CHAPTER 1
INTRODUCTION

The chapter will give an introduction to Bibliometrics, Scientometrics, Webometrics, and Productivity of Authors, Productivity Patterns and to specify objectives methodology and conspectus of the study.

1.1 Preamble

In most academic disciplines Journals play an important role in disseminating findings of research among the disciplinary community members. Understanding a discipline's body of journals is therefore of grave importance when looking for previous research, compiling an overview of previous research and in order to make a decision regarding the best place for publishing research results.

Most people date the birth of the modern scientific journal to the middle of the 17th century, when the Royal Society in England took advantage of the growing printing industry to begin publishing proceedings of their meetings for the benefit of members unable to attend, as well as for posterity.

But scholarly journals as we know them were really a product of the 19th century, when growing activity and public interest in science led to the creation of most of the big titles we know about today: Science, Nature, The New England Journal of Medicine, The Journal of the American Medical Association and The Lancet published their first editions in the 1800’s.

They had noble missions. For example, the preface to the first edition of Science in July 1880 stated that its goal was to “afford scientific workers in the United States the opportunity of promptly recording the fruits of their researches, and facilities for communication between one another and the world”.

Like their predecessor, these journals were enabled by the technologies of the industrial revolution – steam powered rotary printing presses and efficient rail-based mail service. But they were also severely limited by them. Printing and
shipping articles around the country and the world was expensive, and because of this, two key features of modern journals were established.

First, journals limited what they printed, choosing for publication only those works deemed to be of the greatest interest to their target audience. And second, they sold subscriptions – sending copies only to those who had paid. While intrinsically restricting, this business arrangement made sense. Every printed copy of a journal incurred a cost to the publisher, and charging readers meant revenues scaled with costs.

As science grew, so too did science publishing, with increasingly specific journals emerging to cater to new disciplines. By 1990 there were around 5,000 scientific journals in circulation, all of them printed and shipped to subscribers. And the costs were skyrocketing. If you were lucky enough to be at a major research university, you could find most of these journals in the library. But most scientists had to make do with a small subset – whatever their library could afford. And the public was all but completely shut out.

Then along came the Internet. Scientific journals, serving a computer savvy audience with access to fast Internet connections through universities, were amongst the first commercial ventures to take advantage of this new technology. Within a few years – from 1995 to 1998 – virtually all major publishers put versions of their printed journals online.

Scientific journals represent the most vital means for disseminating research findings and are usually specialized for different academic disciplines or sub-disciplines. Often, the research challenges common assumptions and/or the research data presented in the published scientific literature in order to gain a clearer understanding of the facts and findings. Depending upon the policies of a given journal, articles may include reports of original research, re-analyses of others’ research, reviews of the literature in a specific area, proposals of new but untested theories, or opinion pieces. The terms periodical & serial are more generic and refer to all type of these materials.
1.2 Proposed Research

The proposed research is conducted to analyze ‘Journal of antimicrobial Chemotherapy’ through scientometric methods, which have been recognized as one of the important journal resources in the field of antimicrobial research. This thesis constitutes an overview of the scientometric methodology to perform quantitative research on ‘Journal of antimicrobial Chemotherapy’. So far, most of the research on scientific journals scientometric methods has been used from an information science perspective.

The terms Scientometric Bibliometrics, Informetrics and Webometrics are derived out of fusion of or combination of the terms with science, bibliographic information and web respectively. These terms are analogous or synonymous to each other; in other words all these concepts are supplementary or complementary to each other. All these terms are directly related to measuring of generated and collected knowledge; these terms are associated with the study of growth patterns of literature or recorded knowledge (Hood & Wilson, 2001).

Scientometrics involves quantitative studies of scientific activities. Science is a measurable substance and consequently the manpower engaged in science, the scientific literature, talent and expenses afforded to science could be measured by properly selected statistical methods. Scientometrics includes all quantitative aspects science of science, communication in science and science policy (Price, 1963).

1.2.1 Statement of Research Title

Scientometric studies include quantitative and qualitative techniques. For this purpose, several science indicators have been developed and used. The most commonly used indicator is the number of publications. To measure quality of journal present research focuses on author productivity and productivity patterns of authors writing in ‘Journal of antimicrobial Chemotherapy’, as it is a key source for microbiologists, pharmaceutical researchers, biochemists, pharmacologists, clinicians, and other specialists in antimicrobial research. The Journal of Antimicrobial Chemotherapy is a journal of the British Society
for Antimicrobial Chemotherapy (BSAC) and is among the foremost international journals in antimicrobial research. Readers of this journal include representatives of academia, industry and health services, and include those who are influential in formulary decisions.

