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Research Paper

A REVISIT FROM BIRTH TO TILL DATE: BIBLIOMETRIC ANALYSIS OF ANNUAL REVIEW OF IMMUNOLOGY

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Abstract:

Background: This study examines some of the characteristics of Annual Review of Immunology and highlights some of its notable points. Annual Review of Immunology was chosen for this study because it got 1st rank among life science journals and 3rd rank in overall category in recent rankings published by SCImago Journal &*Country Rank*

Methodology/Principal findings: This paper presents bibliometric analysis of "Annual Review of Immunology" from its birth to till date i.e. 1983-2012. This journal has 30 volumes and each volume contains an average of 25 reviews. A total of 772 reviews appeared in Annual Review of Immunology since the first issue published in April 1983, to the end of April 2012. The reviews are categorized according to volume wise number of reviews**,** authorship pattern, percentage of degree of collaboration among co-authors followed by degree of collaboration among co-authors, degree of collaboration with number of authors, length of review, affiliations and citations of reviews. All parameters are presented in the form of tables and graphs to make it easily understandable.

Conclusions/Significance: On the basis of this study we can conclude that Annual Review of Immunology should be a highly preferred journal for communication by the library and information science professionals. This study will be helpful for library professional in collection development and weeding out of journals.

Keywords: Bibliometric, Scopus, Web of science, Pubmed, Annual Review of Immunology

Introduction

The term bibliometric was given by Pritchard (Thanuskodi, 1995). In information science the term bibliometric plays an important role. The methods of bibliometric analysis are used to study the properties and behaviour of recorded knowledge for analysis of structures of scientific and research areas and for evaluation of research activities (Patra et al., 2006). In the recent years, there has been an explosive growth in human knowledge, as a result of which the scientific community is flooded with thousands of journals. Therefore, to maintain quality, there is an urgent need of a system for ranking journal according to some meaningful parameters.

The SCImago Journal & Country Rank is that kind of a system. It is a portal that includes the journals and country specific indicators developed from the information contained in the Scopus® database (Elsevier B.V.) (Leydesdorff, 2009). These indicators can be used to assess and analyze scientific domains. In recent rankings published by SCImago, Annual Review of Immunology got 1st rank among life science journals and 3rd rank in overall category.

Annual Reviews**,** is the non-profit publisher of a collection of 41 review series in specific disciplines in natural science and social science. Its volumes are published each year. The Annual Review of Immunology which covers the significant developments in the field of immunology is in publication since 1983 (Annual Reviews publisher 2012). The authors have chosen first 30 years (1983-2012) of its existence for bibliometric study on the basis of maximum SJR (SCImago Journal & Country Rank) i.e. 12434 in the field of life science journals (Annual Reviews (publisher). (2012, August 8). In Wikipedia).

The purpose of this review is to highlight key characteristics of Annual Review of Immunology and its impact on the scientific communitythrough its first 30 years of existence. To measure all aspects of performance bibliometric analysis remains an easy and useful yardstick.

Objective of the study

The present study has been undertaken with the objective of analyzing the following aspects:

1. To determine the year wise distribution of reviews published from 1983-2012

2. To study the authorship pattern

3. To identify the degree of collaboration among co-authors

5. To study the length of reviews

6. To identify geographical distribution of review articles

7. To identify the number of documents cited

Material and Methods

To study the bibliometric analysis of Annual Review of Immunology the authors compiled data from the time of birth of the journal i.e. from 1983 till date i.e. 2012. In the present study two databases i.e. Thompson-Reuters' ISI Web of Science database and Pubmed(www.ncbi.nlm.nih.gov/**pubmed**/) were used for data compilation. Authors also took help from the journals home page (http://www.annualreviews.org/loi/immunol). A total of 772 reviews appeared in Annual Review of Immunology over the mentioned time period. The collected data has been analyzed and is presented in the form of tables and figures.

Studied parameters

All the objectives of the study were tabulated for all issues of Annual Reviews of Immunology.

