

*Full Length Research Paper*

# A study of scientometrics analysis of research output performance of malaria

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The Scientometrics Analysis of Research Output performance of Malaria research literature is an important aspect of the present study. Scientometrics studies are used to identify the pattern of publication, authorship, citations and secondary journal coverage in the hope such regularities can give an insight into the dynamics of the area under consideration. During 2003-2007 a total of 15685 papers were published by the scientists in the field of malarial research. The average Number of Publications produced per year was 20%. The highest number of publications 3731 was produced in 2006. The most productive author is White N J with 136 papers dealing with malarial research and 0.9% of all papers published in this research field. The highest number of publication is accounted to 11758 (74.96%) Vs LCS 44000 as Articles and lowest is as Bibliography - 1 Vs LCS 0. The highest number of publication is at USA and lowest number of publication is at West Indis (Assoc.St.).

**Keywords:** Scientometric, Malaria research, bibliometric study, Scientometric Analysis

## INTRODUCTION

'Scientometrics' the branch science of science that describes the output traits in terms of organizational research structure, resource inputs and outputs, develops benchmarks to evaluate the quality of information output. Scientometric studies characterize the disciplines using the growth of the pattern and other attributes. These studies have potential particularly in assessing the emerging disciplines. In the present study, we are doing the scientometric study of the research performance on Malaria, a significantly growing area in the knowledge-driven world.

## Applications of Scientometrics

Scientometrics as a technique has extensive applications in identifying the research trends in a subject, trends in

## Abbreviations

TLCS, Total Local Citation Score; TGCS, Total Global Citation Score; TCR, Total Cited Reference

an authorship and collaboration in research, core periodicals, obsolescence and dispersion of scientific literature useful in estimating the comprehensive of secondary periodicals, studying the author's productivity and impact of research, distribution of scientific publications by the research organization, citation studies and so on. Further, Scientometrics could be used in the identification of emerging research areas.

## Statement of the problem

The present study pointing out of analyzing the research output performance of Malaria in Global perspective. In academic and scientific work, publication means of communicating research, primarily of recognition and reward and central social process in the Universities. Therefore through publication the scientists receive professional recognition and esteem as well as promotion, advancement, and funding for the future research. Publication is so central to productivity in research that the work becomes 'a work' only when it takes a conventional, physical (that is published) form, which was received, assessed and acknowledged by the scientific community. Hence publication is a social norm

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in a public sense and serves as a tool for the betterment of the individuals. After the publication, it can be called as research and can be fixed or judged and acknowledged by the scientists in the society.

## Review of Literature

This chapter deals with the relevant Review of Literature. The analysis of the review of literature is the key focus of any research. It enables to be aware of the past and current trends in any particular branch of research. Research on Scientometric study is the performance on Malaria has attracted the attention of various scholars, researchers, information scientists and library personals throughout the world. Their contributions in various research outputs and an analysis of these research findings enables the researcher to identify the research gap. This type of identification enables the researcher to concentrate on a new area of research.

Khurshid and Sahai, (1991) There is great consistency among the various bibliometric, scientometric and informetric laws. The Bradford law deals with the increased scattering of relevant papers on a fixed topic (Bradford, 1934) Brusilovsky, (1978). The scientometric law concerns the frequency of authors writing papers (A. Lotka, 1926) (Lyon, (1979) and the informetric law concerns the frequency of word occurrence. Before embarking on a research project in bibliometric, scientometric and informetric distributions and laws, it is imperative to know what has been done previously in this area. The purpose of this bibliography is to provide a list of articles and other pertinent publications, so as to facilitate the work of other researchers in this field.

## Purpose of the study

□ To determine the Citation analysis is one of the popular methods employed for identification of core documents and complex relationship between citing and cited documents for a particular scholarly community in a geographical proximity.

□ The present citation study is to understand the information and communication channels, in one of the multidisciplinary subject of malaria published in articles from Journals; authors form book and papers from Conference Proceedings in 5 years that is from 2003 to 2007

□ To examine the utility of tertiary sources like handbooks.

## Scope of the Study

The main purpose of the study is to find out the information about the recent communication trends in the

advancement of the field of Multidisciplinary subject a citation analysis "Malaria" and for this purpose, the study is based on articles in journals, authors published the books and papers published in conference proceedings published on Malaria subject from 2003 to 2007 Using statistical techniques like histogram charts, bar charts etc, these will be used to interpret the data. More about this is described in

## Limitations of the Study

The study undertaken is limited to 5 years, i.e. 2003-2007.

It is limited to basic items copied from the handbook.

It is a small scale study, which may need to be indicated by the states.

Here we did Citation analysis of tertiary source of information

In this study we did not include the citation analysis on patents.

## Objectives of the Study

The main objective of this study is to study the citation analysis of malaria in respect of;

1. The number of articles published in journals.
2. The frequency distribution of articles in journal by mentioned year.
3. The number of citing authors in Books.
4. The number of papers published in conference proceedings.
5. Determine the year-wise distribution of citations.
6. Study the use pattern of different type of documents cited.
7. Observe the year wise publication of citations in journals and their distribution.
8. Observe the Authors wise citation to the book.
9. Observe the publications of conference proceedings for distinctive period.

## Hypothesis

In order to study the above mentioned objectives, the following hypotheses are formulated and they are tested with appropriate statistical tools.

