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Indian Contribution in Animal Cell Diseases: A Scientometric Mapping of Research Publications

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Indian Contribution in Animal Cell Diseases: A Scientometric Mapping of Research Publications

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Abstract

This study evaluates the Indian Animal Cell Diseases research output during 1989–2021. We have made a Scientometric analysis of contribution from India in leading journals, international collaboration of publications, most productive Institutions, most productive authors and highly cited works. The study uses 32 years (1989– 2021) publications data in Animal Cell Disease drawn from Web of Science international multidisciplinary bibliographical database. Animal Cell Diseased share of 1741 Publications are collaboration with 75 countries and registered 38345 Citations. Publications and Citations are increased rapidly during the study period, and most notably in the 2013 to 2020. In total, there were 1741 research articles published in 734 journals, 6612 authors from 1981 Institutions. The Most collaboration countries are: United States with 262 publications and received 8840 citations followed by U.K. 49 publications (1760 citations), Saudi Arabia with 41 publications (745 citations), Germany 37 publications with 867 citations. The most productive authors are: Kumar A contributed highest share of 59 publications with 1427 citations, followed by Kumar S contributed 51 papers with 768 citations, Kumar P contributed 31 articles with 870 citations next Kumar R published 29 articles with 515 Citations, Singh S published 26 Articles, Dhama K with 23 articles. The most preferred journals were: PLOS ONE topped the list with 43 publications (2.5%), followed by Vaccine 30 publications (1.7%), Indian Journal of Medical Research published 28 publications (1.6%), Molecular and Cellular Biochemistry published 23 publications (1.3%), Molecular Neurobiology published 23 publications. Collaborative research has led to substantial progress in patient stratification and implementation of standardized treatment protocols.

Keywords: Scientometrics, Animal Cell Diseases, Highly Cited Works

Introduction

Scientometrics is the quantitative study of science. It aims to analyze and evaluate science, technology, and innovation. Major research includes measuring the impact of authors, publications, journals, institutes, Citations, highly cited works and countries as referenced to sets of scientific publications such as articles and patents. Highly cited articles are very different from ‘ordinary’ cited articles. Typically, they are authored by a large number of

scientists and Scholars, often involving international collaboration. Highly cited papers typically obtain citations from a large number of different sources and from papers representing both close by and faraway fields.

Animal disease, an impairment of the normal state of an animal that interrupts or modifies its vital functions. Concern with diseases that afflict animal's dates from the earliest human contacts with animals and is reflected in early views of religion and magic. Diseases of animals remain a concern principally because of the economic losses they cause and the possible transmission of the causative agents to humans. The branch of medicine called veterinary medicine deals with the study, prevention, and treatment of diseases not only in domesticated animals but also in wild animals and in animals used in scientific research. The prevention, control, and eradication of diseases of economically important animals are agricultural concerns. Programs for the control of diseases communicable from animals to man, called zoonosis, especially those in pets and in wildlife, are closely related to human health. Further, the diseases of animals are of increasing importance, for a primary public-health problem throughout the world is animal-protein deficiency in the diet of humans. Indeed, both the United Nations Food and Agricultural Organization (FAO) and the World Health Organization (WHO) have been attempting to solve the problem of protein deficits in a world whose human population is rapidly expanding.

OBJECTIVES OF THE STUDY

The objective of the study is to perform the “Indian Contribution in Animal Cell Diseases: A Scientometric Mapping”. The parameters studied include:

- To find out growth of Publications and Citations;
- To find out the International collaboration of publications with Citations;
- To find out the highly preferred journals;
- To identify the most productive and Cited Authors;
- To find out the highly cited papers;
- To find the Most productive and Cited Institutions;

- To find the bibliographical form wise distribution of publications;

MATERIALS AND METHODS

Web of Science database was used for retrieving data on Animal Cell Diseases for all years using the search term “Animal Cell Diseases” with topic field and “India” with address field. Records pertaining to animal cell disease were retrieved 1741 papers during the period of 1989-2021 and we have refined only the papers which has contributed only by India. A total of 1741 publications registered 38345 Citations to these publications were transferred to Biblioshiny, VoSViewer and Histcite for tabulation and visualization of Concept Mapping and analyzed the data as per objectives of the study.

DATA ANALYSIS AND INTERPRETATION

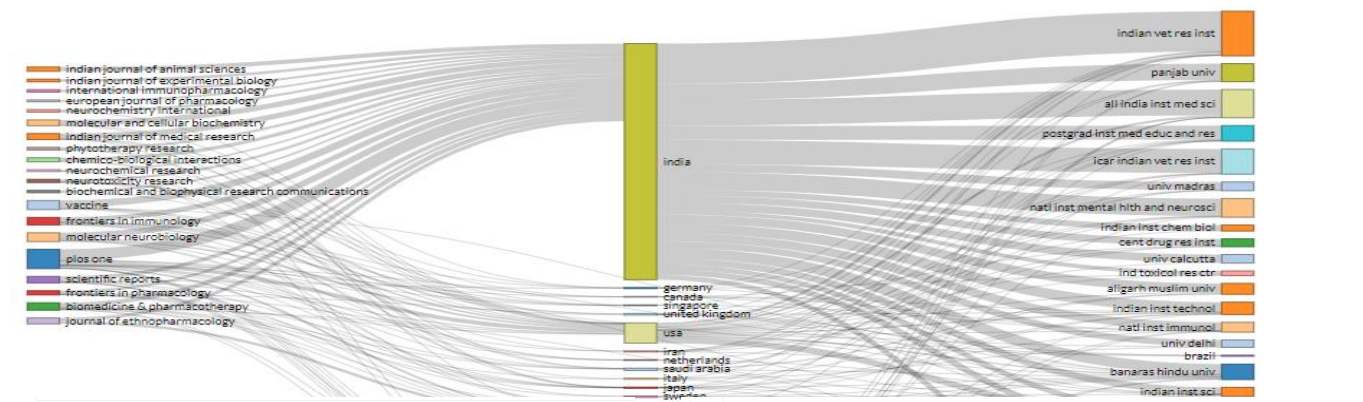
International Collaboration of Publications and Citations

