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Mapping of research output on Eosinophilia in India: A Scientometric Analysis

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Abstract

This study analyses the Eosinophilia research output carried out during the year 1998 – 2017 the different parameters including authorship pattern, growth, Time Series Analysis Degree of Collaboration, Institutions' contribution, most productivity journals were analysed. The overall growth rate of literature output is found to be positive with an increasing trend in Eosinophilia research throughout the study period. Two and more authored papers constitute majority of the contribution and degree of collaboration had a maximum value of 7.14. The result shows that research development activities are increasing in Eosinophilia research in India.

Keywords: Authorship Pattern, Core Journals, India, Eosinophilia Research, Scientometrics

1. Introduction

The aim of Scientometrics is to provide quantitative characterizations of scientific activity. Nalimove and Mulechenko (1969) have coined that the origin of the term scientometrics goes back to the year 1969, when two Russian scientists from the Russian term naukometriya the Russian equivalent of scientometrics. However, the advent of scientometrics as a discipline was in 1978, when the journal Scientometrics was founded by Tibor Braun in 1978. It is part of the sociology of science and has application to science policy-making. It involves quantitative studies of scientific activities, including

other publications, and so overlaps bibliometrics to some extent. The researchers in scientific disciplines form the bigger, but also the most diverse, interest-group in scientometrics. Due to their primary scientific orientation, their interests are strongly related to their specialty.

From Children to Aged many people are suffering from “Eosinophilia”. Sometimes, the “Eosinophilia” is developed as primary complex for the children and tuberculosis for the aged people. People having “Eosinophilia” will struggle during the seasons of pre-autumn, autumn and post autumn. To know the real response of the global scientists, this study has been conducted. A few related literatures on scientometric study has been reviewed towards the completion of the research. Few techniques related to the scientometric analysis has been applied. The study reveals that a continuous research is going on for the betterment of the human health is proved through this study.

2. Literature Review

In the recent years, many researchers have conducted Scientometric analysis in different subject fields. The following studies related to the objectives of this study have been reviewed:

Garg and Padhi (1999) analyzed laser research literature output, it was found that more than three-fourth (79 percent) of the total output. Remaining 21 percent output came from other 108 countries. Further analysis of data indicates that India topped the list in the publication output contributing more than one-fourth (27.9 percent) of the output unlike in other disciplines of science and technology, where USA is ranked first.

Jeyshankar, Ramesh Babu, and Rajendran, (2011) analysed bibliographical details of 1282 research articles published by the scientists of CECRI during the period 2000-2009. From the study it is found that 194 articles (15.13%) published in the year 2009 was the most productive year. Collaborative research was dominant with the highest degree of collaboration being 0.98, in the year 2005. Further, the study investigated authorship pattern, co-authorship pattern, highly prolific authors and highly preferred journals by the scientists of CECRI.

Jeyshankar (2014) evaluated the research publication trend among scientists of Indira Gandhi Centre for Atomic Research during the period 1989-2013. Data were

analyzed based on type of publication, year of publication, language, source, country, institutions, most preferred journals and most prolific authors among other variables. The study revealed that majority (96.26%) of the researchers preferred to publish their research papers in joint authorship only and the degree of author collaboration ranges from 0.84 to 0.99 and its mean value is 0.95. The top three collaborative institutions with IGCAR are Indian Institute of Technology, Chennai, Bhabha Atomic Research Centre, Mumbai and Anna University, Chennai.

Jeyshankar and Vellaichamy (2014) attempted to make the quantitative study of research output on anemia disease for the period 1993–2013. The study reveals that 5085 papers were published during the period under study. The highest number of papers (739) is published in the year 2013 but it received 178 citations only. The minimum number (47) of papers is published in the year of 1996, but they have received 3245 citations. The study reveals that lowest number (0.56%) of citations received in the year 2013. The study focused on authorship pattern, degree of collaboration, most productive authors, subject pattern, major collaborative partners in India, most productive journals, active institutions and highly cited papers.

Jeyshankar & Nishavathi (2018) evaluated the growth of research literature produced by AIIMS (All India Institute of Medical Sciences) for the period of 2007 to 2016. A total of 14410 records were retrieved from the Scopus database. Descriptive statistics for the research publication output revealed mean = 1441, Sd = 318.92, minimum = 1087, maximum = 2141 at 95.0% confidence level. The curve fitting methodology was used to fit the growth of research publication of AIIMS. R square value for exponential growth model is higher (0.908) than the linear growth model (0.849). Journals are identified as most preferred publication pattern (69.42%). The research output of top 20 department aggregates to 57.77% of total productivity.

