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Antimicrobial Therapy: A Scientometric Mapping of Indian Publications

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Abstract

The present study examines 1261 Indian publications on "Antimicrobial Therapy" as covered in Web of Science database during 1991-2021, experiencing an Average Citation per document 24.1, Average Citations per year document 3493, 1261 publications from 574 sources and collaborative index is 5.48. The top 10 highly cited papers registered 202 to 5378 citations, and together contributed 8521 citations, leading to the average citation per paper of 852.1. The study analyses the Indian publications output in Antimicrobial Therapy research during 1991-2021 on different parameters including contribution & citation impact of top most productive collaborative countries, India's overall contribution, its growth pattern and citation impact, contribution of leading countries and identification of leading foreign collaborating partners, impact of leading Indian institutions and authors and pattern of communication of Indian output in most productive journals. The Web of Science citation database has been used to retrieve the data for 31 years (1991-21) by searching the keywords "Antimicrobial Therapy" in Topic field and limited to India with address field. The assessment revealed that a total of 1261 papers were published by the Antimicrobial Therapy research during the study period, which received 30409 citations in total. The most Collaborative countries are: USA with 119 (9943 Citations), UK with 57 (7055 Citations) Saudi Arabia with 47 (862 Citations), China with 41 (2190 Citations). The most productive and leading Institutions are: All India Institute of Medical Science from Delhi with 68 (1330 Citations), Postgrad Institute of Med Education & Research 49 with (765 Citations), Christian Med College & Hospital from Vellore, Tamilnadu with 41 (703 Citations) Panjab with 40 (653 Citations), Panjab University, Panjab with 30 (476), Indian Institute of Technology with 29 (461 Citations), CSIR with 22 (515 Citations), Indian Institute of Science with 21 (624 Citations). The most preferred journals are: INDIAN JOURNAL OF MEDICAL MICROBIOLOGY with 38 Publications and received 468 Citations, INDIAN JOURNAL OF MEDICAL RESEARCH with 33 and received 706 Citations, FRONTIERS IN MICROBIOLOGY with 22 and received 462 Citations. Kumar A tops the list of most influential authors with 26 articles (318 Citations), Singh S with 24 articles (291 Citations), Sharma S with 22 articles (713 Citations), Veeraraghavan B with 21 articles (179 Citations) and Gupta S with 18 articles (602 Citations). Major portion of these publications appeared in foreign journals of repute, as reflected by their impact factor. The study also indicates that Indian scientists have huge international collaboration in this field. Indian literature output peaked at about the same time as that of the world output.

Keywords: Antimicrobial Therapy, Scientometrics, Highly Cited papers

INTRODUCTION

Infectious disease remains a major cause of death and morbidity. According to data from the World Health Organization (WHO) in 1998, infection was the second most common cause of death, causing 25% of deaths worldwide. However, in developing countries, infectious diseases accounted for almost half of all deaths. the development of antimicrobials has greatly reduced mortality and morbidity from infectious diseases, at least in the developed world, the emergence of resistance to antimicrobials threatens to undermine these advances. The history of antimicrobial use in respiratory tract infection and the emergence of resistance indicates that there are still serious problems in defining and choosing the best (most appropriate) antimicrobials for clinical therapy. In order to achieve successful therapy of respiratory tract infection, we need to define clear goals for 'success', and an evidence-based approach for determining the potential of different therapies to achieve these goals. **(Song, J. H. : 2003).**

An antimicrobial therapy kills or inhibits the growth of microorganisms such as bacteria, fungi, or protozoans. Therapies that kill microorganisms are called microbiocidal therapies and therapies that only inhibit the growth of microorganisms are called microbiostatic therapies. Antimicrobial therapy is used to eliminate carriage of the organism and reduce the spread of the organism to other tissues, as well as to prevent further toxin production. **(Nature and Sciencedirect: 2021).** Scientometric studies are useful in understanding the growth of literature, identifying strengths and weaknesses of a country, organization and an individual in various domains of scientific endeavors. These studies will help the policy makers and science administrators to have better insights in framing science policy and guiding the researchers.

OBJECTIVES

The main objective of this study is to analyze the Indian research performance in the field of "Antimicrobial Therapy" as reflected in the publication

and citation output during 1991-2021. In particular, the study focuses on the following aspects:

- To study the share of publications of highly productive collaborative countries;
- To study the Institution-wise distribution of publications and citations;
- To study the year-wise growth of publications and citations;
- To study the most preferred journals for publications and Citations in the field;
- To study most prolific author in the field of Antimicrobial Therapy;
- To study the highly cited publications in Antimicrobial Therapy;
- To study the most collaborative author papers;
- To visual the Citation Network, Co-Authorship Pattern and Bibliographic Coupling;

MATERIALS AND METHODS

Data were collected from Web of Science for the period 1991-2021. All the bibliographic details of publications were downloaded using the search string "Antimicrobial Therapy" with topic field and "India" with Address field. A total of 1261 publications and 30409 citations received to these publications were transferred to Histcite, VoSviewer, Biblioshiny application and analyzed the data as per objectives of the study. The bibliographic fields were analyzed by normal count procedure for Countries, Institutions, Authorships, Journals and Highly Cited papers.

DATA ANALYSIS AND INTERPRETATIONS

The present study has covered Antimicrobial Therapy literature which is indexed by Web of Science online database. A total of 30409 citations were collected from 1261 articles from 573 journals for the period of 31 years (1991-2021). The data were analysed and presented in the form of tables and Maps to facilitate the interpretation in the following sections.

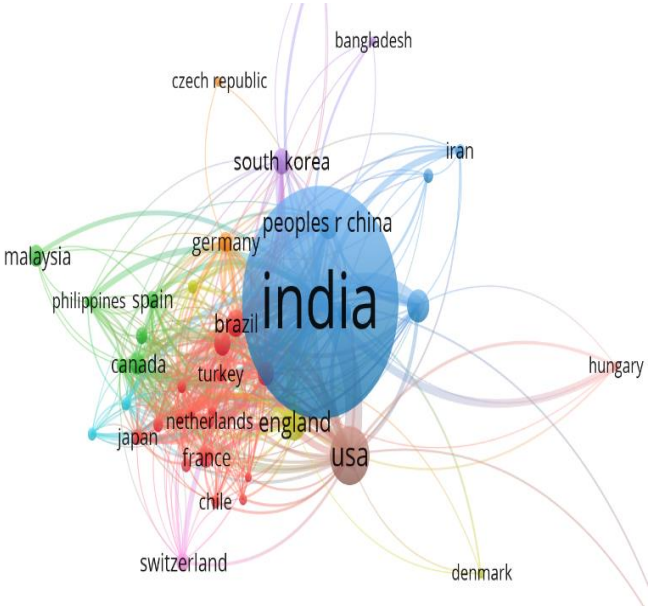
International Collaboration

The geographical wise collaboration of publications is presented in Table 1, which gives the country wise collaboration of contributions of research output. The Indian researcher collaborated with114 countries during 1991-2021. The distribution of collaborative publications output by participating countries is skewed. Of the 114 participating countries, 40 countries 10-119 papers each, 74 countries 1-9 papers each, 20 countries 1072-9943 Citations each, 51 countries 111-862 Citations each and 40 countries 1-96 Citations each. The most Collaborative countries are: USA with 119 (9943 Citations), UK with 57 (7055 Citations) Saudi Arabia with 47 (862 Citations), China with 41 (2190 Citations), Brazil with 38 (7186 Citations), Australia with 34 (6772 Citations) and Italy 34 (1809 Citations) respectively, South Korea with 31 (1375 Citations), France with 27 (5984 Citations) and South Africa with 27 (1663 Citations).