Published monthly, the Journal features original articles on the laboratory aspects and clinical use of antimicrobials including antibacterial, antiviral, antifungal, and antiprotozoal agents.

In addition to the wealth of primary papers, the journal carries review articles offering in-depth discussion on matters of topical concern. Lively leading articles offer incisive coverage of recent advances and controversies.

The Journal publishes between two and eight supplements each year. These include Working Party reports of the British Society for Antimicrobial Chemotherapy, and original publications on pre-clinical and clinical aspects of drugs in development or the role of established drugs in specific therapeutic areas.

Scientific Journals are primary source of information and an important media for communication. They play a major role for communicating the latest research findings through publishing articles containing the current development in any field of knowledge. Information is one of the most important resources for a nation that forms the integral base for its economy. Information is growing out in an exponential rate which is often referred to as information explosion.

Periodicals publication is also increasing day by day since the first scientific journal started publication in 1665. Periodicals are the indicators of literature growth in any field of knowledge. The advent of Internet technology has led to changes in the way journals operate, including faster review times, electronic submissions and tracking, and online publications. Online access of scientific literature has brought remarkable changes in the way knowledge is shared and disseminates due to its easy availability.

In this research considered Journal of Antimicrobial Chemotherapy to analyse different scientometric data for a period of thirty five years (1975-2010)
because in recent past the journal has showed a remarkable growth both quantitatively and qualitatively (Impact factor 5.313 during 2015).

Hence the present research “Scientometric Study of Journal of Antimicrobial Chemotherapy” has been undertaken.

1.3 Explanation of concepts

1.3.1 Scientometrics
Scientometrics is defined as “the study of the measurement of scientific and technological progress” (Brusilovsky, 1978). “The quantitative evaluation and intercomparison of scientific activity, productivity and progress (Beck, 1978). “Part of scientometrics consists of applying number crunching techniques to the study of science of science (Malin, 1979).

1.3.2 Bibliometrics
Allen Pritchard, (1969) who first used the term bibliometrics described it as “application of mathematical and statistical methods to books and other media of communication.”

1.3.3 Productivity
In general productivity means power to produce, fruitfulness. According to the Concise Oxford Dictionary of Current English, the term productivity is defined as ‘the capacity to produce, the state of being productive, and the effectiveness of productive effort are production per unit of effort.’ It feels that the meaning of productivity word given by the dictionary is related to the industry. The meaning of productivity is expected in this research is “Production of publication by an author.”

1.3.4 Productivity Patterns
The term productivity pattern reflects on author productivity etc.

1.3.5 Authorship pattern
When two or more authors jointly produce a publication is called as collaboration. Authorship pattern is important for scientists and researchers to know the research work in order to determine the number of authors (both
single and joint collaborative) contribution of their work (Mahapatra & Rudranarayan, 2004).

1.4 Objectives of the study

Present study has been undertaken with a view.

1. To analyse contents of ‘Journal of antimicrobial Chemotherapy’.


3. To Study Productivity patterns of authors publishing in ‘Journal of antimicrobial Chemotherapy’.

1.5 Hypothesis

Following were the hypothesis formulated for the study;

1) Majority of Authors writing in this journal are from European countries.

2) Majority of Microbiologist and Pharmacist give input to the journal.

3) ‘Journal of antimicrobial Chemotherapy’ is a forum exclusively devoted to laboratory aspects and clinical use of antimicrobials including antibacterial, antiviral and antiprotozoal agents.

4) Teams increasingly dominate solo authors in the production of knowledge.

5) Experts on editorial and advisory board write more papers in the journal.

1.6 Scope and Limitations

Scope of the present study is limited to Journal of Antimicrobial Chemotherapy. Further the study is limited to the data collected from the year 1975 to 2010 only.
1.7 Methodology

This research is based on the analysis of research papers published in Journal of Antimicrobial Chemotherapy, which is analysed by using various scientometric techniques.

Scientometric method of research is used for present study. The method is used in library and information science research. It utilizes quantitative analysis and statistics to describe patterns of publication within a given field or body of literature.