Vellaichamy and Jeyshankar (2018) studied quantitatively the growth and development of world literature on hemophilia in terms of publications output as per SCOPUS database (2003-2017). During 2003-2017 a total of 13503 papers were published by the scientists in the field of hemophilia. They were found that average number of publications published per year, highest number of publications,

contributions, countries involved in the research in this field. USA is the top producing country with 3986 authorships (29.52%) followed by United Kingdom with 1438 authorships (10.65%). Still, in an international sense, relative productivity of India is low and requires more focused research and development.

3. Scope and Objectives of the Paper

In this paper an attempt has been made to project the Indian research out put on the subject of Eosinophilia covering the period 1998 to 2017 and analysed by using the scientometric indicators.

The study has been designed with the following objectives:

- i. To examine the growth of Eosinophilia research output of India during 1998 to 2017;
- ii. To examine and analyse the authorship pattern in Eosinophilia research and development in India;
- iii. To determine the Relative Degree of Collaboration (DC), Collaborative research and highly cited papers; and
- iv. To find out core journals, leading states and top research institutions in the field of Eosinophilia in India.

4. Methodology

The study based on publication and citation data downloaded from Web of Science database. A Sum of 2391 records in Eosinophilia from Covered period of sixty years spanning between 1998 and 2017, were obtained from the Web of Science database were analysed. The researcher applied various Scientometric indicators such as document types, Most Productive Institutions, Highly cited authors, Highly Productive Journals, Prolific authors, Collaborative Countries, Highly cited authors, Open Access Publications, Funding Agencies.

5. Data Analysis and Interpretation

This data analysis and interpretation of 2391 records downloaded from Web of Science (W o S) for the period of 20 years from 1998 to 2017 on 'Eosinophilia' research output. It gives an analytical view of the research literature output in eosinophilia and displays the Indian performance, contribution of emerging countries. The researcher

applied various Scientometric indicators such as document types, Most Productive Institutions, Highly cited authors, Highly Productive Journals, Prolific authors, Collaborative Countries, Highly cited authors, Open Access Publications, Funding Agencies.

Table 1 - Literature output on Eosionophilia Research in India

S. No	Publication Years	Records	%	Cumulative Total	Cumulative percent	TLC S	TGC S
1	1998	5	1.87	5	1.87	2	27
2	1999	2	0.75	7	2.62	0	35
3	2000	10	3.75	17	6.36	10	129
4	2001	6	2.25	23	8.61	10	322
5	2002	8	3.00	31	11.61	6	129
6	2003	7	2.62	38	14.23	6	185
7	2004	5	1.87	43	16.10	2	48
8	2005	4	1.50	47	17.60	4	127
9	2006	8	3.00	55	20.60	4	156
10	2007	14	5.24	69	25.84	12	245
11	2008	12	4.49	81	30.33	4	58
12	2009	14	5.24	95	35.58	3	145
13	2010	13	4.87	108	40.45	6	184
14	2011	15	5.62	123	46.06	0	68
15	2012	26	9.74	149	55.80	5	155
16	2013	23	8.61	172	64.42	3	149
17	2014	22	8.24	194	72.66	4	77
18	2015	26	9.74	220	82.39	1	91
19	2016	31	11.61	251	94.00	2	50
20	2017	16	5.99	267	100.00	0	11
Total		267	100.00			84	2391

According to the publication output from the table 1, the year wise distribution of research analysis, the year of 2016 has highest number of publications 31 (11.61 %) with 2 of TLCS and 50 of TGCS values were scaled and being a first position among the 20 years output in the eosinophilia research at Indian level. The year of 2012 and 2015 has published 26 records each in second position and got different local and global citation scores (2012:5,155; 2015:1, 91) and the year of 2013 has 23 publications with 3 local citation scores and 149 global citations scores respectively.

According to TLCS (Total Local Citation Scores) the following results were found from the above analysis; totally 84 TLCS measured; among those, 2007 has highest TLCS scores 12 with first position for TLCS; 2000 and 2001 has 10 with second position; 2002, 2003 and 2010 has 6 of TLCS values with third position respectively.