1. **Volume wise distribution of reviews:** Table 1 shows volume wise distribution of reviews from 1983-2012. This table prepared with the help of home page of annual review from 1983-1995 and 1996 onwards data collected from Scopus (Figure 1). Cumulative frequency is also shown in the table.
2. **Authorship pattern**: Table 2 analyzes authorship pattern followed in reviews. In this table all the reviews were divided into 5 categories i.e. single author, two authors, three authors, four authors and five or more authors (Figure 2).
3. **Degree of Collaboration among co- authors:** Table 3 discusses degree of collaboration among co-authors. In this table percentage is calculated using the following formula:

$$\frac{\text{Number of co-author publication in a particular year}\times 100}{\text{Total number of reviews in a particular year)}}$$

And degree of collaboration is calculated as follows:

$$\frac{\text{Number of co-author publication in a particular year}}{\text{Total number of reviews in a particular year.}}$$

Table 4 further reveals degree of collaboration with authors, 3 authors, 4 authors, 5 authors and more respectively.

4. **Length of reviews:** Table 5 categorizes the reviews according to their page length. All the reviews were divided into 8 slabs in this table i.e. 1-20, 21-25, 26-30, 31-35, 36-40,41-45,46-50,51 and above (Figure3).
5. **Country wise contribution:** Table 6 analyzes geographical distribution of review articles published from 1983-2012. In this table all the reviews were divided into 2 categories i.e. publications from USA and publications from other countries (Figure 4).
6. **Citation analysis:** The references provided by the authors at the end of their articles are the basis of citation analysis. Citation traces a connection between two documents, one which cites and the other which is cited. Table 7 reveals the number of citations of reviews published in Annual Reviews of Immunology. All review articles were divided into 6 categories i.e. citations between 0-100, 101-200, 201-300, 301-400,401-500 and500 and above (Figure 5).

Results

Table 1 shows that in year 1997 and year 2000 number of reviews were maximum i.e. 31 and in year 1984 number of reviews were 20 which is the minimum in the 30 years (Figure 1).Table 2 reveals that number of reviews written by 2 authors is maximum i.e. 273. Single authored reviews are 170 and 156 reviews are authored by 3 persons. 85 reviews are authored by 4 and 88 reviews are written by 5 or more authors. Further 35 reviews were written by 5 authors, 21 by 6 authors, 10 by 7 authors, 12 by 8 authors, 6 by 9 authors, 5 by 10 authors and only 1 review was written by 15 authors between 1983 and 2012 (figure 2).

Table 1: Volume wise distribution of reviews published from 1983-2012

Vol. No.	Year	Number of reviews	CF
1	1983	22	22
2	1984	20	42
3	1985	21	63
4	1986	24	87
5	1987	25	112

Vol. No.	Year	Number of reviews	CF
6	1988	26	138
7	1989	25	163
8	1990	28	191
9	1991	26	217
10	1992	30	247
11	1993	25	272
12	1994	29	301
13	1995	24	325
14	1996	25	350
15	1997	31	381
16	1998	24	405
17	1999	29	434
18	2000	31	465

Vol. No.	Year	Number of reviews	CF
19	2001	24	489
20	2002	26	515
21	2003	25	540
22	2004	30	572
23	2005	29	599
24	2006	25	624
25	2007	27	651
26	2008	24	675
27	2009	24	699
28	2010	22	721
29	2011	23	744
30	2012	28	772

