STM JOURNALS

Journal of Advancements in Library Sciences
ISSN: 2349-4352(online)
Volume 2, Issue 2
www.stmjournals.com

Bibliometric Analysis of Biochemistry, Genetics and Molecular Biology Research Output

Tawfeeq Nazir*
Department Library & Information Science, University of Kashmir, Srinagar, Jammu and Kashmir, India

Abstract

One of the fundamental criteria to determine the research performance of any institute is its publication profile and more pertinently to say the quality of its published output. This study has tried to analyze the publications output and visibility of Biochemistry, Genetics and Molecular Biology in India. The data were collected from Web of Science database from last 20 years. It was found that the India observed progressive proclivity in both the no. of publications and citations over the years. In an aggregate 882 publications have been published during time span of 20 years. Among all sources of publications research articles receive majority of citations.

Keywords: *Bibliometrics, Biochemistry, Scientometrics, Citation analysis, Research*

**Author for Correspondence* E-mail: tawfeeq17@gmail.com

INTRODUCTION

We have been witnessing exponential growth in scientific research activities, programmes and projects in the country. Their documentation and communication through publications has become more complex and unmanageable, in particular in keeping ourselves abreast of current status of research at different levels of aggregation.

Journals play a paramount role in the exchange of scientific and technical information. Citation analysis is a perceptive part of research. "Citation analysis" refers to references in one text to a further text, with information on where that text can be originated. Citation analysis is useful for indulgent subject relationships, author effectiveness, publication trends, and so on. Eggle and Rousseau [1] define "bibliometrics as a study of documents and their bibliographic references and citation structure". However, Tague-sutcliffe [2] is of view that "bibliometrics is the study of quantitative aspects of production, dissemination, and use of recorded information".

Bibliometrics encompasses a number of empirical methods such as bibliographic coupling and co-citation analysis as opined by Kessler [3]. Citations are conventionally regarded as the formal appreciation of the previously published sources of information that relate to the citing author's research. Thus, the number of times that a publication has been cited by other authors might indicate its overall scientific utility (Murphy) [4].

Given that utility is one aspect of scientific quality, citation counts are commonly used by decision makers to gauge the academic performance of individual researchers, departments and research institutions when making decisions about funding, hiring, promotion and tenure and as well as to compare the development of different disciplines and national scientific outputs and the use of citation counts for academic evaluation has increased rapidly since the introduction of computerized citation indexes and citation scores have been advertised as objective quantitative indicators of scientific performance and a precious addition to conventional methods of research evaluation, such as peer review.

The utilization of citation counts for academic assessment is based on the statement that authors choose references based on their significance and involvement to the author's own work, and that all important sources are

endorsed by citation. Citation analysis has conquered the world of science policy analysis. The main objectives of citation analysis are to evaluate and to interpret citations received by the articles, authors, institutions and other aggregates of scientific activities.

The primary function of citation is to provide a connection between two documents, one which cites and the other which is cited (Leta) [5]. Citation analysis has been used for the evaluation of research performance. Among others, the main uses have been the study of rankings of journals, university departments, scientists, research institutions and academic journals. The preliminary point of this advance is that citations, even the pessimistic ones, are a gauge of persuade in science: the more often an article is cited the more it is famous to the scientific community.

The whole academic community acts as a big set of peers to recognize, by means of citations, the value of a given contribution and the decisions of this jury can be studied using Citation Indices. Citation analysis can be used to recognize the most regularly cited journals pertinent to a given field. As noted by many studies, in a given area or discipline, a few core journals obtain many citations and the rest of journals obtain far fewer citations. This pattern has been also identified with authors and other units of analysis (Astrom) [6]. De Bellis [7] dynamic mapping of science using Citation Indices has been pursued for more than 30 years now. The starting point is that citations from paper to paper or from journal to journal provide indicators of intellectual linkages between subject areas, organizations or individuals. Research advances worn in the field study are co-citations (one document is cited by two other documents) and bibliographic coupling (two documents are cited in another document).

Eggle and Rousseau [1] there are mainly three application areas in citation analysis first qualitative and quantitative evaluation of scientists, publications and scientific institutions, second is modelling of the historical development of science and technology and final is information search and retrieval.