Based on publications output data for India in Animal Cell Disease share of 1741 Publications and collaboration with 75 countries and registered 38345 Citations. The Most collaboration countries are: United States with 262 publications and received 8840 citations followed by U.K. 49 publications (1760 citations), Saudi Arabia with 41 publications (745 citations), Germany 37 publications with 867 citations, Australia 28 publications with 1070 citations, Japan 27 publications with 599 citations, Italy 26 publications with 722 citations. It is noted that 20 countries with more than 10 publications, 15 countries with more than 500 Citations and 36 countries registered more than 100 citations.

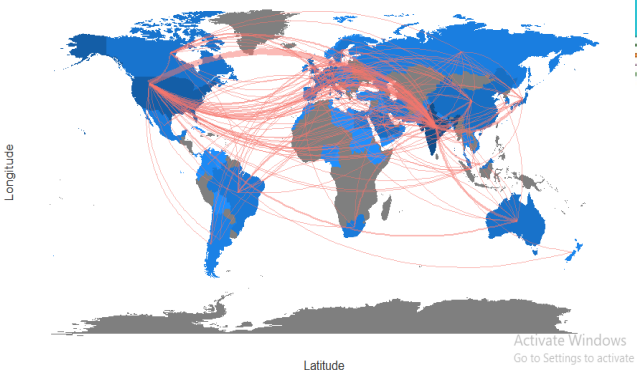
Table 1: Geographical Wise Distribution of Publications

S.No	Country	Records	Citations	ACPP	Country	Records	Citations	ACPP
1	USA	262	8840	33.74	Denmark	3	338	112.66
2	UK	49	1760	35.91	Hungary	3	43	14.33
3	Saudi Arabia	41	745	18.17	Ireland	3	25	8.33
4	Germany	37	867	23.43	Nepal	3	23	7.66
5	Australia	28	1070	38.21	New Zealand	3	71	23.66
6	Japan	27	599	22.18	Norway	3	115	38.33
7	Italy	26	722	27.76	Portugal	3	57	19
8	China	25	829	33.16	Qatar	3	43	14.33
9	France	23	891	38.73	Serbia	3	96	32
10	Canada	21	651	31	Belgium	2	55	27.5
11	Malaysia	21	349	16.61	Colombia	2	18	9
12	South Korea	17	491	28.88	Czech Republic	2	107	53.5

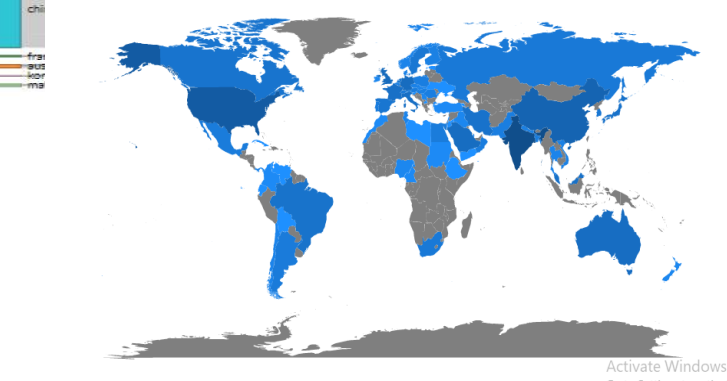
13	Sweden	16	265	16.56	Iraq	2	3	1.5
14	Netherlands	14	588	42	Morocco	2	74	37
15	Spain	14	575	41.07	Nigeria	2	48	24
16	Switzerland	13	670	51.53	Panama	2	53	26.5
17	Taiwan	13	68	5.23	Slovakia	2	49	24.5
18	Brazil	12	478	39.83	Turkey	2	6	3
19	Iran	12	290	24.16	Armenia	1	8	8
20	South Africa	10	288	28.8	Bolivia	1	2	2
21	Egypt	9	145	16.11	Cameroon	1	22	22
22	U Arab Emirates	9	211	23.44	Cuba	1	19	19
23	Mexico	8	569	71.12	Ecuador	1	6	6
24	Singapore	8	453	56.62	Estonia	1	23	23
25	Israel	7	411	58.71	Ethiopia	1	0	0
26	Russia	7	115	16.42	Jordan	1	4	4
27	Austria	6	736	122.66	Lebanon	1	8	8
28	Romania	6	147	24.5	Libya	1	14	14
29	Argentina	5	223	44.6	Macedonia	1	3	3
30	Finland	5	128	25.6	Slovenia	1	19	19
31	Oman	5	209	41.8	St Kitts & Nevi	1	2	2
32	Vietnam	5	36	7.2	Sudan	1	0	0
33	Bangladesh	4	29	7.25	Trinidad Tobago	1	20	20
34	Chile	4	40	10	Tunisia	1	8	8
35	Pakistan	4	117	29.25	Ukraine	1	25	25
36	Poland	4	325	81.25	Venezuela	1	45	45
37	Thailand	4	117	29.25	Yemen	1	43	43