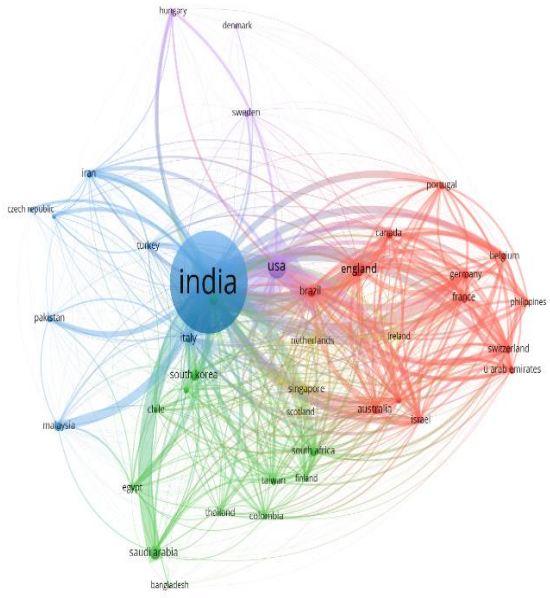
Table 1: International Collaboration

#	Country	Records	Citations	Country	Records	Citations
1	USA	119	9943	Qatar	5	147
2	UK	57	7055	Ukraine	5	256
3	Saudi Arabia	47	862	Unknown	5	417
4	China	41	2190	Bangladesh	4	26
5	Brazil	38	7186	Brunei	4	255
6	Australia	34	6772	Indonesia	4	313
7	Italy	34	1809	Jamaica	4	145
8	South Korea	31	1375	Latvia	4	195
9	France	27	5984	Nepal	4	96
10	South Africa	27	1663	Norway	4	187
11	Canada	25	6423	Oman	4	45
12	Germany	25	6595	Philippines	4	5709
13	Malaysia	24	815	Tunisia	4	89
14	Spain	23	682	Benin	3	111
15	Egypt	19	638	Bosnia & Herceg	3	92
16	Singapore	19	679	Estonia	3	92
17	Japan	18	6160	Ghana	3	88
18	Israel	17	6026	Jordan	3	185
19	Netherlands	17	698	Mauritius	3	46
20	Switzerland	17	6361	Uganda	3	94
21	Turkey	17	647	Zambia	3	244
22	U Arab Emirates	17	5722	Albania	2	82
23	Portugal	16	5841	Algeria	2	60
24	Colombia	15	484	Bahrain	2	56
25	Sweden	15	499	Burkina Faso	2	51
26	Taiwan	15	1072	Cambodia	2	22
27	Thailand	15	662	Cote Ivoire	2	68

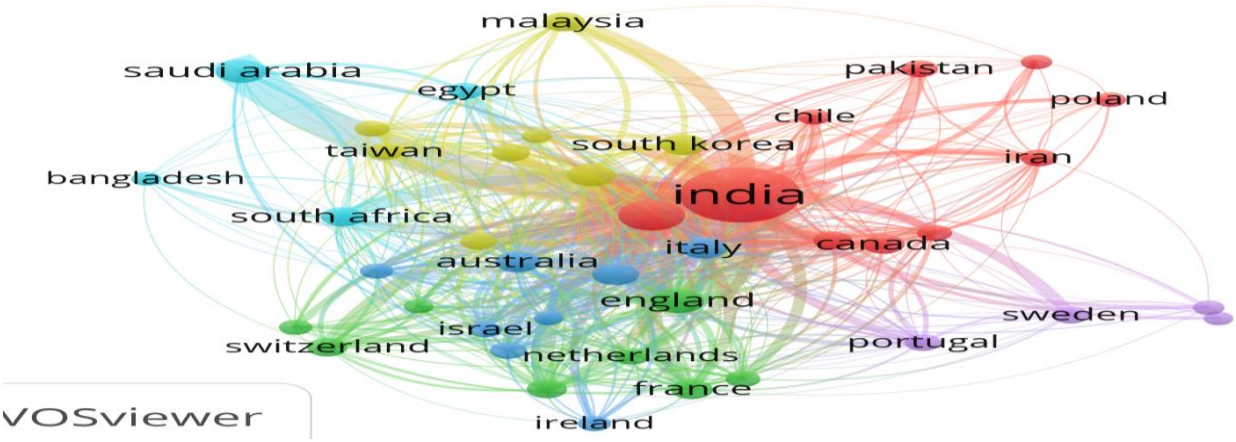
28	Czech Republic	14	355	Cyprus	2	5394
29	Iran	14	640	Ecuador	2	82
30	Belgium	13	5835	Gambia	2	25
31	Ireland	13	374	Morocco	2	82
32	Chile	12	518	Panama	2	49
33	Greece	12	310	Sierra Leone	2	82
34	Poland	12	287	Sudan	2	82
35	Russia	12	322	Tanzania	2	85
36	Pakistan	11	381	Trinidad Tobago	2	82
37	Argentina	10	538	Venezuela	2	82
38	Bulgaria	10	533	Bahamas	1	0
39	Finland	10	505	Bhutan	1	18
40	Mexico	10	266	Bolivia	1	16
41	Cameroon	9	375	Botswana	1	66
42	Hungary	9	694	DEM REP CONGO	1	6
43	Romania	9	290	Dominican Rep	1	16
44	Serbia	9	281	El Salvador	1	16
45	Slovenia	9	198	Fiji	1	1
46	Austria	8	307	Guinea	1	39
47	Croatia	8	231	Kenya	1	172
48	Denmark	8	119	Kuwait	1	27
49	Paraguay	8	384	Libya	1	0
50	BELARUS	7	351	Mali	1	39
51	New Zealand	7	377	Moldova	1	6
52	Nigeria	7	374	Mongolia	1	16
53	Peru	6	361	Montenegro	1	6
54	Vietnam	6	184	Niger	1	39
55	Ethiopia	5	215	Senegal	1	16
56	Georgia	5	195	Togo	1	6
57	Lebanon	5	170	Yemen	1	39