Examined by TGCS (Total Global Citation Scores) an overall period has 2391 citation scores measured. Among those, 2001 has highest TGCS scores 322 with first position; 2007 has 245 with second position; 2003 has 185 of TGCS values with third position respectively.

Table 2: Document wise Analysis on Eosinophilia Research Output in India

S. No	Document Types	Records	%	TLCS	TGCS
1	Articles	211	79.0	75	2086
2	Letters	16	6.0	0	11
3	Editorial Materials	15	5.6	2	18
4	Reviews	14	5.3	2	178
5	Meeting Abstracts	7	2.6	0	0
6	Article; Proceedings Papers	4	1.5	5	98
Total		267	100	84	2391

Table 2 displays the document type wise distribution of eosinophilia research in India. The study reveals that there are six types of documents published by Indian researchers in the field of eosinophilia. The maximum of 211 publications were published as ‘articles’ by Indian researchers forming 79 per cent of the total Indian output. The second most preferred document type is ‘Letters’ (16 records, 6%). Third most preferred document type was ‘Editorial Materials’ (5.6%). Other document types are: 14 records as ‘Reviews’ type; 7 records as ‘Meeting Abstracts’ and ‘Article; Proceedings Papers’ 4 records respectively.

Table 3: Most Productive Institutions in India on Eosinophilia Research (271)

S. No	Name of the Institutions	Records	Percent	TLCS	TGCS
1	All India Institute of Medical Society	17	6.4	9	246
2	University of Delhi	16	6.0	11	321
3	Postgraduate Medicine, Education and Research	13	4.9	0	44
4	Government Medical Colleges in India	12	4.5	5	57
5	Christian Medical College and Hospital	10	3.7	3	30
6	CSIR Institute of Genomics and Integrative Biology	8	3.0	8	379
7	NIAID	8	3.0	5	296
8	Anna University	6	2.2	7	51
9	Postgraduate Medicine, Education and Research	6	2.2	0	9
10	University Oxford	6	2.2	16	342
11	CSIR	5	1.9	7	116
12	Pravara Rural College of Pharmacy	5	1.9	4	33
13	The National Institute for Research in Tuberculosis	5	1.9	5	220

14	Indian Veterinary Research Institute	4	1.5	2	16
15	PGIMER	4	1.5	1	19
16	University of Wisconsin	4	1.5	5	27
17	AIIMS	3	1.1	0	1
18	COLL - MED Ltd.	3	1.1	0	4
19	Government Medical College and Hospital	3	1.1	0	40
20	Jadavpur University	3	1.1	1	14
21	KEM Hosp	3	1.1	0	1
22	Medical College and Hospital	3	1.1	0	9
23	National Institute of Mental Health and Neurosciences	3	1.1	0	11
24	National Institute for Research in Tuberculosis	3	1.1	0	57
25	Regional Cancer Centre	3	1.1	1	12
26	Safdarjung Hospital	3	1.1	2	13
27	inhgad College of Pharmacy	3	1.1	1	17
28	Vardhman Mahavir Medical College	3	1.1	2	13
29	Aarhus University	2	0.7	1	87
30	Al-Azhar University	2	0.7	0	23
31	Amrita Institute of Medical Sciences and Research Centre	2	0.7	0	3
32	Apollo Hospital	2	0.7	0	0
33	Bai Jerbai Wadia Hospital For Children	2	0.7	0	4
34	Bharati Vidyapeeth University	2	0.7	1	7
35	Brunel University	2	0.7	1	31
36	Cent Drug Research Institute	2	0.7	0	13
37	Center for Biochemical technology	2	0.7	0	3
38	Dr Hari Singh Gour Vishwavidyalaya	2	0.7	3	24
39	Government General Hospital	2	0.7	1	15
40	Guru Nanak Dev University	2	0.7	0	6
41	Himalayan Institute of Medical Science	2	0.7	0	1
42	John Radcliffe Hospital	2	0.7	4	82
43	Louisiana State University	2	0.7	0	23
44	Madras Veterinary College	2	0.7	1	11
45	Manipal University	2	0.7	0	2
46	Maulana Azad Medical College	2	0.7	0	10
47	National Institute of Pathology (Indian Council of Medical Research)	2	0.7	0	10
48	R. C. Patel Institute of Pharmaceutical Education and Research	2	0.7	0	7
49	Sanjay Gandhi Postgraduate Institute of Medical Sciences	2	0.7	0	22
50	Sir Ganga Ram Hospital	2	0.7	0	0

Table 3 showcases the most productive institutes in India in the field of eosinophilia research. It could be found from the table that 'All India Institute of Medical Science has the maximum output of 27 records with the GCS of 246. University of Delhi

took the second spot with 16 publications (321 GCS) followed by Postgraduate Institute of Medical Educational and Research with 13. CSIR Institute of Genomics and Integrative Biology (CSIR-IGIB) is the first place in terms of number of global citation scores (379) and first 50 institutions have produced 209 records during the study period.

