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Indian Contribution in Covid-19: A Scientometric Mapping of Research Publications

Surulinathi Muthuraj
surulinathi@gmail.com

Jayasuriya T MLIS
Bharathidasan University

Balasubramani R Associate Professor
Bharathidasan University, lisbala@gmail.com

Arputha Sahaya Rani Y Research Scholar
Bharathidasan University, srsahayaranisat@gmail.com

Salini T Research Scholar
Bharathidasan University

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M. Surulinathi, Assistant Professor,
T. Jayasuriya, II Year MLIS,
R. Balasubramani, Associate Professor,
Y. Arputha Sahayarani, Research Scholar,
T. Salini, Research Scholar,
Department of Library and Information Science,
Bharathidasan University, Tiruchirappalli-24, India
Corresponding Author: surulinathi@gmail.com

Abstract

The study examines India's performance based on its publication output in Covid-19 during 2020-2021, based on several parameters, including the, publications share and rank, institutional profile of selected institutions, international collaboration profile and major collaborative partners, patterns of communication in national and international journals, Highly cited papers and most productive authors. The study uses 2 years publications data in Covid-19 drawn from Web of Science international multidisciplinary bibliographical database. It is interesting to note that the prolific authors belong to All India Institute of Medical Science with 489 Publications (1266 Citations), Post Grad Inst Med Educational & Res with 171 (666 Citations), Dr DY Patil University with 85 (382 Citations), Indian Institute of Technology with 54 (349 Citations), Manipal Academy of Higher Education with 59 (279 Citations), and Banaras Hindu University with 56 (171 Citations). The most productive authors are Kumar A from Armed Forces Med College, Dept Ophthalmology, Pune (Maharashtra state) with 115 Publications and registered 372 Citations (H-Index: 10), Wiwanitkit from Dr DY Patil Univ, Pune (Maharashtra state) with 91 Publications (411 Citations) (H-Index: 11), Kumar S from Jai Narayan Vyas Univ, Jodhpur(Rajasthan state) with 85 (421 Citations) (H-Index: 10), Gupta S with 57 (209 Citations) (H-Index: 7), Singh with 53 (175 Citations) and Sharma S with 52 (359 Citations). The most preferred journals by the scientists were: INDIAN JOURNAL OF OPHTHALMOLOGY with 143 papers (443 Citations), JOURNAL OF BIOMOLECULAR STRUCTURE & DYNAMICS with 113(1066 Citations), ASIAN JOURNAL OF PSYCHIATRY with 100 (1419 Citations), INDIAN PEDIATRICS (61), DERMATOLOGIC THERAPY (57), INDIAN JOURNAL OF MEDICAL RESEARCH (52), and INDIAN JOURNAL OF PEDIATRICS (50). The most cited one is: Singhal T A Review of CoronavirusDisease-2019 (COVID-19), INDIAN JOURNAL OF PEDIATRICS. 2020 APR; 87 (4): 281-286 with 604 Citations.

Keywords: *Covid-19, Coronavirus; Highly Cited papers, Scientometrics*

INTRODUCTION

Nowadays, the whole World is under threat of Coronavirus disease (COVID-19). The ongoing COVID-19 pandemic has resulted in many fatalities and forced scientific communities to foster their Research and Development activities. As a result, there is an enormous growth of scholarly literature on

the subject. In order to combat this novel Coronavirus, the open access to scientific literature is essential. On this line, many reputed academic institutions and publication firms have made their literature on COVID-19 accessible to all. The study found the considerable and constant growth of Indian publications on COVID-19 during the period of 2020-2021.

The first case of the COVID-19 pandemic in India was reported on 30 January 2020. As on 17 May 2020, the Ministry of Health and Family Welfare, Government of India has reported 90927 confirmed cases from 33 states with 2872 deaths (MoHFW, 2020). Though India is in complete lockdown since March 24, over the weekend there is a rapid increase in COVID-19 cases in some states in India notably from Maharashtra, Gujarat, Tamil Nadu, Delhi, Madhya Pradesh and few other states. The rapid increase over the weekend in the month of May has created some kind of panic in India. The government and other civil bodies are making efforts to mitigate the spread of this virus.

The Bibliometric/Scientometric studies, which help in quantifying the research publication pattern in a particular domain, have also been done to assess the research productivity of scientific literature on COVID-19. Bibliometric/Scientometric studies help in identifying the emerging area of research, provide evidence of impact of research through citations, helps in identifying right scholarly literature to consult for study and also for carrying research forward, and also helpful for policy makers to strategize the potential research areas and funding.

OBJECTIVES OF THE STUDY

The main objectives of this study is to analyze the research performance of India in Covid-19 as reflected in Web of Science database its publication output during 2019-2021. In particular, the study focuses on the following objectives: (i) the Indian research output and Citations Impact (ii) the patterns of international collaboration and major collaborative partners, (iii) Most productive Institutions and Authors (iv) The most cited Institutions and

Authors (v) Highly cited works (vi) Medium of Communications and (vii) Most preferred journals with Citations and Impact Factor.

MATERIALS AND METHODS

The study used Indian publications data from 2020 to 2021 in the area of Covid-19 as defined in Web of Science international multidisciplinary bibliographical database maintained by Clarivate Analytics. In addition, it used citations data for measuring quality and visibility of Indian research output. The search string was "Covid-19" with topic field and India with address field received 4272 records and received 21190 Citations and scientist preferred 1173 journals by 14611 Scientists including International collaborative authors. The retrieved data are exported in to Histcite, VoSViewer and Biblioshiny for tabulated and analyzed.

DATA ANALYSIS AND INTERPRETATIONS

International Collaboration (149)

