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Research Article

A Scientometric Analysis Of Highly Cited Papers Of India In Covid-19 Research 2019-2024

S. Ravichandran[1], P. Rajendran[2]

[1]Library Assistant, [2]University Librarian, SRM Institute of Science and Technology, Kattankolathur, Chengalpet, Tamilnadu, India.

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Corresponding Author:
S. Ravichandran, SRM Institute of Science and Technology, Kattankolathur, Chengalpet, Tamilnadu, India.
E-mail Id:
ravichas2@srmist.edu.in
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A B S T R A C T

Between 2019 and 2024, the current study looks at the annual increase of Covid-19 research articles, which includes 4677 publications and 78181 citations. The data indicates that 1769 research publications (37.82%) were the most contributed in 2021, followed by 1283 (27.43%) in 2022 and 614 (13.13%) in 2023. Medicine contributes a maximum of 3358 (54.14%) research articles, compared to a maximum of 50 (13.55%) research papers from Gupta, N. and Panda, S. 274 (22.17%) research publications are contributed by the Indian Council of Medical Research, compared to 106 (15.41%) by the Indian Journal of Medical Research. A maximum of 3644 (68.34%) research papers are contributed by India, while a maximum of 3750 (14.10%) research publications are contributed by humans. A maximum of 167 (18.60%) research papers are contributed by the Indian Council of Medical Research, while the highly cited paper, Bernal J.L. et al. (2021), receives a maximum of 1913 citations. Efficacy of Covid-19 Vaccines against the Delta Variant of B.1.617.2, New England Journal of Medicine, 385(7): 585–594.

Keywords: COVID-19, Research, Citation, Collaboration, India

Introduction

In Wuhan, China, numerous cases of pneumonia brought on by a new coronavirus (SARS-CoV-2) were discovered in late 2019.[1] The World Health Organization (WHO) calls this "COVID-19" because it caused acute respiratory distress syndrome (SARS), which spread around the world. The WHO declared a pandemic as a result of the unusual virus's quick global spread, which drastically altered social norms.[1] Many individuals afflicted with COVID-19 have experienced distressing consequences. Additionally, it significantly affects how non-COVID-19 patients receive healthcare.

Coughing, shortness of breath, fever, fatigue, headache, sputum production, and myalgia are all signs of a SARS-CoV-2 infection. Anosmia and other gastrointestinal problems were also observed by patients.[2] Presymptomatic to asymptomatic, flu-like symptoms to serious disease and death, is the spectrum of infection severity. Critically ill patients may have multiple organ dysfunction, shock, or respiratory failure. The majority of COVID-19 infections—roughly 75–80%—are mild, exhibiting only flu-like symptoms; 15–20% are severe, requiring hospitalization for additional oxygen; and 5% are critical, requiring artificial breathing.[3] Age and underlying medical conditions like diabetes, cancer, cardiovascular disease, hypertension, and chronic respiratory disease are linked to the deadly illness.[4] People over 60 or those with underlying medical conditions were more likely to contract it, and up to 3% of infections resulted in death. However, due of the inoculum, it can also affect young people. It is yet unclear how SARS-CoV-2 infection affects the male reproductive system in humans. This review's goal is to highlight the existing understanding of how the unique SARS-CoV-2 infection affects the male reproductive system.[5]

Scientometrics

The study of scientific research publications is known as scientometrics. Using statistical tools and scientometrics methodologies, scientometrics analysis has been utilized to evaluate the scientific literature that has been published online or offline. The term "bibliometric," which refers to the use of statistical and mathematical techniques for books and other communication mediums, was first used by Alan Pritchard in the late 1960s (Pritchard, 1969).[6] "Scientometrics is defined as the quantitative evaluation and inter-comparison of scientific activity, productivity, and progress," according to Beck (1978).[7] "Scientometrics" is the science of measuring science, according to Bookstein (1995).[8] Scientometrics is also regarded as a bibliometric metric for assessing the influence of science and technology application, societal relevance, and scientific advancement. According to Ingwerson and Christensen (1997).[9] "informatics" refers to a more contemporary development of the classic bibliometric analysis that also encompasses non-scholarly societies where information is created, shared, and utilized. It is among the most crucial metrics for evaluating scientific outputs. According to Tague-Sutcliffe (1992), "it involves quantitative studies of scientific activities, including, among other publications, bibliometrics to some extent.".[10] It provides a set of metrics for researching the composition and methodology of academic communication (Subramanian 1983).[11] Sengupta (1985) defines it as the study and measurement of publication patterns of all written communication types and their authorship in a particular field of study.[12] The goal of the current study is to examine the trends and features of several bibliometric facets of research publications on cloud computing technology.

Review Of Literature

Sandeep Grover et al. (2021).[13] Covid-19's Effect on Mental Health: A Bibliometric Analysis of Indian Publications. According to the search, 1210 publications from India emerged between the start of the pandemic and April 24, 2021, accounting for 6.87% of the global output on the subject and average 5.97 citations per paper. In terms of the quantity of publications on mental health, India came in fifth place, while the United States produced the most publications (26.9%). International collaborations were involved in about one-third (30.91%) of the publications, with the United States accounting for the greatest number of collaborations. "Mental health" was one of the most often used terms in the study. The majority of the research from 478 organizations originated from the National Institute of Mental Health and Neuro Sciences (NIMHANS), located in Bangalore. Five of the ten most prolific writers.