Table 4: Highly Productive Journals on Eosinophilia Research in India

S. No	Name of the Journals	Records	%	TLCS	TGCS
1	Indian Journal of Dermatology	10	3.75	0	17
2	Indian Journal of Dermatology Venereology & Leprology	9	3.37	3	20
3	Indian Journal of Medical Research	8	3.00	0	68
4	Indian Journal of Pediatrics	7	2.62	2	10
5	Indian Journal of Hematology And Blood Transfusion	6	2.25	3	10
6	Indian Journal of Pathology And Microbiology	5	1.87	1	13
7	Indian Journal of Pharmacology	5	1.87	0	4
8	Indian Pediatrics	5	1.87	0	20
9	Journal of Allergy And Clinical Immunology	5	1.87	2	137
10	Journal of Cytology	5	1.87	0	17
11	Journal of Postgraduate Medicine	4	1.50	2	24
12	Pediatric Dermatology	4	1.50	0	41
13	Tropical Doctor	4	1.50	0	8
14	Annals of Allergy Asthma & Immunology	<u>3</u>	1.12	0	46
15	Cell Biology International	<u>3</u>	1.12	3	10
16	Current Opinion In Pulmonary Medicine	<u>3</u>	1.12	5	55
17	Diagnostic Cytopathology	<u>3</u>	1.12	1	21
18	International Immunopharmacology	<u>3</u>	1.12	8	103
19	International Journal of Dermatology	<u>3</u>	1.12	0	15
20	Journal of Ethnopharmacology	<u>3</u>	1.12	1	28
21	Journal of Pediatric Hematology Oncology	3	1.12	0	2
22	Medical Mycology	3	1.12	1	49
23	Parasitology International	3	1.12	0	15
24	Acta Cytologica	2	0.75	2	18
25	American Journal of Therapeutics	2	0.75	0	1
26	Archives of Iranian Medicine	2	0.75	0	8
27	Asian Pacific Journal of Allergy And Immunology	<u>2</u>	0.75	2	39
28	Buffalo Bulletin	<u>2</u>	0.75	0	0
29	Clinical And Experimental Dermatology	<u>2</u>	0.75	0	3
30	Clinical Rheumatology	<u>2</u>	0.75	0	12
31	Indian Journal of Medical Microbiology	<u>2</u>	0.75	1	9
32	Indian Journal of Psychiatry	<u>2</u>	0.75	0	1
33	Infection And Immunity	<u>2</u>	0.75	1	36
34	Journal of Immunology	<u>2</u>	0.75	3	106
35	Journal of Tropical Pediatrics	<u>2</u>	0.75	0	0
36	Latin American Journal of Pharmacy	2	0.75	1	4

37	Medicinal Chemistry Research	<u>2</u>	0.75	0	6
38	Molecular Immunology	<u>2</u>	0.75	3	34
39	Natural Product Research	2	0.75	3	23
40	Neurology India	<u>2</u>	0.75	0	6
41	Revista Brasileira De Farmacognosia-Brazilian Journal of Pharmacognosy	<u>2</u>	0.75	0	9
42	Transactions of The Royal Society of Tropical Medicine And Hygiene	<u>2</u>	0.75	0	30
43	Acta Oncologica	<u>1</u>	0.37	0	11
44	Acta Parasitologica	<u>1</u>	0.37	0	13
45	American Journal of Respiratory and Critical Care Medicine	<u>1</u>	0.37	0	0
46	American Journal of Tropical Medicine and Hygiene	1	0.37	1	8
47	Annals of Hematology	1	0.37	0	12
48	Annals of Indian Academy of Neurology	1	0.37	0	1
49	Annals of Thoracic Medicine	1	0.37	0	4
50	Antimicrobial Agents and Chemotherapy	1	0.37	0	50

Eosinophilia Research output in India is 267 publications with 211 Articles. The articles came in Journals and that journals got local and global citations scores. Table 4.6.7 displays the highly productive journals based on number of records published therein. The journal ‘Indian Journal of Dermatology’ has the maximum number of 10 (3.75) publications. ‘Indian Journal of Dermatology Venereology & Leprology’ published 9 (3.37%) publications. Followed by ‘Indian Journal of Medical Research’ which has published 8 documents, ‘Indian Journal of Pediatrics’ has published 7 documents. ‘Indian Journal of Hematology and Blood Transfusion’ has published 6 records in the field of eosinophilia.

