J Young Pharm, 2021; 13(3) Suppl: s19-s29
A multifaceted peer reviewed journal in the field of Pharmacy
www.jyoungpharm.org | www.phcog.net

Original Article

Select South Asian Countries in Covid-19 Research: A Bibliometric Assessment of their Publications during 2019-21

BM Gupta[1,*], SM Dhawan[2], M Surulinathi[3]
[1]Formerly with CSIR-NISTADS, New Delhi, INDIA.
[2]Formerly with CSIR-NPL, New Delhi, INDIA.
[3]Bharathidasan University, Department of Lib. and Inf. Science, Tiruchirappalli, Tamil Nadu, INDIA.

ABSTRACT

Background: The global scientific community has been quick to respond to health crisis unleashed by Covid-19 pandemic with intensified investments in R&D and thereby it gave new impetus to Covid-19 research. The world has come to witness unprecedented increase in research publications on control and treatment of Covid-19 pandemic. Like any other region in the world, South Asia too has been the worst-hit region and it too witnessed increase in Covid-related research studies. Systematic reviews of such literature and bibliometric studies are used nowadays as tools to identify and analyze key and significant South Asian contribution to the subject. The present study aims to assess and quantify the contribution and impact of Covid-19 research made by a group of select four South Asian countries. **Methods:** Publications data on Covid 19 covering the period between December 2019 and 8.7.2021 was sourced from the Scopus database. VOSviewer 1.6.14 software was applied to generate network maps, assess hot topics in the area and describe collaboration patterns in research between different countries. **Results:** A total of 18,64,275 publications reflecting the global research output on Covid-19 were retrieved from the Scopus database. The publications data of select four South Asian countries - Pakistan, Bangladesh, Nepal and Sri Lanka - was also retrieved. Comparatively the data size of select four South Asian countries was small, limited to 4012 documents, and accounting for a 2.15% share of the global research output on Covid-19 virus. Pakistan published the most number of Covid-19 publications (*n*=2246, 55.58%), followed by Bangladesh (*n*=1203, 29.99%), Nepal (*n*=512, 12.76%) and Sri Lanka (*n*=202, 5.03%). The United States as the collaborating partner in most number of publications contributed by South Asian countries (*n*=609, 25.41%), followed by the United Kingdom (*n*=496, 20.69%), China (*n*=453, 18.90%), Saudi Arabia (*n*=441, 18.40%) and India (*n*=426, 17.77%). Covid-19 treatment type was the most studied topic in the contributions made by South Asian countries accounting for a 16.45% share, followed by epidemiology (15.63%), risk factors (5.835), clinical studies (4.81%), etc. **Conclusion:** This paper finds that the quantity and quality of research pursued by a select group of four South Asian countries in the domain of Covid 19 studies has so far been small and insignificant. There is an urgent need on the part of select group of South Asian counties to improve their productivity and qualitative performance at the national, institutional, and individual author level.

Key words: Coronavirus Disease 2019, Covid-19, SARS-CoV-2, South Asia, Pakistan, Bangladesh, Nepal, Sri Lanka, Publications, BIbliometrics, Scientometrics.

Correspondence

Dr. BM Gupta,

Formerly with CSIR-NISTADS, New Delhi 110 012, INDIA.

Email id: bmgupta1@gmail.com

DOI: 10.5530/jyp.2021.13s.67

INTRODUCTION

The pneumonia-like illness was first witnessed in December 2019 and soon after its detection it was attributed to the novel SARS-CoV-2 virus. The Corona Virus Disease (Covid-19) had aggressively spread throughout China in the following several weeks, but within next 4 months it became a world-wide pandemic. Almost every country in the world was affected by Covid-19 virus. By 5 September 2021, a total of 22,30,22538 patients were reportedly confirmed in over 200 countries, including 46,02882 death cases.[1] Covid-19 soon became a major public health crisis. The countries like Pakistan, Bangladesh, Nepal and Sri Lanka from the South Asian region reported a total of 39,72,272 cases and 75069 deaths, representing 1.78% and 1.63% of the global share respectively. Individually the number of Covid-19 cases in the select four South Asian countries were: Pakistan (11,94,198), Bangladesh (15,24,890), Nepal (77,5548) and Sri Lanka (4,77,636). The number of Covid-19 deaths were: Pakistan (26,487), Bangladesh (26,794), Nepal (10,924) and Sri Lanka (10,864).

Despite the fact that coronavirus disease (Covid-19) pandemic has put an unprecedented pressure on healthcare systems worldwide, extensive measures were undertaken to contain, reduce and prevent its transmission.[1] Medical practitioners/scientists including specialists in infectious diseases, virology, microbiology were quick to start studying the disease from various scientific and clinical perspectives. They developed a deeper understanding of the patho-physiology, antiviral treatment, immune regulation, pathology of the disease and vaccine research. Covid-19 also garnered a significant attention in South Asian countries.

A bibliometric analysis of the Covid-19 landscape can help improve clinicians' understanding about the large and growing body of evidence on the topic. Bibliometric methods are in use nowadays for conducting an objective evaluation of scientific research quantitatively and qualitatively. This study seeks to analyze and evaluate research output of the South Asian region with the aim to present the research hotspots, development trends, and key research institutions in Covid-19 research, key research activities; key research ideas, and identify current patterns in collaborative research. Such a bibliometric study is going to be of great significance in understanding current research trends in the subject.

Literature Review

There are a few bibliometric studies in the literature that have sought to analyze Covid-19 research from a regional perspective by using metrics. Among such studies, Zyoud[2] assessed the Arab scientific literature on Covid-19 as indexed in Scopus database. The study assessed research productivity and impact, identified key research topics, hotspots in

Covid-19 research, and key players in the collaboration network among countries, organizations and authors. Mbogning, Bragazzi, Tsinda, Bouba, Mmbando and Kong[3] identified key emerging research trends and hot-spots in the scientific literature on Covid-19 from Africa. The study looked at the research patterns among African researchers. They estimated the strength of collaboration and partnership between African researchers and scholars collaborating from the rest of the world during the Covid-19 pandemic, using three databases. They found that Covid-19-related collaboration patterns varied among African regions. For instance, most partnerships occurred with formerly colonial ruling countries (such as European or North-American countries). In some cases, scholarly ties were between North African countries and scholars from the Kingdom of Saudi Arabia. Guleid, Oyando and Kabia *et al*.[4] carried out a bibliometric analysis to describe the Covid-19 research output (1296 records) in Africa in terms of setting, study design, research themes and author affiliation, using few databases covering the period between 1 December 2019 and 3 January 2021. The study highlighted Africa's Covid-19 research and its existing capacity to carry out research.