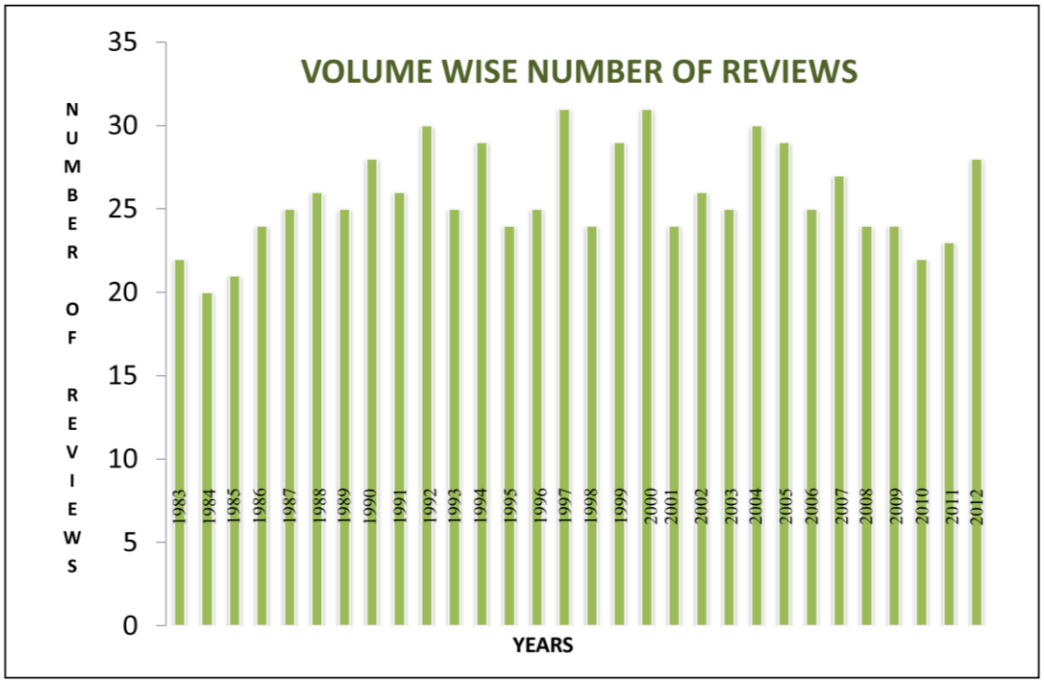

Figure 1 Volume wise distribution of reviews published from 1983-2012

Table 2: Authorship pattern of reviews published from 1983-2012

Authorship						
Years	Single	2 authors	3 authors	4 authors	5 authors and more	Total
1983	3	12	6	1	0	22
1984	6	7	4	1	2	20
1985	10	5	2	1	2	20
1986	3	12	4	2	3	24
1987	6	14	2	2	2	26
1988	6	9	7	4	0	26
1989	5	11	4	4	2	26
1990	15	8	1	2	2	28
1991	5	12	3	4	2	26
1992	10	9	5	4	1	29
1993	6	9	3	4	3	25
1994	9	9	4	2	5	29
1995	9	9	5	0	2	25
1996	4	7	5	4	5	25
1997	5	10	8	5	3	31
1998	4	12	5	1	2	24
1999	7	10	5	2	5	29

2000	7	12	7	0	5	31
2001	3	10	0	6	5	24
2002	5	10	9	1	2	27
2003	4	5	9	2	5	25
2004	6	9	8	2	6	31
2005	9	9	4	5	2	29
2006	3	9	5	4	4	25
2007	4	6	9	3	4	26
2008	3	6	6	5	5	25
2009	5	9	6	3	0	23
2010	2	6	6	4	4	22
2011	3	4	8	4	4	23
2012	3	13	6	3	3	28
Total	170	273	156	85	88	772