BM Gupta et al. (2021).[14] Covid-19 and Heart Conditions: A Scientific Evaluation of International Publications in 2020–21. 5298 relevant papers on "Covid-19 and Heart Disease" were found using the Scopus database. These publications garnered 62459 citations, with an average of 11.79 citations per paper. 123 countries participated in the total publications, with the United States, Italy, the United Kingdom, and China dominating in terms of global publishing productivity, citation impact per publication, and relative citation index. These 5298 papers involved 2499 authors and 1761 organizations. In terms of publishing productivity, Massachusetts General Hospital, Brigham and Women's Hospital, and Harvard Medical School are in the lead. JAMA Cardiology (154.23), Journal of the American College of Cardiology (54.99), and Circulation (43.54) lead in citation impact per manuscript, whereas Stroke, Circulation, and the European Heart Journal lead in publication productivity (85, 81, and 73 publications, respectively).

Sandeep Grover et al. (2021).[15] A bibliometric analysis of publications regarding the relationship between sleep disorders and COVID-19. The average number of citations per paper in the global publications on this theme was 15.05. The average number of citations per paper was 34.59, and 19.02% of its total publications on this issue were supported by outside funding. In contrast to China (2.52), the UK (2.26), and Italy (1.67), which led in terms of the relative citation index, the USA, China, and Italy dominated the worldwide publications ranking and productivity. Global research on this issue involved 527 organizations and 773 authors. The top 15 most prolific organizations and authors contributed 21.62% and 6.28% of the global publication share and 63.70% and 56.20% of the global citation share, respectively. The most productive authors were Z. Liu, S. Grover, G. Wang, and Huazhong University of Science & Technology. The most fruitful journals were Frontiers in Psychiatry, Sleep Medicine, and International Journal of Environment Research & Public Health.

Devi Dayal et al. (2021).[16] Covid-19 and Thyroid: A Bibliometric Evaluation of Research Output Based on Scopus. Of the 599 publications worldwide, 446 (74.4%) were original works. Even though just 18.0% (108) of the publications were financed, their average citations per paper (CPP) was higher than that of the unfunded papers (average CPP 14.8 against 9.8). While China, Germany, the UK, and the USA had the greatest influence, the most productive nations among the 97 that took part in the study were the USA, Italy, India, and China. The overall number of research organizations was 272, and the number of writers was 404. Universita Degli Organizations Università degli Studi NaUniversità degli Studi dipoli, Italy, Studi diItaly; Harvard Medical School, USA; Italy; and Università degli Studi diStudi di Milano, Italy, were the most prolific organizations. Authors G. Troncone, L. Glovanella, and G. Anedda were the most productive. Frontiers in Endocrinology, Journal

of Endocrine Investigation, and Endocrine were the most productive journals. The average CPP was 141.8, and just 22 (3.6%) were highly referenced.

Surulinathi et al. (2021).[17] A Bibliometric Evaluation of International Publications on COVID-19 and Neurosciences in 2020–21. 5245 publications worldwide, with an average of 13.46 citations per paper, were published on "Covid-19 and Neurosciences," as defined by the Scopus database. Of these 5245 papers, 1287, or 24.54%, had an average of 20.17 citations per manuscript and were supported by external financing from more than 150 agencies. Based on citations per paper and relative citation index, the USA, UK, and Italy contributed the most publications (26.43%, 12.14%, and 10.51%), while China (23.8 and 1.78), Spain (9.13 and 0.68), and Italy (8.56 and 0.64) registered the highest citation impact. A total of 160 countries took part in the global research on this topic. Among the demographic age groups, adults made up the biggest number (30.31%), and the neurological illnesses affected by COVID-19 included stroke, multiple sclerosis, and headache.

Devi Dayal et al. (2021).[18] Vitamin D Deficiency and COVID-19: A Scientometric Evaluation of International Publications in 2020–21. 187 (42.9%) of the 435 international papers on VDD in COVID-19 were unique. The average number of citations per paper (CPP) was 13.0, and the total was 5664. The largest funding source (n=18) was the National Institutes of Health in the United States, which provided support for eighty-eight publications (20.2%). Research on this issue was conducted in seventy-four nations; the USA and Italy were the most influential, while the USA and Italy lead in productivity with 18.3% and 16.5%, respectively. "Risk Factors" was the most popular research topic, accounting for 29.6% of the total. The most influential authors and organizations were Grant (USA) and Laird (Ireland), as well as the most productive authors, with numbers 254 and 383. Productivity is highest in the Journal of Medical Virology and Endocrine, followed by Diabetes and Metabolic Syndrome and Ageing Clinical and Experimental Research.

Kanu Chakraborty et al. (2021).[19] A Bibliometric Evaluation of International Scientific Literature on Ocular Signs of COVID-19. 32935 citations were made to 3453 publications on "Ophthalmic Manifestations of Covid-19," with an average of 9.54 citations per paper. Out of all the publications, 557 were supported by outside funding sources and had 10802 citations. Of all the countries, the United States and India published the most papers. In terms of international joint publications, the United States and the United Kingdom held the top spot. The most productive fields were neurology and medicine. The most fruitful source is the Indian Journal of Ophthalmology. The United States of America has contributed the most papers to this topic, with a total of 46 highly referenced articles published in 35 journals.