A number of other bibliometric studies focused on vaccines and therapeutics, and research productivity among Latin America countries, and on the need or increased investment in Covid research. Forera-Pena *et al*.[5] described and analyzed scientific activity (29 records) on Covid-19 in Latin America using literature as available from PubMed, LILACS, and the preprint repositories, BioRxiv and medRxiv, covering the period from 1 Jan to 24 April 2020. The country with the most number of scientific publications was Brazil, followed by Colombia and Mexico. The university with the most number of articles was the Technological University of Pereira, Colombia. A 41.3% share of the publications were preprinted documents. Editorial comments or expert opinions were excluded from the study. Three out of four investigations had an epidemiological focus and limited to studies on diagnosis, pathophysiology and therapeutic. Gegorio-Chaviano, Limaymanta and Lopez-Mesa[6] presented a bibliometric study on the main trends in Covid-19 research (142 records) produced in Latin America and as indexed in Web of Science, Scopus, and Pubmed databases. Bibliometric indicators such as production, visibility, impact, and collaboration were used to analyze and assess the regional participation in the subject**.** Torres and Torrell-Vallespin[7] evaluated the Latin American and Caribbean scientific production (257 records from 155 journals) about Covid-19 using PubMed database. A total of 655 authors affiliated to 311 institutions were from 16 Latin American and Caribbean countries. The international collaboration rate reached 61.08%. The journals with the greatest production were Travel Medicine and Infectious Disease (*n*= 23) and Epidemiology and Health Services: Journal of the Brazilian Unified Health System (*n*= 13).

Although a few bibliometric studies have sought to assess the scholarly output from countries like Middle East, Latin America and Africa on Covid-19, but no bibliometric studies per se are avaiable in the literature that have analyzed research output from South Asian countries. Given this context, a bibliometric study aimed to study and assess Covid-19 research from South Asia will certainly fill the gap. Such a study is desirable to identify current trends, key areas of research focus, patterns of collaborative research, strength of research collaboration, and leading sources and journals during the Covid-19 pandemic period.

METHODS

South Asia is a diverse region, encompassing countries of vastly different sizes and development levels and with widely varying degrees of scholarly output and citations. The eight countries that comprise South Asia include India, Pakistan, Bangladesh, Nepal, Sri Lanka, Afghanistan, Bhutan and Maldives. Here the output of India in Covid-19 research is much higher than the combined output of other seven countries. In the second group, the output of Pakistan,, Bangladesh, Nepal and Sri Lanka is comparatively more significant compared to the output of other three countries. As a result, we deemed it appropriate to limit the scope of this study to four select Asian countries namely Pakistan, Bangladesh, Nepal and Sri Lanka.

Published papers by four select South Asian countries were identified, retrieved and downloaded from the Scopus database. The data was sourced on 8 July 2021 covering the publication period between December 2019 and 8 July 2021. The Scopus database was chosen for the purpose, as it is considered as the world's largest abstract and citation database of peer-reviewed scientific literature compared to similar databases. The keywords that were used in the search engine of Scopus include ("Covid-19 " or "2019 novel coronavirus" or "coronavirus 2019" or "coronavirus disease 2019" or "2019-novel CoV" or "2019 ncov" or covid 2019 or covid19 or "corona virus 2019" or ncov-2019 or ncov2019 or "nCoV 2019" or 2019-ncov or covid-19 or "Severe acute respiratory syndrome coronavirus 2" or "SARS-CoV-2"). This search yielded a total of 186427 publications on Covid-19. The database search was further restricted to four select South Asian countries and the search yielded a total of 4412 records. The research output was further refined by using additional features in Scopus database to get statistics distributed by countries, organizations, authors, journals and keywords. All data relevant to Covid-19 downloaded from the Scopus was exported to Excel to collect quantitative data (1) publication output; (2) document type; (3) country/region; (4) organization/authors; (5) journals; and (6) citation. VOSviewer v.1.6.14 (https://www.vosviewer.com/) was used to construct and visualize network linkages between countries, organizations, authors and keywords.

TITLE ("covid 19" or "2019 novel coronavirus" or "coronavirus 2019" or "coronavirus disease 2019" or "2019-novel CoV" or "2019 ncov" or covid 2019 or covid19 or "corona virus 2019" or ncov-2019 or ncov2019 or "nCoV 2019" or 2019-ncov or covid-19 or "Severe acute respiratory syndrome coronavirus 2" or "SARS-CoV-2") or KEY ("covid 19" or "2019 novel coronavirus" or "coronavirus 2019" or "coronavirus disease 2019" or "2019-novel CoV" or "2019 ncov" or covid 2019 or covid19 or "corona virus 2019" or ncov-2019 or ncov2019 or "nCoV 2019" or 2019-ncov or covid-19 or "Severe acute respiratory syndrome coronavirus 2" or "SARS-CoV-2") AND (LIMIT-TO (AFFILCOUNTRY,"Pakistan") OR LIMIT-TO (AFFILCOUNTRY,"Bangladesh") OR LIMIT-TO (AFFILCOUNTRY,"Nepal") OR LIMIT-TO (AFFILCOUNTRY,"Sri Lanka"))

ANALYSIS AND RESULTS

Publications and Citations

During 18-month period between December 2019 and 8 July 2021, the global Covid-19 research accumulated a total of 1,86,427 publications. The USA contributed the most number of publications, with a 25.52% global share, followed by U.K. (10.63%), China (9.58%), Italy (8.27%), India (7.00%), and five other countries, namely Spain, Germany, Canada, Australia and France contributed 3.64% to 4.28% share to global output. The top 10 countries contributed a 81.03% global share (1,51,060 publications) (Table 1). In comparison to top 10 countries, the group of select four South Asian countries (Pakistan, Bangladesh, Nepal and Sri Lanka) contributed a 2.15% share (4012 publications) on Covid-19 research (Table 2).

The select South Asian countries contributed a total of 4012 publications (2020=1670 and 2021-22=2342) on Covid-19 research. These 4012 publications received a total 26,023 citations, an average of 6.49 citations per paper (CPP). The select South Asian countries contributed a 2.15%

Table 1: Global Covid-19 Research: Publication Output of Top 10 Countries during December 2019 and 8 July 2021.

S. No	Name of the country	TP	%TP
1	USA	47579	25.52
2	U.K.	19817	10.63
3	China	17853	9.58
4	Italy	15423	8.27
5	India	13051	7.00
6	Spain	7978	4.28
7	Germany	7914	4.25
8	Canada	7816	4.19
9	Australia	6845	3.67
10	France	6784	3.64
	Total of top 10 countries	151060	81.03
	Global Output	186427	100.00

Table 2: Global Covid-19 Research: Publication Profile of select South Asian Countries during December 2019 and 8 July 2021.

S.No	Name of the country	N	TC	CPP	%TP
1	Pakistan	2246	15427	6.87	1.20
2	Bangladesh	1203	10410	8.65	0.65
3	Nepal	512	4779	9.33	0.27
4	Sri Lanka	202	1876	9.29	0.11
	Total	4163	32492	7.80	2.23
	Actual Total	4012	26023	6.49	2.15
	Global Total	186427			

share to global output. India contributed a 7% share, more than thrice the combined output of four South Asian countries.