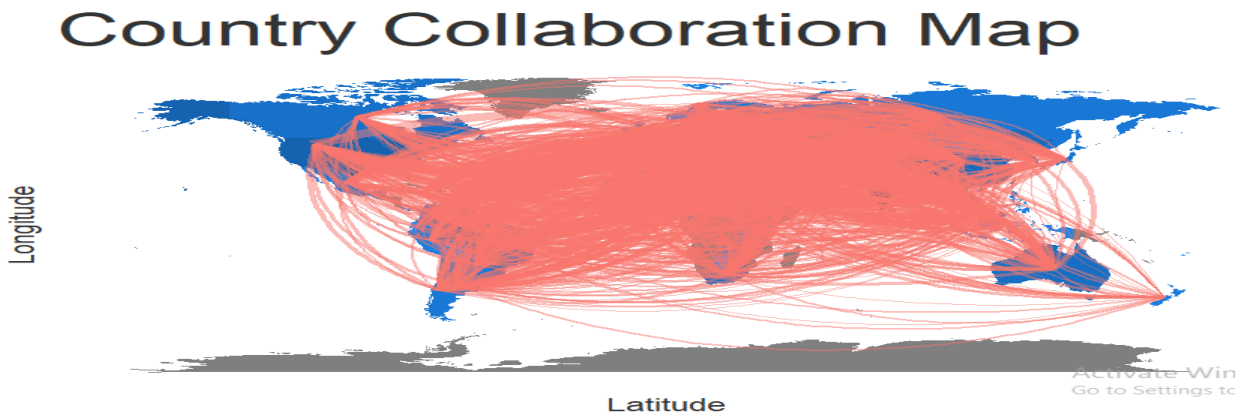
Citation Network

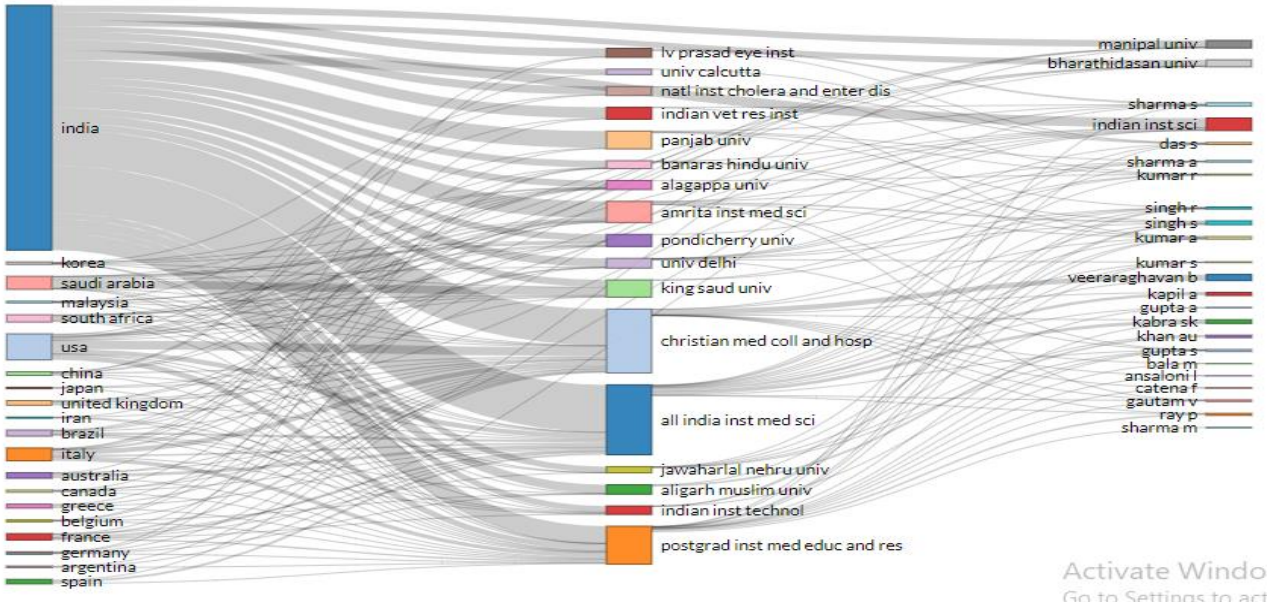


Bibliographic Coupling



Co-Authorship Map





Three field plot: (Countries, Institutions and Authors)

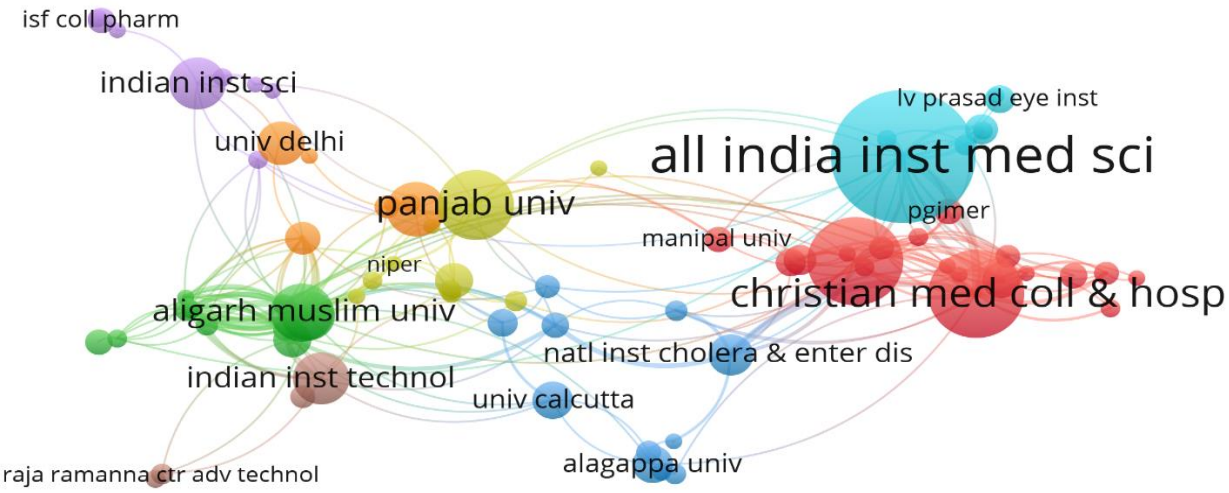
Most Productive Institutions

A total of 2796 organizations (4379 Departments) published 1261 publications in Antimicrobial Therapy. Of the 2796 organizations, 2768 Institutions contributed 1-9 papers each, 28 Institutions 6-10 papers each, 53 Institutions 1223-5694 Citations each, 350 Institutions 100-943 Citations each, 2319 Institutions 1-99 Citations each and 227 Institutions does not have citations. The profile of these top 40 Institutions are presented in Table 2. The most productive and leading Institutions are: All India Institute of Medical Science from Delhi with 68 (1330 Citations), Postgrad Institute of Med Education & Research 49 with (765 Citations), Christian Med College & Hospital from Vellore, Tamilnadu with 41 (703 Citations) Panjab with 40 (653 Citations), Panjab University, Panjab with 30 (476), Indian Institute of Technology with 29 (461 Citations), CSIR with 22 (515 Citations), Indian Institute of Science with 21 (624 Citations), Aligarh Muslim University with 24 (482 Citations), University Delhi with 17 (127 Citations) and National Institute of Cholera & Enter Dis from Kolkata with 16 (884 Citations). The most productive Institutions from Tamilnadu: Christian Med College & Hospital with 41 (703 Citations), Alagappa University with 14 (123 Citations), Bharathidasan University with 13 (461 Citations). University of Madras with 11 (186 Citations), VIT with 9 (141 Citations), Annamalai University with 8 (106 Citations) and Madurai Kamaraj University with 7 (77 Citations).

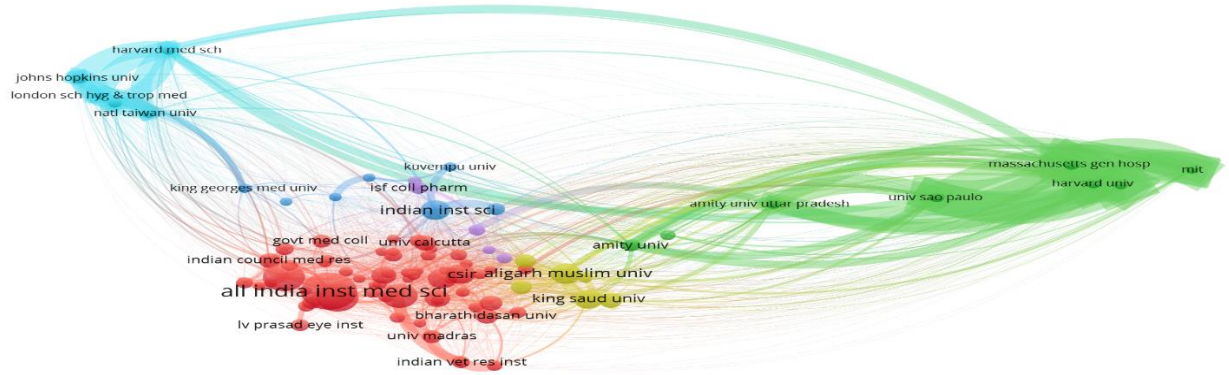
Table 2: Most Productive Institutions

#	Institution	Records	Citations
1	All India Institute of Medical Science	68	1330
2	Postgrad Institute of Med Education & Research	49	765
3	Christian Med College & Hospital - Tamilnadu	41	703
4	Panjab University	30	476
5	Indian Institute of Technology	29	461
6	CSIR	22	515
7	Indian Institute of Science - Bangalore	21	624
8	Aligarh Muslim University	24	482
9	University Delhi	17	127
10	National Institute of Cholera & Enter Dis	16	884
11	Alagappa University - Tamilnadu	14	123
12	University Calcutta	14	275
13	Bharathidasan University - Tamilnadu	13	461
14	Indian Council Med Research	13	511
15	Pondicherry University	13	194