BM Gupta and KK Mueen Ahmed (2021).[20] COVID-19 Vaccine: A Scientific Evaluation of International Publications in 2020 China, South Korea, and the USA had the greatest influence, while the USA, the UK, and China were the most prolific of the top 12. International collaborations accounted for over 51% of publications in these top 12 nations. Harvard Medical School in the United States (12 papers), the University of Washington in Seattle, the United States (10 papers), and Fudan University in China (with 12, 10, and 8 papers) were the most productive institutions. Tongji Medical College, China (56.0 and 7.28), Shanghai Medical College, China (33.2 and 4.32), and the Chinese Center for Disease Control and Prevention, China (23.5 and 3.06), were the most influential organizations in terms of citations per publication and relative citation index. The most influential journals in terms of citations per publication were Journal of Medical Virology (66.5), Cell (27.2), and New England Journal of Medicine (23.4), whereas the most productive journals were Nature, Science, and Vaccine (24, 18, and 18 papers respectively).

Ravichandran.S and Vivekanandhan.S (2022).[21] analyzed the current work and conducted a scientometric analysis of 248966 research papers and 2428009 citations related to COVID-19 that were found in the Scopus database between 2019 and 2021. In 2021, a total of 163085 (65.50%) research papers were submitted. The U.S. contributed a maximum of 60964 (27.26%), with 84795 (3.73), CPP of 1.39, H-index of 87, and RCI of 0.14 citations. Contributions from the fields of molecular biology, genetics, and biochemistry total a maximum of 22753 (18.69%). Mahase, E. from the United States is responsible for a maximum of 266 (13.23%) contributions. Articles provide a maximum of 157579 (63.29%) research publications. The largest number of citations was 36889 (10.98%) in the Journal of Medical Virology, followed by a maximum of 3405 (11.48%) from Harvard Medical School and a maximum of 3178 (15.74%) from the International Journal of Environmental Research and Public Health.

Devi Dayal et al. (2021).[22] A Scientometric Evaluation of International Publications Using the Scopus Database on COVID-19 and Type 1 Diabetes. Up till August 4, 2021, there were 255 publications in total. The average citations for the 73 (28.6%) that were sponsored were greater than those of the non-funded (19.0 against 9.8). Sixty-nine nations took part; the most influential were Canada, the UK, and Italy, while the USA, Italy, and the UK topped in output. The University of Glasgow, UK, PGIMER-Chandigarh, India, and Barbara Davis Center, USA were the most influential organizations, while King's College London, UK, the University of Colorado, USA, and Barbara Davis Center,

USA, were the most prolific. While Italy's A. Avogaro and India's S. Bhadada and R. Pal lead in impact, the United States' Q. Ebekozien and Italy's C. Maffeis and R. Schiaffini led in productivity. The top journals were Diabetes Care and Diabetes Research and Clinical Practice. There were just 12 (4.7%) highly referenced papers.

Gupta et al. (2021).[23] Out of these 2246 publications, only 12 were considered highly referenced. The authors of this work evaluated 100 of the best HCPs in South Asia, spanning literature up to October 2022, in a more current analysis on the region; nonetheless, the study only included a small number of HCPs with a concentration on Pakistan. With over 7600 publications, Pakistan has already produced a significant amount of research on the subject of COVID-19. However, until recently, there had not been a single bibliometric study that attempted to assess Pakistan's research performance in COVID-19 using a full published data set of the nation for the purpose.

Gupta, Kappi, Bansal, et al. (2023).[24] Due to their scant or insufficient coverage and the fact that they were primarily limited to the early stages of the pandemic outbreak, the majority of these studies on COVID-19 subjects are now considered to be out of date. This study aims to evaluate and comprehend the trends and features of COVID-19 research in India by employing a bibliometric approach to analyze highly cited papers on the virus. Using quantitative and qualitative measures of research productivity, citations, and performance, the study will highlight the important areas of COVID-19 research as well as the key researchers, significant research organizations, and core publications.

Methodology

The following search term is used to find the Covid-19 research publications from 2019 to 2024 in the Scopus multidisciplinary online database: (TITLE-ABS-KEY ("COVID 2019") OR TITLE-ABS-KEY ("2019 novel coronavirus") OR TITLE-ABS-KEY ("SARS - CoV 2") AND PUBYEAR > 2018 AND PUBYEAR < 2025). On January 31, 2025, the data for this study was gathered. A Microsoft Excel worksheet was used to analyze the data that was gathered.

Objectives the study

- To identify and analyze the growth rate of India research in Covid-19 research output publications in India
- To analyze the author's, research output publications
- To analyze the subject of research output publications
- To assess the institution-wise and journals research concentration;
- To examine the country-wise distribution of publications;
- To analyze the keyword Funding agency supported Covid-19 research
- To analyze highly cited papers of research publications

Data Analysis and Interpretations

With 4,677 research articles and 78,181 citations, Table 1 displays the growth of Covid-19 research publications year over year over the 10-year study period between 2019 and 2024. A maximum of 1,769 (37.82%) research articles are contributed in 2021, followed by 1,283 (27.43%) publications in 2022 and 614 (13.13%) publications in 2023, according to the report. There are 467.7 research publications year on average.