Pakistan contributed the most number of publications in the region (2246 and 55.58% share of 4012 publications), followed by Bangladesh (1203 publications and 29.99% share), Nepal (512 publications and 12.76% share) and Sri Lanka (202 publications and 5.03% share). Pakistan accounts for a 1.20% share in the global output, followed by Bangladesh (0.65%), Nepal (0.27%) and Sri Lanka (0.11%). In terms of impact, Nepal registered the highest citation impact per paper (9.33) among South Asian countries, followed by Sri Lanka (9.29 CPP), Bangladesh (8.65 CPP) and Pakistan (6.87 CPP). Although the publication output of Pakistan is more than the combined output of Bangladesh, Nepal and Sri Lanka, but it registered the least citation impact among four South Asia countries. A complete publication profile of select South Asian countries is given in Table 2.

Of the total output by select South Asian countries, 546 papers (13.61%) resulted from research funded by 100+ external agencies. These 546 papers received a total 6809 citations since their publication, an average of 12.47 citations per paper. It is much higher than the average impact of regional output (6.49 CPP). The major external funding agencies that supported Covid research in South Asian countries are: King Saud University, Saudi Arabia (59 papers and 597 citations), National Natural Science Foundations of China (58 papers with 430 citations), National Institute of Health, USA (33 papers and 1366 citations), National Research Foundation of Korea (21 papers and 254 citations), Bill and Melinda Gates Foundation (20 papers and 251 citations), National Institute of Health Research (20 papers and 1075 citations), Taif University (19 papers and 34 citations), Prince Sultan University (18 papers and 80 citations), Higher Education Commission, Pakistan (16 papers and 116 citations), etc. In terms of impact, the publications funded by National Institute of Health Research registered the highest citation impact per paper (53.75), followed by National Institute of Health (41.39), Bill and Melinda Gates Foundation (12.55), National Research Foundation of Korea (12.09), King Saud University (10.11), etc.

Of the 4012 papers by select South Asian countries, articles constituted the largest publications share (2609 papers and 65.03%), followed by reviews (567 papers and 14.13%), letters (434 papers and 10.82%), notes (142 papers and 3.54%), conference papers (122 papers and 3.04%), editorials (78 papers and 1.94%), book chapters (30 papers and 0.75%), data papers and erratum (12 papers and 0.30% each), short surveys (5 papers and 0.12%) and retract (1 paper and 0.025).

International Collaboration

A 59.75% share of research output (2397 out of 4012) by select South Asian countries was involved in international collaboration. These 2397 papers accrued a total of 23088 citations, a average of 9.63 citations per paper. Select South Asian countries published the most number of papers in collaboration with the USA (25.41% share), followed by U.K. (20.69%), China (18.9%), Saudi Arabia (18.4%), India (17.77%), etc. (Table 3). Bangladesh publishing 63.04% of its output as international collaborative papers, followed by Pakistan (60.09%), Nepal (59.98) and Sri Lanka (58.89%).

Figure 1 illustrates a visualization network of international cooperation between the four select South Asian countries and the foreign countries with which they collaborated. The network chart was created using the VOSviewer visualization software. The USA, U.K., China and Saudi Arabia are at the centre of cooperation for being the most influential countries in international collaboration with select South Asian countries.

Foreign Organizations Collaborating with South Asian Organizations

The top 15 foreign organizations with which South Asian organizations collaborated in Covid-19 research are listed in Table 4. Of these, 4 were from U.K., 3 from Saudi Arabia, 2 each from Australia and Columbia, and 1 each from Canada, China, India and Malaysia. King Saud University, Saudi Arabia contributed the most number (82) of papers, followed by UNSW, Australia (66 papers), King Abdulaziz University, Saudi Arabia (61 papers), etc. Universidad Tecnologica de Pereira,

Table 3: Top 10 Collaborative Partners Countries in Publications Output by select South Asian Countries in Covid-19 Research.

S.No	Name of the collaborative country	TP	TC	CPP	% TP
1	USA	609	8359	13.73	25.41
2	U.K.	496	6796	13.70	20.69
3	China	453	7002	15.46	18.90
4	Saudi Arabia	441	7113	16.13	18.40
5	India	426	6724	15.78	17.77
6	Australia	332	4423	13.32	13.85
7	Malaysia	257	2646	10.30	10.72
8	Canada	195	3218	16.50	8.14
9	Japan	147	3840	26.12	6.13
10	Turkey	130	2523	19.41	5.42
11	Egypt	127	2460	19.37	5.30
12	Italy	125	2573	20.58	5.21
	Total ICP	2397	23088	9.63	

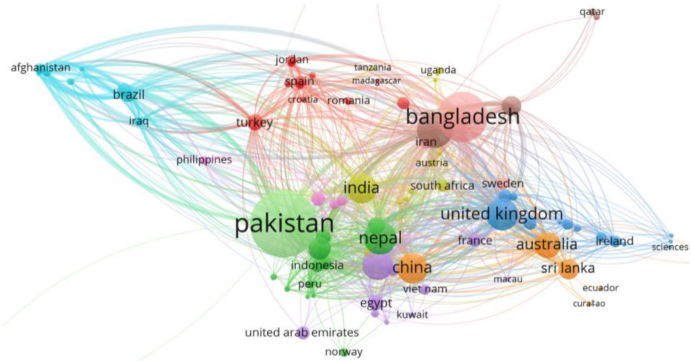

Figure 1: Network of Collaboration Linkages of select South Asian countries and of Countries with which they collaborated.

Table 4: Top 15 Most Productive Foreign Organizations with which Organizations from select South Asian Countries Collaborated.

S.No	Name of the organizations	TP	TC	CPP	% TP
1	King Saud University, Saudi Arabia	82	1743	21.26	3.42
2	UNSW Sydney, Australia	66	1549	23.47	2.75
3	King Abdulaziz University, Saudi Arabia	61	340	5.57	2.54
4	University of Oxford, U.K.	58	1276	22.00	2.42
5	Indian Veterinary Research Institute, India	52	1823	35.06	2.17
6	University of Toronto, Canada	46	836	18.17	1.92
7	Universiti Sains Malaysia	43	252	5.86	1.79
8	London School of HYgience * Tropical Medicine, U.K.	41	458	11.17	1.71
9	Prince Sultan University, Saudi Arabia	40	611	15.28	1.67
10	Fundacion Autonoma de las America, Columbia	140	2087	14.91	5.84
11	Ministry of Education, China	39	1226	31.44	1.63
12	Universidad Tecnologica de Pereira, Columbia	38	2192	57.68	1.59
13	Nottingham Trent UNiversity, U.K.	35	815	23.29	1.46
14	University of Melbourne, Austtralia	35	712	20.34	1.46
15	Imperial College, London, U.K.	34	1762	51.82	1.42
	Total ICP of South Asia countries	2397			

Columbia registered the highest citations per paper (57.68 CPP), followed by Imperial College, London, U.K. (51.82 CPP), Indian Veterinary Research Institute, Bareilly, India (35.06 CPP) and UNSW, Sydney, Australia (35.06 CPP), etc. (Table 4).