PROBLEM

Bibliometrics study has earned its place as an important tool in evaluating research activities and the scientific output by counting the number of papers and the impact these papers have made on scientific disciplines. Therefore, need was felt to determine the Bibliometric analysis of the Indian top Biochemistry, Genetics and Molecular Biology journal. It helps to identify the growth of papers, inter-relationship among the sub disciplines, productivity, authorship pattern and collaboration.

REVIEW OF RELATED LITERATURE

Arunachalam, Srinivasan and Raman [8] analyzed the globally collaborated authored papers pertaining to authors from the developed countries and the Third World countries, using SCI 1991.They found that China has published higher number of collaborative papers with the majority of Asian countries and the advanced countries of the West except the United Kingdom. The results also found that both India and China collaborate with the United States of America mostly in physics followed by clinical medicine. Basu [9] analyzed that the foreign collaboration has great impact on visibility of Indian science research. Okubo [10] compared the international paper proportion of five Chinese scientific journals in 1996 with that of well-known foreign journals in the same category, and argued that journals with a high impact factor always have internationalization. Das and Sen [11] analyzed the authorship patterns of the citations and shows that more than 15% contributions are single-authored and about 85% are the result of teamwork. Single-authored articles comprise of 15.52% of the total citations and nearly 28% resulted through the teamwork of five or more authors. The study also found that 88.73% Citation gain by journal articles of which 9.48% are author self-citations.

Ren and Rousseau [12] analyzed journal citation report (JCR) data from 2000 and 2001. They found that Chinese English language journals are not internationally recognized and have very low international visibility. Glanzel and Schubert [13] found that the standards and, particularly, the visibility of scientific

research, depend on the level of collaboration. Lee [14] found that Institute of Molecular and Cell Biology researchers have been very selective in publishing their research work. He found that 95.6% of the articles were published in Institute for Scientific Information journals.

The articles received an average of 25 to 35 citations per article, and the percentage of non-cited articles is 11.6%. Four articles received more than 200 citations, and 18 received between 100 and 200 citations. Moin, Mahmoudi and Rezaei [15] reviewed the scientific output of Iran over the period 1967–2003 and compared it with 15 countries in the year 2000. Throughout this period Iran's relative share in global scientific output improved from 0.0003 per cent to 0.29 per cent till 2003. Comparing the ratio of science output to gross national product, Iran stood at the 13th place among 16 countries in the year 2000.

Harirchi, Melin and Etemad [16] investigated factors behind co-authorship between scientists in Iran and elsewhere. The findings show that co-authored articles were not the result of a collaborative project. The main collaborative motives behind the co-authorships are sharing laboratory devices, accessing knowledge and increased efficiency. Alike Wang, Wang and Weldon [17] analyzed the internationalization of ten of China's English language scientific journals.

The data showed that though the total trend of Impact Factor and Total Citation keeps rising; their subject rank has shown a slight decrease. Davarpana and Behrouzfar [18] explore the globalization and citation rate of Iranian scientific journals covered by the Institute for Scientific Information (ISI) between 2000 and 2006. The study found that the visibility rate of Iranian journals is low as compared to their international complements. Garg and Kumar [19] analyzed 5317 articles and reviews published in 46 Indian science journals indexed by Science Citation Index Expanded (SCIE) during 2006 specifies that these journals chiefly published local papers. Nearly 40% of the papers published in these journals were cited in the international papers during January 2006–June 2009. The results found that collaborative papers had the highest rate of citation per paper.

Mingers and Xu [20] probe the relationship between the number of citations received by papers and factors like author(s), the article itself, and the journal published in six well-known management science journals. The results reveal that the strongest aspect is the journal in which paper is published. The other factors may also be important including the length of the paper, the number of references, the status of the first author's institution, and the type of paper. Sotudeh [21] found that Iran experienced a considerable citation loss, compared to its expectation level. The reason behind this drop is the poor publication approach adopted by Iranian scholars.

