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PROTEOMICS RESEARCH IN INDIA: A SCIENTOMETRIC ASSESSMENT OF PUBLICATION OUTPUT DURING 1998-2018

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ABSTRACT

*The paper examines 1190 Indian publications on proteomics research during 1998-2018, as covered in the Web of Science database. The Indian publications were downloaded using a search strategy which uses the search term 'proteomics *' in the two tags, namely 'keyword tag' and 'Article Title tag' and restricting it to India in 'country tag' and period 1998-2018 in 'date range tag'. More numbers of articles were published in the year 2016. The most productive 25 Indian organizations and authors together contributed 68.65per cent and 62.35 per cent share to the overall publications output of India in proteomics research during 1998-2018. The study reveals that most of the researchers preferred to publish their research results in journals; as such 72.8% of articles were published in journals. The top 25 journals contributed 42.9 per cent share to the Indian journal output during 1998-2018. Conclude that India is still not a leading country in the world on proteomics research both in terms of quantity and quality of research. In view of the strategic and global importance and to increase the research output and quality, the Indian Government needs to identify this area as one of the national priority areas, involving much larger R&D investments and trained manpower and also increase international collaboration with leading proteomics research hubs.*

KEYWORDS: *Scientometric, Proteomics, Document, Journal, Citation, India*

INTRODUCTION

Scientometric analysis technique has emerged in the last few years and it fundamentally deals with the study of quantifying and analyzing science and technology and overall research performance of an institution. It is a science of the application of mathematical and statistical methods which are often developed to measure and evaluate the scientific publications. Being a unique research area, scientometrics is utilized to quantify national and international systems of innovation which helps in developing policy in science and technology and derives long-term economic and social benefits. It is utilized to identify the pattern of publication, authorship, productive author, author affiliation, year-wise growth, citations and behavior of a subject over a period of time and thereby offering insight into the dynamics of the area under study which in turn may help to formulate science policy[1]. The results of investigations reported for newly emerging disciplines in science and technology have been found very fascinating and prompted me to study the characteristics and dynamics of growth and development of another emerging research specialty in Proteomics, hence this study.

Technological advances in the field of genomics have given rise to the development of a new area called proteomics. Proteomics involves the analysis of all proteins expressed in a genome and uses a combination of sophisticated

technologies such as two-dimensional electrophoresis, mass spectrometry, and bioinformatics to identify and characterize proteins. This new area offers the potential to discover new biomarkers, improve diagnosis, and improve the prognosis of disease processes[2]. The word "proteome" represents the complete protein pool of an organism encoded by the genome. In a broader term, Proteomics is defined as the total protein content of a cell or that of an organism. Proteomics helps in the understanding of alteration in protein expression during different stages of the life cycle or under stress condition. Likewise, Proteomics helps in understanding the structure and function of different proteins as well as protein-protein interactions of an organism. This study aims to examine the emergence of research areas, research groups, and the pattern of publications, authorship, institutions, a growth rate of publication, journals coverage and countries with a view to mapping the cognitive or intellectual structure of research of the scientists in the field of Proteomics.

OBJECTIVES OF THE STUDY

The main objective of this study is to examine the current status of Indian Proteomics research productivity, as reflected in the country research output during 1998–2018. The researcher has framed the following objectives for the purpose of present research.

- To examine the Yearwise distribution of research productivity in Proteomics;
- To identify the Document wise distribution of research productivity in Proteomics;
- To analyses the Prolific ranking of authors based on research productivity in Proteomics;
- To identify journal wise distribution of research productivity in Proteomics;
- To assess the Institution wise research concentration in Proteomics;
- To identify Country – wise Collaborative Distribution of Publications

METHODOLOGY

The present study aims at analyzing the research output of Researchers in the field of Proteomics. The growth rates of output in terms of research productivity are analyzed from 1998 to 2018. The author productivity is examined to identify the pattern of research contribution in the field of Proteomics. The data has classified into Histcite Software. The data so retrieved were downloaded and later imported into a database management system for data cleaning and coding. In data cleaning, all duplicate records as well as records pertaining to publication years, not under the purview of our study, were eliminated.