Foreign Authors that Collaborated with South Asian Authors

The top 15 foreign authors that had collaborated with South Asian authors in Covid-19 research are listed in Table 5. Of these, 4 were from India, 2 each from Australia, Columbia and Saudi Arabia, and 1 each from Afghanistan, China, , Malaysia, U.K. and USA. K.Dhama (India) tops the ranking list with 50 collaborative papers, followed by A.J.Rodriquez-Morales (Columbia) (36 papers), A.A.Rabaan (USA), (33 papers), M.Y.Essar (Afghanistan) (30 papers), R.Tiwari (India) (25 papers), etc. D.K.Binilla-Aldana (Columbia) registered the highest

Table 5: Top 15 Most Productive Foreign Authors that Collaborated with South Asian Authors.

S.No	Name of the author	Affiliation of the author	TP	TC	CPP	% TP
1	K. Dhama	IVRI-Bareilly, India	50	1798	35.96	2.09
2	A.J.Rodriquez-Morales	Fundacion Universitataria Autonoma des las America, Columbia	36	2139	59.42	1.50
3	A.A.Rabaan	John Hopkins Aramco Healthcare, USA	33	1857	56.27	1.38
4	M.Y..Essar	Kateb University,Medical Research Center, Afghanistan	30	75	2.50	1.25
5	R.Tiwari	IVRI-Bareilly, India	25	703	28.12	1.04
6	M.D.Groffths	Nottingham Trent University, U.K,	25	740	29.60	1.04
7	M.Bilal	Huaiyin Institute of Technology, China	19	61	3.21	0.79
8	M.Haque	National DEfence University of Malaysia	19	87	4.58	0.79
9	S.K.Kar	King George's University, Lucknow, India	18	292	16.22	0.75
10	D.K.Binilla-Aldana	Universidad Technologica de Pereira, Columbia	17	1735	102.06	0.71
11	Y.H.Khan	Jouf University, Saudi Arabia	17	86	5.06	0.71
12	T.H.Mallhi	Jouf University, Saudi Arabia	17	85	5.00	0.71
13	M.A.Moni	UNSW Sydney, Australia	16	84	5.25	0.67
14	A.Ahmed	Monash University, Australia	14	79	5.64	0.58
15	Y.S.Malik	IVERI-Bareilly, India	14	542	38.71	0.58
		Total ICP of South Asia countries	2397			

citations per paper (102.06 CPP), followed by A.J.Rodriquez-Morales (Columbia) (59.42 CPP) and A.A.Rabaan (USA)(56.27 CPP), etc.

Distribution by Population Age Groups

The publications output by select South Asian countries in Covid-19 research was divided into five population age groups (Table 6). "Adults" accounted for the most (16.35%) publications share, followed by "Middle Aged" (7.30%), "Aged" (4.99%), "Child" (4.81%) and "Adolescents"(4.16%). "Aged" population group reported the largest impact per paper (17.59 CPP), followed by "Middle Aged"(15.20 CPP), "Adults"(13.45 CPP), "Adolescents"(12.65" CPP) and "Child"(10.10 CPP).

Distribution by Broad Subject Areas

The publications output by select South Asian countries on Covid-19 research was divided into more than 25 subject areas. The top 14 subject areas which comparatively accounted for a higher share are listed in Table 7. Among 14 subject areas, Medicine accounted for the highest

Table 6: Publications Output by select South Asian Countries Distributed by Population Age Groups.

S.No.	Population Age Group	TP	TC	CPP	% TP
1	Adults	656	8826	13.45	16.35
2	Middle Aged	293	4454	15.20	7.30
3	Aged	200	3517	17.59	4.99
4	Child	193	1949	10.10	4.81
5	Adolescents	167	2113	12.65	4.16
	South Asia Total papers	4012			

Table 7: Subject-Wise Break-up of Publications Output by select South Asian Countries on Covid-19 Research.

S.No	Name of the Subject	TP	TC	CPP	%TP
1	Medicne	2320	17950	7.74	57.83
2	Social Sciences	392	1551	3.96	9.77
3	Biochemistry, Genetics and Molecular Biology	386	4708	12.20	9.62
4	Immunology and Microbiology	359	2743	7.64	8.95
5	Computer Science	357	1271	3.56	8.90
6	Environment Science	272	2479	9.11	6.78
7	Engineering	270	1369	5.07	6.73
8	Pharmacology, Toxicology and Pharmaceutics	200	1091	5.46	4.99
9	Agricultural and Biological Sciences	157	550	3.50	3.91
10	Economics, Econometrics and Finance	145	1284	8.86	3.61
11	Psychology	145	1525	10.52	3.61
12	Business, Management and Accounting	135	553	4.10	3.36
13	Neuroscience	105	2638	25.12	2.62
14	Energy	82	277	3.38	2.04
	South Asia total publications	4012	26023	6.49	100.00

publication share (57.83%), followed by Social Sciences, Biochemistry, Genetics and Molecular Biology, Immunology and Microbiology and Computer Science (from 8.9% to 9.77%), and others. In terms of impact, Neuroscience, Biochemistry, Genetics and Molecular Biology and Psychology registered the highest citation impact per paper (25.12, 12.20 and 10.52 respectively) and Energy, Agricultural and Biological Sciences and Computer Science the least (3.38, 3.50 and 3.56 respectively) (Table 7).

Distribution by Type of Research Studies

"Treatment" type studies accounted for the largest share (16.45%) of publications, followed by "Epidemiology" (15.63%), "Risk Factors" (5.83%), "Clinical Studies" (4.81%), "Complications"(3.59%), "Pathophysiology" (3.22%) and "Genetics"(1.60%) (Table 8). Under "Treatment" type studies, "Drugs (7.45%) and Vaccine (4.64%)" being sub-categories accounted for most share. In terms of impact, "Pathophysiology" registered the highest citation impact per paper (21.96), followed by "Genetics"(18.34 CPP), "Clinical Studies"(16.58 CPP) and "Treatment" (13.09 CPP), etc.

Distribution by Significant Keywords

Keywords provide a secondary support to identify key research areas related to Covid-19 research. Around 46 keywords (assumed to be significant based on high frequency of their occurrence) have been identified from the South Asian literature on Covid-19 research. Their frequency of occurrence varied from 71 to 3169 times. These keywords occurring independently or in combination tend to throw some light on key research trends in this area. These keywords are listed in Table 9 and are arranged in the decreasing order of their occurrence in the literature during 2019-21. A network visualization chart was created by mapping co-occurrences of keywords in title/abstract for all publications (Figure 2). Significant research topics or areas of research in South Asian publications on Covid-19 are scattered into three different clusters represented in different colors.

Table 8: Distribution of Publications Output contributed by select South Asian Countries by Type of Studies in Covid-19 Research.