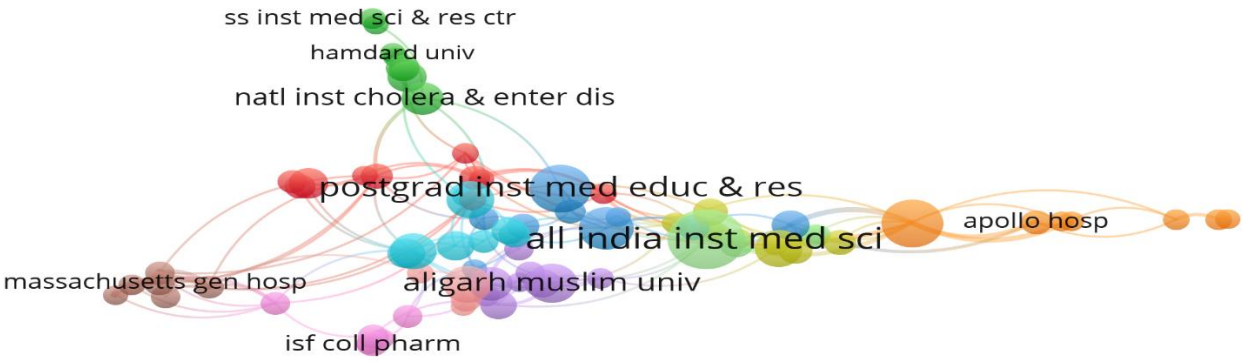
16	Banaras Hindu University	12	96
17	Govt Med College	12	377
18	Jawaharlal Nehru University	12	185
19	University of Madras - Tamilnadu	11	186
20	Govt Med Coll & Hospital	10	327
21	Jadavpur University	10	208
22	LV Prasad Eye Inst	10	430
23	Manipal Acad Higher Education	10	272
24	Amity University	9	530
25	Indian Vet Res Institute	9	275
26	ISF College Pharm	9	199
27	Manipal University	9	443
28	PGIMER	9	48
29	VIT University - Tamilnadu	9	141
30	Acad Sci & Innovat Res AcSIR	8	88
31	Annamalai University - Tamilnadu	8	106
32	Apollo Hosp	8	51
33	Amity University Uttar Pradesh	7	462
34	Amrita Inst Med Science	7	103
35	Bose Institute	7	66
36	Jamia Hamdard	7	242
37	Kasturba Med Coll & Hospital	7	90
38	King Georges Med University	7	183
39	Madurai Kamaraj University - Tamilnadu	7	77
40	Maulana Azad Med College	7	58



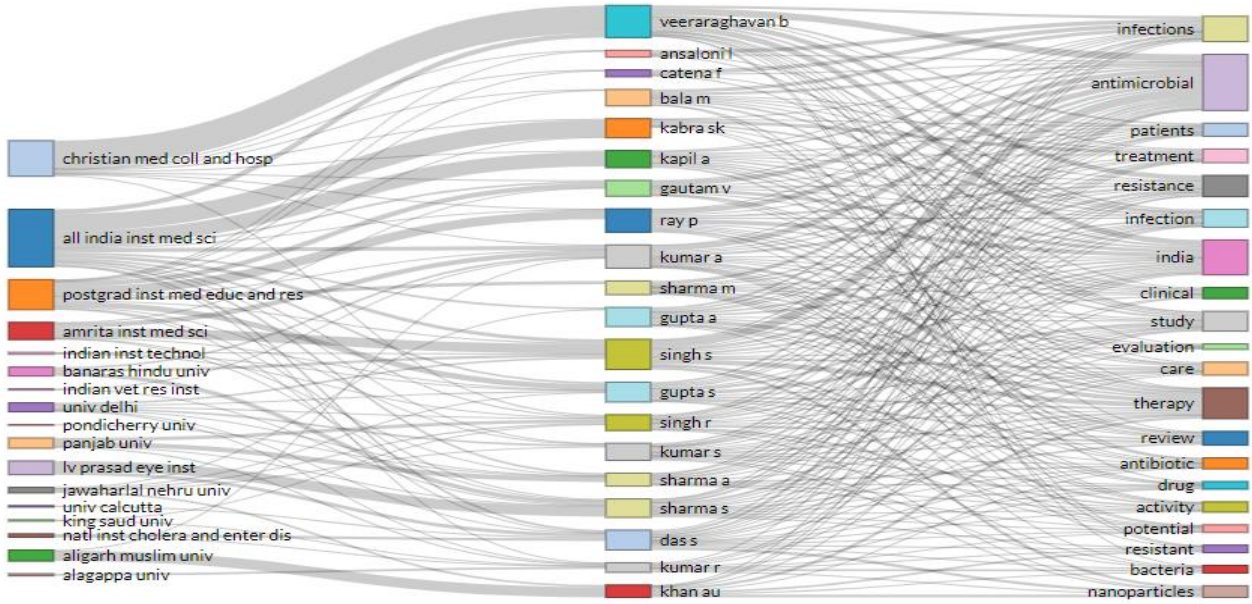
Citation Network of Institutions



Bibliographic Coupling of Institutions



Co-Authorship of Institutions



Three field plot: (Institutions, Authors and titles)

Year wise publication and Citation Impact

A total of 1261 publications were published in Antimicrobial Therapy during 1991-2021 and these publications received 30409 Citations. Year-wise distribution of publications and citations is given in Table 3. The highest number of publications 159 were published in 2011 and received 1680 Citations. The highest number of citations 8350 were received in 2013. The Average Citations Per Year 24.11. There was publication in 1991 publication with no citations. It is noted that 2009-2018 Citations are very high with 1167-8350 and the single digit of publications are published during 1991-2000.

Table 3: Year wise publication and Citation Impact

#	Year	Records	Citations		Year	Records	Citations		Year	Records	Citations
1	1991	1	0		2019	159	1680		2013	71	8350
2	1992	2	14		2020	157	535		2017	99	2299
3	1993	4	61		2018	139	2136		2016	92	2262
4	1994	2	44		2017	99	2299		2018	139	2136
5	1995	2	34		2016	92	2262		2015	65	2048
6	1996	1	35		2021	72	41		2011	62	1890
7	1997	6	73		2013	71	8350		2019	159	1680
8	1998	5	223		2014	66	1416		2012	46	1433
9	1999	8	239		2015	65	2048		2014	66	1416
10	2000	9	203		2011	62	1890		2009	34	1167
11	2001	10	216		2012	46	1433		2005	16	809
12	2002	8	143		2009	34	1167		2008	33	731
13	2003	6	190		2008	33	731		2010	32	638
14	2004	12	554		2010	32	638		2007	17	617
15	2005	16	809		2007	17	617		2004	12	554
16	2006	10	310		2005	16	809		2020	157	535
17	2007	17	617		2004	12	554		2006	10	310
18	2008	33	731		2001	10	216		1999	8	239
19	2009	34	1167		2006	10	310		1998	5	223
20	2010	32	638		2000	9	203		2001	10	216
21	2011	62	1890		1999	8	239		2000	9	203
22	2012	46	1433		2002	8	143		2003	6	190
23	2013	71	8350		1997	6	73		2002	8	143
24	2014	66	1416		2003	6	190		1997	6	73
25	2015	65	2048		1998	5	223		1993	4	61
26	2016	92	2262		1993	4	61		1994	2	44
27	2017	99	2299		1992	2	14		2021	72	41
28	2018	139	2136		1994	2	44		1996	1	35
29	2019	159	1680		1995	2	34		1995	2	34
30	2020	157	535		1991	1	0		1992	2	14
31	2021	72	41		1996	1	35		1991	1	0