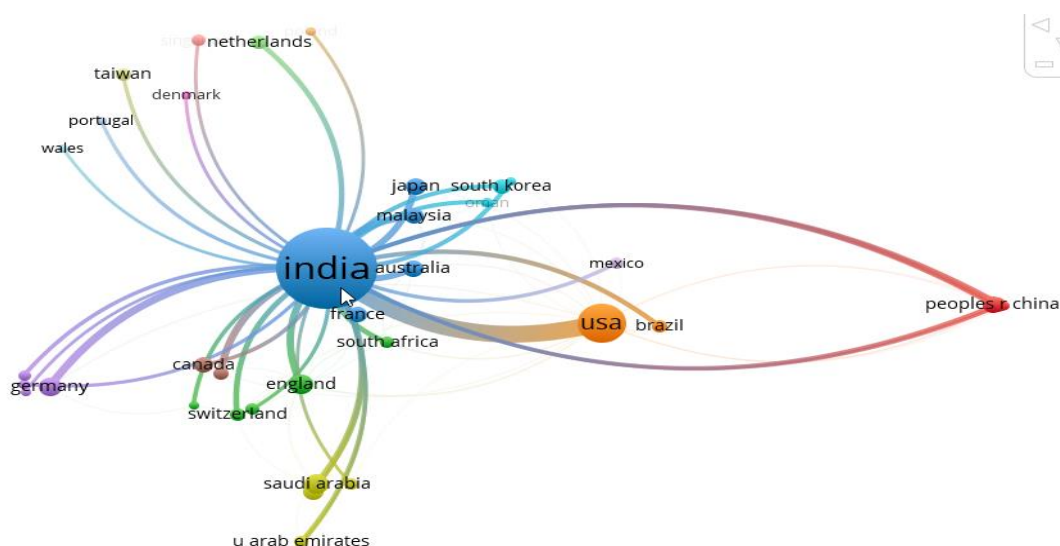
Country Collaboration Map



Country Scientific Production



Country	Documents	Citations	Total link strength
india	1723	38006	316
usa	264	8924	149
england	41	1321	26
germany	38	877	25
malaysia	21	349	25
australia	28	1070	22
iran	12	290	18
saudi arabia	41	745	17
japan	27	599	15
south africa	10	288	13
spain	15	607	12
sweden	16	265	12
switzerland	13	670	12
brazil	12	478	10
peoples r china	26	861	10
romania	6	147	10
france	23	891	8
oman	5	209	8
south korea	17	491	7
thailand	4	117	7



Most Productive and Cited Authors

Based on publications and citations output data for India in Animal Cell Diseases, a total of 6612 authors were identified and top 30 leading authors are listed in the below table 2. These top 30 authors together contributed 591 papers in the total cumulative research output by India in Animal Cell Disease during 1989–2021. The most productive authors are: Kumar A contributed highest share of 59 publications with 1427 citations, followed by Kumar S contributed 51 papers with 768 citations, Kumar P contributed 31 articles with 870 citations next Kumar R published 29 articles with 515 Citations, Singh S published 26 Articles, Dhama K with 23 articles, Kumar V with 21 articles, Singh R with 20 articles, Ghosh S with 19 publications. Most cited authors are: Kumar A received

1427 citations for 59 Publications followed by Singh AK received 1302 citations next Gaddipati j received 1131 citations (2 papers), Maheshwari RK received 1131 citations (2 papers), Srimal RC obtained 1119 citations (1 papers). It is noted that 45 authors with minimum of 10 Publications, citation range is 56-1427 and 417 authors are registered more than 100 Citations.

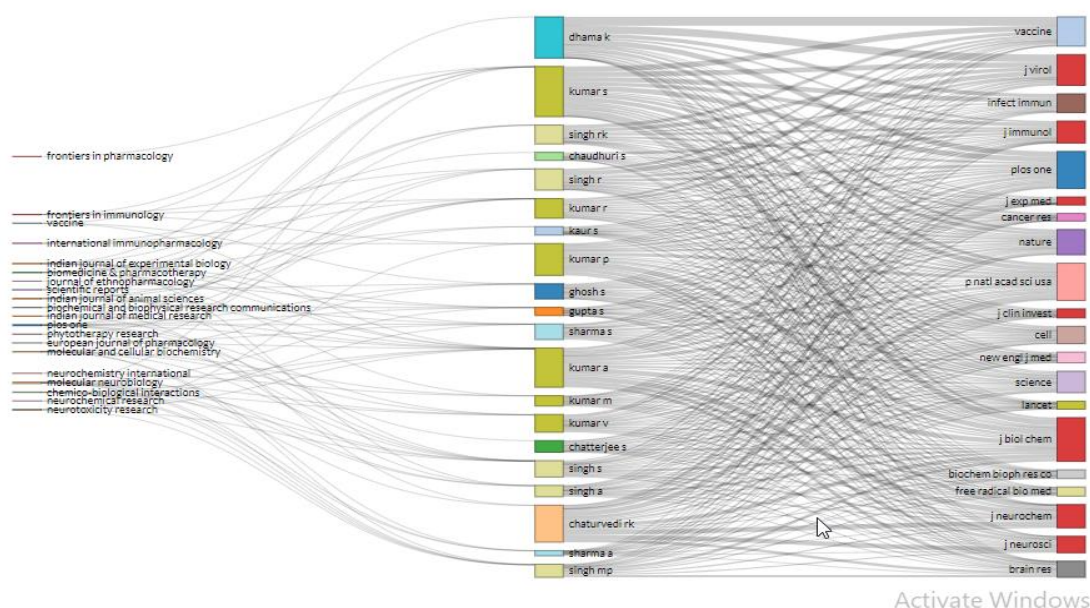
Table 2: Most Productive and Cited Authors