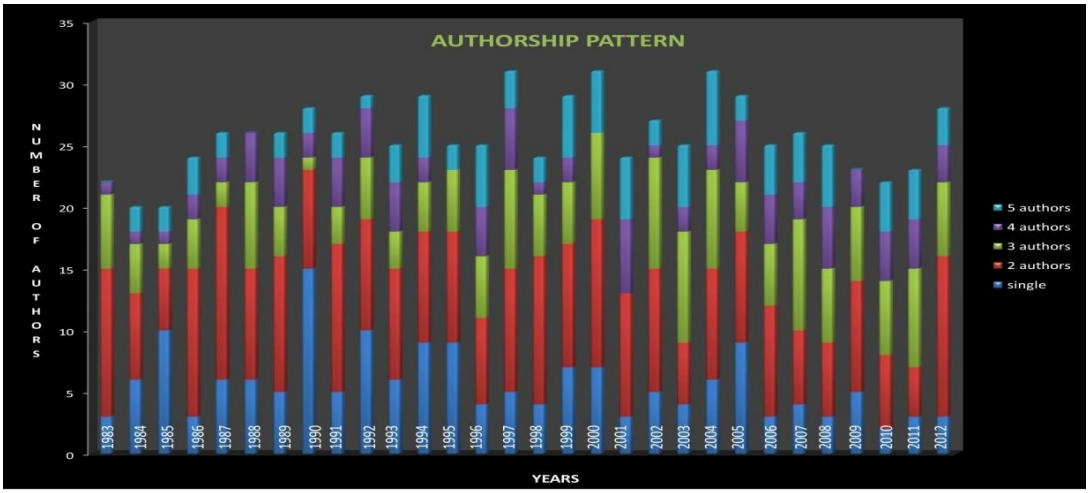

Figure 2 Authorship Pattern of reviews published from 1983-2012

Table 3shows that in year 1990, degree of collaboration is 0.46, in year 1985 0.50 and in year 2010 degree of collaboration was maximum i.e. 0.90. Table 4 furtheranalyzes degree of collaboration with different number of authors. Table 5shows that out of total 772 reviews, 1 review is of 4 pages which is having the lowest number of pages. Maximum length is 83 pages. 24 reviews fall in category 51 and above, 209 reviews fall in the category of 26-30 pages length and 165 reviews fall in the category of 21-25 pages length, so the average page length of review articles published in Annual Review of Immunology are 26-30 pages (Figure 3).

Table 3: Number of co-author Publications during 1983-2012

Year	Number of co-author Publication	Total	% age	Degree of collaboration
1983	19	22	86.36	0.86
1984	14	20	70.00	0.70
1985	10	20	50.00	0.50
1986	21	24	87.50	0.87
1987	20	26	76.92	0.76
1988	20	26	76.92	0.76
1989	21	26	80.77	0.80
1990	13	28	46.43	0.46
1991	21	26	80.77	0.80
1992	19	29	65.52	0.65
1993	19	25	76.00	0.76
1994	20	29	68.96	0.68
1995	16	25	64.00	0.64
1996	21	25	84.00	0.84
1997	26	31	83.87	0.83
1998	20	24	83.33	0.83
1999	22	29	75.86	0.75
2000	24	31	77.42	0.77
2001	21	24	87.50	0.87
2002	22	27	81.48	0.81
2003	21	25	84.00	0.84
2004	25	31	80.64	0.80
2005	20	29	68.96	0.68
2006	22	25	88.00	0.88
2007	22	26	84.61	0.84
2008	22	25	88.00	0.88
2009	18	23	78.26	0.78
2010	20	22	90.91	0.90
2011	20	23	86.96	0.86
2012	25	28	89.28	0.89

Table 4: Degree of Collaboration among co-authors

Year	2 authors	3 authors	4 authors	5 authors & more
1983	0.55	0.27	0.04	0.00
1984	0.35	0.20	0.05	0.10
1985	0.25	0.10	0.05	0.10
1986	0.50	0.17	0.08	0.12
1987	0.54	0.08	0.07	0.07
1988	0.34	0.27	0.15	00
1989	0.42	0.15	0.15	0.08
1990	0.29	0.03	0.07	0.07
1991	0.46	0.11	0.15	0.08
1992	0.31	0.17	0.14	0.03
1993	0.36	0.12	0.16	0.12
1994	0.31	0.14	0.06	0.17
1995	0.36	0.20	00	0.08
1996	0.28	0.20	0.16	0.20
1997	0.32	0.26	0.16	0.09
1998	0.50	0.21	0.04	0.08
1999	0.34	0.17	0.07	0.17
2000	0.39	0.22	00	0.16
2001	0.42	00	0.25	0.20
2002	0.37	0.33	0.04	0.07
2003	0.20	0.36	0.08	0.20
2004	0.29	0.26	0.06	0.19
2005	0.31	0.14	0.17	0.06
2006	0.36	0.20	0.16	0.16
2007	0.23	0.35	0.11	0.15
2008	0.24	0.24	0.20	0.20
2009	0.39	0.26	0.13	00
2010	0.27	0.27	0.18	0.18
2011	0.17	0.35	0.17	0.17
2012	0.46	0.21	0.11	0.11