Table 5: Prolific authors on Eosinophilia research output

S. No	Author	Records	TLCS	TGCS
1	Madan T	10	19	503
2	Nutman TB	8	5	296
3	Sarma PU	8	18	475
4	Sasidharanpillai S	8	3	25
5	Singh M	8	16	344
6	Binitha MP	7	3	22
7	Kishore U	7	16	338
8	Riyaz N	7	3	25
9	Ghosh B	6	9	208
10	Kumaraswami V	6	5	221
11	Shah A	6	2	177
12	Balakrishnan A	5	7	32
13	Kumar S	5	0	24
14	Reid KBM	5	13	295

15	Sharma P	5	2	13
16	Dinda AK	4	5	179
17	Gupta R	4	0	14
18	Khader A	4	3	16
19	Mabalirajan U	4	8	185
20	Miyamoto S	4	5	27
21	Narayanan K	4	5	27
22	Nirmal SA	4	4	33
23	Ram A	4	8	116
24	Sharma A	4	1	12
25	Vijayan VK	4	5	61
26	Agarwal R	3	0	18
27	Chakrabarti A	3	0	25
28	Chandra S	3	0	3
29	Das S	3	0	17
30	Dogra S	3	0	3
31	Garg S	3	0	15
32	Gaur SN	3	3	53
33	Ghosh K	3	0	58
34	Gupta A	3	0	23
35	Gupta S	3	0	31
36	Gupta VK	3	0	57
37	Kaur S	3	1	122
38	Krishnamoorthy B	3	4	16
39	Kumar A	3	0	34
40	Kumar R	3	2	47
41	Malhotra P	3	2	4
42	Rajan U	3	3	16
43	Saxena S	3	3	113
44	Sharma RL	3	2	16
45	Sharma S	3	1	13
46	Singh A	3	0	13
47	Singh S	3	0	18
48	Varma N	3	2	4
49	Al-Ghareeb K	2	0	23
50	Al-Khami AA	2	0	23

Table 2 shows the highly prolific authors based on their research productivity and table lists only the authors who produced minimum 2 and plus records in Eosinophilia research in India. Madan, T is the highly prolific author in India who has produced 10 records during the study period with the GCS of 503. He is followed by four authors Nutman TB, Sarma PU, Sasidharanpillai S and Singh M had contributed 8 articles with the GCS of 296, 472, 25 and 344 respectively. The authors Binitha MP, Kishore U and Riyaz N were published 7 articles each and got the Global Citation Scores 22, 338 and 25

respectively. The authors Kaur, S and Saxena S have produced only 3 publications and they got more than 100 citations.

Table 6 Highly cited authors in Eosinophilia research output

S. No	Author	Records	TLCS	TGCS
1	Madan T	10	19	503
2	Sarma PU	8	18	475
3	Singh M	8	16	344
4	Kishore U	7	16	338
5	Nutman TB	8	5	296
6	Reid KBM	5	13	295
7	Kumaraswami V	6	5	221
8	Ghosh B	6	9	208
9	Mabalarajan U	4	8	185
10	Dinda AK	4	5	179
11	Shah A	6	2	177
12	Clark H	1	7	140
13	Hussain EM	1	7	140
14	Strong P	2	7	140
15	Kaur S	3	1	122
16	Ram A	4	8	116
17	Saxena S	3	3	113
18	Chanock SJ	1	2	101
19	Choi EH	1	2	101
20	Foster CB	1	2	101
21	Zhu S	1	2	101
22	Zimmerman PA	1	2	101
23	Black CM	1	1	89
24	Cramer D	1	1	89
25	Denton CP	1	1	89
26	Desai SR	1	1	89
27	du Bois RM	1	1	89
28	Goh NSL	1	1	89
29	Hansell DM	1	1	89
30	Veeraraghavan S	1	1	89
31	Wells AU	1	1	89
32	Thiel S	2	1	87
33	Das M	2	5	86
34	Gangal SV	2	5	86
35	Muralidhar K	1	2	78
36	Bhattacharya I	1	4	76
37	Vijayan VK	4	5	61
38	Ghosh K	3	0	58
39	Agrawal A	1	0	57
40	Ahmad T	1	0	57
41	Babu S	2	0	57
42	Gupta VK	3	0	57
43	Joseph DA	1	0	57
44	Leishangthem GD	1	0	57
45	Srivastava A	2	0	56
46	Gaur SN	3	3	53