A total of 4,677 papers received 78,181 citations over the course of the 6-year study. In 2021, 1,769 publications were received out of that total of 43,025 citations. In 2022, it received 1,283 publications and 16,422 citations. According to the survey, 78,181 (100%) of the 4,677 publications are cited research publications. In 2020, the highest number of citations per manuscript was 28.6; in 2021, it was 24.3; and in 2019, it was 20.3. The RCI ranges from a low of 0.05 in 2024 to a maximum of 1.71 in 2020. The year 2021 has the highest H-index at 87, while the year 2019 has the lowest at 3. Contributions of India's Top 06 Authors to COVID-19 Research Publications

Of the 369 authors who contributed to 50 articles, 13.55% had participated as both authors, according to the VOS viewer program. The top ten author contributions for the Covid-19 research articles were found in Table 2 using data from the Scopus database. According to the study, Gupta, N., India, and Panda, S. produced a maximum of 50 (13.55%) research papers. Following the United States are Abraham, P., Bhargava, B., the United Kingdom, with 44 (11.92%) research papers, and China, with 43 (11.65%).

Figures 1 and 2 show the network visualization of the top ten most productive authors in the COVID-19 India research, the overlay visualization of the top ten most productive authors in the COVID-19 India research, and the density visualization of the top ten most productive authors in the COVID-19 India research, respectively, as determined by the VOS viewer software. 3,014 (22.14%) citations were the most. Abraham, P. in China. The RCI is 1.90, the H-index is 20, and the maximum CPP is 70.09. Then came 2,340 (17.16%) Gupta, N., United States, India. The RCI is 1.27, the H-index is 22, and the maximum CPP is 46.80. Gupta, N., India, by 2,215 (16.25%). The RCI is 1.20, the H-index is 18, and the maximum CPP is 44.30. 322 has the fewest citations (2.36%). The RCI is 0.34, the H-index is 09, and the CPP is 12.38. According to this survey, the top 10 writers from 10 different nations contributed to 369 (100%) of the research articles. The top ten most productive authors in COVID-19 research articles from India are identified by the VOS viewer software in Figure 1, Network Visualization, Figure 2, Overlay Visualization, and Figure 3, Density Visualization.

The top ten subject contributions for the Covid-19 research articles were found in Table 3 using the Scopus database. Based on the analysis, it was found that medicine contributes a maximum of 3,358 (54.14%) research articles, followed by immunology and microbiology (680 (10.96%) and biochemistry, genetics, and molecular biology (636 (10.25%). Computer science and agricultural and biological sciences had the lowest scores, at 152 (2.45%). publications about research.

The contributions of the top ten journals in the field of COVID-19 research are displayed in Table 4. From the study, it is identified that the maximum of 106 (15.41%) research publications are contributed by the Indian Journal of Medical Research, followed by Indian Journal of Ophthalmology with 99 (14.39%) research publications, third-placed in the Plos One with 82 (11.92%) research publications. The Journal of Medical Virology had the most citations (1826, 17.35%) during the 10-year study period; the CPP was 35.12, the H-Index was 20, and the RCI was 2.30. The Journal of the Association of Physicians of India has the lowest citations of 40 (0.38), with a CPP of 0.80, an H-Index of 03, and an RCI of 0.05. Over the course of the 10-year study period, 688 (100. %) research papers contributed to the top 10 journals.

Table 05 lists the top 10 institutions' contributions over the course of the 10-year study period. The Indian Council of Medical Research contributed the most (274, 22.17%), followed by All India Institute of Medical Sciences, New Delhi, with 256, 20.71 percent, and the Postgraduate Institute of Medical Education and Research, Chandigarh, with 175 (14.16%). The Indian Council of Medical Research had the most citations (50,341; 22.57%), and the CPP was 13.36. The RCI is 1.02 and the H-Index is 35. 580 (2.60%) Christian Medical College, Vellore has the lowest citations, with a CPP of 7.34, an H-Index of 2, and an RCI of 0.41. During the 10-year study period, 1,236 (100%) research articles were produced by the top 10 institutions.

The top 10 nations' research papers on COVID-19 throughout the 2019–2024 study period is displayed in Table 6. The results of this study show that India contributes a maximum of 3,644 (68.34%) research papers, followed by the United States (578; 10.84%) and the United Kingdom (322; 5.04%). The largest number of citations throughout the ten-year study period was 98,2021 (95.47%) in India; the CPP is 2269.49, the H-index is 165, and the RCI is 1.40. The countries with the fewest citations were Saudi Arabia, Bangladesh, Canada, and Pakistan (2,035, 2,072, 2,035, 2,064; 0.20%). The RCI is 0.10, the CPP is 18.67, and the H-index is 21. 5,332 (100. %) research articles were provided by the top 10 nations.

The top ten keyword research articles for Covid-19 research during 2019–2024 are displayed in Table 7. According to this analysis, humans are responsible for a maximum of 3,750 (14.10%) research articles, followed by COVID-19 (3,701 (13.92%) and SARS-CoV-2 (3,167 (11.91%). Male was the least popular keyword, appearing in 1,517 research publications (5.70%). A total of 26,593 (100%) research publications were attributed to the top 10 keywords.