DATA COLLECTION

The basic publication data used in this study is derived from the Expanded Version of Science Citation Index (SCI) database, available in Web of Science. The raw publications data along with their citations have been downloaded from the Web of Science in May 2018. Publications data for 21 years from 1998 to 2018 were used for analyzing the growth and impact of Proteomics research.

DATA ANALYSIS

The Data analysis related to the growth of literature, Source wise research output, country wise research output prolific author productivity, Institution and Collaborative country wise research output of Proteomics research in scientometric and so on.

Growth of Publications and Citation Scores

The table -1 depicts the proteomics research output in the Indian level. From the below table, it could clearly see that during the period 1998 - 2018 a total of 1190 publications were published. Table-**1** shows that a chronological histogram of citations, demonstrating that citation frequency grew steadily from 2003; it reached a maximum GCS of 2741 in 2015 and LCS of 144 in 2011. The highest publication is 190 in 2016 with 780 Global Citation Scores followed by 181 papers in 2015 with 2741 Global Citation Score and 158 papers in 2017 with 137 Global Citation Scores. The lowest publication is 1 in 1998 and1999 with 64 and 10 Global Citation Scores. It shows that even minimum numbers of records were scored higher global citations. The study also reveals all these 1190 publications have 62518 cited references it shows that there is a healthy trend in citing reference is found among the Indian Scientists belongs to proteomics.

Table 1: Shows Year Wise Distribution of Publication and Citation Scores

S.No	Publication Year	Publication	Percent	TLCS	TGCS
1	1998	1	0.1	0	64
2	1999	1	0.1	1	10
3	2000	2	0.2	2	6
4	2001	2	0.2	4	20
5	2002	6	0.5	4	117
6	2003	12	1.0	18	1477
7	2004	10	0.8	14	787
8	2005	17	1.4	22	492
9	2006	17	1.4	20	485
10	2007	32	2.7	59	792
11	2008	47	3.9	102	1861
12	2009	35	2.9	95	2221
13	2010	60	5.0	77	1257
14	2011	77	6.5	144	2599
15	2012	95	8	102	1384
16	2013	99	8.3	108	1283
17	2014	114	9.6	135	1961
18	2015	181	15.2	111	2741
19	2016	190	16.0	44	780
20	2017	158	13.3	8	137
21	2018	34	2.9	0	6
Total		**1190**	**100**	**1070**	**20480**

Documentwise Distribution of Publications

Table-2 indicates the Document wise distribution of research output in Proteomics has observed a total of 1190 publications in Proteomics during the period of twenty-one years from 1998 to 2018. Out of various sources of publications in proteomics, journal articles that appeared in the journals have shown a predominant contribution (72.8.%) with Global citation score is 15069 and this source occupies the first position. The source of the review comes second in order (21.3%) with Global citation score is 5106 of sharing total research output in proteomics during the period of analysis. The source

of Editorial Material comes in the third position (2.1%) with respect to total output in proteomics research during the study period.

Table 2: Shows Document Wise Distribution of Publications

S.No	Document Type	Recs	Percent	TLCS	TGCS
1	Article	866	72.8	884	15069
2	Review	253	21.3	161	5106
3	Editorial Material	25	2.1	9	112
4	Meeting Abstract	22	1.8	0	0
5	Review; Book Chapter	9	0.8	5	65
6	Article; Proceedings Paper	7	0.6	10	120
7	Editorial Material; Book Chapter	2	0.2	0	0
8	Letter	2	0.2	1	2
9	Article; Book Chapter	1	0.1	0	6
10	Article; Data Paper	1	0.1	0	0
11	Article; Early Access	1	0.1	0	0
12	Correction	1	0.1	0	0
Total		**1190**	**100**	**1070**	**20480**

Ranking of Prolific Authors Based on Publications

Table- 3 indicates the ranking of prolific authors by the number of publications. Authors “Pandey, A” has published a highest number of articles for the study period with 95 papers; next consecutive authors “Prasad TSK”. is published next highest number of articles for the study period with 51 papers. “Marimuthu A” highest Global Citation Scores of 2440 with just 15 publications followed by “Geol, R” having Global Citation Score of 2248 with just 14 publications and “Muthusamy B” having Global Citation Score of 2045 with just 13 publications, while Mohanty AK having lowest Global Citation Score of 34 with just 12 publications. Thus the most-cited authors are distinguished from the most-published ones. It is found from the analysis that to author productivity in the proliferation of research in Proteomics as the research papers equally distributed by a large number of authors.