OBJECTIVES

The main objectives of the study are:

I. To analyze the growth of Biochemistry, Genetics and Molecular Biology research
II. To find out the source type preferred for publishing research
III. To identify the pattern and growth of citations

METHODOLOGY

The Web of Science database was used to retrieve publication and citation data in the field of Biochemistry, Genetics and Molecular Biology from India. The retrieved results were then analyzed.

SCOPE

The scope of study was limited to the field of Biochemistry, Genetics and Molecular Biology from India from Year 1995–2014.

DATA- ANALYSIS AND INTERPRETATION

Year –wise Distribution of Publications

The journal witnessed progressive trend in the no. of publications over the year with few exceptions. In an aggregate 538 publications have been published during time span of 20 years. Year 1995 and 2002 represent the least productive years with just 11 and 12 publications while as 2011 has been the most productive year with 101 publications (Figure 1).

Fig. 1: *Year- wise Distribution of Publications.*

Compound Annual Growth Rate of Publications

The publication rate has grown 24.51% in last 20 years, thus representing the smoothed annualized gain over the time prospect (Table 1).

Table 1: *Compound Annual Growth Rate of Publications.*

Period	Output Cumulative		CAGR (Compound Annual Growth Rate)
	Initial (1995)	*Final (2014)*	
20 years	11	882	24.51%

Yearly Distribution of Citation Trends among Publications

The publications of the journal showed progressive trend over the years. Publications in Year 2014 and 2012 emerge to be top cited with 694 and 583 citations followed by year 2013 and 2011 receive 568 and 542 citations. Similarly the foreign citations increase with the time, publication of year 2014 and 2013 appear as the pinnacle each receive 423 foreign citations followed by year 2011 and 2012 they both receive 355 foreign citations (Table 2).

Distribution of Source Type and Citation Received

The research output in the field of Biochemistry, Genetics and Molecular Biology is published in diverse formats like research articles journals, Review articles, book reviews etc. based on the type of research performed by the researchers. Out of total 882 publications, 83.79% publications are published as research articles, 8.39% published as a review articles, 4.88% as an editorial, 1.81% as a biography and 1.13% as correction.

Table 2: *Citation Trend of Publications over the Years.*

Year	Total No. of Citations Received	No. of Foreign Citations Received
1995	-	-
1996	0	0
1997	13	9
1998	50	38
1999	50	33
2000	73	59
2001	72	48
2002	56	33
2003	95	44
2004	100	45
2005	112	62
2006	134	74
2007	179	96
2008	238	127
2009	281	157
2010	427	280
2011	542	355
2012	583	355
2013	568	423
2014	694	423

Similarly the articles receive 76.79 citations followed by review articles with 21.01% citations and zero citations in case of correction. The average citation per year of articles is 176.95 followed by review articles having 48.42 citations per year (Table 3).

Table 3: *Distribution of Source Type.*

Publication type	Number	No. of Citations Received	Average Citation per Year
Articles	739 (83.79%)	3362 (76.79%)	176.95
Review	74 (8.39%)	920 (21.01%)	48.42
Editorial	43 (4.88%)	75 (1.71%)	4.41
Biography	16 (1.81%)	21 (0.48%)	1.91
Correction	10 (1.13%)	0	0

Publication and Citation Pattern

From the data, it is evident that 882 publications receive 4378 Citations. Out of total citations receive 4222 are cross citations and only 156 are self citations. The average citation per item is 4.96 (Table 4).

Table 4: *Publication and Citation Pattern.*

No. of publications	822
Total Citations Received	4378
Sum of Times Cited without self-citations	4222
Average Citations per Item	4.96

Foreign Authors Publication Share

From the data, it was found that out of 882 Publications foreign authors share 578 publications and they receive 2646 Citations. Out of 2646 citations 2585 are cross citations and 61are self citations (Table 5).

Table 5: *Foreign Authors Publication Share.*

No. of publications of foreign authors	578
Total Citations Received	2646
Sum of Times Cited without self-citations	2585
Average Citations per Item	4.58

Comparative View of Publications versus Total Citations and Foreign Citations Shares over the Years

The data clearly shows that all the parameters show progressive growth over the years (Figure 2).