The top 14 funding agencies' research publications for COVID-19 research over the 2019–2024 study period are displayed in Table 8. According to this study, the Indian Council of Medical Research contributes a maximum of 167 (18.60%) research publications, followed by the National Institutes of Health with 111 (12.36%) and the Department of Biotechnology, Ministry of Science and Technology, India, in third place with 110 (12.25%). With 49 (5.46%) research publications, it is the Science and Engineering Research Board's lowest funding agency. 898 (100%) research articles were contributed by the top 10 funding agencies.

Table 9 lists the top 10 Covid-19 research publications that received the most citations over the chosen ten-year study period. Bernal J.L. et al. (2021) Effectiveness of Covid-19 Vaccines against the B.1.617.2 (Delta) Variant, New England Journal of Medicine, 385 (7): 585-594, received a maximum of 1,913 citations, according to the study. 1,518 citations by Planas D. et al. (2021) came next. decreased susceptibility of the Delta form of SARS-CoV-2 to neutralization by antibodies, Nature, 596 (7871): 276–280. A comprehensive investigation of COVID-19-related mortality, 2020–21, The Lancet, 399 (10334): 1513–1536; Wang H. et al., 2022. Estimating extra mortality owing to the COVID-19 pandemic. Seven articles, two reviews, and one note cover the top ten most cited paper publications.

Table 1.Year-wise growth of Covid-19 research publications in India

S.No	year	Publications	%	Citations	%	H-Index	CPP	RCI
1	2019	3	0.064	61	0.078	2	20.3	1.22
2	2020	553	11.82	15,823	20.24	62.00	28.6	1.71
3	2021	1,769	37.82	43025	55.03	87.00	24.3	1.45
4	2022	1,283	27.43	16,422	21.01	51.00	12.8	0.77
5	2023	614	13.13	2,466	3.154	18.00	4.02	0.24
6	2024	455	9.728	384	0.491	8.00	0.84	0.05

	Total	4,677	100	78,181	100			

Table 2.Top 10 Author's Contributions to Covid-19 research publications in India

S.No	Authors	Country	Publications	%	Citations	%	H- Index	CPP	RCI
1	Gupta, N.	India	50	13.55	2,340	17.16	22	46.80	1.27
2	Panda, S.	United States	50	13.55	2,215	16.25	18	44.30	1.20
3	Bhargava, B.	United Kingdom	44	11.92	1,891	13.87	19	42.98	1.16
4	Abraham, P.	China	43	11.65	3,014	22.11	20	70.09	1.90
5	Yadav, P.D.	Australia	40	10.84	780	5.72	16	19.50	0.53
6	Potdar, V.	Saudi Arabia	35	9.49	1,170	8.58	12	33.43	0.90
7	Guleria, R.	Bangladesh	30	8.13	1,006	7.38	13	33.53	0.91
8	Misra, S.	Canada	26	7.05	322	2.36	9	12.38	0.34
9	Pati, S.	Pakistan	26	7.05	542	3.98	10	20.85	0.56
10	Mohan, A.	Germany	25	6.78	353	2.59	9	14.12	0.38
	Total		369	100.00	13,633	100.00			

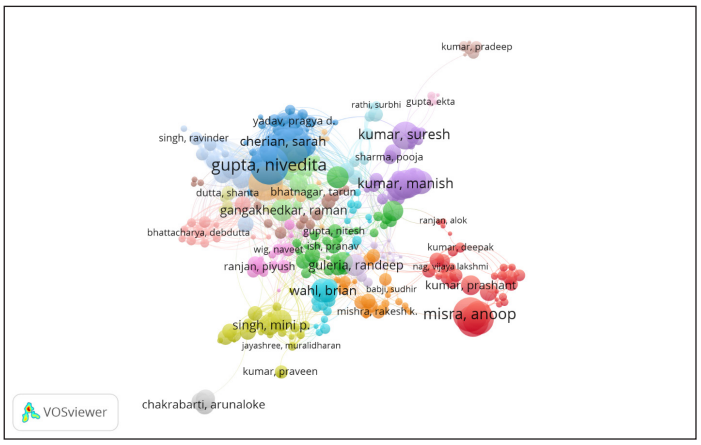

Figure 1.Network Visualization of top-10 most productive authors in COVID-19 India research

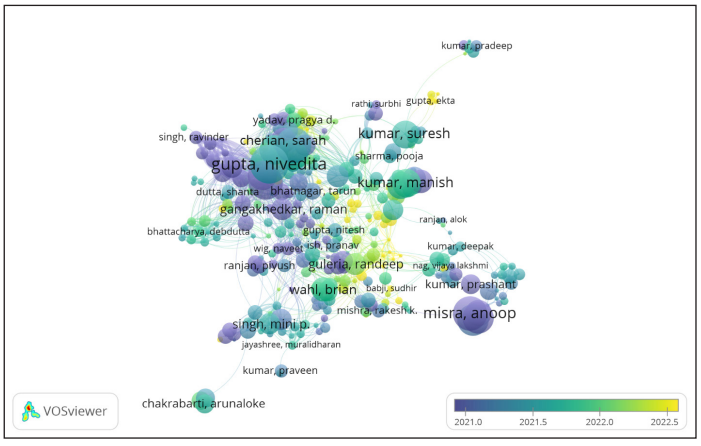

Figure 2.Overlay Visualization of top-10 most productive authors in COVID-19 India research