Table 3: Shows Ranking of Authors Productivity

S No	Author	Recs	%	TLCS	TLCS/t	TLCSx	TGCS	TGCS/t	TLCR	TLCSb	TLCSe
1	Pandey A	95	8.0	302	36.63	77	5928	677.55	187	62	2
2	Prasad TSK	51	4.3	125	20.78	34	2699	393.22	135	19	
3	Srivastava S	46	3.9	65	11.53	11	565	89.62	75	11	
4	Chaerkady R	38	3.2	149	18.80	38	3304	416.28	64	33	11
5	Kumar A	33	2.8	21	3.86	10	363	60.74	27	2	
6	Gowda H	32	2.7	49	11.38	18	977	206.15	81		
7	Singh S	31	2.6	45	7.22	12	415	84.76	45	11	
8	Chakraborty N	29	2.4	111	14.26	26	508	65.42	115	26	12
9	Chakraborty S	29	2.4	100	12.77	24	461	59.82	93	15	8
10	Sirdeshmukh R	28	2.4	67	10.61	25	1157	204.58	41	6	
11	Harsha HC	27	2.3	107	12.13	20	1839	167.50	41	28	9
12	Kumar S	27	2.3	42	5.85	22	1531	168.78	33	14	
13	Kumar D	26	2.2	46	7.65	5	277	50.88	58	18	0
14	Ray S	26	2.2	82	12.94	16	1681	192.50	49	18	
15	Agrawal GK	23	1.9	45	6.78	13	265	40.81	65	24	
16	Rakwal R	23	1.9	45	6.78	13	265	40.81	65	24	
17	Renuse S	23	1.9	85	13.75	25	1110	206.64	49	17	

Table 3: Contd.,

18	Pinto SM	22	1.8	54	11.07	12	934	188.89	59	4	
19	Yadav S	22	1.8	11	2.15	3	143	24.90	28	1	
20	Chatterjee A	21	1.8	48	9.88	18	975	202.23	54	3	
21	Gupta S	21	1.8	23	2.89	8	228	31.68	40	2	
22	Kumar R	19	1.6	21	3.95	6	201	43.40	15	7	
23	Sahasrabuddhe NA	18	1.5	63	11.04	21	1050	205.39	53	9	
24	Kim MS	16	1.3	41	7.44	16	892	173.27	34	6	
25	Kumar P	16	1.3	53	8.95	16	950	181.08	21	7	
26	Sengupta S	16	1.3	7	1.38	3	156	29.49	11	1	
27	Sharma R	16	1.3	9	1.97	3	297	58.60	24	2	
28	Singh PK	16	1.3	32	6.85	12	129	28.88	33	0	
29	Marimuthu A	15	1.3	79	11.87	26	2440	340.78	33	15	0
30	Rapole S	15	1.3	12	3.32	0	75	20.53	16		
31	Basak T	14	1.2	5	1.18	2	128	25.79	18	0	
32	Goel R	14	1.2	73	10.62	21	2248	306.26	34	12	0
33	Rai LC	14	1.2	53	8.29	16	220	34.75	41	10	
34	Sharma A	14	1.2	11	1.90	3	205	29.94	6	4	
35	Sharma S	14	1.2	14	2.22	8	189	23.91	9	0	
36	Singh MP	14	1.2	29	3.85	1	205	24.18	27	8	2
37	Dash D	13	1.1	31	5.58	3	208	38.70	41	10	3
38	Kumar V	13	1.1	7	1.43	0	94	15.35	13	1	
39	Muthusamy B	13	1.1	72	10.12	19	2045	254.43	31	11	1
40	Sarkar A	13	1.1	34	5.02	14	192	25.58	44	23	0
41	Singh R	13	1.1	12	1.78	6	311	59.78	30	5	
42	Sundaram CS	13	1.1	31	2.76	19	301	29.76	5	6	8
43	Banerjee S	12	1.0	27	3.53	9	1355	143.30	9	8	
44	Datta A	12	1.0	90	10.14	20	405	44.07	19	16	26
45	Dube A	12	1.0	13	1.45	3	164	20.20	18	2	
46	Komatsu S	12	1.0	26	4.21	11	326	57.56	29	16	
47	Kulkarni MJ	12	1.0	24	3.50	10	131	17.17	8	4	4
48	Kumar M	12	1.0	26	5.50	10	842	177.52	10	0	
49	Mohanty AK	12	1.0	5	0.92	4	34	7.25	2	3	
50	Nirujogi RS	12	1.0	38	8.40	12	821	167.42	33		