S.No.	Type of Studies	TP	TC	CPP	% TP
1	Clinical Studies	193	3199	16.58	4.81
	Clinical Trials	115	1609	13.99	2.87
2	Epidemiology	627	5870	9.36	15.63
3	Pathophysology	129	2833	21.96	3.22
4	Genetics	64	1174	18.34	1.60
5	Complications	144	1518	10.54	3.59
6	Risk Factors	234	2369	10.12	5.83
7	Treatment	660	8639	13.09	16.45
	Drugs	299	5018	16.78	7.45
	Immunotherapy	24	114	4.75	0.60
	Monoclonal Antibody	36	596	16.56	0.90
	Vaccine	186	1527	8.21	4.64
	Cobvalescent Plasma	49	684	13.96	1.22
	Treatment Outcome	66	700	10.61	1.65
	South Asia Total	4012			

Top 30 Most Productive Organizations.

A total 689 research organizations from "Select South Asia Countries" participated in Covid-19 research, during 2019-21. The distribution of research output organization - wise is skewed. 325 organizations published 1-5 papers each, 216 organizations 6-10 papers each, 113 organizations 11-20 papers each, 106 organizations 21-50 papers each and 7 organizations 101-79 papers each.

The productivity of top 30 most productive varied from 42 to 179 publications per organization. Together they contributed a 58.20% (2335) publications share and 79.60%(20714) citations share during 2019-21. Of the top 30 organizations, 16 were from Pakistan, 11 from Bangladesh, 2 from Nepal and 1 from Sri Lanka.

A scientometric profile of top 8 most productive and 8 most impactful organizations is presented in Table 10.

- Eleven organizations registered their publication output above the group average (77.83) of all organizations;
- Five organizations registered their citation per paper and relative citation index above the group average (8.87 and 1.37) of all organizations.

A network visualization map of research collaboration among Top 30 organizations from select South Asian countries, with a minimum research output of 42 publications on Covid-19-research is shown in Figure 3. The map was created using VOSviewer software version 1.6.16

Table 9: Top 46 Keywords and the Frequency of their Occurrence in Publications output by select South Asian Countries on Covid-19 Research during 2019-21.

S. No	Name of Keyword	Frequency	S. No	Name of Keyword	Frequen cy	S. No	Name of Keyword	Frequency
1	Covid-19	3169	17	Social Distancing	135	33	Drug Therapy	93
2	Pandemic	1499	18	Hydroxycholorquine	133	34	Diabetes Mellitus	97
3	Virus Pneumonia	558	19	Vaccination	128	35	Hand Washing	89
4	Betacoronovirus	446	20	Social Media	126	36	Metabolism	89
5	Virology	250	21	Angiotensin Converting Enzyme 2	120	37	Education	86
6	Virus Transmission	558	22	Diagnosis	119	38	Machine Learning	86
7	Mental Health	220	23	Dyspnea	119	39	Fear	83
8	Psychology	206	24	Remdesivir	118	40	Azithromycin	81
9	Quarantine	204	25	Immunity	110	41	C.Reactive Protein	77
10	Anxiety	192	26	Throax Radiography	101	42	Mental Disease	76
11	Prevention and Control	182	27	Cholorquine	101	43	Mental Stress	76
12	Depression	165	28	Molecular Docking	97	44	Pathogenicity	76
13	Lockdown	165	29	Deep Learning	94	45	Risk Assessment	76
14	Comorbidity	146	30	Hypertension	94	46	Prediction	73
15	Antiviral Agents	137	31	Intensive Care	94			
16	Coughing	138	32	Computer Assisted Tomography	93			

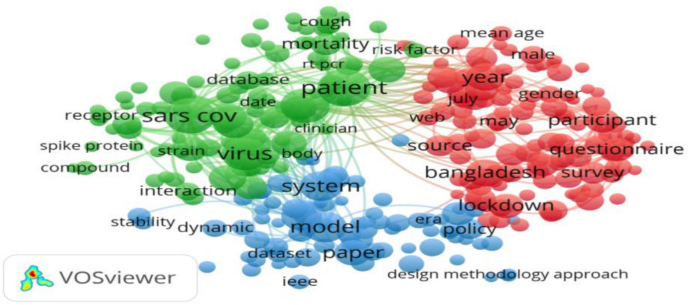

Figure 2: Mapping Co-Occurences of Keywords Characterizing Covid-19 Research

Top 30 Most Productive Authors

A total of 1199 authors hailing from select South Asian countries had participated in Covid-19" research during 2020-21. Of these, 849 authors published 1-5 papers each, 177 authors 6-10 papers each, 58 authors 11-20 papers each and 15 authors 21-50 papers each. Of the 30 authors, 14 are from Pakistan, 12 from Bangladesh and 4 from Nepal and none from Sri Lanka.

The productivity of top 30 most productive authors varied from 12 to 50 publications per author; together they contributed a 14.28% (573) publications share and 35.99% (9365) citations share during 2019-21. A scientometric profile of top 8 most productive and 8 most impactful authors is presented in Table 11.

- Eight authors registered their publication output above the group average (19.10) of all authors;
- Nine authors registered their citation per paper and relative citation index above the group average (16.34 and 2.52) of all authors.

A network visualization map of research collaboration among top 30 authors with a minimum research output of 12 publications each on Covid-19 research is shown in Figure 4. The map was created using VOSviewer software version 1.6.16.

Top 30 Most Productive Journals

Of the total 4012 publications on Covid-19 research, 3860 (96.21%) appeared in 671 journals, 97 publications in conference proceeding (97), 44 in book series, 10 as books and 3 in trade journal. The distribution of 3860 publications across journals is highly skewed. Of these 496 journals contributed 1-5 papers each, 103 journals 6-10 papers each, 45 journals 11-20 papers each, 18 journals 21-50 papers each and 7 journals 51-83 papers. The top 30 journals published 19 to 83 papers per journal and together they contributed a 28.13% share.

The top seven most productive journals include *Journal of The College of Physicians and Surgeons Pakistan* (83 papers), *PLOS One* (72 papers), *Journal of The Nepal Medical Association* (69 papers), *Journal o Medical Virology* (61 papers), *Pakistan Journal of Medical Sciences* (57 papers), *Frontiers In Public Health* (54 papers) and *Heliyon* (51 papers). In terms of citation impact per paper the top journals include: *Asian Journal of Psychiatry* (29.69 CPP), *Journal of Biomolecular Structure and Dynamics* (24.12 CPP), *Chaos, Solitons and Fractals* (19.24 CPP), *IEEE Access* (17.05 CPP), *American Journal of Tropical Medicine and Hygiene* (13.36 CPP), *International Journal of Environmental Research and Public Health* (10.95 CPP), *Pakistan Journal of Medical Sciences* (9.09 CPP) and *Journal of Medical Virology* (8.74 CPP).

Highly-Cited Papers

Out of 4012 publications on Covid-19 research, only 47 (1.17% share) received 100-949 citations per paper. These papers are assumed to be highly-cited papers as every such paper had received at least 100 citations per paper. Together these 47 highly-cited papers received a total of 10733 citations, an average 228.36 citations per paper. Amongst 47 highly-cited papers, 30 received 100-191 citations each, 9 papers 204-299 citations each, 4 papers 373-488 citations each and 4 papers 535-949 citations each.