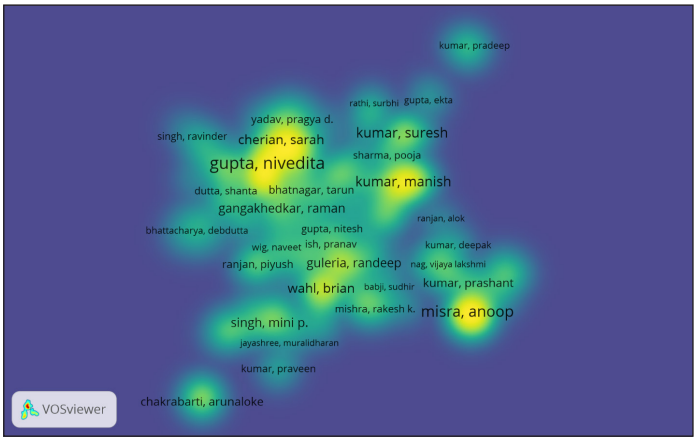

Figure 3, Density Visualization of top-10 most productive authors in COVID-19 India research

Table 3 Subject wise of Covid-19 research publications in India

S.No	Subject area	No. of articles	%
1	Medicine	3358	54.14
2	Immunology and Microbiology	680	10.96
3	Biochemistry, Genetics and Molecular Biology	636	10.25
4	Pharmacology, Toxicology and Pharmaceutics	379	6.11
5	Environmental Science	295	4.76
6	Multidisciplinary	221	3.56
7	Social Sciences	174	2.81
8	Engineering	156	2.51
9	Agricultural and Biological Sciences	152	2.45
10	Computer Science	152	2.45
	Total	6,203	100.00

Table 4 top 10 Journal's Contributions to Covid-19 research publications in India

S.No	Journal	No. of articles	%	Citations	%	H-Index	CPP	RCI
1	Indian Journal Of Medical Research	106	15.41	1,808	17.18	25	17.06	1.11
2	Indian Journal Of Ophthalmology	99	14.39	1,662	15.79	17	16.79	1.10
3	Plos One	82	11.92	1,374	13.05	21	16.76	1.10
4	Indian Journal Of Public Health	72	10.47	174	1.65	6	2.42	0.16
5	Diabetes And Metabolic Syndrome Clinical Research And Reviews	68	9.88	2,547	24.20	28	37.46	2.45
6	Frontiers In Public Health	56	8.14	395	3.75	11	7.05	0.46
7	Journal Of Medical Virology	52	7.56	1,826	17.35	20	35.12	2.30
8	Scientific Reports	52	7.56	503	4.78	12	9.67	0.63
9	Journal Of The Association Of Physicians Of India	51	7.41	196	1.86	7	3.84	0.25
10	Journal Of Association Of Physicians Of India	50	7.27	40	0.38	3	0.80	0.05
	Total	688	100.00	10,525	100.00			

Table 5 Top 10 Institution's contributions to Covid-19 research publications in India

S.No	Institutions	Publications	%	Citations	%	H-Index	CPP	RCI
1	Indian Council of Medical Research	274	22.17	5,031	22.57	35	18.36	1.02
2	All India Institute of Medical Sciences, New Delhi	256	20.71	4,227	18.96	32	16.51	0.92
3	Postgraduate Institute of Medical Education and Research, Chandigarh	175	14.16	3,236	14.52	28	18.49	1.03
4	Ministry of Health and Family Welfare	108	8.74	1,086	4.87	18	10.06	0.56
5	National Institute of Virology India	94	7.61	3,490	15.66	24	37.13	2.06
6	Christian Medical College, Vellore	79	6.39	580	2.60	2	7.34	0.41
7	All India Institute of Medical Sciences, Jodhpur	66	5.34	785	3.52	17	11.89	0.66
8	Academy of Scientific and Innovative Research AcSIR	65	5.26	866	3.89	15	13.32	0.74
9	Council of Scientific and Industrial Research India	60	4.85	2,119	9.51	19	35.32	1.96
10	Banaras Hindu University	59	4.77	869	3.90	15	14.73	0.82
	Total	1236	100.00	22,289	100.00			

Table 6 Country-wise Contributions to Covid-19 research publications in India

S.No	Country	No.of articles	%	Citations	%	H- Index	CPP	RCI
1	India	3644	68.34	9,82,021	95.47	165	269.49	1.40
2	United States	578	10.84	17,327	1.68	58	29.98	0.16
3	United Kingdom	322	6.04	13,534	1.32	49	42.03	0.22
4	China	165	3.09	2,267	0.22	24	13.74	0.07
5	Australia	135	2.53	2,219	0.22	27	16.44	0.09
6	Saudi Arabia	109	2.04	2,035	0.20	21	18.67	0.10
7	Bangladesh	102	1.91	2,072	0.20	25	20.31	0.11
8	Canada	94	1.76	2,035	0.20	21	21.65	0.11
9	Pakistan	93	1.74	2,064	0.20	21	22.19	0.12
10	Germany	90	1.69	3,060	0.30	26	34.00	0.18
	Total	5332	100.00	102,8,634	100.00			