Journal Wise Distribution of Research Productivity

The study found that the total research output of the Proteomics for the study period (1998 – 2018) published in 468 journals. The journal "Journal of Proteomics" topped with 91 publications with the Global Citation Score of 883 followed by "Proteomics" has 68 publications with the Global Citation Score of 1125 and "Journal of Proteome Research" with 50 publications with the Global Citation Score of 1231 respectively. "Nucleic Acids Research" has scored the highest Global Citation Score of 1979 with 7 publications while "Indian Journal of Biotechnology" has scored a lowest Global Citation Score of 2 with just 5 records.

Table 4: Journal Wise Distribution of Research Productivity in Proteomics

S No	Journal	Papers	%	TLCS	TLCS/t	TGCS	TGCS/t	TLCR
1	Journal of Proteomics	91	7.6	142	26.79	883	166.68	151
2	Proteomics	68	5.7	126	20.23	1125	158.54	98
3	Journal of Proteome Research	50	4.2	121	17.57	1231	154.22	59
4	OMICS-A Journal of Integrative Biology	33	2.8	20	5.15	178	32.96	49

5	PLOS One	32	2.7	0	0.00	515	76.20	23

Table 4: Contd.,

6	Molecular & Cellular Proteomics	31	2.6	76	8.20	1184	147.57	31
7	Scientific Reports	28	2.4	0	0.00	87	23.75	34
8	Frontiers In Plant Science	24	2.0	0	0.00	302	74.22	43
9	Proteomics Clinical Applications	17	1.4	25	3.34	176	22.03	16
10	Frontiers In Microbiology	14	1.2	0	0.00	126	33.88	8
11	Current Proteomics	13	1.1	2	0.36	20	2.67	9
12	Expert Review of Proteomics	11	0.9	16	3.09	144	21.07	28
13	Clinical Proteomics	10	0.8	0	0.00	107	21.60	71
14	Current Science	10	0.8	13	1.02	112	7.82	4
15	Molecular Bio-systems	9	0.8	7	0.93	82	11.79	14
16	Applied Biochemistry and Biotechnology	8	0.7	6	0.96	81	12.61	3
17	Biochimica Et Biophysica Acta-Proteins and Proteomics	8	0.7	8	1.37	117	18.35	13
18	Electrophoresis	8	0.7	13	1.63	69	8.54	0
19	BMC Genomics	7	0.6	0	0.00	103	16.41	1
20	Current Drug Metabolism	7	0.6	0	0.00	70	6.36	0
21	Journal of Biological Chemistry	7	0.6	0	0.00	113	24.19	3
22	Nucleic Acids Research	7	0.6	46	4.77	1979	191.77	8
23	Clinica Chimica Acta	6	0.5	10	1.40	79	11.21	3
24	Gene	6	0.5	1	0.33	43	9.10	1
25	Indian Journal of Medical Research	6	0.5	7	1.09	88	9.77	1
26	Journal of Plant Biochemistry and Biotechnology	6	0.5	1	0.14	13	1.92	8
27	Protein and Peptide Letters	6	0.5	1	0.25	13	2.72	0
28	Biochemical and Biophysical Research Communications	5	0.4	8	1.34	75	8.16	3
29	Biomed Research International	5	0.4	0	0.00	58	9.82	1
30	Computational Biology and Chemistry	5	0.4	0	0.00	65	7.58	1
31	Functional & Integrative Genomics	5	0.4	3	0.75	18	4.83	12
32	Indian Journal of Biochemistry & Biophysics	5	0.4	6	0.56	39	3.07	0
33	Indian Journal of Biotechnology	5	0.4	0	0.00	2	0.42	1
34	International Journal of Biological Macromolecules	5	0.4	0	0.00	5	1.90	2
35	Journal of Biosciences	5	0.4	3	0.40	61	6.38	4
36	Molecular and Cellular Biochemistry	5	0.4	3	0.51	28	4.93	1
37	Plant Science	5	0.4	10	1.38	82	13.64	1
38	Proteome Science	5	0.4	0	0.00	81	11.46	3
39	Tumor Biology	5	0.4	0	0.00	10	2.73	6
40	Analytical Chemistry	4	0.3	3	0.32	105	10.72	1
41	Current Genomics	4	0.3	0	0.00	5	1.67	2
42	European Journal of Mass Spectrometry	4	0.3	1	0.08	13	1.46	12
43	Experimental Parasitology	4	0.3	3	0.53	20	2.97	2
44	Journal of Chromatography B-Analytical Technologies In the Biomedical and Life Sciences	4	0.3	4	1.10	47	5.89	3
45	Journal of the American Society for Mass Spectrometry	4	0.3	6	0.64	47	4.68	2
46	Magnetic Resonance In Chemistry	4	0.3	1	0.14	13	1.68	8
47	Molecular Biology Reports	4	0.3	3	0.54	54	7.67	1