Researchers may use the scientometric methods of evaluation to determine the influence of a single writer or to describe the relationship between two or more writers or works (University of Texas, 2015). Scientometrics is the application of mathematical and statistical methods for measuring quantitative and qualitative changes in collections of books and other media. By using quantitative analysis it is, for instance, possible to measure the scattering of articles to different journals or to measure the growth and obsolescence of literature in different subject fields. Scientometric studies can be used to study the regional pattern of research, the extent of cooperation between research groups and national research profiles. The methods are objective and repeatable; to be of practical value, however, the results must be applied to a complex reality (Ungern-Sternberg, 1995).

The steps in the methodology include:

a) Data collection;

b) Data analysis and Interpretation

1.7.1 Data collection

Data is collected from all issues i.e. from 1975 to 2010 of ‘Journal of Antimicrobial Chemotherapy’ available on Internet and data will be analyzed by using statistical parameters.
1.7.2 Data analysis and interpretation
Data is collected from all issues i.e. from 1975 to 2010 of ‘Journal of Antimicrobial Chemotherapy’ available on Internet and data will be analyzed by using statistical parameters.

1.8 Summary of major conclusions & Implications

1.8.1. Conclusions
1. The *Journal of Antimicrobial Chemotherapy* is among the foremost international journals in antimicrobial research. Published monthly, the Journal features original articles on the laboratory aspects and clinical use of antimicrobials including antibacterial, antiviral, antifungal, and antiprotozoal agents.

The Journal publishes between two and eight supplements each year. These include Working Party reports of the British Society for Antimicrobial Chemotherapy, and original publications on pre-clinical and clinical aspects of drugs in development or the role of established drugs in specific therapeutic areas. *Journal of Antimicrobial Chemotherapy* articles are free at PubMed Central after 12 months of its publication. *Journal of Antimicrobial Chemotherapy* has started its publication from 1975. So far, 65 Volumes have been published. During the first two years of publication four issues per volume each year were published, during 1977-1980 six issues per volume each year and since 1981-2008 six issues per volume with two volumes each year were published i.e. from Volume 7-62.

*Journal of Antimicrobial Chemotherapy* has an impact factor of 5.439 during the year 2013. This information is taken from the Journal Citation Reports, published annually as part of the Science Citation Index by ISI. It is ranked # 6th by impact factor out of 70 journals in ‘Infectious Disease’ category, ranked #17 out of 119 journals in ‘Microbiology’ and ranked #17 out of 254 journals in ‘Pharmacology & Pharmacy’ category during the year 2013.

Microbiologists study microbes—bacteria, viruses, mycoplasma, fungi, algae and protozoa—some of which cause diseases, but many of which
contribute to the balance of nature or are otherwise beneficial. Microbiological research includes infectious diseases, recombinant DNA technology, alternative methods of energy production and waste recycling, new sources of food, new drug development, and the etiology of sexually transmitted diseases, among other areas. Microbiology is also concerned with environmental problems and industrial processes.

Following are the sections of Journal of Antimicrobial Chemotherapy:

Leading articles, Reviews, The Garrod Lecture, For debate, Original articles, Brief reports, Antimicrobial practice, Meeting reports, Correspondence, Book reviews.

2. Present study covered 392 Issues from 1975 to 2010 in which 10638 articles were published. All these 10638 articles were written by 46232 authors. The average numbers of authors per paper were 4.34. The rank list of authors was prepared by two different methods first a general list of authors by giving equal weightage to every author and second by giving weightage to first author only.

3. The total number of authors (author at any position) it is was found that Richard Wise, who participated in a maximum of 202 publications stood at first rank and is the most productive author, while David M. Livermore contributed 154 articles and stood at second rank followed by Jenny M. Andrews, D. S. Reeves and A. P. MacGowan at third, fourth and fifth rank respectively.

4. It is concluded that authors at any position top 20 ranking authors totaling 27 authors almost 22 authors (highlighted bold) were from editorial board which is almost 81 % among the top 20 authors. The journal had 263 experts on their editorial board and amongst them 225 had published 3638 articles during 1975-2010 which is 34.19 % of total articles (10638) published by 46232 authors. This indicates that “Experts on editorial and advisory board writes more papers in the journal” (Hypothesis No. 5) is Valid.

5. It is noteworthy that authors contributing at first position 13 authors among the 26 authors (mark bold) are from the editorial board. This
indicates that “Experts on editorial and advisory board writes more papers in the journal” (Hypothesis No. 5) is Valid.