#	Publication Impact			Citation Impact		
	Author	Records	Citations	Author	Records	Citations
1	Kumar A	59	1427	Kumar A	59	1427
2	Kumar S	51	768	Singh AK	12	1302
3	Kumar P	31	870	Gaddipati J	2	1131
4	Kumar R	29	515	Maheshwari RK	2	1131
5	Singh S	26	530	Srimal RC	1	1119
6	Dhama K	23	497	Kumar P	31	870
7	Sharma S	23	502	Chaturvedi RK	15	798
8	Kumar V	21	382	Kumar S	51	768
9	Singh R	20	348	Shukla Y	12	722
10	Ghosh S	19	466	Singh VK	8	614
11	Kaur S	18	251	Singhal T	1	566
12	Kumar M	18	411	Bapat SA	2	534
13	Gupta S	17	178	Das S	10	534
14	Singh A	17	286	Singh S	26	530
15	Singh MP	17	452	Kurrey NK	2	528
16	Singh RK	17	382	Koppikar CB	1	527
17	Chaturvedi RK	15	798	Mali AM	1	527
18	Sharma A	15	214	Kumar R	29	515
19	Chatterjee S	14	462	Singh B	6	514
20	Chaudhuri S	14	93	Sharma S	23	502
21	Shukla S	14	366	Dhama K	23	497
22	Singh M	14	350	Ray A	7	479
23	Kumar N	13	328	Ghosh S	19	466
24	Mishra A	13	130	Chatterjee S	14	462
25	Patel DK	13	207	Singh MP	17	452
26	Huang CY	12	72	Pezzuto JM	2	449
27	Shukla Y	12	722	Mukherjee PK	2	437
28	Singh AK	12	1302	Basu A	5	431
29	Singh D	12	226	Kumar M	18	411
30	Singh P	12	169	Druzhinina IS	1	396

H-Index of Authors

Author	h_index	g_index	TC
KUMAR A	23	37	1427
KUMAR P	16	29	870
SINGH S	15	22	530
KUMAR S	14	26	768

SINGH MP	12	17	452
CHATURVEDI RK	12	15	798
SHARMA S	11	22	500
KUMAR V	11	19	377
SHUKLA S	11	14	366
SHUKLA Y	11	12	722
DHAMA K	10	22	497
SINGH RK	10	17	382
KUMAR R	9	22	513
SINGH R	9	18	348
SINGH A	9	16	286
SHARMA A	9	14	214
SANDHIR R	9	11	378
NEHRU B	9	10	289
GHOSH S	8	19	466
KUMAR M	8	18	411



Most Preferred Journals

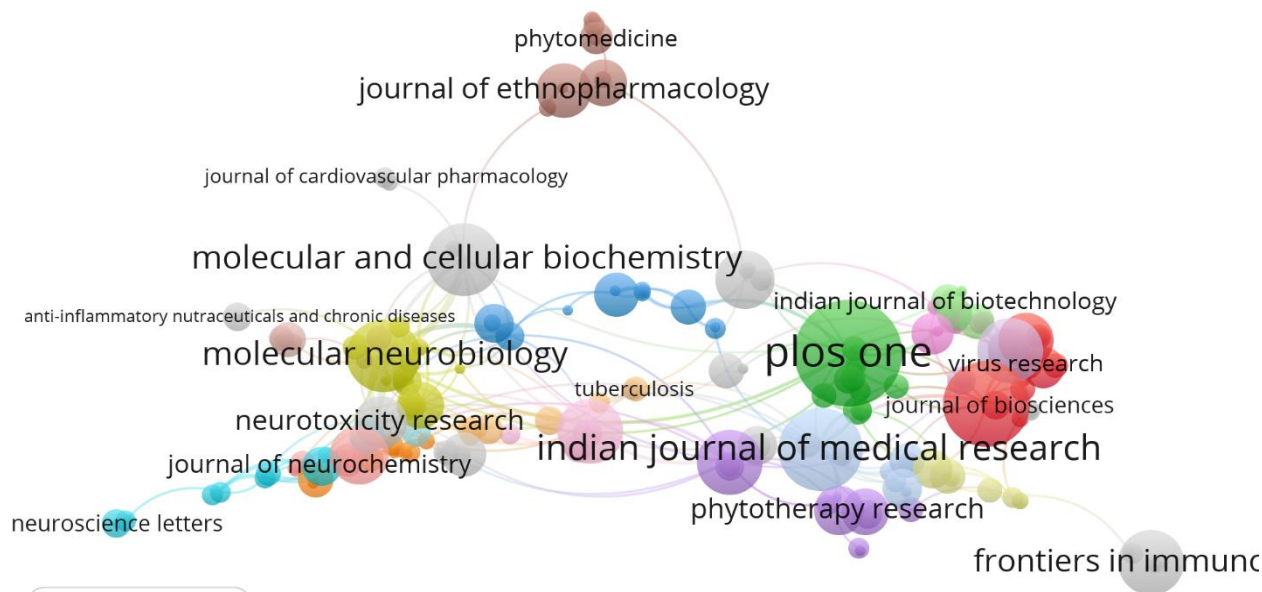
The total number of 1741 articles related to Animal Cell Diseases studies were scattered in 734 individual journals. The most preferred journals were: PLOS ONE topped the list with 43 publications (2.5%), followed by Vaccine 30 publications (1.7%), Indian Journal of Medical Research published 28 publications (1.6%), Molecular and Cellular Biochemistry published 23 publications (1.3%), Molecular Neurobiology published 23 publications (1.3%),

Biomedicine & Pharmacotherapy published 19 publications (1.1%). The most cited journals are: Life Sciences topped with 1706 citations followed by PLOS ONE obtained 1352 citations, Free Radical Biology and Medicine acquired 615 citations, Vaccine received 595 citations, Indian Journal of Medical Research received 585 citations. It is noted that 20 journals with more than 10 Publications, 97 journals registered more than 100 Citations each.