48	Molecular Biotechnology	4	0.3	11	1.46	90	13.00	7
49	Molecular Neurobiology	4	0.3	7	1.62	32	6.56	15
Table 4: Contd.,								
50	Plant Cell Reports	4	0.3	0	0.00	30	6.58	0

Institution Wise Distribution of Publications

In general, institutions which are specifically meant for research activities would contribute a greater level of research publications and it is not up to the mark of the desired level of expectations in other institutions. The below given table-5 analysis indicates Institution-wise research productivity. It is noted that 1315 institutions were contributed 1190 of the total research productivity. It is noted that the Institute of Bioinformatics-Bangalore contributed the highest number of research publications (90) at the same time it second rank in terms of Global Citation Score 2895 but Johns Hopkins University contributed the second highest number of research publications (85) at the same time it first rank in terms of Global Citation Score 5455.

Table 5: Institution wise Distribution of Proteomics Research Output

S.No	Institution	Recs	%	TLCS	TGCS
1	Institute of Bioinformatics	90	7.6	177	2895
2	Johns Hopkins University	85	7.1	232	5455
3	Indian Institute of Technology	81	6.8	73	981
4	CSIR	60	5.0	31	451
5	Manipal University	54	4.5	95	660
6	Banaras Hindu University	46	3.9	95	632
7	All India Institute of Med Science	44	3.7	27	363
8	Pondicherry University	35	2.9	65	516
9	Indian Institute of Science	33	2.8	18	408
10	University of Delhi	33	2.8	34	466
11	National Centre for Cell Science	31	2.6	34	229
12	National Institute *of* Plant Genome Research	31	2.6	86	451
13	National Institute of Mental Health and Neuro Sciences	30	2.5	61	1150
14	Centre *for* Cellular & Molecular Biology	29	2.4	43	466
15	Central Drug Research Institute	22	1.8	28	344
16	Amrita Vishwa Vidyapeetham	20	1.7	37	408
17	International Technological Park	19	1.6	36	425
18	University of Hyderabad	19	1.6	16	193
19	University of Tsukuba	19	1.6	25	147
20	Yenepoya University	19	1.6	6	41
21	Bose Institute	18	1.5	20	183
22	Jawaharlal Nehru University	18	1.5	11	266
23	CSIR-Institute *of* Genomics & Integrative Biology	17	1.4	11	120
24	Research Laboratory Biotechnology & Biochemistry (RLABB)	17	1.4	33	226
25	Aligarh Muslim University	16	1.3	5	115
26	Jamia Millia Islamia	16	1.3	18	207
27	Tata Institute of Fundamental Research	16	1.3	14	152
28	International Centre for Genetic Engineering and Biotechnology	15	1.3	11	411
29	Jamia Hamdard	15	1.3	18	110
30	KIIT University	15	1.3	8	52
31	Institute of Genomics & Integrative Biology	14	1.2	20	256
32	Kuvempu University	14	1.2	50	1620
33	National Dairy Research Institute	14	1.2	9	121