47	Arora N	2	1	50
48	Boykin DW	1	0	50
49	Hall JE	1	0	50
50	Kyle DE	1	0	50

From table 6, explains that highly cited first fifty authors on eosinophilia research output in twenty years. ‘Madan T’ has got 503 global citation scores and 19 local citation scores from 10 records followed by ‘Sarma PU’ has got 475 global citation scores; 18 local citation scores from 8 records and ‘Singh M’ has got 344 global citation scores; 16 local citation scores from 8 records respectively. Among top 50 highly cited authors, only one author has got more than 500 citations, 7 authors have got more than 200 citations, 14 authors have got more than 100 citations and the remaining authors were got below 100 citations. Seven authors were published only one record and they got more than 100 citations, 11 authors have not get local citation scores with their publications.

Table 7: India’s Collaborative Research Productivity on Eosinophilia Research Output

S. No	Country	Records	%	TLCS	TGCS
1	India	260	83.87	78	2095
2	USA	23	7.42	10	419
3	UK	10	3.23	18	465
4	Denmark	3	0.97	2	109
5	Egypt	2	0.65	0	23
6	Switzerland	2	0.65	1	40
7	Finland	1	0.32	0	36
8	Greece	1	0.32	0	4
9	Italy	1	0.32	0	1
10	Japan	1	0.32	0	7
11	Kuwait	1	0.32	0	2
12	Slovakia	1	0.32	0	7
13	South Korea	1	0.32	1	8
14	Thailand	1	0.32	0	5
15	Tunisia	1	0.32	0	6
16	Unknown	1	0.32	0	0
Total		310	100	110	3227

Table 7 show the country wise collaborative research output of eosinophilia research in India. India has contributed the maximum of 23 publications by collaborating with USA with 419 global citation scores, followed by UK has 10 publications with 465 global citation scores, Denmark has 3 publications with 109 global citation scores respectively. Egypt and Switzerland have collaborated two records and they got 109 and 40 global citation scores. Ten countries were collaborated only one record each.

Table 8: Authorship Pattern of Eosinophilia Research in India

No. of Authors	No. of Records	%	Cumulative Total	Cumulative Percent
1	15	5.62	15	5.62
2	34	12.73	49	18.35
3	41	15.36	90	33.71
4	63	23.60	153	57.31
5	38	14.23	191	71.54
6	33	12.36	224	83.90
7	16	5.99	240	89.89
8	11	4.12	251	94.01
9	8	3.00	259	97.01
10	2	0.75	261	97.75
11	1	0.37	262	98.13
12	1	0.37	263	98.50
15	1	0.37	264	98.88
17	1	0.37	265	99.25
18	1	0.37	266	99.63
21	1	0.37	267	100.00
	267	100		

Table 8 explains the authorship pattern of eosinophilia research publications. Single authored publications were just 19 contributing 5.62 percent of the total Indian output. Double authored papers were 34 (12.73 %) followed by three authored publications with 41 (15.36%) records and four authored papers with 63 records (23.60 %). It is found that multi authored publications has the maximum research output i.e. 94.38 percent (252 records) of the total Indian output.