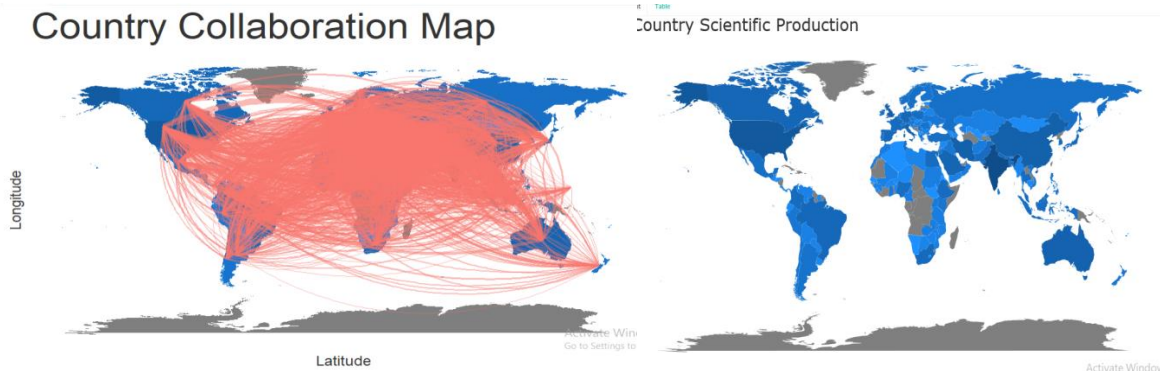
In all 150 countries participated in international collaboration with India in Covid-19 research with 4272 publications recorded 21616 Citations during 2020-2021, of which contribution of countries are listed in Table 1. The most productive countries are: USA is leading country with 597 Publications recorded 4775 Citations followed by UK with 335 (3069 Citations), China with 209 (3248 Citations), Australia with 189 (1231 Citations), Italy with 165 (1655 Citations), Saudi Arabia with 161 (1564 Citations). It is noted that 10 countries with more than 100 publications, 67 countries with more than 10 publications, 14 countries with more than 1000 Citations, 32 countries with more than 500 Citations, 38 countries with more than 400 Citations and 60 countries with 100 Citations.

Table:1 International Collaboration

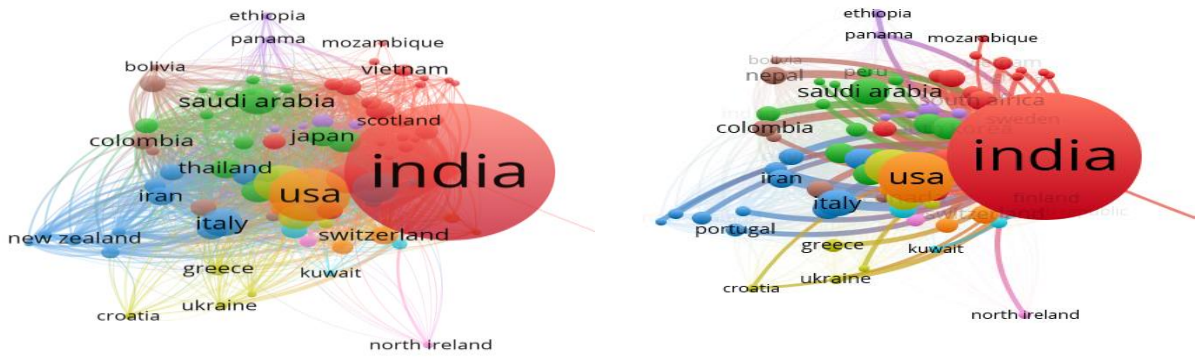
#	Country	Records	Citations	Country	Records	Citations
1	USA	597	4775	Iraq	7	6
2	UK	335	3069	Kosovo	7	109
3	Peoples R China	209	3248	Bulgaria	6	24
4	Australia	189	1231	Kazakhstan	6	55

5	Italy	165	1655	Tanzania	6	45
6	Saudi Arabia	161	1564	Yemen	6	61
7	Canada	137	964	Kyrgyzstan	5	8
8	Germany	116	915	Libya	5	15
9	South Korea	111	1590	Lithuania	5	20
10	Brazil	104	1095	Mali	5	14
11	Spain	98	1208	Malta	5	15
12	Japan	93	1643	Trinidad Tobago	5	15
13	Thailand	87	922	Afghanistan	4	15
14	South Africa	84	490	Bahrain	4	19
15	France	78	966	Benin	4	2
16	Switzerland	77	419	Jamaica	4	10
17	Iran	72	824	Luxembourg	4	15
18	Singapore	72	1349	Malawi	4	32
19	Malaysia	71	331	Myanmar	4	15
20	Bangladesh	70	568	Palestine	4	12
21	Netherlands	67	939	Uruguay	4	4
22	Egypt	64	475	Zimbabwe	4	26
23	Turkey	63	543	Azerbaijan	3	9
24	Nepal	62	1302	Bosnia &Herceg	3	12
25	Colombia	58	1344	DEM REP CONGO	3	6
26	Poland	55	615	Ecuador	3	0
27	Indonesia	54	862	Gambia	3	9
28	Pakistan	54	368	Georgia	3	4
29	Sweden	52	384	Guatemala	3	10
30	Mexico	51	850	Papua N Guinea	3	7
31	Russia	46	558	Rep Congo	3	32
32	Nigeria	43	194	Rwanda	3	1
33	U Arab Emirates	43	160	Venezuela	3	595
34	Belgium	40	486	Albania	2	5
35	Greece	38	467	Algeria	2	0
36	Portugal	37	312	Armenia	2	29
37	Taiwan	36	371	Barbados	2	2
38	Norway	35	464	BELARUS	2	21
39	Vietnam	34	103	Burkina Faso	2	65
40	New Zealand	33	233	Cambodia	2	6
41	Ireland	31	308	Eritrea	2	3
42	Israel	30	581	Guinea	2	4
43	Argentina	29	187	Honduras	2	639
44	Philippines	26	80	Slovakia	2	0
45	Chile	25	218	St Kitts & Nevi	2	0
46	Denmark	25	350	Syria	2	4
47	Finland	25	233	Antigua &Barbu	1	0
48	Austria	24	140	Bahamas	1	0
49	Peru	23	652	Bhutan	1	3
50	Jordan	21	76	Botswana	1	0
51	Kenya	21	214	Costa Rica	1	1
52	Qatar	20	162	Dominican Rep	1	0
53	Tunisia	20	237	El Salvador	1	0
54	Lebanon	19	144	Estonia	1	0
55	Romania	19	74	Fiji	1	0
56	Ukraine	18	214	Guyana	1	15

57	Morocco	16	91	Lesotho	1	7
58	Uganda	15	66	Maldives	1	0
59	Ethiopia	14	31	Mauritius	1	0
60	Ghana	14	92	Micronesia	1	0
61	Serbia	13	42	Moldova	1	2
62	Slovenia	13	92	Mongolia	1	16
63	Czech Republic	12	146	Namibia	1	1
64	Oman	12	75	Niger	1	14
65	Sri Lanka	12	82	North Macedonia	1	0
66	Croatia	10	17	Paraguay	1	0
67	Hungary	10	61	Senegal	1	0
68	Kuwait	9	25	Sierra Leone	1	14
69	Zambia	9	11	Sint Maarten	1	0
70	Mozambique	8	36	South Sudan	1	0
71	Panama	8	589	Suriname	1	17
72	Sudan	8	21	Tonga	1	0
73	Bolivia	7	616	Unknown	1	1
74	Cameroon	7	85	Uzbekistan	1	1
75	Cyprus	7	30	Viet Nam	1	0



d	Country	Documents	Citations	Total link strength
	india	3987	20371	9631
	usa	598	4695	3293
	england	303	2898	2214
	italy	161	1576	1603
	australia	182	1152	1388
	peoples r china	203	3169	1275
	saudi arabia	163	1560	1157
	south korea	108	1558	1107
	iran	70	788	1093
	brazil	98	1052	995
	colombia	57	1317	895
	spain	93	1129	888
	germany	111	839	872
	canada	129	885	859
	indonesia	51	862	819
	egypt	61	461	770
	poland	50	574	723
	thailand	87	932	720
	japan	87	1572	702
	singapore	67	1320	674