Table 7 top 10 Keyword Contributions to Covid-19 research publications in India

S.No	Keyword	No. of articles	%
1	Human	3,750	14.10
2	COVID-19	3,701	13.92
3	SARS-CoV-2	3,167	11.91
4	India	3,030	11.39
5	Humans	2,954	11.11
6	Coronavirus Disease 2019	2,893	10.88
7	Article	2,097	7.89
8	Pandemic	1,898	7.14

9	Female	1,586	5.96
10	Male	1,517	5.70
	Total	26,593	100.00

Table 8 top 10 Funding Agency Contributions to Covid-19 research publications in India

S.No	Funding Agency	No. of articles	%
1	Indian Council of Medical Research	167	18.60
2	National Institutes of Health	111	12.36
3	Department of Biotechnology, Ministry of Science and Technology, India	110	12.25
4	Department of Science and Technology, Ministry of Science and Technology, India	103	11.47
5	U.S. Department of Health and Human Services	94	10.47
6	Council of Scientific and Industrial Research, India	87	9.69
7	National Natural Science Foundation of China	63	7.02
8	Bill and Melinda Gates Foundation	58	6.46
9	Ministry of Health and Family Welfare	56	6.24
10	Science and Engineering Research Board	49	5.46
	Total	898	100.00

Table 9 Highly Cited paper top 10 Covid-19 research publications in India

S.No	Authors	Cited by	Document Type
1	Bernal, J.L.; et.al. (2021). Effectiveness of Covid-19 Vaccines against the B.1.617.2 (Delta) Variant, New England Journal of Medicine, 385 (7): 585 - 594.	1,913	Article
2	Planas, D.; et.al. (2021). Reduced sensitivity of SARS-CoV-2 variant Delta to antibody neutralization, Nature, 596 (7871): 276 - 280.	1,518	Article
3	Wang, H.; et.al. (2022). Estimating excess mortality due to the COVID-19 pandemic: a systematic analysis of COVID-19-related mortality, 2020–21, The Lancet, 399 (10334): 1513 - 1536.	1,041	Article
4	Mlcochova, P.; et.al. (2021). SARS-CoV-2 B.1.617.2 Delta variant replication and immune evasion, Nature, 599 (7883):114 - 119.	885	Article
5	Wouters, O.J.; et.al. (2021). Challenges in ensuring global access to COVID-19 vaccines: production, affordability, allocation, and deployment, The Lance, 397 (10278): 1023 -1034.	833	Review
6	Tao, K.; et.al. (2021). The biological and clinical significance of emerging SARS-CoV-2 variants, Nature Reviews Genetics, 22 (12): 757 - 773.	688	Review
7	Singh, A.K.; et.al. (2021). Mucormycosis in COVID-19: A systematic review of cases reported worldwide and in India, Diabetes and Metabolic Syndrome: Clinical Research and Reviews, 15 (4) article No 102146.	608	Article
8	Chakaya, J.; et.al. (2021). Global Tuberculosis Report 2020 – Reflections on the Global TB burden, treatment and prevention efforts, International Journal of Infectious Diseases, 113, S7-S12.	591	Article
9	Machingaidze, S.; Wiysonge C.S. (2021). Understanding COVID-19 vaccine hesitancy, Nature Medicine, 27 (8): 1338 - 1339.	407	Note
10	Kumar, S.; et.al. (2022). Mucormycosis in COVID-19: A systematic review of cases reported worldwide and in India, Journal of Medical Virology, 94 (4): 1641 - 1649.	395	Article

Major Finding

- During the 10- year study the year-wise growth of Covid-19 research publications during the 10- year study period between 2019 and 2024 with 4,677 research publications and 78,181 citations. From the study, it is identified that a maximum of 1,769 (37.82%) research publications are contributed in the year 2021, followed by 1,283 (27.43%) publications in the year 2022, and 614 (13.13%) publications in the year 2023.
- During the authorship maximum of 50 (13.55%) research publications are contributed by Gupta, N. India and Panda, S. and the subject a maximum of 3,358 (54.14%) research publications are contributed by Medicine
- During the journals of a maximum of 106 (15.41%) research publications are contributed by the Indian Journal of Medical Research, and the maximum Institution of 274 (22.17%) contributions are Indian Council of Medical Research
- During the country a maximum of 3,644 (68.34%) research publications are contributed by the India, and the keyword a maximum of 3,750 (14.10%) research publications are contributed by the Human
- During the funding agency a maximum of 167 (18.60%) research publications are contributed by the Indian Council of Medical Research, and the highly cited paper for a maximum of 1913 citations are received for the publication of Bernal J.L.; et.al (2021) Effectiveness of Covid-19 Vaccines against the B.1.617.2 (Delta) Variant, New England Journal of Medicine, 385 (7): 585 - 594.