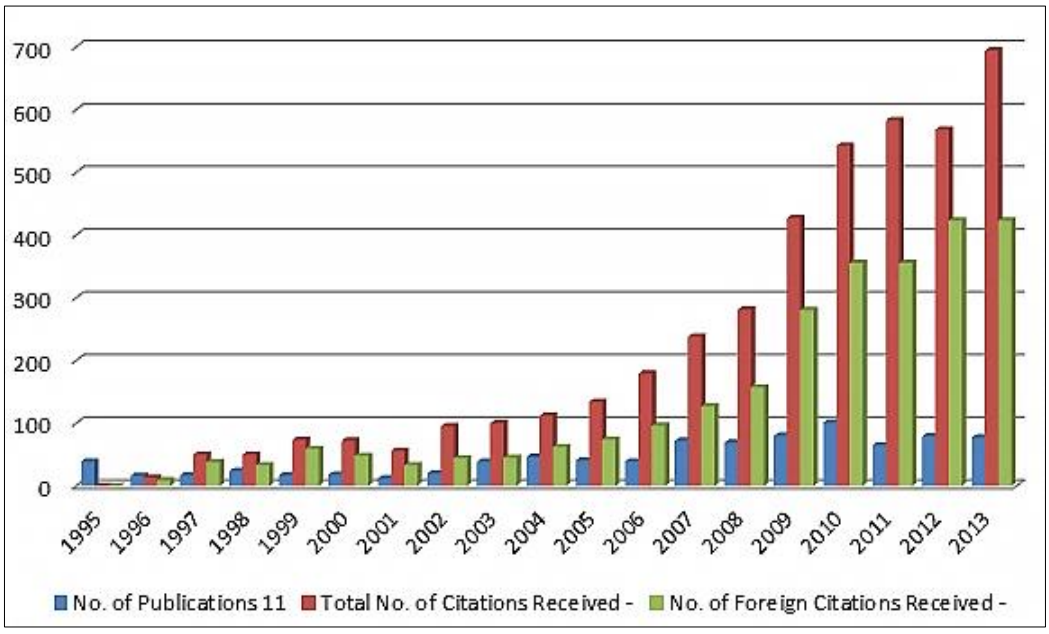

Fig. 2: *Publication and Citation Pattern.*

FINDINGS

The major findings of the study are discussed under following headings:

- 538 publications have been published during time span of 20 years.
- Publication pace has grown 24.51% in last 20 years.
- Publications in Year 2014 and 2012 emerge to be top cited with 694 and 583 citations.

- Foreign citations increase with passing years.
- 83.79% of publications are published as research articles, 8.39% published as a review articles, 4.88% as an Editorial, 1.81% as a Biography and 1.13% as correction.
- Out of 4378 citations receive, 4222 are cross citations and only 156 are self citations.
- Out of 882 Publications foreign authors share 578 publications and they receive 2646 Citations. Out of 2646 citations 2585 are cross citations and 61are self citations.

CONCLUSION

The study provides an overview of growth and development of research output in the field of Biochemistry, Genetics and Molecular Biology published in Indian journal. Although the publications count in journal show increasing trend with qualitative publishing yet, keeping in view the immense importance of the Biochemistry, Genetics and Molecular Biology research particularly for developing nations like India there is much to do to improve the growth and development of scholarly output in the particular field to improve and advance stability of the nation. In above milieu it becomes imperative to deliberate upon the causes that are contributing towards squat research output in the journal.

