 shows the Top 20 highly cited papers citation network. These 20 papers were cited 9 or more times. The circle size represents the frequency of co-cited references, the connection between two circles represents the relationship of references. There is no relationship between these papers, so they were not connected to each other.

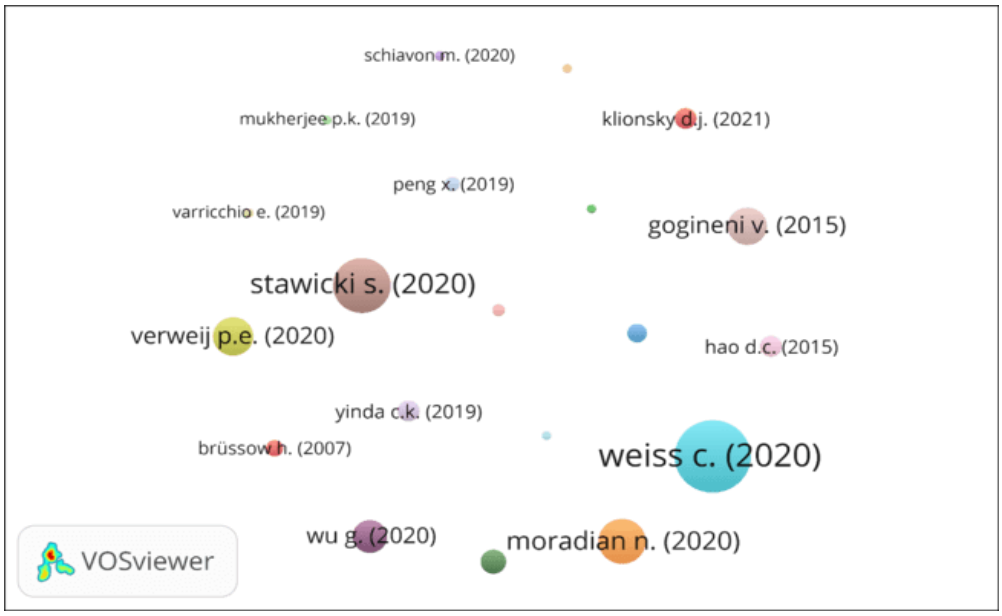

Figure 5: Top 20 highly cited papers citation network (with a min of 9 citations) in covid-19 and mucormycosis

4.5. Analysis Keyword Co-Occurrence

Keyword analysis identifies the common interests of researchers and their work. The analysed keywords were derived from the searched query and the frequency of their occurrence in all articles during the study period. Figure 6 shows the keywords occurrence network and figure 7 shows the keywords timeline view of post-covid-19 and mucormycosis publications during 2017 – 2021. Keywords can effectively reflect research hotspots in co-occurrence, providing disciplinary areas supportive for scientific research.

Prior to visualization, keywords should be pre-processed, merging different types with similar meanings to improve the quality of keyword co-occurrence analysis. For example "Fungi", "Fungus", "Bacteria (microorganisms)", and "Human", "Humans" are seen as the same word. Of the 154 documents, 2034 keywords were found. Among them, 69 keywords meet the threshold (the minimum number of keyword occurrences is 5). The size of the circle indicates the total frequency of keyword occurrence in the field of covid-19 and mucormycosis. The larger the size of the circle denotes the more research hotspots and directions in this area. The curved line indicates the strength of the relationship between the two keywords. In figure 6, it is found that all the 69 keywords are divided into 5 clusters with various colours based on the occurrence relationship. Table 5 shows their main clusters by their order of importance.

Figure 7 denotes the year-wise growth trend of keywords and these are the hot spot research topics in the current scenario. In the figure, the yellow colour shows the highest keywords that occurred various times throughout the study period.