Table 3: Most Productive Journals

#	Journal	Impact Factor	Records	%	Citations
1	PLOS ONE	2.74	43	2.5	1352
2	VACCINE	3.143	30	1.7	595
3	INDIAN JOURNAL OF MEDICAL RESEARCH	1.503	28	1.6	585
4	MOLECULAR AND CELLULAR BIOCHEMISTRY	2.057	23	1.3	445
5	MOLECULAR NEUROBIOLOGY	4.586	23	1.3	329
6	BIOMEDICINE & PHARMACOTHERAPY	4.545	19	1.1	446
7	CHEMICO-BIOLOGICAL INTERACTIONS	2.577	19	1.1	536
8	FRONTIERS IN IMMUNOLOGY	6.429	19	1.1	180
9	INDIAN JOURNAL OF ANIMAL SCIENCES	0.186	19	1.1	23
10	NEUROCHEMISTRY INTERNATIONAL	3.994	16	0.9	530
11	SCIENTIFIC REPORTS	3.998	16	0.9	150
12	INDIAN JOURNAL OF EXPERIMENTAL BIOLOGY	0.783	14	0.8	71
13	JOURNAL OF ETHNOPHARMACOLOGY	3.690	14	0.8	237
14	NEUROTOXICITY RESEARCH	3.538	13	0.7	446
15	PHYTOTHERAPY RESEARCH	3.092	12	0.7	330
16	FRONTIERS IN PHARMACOLOGY	4.418	11	0.6	128
17	INTERNATIONAL IMMUNOPHARMACOLOGY	3.943	11	0.6	224
18	NEUROCHEMICAL RESEARCH	2.125	11	0.6	249
19	BIOCHEMICAL AND BIOPHYSICAL RESEARCH COMMUNICATIONS	2.985	10	0.6	240
20	EUROPEAN JOURNAL OF PHARMACOLOGY	3.170	10	0.6	240
21	ARCHIVES OF VIROLOGY	2.261	9	0.5	83
22	INDIAN JOURNAL OF ANIMAL RESEARCH	0.253	9	0.5	40
23	VETERINARY QUARTERLY	2.525	9	0.5	127
24	VETERINARY RESEARCH COMMUNICATIONS	1.203	9	0.5	286
25	CURRENT SCIENCE	0.756	8	0.5	63
26	INTERNATIONAL JOURNAL OF BIOLOGICAL MACROMOLECULES	5.162	8	0.5	60
27	JOURNAL OF NEUROCHEMISTRY	4.870	8	0.5	248
28	LIFE SCIENCES	3.647	8	0.5	1706
29	MICROBIAL PATHOGENESIS	2.914	8	0.5	33
30	PLOS NEGLECTED TROPICAL DISEASES	3.885	8	0.5	85

Source	Documents	Citations	Total link strength
plos one	43	1352	23
vaccine	30	595	15
indian journal of medical research	28	585	20
molecular and cellular biochemistry	23	445	25
molecular neurobiology	23	329	46
chemico-biological interactions	19	536	19
biomedicine & pharmacotherapy	19	446	14
frontiers in immunology	19	180	3
indian journal of animal sciences	19	23	4
neurochemistry international	16	530	20
scientific reports	16	150	11
journal of ethnopharmacology	14	237	4
indian journal of experimental biol...	14	71	4
neurotoxicity research	13	446	30
phytotherapy research	12	330	8
neurochemical research	11	249	20
international immunopharmacology	11	224	8
frontiers in pharmacology	11	128	4
biochemical and biophysical resea...	10	240	11
europaean journal of pharmacology	10	240	5



Keyword wise distribution of Publications

Keywords are one of the best Scientometric indicators to understand the content of the publications and growth of the subject field. In this areas, 5068 keywords were appended by the Indian authors in 1741 publications. The table shows the top 30 keywords appended in the articles. Among them, Induced scored first position with 302 occurrences, followed by Disease with 226, Rats with 149 occurrences, Model occurrences with 142 and Cell with 137.

Table 4: Keyword wise distribution of Publications

#	Word	Records	Citations
1	INDUCED	302	5987
2	DISEASE	226	5535
3	RATS	149	2544
4	MODEL	142	2404
5	CELL	137	2577
6	CELLS	135	3162
7	MICE	114	1618
8	EFFECT	100	1773
9	VIRUS	100	1293
10	POTENTIAL	90	1677
11	HUMAN	83	2234
12	PROTEIN	82	1200
13	EXPERIMENTAL	80	1297
14	EXPRESSION	73	802
15	ROLE	72	1600

1548 citations. The most cited years are from 2011, 2015, 2014, 2012, 2013 and 2016.

Table 5: Year wise distribution of Publications

Publication Impact					Citation Impact		
#	Year	Records	%	Citations	Year	Records	Citations
1	2016	153	8.8	2617	2011	80	3251
2	2018	152	8.7	1362	2015	121	3133
3	2020	152	8.7	895	2014	114	3038
4	2019	142	8.2	938	2012	96	2760
5	2017	131	7.5	1548	2013	109	2759
6	2015	121	7.0	3133	2016	153	2617
7	2014	114	6.5	3038	2009	65	2540
8	2013	109	6.3	2759	2006	33	2323
9	2012	96	5.5	2760	2007	51	2303
10	2011	80	4.6	3251	2010	67	2044
11	2010	67	3.8	2044	2017	131	1548
12	2009	65	3.7	2540	2008	48	1475
13	2007	51	2.9	2303	2018	152	1362
14	2008	48	2.8	1475	2003	20	1194
15	2021	36	2.1	5	2005	32	1185
16	2006	33	1.9	2323	2019	142	938
17	2005	32	1.8	1185	2020	152	895
18	2004	23	1.3	686	2004	23	686
19	2003	20	1.1	1194	2000	17	469
20	2000	17	1.0	469	2001	15	449
21	2001	15	0.9	449	1999	13	386
22	1997	13	0.7	373	1997	13	373
23	1999	13	0.7	386	1998	6	119
24	2002	11	0.6	117	2002	11	117
25	1996	8	0.5	42	1991	3	96
26	1998	6	0.3	119	1995	5	91
27	1992	5	0.3	88	1992	5	88
28	1993	5	0.3	53	1993	5	53
29	1995	5	0.3	91	1996	8	42
30	1991	3	0.2	96	2021	36	5
31	1994	2	0.1	3	1994	2	3