International Collaboration of Network

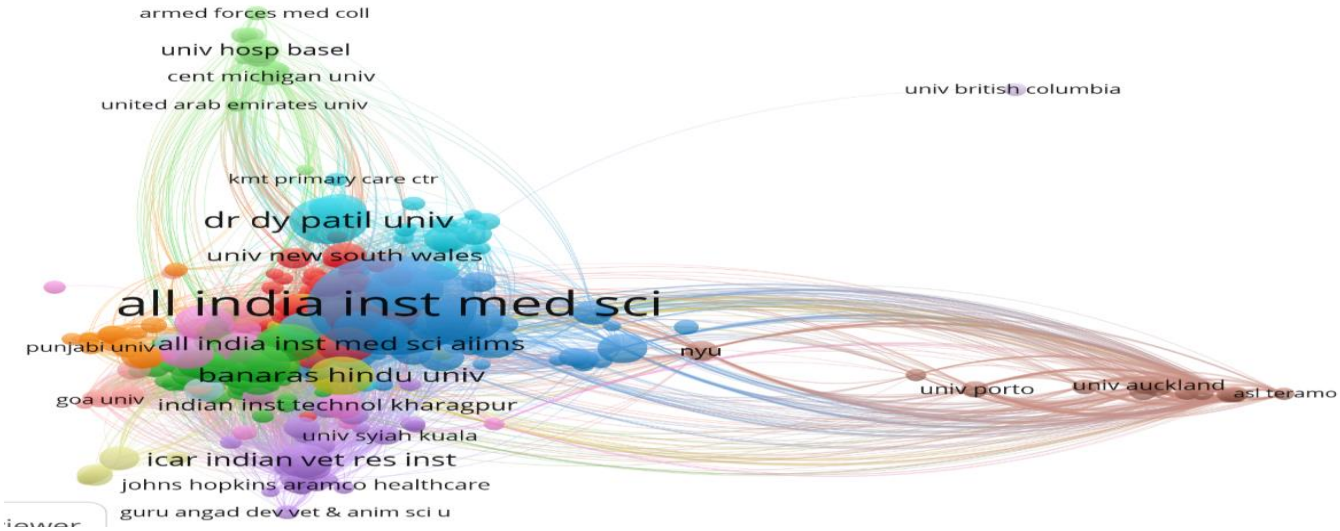
Most productive Institutions (6735)

There are 6735 Institutions are involved the research in Covid-19 including collaborative Institutions. The average citation received per paper by total papers of these institutes with a average citation per paper was 5.41. 210 Institutions registered with more than 10 publications, 35 Institution recorded with more than 500 Citations, and 258 Institutions with more than 100 Citations. The most productive Institutions are: All India Institute of Medical Science with 489 Publications (1266 Citations) followed by Post Grad Inst Med Educational & Res with 171 (666 Citations), Dr DY Patil University with 85 (382 Citations), Indian Institute of Technology with 54 (349 Citations), Manipal Academy of Higher Education with 59 (279 Citations), and Banaras Hindu University with 56 (171 Citations). Most Cited Institutions are: ICAR Indian Vet Research Institute with 1149 Citations for 45 publications followed by All India Institute of Medical Science with 1009 for 389 Publications, Ministry of Health with 638 for 7 publications, Southeast University with 606 for 10 Publications and Tata Memorial Hospital 602 for 26 Publications.

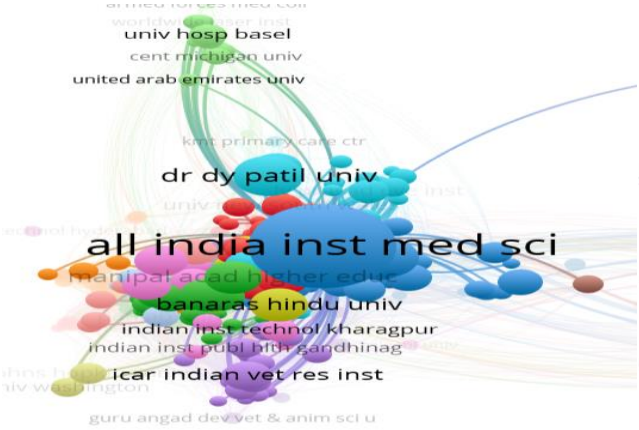
Table:2 Most Productive Institutions with Citations

#	Institution	Records	Citations
1	All India Inst Med Science AIIMS	489	1266
2	Post Grad Inst Med Educational & Res	171	666
3	Dr DY Patil University	85	382
4	Indian Inst Technology	77	418
5	Manipal Academy of Higher Education	59	279
6	Banaras Hindu University	56	171
7	Hainan Med University	46	326
8	University of Delhi	46	222

9	ICAR Indian Vet Res Inst	45	1149
10	Christian Med College & Hospital	44	335
11	PGIMER	43	165
12	Indian Council Med Research	42	367
13	King Georges Med Univ	39	463
14	National Institute of Technology	39	218
15	Indian Inst Science	36	147
16	Jamia MilliaIslamia	36	307
17	Natl Inst Mental Hlth&Neurosci NIMHANS	35	312
18	Sanjay Gandhi Postgrad Inst Med Sci	35	260
19	Univ New South Wales	35	214
20	Govt Med Coll	34	168
21	Acad Sci & Innovat Res AcSIR	32	251
22	Jawaharlal Nehru University	32	61
23	Natl Inst Mental Hlth & Neurosci	32	149
24	Univ Melbourne	32	321
25	LV Prasad Eye Inst	29	178
26	Govt Medical College and Hospitals	28	139
27	Post Grad Inst Med Educ & Res PGIMER	27	750
28	CSIR	26	88
29	Tata memorial Hospital	26	602
30	University of Calcutta	26	83
31	Vellore Institute of Technology	25	51
32	Amity University	24	57
33	Panjab University	24	84
34	Jadavpur University	23	64
35	Jamia Hamdard	23	87