Most preferred Journals

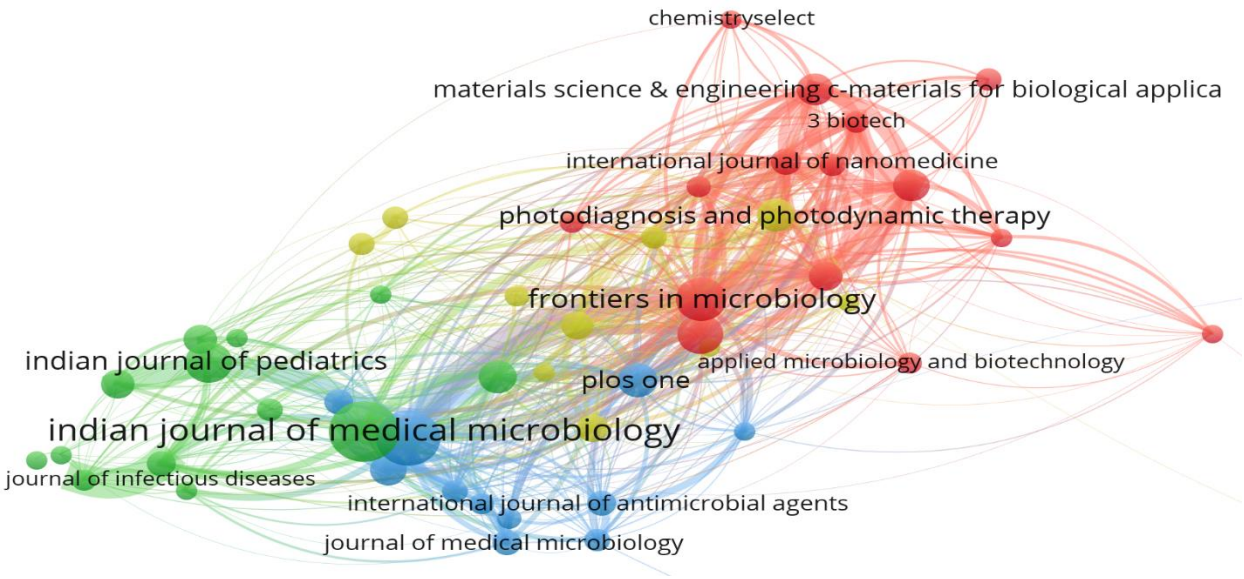
The scientific literature on Antimicrobial Therapy is spread over 573 different Web of Science source journals. Table 4 gives the leading journals each number of publications and number of Citations. For scientists, such information could be valuable with respect to the selection of the appropriate journals for publishing their own results. The most preferred journals are: INDIAN JOURNAL OF MEDICAL MICROBIOLOGY with 38 Publications and received 468 Citations, INDIAN JOURNAL OF MEDICAL RESEARCH with 33 and received 706 Citations, FRONTIERS IN MICROBIOLOGY with 22 and received 462 Citations, INDIAN JOURNAL OF PEDIATRICS with 19 and received 82 Citations, MICROBIAL PATHOGENESIS with 18 and received 204 Citations and PLOS ONE with 14 and received 287 Citations. The most cited journals are: CRITICAL CARE MEDICINE with

5378 Citations for single paper followed by INDIAN JOURNAL OF MEDICAL RESEARCH with 706 Citations for 33 papers, ANTIMICROBIAL AGENTS AND CHEMOTHERAPY with 679 Citations for 7 papers. It is noted that 17 Journals 10-38 publications each, 556 Journals 1-9 Publications each, 65 Journals 100-5378 citations each, 453 Journals 1-99 Citations each, 55 Journals does not have citations.

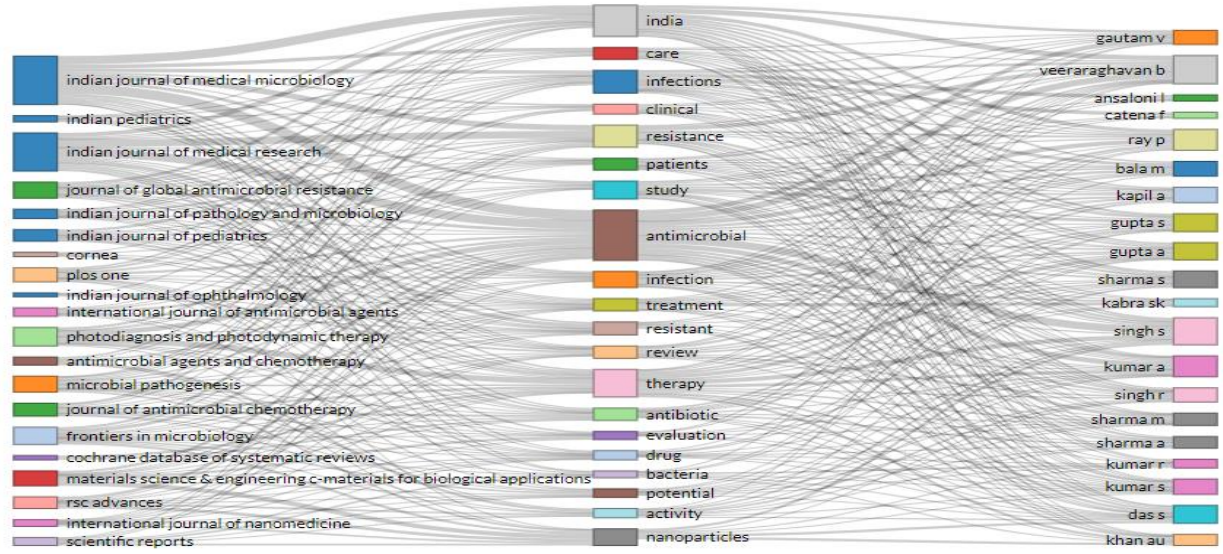
Table 4: Most preferred Journals

#	Journal	Records	Citations
1	INDIAN JOURNAL OF MEDICAL MICROBIOLOGY	38	468
2	INDIAN JOURNAL OF MEDICAL RESEARCH	33	706
3	FRONTIERS IN MICROBIOLOGY	22	462
4	INDIAN JOURNAL OF PEDIATRICS	19	82
5	MICROBIAL PATHOGENESIS	18	204
6	PLOS ONE	14	287
7	JOURNAL OF GLOBAL ANTIMICROBIAL RESISTANCE	13	72
8	PHOTODIAGNOSIS AND PHOTODYNAMIC THERAPY	13	91
9	INDIAN JOURNAL OF PATHOLOGY AND MICROBIOLOGY	12	225
10	MATERIALS SCIENCE & ENGINEERING C-MATERIALS FOR BIOLOGICAL APPLICATIONS	12	435
11	RSC ADVANCES	12	461
12	COCHRANE DATABASE OF SYSTEMATIC REVIEWS	11	243
13	INDIAN PEDIATRICS	11	125
14	SCIENTIFIC REPORTS	11	230
15	ANTIMICROBIAL AGENTS AND CHEMOTHERAPY	10	596
16	CORNEA	10	142
17	JOURNAL OF ANTIMICROBIAL CHEMOTHERAPY	10	97
18	INTERNATIONAL JOURNAL OF NANOMEDICINE	9	191
19	INDIAN JOURNAL OF OPHTHALMOLOGY	8	273
20	INTERNATIONAL JOURNAL OF ANTIMICROBIAL AGENTS	8	261
21	JOURNAL OF MEDICAL MICROBIOLOGY	8	240
22	JOURNAL OF PURE AND APPLIED MICROBIOLOGY	8	6
23	WORLD JOURNAL OF EMERGENCY SURGERY	8	489
24	EUROPEAN JOURNAL OF CLINICAL MICROBIOLOGY & INFECTIOUS DISEASES	7	132
25	EXPERT REVIEW OF ANTI-INFECTIVE THERAPY	7	212