Table 5: Categorization of the reviews according to their page length

Year	1-20	21-25	26-30	31-35	36-40	41-45	46-50	51&above	Total
1983	1	7	6	5	3	--	--	--	22
1984	6	5	1	5	2	--	--	1	20
1985	2	9	7	1	2	--	--	--	21
1986	5	4	9	3	1	--	--	2	24
1987	6	11	2	1	3	1	1	--	25
1988	4	8	6	8	--	--	--	--	26
1989	4	6	4	8	2	1	--	--	25
1990	5	6	8	5	1	2	--	1	28
1991	--	6	11	5	4	--	--	--	26
1992	2	7	13	2	4	2	--	--	30
1993	2	5	6	4	3	2	3	--	25
1994	2	3	5	8	4	4	1	3	29
1995	2	4	9	6	2	1	--	--	24
1996	3	5	13	3	--	1	--	--	25
1997	3	6	14	5	1	1	1	--	31
1998	1	11	5	3	4	--	--	--	24
1999	4	1	3	9	6	3	2	1	29
2000	4	2	10	7	1	4	1	2	31
2001	2	7	6	3	2	2	--	2	24
2002	2	4	5	6	4	--	3	2	26
2003	--	1	7	8	2	2	4	1	25
2004	2	7	8	6	2	1	1	3	30
2005	1	4	6	8	3	1	3	3	29
2006	1	4	7	8	2	--	3	--	25
2007	3	4	7	5	4	2	1	1	27
2008	--	5	7	7	2	1	1	1	24
2009	2	3	9	6	2	1	1	--	24
2010	2	7	4	4	1	3	1	--	22
2011	2	7	3	4	2	3	1	1	23
2012	5	6	8	4	4	--	1	--	28
	78	165	209	157	73	38	29	24	772

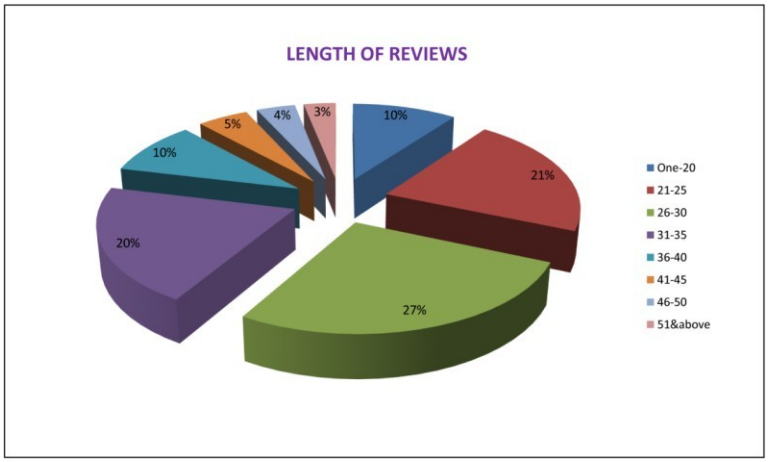

Figure 3 Pie chart categorizing the reviews according to their page length

Table 6reveals that out of 772 reviews maximum reviews are from USA (70 %) and rest (30%) are from other affiliations (Figure 4).Table 7shows that 156 reviews have more than 501 citations, 197 reviews have citations between 0-100, 175 reviews have citations between 101-200, 108 reviews have citations between 201-300, 87 reviews have citations between 301-400 and 49 reviews have citations between 401-500 (Figure 5). This shows the high impact of this journal on scientific community.

Table 6: Geographical distribution of review articles

Vol. No.	Year	Number of reviews	USA	Others
1	1983	22	16	6
2	1984	20	19	1
3	1985	21	19	2
4	1986	24	16	8
5	1987	25	18	7
6	1988	26	18	8
7	1989	25	16	9
8	1990	28	20	8
9	1991	26	20	6
10	1992	30	25	5
11	1993	25	17	8
12	1994	29	18	11
13	1995	24	16	8
14	1996	25	14	11
15	1997	31	13	18
16	1998	24	20	4
17	1999	29	25	4
18	2000	31	24	7
19	2001	24	13	11
20	2002	26	18	8
21	2003	25	16	9
22	2004	30	23	7
23	2005	29	19	10
24	2006	25	18	7
25	2007	27	17	10
26	2008	24	19	5
27	2009	24	17	7
28	2010	22	13	9
29	2011	23	17	6
30	2012	28	17	11