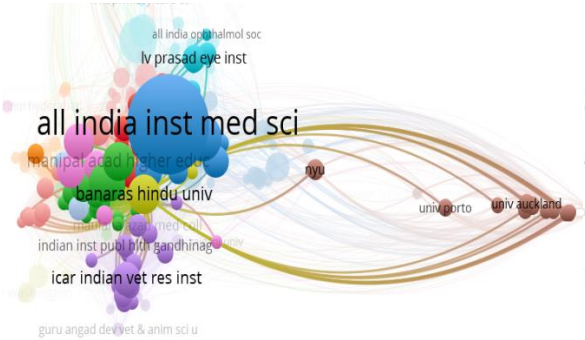


Citation Network of Institutions



All India Institute of Medical Science

ICAR Indian Vet Research Institute



Banaras Hindu University

Manipal Academy of Higher Education

Organization	Documents	Citations	Total link strength
all india inst med sci	389	998	1193
icar indian vet res inst	43	565	882
sher e kashmir univ agr sci & tech...	19	174	506
univ tecnol pereira	21	309	469
fdn univ autonoma amer	16	284	402
univ porto	11	125	360
univ auckland	13	163	351
queen mary univ london	12	136	350
hosp magalhaes lemos	8	110	345
bkl walawalkar rural med coll	8	112	338
king georges med univ	39	463	325
iran univ med sci	9	109	314
polytech univ marche	7	109	314
tunis el manar univ	7	109	314
up pandit deen dayal upadhayay p...	10	94	314
tribhuvan univ teaching hosp	11	158	313
univ hosp basel	24	130	308
post grad inst med educ & res	84	381	306
natl inst mental hlth & neurosci ni...	35	312	305
helwan mental hlth hosp	6	109	298

Document types

Of the total publications in Covid-19, 1509 appeared as articles (38.6%), 826 as letters (21.1%), 615 as reviews (15.7%), 380 as Article; Early Access (9.7%), 373 as Editorials materials (9.5%), 89 as Review; Early Access, 59 as Letter; Early Access, 35 as Meeting Abstract, Editorial Material; Early Access and remaining are listed in the below table 3.

Table: 3 Document type wise distributions of Publications

#	Document Type	Records	%	Citations
1	Article	1509	38.6	8512
2	Letter	826	21.1	2314
3	Review	615	15.7	6308
4	Article; Early Access	380	9.7	1315
5	Editorial Material	373	9.5	1522
6	Review; Early Access	89	2.3	103
7	Letter; Early Access	59	1.5	214
8	Meeting Abstract	35	0.9	0
9	Editorial Material; Early Access	14	0.4	66
10	Correction	7	0.2	5
11	Article; Data Paper	2	0.1	3
12	Correction; Early Access	2	0.1	1
13	News Item	1	0.0	2

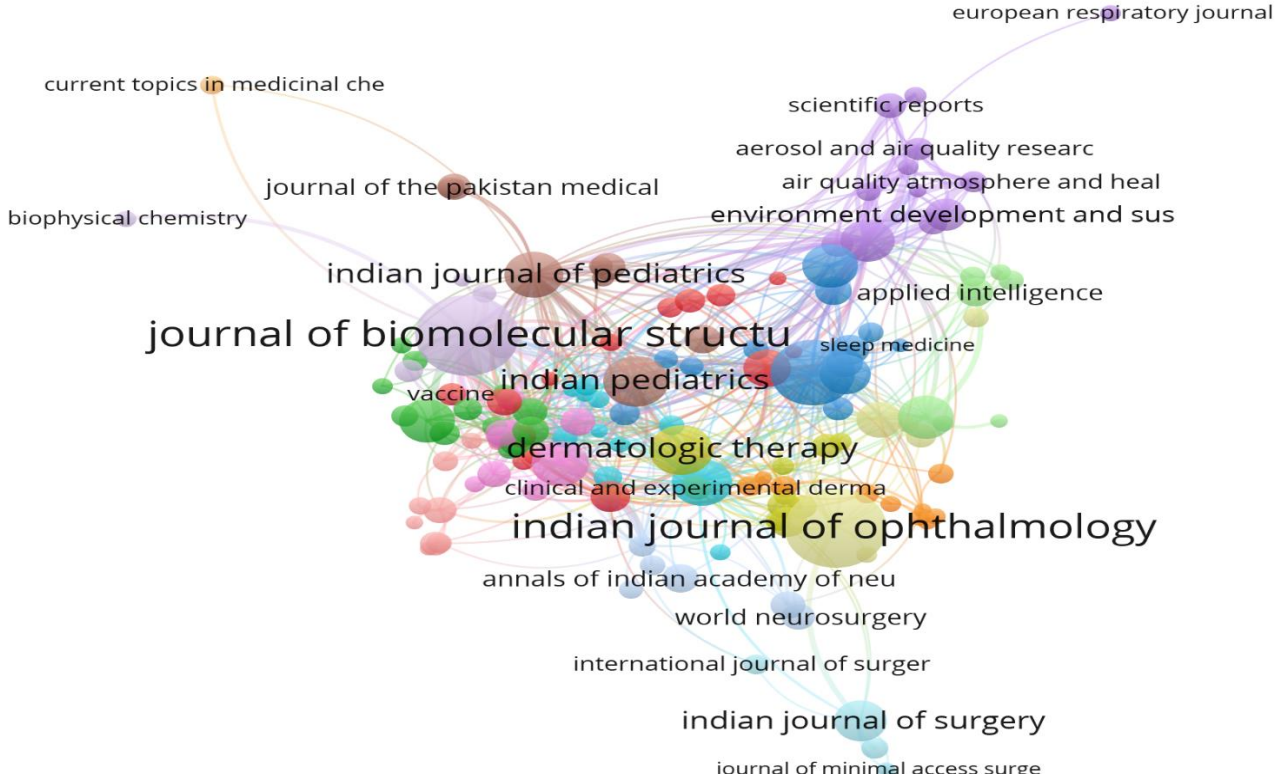
Most Preferred Journals (1173)

The most preferred journals by the scientists were: INDIAN JOURNAL OF OPHTHALMOLOGY with 143 papers (443 Citations), JOURNAL OF BIOMOLECULAR STRUCTURE & DYNAMICS with 113 (1066 Citations), ASIAN JOURNAL OF PSYCHIATRY with 100 (1419 Citations), INDIAN PEDIATRICS (61), DERMATOLOGIC THERAPY (57), INDIAN JOURNAL OF MEDICAL RESEARCH (52), and INDIAN JOURNAL OF PEDIATRICS (50). It is noted that 78 journals with more than 10 publications and 7 journals with more than 50 Publications, 3 Journals received more than 1000 citations and 38 Journals received more than 100 Citations. The most Cited Journals are: Asian Journal of Psychiatry with 1419 Citations followed by Science of the Total environment with 1218, Journal of Biomolecular Structure and Dynamics with 1066 Citations.