Table 9: Times Series Analysis for Eosinophilia Research Output in India

Years	Records (Y)	X	X ²	XY
1998	5	-9.5	90.25	-47.5
1999	2	-8.5	72.25	-17
2000	10	-7.5	56.25	-75
2001	6	-6.5	42.25	-39
2002	8	-5.5	30.25	-44
2003	7	-4.5	20.25	-31.5
2004	5	-3.5	12.25	-17.5
2005	4	-2.5	6.25	-10
2006	8	-1.5	2.25	-12
2007	14	-0.5	0.25	-7
2008	12	0.5	0.25	6
2009	14	1.5	2.25	21
2010	13	2.5	6.25	32.5
2011	15	3.5	12.25	52.5
2012	26	4.5	20.25	117

2013	23	5.5	30.25	126.5
2014	22	6.5	42.25	143
2015	26	7.5	56.25	195
2016	31	8.5	72.25	263.5
2017	16	9.5	90.25	152
Total	267		665	808.5

Straight Line equation $Y_c = a + bX$

Since $\Sigma x = 0$

$a = \Sigma Y/N = 267/20 = 13.35$; $b = \Sigma XY/\Sigma x^2 = 808.5/665 = 1.22$

Estimated literature in 2025 is when $X = 2025 - 2008 = 17$

$$= 13.35 + 1.22 * 17 = \mathbf{34.09}$$

Estimated literature in 2030 is when $X = 2030 - 2008 = 22$

$$= 13.35 + 1.22 * 22 = \mathbf{40.19}$$

From the table 4.6.9, it is inferred that the future trend of eosinophilia research output from India may have an increasing trend in the year 2025 and such an increasing trend may continue during 2030 also thereby leading to a conclusion that the growth trend in eosinophilia research in India is a continuum.

Table 10: DC & RSA of Eosinophilia Research in India

Years	Total Records	Single Authored Records	Multi Authored Rerecords	DC	Rate of Single Authorship
1998	5	0	5	100.00	0
1999	2	0	2	100.00	0
2000	10	0	10	100.00	0
2001	6	0	6	100.0	0
2002	8	0	8	100.00	0
2003	7	1	6	85.71	14.29
2004	5	1	4	80.00	20.00
2005	4	0	4	100.00	0.00
2006	8	1	7	87.50	12.50
2007	14	5	9	64.29	35.71
2008	12	0	12	100.00	0.00
2009	14	1	13	92.86	7.14
2010	13	0	13	100.00	0.00
2011	15	0	15	100.00	0.00
2012	26	2	24	92.31	7.69
2013	23	1	22	95.65	4.35
2014	22	0	22	100.00	0.00
2015	26	1	25	96.15	3.85
2016	31	1	30	96.77	3.23
2017	16	1	15	93.75	0
	267	15	252		

The analysis of data for single authored papers and multi authored papers revealed the fact that single authored papers suffered in producing more research papers while multi authored papers recorded increasing trend. In recent decades, there has been an increasing trend towards collaboration in research. Researcher used Subramanyam's (1983) law for calculating Degree of Collaboration in the systems biology research.

- Degree of collaboration had an initial value of 100 per cent in the year 1998 and this decreased to 93.75 in the year 2017.
- There was not a much growth in single authored papers and multi authored papers showed the increasing trend.
- This could be taken as evidence to the effect that scientists in eosinophilia intended to take collaborative participation in research, problem solving activities and publications as well.

Table 12: Showing Number of Records, Number of Citations and Total Citations on Eosinophilia Research in India

No. of Records	No. of Citations	Total Citations
69	0	0
31	1	31
26	2	52
19	3	57
9	4	36
10	5	50
11	6	66
12	7	84
5	8	40
5	9	45
8	10	80
7	11	77
3	12	36
4	13	52
4	14	56
4	15	60
2	16	32
2	17	34
2	18	36
3	19	57
2	20	40
3	21	63
4	22	88
1	23	23
1	29	29

1	30	30
1	32	32
1	33	33
3	35	105
1	36	36
1	46	46
1	47	47
1	49	49
1	50	50
1	52	52
1	57	57
1	71	71
1	75	75
1	76	76
1	78	78
1	89	89
1	101	101
1	140	140
267		2391

Table 12 clearly explains the number of citations received by number of records in Eosinophilia research output of India. It is found that 69 publications had received zero citations and 31 publications had received just 1 citation each. While 26 records had 2 citations each, 19 publications had 3 citations each and 9 documents had 4 citations each. One article has got the maximum of 140 citations followed by another one article with 101 citations. The overall analysis shows that 267 publications had received 2391 citations with the average citation per paper of 8.96.

Table 13: Open Access Publications of Eosinophilia Research Output in India

Open Access Publication	Number of Records	Percent
No	164	61.43
Gold or Bronze	87	32.58
Green Published	15	5.62
Green Accepted	1	0.37
Total	267	100

Table 13 shows that out of 267 documents published in Eosinophilia research in India, 103 (38.57%) documents are available in open access platforms while the majority of 164 (61.43%) documents are not available in open access platforms.