34	Saha Institute *of* Nuclear Physics	14	1.2	12	141
35	Bhabha Atomic Research Centre	13	1.1	6	111
Table 5: Contd.,					
36	National University	13	1.1	7	355
37	King Saud University	12	1.0	10	66
38	Rajiv Gandhi University *of* Health Sciences	12	1.0	30	198
39	University of Calcutta	12	1.0	2	93
40	National Institute *of* Immunology	11	0.9	1	173
41	Academy of Scientific and Innovative Research	10	0.8	8	48
42	AMITY University	10	0.8	0	28
43	Amrita University	10	0.8	20	182
44	Armed Forces Medical College	10	0.8	35	912
45	University of Kalyani	10	0.8	4	194
46	National JALMA Institute for Leprosy & Other Mycobacterial. Diseases	9	0.8	4	48
47	Postgraduate Institute of Medical Education and Research (PGIMER)	9	0.8	30	778
48	Showa University	9	0.8	15	76
49	Tamil Nadu Agriculture University	9	0.8	11	69
50	Tata Memorial Hospital	9	0.8	20	176

Country – wise Collaborative Distribution of Publications

The below-given table-6 indicates that among the country-wise distribution of Genomics covered by the study tops India with 1182 (99.3 %) publications collaborated with other countries followed by the United States of America with 200 (16.8 %), Germany and Japan with 47 (3.9 %), research publications respectively. First place goes to India having total Global Citation Score of 20157 with 1182 publications. United States of America secured the second rank in terms of GCS with 7697 but only 200 publications and also the collaboration with around than 57 Countries.

Table 6: Country-wise Collaborative Distribution of Publication

S.No	Country	Recs	Percent	TLCS	TGCS
1	India	1182	99.3	1067	20157
2	USA	200	16.8	282	7697
3	Germany	47	3.9	20	2543
4	Japan	47	3.9	69	775
5	UK	46	3.9	71	1568
6	South Korea	33	2.8	8	451
7	France	23	1.9	38	716
8	Australia	22	1.8	20	442
9	Nepal	22	1.8	41	260
10	Peoples R China	21	1.8	42	1224
11	Saudi Arabia	21	1.8	16	114
12	Italy	19	1.6	28	722
13	Canada	16	1.3	48	1645
14	Singapore	16	1.3	7	365
15	Brazil	15	1.3	2	89
16	Sweden	15	1.3	9	2017
17	Netherlands	13	1.1	18	508
18	Austria	11	0.9	6	82
19	Denmark	10	0.8	24	2492
20	Taiwan	10	0.8	1	67
21	Ireland	9	0.8	9	148
22	Luxembourg	9	0.8	22	115

23	Egypt	8	0.7	3	36
24	Pakistan	8	0.7	6	356
Table 6: Contd.,					
25	Finland	7	0.6	3	106
26	South Africa	7	0.6	10	123
27	Switzerland	7	0.6	2	35
28	Spain	6	0.5	22	1127
29	Argentina	5	0.4	0	14
30	Chile	5	0.4	31	764
31	Israel	5	0.4	3	302
32	Thailand	5	0.4	3	44
33	Turkey	5	0.4	4	30
34	Unknown	5	0.4	3	35
35	Greece	4	0.3	4	18
36	Iran	4	0.3	14	110
37	Malaysia	4	0.3	4	30
38	Mexico	4	0.3	17	69
39	New Zealand	4	0.3	0	21
40	Belgium	3	0.3	6	57
41	Czech Republic	3	0.3	1	68
42	Cameroon	2	0.2	0	11
43	Ethiopia	2	0.2	1	11
44	Ghana	2	0.2	0	7
45	Norway	2	0.2	0	10
46	Philippines	2	0.2	8	54
47	Tunisia	2	0.2	0	14
48	Cyprus	1	0.1	0	3
49	Ecuador	1	0.1	0	5
50	Estonia	1	0.1	0	9
51	Hungary	1	0.1	0	8
52	Morocco	1	0.1	0	0
53	Russia	1	0.1	0	2
54	Slovakia	1	0.1	0	0
55	Sudan	1	0.1	0	0
56	Ukraine	1	0.1	0	2
57	Uzbekistan	1	0.1	0	5
58	Vietnam	1	0.1	0	9