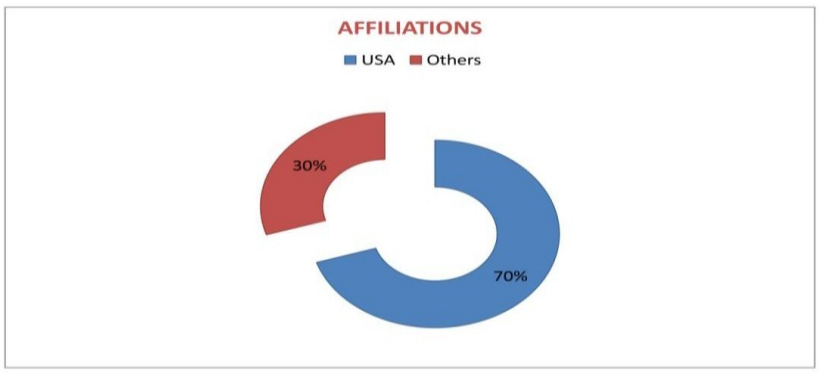

Figure 4: Geographical distribution of review articles published from 1983-2012

Table 7: Citation analysis

Year	0-100	101-200	201-300	301-400	401-500	501& above	Total
1983	7	4	4	3	1	3	22
1984	5	4	2	2	2	5	20
1985	7	7	1	2	0	4	21
1986	6	5	6	4	-	3	24
1987	7	10	4	2	-	2	25
1988	8	5	5	4	1	3	26
1989	6	4	5	4	1	5	25
1990	5	5	6	1	4	7	28
1991	4	7	5	2	1	7	26
1992	5	7	5	4	1	8	30
1993	2	4	3	5	1	10	25
1994	3	6	2	4	2	12	29
1995	5	3	1	5	4	6	24
1996	3	5	4	5	3	5	25
1997	6	3	6	-	3	13	31
1998	3	4	2	4	1	10	24
1999	2	5	6	4	1	11	29
2000	4	8	5	6	1	7	31
2001	1	5	3	2	1	12	24
2002	1	7	-	6	6	6	26
2003	2	5	7	5	2	4	25
2004	4	9	7	4	2	4	30
2005	3	8	6	3	4	5	29
2006	4	10	5	3	2	1	25
2007	6	12	5	1	2	1	27
2008	11	10	1	1	-	1	24
2009	8	10	2	1	2	1	24
2010	18	3	-	-	1	-	22
2011	23	-	-	-	-	-	23
2012	28	-	-	-	-		28
Total	197	175	108	87	49	156	772

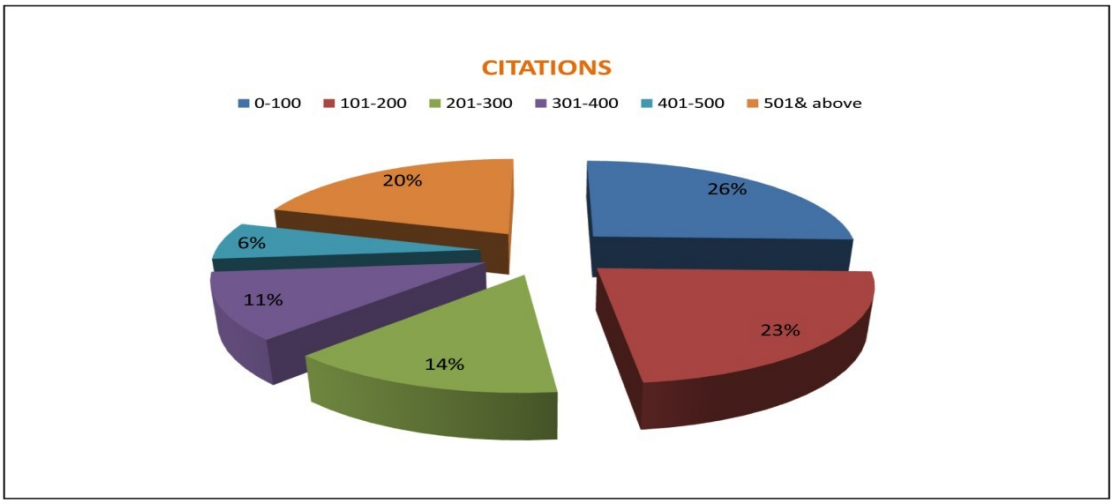

Figure 5: Citation analysis

Related studies

Mamdapur et al (2011) in their paper entitled "Baltic Astronomy (2000-2008)-A Bibliometric Study" have analysed articles published in the journal Baltic Astronomy from the year 2000-2008. For analysing the article the authors have collected data from the print version of the journal. In this research paper authors discussed different variables i.e. volume wise distribution of articles, length of the articles, authorship pattern, degree of collaboration among co-authors, year-wise