6. Subject wise productivity was determined through keywords provided by authors. It can be noted that the highest number of articles are on pharmacology 1214 (9.58%) during the study period followed by drug resistance 1075 (8.48%) and drug effect at third position with 807 keywords (6.37%). However it is noteworthy that 100% of the articles are related to laboratory aspects and clinical use of different antibiotics against different diseases in humans.

7. It can also be noted that articles with keywords Antimicrobial agents/antimicrobials, Antibacterial Agents and antiviral/antiviral-agents jointly accounts for 8.86 % of total keywords. This indicates that the hypothesis “Journal of antimicrobial Chemotherapy is a forum exclusively devoted to laboratory aspects and clinical use of antimicrobials including antibacterial, antiviral and antiprotozoal agents”. (Hypothesis No. 3) is valid.

8. The Journal of Antimicrobial Chemotherapy publishes between two and eight supplements each year. These include Working Party reports of the British Society for Antimicrobial Chemotherapy, and original publications on pre-clinical and clinical aspects of drugs in development or the role of established drugs in specific therapeutic areas. The journal consist 150 supplements published during 1975 to 2010. There were 2309 articles published in these supplement.

9. Supplements published along with the Journal of Antimicrobial Chemotherapy under study covered 150 supplements from 1975 to 2010 in which 2309 articles were published. All these 2309 articles were written by 4746 authors. The average numbers of authors per paper were 2.05.

10. It can also be noted that top 10 ranking authors totaling 19 authors almost 7 authors (highlighted bold) were from editorial board which is almost 38 % among the top 10 authors. All top 10 authors (19 authors) published 292
articles and those on editorial board (7 authors) published 161 articles which is almost 55.13 %. This indicates that “Experts on editorial and advisory board writes more papers in the journal” (Hypothesis No. 5) is valid.

11. It is can be seen while analyzing supplement data that top ten authors with their contribution as a first author, 1685 authors had written articles with first position. It is noteworthy that again Richard Wise, who contributed 23 publications at first position and placed at first rank, while R G Finch contributed 19 articles with second rank, D M Livermore and P. G. Davey both of them contributed 11 articles are at third rank, D Felmingham and Harold C. Neu, fourth and D. A. Leigh and D. S. Reeves at fifth rank. It can also be noted from the above table that 11 authors among the 31 authors are from the editorial board. Top 10 ranking authors (31 authors) contributed 220 articles out of which 11 authors from editorial board contributed 108 articles which are 49% of top ten authors. This indicates that “Experts on editorial and advisory board writes more papers in the journal” (Hypothesis No. 5) is valid.

12. While determining the year wise productivity of supplement published along with the journal is seen that shows the irregular growth of supplements of Journal of antimicrobial Chemotherapy for the period 1975 to 2010 (35 years). The most productive year was 1983, as total productivity in this year was 183, followed by (178) 1982 and (169) in 1986 after 1993 there is consistently low productive growth rate is seen with up’s and down.

13. While determining relative growth rate of supplements it concluded that RGR has consistently decreased from 1976 (0.39) to 2010 (0.01) in the span of 35 years.

14. While calculating doubling time for supplements there is inconsistency in doubling. The doubling time increases over the entire years under the study. This suggests that the growth rate is not constant as the time period increases.
15. It is further observed that, in the year wise authorship pattern the highest number of single authored publications was 45 in the year 1988 and highest number of multiple authors was 608 during the year 2008, which indicates that “**Teams increasingly dominate solo authors in the production of knowledge.**” (Hypothesis no. 4) is valid.

16. The Degree of Collaboration of authors from Journal of Antimicrobial Chemotherapy during 1975-2010. It was observed that Degree of Collaboration consistently increased over the years and the highest was recorded in the year 2010 with 0.98. Even though there were fluctuations in degree of collaboration, since 1975 (0.56) it was progressively increased which indicates that “**Teams increasingly dominate solo authors in the production of knowledge.**” (Hypothesis no. 4) is valid.

17. It clearly shows that the percentage of multi-authored papers is far more than that of the single-authored papers. They are 89.53% (multi-authored papers) and 10.47% (single-authored papers) respectively. It indicates that “**Teams increasingly dominate solo authors in the production of knowledge.**” (Hypothesis no. 4) is valid.