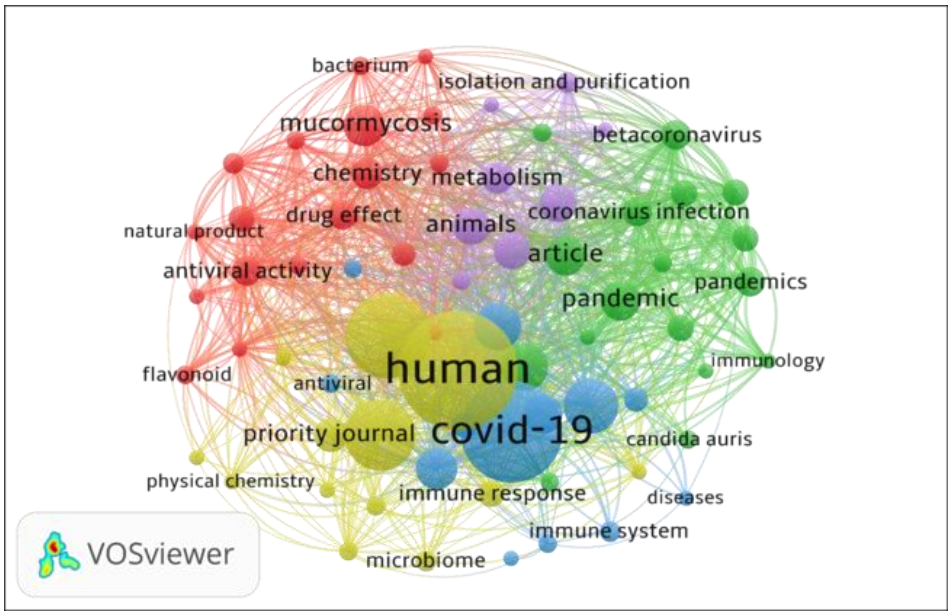

Figure 6: keywords occurrence network of post-covid -19 and mucormycosis related publications

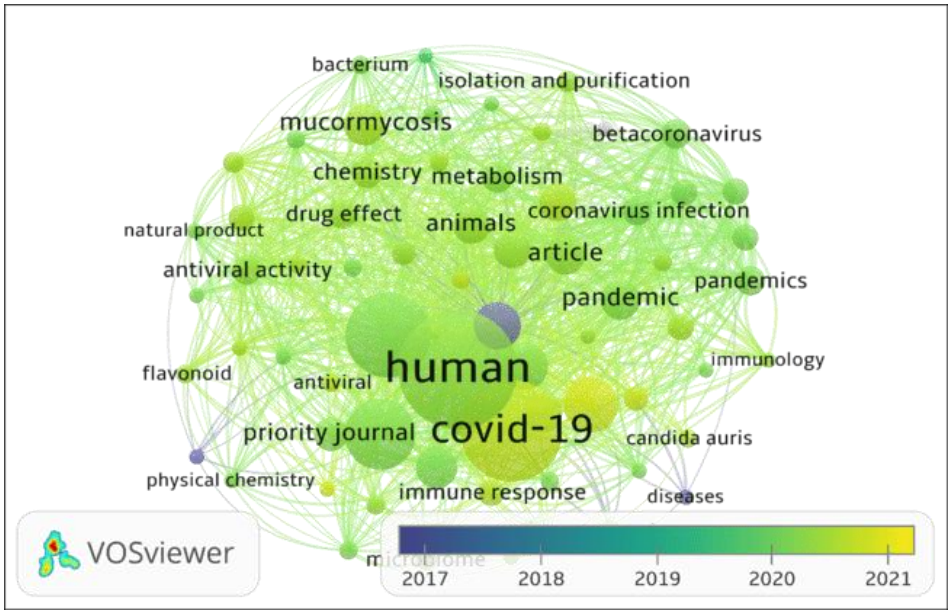

Figure 7: Keyword's timeline view of post-covid-19 and mucormycosis publications during 2017 – 2021.

Table 5: Main keywords occurred in the post-covid-19 and mucormycosis related publications - Cluster-wise

Cluster	Colour	Keywords
1	Red (18)	mucormycosis; antiviral activity; antiviral agents; anti-inflammatory activity; bacterium; chemistry; drug effect;
2	Green (17)	article; coronavirus infection; coronavirus infections; beta coronavirus; immunology; genetics; pandemics;
3	Blue (13)	covid-19; sars-cov-2; viruses; severe acute respiratory syndrome coronavirus 2; coronavirus; public health; immune system;
4	Yellow (13)	human; non human; review; sars coronavirus; physical chemistry; immune response; oxidative stress;
5	Violet (8)	animal; animals; virology; metabolism; virus infection;

5. DISCUSSIONS AND CONCLUSION

The results of the present study reflect the post-covid-19 and mucormycosis publications and found significant insights**.** The research output is in increasing trend and 2020 and till May 2021 the growth rate is highest. The country-wise research output indicates that the USA and India were contributed the highest papers with 45 and 25 respectively. It is not startling that most of the related publications are made in the United States, as the United States has the largest scientific research institutes, P3 and P4 biology laboratories, and the largest research investments. Whereas in India very few funding agencies are funding for research and development. This indicates that there is an urgent need for Indian Post-covid-19 and mucormycosis research to overcome this deadly fungus. The USA received the highest citations with 452 and the majority of the highly cited papers were contributed, followed by India with 162 citations.