REFERENCES

1. Eggle l, Rousseau R. Introduction to Informatics: Quantitative Methods in Library. *Documentation and Information Service*. 1990. Retrieved from:http://eprints.rclis.org/archieve/00003297.
2. Tague-sutcliffe J. An Introduction to Informatics. *Inform Process Manag*. 1992; 28(1). Doi:10.1016/0306-4573(92) 90087-G
3. Kessler MM. Comparison of the Results of Bibliographic Coupling and Analytic Subject Indexing. *Am Doc*. 1965; 16(3): 223–233p.
4. Murphy, Benjamin. University Library. *University of Illinois at Urbana-Champaign University of Illinois. University Library*. 2012. Retrieved from: http://www.library.illinois.edu/learn/research/citationanalysis.html.
5. Leta J. Brazilian Scientometrics: From Little to Big? *ISSI Newsletter* 2012; 8(3): 34p. Retrieved from: *http://www.issi-society.info/archives/newsletter31.pdf*
6. Astrom F. Citation Patterns in Open Access Journals, 2007. Retrieved from: http://www.kb.se/Docs/about/projects/openaccess/citation_patterns_final090225.pdf
7. De Bellis N. *Bibliometrics and Citation Analysis: from the Science Citation Index to Cybermetrics.* SCARECROW PRESS, INC. The United States of America, 2009. Retrieved from: http://203.128.31.71/articles/0810867133_LIS.pdf
8. Arunachalam S, Srinivasan R, Raman V. International Collaboration in Science: Participation by the Asian giants. *Scientometrics*. 1993; 30(1): 7–22p. DOI: 10.1007/BF02017209
9. Basu A. Science Publication Indicators for India: Questions of Interpretation. *Scientometrics.* 1999; 44(3): 347–360p. DOI: 10.1007/BF02458484
10. Okubo Y. Internationality of Scientific Journals in China. *Proceedings of International Symposium on Chinese Scientific Journals Being Included in the International Major Index Database,* 18-21 November, Nanjing, PRC, 1999. DOI: 10.1007/s11192-008-2067-y
11. Das AK, Sen BK. Indian Journal of Medical Research –An Analysis of Citation Pattern. *ILA bulletin*, 2001; 37(1): 9–12p. Retrieved January 20, 2011, Retrieved from: http://openmed.nic.in/1219/01/das_sen_ilabulletin_37_1.pdf.
12. Ren S, Rousseau R. International Visibility of Chinese Scientific Journals. *Scientometrics*. 2002; 53(3): 389–405p. DOI:10.1023/A:1014877130166
13. Glanzel W, Schubert A. Analyzing Scientific Networks through Co-Authorship. *Handbook of Quantitative Science and Technology Research*, 2005; (2): 257–276p. DOI: 10.1007/1-4020-2755-9_12
14. Lee CK. A Scientometric Study of the Research Performance of the Institute of Molecular and Cell Biology in Singapore. *Scientometrics*. 2005; 56(1): 95–110p. DOI: 10.1023/A: 1021902724734.

15. Moin M, Mahmoudi M, Rezaei N. Scientific Output of Iran at the Threshold of the 21st Century. *Scientometrics*. 2005; 239: 248p. DOI: 10.1007/s11192-005-0017-5
16. Harirchi G, Melin G, Etemad S. An Exploratory Study of the Feature of Iranian Co-authorships in Biology, Chemistry and Physics. *Scientometrics.* 2007; 72(1): 11–24p. DOI: 10.1007/s11192-007-1693-0.
17. Wang S, Wang H, Weldon PR. Bibliometric Analysis of English-language Academic Journals of China and their Internationalization. *Scientometrics*. 2007; 73(3): 331–43p. DOI: 10.1007/s11192-007-1775-z.
18. Davarpana MR, Behrouzfar H. International Visibility of Iranian ISI Journals: A Citation Study. *Aslib Proceedings*, 2009; 61(4): 407–419p. DOI: 10.1108/00012530910973802
19. Garg KC, Kumar S. An Analysis of the Citation Pattern of Indian Science Journals Indexed by SCIE. *Ann Lib Inform Stud. (ALIS)*, 2010; 57(4): 365–372p. Retrieved fromhttp://nopr.niscair.res.in/handle/123456789/11054
20. Mingers J, Xu F. Thedrivers of Citations in Management Science Journals. *Eur J Oper Res.* 2010; 205(2): 422–430p. DOI:10.1016/j.ejor.2009.12.008
21. Sotudeh H. Concentration Effect of Citation to Iranian Papers: Iran's Matthew Core Journals. *Online Inform Rev*. 2011; 35(3): 471–491p.

Cite this Article
Tawfeeq Nazir. Bibliometric Analysis of Biochemistry, Genetics and Molecular Biology Research output. *Journal of Advancements in Library Sciences.* 2015; 2(2): 18–24p.