CHAPTER 5
FINDINGS AND DISCUSSION

5.1 Introduction

The present study “Indian Genetics Literature: A scientometric study” has been undertaken to assess and analyse the status of Indian Genetics literature in comparison with other major countries of the World. The study includes growth of literature, productivity in different branches, authorship pattern and collaboration, correlation study and productivity of scientific institutions and related journals in the field of Genetics. For the study, relevant data is retrieved from PubMed and other databases using advanced search option. Different statistical measures like growth models and scientometric indexes are applied on the data to get values free from errors and the analysis reveals following findings.

5.2 Significant Findings

The significant findings of the present study in the field of Genetics are summarized below:

Relative Growth Rate and Doubling Time
1 The mean relative growth rate and doubling time in the field of Genetics for world’s publication output is 0.47 and 1.9 showing inverse proportion between values of relative growth rate and doubling time in GenBank database.
2 The mean relative growth rate and doubling time in the field of Genetics for world publication output is 0.19 and 5.13 and 0.25 and 3.31 for Indian literature showing inverse proportion between values of relative growth rate and doubling time in PubMed database.
3 The relative growth rate shows a trend from 0.74 to 0.08 for world literature and 0.78 to 0.15 for Indian publication output. The doubling time has increased from 0.94 to 8.45 for world literature and from 0.88 to 4.45 for Indian literature in PubMed database.
4 The distribution of articles among 10 branches of Genetics reveals that maximum number of articles is published in Molecular genetics (8264795) with maximum mean relative growth rate of 0.34 and doubling time of 11.10.
The number of articles is the least in Evolutionary genetics (321693) with mean relative growth rate of 0.43 and doubling time 7.46.

India has produced 21884 papers related to Genetics during 1993-2012 with gradual increase in publications year by year. India ranks the 3rd among major Asia countries and occupies the 9th position among major cross nations with respect to number of publications output in the field of Genetics.

Application of Growth Models

Both Exponential and Logistic growth models (0.992) equally fit well for Indian Genetics publication data whereas for world literature Logarithmic and Linear growth models (0.994) fit well equally.

Among branches of Genetics, exponential growth curve fits well for the branch Genomics (0.982).

Activity Index

India shows the highest Activity Index for the branch Microbial genetics.

India gives maximum priority to Microbial genetics and minimum priority to Developmental genetics during both block periods (1993-2002 and 2003-2012).

Microbial genetics in India is identified as the field of thrust with Population genetics and Genomics in the field of high priority.

Correlation Coefficient

There is high degree of correlation between branches of Genetics. The highest degree of correlation exists between branches Molecular genetics and Human genetics (0.998).

Factor Analysis

Factor analysis of branches of Genetics shows Molecular genetics as the only factor contributing about 96% and remaining 4% is contributed by other branches of Genetics.

The Attractivity index is highest for the branch Molecular genetics in India during both the block periods.
The journal Nature Genetics has the highest impact factor of 35.21 among Genetics journals. The Relative Citation Impact of major countries in the field of Genetics is more than one indicating higher citation rate compared to world citation rate. The citation per paper in India in the field of Genetics has increased till 2002 but decreased from 18.35 to 0.48 during 2002-2012 which may be because of the lack of time lag by the recent publications to receive more citations.

**Collaboration study**

17 The contribution of single-author, double-authors and three-authored publications has decreased from 5% to 2.5%, 24% to 15% and 24% to 19% during 1993-2002 to 2003-2012 respectively.
18 The proportion of four and more than four-author publications has increased from 47% during 1993-2002 to 64% during 2003-2012 with the average percentage being 60.7% for the entire period of 20 years which may be due to interdisciplinary research and team work.
19 The values of Collaboration coefficient, collaboration index and Degree of collaboration in the field of Genetics have increased gradually from 0.60 in 1993 to 0.74 in 2012, 2.8 in 1993 to 3.35 in 2012 and 0.84 for two-authored publications to 0.96 for ten and above, except a slight fluctuation in three-authored publications showing 0.80 respectively indicating the trend towards collaborative publications.

**Ranking of Genetics Journals**

20 Among various sources, Journal articles (99.8%) supported and funded by Non-US Government agencies form a major source of scientific information in the field of Genetics.
21 Out of 2171 Genetics journals, PLoS ranks first with 406 articles (1.82%) followed by Indian Journal of Medical Research with 363 articles (1.62%).
22 The distribution pattern of the articles in Genetics journals follows the Bradford’s distribution which shows that the Bradford’s law of scattering positively fits with the Indian Genetics literature.
Ranking of Institutions

23 Among institutes in India, a total of 82% is contributed by R and D institutes and remaining 18% is contributed by Universities in the field of Genetics.

24 Indian Institute of Science contributes highest publications of 988 (4.42%) on Genetics followed by All India Institute of Medical Sciences with 896 (4.01%).

25 Among Indian universities, University of Delhi, South Campus stands first with 220 (5.58%) publications of the total output in the field of Genetics followed by Punjab University with 156 (3.95%).

5.3 Further Research

Indian Genetics publication output is gradually increasing year by year. Despite this growth rate, to help the policy makers and science managers to try to find different ways to increase the quality of the research publication and to raise citation per document more number of detailed studies has to be carried out. This needs the study that includes the use of advanced evaluative bibliometric techniques on data retrieved from a database with advanced search option covering all the Indian Genetics publication output. Also the study on Obsolescence of literature in the field of Genetics with special reference to India will be of very much use to the librarians and managers of information centres.

5.4 Conclusion

Research is the backbone of any field/subject, not just undertaken for the sake of its survival and sustenance but for the furtherance of the subject scope. Most of the research activities undertaken at any level, aim at the welfare and betterment of living being with human being the first consideration. Genetics, often called the core science of biology has always been the supreme fantasy of humans as it has got direct bearing upon not only human health and longevity of life but also on animals and plants life.

The main objective of the study reveals the status of Genetics in the country, its strong and weaker areas of research, quantity and quality of research output, dynamics of research across institutes and geographic regions. The study provides the qualitative
and quantitative analysis of the progress of Indian Genetics literature as reflected by its publications output reported in the different databases. Such a study may prove to be of use to the Indian science policy makers and managers to have an insight of the Genetics situation in the country. The application of Science indicators are useful both for descriptive as well as analytical purposes. On one hand these indicators identify trends, make comparisons or give explicit information on specific science policy issue; while on the other hand these are used as an aid to theoretical understanding of casual structure related to system of Genetics. Findings of the study have tremendous value for applications. They are useful to students, teachers, research scholars, scientists and library and information science professionals for their collection development in their library.