18. The total articles under study (10638) the department wise authorship pattern it is prominently seen that Authors from department of Microbiology are leading contributors with 7169 (15.51%) followed by Department of Medicine with 6306 (13.64%) authors, department of Infectious diseases is at third position with 3894 (8.42%) authors. It can be noted from top 40 departments with 36632 (79.24%) contributed to the Journal of Antimicrobial Chemotherapy that majority of them are microbiologist and pharmacists. It can also be noted that there are 652 (1.41%) authors whose affiliation is not mentioned while providing authors information hence considered as unknown. From the figure 4.1.2.4 it can be seen that 45.5% are microbiologists and 33.49% are Pharmacists while 21% are from miscellaneous represents departments. Hence it can be concluded that “**Majority of Microbiologist and Pharmacist give input to the journal**, (Hypothesis number 2) is valid.
19. While determining authorship patterns of supplements to Journal of Antimicrobial Chemotherapy. It could be noted that single authored papers rank first in order sharing 32%. The next place is recorded by 5 to 9 authored papers sharing 20% of the total research contributions. Two authored contributions take that third position in order occupying 18% of the total research output during the study period followed by between Three and four authored papers (17%) and (12%) respectively. The least percentage was recorded by more than ten authored publications with 1%. A significant note of the study is that the majority of the publications are contributed by multiple authors which indicate that “Teams increasingly dominate solo authors in the production of knowledge.” (Hypothesis no. 4) is valid.

20. While determining authorship patterns of supplements to Journal of Antimicrobial Chemotherapy. It could be noted that single authored papers rank first in order sharing 32%. The next place is recorded by 5 to 9 authored papers sharing 20% of the total research contributions. Two authored contributions take that third position in order occupying 18% of the total research output during the study period followed by between Three and four authored papers (17%) and (12%) respectively. The least percentage was recorded by more than ten authored publications with 1%. A significant note of the study is that the majority of the publications are contributed by multiple authors which indicate that “Teams increasingly dominate solo authors in the production of knowledge.” (Hypothesis no. 4) is valid.

21. It can be seen that USA rank first with 1089 authors (22.95%) and is topmost contributing country to supplements to Journal of Antimicrobial Chemotherapy, while UK rank second with 945 (19.91%) authors, France rank third with 739 (15.57%), England rank fourth with 347 (7.31%), and Germany rank fifth with 316 (6.66%) authors contributing there articles, however there are no contributions from India authors. It can also be noted from the table and figure 4.2.7 that majority of authors contributed in the
supplement to Journal of Antimicrobial Chemotherapy are from European countries (Highlighted in Bold). Authors from European continent (69.28%) are the highest contributors to the supplements. This indicates that “majority of authors writing in this journal are from European countries”. (Hypothesis No. 1) is valid.

1.8.2.2 Implications for authors

While collecting bibliographic details of the articles the designation of author was missing which has played stumbling block in author analysis by their designation, therefore each author should give their designation as well as specialization.

1.9 Conspectus

The present thesis has been divided into 5 chapters viz.

Chapter 1 – Introduction

This chapter deals with the preamble, proposed research, objectives, hypothesis, scope & limitations, methodology, summary of major conclusion & implications, & conspectus.

Chapter 2 - Scientometric: A Review

Explain definitions of bibliometrics, Scientrometrics, etc. and review of related literature.

Chapter 3 – Journal of Antimicrobial Chemotherapy

Presents brief profile of Journal of Antimicrobial Chemotherapy, its objectives, functions & detailed information about journal.

Chapter 4 – Scientometric Study of Journal of Antimicrobial Chemotherapy
This chapter deals with the Scientometric Study of Journal of Antimicrobial Chemotherapy. It has been analysed under the major headings viz. Author Productivity, Authorship Patterns. The chapter is divided into two sections viz. 4.1 (Antimicrobial Chemotherapy – Journal data) and 4.2 (Antimicrobial Chemotherapy – Supplement data)

Chapter 5— Major Conclusions and Implications

Summarizes the major findings and implications, presents the conclusions drawn.

The thesis ends with the list of bibliographical references.

1.10 Conclusion

Present chapter has given objectives, methodology, etc of the study since present study is using Scientometric method, it was felt necessary to review the relevant published literature. Chapter-2 provides the review of related literature on the subject Bibliometrics in general and productivity patterns in particular.

References