Conclusion

India is at the forefront of COVID-19 research thanks to institutional partnerships with leading foreign nations. India's most extensive scientific collaborations have been with the United States, China, and the United Kingdom. Pakistan has benefited greatly from outside funding sources in the US and the UK, which have helped to improve the caliber of its COVID-19 research output. At less than 2% of total output during COVID-19, India's contribution to quality output is still quite little overall. Gupta, N. India, and Panda, S. provided a maximum of 50 (13.55%) research articles as authors, while Medicine contributed a maximum of 3,358 (54.14%) research papers as subjects. The Indian Journal of Medical Research contributes a maximum of 106 (15.41%) research papers, while the Indian Council of Medical Research contributes a maximum of 274 (22.17%). India contributes a maximum of 3,644 (68.34%) research articles to the nation, whereas humans provide a maximum of 3,750 (14.10%) research publications. This study indicates that the quantity and caliber of COVID-19 research output in India vary significantly. To close the gap, India will have to come up with suitable policy-based solutions. India was the top nation in 36 global collaborative HCPs. This supports the idea that India still has a great deal of potential to address the difficult COVID-19 health issues.

Reference

1. COVID 19 and male infertility an overview of the.14. aspx. (Online access on 18.08.2022).https://journals.lww.com/md- journal/Full text/2022/07080/.
2. Zhu N, Zhang D, Wang W, et al. (2020). A novel coronavirus from patients with pneumonia in China, 2019. New England Journal Medicine, 382,727 – 33.
3. Pan L, Mu M, Yang P, et al. (2020). Clinical characteristics of COVID-19 patients with digestive symptoms in Hubei, china: a descriptive, cross-sectional, multicentre study, the American Journal Gastroenterol, 115,766 – 73.
4. Chen N, Zhou M, Dong X, et al. (2020). Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. Lancet, 395, 507 – 13.
5. Huang C, Wang Y, Li X, et al. (2020). Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. Lancet, 395:497 – 506.
6. Pritchard, A. (1969). "Statistical bibliography or bibliometric?" Journal of Documentation, 25, 348 - 349.
7. Beck, MT. (1978). "Editorial Statement". Scientometrics, 1 (1): 3 - 4.
8. Bookstein A. (1976). The bibliometric distributions". Library Quarterly, 46 (4):416 - 423.
9. Ingwersen, P and Christensen, FH. 91997). "Data set isolation for bibliometric online analysis of research publication: fundamental methodological issues". Journal of the American Society for Information Science, 48, 205 - 217.
10. Tague-sutclififfe, J. (1992) An introduction to information. Information processing and management, 28 (1): 1 - 3.
11. Subramanian, K. (1983). Bibliometric studies of research collaboration: A review. Journal of information science, 6 (38).
12. Sengupta, I.N. (1985). Bibliometrics: a bird's eye view. IASLIC Bulletin, 30 (4): 167 - 174.
13. Sandeep Grover, et al. (2021) Impact of Covid-19 on Mental Health: A Bibliometric Assessment of Publications from India, Journal of Young Pharm, 13 (3): 66 - 71.
14. BM Gupta, et al. (2021). Covid-19 and Heart Diseases: A Scientometric Assessment of Global Publications during 2020-21, Journal of Young Pharm, 13 (3): 78 - 83.
15. Sandeep Grover, et al. (2021). Bibliometric Study of Publications on Impact of Covid-19 and Sleep Disorders, Journal of Young Pharm, 13 (3): 72 - 77.
16. Devi Dayal, et al. (2021). Covid-19 and Thyroid: A Scopus-based Bibliometric Assessment of Research Output, Journal Young Pharm, 13 (3): 84 - s88.

17. M. Surulinathi, et al. (2021). Global Publications on Covid-19 and Neurosciences: A Bibliometric Assessment during 2020-21, Journal of Young Pharm, 13 (3): 101 - 107
18. Devi Dayal, et al. (2021). Covid-19 and Vitamin D Deficiency: A Scientometric Assessment of Global Publications during 2020-21, Journal of Young Pharm, 13 (3): 89 - 94.
19. Kanu Chakraborty, et al. (2021). Ophthalmic Manifestations of Covid-19: A Bibliometric Assessment of Global Scientific Literature, Journal of Young Pharm, 13 (3): 108 - 114.
20. BM Gupta, and K.K. Mueen Ahmed, (2021) COVID-2019 Vaccine a Scientometric Assessment of Global Publications during 2020, Journal Young Pharm, 14 (1): 37 - 45.
21. Ravichandran, S. and Vivekanandhan, S. (2022). Scientometric Study of World Research Publications on COVID-19 from the Scopus Database for the Period of 2019 - 2021, Asian Journal of Research, 1 (2), 1 - 17.
22. Devi Dayal, et al. (2021). Covid-19 and Type 1 Diabetes: A Scientometric Assessment of Global Publications based on the Scopus Database, Journal of Young Pharm, 13 (3): 95 - 100.
23. Gupta, B. M. et.al. (2021) Select South Asian Countries in COVID-19 Research: A Bibliometric Assessment of their Publications during 2019-21. Journal of Young Pharmacists, 13 (3s), s19 – s29. DOI: 10.5530/jyp.13s.67
24. Gupta, B. M, et.al. (2023). Scientometric Analysis of Top 100 High Cited Papers on COVID-19 Research in Nepal: A Study. Indian Journal of Information, Library and Society, 36 (1–2), 43 – 56.