Bibliographical form wise distribution of Publications

This table shows that 1318 (75.7%) published in Articles followed by Review with 376 Publications (21.6%), Proceedings paper with 19(1.1%), Article; Early Access and remaining are published in other forms of communications.

Table 6: Document wise distribution of Publications

#	Document Type	Records	%	Citations
1	Article	1318	75.7	23203
2	Review	376	21.6	13431
3	Proceedings Paper	19	1.1	1515
4	Article; Early Access	9	0.5	2
5	Editorial Material	7	0.4	37
6	Review; Book Chapter	4	0.2	109
7	Review; Early Access	4	0.2	1
8	Article; Book Chapter	1	0.1	4
9	Article; Retracted Publication	1	0.1	23
10	Note	1	0.1	11
11	Review; Retracted Publication	1	0.1	9

Most productive Institutions

There were 1981 institutions involved the research in this field. The most productive institutions were: Panjab University from Panjab contributed 82 papers (4.7%) with 1950 citations followed Indian Veterinary Research Institute published 76 papers (4.4%) and received 1489 citations, All India Institute of Medical Sciences, New Delhi with 46 papers (2.6%) and received 768 citations, Banaras Hindu University from Varanasi (42 papers) (2.4%) 1075 citations, CSIR 41 papers (2.4%) received 792 citations, Postgraduate Institute Medical Education & Research 38 papers (2.2%) 823 citations University of Madras, Chennai published 35 papers (2%) with 894 citations, Indian Institute of Technology contributed 33 articles (1.9%) with 849 citations, National Institute Immunology 33 papers (1.9%) with 382 citations and Aligarh Muslim University contributed 28 papers (1.6%) 368 citations. The most cited Institutions were: Panjab University with 1950 citations, followed by Indian Toxicology Research Center with 1691 citations, Indian Veterinary Research Institute with 1489 citations, Uniformed Service University Life Science with 1119 citations, Banaras Hindu University with 1075 citations. It is noted that 55 Institutions with 10-82 publications range, 5 Institutions registered more than 1000 Citations and 217 Institutions are registered 100 publications each.

Table 7: Most Productive Institutions

#	Institution	Records	%	Citations
1	Panjab University	82	4.7	1950
2	Indian Vet Res Institute	76	4.4	1489
3	All India Institute Med Science	46	2.6	768

4	Banaras Hindu University	42	2.4	1075
5	CSIR	41	2.4	792
6	Postgrad Institute Med Education & Res	38	2.2	823
7	University of Madras	35	2.0	894
8	Indian Institute of Technology	33	1.9	849
9	National Institute Immunology	33	1.9	382
10	Aligarh Muslim University	28	1.6	368
11	Jamia Hamdard	28	1.6	641
12	Indian Institute Chemical Biology	26	1.5	632
13	ICAR Indian Vet Res Institute	25	1.4	145
14	Bharathiar University	24	1.4	145
15	University of Delhi	23	1.3	599
16	Indian Institute of Science	22	1.3	469
17	University of Calcutta	22	1.3	200
18	Ind Toxicol Res Centre	21	1.2	1691
19	Cent Drug Res Institute	20	1.1	424
20	King Saud University	19	1.1	434
21	Christian Med College & Hospital	18	1.0	765
22	Natl Brain Res Center	18	1.0	820
23	Acad Sci & Innovat Res AcSIR	17	1.0	270
24	Sanjay Gandhi Postgrad Institute Med Science	17	1.0	717
25	Annamalai University	16	0.9	654
26	Center Cellular & Molecular Biology	16	0.9	239
27	Natl Res Center Equines	16	0.9	295
28	Def Res & Dev Estab	15	0.9	213
29	Institute Ctr Genet Engn & Biotechnology	15	0.9	525
30	Jawaharlal Nehru University	15	0.9	338
31	Natl Institute Mental Hlth & Neuroscience	15	0.9	292
32	Tamil Nadu Vet & Anim Sci University	15	0.9	259
33	King Abdulaziz University	14	0.8	250
34	Manipal University	14	0.8	144
35	Jiwaji University	13	0.7	308
36	NIPER	13	0.7	183
37	Acad Sci & Innovat Res	12	0.7	116
38	Bharathidasan University	12	0.7	121
39	China Med University	12	0.7	90
40	ISF Coll Pharm	12	0.7	357
41	University of Hyderabad	12	0.7	170
42	Amity University	11	0.6	81
43	Asia University	11	0.6	59
44	Indian Council Med Res	11	0.6	89
45	Johns Hopkins University	11	0.6	646
46	Lala Lajpat Rai Univ Vet & Animal Science	11	0.6	86
47	Natl Institute Nutr	11	0.6	305
48	Cent Food Technol Res Institute	10	0.6	717
49	Cent Leather Res Institute	10	0.6	274
50	GLA University	10	0.6	29
51	Indian Council Agricultural Research	10	0.6	89
52	Natural Center Cell Science	10	0.6	773
53	Natl Inst Pharmaceut Educ & Res	10	0.6	171
54	Post Grad Inst Med Educ & Res	10	0.6	89
55	University Penn	10	0.6	748