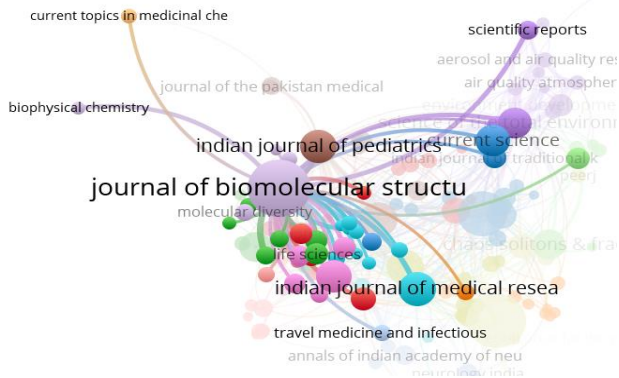
Table: 4 Most Preferred Journals

#	Journal	Impact Factor	Records	Citations
1	INDIAN JOURNAL OF OPHTHALMOLOGY	1.019	143	443
2	JOURNAL OF BIOMOLECULAR STRUCTURE & DYNAMICS	4.986	113	1066
3	ASIAN JOURNAL OF PSYCHIATRY	2.529	100	1419
4	INDIAN PEDIATRICS	1.186	61	162
5	DERMATOLOGIC THERAPY	1.669	57	222
6	INDIAN JOURNAL OF MEDICAL RESEARCH	1.503	52	359
7	INDIAN JOURNAL OF PEDIATRICS	1.508	50	771
8	CURRENT SCIENCE	0.756	45	39

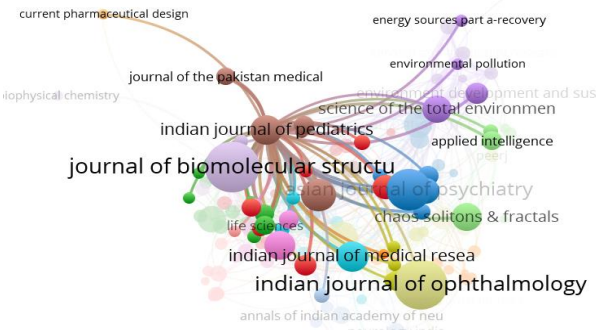
9	JOURNAL OF MEDICAL VIROLOGY	2.049	45	431
10	CHAOS SOLITONS & FRACTALS	3.764	44	426
11	MEDICAL HYPOTHESES	1.322	44	99
12	SCIENCE OF THE TOTAL ENVIRONMENT	6.551	41	1218
13	INDIAN JOURNAL OF SURGERY	0.561	38	77
14	INDIAN JOURNAL OF PSYCHIATRY	0.81	37	122
15	FRONTIERS IN PUBLIC HEALTH	2.483	33	78
16	PLOS ONE	2.740	30	126
17	HUMAN VACCINES & IMMUNOTHERAPEUTICS	3.643	23	206
18	ENVIRONMENT DEVELOPMENT AND SUSTAINABILITY	2.191	21	73
19	PSYCHIATRY RESEARCH	2.208	21	209
20	ANNALS OF INDIAN ACADEMY OF NEUROLOGY	0.333	20	31
21	INDIAN JOURNAL OF ORTHOPAEDICS	0.503	20	47
22	INDIAN JOURNAL OF TRADITIONAL KNOWLEDGE	1.273	20	0
23	LIFE SCIENCES	3.647	20	220
24	INDIAN JOURNAL OF BIOCHEMISTRY & BIOPHYSICS	0.537	19	20
25	INTERNATIONAL JOURNAL OF SOCIAL PSYCHIATRY	1.613	19	106
26	FRONTIERS IN PHARMACOLOGY	4.40	18	32
27	JOURNAL OF SURGICAL ONCOLOGY	3.244	18	27
28	NEUROLOGY INDIA	2.708	18	70
29	3 BIOTECH	2.389	17	13
30	APPLIED INTELLIGENCE	1.172	17	13

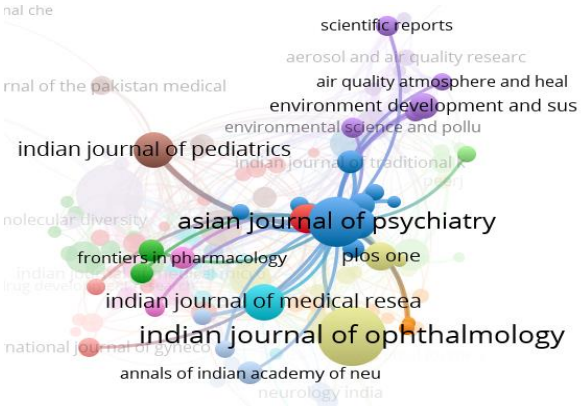


d	Source	Documents	Citations	Total link strength
	science of the total environment	41	1218	202
	journal of biomolecular structure ...	150	1325	201
	asian journal of psychiatry	100	1419	118
	indian journal of pediatrics	50	771	85
	indian journal of medical research	52	359	78
	environment development and sus...	24	96	70
	journal of medical virology	46	431	61
	frontiers in pharmacology	18	32	56
	air quality atmosphere and health	11	139	53
	human vaccines & immunotherap...	23	206	50
	indian journal of psychiatry	37	122	50
	life sciences	20	220	48
	chaos solitons & fractals	44	426	46
	frontiers in public health	33	78	43
	aerosol and air quality research	12	67	42
	3 biotech	17	13	40
	travel medicine and infectious dise...	11	687	40
	archives of medical research	16	156	38
	psychiatry research	21	209	36
	european review for medical and p...	12	126	33



Journal of Biomolecular Structure **Indian Journal of Ophthalmology**





Indian Journal of Pediatrics **Asian Journal of Psychiatry**

Most productive authors (14611)