Citations Network of Sources



Bibliographic Coupling of Institutions



Three Field Plot: Source, Title and Authors

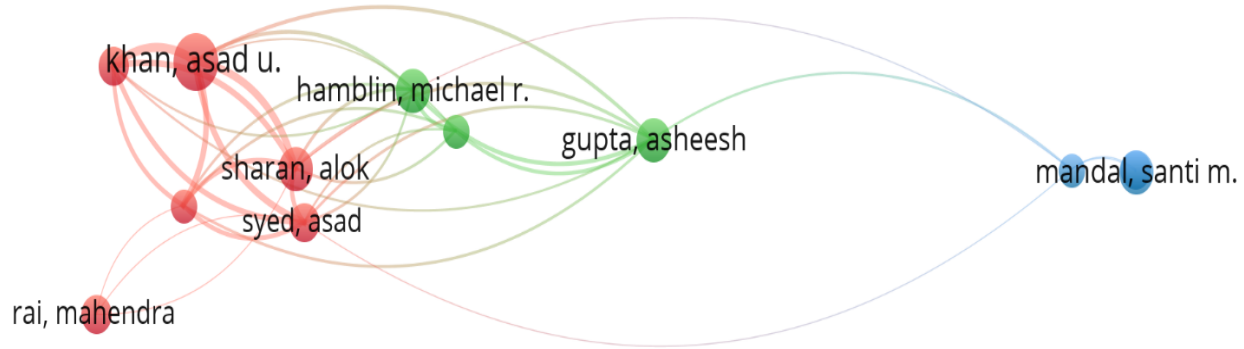
Most Productive Authors

The list of most productive and influential authors is shown in Table 5. The most productive authors are ordered by the maximum number of total publications while the most influential authors are accounted by Total Citations. The table also describes authors with total Publications and Citations. 26 Authors 10-26 publications each, 6796 Authors 1-9 publications each, 72 Authors 1020-10756 Citations each, 547 Authors 100-969 Citations each, 649 Authors does not have citations. Kumar A tops the list of most influential author

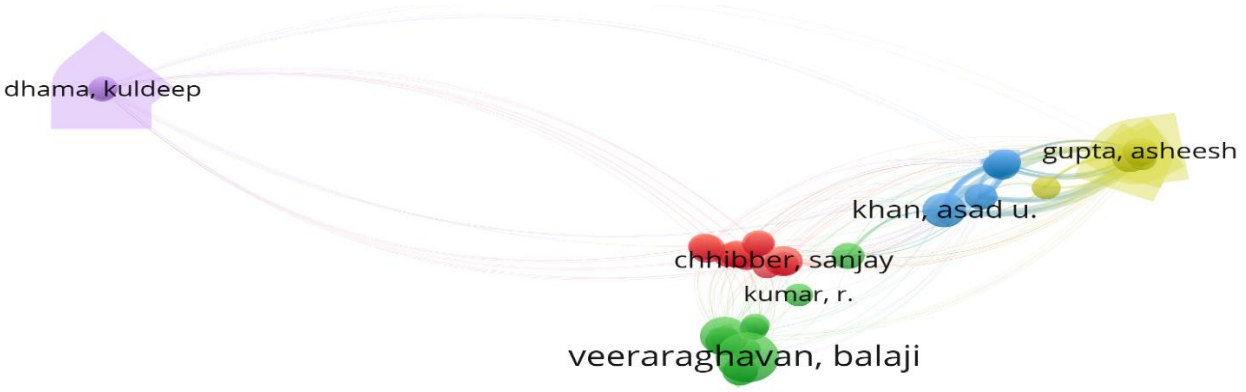
with 26 articles (318 Citations), Singh S with 24 articles (291 Citations), Sharma S with 22 articles (713 Citations), Veeraraghavan B with 21 articles (179 Citations) and Gupta S with 18 articles (602 Citations). The maximum citations were attained by Annane D and Webb SA with 10756 for 2 publications followed by Rella J with 5471 Citations for 10 Publications, Vincent JL with 5450, Mehta S with 5399 Citations for 2 publications.

Table 5: Most Productive Authors (6822)

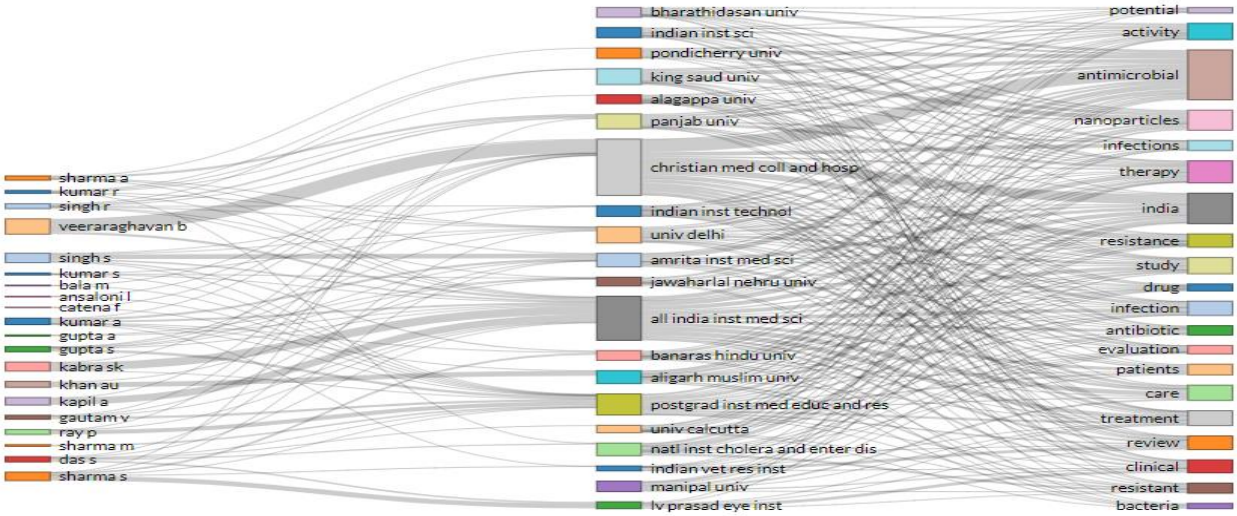
#	Author	Records	Citations	Author	Records	Citations
1	Kumar A	26	318	Annane D	2	10756
2	Singh S	24	291	Webb SA	2	10756
3	Sharma S	22	713	Rello J	10	5471
4	Veeraraghavan B	21	179	Vincent JL	3	5450
5	Gupta S	18	602	Mehta S	2	5399
6	Kumar R	17	233	Reinhart K	2	5394
7	Ray P	17	234	Divatia JV	2	5384
8	Das S	16	309	Aitken L	1	5378
9	Gupta A	16	1020	Al Rahma H	1	5378
10	Sharma A	15	169	Angus DC	1	5378
11	Singh R	15	74	Beale RJ	1	5378
12	Kabra SK	13	441	Bernard GR	1	5378
13	Kumar S	13	145	Biban P	1	5378
14	Sharma M	13	247	Bion JF	1	5378
15	Bala M	12	455	Calandra T	1	5378
16	Kapil A	12	257	Carcillo JA	1	5378
17	Gautam V	11	143	Clemmer TP	1	5378
18	Khan AU	11	312	Dellinger RP	1	5378
19	Ansaloni L	10	505	Deutschman CS	1	5378
20	Catena F	10	505	Douglas IS	1	5378
21	Coccolini F	10	505	Du B	1	5378
22	Kumar M	10	180	Fujishima S	1	5378
23	Leppaniemi A	10	505	Gando S	1	5378
24	Rello J	10	5471	Gerlach H	1	5378
25	Sartelli M	10	505	Goodyear-Bruch C	1	5378
26	Singh V	10	146	Guyatt G	1	5378