56	Bose Institute	9	0.5	142
57	CSIR Cent Drug Res Institute	9	0.5	97
58	CSIR Indian Inst Toxicol Research	9	0.5	141
59	Guru Angad Dev Vet & Anim Sci University	9	0.5	60
60	Hamdard University	9	0.5	287

Organization	Documents	Citations	Total link strength
csir	41	792	116
banaras hindu univ	42	1075	102
csir indian inst toxicol res	9	141	86
acad sci & innovat res	12	116	83
ind toxicol res ctr	21	1691	57
acad sci & innovat res acsir	17	270	49
indian vet res inst	76	1489	45
panjab univ	82	1950	42
jiwaji univ	13	308	41
indian inst toxicol res	9	832	35
natl res ctr equines	16	295	34
csir iitr	5	324	33
jamia hamdard	28	641	31
postgrad inst med educ & res	38	823	27
natl inst immunol	33	382	25
icar indian vet res inst	25	145	21
barkatullah univ	7	250	20
cent drug res inst	20	424	19
ivri	9	89	18
natl inst nutr	11	305	18



Highly Cited Works

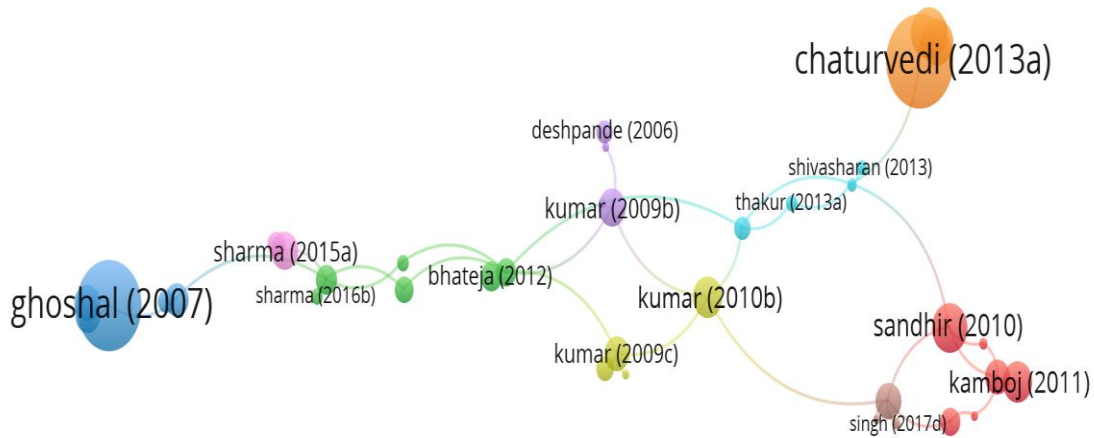
The top 20 most cited papers are listed in Table. The most frequently cited one is “Maheshwari RK, Singh AK, Gaddipati J, Srimal RC, Multiple biological activities of curcumin: A short review, LIFE SCIENCES. 2006 MAR 27; 78 (18): 2081-2087” with 1119 citations followed by Singhal T A Review of Coronavirus Disease-2019 (COVID-19) - an update on the status INDIAN JOURNAL OF PEDIATRICS. 2020 APR; 87 (4): 281-286 with 566 Citations next Bapat SA, Mali AM, Koppikar CB, Kurrey NK, Stem and progenitor-like cells contribute to the aggressive behavior of human epithelial ovarian cancer, CANCER RESEARCH 2005 APR 15; 65 (8): 3025-3029 with 527 Citations.

Table 8: Highly cited papers

S.No	Date / Author / Journal	GCS	CR
1	206 Maheshwari RK, Singh AK, Gaddipati J, Srimal RC Multiple biological activities of curcumin: A short review, LIFE SCIENCES. 2006 MAR 27; 78 (18): 2081-2087	1119	88
2	1597 Singhal T, A Review of Coronavirus Disease-2019 (COVID-19), INDIAN JOURNAL OF PEDIATRICS. 2020 APR; 87 (4): 281-286	566	30
3	174 Bapat SA, Mali AM, Koppikar CB, Kurrey NK Stem and progenitor-like cells contribute to the aggressive behavior of human epithelial ovarian cancer CANCER RESEARCH. 2005 APR 15; 65 (8): 3025-3029	527	19
4	517 Druzhinina IS, Seidl-Seiboth V, Herrera-Estrella A, Horwitz BA, Kenerley CM, et al., Trichoderma: the genomics of opportunistic success, NATURE REVIEWS MICROBIOLOGY. 2011 OCT; 9 (10): 749-759	396	115
5	117 Naidu KA, Vitamin C in human health and disease is still a mystery ? An overview, NUTRITION JOURNAL. 2003; 2: Art. No. 7	373	101
6	244 Girish KS, Kemparaju K, The magic glue hyaluronan and its eraser hyaluronidase: A biological overview LIFE SCIENCES. 2007 MAY 1; 80 (21): 1921-1943	368	260
7	879 Checkley W, White AC, Jaganath D, Arrowood MJ, Chalmers RM, et al., A review of the global burden, novel diagnostics, therapeutics, and vaccine targets for cryptosporidium LANCET INFECTIOUS DISEASES. 2015 JAN; 15 (1): 85-94	351	148
8	345 Rayasam GV, Tulasi VK, Sodhi R, Davis JA, Ray A Glycogen synthase kinase 3: more than a namesake BRITISH JOURNAL OF PHARMACOLOGY. 2009 MAR; 156 (6): 885-898	326	142
9	494 Vang O, Ahmad N, Baile CA, Baur JA, Brown K, et al. What Is New for an Old Molecule? Systematic Review and Recommendations on the Use of Resveratrol PLOS ONE. 2011 JUN 16; 6 (6): Art. No. e19881	314	144
10	712 Chaturvedi RK, Beal MF, Mitochondrial Diseases of the Brain, FREE RADICAL BIOLOGY AND MEDICINE. 2013 OCT; 63: 1-29	260	485
11	337 Dhawan A, Bajpayee M, Parmar D, Comet assay: a reliable tool for the assessment of DNA damage in different models, CELL BIOLOGY AND TOXICOLOGY. 2009 FEB; 25 (1): 5-32	251	290
12	241 Ghoshal A, Das S, Ghosh S, Mishra MK, Sharma V, et al., Proinflammatory mediators released by activated microglia induces neuronal death in Japanese Encephalitis GLIA. 2007 APR 1; 55 (5): 483-496	248	55
13	885 Rengan AK, Bukhari AB, Pradhan A, Malhotra R, Banerjee R, et al., In Vivo Analysis of Biodegradable Liposome Gold Nanoparticles as Efficient Agents for Photothermal Therapy of Cancer, NANO LETTERS. 2015 FEB; 15 (2): 842-848	219	40
14	62 Singh VK, Mehrotra S, Agarwal SS The paradigm of Th1 and Th2 cytokines - Its relevance to autoimmunity and allergy, IMMUNOLOGIC RESEARCH. 1999; 20 (2): 147-161	218	97
15	275 Katiyar-Agarwal S, Gao S, Vivian-Smith A, Jin H A novel class of bacteria-induced small RNAs in Arabidopsis	217	62