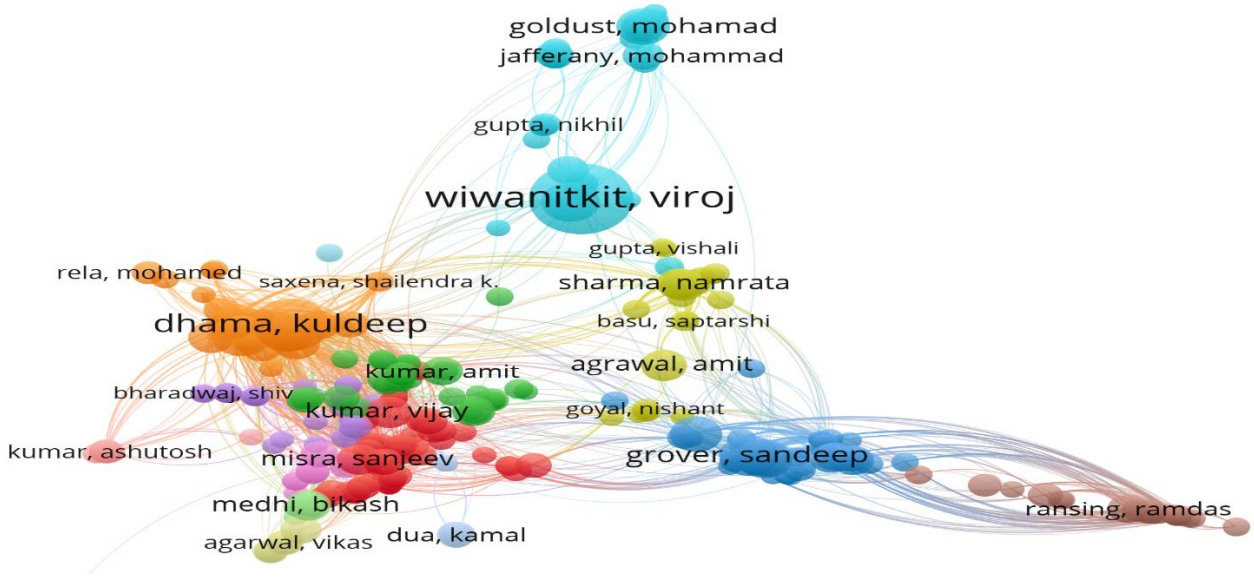
Based on publications output data for India in Covid-19, Six authors were identified as high productive with more than 50 papers and 175 authors with more than 10 Publications during 2020-2021. The most productive authors are Kumar A from Armed Forces Med College, Dept Ophthalmology, Pune, Maharashtra with 115 Publications and registered 372 Citations (H-Index: 10), Wiwanitkit from Dr DY Patil Univ, Pune, Maharashtra

with 91 Publications (411 Citations) (H-Index: 11), Kumar S from Jai Narayan Vyas Univ, Jodhpur, Rajasthan with 85 (421 Citations) (H-Index: 10), Gupta S with 57 (209 Citations) (H-Index: 7), Singh with 53 (175 Citations) and Sharma S with 52 (359 Citations). The most cited authors are: Dharma K with 1137 Citations for 47 papers (H-Index: 11) followed by Rodriguez-Morales AJ with 897 Citations for 23 papers(H-Index: 9), Bonilla-Aldana DK with 824 Citations for 14 papers(H-Index: 7), Sah R with 793 for 18 Publications (H-Index: 9) and Rabaan AA with 706 Citations for 15 Publications(H-Index: 7). It is noted that 317 authors with more than 100 Citations, 26 authors with more than 500 Citations and 31 authors with more than 400 Citations.

Table:5 Most Productive and Cited Authors

	Publications Impact				Citations Impact		
#	**Author**	**Records**	**Citations**		**Author**	**Records**	**Citations**
1	Kumar A	115	372		Dhama K	47	1137
2	Wiwanitkit V	91	411		Rodriguez-Morales AJ	23	897
3	Kumar S	85	421		Bonilla-Aldana DK	14	824
4	Gupta S	57	209		Sah R	18	793
5	Singh S	53	175		Rabaan AA	15	706
6	Sharma S	52	359		Singhal T	6	656
7	Sharma A	49	209		Harapan H	12	633
8	Dhama K	47	1137		Balbin-Ramon GJ	2	584
9	Gupta N	46	239		Holguin-Rivera Y	2	584
10	Kumar P	46	167		Ahmad T	4	583
11	Kumar R	46	208		Alvarado-Arnez LE	1	578
12	Kumar V	44	222		Cardona-Ospina JA	1	578
13	Sharma P	43	154		Escalera-Antezana JP	1	578
14	Gupta A	42	151		Franco-Paredes C	1	578
15	Singh A	40	231		Gutierrez-Ocampo E	1	578
16	Das S	39	278		Henao-Martinez AF	1	578
17	Ghosh S	36	136		Kataoka H	1	578
18	Sahoo S	35	155		Lagos-Grisales GJ	1	578
19	Singh R	35	399		Nishiura H	1	578
20	Gupta R	34	130		Paniz-Mondolfi A	1	578
21	Sharma N	33	347		Ramirez-Vallejo E	1	578
22	Joob B	32	304		Suarez JA	1	578
23	Kumar M	32	146		Villamil-Gomez WE	1	578
24	Das A	31	77		Villamizar-Pena R	1	578
25	Gupta M	30	196		Zambrano LI	1	578
26	Tiwari R	30	498		Rajkumar RP	10	511
27	Ghosh A	29	49		Tiwari R	30	498
28	Grover S	29	154		Malik YS	23	446
29	Kumar N	27	63		Chakrabarti S	20	426
30	Singh AK	27	267		Kumar S	85	421

Author	Documents	Citations	Total link strength
dhama, kuldeep	46	1132	1231
iwari, ruchi	29	497	1049
malik, yashpal singh	18	402	713
rodriguez-morales, alfonso j.	22	891	652
patel, shailesh kumar	19	171	621
sah, ranjit	18	793	579
bonilla-aldana, d. katterine	13	817	544
sharun, khan	17	301	496
singh, karam pal	8	285	496
rabaan, ali a.	15	706	431
harapan, harapan	12	633	403
ransing, ramdas	14	127	381
natesan, senthilkumar	13	27	358
pathak, mamta	10	118	336
yatoo, mohd iqbal	11	90	323
adiukwu, frances	9	110	289
ramalho, rodrigo	10	110	289
arnaout, amine	7	109	262
orsolini, laura	7	109	262
pereira-sanchez, victor	7	109	262