Table 14: Eosinophilia Research Areas in India (46)

S. No.	Name of The Research Areas	Records	Percentages
1	Immunology	42	15.73
2	Pharmacology Pharmacy	35	13.10
3	Dermatology	31	11.61
4	Pediatrics	28	10.48
5	General Internal Medicine	23	8.61
6	Hematology	16	5.99
7	Pathology	15	5.61
8	Respiratory System	14	5.24
9	Parasitology	13	4.86
10	Research Experimental Medicine	13	4.86
11	Tropical Medicine	13	4.86
12	Allergy	12	4.49
13	Infectious Diseases	11	4.12
14	Oncology	11	4.12
15	Public Environmental Occupational Health	11	4.12
16	Medical Laboratory Technology	9	3.37
17	Veterinary Sciences	7	2.62
18	Gastroenterology Hepatology	6	2.24
19	Integrative Complementary Medicine	6	2.24
20	Surgery	6	2.24
21	Cardiovascular System Cardiology	5	1.87
22	Cell Biology	5	1.87
23	Neurosciences Neurology	5	1.87
24	Rheumatology	5	1.87
25	Mycology	4	1.49

From the above table 14 analysis of data could find that very few number of multidisciplinary and inter disciplinary areas of eosinophilia research has been carried out across the globe. The analysis shows that a majority of the research contribution for the study period is on Immunology (15.73%), Pharmacology Pharmacy (13.10) and Dermatology (11.61%). The next three areas where contributed more number of publications is on pediatrics (10.48 %), General Internal Medicine (8.61%) and Hematology (5.99%).

Findings and Conclusion

- A total of 2391 records in Eosionophilia research output covered in SCOPUS database in India during the period 1998-2017. The average growth rate of

literature output in Eosinophilia research, works out to be 43.33 per cent. The growth rate is found to be maximum in the year 2016 (11.61%) and in the years 2012 and 2015 (9.74%) and at its minimum in the years 1998 and 2005 (1.87%).

- Out of fifty institutes in India, only 4 institutes have contributed more than 10 records, of which 25.50 per cent (All India Institute of Medical Society (6.4%), University of Delhi (6.0%), Postgraduate Medicine, Education and Research (4.9%), Government Medical Colleges in India (4.5%) and Christian Medical College and Hospital (3.7%).
- Of the top 50 journals producing Eosinophilia research literature, it is the Indian Journal of Dermatology that ranks first with 3.75 per cent of the total periodical literature output during the period under study.
- The pattern of prolific authorship found in the literature output in Eosinophilia, Madan T (10 papers) his paper received TLCS (19) and TGCS (503) followed by Nutman TB (8), TLCS (19), TGCS (503), Sarma PU (8), TLCS (18), TGCS (475), Sasidharanpillai S (8), TLCS (3), TGCS (25) and Singh M (8), TLCS (16) and TGCS (344).
- The single, double and multiple authored publications 5.62 per cent, 12.73 per and 81.63 per cent respectively.
- It is found that the country – wise collaborative research literature contributed by India with 83.87 per cent at the most followed by USA with 7.42 per cent and UK with 3.23 per cent.
- Degree of collaboration had an initial value of 100 per cent in the year 1998 and this decreased to 93.75 in the year 2017.
- It is observed, out of 267 documents published in Eosinophilia research in India, 103 (38.57%) documents are available in open access platforms while the majority of 164 (61.43%) documents are not available in open access platforms.

From the forgoing analysis of the various facets of Eosinophilia study facilities to form irrefutable conclusions. This analysis indicated pattern of different peripherals of the study such as future trend of literature, coverage period and the frequency of published records, emphasis on core journals and global standing of the various states and outreach activities of institutions involved in Eosinophilia literature. This is the first attempt to apply Scientometric techniques to analyse Eosinophilia research in India. More research is needed for the purpose of evaluating

Eosinophilia research particularly in other Asian countries. Such studies would be helpful in assessing the any research area output. National and International collaborative projects will produce improved research output and exchange of information in any subject. In India, the importance of Eosinophilia research is very less. There may be few institutions in India doing serious research in the Eosinophilia research field. So the Indian government encourage and sponsor projects to already engaged institution. It is the high time to wake up and start serious work on Eosinophilia research activity to keep up with the advance countries.

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