	GENES & DEVELOPMENT. 2007 DEC 1; 21 (23): 3123-3134		
16	233 Sudarshan MK, Madhusudana SN, Mahendra BJ, Rao NSN, Narayana DHA, et al. Assessing the burden of human rabies in India: results of a national multi-center epidemiological survey INTERNATIONAL JOURNAL OF INFECTIOUS DISEASES. 2007 JAN; 11 (1): 29-35	212	12
17	310 Chatterjee S, Kundu S, Bhattacharyya A, Hartinger CG, Dyson PJ, The ruthenium(II)-arene compound RAPTA-C induces apoptosis in EAC cells through mitochondrial and p53-JNK pathways, JOURNAL OF BIOLOGICAL INORGANIC CHEMISTRY. 2008 SEP; 13 (7): 1149-1155	205	56
18	123 Shukla A, Gulumian M, Hei TK, Kamp D, Rahman Q, et al., Multiple roles of oxidants in the pathogenesis of asbestos-induced diseases, FREE RADICAL BIOLOGY AND MEDICINE. 2003 MAY 1; 34 (9): 1117-1129	201	110
19	539 Kumar M, Nagpal R, Kumar R, Hemalatha R, Verma V, et al., Cholesterol-Lowering Probiotics as Potential Biotherapeutics for Metabolic Diseases EXPERIMENTAL DIABETES RESEARCH. 2012; : Art. No. 902917	195	107
20	678 Meena DK, Das P, Kumar S, Mandal SC, Prusty AK, et al., Beta-glucan: an ideal immunostimulant in aquaculture (a review), FISH PHYSIOLOGY AND BIOCHEMISTRY. 2013 JUN; 39 (3): 431-457	175	223

Document	Citations	Links
maheshwari (2006)	1119	1
singhal (2020)	566	0
bapat (2005)	527	1
druzhinina (2011)	396	0
naidu (2003)	373	0
girish (2007)	368	0
checkley (2015)	351	1
rayasam (2009)	326	0
vang (2011)	314	1
chaturvedi (2013a)	260	3
dhawan (2009)	251	0
ghoshal (2007)	248	3
rengan (2015)	219	0
singh (1999)	218	1
katiyar-agarwal (2007)	217	0
sudarshan (2007)	212	3
chatterjee (2008)	205	0
shukla (2003)	201	1
kumar (2012a)	195	0
meena (2013)	175	1
singh (2015a)	164	1



FINDINGS AND CONCLUSION

Animal Cell Disease publications and Citations are increased rapidly during the study period, and most notably in the 2013 to 2020. In total, there were 1741 research articles published in 734 journals, 6612 authors, 1981 Institutions from 70 Countries. Hence, these journals are the core journals and play important roles during the knowledge dissemination and exchange in Animal Cell Diseases. The papers of publications registered 38345 Citations and Average Citation Per Paper is 22.2. This scientometric study provides an in-depth analysis of publications and citations in Animal Cell Diseases research. Collaborative research has led to substantial progress in patient stratification and implementation of standardized treatment protocols.

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- **Sebastiyan, R., Babu, V. R., & Surulinathi, M. (2020).** Mapping of research output in food economics:A scientometric ananlysis. *Library Philosophy and Practice*, Summer 9-1-2020, 1-18.
- **Senthamilselvi, A., Surulinathi, M., Karthik, M., & Jayasuriya, T. (2020).** Research output on coronavirus (covid-19)/Hantavirus in india: A

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- **Surulinathi, M., Balasubramani, R., & Amsaveni, N. (2020).** Covid-19 research output in 2020: The global perspective using scientometric study. *Library Philosophy and Practice*, 2020, 1-18.
- **Surulinathi, M., Rajkumar, N., Jayasuriya, T., & Rajagopal, T. (2021).** Indian contribution in animal behaviour research: A scientometric study. *Library Philosophy and Practice*, 2021, 1-19.
- **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.
- **Surulinathi, M., Arputha Sahayarani, Y., Srinivasa Ragavan, S., Rajkumar, N., & Jayasuriya, T. (2021).** Covid-19 drugs and medicines: A scientometric mapping of research publications. *Library Philosophy and Practice*, 2021, 1-16.