Citation Network of Authors

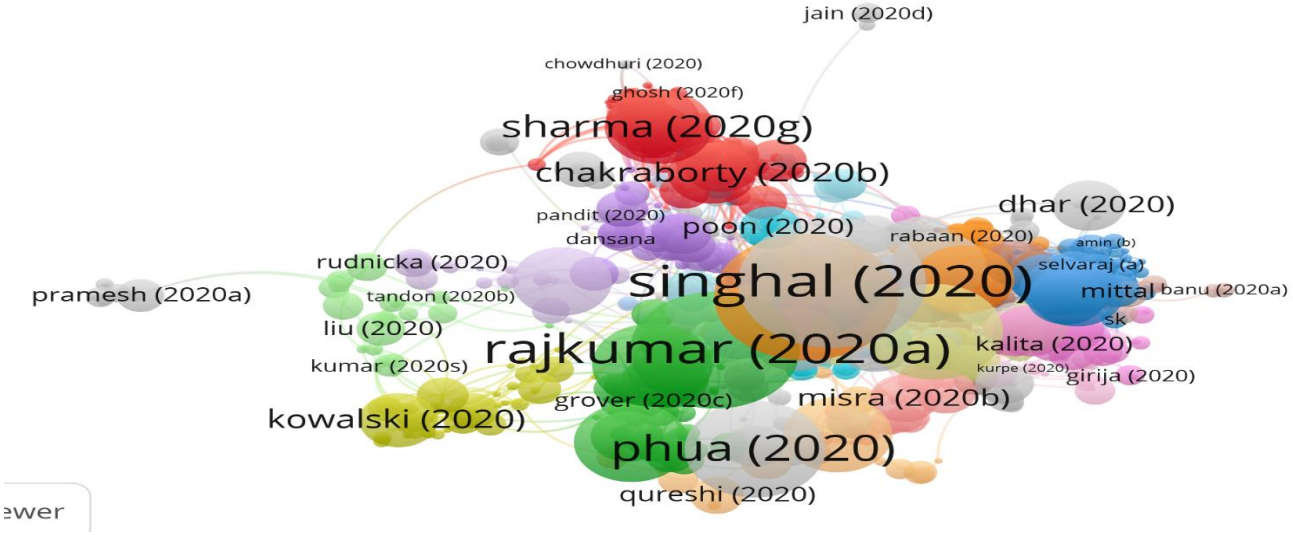
Highly Cited Papers

This section analyzes the characteristics of top 23 most high-cited papers of India in Covid-19 research. The cumulative citations received by these high-cited papers were 5090 (21190), with an average of 221.30 citations per paper. The most cited one is: Singhal T A Review of CoronavirusDisease-2019 (COVID-19), INDIAN JOURNAL OF PEDIATRICS. 2020 APR; 87 (4): 281-286 with 604 Citations followed by Rodriguez-Morales AJ, Cardona-Ospina JA, Gutierrez-Ocampo E, Villamizar-Pena R, Holguin-Rivera Y, et al., Clinical, laboratory and imagingfeatures of COVID-19: A systematicreview and meta-analysis TRAVEL MEDICINE AND INFECTIOUS DISEASE. 2020 MAR-APR; 34: Art. No. 101623 with 578 Citations, Rajkumar RP, COVID-19 and mentalhealth: A review of the existing literature with 490.

Table:6 Highly Cited papers

#	Date / Author / Journal	Citations
1	717 Singhal T, A Review of CoronavirusDisease-2019 (COVID-19), INDIAN JOURNAL OF PEDIATRICS. 2020 APR; 87 (4): 281-286	604
2	680 Rodriguez-Morales AJ, Cardona-Ospina JA, Gutierrez-Ocampo E, Villamizar-Pena R, Holguin-Rivera Y, et al., Clinical, laboratory and imagingfeatures of COVID-19: A systematicreview and meta-analysis TRAVEL MEDICINE AND INFECTIOUS DISEASE. 2020 MAR-APR; 34: Art. No. 101623	578
3	1436 Rajkumar RP, COVID-19 and mentalhealth: A review of the existingliterature, ASIAN JOURNAL OF PSYCHIATRY. 2020 AUG; 52: Art. No. 102066	490
4	843 Phua J, Weng L, Ling L, Egi M, Lim CM, et al., Intensivecaremanagement of coronavirusdisease 2019 (COVID-19): challenges and recommendations, LANCET RESPIRATORY MEDICINE. 2020 MAY; 8 (5): 506-517	337
5	685 Leng ZK, Zhu RJ, Hou W, Feng YM, Yang YL, et al. Transplantation of ACE2(-) MesenchymalStemCellsImproves the Outcome of Patients with COVID-19 Pneumonia, AGING AND DISEASE. 2020 APR; 11 (2): 216-228	327
6	901 Roy D, Tripathy S, Kar SK, Sharma N, Verma SK, et al. Study of knowledge, attitude, anxiety & perceived mental health care need in Indian population during COVID-19 pandemic, ASIAN JOURNAL OF PSYCHIATRY. 2020 JUN; 51: Art. No. 102083	249
7	1442 Chew NWS, Lee GKH, Tan BYQ, Jing MX, Goh YH, et al. A multinational, multicentre study on the psychologicaloutcomes and associatedphysicalsymptoms amongst healthcareworkers during COVID-19 outbreak, BRAIN BEHAVIOR AND IMMUNITY. 2020 AUG; 88: 559-565	226
8	1841 Ellul MA, Benjamin L, Singh B, Lant S, Michael BD, et al., Neurologicalassociations of COVID-19 LANCET NEUROLOGY. 2020 SEP; 19 (9): 767-783	207
9	1598 Sharma S, Zhang MY, Anshika, Gao JS, Zhang HL, et al. Effect of restrictedemissions during COVID-19 on airquality in India, SCIENCE OF THE TOTAL ENVIRONMENT. 2020 AUG 1; 728: Art. No. 138878	201
10	1052Dhama K, Sharun K, Tiwari R, Dadar M, Malik YS, et al. COVID-19, an emergingcoronavirusinfection: advances and prospects in designing and developingvaccines, immunotherapeutics, and therapeutics HUMAN VACCINES & IMMUNOTHERAPEUTICS. 2020 JUN 2; 16 (6): 1232-1238	172
11	824 Joob B, Wiwanitkit V, COVID-19 can present with a rash and be mistaken for dengue, JOURNAL OF THE AMERICAN ACADEMY OF DERMATOLOGY. 2020 MAY; 82 (5): E177-E177	168
12	706 Hussain A, Bhowmik B, Moreira NCD, COVID-19 and diabetes: Knowledge in progress, DIABETES RESEARCH AND CLINICAL PRACTICE. 2020 APR; 162: Art. No. 108142	157
13	269 Muralidharan N, Sakthivel R, Velmurugan D, Gromiha MM, Computational studies of drugrepurposing and synergism of lopinavir, oseltamivir and ritonavirbinding with SARS-CoV-2 protease against COVID-19, JOURNAL OF BIOMOLECULAR STRUCTURE & DYNAMICS. ;	152
14	1630Mahato S, Pal S, Ghosh KG, Effect of lockdownamidCOVID-19 pandemic on airquality of the megacityDelhi, India, SCIENCE OF THE TOTAL ENVIRONMENT. 2020 AUG 15; 730: Art. No. 139086	151
15	745Khunti K, Singh AK, Pareek M, Hanif W Is ethnicitylinked to incidence or outcomes of covid-19? Preliminarysignals must be exploredurgently, BMJ-BRITISH MEDICAL JOURNAL. 2020 APR 20; 369: Art. No. m1548	144
16	1599 Chakraborty I, Maity P, COVID-19 outbreak: Migration, effects on society, globalenvironment and prevention, SCIENCE OF THE TOTAL ENVIRONMENT. 2020 AUG 1; 728: Art. No. 138882	133
17	825 Shahid Z, Kalayanamitra R, McClafferty B, Kepko D, Ramgobin D, et al., COVID-19 and OlderAdults: What We Know, JOURNAL OF THE AMERICAN GERIATRICS SOCIETY. 2020 MAY; 68 (5): 926-929	129
18	941 Chiu PWY, Ng SC, Inoue H, Reddy DN, Hu EL, et al.	128