Among 47 high-cited papers, the USA has been the largest collaborating partner with 15 papers, followed by U.K. (14 papers), Saudi Arabia (12 papers), China (11 papers), Australia (10 papers), India (8 papers), Canada, France and Japan (7 papers each), Brazil, Egypt and Iran (5 papers each), Germany, Italy, Thailand and Turkey (4 papers each),

Table 10: Profile of Top 8 Most Productive and 8 Most Impactful Organizations.

S.No	Name of the Organization	TP	TC	CPP	HI	ICP	%ICP	RCI
	Top 8 Most Productive Organizations							
1	The Aga Khan University, Pakistan	179	2703	15.10	18			2.33
2	Jahangirnagar University, Bangladesh	165	1993	12.08	23			1.86
3	University of Dhaka, Bangladesh	156	701	4.49	12			0.69
4	Tribhuvan University, Nepal	117	2294	19.61	19			3.02
5	Quaid-i-Azam University, Pakistan	115	883	7.68	14			1.18
6	University of the Punjab, Pakistan	113	585	5.18	12			0.80
7	Dow University of Health Sciences, Pakistan	109	670	6.15	12			0.95
8	The Aga Khan University Hospital, Pakistan	98	469	4.79	10			0.74
	Top 8 Most Impactful Organizations							
1	Tribhuvan University Teaching Hospital, Nepal	72	1988	27.61	16			4.25
2	Tribhuvan University, Nepal	117	2294	19.61	19			3.02
3	The Aga Khan University, Pakistan	179	2703	15.10	18			2.33
4	University of Veterinary and Animal Sciences, Lahore, Pakistan	63	830	13.17	12			2.03
5	International Centre for Diarrhoeal Disease Research, Bangladesh	53	644	12.15	12			1.87
6	Jahangirnagar University, Bangladesh	165	1993	12.08	23			1.86
7	University of Karachi, Pakistan	43	494	11.49	10			1.77
8	University of Malakand, Pakistan	51	575	11.27	11			1.74

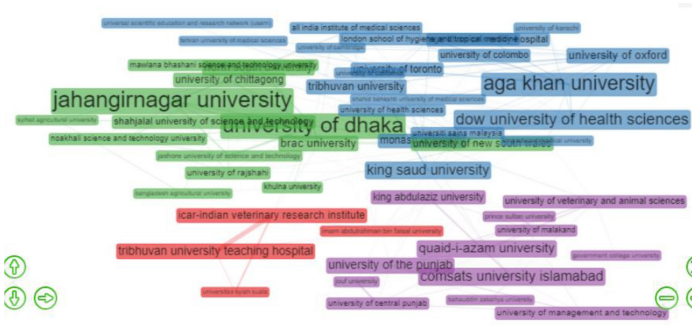

Figure 3: Network Collaboration visualization map of Top 30 Research Organizations in Covid-19 Research and belonging to select South Asian Countries.

etc. In 47 highly-cited papers, Pakistan leads with 9 as first author papers, followed by Bangladesh (8 papers), Sri Lanka (2 papers) and Nepal (1 paper).

These 47 high-cited papers witnessed the participation of 56 South Asia organizations (24 from Bangladesh, 22 from Pakistan, 6 from Sri Lanka and 4 from Nepal) and of 72 authors. Of the 56 organizations, The Aga Khan University, Karachi contributed 6 papers, followed by Undergraduate Research Organization, Savara, Dhaka, Bangladesh (4 papers), Dow University of Health Sciences, Karachi, Pakistan, Jahagirnagar University, Dhaka, Bangladesh and Tribhuvan Universiy Teaching Hospital, Kathmandu (3 papers each), Holy Family Red Crescent Medical College, Dhaka, Bangladesh, University of Columbo, Sri Lanka and University of Jayawardenepura, Sri Lanka (2 papers each) and 1 paper each by 45 other South Asia organizations.

The 47 highly-cited papers were published in 36 journals, with 2 papers each in *Asian Journal of Psychiatry, Environmental Research, Infezioni in Medicine*, *International Journal of Mental Health and Addition*, *Journal of Behavior and Experimental Finance*, *Journal of Biomedical Structure and Analysis*, *Lancet Infectious Diseases*, *New England Journal of Medicine, Science and Science of the Total Environment* and 1 paper each in 25 other journals.

SUMMARY AND CONCLUSION

This paper has sought to provide a descriptive picture of Covid-19 research pursued across a select group of four South Asian countries in the context of global research trends in the subject. The data for the study was sourced from the Scopus database covering the publication period from December 2019 till 8 July 2021. The select four South Asia countries (Pakistan, Bangladesh, Nepal and Sri Lanka) together contributed a total 4012 publications, a 2.15% share to global output during 2019-21. The distribution by country of publication origin is: Pakistan (n=2246, 55.58% share of regional output), followed by Bangladesh (n=1203, 29.99%), Nepal (n=512, 12.76%) and Sri Lanka (n=202, 5.03%). These 4012 publications were cited with an average of 6.49 citations per paper (CPP). A 13.61% (546) share of regional output had resulted from research duly funded by 100+ external agencies. These 546 funding based publications were cited with an average of 12.47 citations per paper, the regional citation record is 6.49 CPP. International collaboration in research has been instrumental in driving the qualitative dimensional of regional research output. A 59.75% share of regional output had resulted from collaboration with foreign countries such as the USA (n=609, 25.41% of regional output), UK (n=496, 20.69%), China (n=453, 18.90%), Saudi Arabia (n=441, 18.40%) and India (n=426, 17.77%).

The key research organizations that dominate research with a 58.2% share of regional output include The Aga Khan University, Pakistan (n=179 publications, 4.46%) ranked first, followed by Jahangirnagar University, Bangladesh (n=165 publications, 4.11%) and University of Dhaka, Bangladesh (n=156 publications, 3.89%). In addition, Pakistan and Bangladesh accounted for 16 and 11 of the top thirty organizations, indicating the presence of many outstanding research groups in Covid-19 research.

The key research authors that dominate research with 14.28% share of regional output include M.A.Mamun (Centre for Health Innovation, Networking, Training, Action and Research – Bangladesh)(n=35, 1.25%), A.Ahmad (Punjab Medical College, Pakistan)(n=32, 0.87%), I.Uttah (Gandhara University, Pakistan)(n=32, 0.80%), T.B.Emran (BGC Trust University, Bangaldesh)(n=28, 0.80%), etc. In addition, Pakistan

Table 11: Profile of Top 8 Most Productive and 8 Most Impactful Authors.