MAJOR FINDINGS

- The findings of Indian research productivity in proteomics has the highest publication is 190 in 2016 with 780 Global Citation Scores followed by 181 papers in 2015 with 2741 Global Citation Score and 158 papers in 2017 with 137 Global Citation Scores. The lowest publication is 1 in 1998 and1999 with 64 and 10 Global Citation Scores.
- The findings of various sources of publications in proteomics, journal articles have shown a predominant contribution (72.8.%) with Global citation score is 15069 and this source occupies the first position followed by the source of review comes second in order (21.3%) with Global citation score is 5106 of sharing total research output in proteomics during the period of analysis.
- The findings of the prolific authors “Pandey, A” has published a highest number of articles for the study period with 95 papers; next consecutive authors “Prasad TSK”. are published next highest number of articles for the

study period with 51 papers. “Marimuthu A” highest Global Citation Scores of 2440 with just 15 publications followed by “Geol, R” having Global Citation Score of 2248 with just 14 publications and “Muthusamy B” having Global Citation Score of 2045 with just 13 publications, while Mohanty AK having lowest Global Citation Score of 34 with just 12 publications. It is found from the analysis that to author productivity in the proliferation of research in Proteomics as the research papers equally distributed by a large number of authors.

- The findings of the total research output of the Proteomics for the study period (1998 – 2018) published in 468 journals. The journal “Journal of Proteomics” topped with 91 publications with the Global Citation Score of 883 followed by “Proteomics” has 68 publications with the Global Citation Score of 1125 and “Journal of Proteome Research” with 50 publications with the Global Citation Score of 1231 respectively. “Nucleic Acids Research” has scored the highest Global Citation Score of 1979 with 7 publications while “Indian Journal of Biotechnology” has scored a lowest Global Citation Score of 2 with just 5 records.
- The findings of the Indian research output of the Proteomics in1315 institutions were contributed 1190 of the total research productivity. It is noted that the Institute of Bioinformatics-Bangalore contributed the highest number of research publications (90) at the same time it second rank in terms of Global Citation Score 2895 but Johns Hopkins University contributed the second highest number of research publications (85) at the same time it first rank in terms of Global Citation Score 5455.
- The findings of the country-wise distribution of Genomics covered by the study tops India with 1182 (99.3 %) publications collaborated with other countries followed by the United States of America with 200 (16.8 %), Germany and Japan with 47 (3.9 %), research publications respectively. First place goes to India having total Global Citation Score of 20157 with 1182 publications. United States of America secured the second rank in terms of GCS with 7697 but only 200 publications and also a collaboration with around than 57 Countries.

CONCLUSIONS

It concludes quantitatively the contributions made by the Indian researchers during 1998-2018 as reflected in the Web of Science database. During 21 years period (1998 –2018) Indian contributions in terms of a number of publications are significant. Though the records available in the Web of Science database reveal a small number, it is important that the Web of Science covers only the peer-reviewed journals. If a broader coverage database is available, it may provide a reasonable number of papers. It concludes that India is still not a leading country in the world on proteomics research both in terms of quantity and quality of research. In view of the strategic and global importance and to increase the research output and quality, the Indian Government needs to identify this area as one of the national priority areas, involving much larger R&D investments and trained manpower and also increase international collaboration with leading proteomics research hubs.

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