Citation Network of Authors



Bibliographic Coupling of Authors



Three Field Plot: Authors, Institutions and Titles

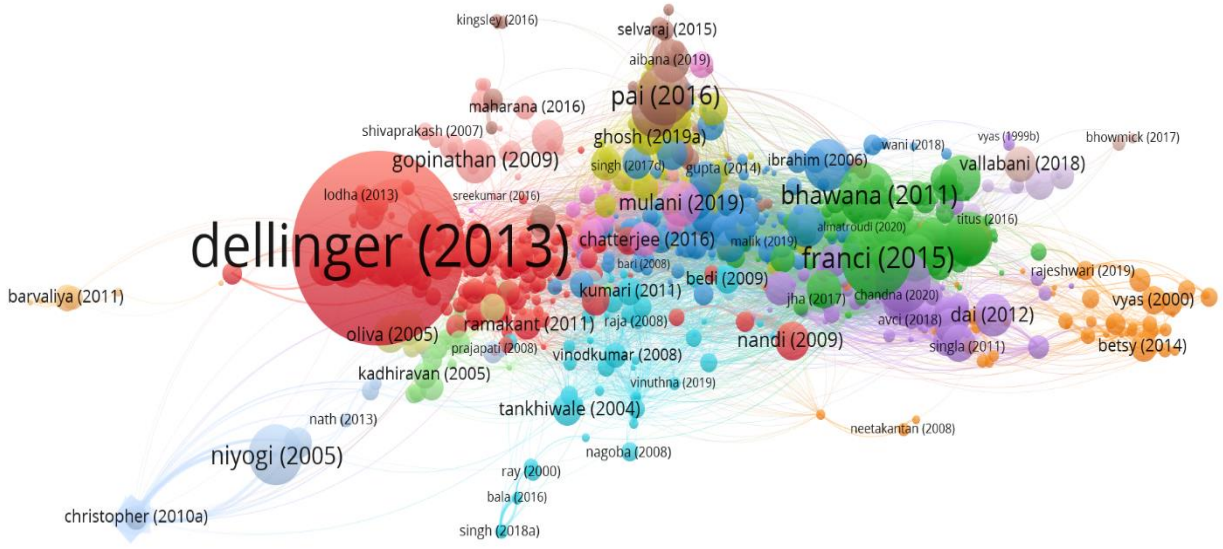
Highly Cited Papers

The most highly cited 10 publications (which have got at least 200 citations) during the period of study are listed in Table 6. The number of Citations does not necessarily indicate the quality of paper, but it is a measure of its impact in this field. The most frequently cited one was "Surviving Sepsis Campaign: International Guidelines for Management of Severe Sepsis and Septic Shock" published in CRITICAL CARE MEDICINE. 2013 FEB; 41 (2): 580-637 by Dellinger RP, Levy MM, Rhodes A, Annane D, Gerlach H, et al. with 5378 citations followed by Franci G, Falanga A, Galdiero S, Palomba L, Rai M, et al. Silver Nanoparticles as Potential Antibacterial Agents, MOLECULES. 2015 MAY; 20 (5): 8856-8874 with 651 Citations. It is noted that 41 papers received 100-5378 Citations each,

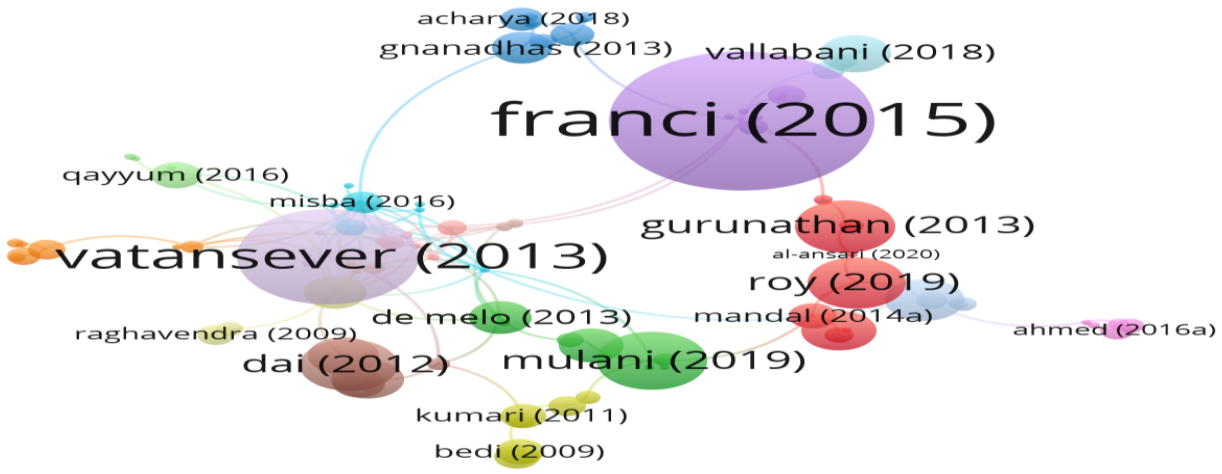
537 papers received 10-96 Citations each, 547 papers received 1-9 Citations each, 177 papers do not have Citations.

Table 6: Highly Cited Papers

#	Date / Author / Journal	Citations
1	360 Dellinger RP, Levy MM, Rhodes A, Annane D, Gerlach H, et al., Surviving Sepsis Campaign: International Guidelines for Management of Severe Sepsis and Septic Shock: 2012, CRITICAL CARE MEDICINE. 2013 FEB; 41 (2): 580-637	5378
2	516 Franci G, Falanga A, Galdiero S, Palomba L, Rai M, et al., Silver Nanoparticles as Potential Antibacterial Agents, MOLECULES. 2015 MAY; 20 (5): 8856-8874	651
3	252 Bhawana, Basniwal RK, Buttar HS, Jain VK, Jain N, Curcumin Nanoparticles: Preparation, Characterization, and Antimicrobial Study, JOURNAL OF AGRICULTURAL AND FOOD CHEMISTRY. 2011 MAR 9; 59 (5): 2056-2061	401
4	404 Vatansever F, de Melo WCMA, Avci P, Vecchio D, Sadasivam M, et al., Antimicrobial strategies centered around reactive oxygen species - bactericidal antibiotics, photodynamic therapy, and beyond, FEMS MICROBIOLOGY REVIEWS. 2013 NOV; 37 (6): 955-989	391
5	622 Pai M, Behr MA, Dowdy D, Dheda K, Divangahi M, et al., Tuberculosis, NATURE REVIEWS DISEASE PRIMERS. 2016 OCT 27; 2: Art. No. 16076	374
6	96 Niyogi SK, Shigellosis, JOURNAL OF MICROBIOLOGY. 2005 APR; 43 (2): 133-143	359
7	327 Gopinath V, MubarakAli D, Priyadarshini S, Priyadharsshini NM, Thajuddin N, et al., Biosynthesis of silver nanoparticles from Tribulus terrestris and its antimicrobial activity: A novel biological approach, COLLOIDS AND SURFACES B-BIOINTERFACES. 2012 AUG 1; 96: 69-74	270
8	177 De R, Kundu P, Swarnakar S, Ramamurthy T, Chowdhury A, et al., Antimicrobial Activity of Curcumin against Helicobacter pylori Isolates from India and during Infections in Mice, ANTIMICROBIAL AGENTS AND CHEMOTHERAPY. 2009 APR; 53 (4): 1592-1597	251
9	670 Dheda K, Gumbo T, Maartens G, Dooley KE, McNerney R, et al., The epidemiology, pathogenesis, transmission, diagnosis, and management of multidrug-resistant, extensively drug-resistant, and incurable tuberculosis LANCET RESPIRATORY MEDICINE. 2017 APR; 5 (4): 291-360	244
10	834 Narayan R, Nayak UY, Raichur AM, Garg S, Mesoporous Silica Nanoparticles: A Comprehensive Review on Synthesis and Recent Advances PHARMACEUTICS. 2018 SEP; 10 (3): Art. No. 118	202