According to observations, compared with developing countries, developed countries have the most research results and limited cooperation with developing countries. Countries like India with high infection rates need to better understand the clinical and the epidemiology of such infectious diseases. In addition, through strengthening global collaboration, the Government and the concerned authorities should continue to formulate effective strategies to improve and strengthen epidemic prevention measures [15]. These findings reveal the importance of bibliometric methods for understanding global research trends in post-Covid-19 and mucormycosis research. Therefore, this research provides useful information for researchers in this field: medical virologists, policymakers, and scholars.

CONFLICT OF INTEREST: None

REFERENCES

1. Yang W, Zhang J, Ma R. The prediction of infectious diseases: A bibliometric analysis. Int J Environ Res Public Health. 2020; 17(17):1–19. https://doi.org/10.3390/ijerph17176218
2. Banerjee S, Denning DW, Chakrabarti A. One Health aspects & priority roadmap for fungal diseases : A mini-review. Indian J Med Res. 2021;153(March):311–9.
3. WHO. COVID-19 Weekly Epidemiological Update 35 [Internet]. World Health Organization. 2021 [cited 2021 Jun 4]. p. 1–28. Available from: https://www.who.int/docs/default-source/coronaviruse/situation-reports/weekly_epidemiological_update_22.pdf
4. Kingsland J. "Black fungus" (mucormycosis) and COVID-19: Myths and facts [Internet]. Medical News Today. 2021 [cited 2021 Jun 4]. Available from: https://www.medicalnewstoday.com/articles/black-fungus-and-covid-19-myths-and-facts
5. Raut A, Huy NT. Correspondence Rising incidence of mucormycosis in patients with COVID-19 : another challenge for India amidst the second. Lancet Respir [Internet]. 2021; 2600(21):2600. Available from: http://dx.doi.org/10.1016/S2213-2600(21)00265-4https://doi.org/10.1016/S2213-2600(21)00265-4
6. Small H. Visualizing science by citation mapping. J Am Soc Inf Sci [Internet]. 1999 [cited 2021 May 31]; 50(9):799–813. Available from: https://ideas.repec.org/a/bla/jamest/v50y1999i9p799-813.htmlhttps://doi.org/10.1002/(SICI)1097-4571(1999)50:9<799::AID-ASI9>3.0.CO;2-G
7. van Eck NJ, Waltman L. Software survey: VOSviewer, a computer program for bibliometric mapping. Scientometrics. 2010; 84(2):523–38. https://doi.org/10.1007/s11192-009-0146-3
8. Kappi M, Chaman Sab M, Sankrappa Biradar B, Bagalkoti VT. Bibliometric Study of World COVID-19 Publication Output. Shanlax Int J Arts, Sci Humanit. 2021; 8(3):86–95. https://doi.org/10.34293/sijash.v8i3.3489
9. Mallikarjun B, Kappi M. Visualisation of Asthma Research Output in India during 2010-2019. Libr Philos Pract [Internet]. 2020; Available from: https://digitalcommons.unl.edu/libphilprac/4253
10. Satish D, Joy D, Ross A, . B. Mucormycosis coinfection associated with global COVID-19: a case series from India. Int J Otorhinolaryngol Head Neck Surg. 2021; 7(5):815. https://doi.org/10.18203/issn.2454-5929.ijohns20211574
11. Sharma S, Grover M, Bhargava S, Samdani S, Kataria T. Post coronavirus disease mucormycosis: A deadly addition to the pandemic spectrum. J Laryngol Otol. 2021; https://doi.org/10.1017/S0022215121000992
12. Media JN. Amid COVID-19 pandemic, India reports over 11,700 black fungus cases | Check state-wise report on mucormycosis cases here [Internet]. Jagran New Media. 2021 [cited 2021 May 30]. Available from: https://english.jagran.com/india/amid-covid19-pandemic-india-reports-over-11700-black-fungus-cases-check-statewise-report-on-mucormycosis-cases-here-10027224
13. Mukherjee B. Analysis of global research trends in coronaviruses: A bibliometric investigation. J Scientometr Res. 2020; 9(2):185–94. https://doi.org/10.5530/jscires.9.2.22
14. Santha kumar R, Kaliyaperumal K. A scientometric analysis of mobile technology publications. Scientometrics. 2015; 105(2):921–39. https://doi.org/10.1007/s11192-015-1710-7
15. Kalra G, Kaur R, Ichhpujani P, Chahal R, Kumar S. COVID-19 and ophthalmology: A scientometric analysis. Indian J Ophthalmol. 2021; 69(5):1234–40. https://doi.org/10.4103/ijo.IJO_3284_20