S. No.	Name of the author	Affiliation of author	TP	TC	CPP	HI	RCI
		Top 8 Most Productive Authors					
1	R. Sah	Tribhuvan University, Nepal	50	2219	44.38	18	6.84
2	M.A. Mamun	Centre for Health Innovation, Networking, Training, Action and Research – Bangladesh	35	1038	29.66	14	4.57
3	A.Ahmad	Punjab Medical College, Pakistan	32	76	2.38	6	0.37
4	I. Ullah.	Gandhara University, Pakistan	32	243	7.59	7	1.17
5	T.B.,Emran	BGC Trust University Bangladesh	28	149	5.32	7	0.82
6	A.Ikram	National Institute of Health, Pakistan	25	49	1.96	4	0.30
7	M.S.Afzal	University of Management and Technology, Lahore, Pakistan	23	131	5.70	7	0.88
8	S.M.Y. Arafat	Enam Medical College and Hospital, Bangladesh	23	302	13.13	8	2.02
		Top 8 Most Impactful Authors					
1	A.M.Baig	The Aga Khan University, Pakistan	15	1102	73.47	7	11.32
2	H.Harapan	Universitas Syiah Kuala, Bangladesh	16	1019	63.69	5	9.81
3	R. Sah	Tribhuvan University, Nepal	50	2219	44.38	18	6.84
4	M.A. Mamun	Centre for Health Innovation, Networking, Training, Action and Research – Bangladesh	35	1038	29.66	14	4.57
5	M.T.Sikder	Jahagirnagar University, Bangaldesh	14	333	23.79	6	3.66
6	Z.A.Bhutta	The Aga Khan University, Pakistan	13	302	23.23	7	3.58
7	S. Mukhtar.	University of Management and Technology Lahore, Pakistan	15	324	21.60	6	3.33
8	R.Kabir	Anglia Ruskin University, Bangladesh	13	256	19.69	7	3.03

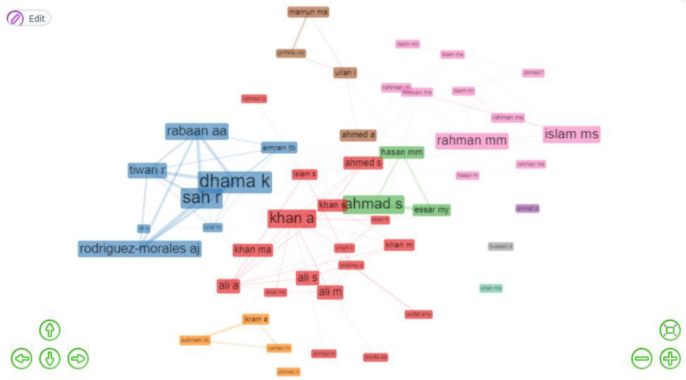

Figure 4: Network Collaboration Visualization Map of Authors from select South Asian Countries and involved in Covid-19 Research.

and Bangladesh accounted for 14 and 12 of the top thirty authors, indicating the presence of active research groups in Covid-19 research.

The top journals publishing Covid-19 research include: The Journal of *The College of Physicians and Surgeons Pakistan* (*n*=83, 2.15%), *PLOS One* (*n*=72, 1.87%) average citations per paper, *Journal of The Nepal Medical Association* (*n*=69, 1.79%), *Journal of Medical Virology* (*n*=6, 1.58%) and *Pakistan Journal of Medical Sciences* (*n*=57, 1.48%) were ranked as the top five most productive journals, respectively.

CONCLUSION

The quantity of output by the select group of four countries (Pakistan, Bangladesh, Nepal and Sri Lanka) belonging to South Asia has been small and insignificant, just 2.15% share of global output. In comparison, India alone contributed a 7% global share, more than thrice the combined output by the select group of countries. The size of their share of highly-cited papers has also been small, just 1.17%. Besides, the performance of their research evaluated on 'average citations per paper' has not been very impressive, it was just 6.49 CPP. In overall, there is an urgent need on the part of the select group of South Asian countries to take initiatives with aim to improve both the quantity and quality of their research at global, national, institutional, and individual author level.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

REFERENCES

1. WHO. Coronovirus (Covid-19) dashboard. Available from: http://covid-19.who.int [cited 9/10/2021].
2. Zyoud SH. The Arab region's contribution to global Covid-19 research: bibliometric and visualization analysis. Global Health. 2021;17(1):31. doi: 10.1186/s12992-021-00690-8, PMID 33766073.
3. Mbogning Fonkou MD, Bragazzi NL, Tsinda EK, Bouba Y, Mmbando GS, Kong JD. Covid-19 pandemic related research in Africa: bibliometric analysis of scholarly output, collaborations and scientific leadership. Int J Environ Res Public Health. 2021;18(14):7273. doi: 10.3390/ijerph18147273, PMID 34299724.
4. Guleid FH, Oyando R, Kabia E, Mumbi A, Akech S, Barasa E. A bibliometric analysis of Covid-19 research in Africa. BMJ Glob Health. 2021;6(5):e005690. doi: 10.1136/bmjgh-2021-005690, PMID 33972261.
5. Forero-Peña DA, Carrión-Nessi FS, Camejo-Ávila NA, Forero-Peña MJ. Covid-19 en Latinoamérica: una revisión sistemática de la literatura y análisis bibliométrico. Rev salud pública;22(2):1-7. doi: 10.15446/rsap.v22n2.86878.
6. Gregorio-Chaviano O, Limaymanta CH, López-Mesa EK. Bibliometric evaluation of Latin American contributions on Covid-19. Biomedica. 2020 Oct 30;40(Supl. 2) [Suppl:104-15]. English, Spanish:104-15. doi: 10.7705/biomedica.5571, PMID 33152194.
7. Torres PC, Torrell-Vallespín S. Bibliometric analysis of Latin American and Caribbean scientific production about Covid-19. 2020;31(3):1-21. PMID PubMed. Revista Cubana de Información en Ciencias de la Salud (ACIMED).

Appendix

Table. Profile of Top 30 Organizations

S.No	Name of the Organization	TP	TC	CPP	HI	RCI
1	The Aga Khan University, Pakistan	179	2703	15.10	18	2.33
2	Jahangirnagar University, Bangladesh	165	1993	12.08	23	1.86
3	University of Dhaka, Bangladesh	156	701	4.49	12	0.69
4	Tribhuvan University, Nepal	117	2294	19.61	19	3.02
5	Quaid-i-Azam University, Pakistan	115	883	7.68	14	1.18
6	University of the Punjab, Pakistan	113	585	5.18	12	0.80
7	Dow University of Health Sciences, Pakistan	109	670	6.15	12	0.95
8	The Aga Khan University Hospital, Pakistan	98	469	4.79	10	0.74
9	University of Management and Technology, Lahore	86	624	7.26	11	1.12
10	COMSATS University, Islamabad, Pakistan	84	363	4.32	11	0.67
11	University of Lahore, Pakistan	80	281	3.51	10	0.54
12	Tribhuvan University Teaching Hospital, Nepal	72	1988	27.61	16	4.25
13	University of Columbo, Sri Lanka	69	562	8.14	11	1.25
14	National University of Science and Technology of Pakistan	67	401	5.99	11	0.92
15	North South University, Bangladesh	65	275	4.23	6	0.65
16	BRAC University, Bangladesh	64	397	6.20	9	0.96
17	University of Veterinary and Animal Sciences, Lahore, Pakistan	63	830	13.17	12	2.03
18	Rajshahi University, Bangladesh	58	274	4.72	11	0.73
19	Shahjalal University of Science and Technology, Bangladesh	57	406	7.12	10	1.10
20	University of Chittagong, Bangladesh	54	606	11.22	9	1.73
21	International Centre for Diarrhoeal Disease Research, Bangladesh	53	644	12.15	12	1.87
22	The Islamic University of Bawalpur, Pakistan	51	297	5.82	9	0.90
23	University of Malakand, Pakistan	51	575	11.27	11	1.74
24	University of Central Punjab,	50	147	2.94	8	0.45
25	Bangladesh University of Engineering and Technology	47	325	6.91	10	1.07
26	Khulalna University, Bangladesh	43	213	4.95	7	0.76
27	University of Karachi, Pakistan	43	494	11.49	10	1.77
28	King Edward Medical University, Lahore, Pakistan	42	240	5.71	9	0.88
29	Government College University of Faisalabad, Pakistan	42	313	7.45	9	1.15
30	Mawlana Bhashani Science and Technology University, Bangladesh	42	161	3.83	8	0.59
		2335	20714	8.87	11.3	1.37
		4012	26023	6.49		
		58.20	79.60			