Bibliographic Coupling of Documents



Citation Network of Document

Most Collaborative papers

Table 7 shows the authorship pattern of research contributions published on Antimicrobial Therapy from the period of 1991 to 2021. It is noted that 131 papers with more than 10 authors, 1240 papers are multi authored papers and 21 papers with single authored papers. The most collaborative authored papers are: Blot S, Antonelli M, Arvaniti K, Blot K, Creagh-Brown B, et al., Epidemiology of intra-abdominal infection and sepsis in critically ill patients: "AbSeS", a multinational observational cohort study and ESICM Trials Group Project INTENSIVE CARE MEDICINE. 2019 DEC; 45 (12): 1703-1717 with 542 Authors followed by "Chambers ST, Murdoch D, Morris A, Holland D, Pappas P, et al.," HACEK Infective Endocarditis: Characteristics and Outcomes from a Large, Multi-National Cohort, PLOS ONE. 2013 MAY 17; 8 (5): Art. No. e63181 with 346 authors.

Table 7: Most Collaborative papers

#	Date / Author / Journal	Authors
1	1020 Blot S, Antonelli M, Arvaniti K, Blot K, Creagh-Brown B, et al., Epidemiology of intra-abdominal infection and sepsis in critically ill patients: "AbSeS", a multinational observational cohort study and ESICM Trials Group Project, INTENSIVE CARE MEDICINE. 2019 DEC; 45 (12): 1703-1717	542
2	381 Chambers ST, Murdoch D, Morris A, Holland D, Pappas P, et al., HACEK Infective Endocarditis: Characteristics and Outcomes from a Large, Multi-National Cohort, PLOS ONE. 2013 MAY 17; 8 (5): Art. No. e63181	345

3	974 Fosbol EL, Park LP, Chu VH, Athan E, Delahaye F, et al., The association between vegetation size and surgical treatment on 6-month mortality in left-sided infective endocarditis, EUROPEAN HEART JOURNAL. 2019 JUL 14; 40 (27): 2243-2251	305
4	1002 Aliberti S, Cook GS, Babu BL, Reyes LF, Rodriguez AH, et al., International prevalence and risk factors evaluation for drug-resistant Streptococcus pneumoniae pneumonia, JOURNAL OF INFECTION. 2019 OCT; 79 (4): 300-311	279
5	725 Sartelli M, Kluger Y, Ansaloni L, Carlet J, Brink A, et al. A Global Declaration on Appropriate Use of Antimicrobial Agents across the Surgical Pathway, SURGICAL INFECTIONS. 2017 NOV-DEC; 18 (8): 846-853	238
6	607 Sartelli M, Weber DG, Ruppe E, Bassetti M, Wright BJ, et al., Antimicrobials: a global alliance for optimizing their rational use in intra-abdominal infections (AGORA) WORLD JOURNAL OF EMERGENCY SURGERY. 2016 JUL 15; 11: Art. No. 33	173
7	963 Rello J, Eshwara VK, Conway-Morris A, Lagunes L, Alves J, et al., Perceived differences between intensivists and infectious diseases consultants facing antimicrobial resistance: a global cross-sectional survey, EUROPEAN JOURNAL OF CLINICAL MICROBIOLOGY & INFECTIOUS DISEASES. 2019 JUL; 38 (7): 1235-1240	136
8	356 Sartelli M, Catena F, Ansaloni L, Moore E, Malangoni M, et al., Complicated intra-abdominal infections in a worldwide context: an observational prospective study (CIAOW Study), WORLD JOURNAL OF EMERGENCY SURGERY. 2013 JAN 3; 8: Art. No. 1	74
9	360 Dellinger RP, Levy MM, Rhodes A, Annane D, Gerlach H, et al., Surviving Sepsis Campaign: International Guidelines for Management of Severe Sepsis and Septic Shock: 2012, CRITICAL CARE MEDICINE. 2013 FEB; 41 (2): 580-637	73
10	686 Sartelli M, Chichom-Mefire A, Labricciosa FM, Hardcastle T, Abu-Zidan FM, et al., The management of intra-abdominal infections from a global perspective: 2017 WSES guidelines for management of intra-abdominal infections WORLD JOURNAL OF EMERGENCY SURGERY. 2017 JUL 10; 12: Art. No. 29	71

SUMMARY AND CONCLUSION

This study explores the characteristics of Antimicrobial Therapy research by Indian Authors during 1991-2021 based on the Web of Science database using the scientometric techniques. The study reveals an exponential growth of literature, which may be attributed to input time-lag in the database. This reflects the extensive worldwide study on Antimicrobial Therapy. An average publication per year 40.68 of annual growth of publications was observed. India has collaborated with 114 countries, the most Collaborative countries are: USA with 119 (9943 Citations), UK with 57 (7055 Citations) Saudi Arabia with 47 (862 Citations), China with 41 (2190 Citations). The most frequently cited one was “Surviving Sepsis Campaign: International Guidelines for Management of Severe Sepsis and Septic Shock” published in CRITICAL CARE MEDICINE. 2013 FEB; 41 (2): 580-637 by Dellinger RP, Levy MM, Rhodes A, Annane D, Gerlach H, et al. with 5378 citations. The most collaborative authored papers are: Blot S, Antonelli M, Arvaniti K, Blot K, Creagh-Brown B, et al., Epidemiology of intra-abdominal infection and sepsis in critically ill patients: "AbSeS", a multinational

observational cohort study and ESICM Trials Group Project INTENSIVE CARE MEDICINE. 2019 DEC; 45 (12): 1703-1717 with 542 Authors. 6822 authors shared 1261 publications and received 30409 Citations. Collaborative research has become more prevalent globally over the past 30 years and researchers are increasingly required to work across disciplines, institutions and borders. Collaboration can benefit the research: Maximize the outputs and Impact, Attract Funding, Expand the Network and Embrace the new.

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- **Laksham S., Surulinathi M., Balasubramani, R. and Srinivasaragavan S. (2020).** Mapping the research output on Coronavirus: A Scientometric Study, Gedrag & Organisatie Review, 33(2), 163-186.
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- **Surulinathi, M., Sankaralingam, R., Senthamilselvi, A., & Jayasuriya, T. (2020).** Highly cited works in covid-19: The global perspective. *Library Philosophy and Practice, 2020*, 1-18.
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