	Practice of endoscopy during COVID-19 pandemic: positionstatements of the AsianPacificSociety for DigestiveEndoscopy (APSDE-COVIDstatements) GUT. 2020 JUN; 69 (6): 991-996	
19	1380 Vellingiri B, Jayaramayya K, Iyer M, Narayanasamy A, Govindasamy V, et al., COVID-19: A promisingcure for the globalpanic, SCIENCE OF THE TOTAL ENVIRONMENT. 2020 JUL 10; 725: Art. No. 138277	115
20	273 ant S, Singh M, Ravichandiran V, Murty USN, Srivastava HK, Peptide-like and small-moleculeinhibitors against Covid-19, JOURNAL OF BIOMOLECULAR STRUCTURE & DYNAMICS. ;	108
21	945 Kowalski LP, Sanabria A, Ridge JA, Ng WT, de Bree R, et al., COVID-19 pandemic: Effects and evidence-basedrecommendations for otolaryngology and head and necksurgerypractice, HEAD AND NECK-JOURNAL FOR THE SCIENCES AND SPECIALTIES OF THE HEAD AND NECK. 2020 JUN; 42 (6): 1259-1267	107
22	271 Joshi RS, Jagdale SS, Bansode SB, Shankar SS, Tellis MB, et al., Discovery of potentialmulti-target-directedligands by targetinghost-specificSARS-CoV-2 structurallyconservedmainprotease JOURNAL OF BIOMOLECULAR STRUCTURE & DYNAMICS. ;	104
23	701 Banerjee D, The COVID-19 outbreak: Crucialrole the psychiatrists can play, ASIAN JOURNAL OF PSYCHIATRY. 2020 APR; 50: Art. No. 102014	103



Citation Network of Highly Cited Papers

Document	Citations	Links
sharma (2020g)	201	63
singhal (2020)	604	59
muralidharan	152	56
mahato (2020b)	151	50
boopathi	98	48
joshi (c)	104	47
enmozhi	61	42
gupta (b)	94	40
pant	108	37
dhama (2020g)	172	35
umesh	47	33
bhardwaj	58	32
vellingiri (2020)	115	29
rajkumar (2020a)	490	28
gautam (2020d)	41	28
dhama (2020c)	86	27
koulgi	3	26
jain (2020c)	39	25
kumar (h)	35	24
sengupta (2020)	46	24
mittal	37	23

FINDINGS AND CONCLUSION

We conclude that Indian scientists had published 4272 (22840 Citations) (Global Research output 80843) papers in Covid-19 research during 2020-2021 and registered an average citation per paper of 5.42 and achieved the h-index as 55. India ranks 5th position among the countries in Covid-19 research and USA contributed the largest publications share of 24224 Publications followed by China with 10206, England with 8444 and Italy with 8183. It is interesting to note that the prolific authors belong to All India Institute of Medical Science with 489 Publications (1266 Citations), Post Grad Inst Med Educational & Res with 171 (666 Citations), Dr DY Patil University with 85 (382 Citations), Indian Institute of Technology with 54 (349 Citations), Manipal Academy of Higher Education with 59 (279 Citations) and Banaras Hindu University with 56 (171 Citations).

The most productive authors are Kumar A from Armed Forces Med College, Dept Ophthalmology, Pune, Maharashtra with 115 Publications and registered 372 Citations (H-Index: 10), Wiwanitkit from Dr DY Patil Univ, Pune, Maharashtrawith 91 Publications (411 Citations) (H-Index: 11), Kumar S from Jai Narayan Vyas Univ, Jodhpur, Rajasthan with 85 (421 Citations) (H-Index: 10), Gupta S with 57 (209 Citations) (H-Index: 7), Singh with 53 (175 Citations) and Sharma S with 52 (359 Citations). The most preferred journals by the scientists were: INDIAN JOURNAL OF OPHTHALMOLOGY with 143 papers (443 Citations), JOURNAL OF BIOMOLECULAR STRUCTURE & DYNAMICS with 113(1066 Citations), ASIAN JOURNAL OF PSYCHIATRY with 100 (1419 Citations), INDIAN PEDIATRICS (61), DERMATOLOGIC THERAPY (57), INDIAN JOURNAL OF MEDICAL RESEARCH (52), and INDIAN JOURNAL OF PEDIATRICS (50).

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- **Surulinathi, M., Arputha Sahayarani, Y., Srinivasaragavan, S., & Jayasuriya, T. (2020).** Research output on Covid-19/Coronavirus Vaccine: A Scientometric Study.Library Philosophy and Practice (ejournal), 4781, 1-16.
- **Surulinathi, M., Rajkumar N., Jayasuriya T., Rajagopal T (2021**). Indian Contribution in Animal Behaviour Research: A Scientometric Study, Library Philosophy and Practice (e-Journal), 4897, 1-19.
- **Surulinathi, M., Arputha Sahayarani, Y., Srinivasaragavan, S., Rajkumar, N., & Jayasuriya, T. (2021).** Covid-19 Drugs, and Medicines: A Scientometric Mapping of Research Publication, Library Philosophy and Practice (e-journal), 4781, 1-16.