appearance of citations, country-wise contributions and ranked list of journals. There are total 552 articles published from 2000-2008. The researchers revealed that multi-authored contribution dominates this field of research. To calculate the degree of collaboration authors used formula given by Subramanyam. This study has highlighted the variety of bibliometric measures that can be used to understand the different aspects of the journal. The authors conclude that top 20 journals cited by the authors cover almost 87.60 % of references and indicated the fact that collaborative research is prevalent in astronomy research.

Eather Rani and DrAzariahJeba Kumar (2011) in their paper entitled "Indian Journal of Chest Diseases and Allied Sciences: A Bibliometric Study" (An Indian journal indexed in MEDLINE database of United States National Library of Medicine, top most cited database in the health science) analysed 3302 citations enclosed to 190 articles which are published in this journal. It covered period 1999-2003 (vol. 41- vol. 45). The authors analysed indexing status, chronological distribution of contributions, authorship pattern, citation analysis and geographical distribution. Authors also revealed that joint authors are contributing more articles. Contribution of India is more and in India, Delhi is on top among Indian states, National Capital Territory. Authors collected 100 % data manually from the issues during the selected period and compared it with MEDLINE database of National Library of Medicine to find out the accuracy of indexing in MEDLINE.

Bernard Sainte-Marie (2010) in his paper entitled "The First 30 Years of the Journal of Crustacean Biology- a Bibliometric Study" has discussed that total of 2052 articles appeared in JCB from the first issue in February 1981 to the end of 2009. The number of articles by volume increased from 50 in 1981 to 93 in 2002 and then declined to around 70. From 1981 to 2009, article size varied around a mean of 11 pages (pre-2005 format) but mean number of authors and references by article increased by a factor of 1.87 and 2.20, respectively. JCB content is predominated numerically by taxonomy and systematic (36% of all articles), but other research areas (anatomy, physiology, development, growth-reproduction, life history, behaviour, ecology, conservation) were also represented from the outset. JCB's 2-year impact factor increased significantly from 1991 to 2009. Longer-term impact of JCB is evident in the fact that almost half of all JCB articles were cited in 2009 and that the mean age of those cited articles was only slightly less than the mean age of all JCB articles (12.6 versus 13.3 years). However, citations to JCB differ widely across research areas, with articles in taxonomy cited on average at less than half the rate of articles in the areas of ecology or conservation. The most cited JCB articles by combination of research area and decade of publication deal primarily with higher crustaceans (malacostracans) and are reviews or original research articles with cross-disciplinary appeal.

Conclusion

Bibliometric techniques are being used for a variety of purposes like determination of various scientific indicators, evaluation of scientific output, selection of journals for libraries and even forecasting the potential of a particular field (**Zafrunnisha, 2012**). The popularity in the adaptation of bibliometric techniques in various disciplines stimulated stupendous growth of literature on bibliometric and its related areas. The above study has elucidated the variety of bibliometric measures which can be useful for understanding various aspects (Ramkrishnan and Babu, 2007; Khaparde and Marathwada, 2011; Sharma and Singh, 2012). It provides a link between research and scholarship and reflective professional practice so that all are informed and enhanced (Singh et al., 2011). In this journal there are 772 reviews from the year 1983-2012. In 30 years of existance two times maximum 31 reviews were published. In this journal one review was written by 15 autores and 5 reviews were authored by 10. Maximum degree of collaboration is 0.90 and degree of collaboration with 5 authors and more is 0.00. Out of total 772 reviews 1 review is of 4 pages which is the lowest. Maximum length is 83 pages. The interesting result of this study is that 70 % reviews are from USA. This journal has very high citations. 54 reviews citation is more than 1000 and in the year 1989 one review has 5342 citations.

On the basis of this study we can conclude that Annual Review of Immunology should be a highly preferred journal for communication by the library and information science professionals. This study will be helpful for library professional in collection development and weeding out of journals.

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