Table. Profile of Top 30 Authors

S. No.	Author Name	Affiliation of author	TP	TC	CPP	HI	RCI
1	R. Sah	Tribhuvan University, Nepal	50	2219	44.38	18	6.84
2	M.A. Mamun	Centre for Health Innovation, Networking, Training, Action and Research – Bangladesh	35	1038	29.66	14	4.57
3	A.Ahmad	Punjab Medical College, Pakistan	32	76	2.38	6	0.37
4	I. Ullah.	Gandhara University, Pakistan	32	243	7.59	7	1.17
5	T.B.,Emran	BGC Trust University Bangladesh	28	149	5.32	7	0.82
6	A.Ikram	National Institute of Health, Pakistan	25	49	1.96	4	0.30
7	M.S.Afzal	University of Management and Technology, Lahore, Pakistan	23	131	5.70	7	0.88
8	S.M.Y. Arafat	Enam Medical College and Hospital, Bangladesh	23	302	13.13	8	2.02
9	H.Ahmed	COMSATS University, Islamabad, Pakistan	18	103	5.72	6	0.88
10	M.Salman	National Institute of Health, Pakistan	18	36	2.00	3	0.31
11	G.S.Shrestha	Tribhuvan University Teaching Hospital, Nepal	17	124	7.29	4	1.12
12	S.Islam	Jahangirnagar University, Bangladesh	16	78	4.88	6	0.75
13	H.Harapan	Universitas Syiah Kuala, Bangladesh	16	1019	63.69	5	9.81
14	P.Sharma	Patan Academy of Health Sciences, Lalitpur, Nepal	16	238	14.88	6	2.29
15	S.Ahmad	Quaid-i-Azam University, Pakistan	15	145	9.67	5	1.49
16	U.A.Awan	University of Management and Technology, Lahore, Pakistan	15	55	3.67	4	0.56
17	A.M.Baig	The Aga Khan University, Pakistan	15	1102	73.47	7	11.32
18	G. Dangal	Kathmandu Model Hospital, Nepal	15	24	1.60	2	0.25
19	M.M.Hasan	Mawlana Bhashani Science and Technology University, Bangladesh	15	38	2.53	4	0.39
20	S. Mukhtar.	University of Management and Technology Lahore, Pakistan	15	324	21.60	6	3.33
21	M.M.Rahman	Jahangirnagar University, Bangladesh	15	212	14.13	6	2.18
22	S.Hossain	Jahangirnagar University, Bangaldesh	14	258	18.43	5	2.84
23	A.Javed	Pakistan Psychiatric Research Center	14	127	9.07	4	1.40
24	M.T.Sikder	Jahagirnagar University, Bangaldesh	14	333	23.79	6	3.66
25	M.M..Alam	National Institute of Health, Pakistan	13	34	2.62	3	0.40
26	M.Ali	Quiad-i-Azam University, Pakistan	13	110	8.46	5	1.30
27	Z.A.Bhutta	The Aga Khan University, Pakistan	13	302	23.23	7	3.58
28	M.S.Islam	Jahagirnagar University, Bangladesh	13	177	13.62	7	2.10
29	R.Kabir	Anglia Ruskin University, Bangladesh	13	256	19.69	7	3.03
30	M.A.Hosain	University of Dhaka, Bangladesh	12	63	5.25	4	0.81
			573	9365	16.34	183	2.52
			4012	26023	6.49		
			14.28	35.99			

Table. Profile of Top 30 Journals.

S.No	Name of the Journal	TP	TC	CPP
1	Journal of The College Of Physicians And Surgeons Pakistan	83	78	0.94
2	PLOS One	72	419	5.82
3	Journal Of The Nepal Medical Association	69	35	0.51
4	Journal Of Medical Virology	61	533	8.74
5	Pakistan Journal Of Medical Sciences	57	518	9.09
6	Frontiers In Public Health	54	452	8.37
7	Heliyon	51	320	6.27
8	Asia-Pacific Journal of Public Health	45	79	1.76
9	International Journal Of Environmental Research And Public Health	43	471	10.95
10	Kathmandu University Medical Journal	36	14	0.39
11	Pakistan Journal Of Medical And Health Sciences	34	6	0.18
12	Journal Of Nepal Health Research Council	33	69	2.09
13	Asian Journal Of Psychiatry	32	950	29.69
14	Results In Physics	32	154	4.81
15	Journal Of The Pakistan Medical Association	31	83	2.68
16	Computers, Materials and Continua	29	59	2.03
17	Annals Of Medicine And Surgery	28	78	2.79
18	Disaster Medicine And Public Health Preparedness	28	52	1.86
19	Sustainability	28	93	3.32
20	Journal Of Biomolecular Structure And Dynamics	25	603	24.12
21	Chaos, Solitons And Fractals	25	481	19.24
22	Frontiers In Psychology	25	47	1.88
23	Environmental Science And Pollution Research	24	76	3.17
24	American Journal Of Tropical Medicine And Hygiene	22	294	13.36
25	World Neurosurgery	20	83	4.15
26	IEEE Access	20	341	17.05
27	Journal of Ayub Medical College, Abbottabad : JAMC	19	12	0.63
28	Economic Research Ekonomska Istrazivang	21	29	1.38
29	Journal of Global Health	20	58	2.90
30	Alexandria Engineering Journal	19	98	5.16
		1086	6585	6.06
		3860		
		28.13		

HCP=47 (10733 citations)

Article History: Received: 08-08-2021; Revised: 11-09-2021; Accepted: 03-10-2021
Cite this article: Gupta BM, Dhawan SM, Surulinathi M. Select South Asian Countries in Covid-19 Research: A Bibliometric Assessment of Their Publications during 2019-21. J Young Pharm. 2021;13(3) Suppl:s19-s29.