1. The Journal source of publication of Science and Technology research output occupies a predominant place while comparing other sources of publications.
2. There is a significant level of variation in research output performance in various
3. Trend and significantly doubling time for publications explain an increasing trend.
4. There is a significant level of variation in research

**Table 1.** Showing Year-wise Distribution of Total Research Output on Malaria

S.NO	YEAR	RESEARCH OUTPUT	PERCENTAGE	CUM. %
1	2003	2604	16.60	16.60
2	2004	3035	19.35	35.95
3	2005	3234	20.62	56.57
4	2006	3731	23.79	80.36
5	2007	3081	19.64	100.00
	<b>TOTAL</b>	<b>15685</b>	<b>100.00</b>	

output in various branches of Science and Technology.

5. There has been an increasing trend in collaborative scientific research in recent years.
6. The Implication of Lotka's law is related to author productivity in scientific literature.
7. The Implication of Bradford's distribution is related to journal output of malaria.

### Methodology

1. The study entitled " scientometric study of the research performance on malaria 2003-2007: a global perspective" is a case study encompassing records output on web of science web site
2. The aim of the present study is analyze the research output of malaria in the field of Science and Technology.
3. The growth rates of output in terms of both at absolute level and relative level are analyzed from 2003-2007.
4. The authorship pattern and author productivity are examined to identify the pattern of research contribution in the field of science.
5. The study is mainly exploratory in nature in identifying research output of malaria and it is also analyze in nature in strengthening the empirical validity due to application of suitable statistical tools.

### Data collection

The publications of malaria are mostly in the form of primary Journals, Notes", Letters, reviews, Editorial-materials, Meeting-abstracts, Bibliographic-items and Discussions. The research papers published by web of science in the field of Science and Technology covered and index database were taken as the prime source for the present study. web of science database which is considered to be a prime source of data for the present study. The bibliographical details of publications were entered in the catalogue cards. Finally the cards were arranged in different ways with a view to identify the research performance of faculty Members.

## RESULT AND DISCUSSION

### Showing Year-wise Distribution of Total Research Output on Malaria

Analysing the research output performance of Malaria in Global perspective is a yard stick to observe the performance of an area in a particular discipline of scientific research.

In the present study the research output on Science and Technology Publication is taken as a tool to evaluate the performance at various levels.

Malaria research output of research publication at a global level is mainly concentrated in the table 1. This table indicates the total output made by the year wise distribution of research publication in field of malaria [Bujdoso, et al (1981)] between 2003 and 2007. The number of publication is accounted to 2604 in 2003 and it raised upto 3081 in 2007. The publication output in 2006 is noted to be the highest productivity of 23.79 per cent output over the study period.

Malaria research output of research publication at a global level is mainly concentrated in the table 2. This table indicates the total output made by the year wise distribution of total research output Vs Global citation score research publication in field of malaria between 2003 and 2007. The number of publication is accounted to 2604(16.6%) Vs GCS 30491 in 2003 and it downed to 3081(19.6%) Vs GCS 1840 in 2007.

Malaria research output of research publication at a local level is mainly concentrated in the table 3. This table indicates the total output made by the year wise distribution of total research output Vs Local citation score research publication in field of malaria between 2003 and 2007. The number of publication is accounted to 2604(16.6%) Vs LCS 18102 in 2003 and it downed to 3081(19.6%) Vs LCS 955 in 2007.

Table 4 shows the source wise distribution of the Malaria research output. This table indicates the total output through various sources of research publication in field of malaria between 2003 and 2007. The highest number of publication is in the form of Articles accounted to 11758 (74.96%). The lowest number of publication is in Bibliography accounted to 1 (0.01%) [ Lara, ( 1983)].

**Table 2.** Showing Year-wise Distribution of Total Research Output Vs Global Citation Score

S.NO	YEAR	RESEARCH OUTPUT	PERCENTAGE (%)	TOTAL GCS
1	2003	2604	16.6	30491
2	2004	3035	19.3	29151
3	2005	3234	20.6	19890
4	2006	3731	23.8	10168
5	2007	3081	19.6	1840
	<b>TOTAL</b>	<b>15685</b>	<b>100.00</b>	<b>91540</b>

**Table 3.** Showing Year-wise Distribution of Total Research Output Vs Local Citation Score

S.NO	YEAR	RESEARCH OUTPUT	PERCENTAGE (%)	TOTAL LCS
1	2003	2604	16.6	18102
2	2004	3035	19.3	17159
3	2005	3234	20.6	11644
4	2006	3731	23.8	5202
5	2007	3081	19.6	955
	<b>TOTAL</b>	<b>15685</b>	<b>100.00</b>	<b>53062</b>

**Table 4.** Showing Source-wise Distribution of Malaria Output

S.NO	TYPE OF DOCUMENT	RESEARCH OUTPUT	PERCENTAGE	CUM. %
1	Article	11758	74.96	74.96
2	Review	1488	9.49	84.45
3	Meeting Abstract	957	6.10	90.55
4	Editorial Material	586	3.74	94.29
5	Letter	529	3.37	97.66
6	News Item	211	1.35	99.01
7	Correction	118	0.75	99.76
8	Book Review	16	0.10	99.86
9	Reprint	15	0.10	99.96
10	Biographical-Item	6	0.03	99.99
11	Bibliography	1	0.01	100.00
	<b>Total</b>	<b>15685</b>	<b>100.00</b>	

Malaria research output of research publication through various sources at a Global level is mainly concentrated in the table 5. This table indicates the total output made by the source wise distribution of total research output Vs Global citation score research publication in field of malaria between 2003 and 2007. The highest number of publication is accounted to 11758 (74.96%) Vs GCS 73103 as Articles and lowest is as Bibliography 1 (0.01%) Vs GCS 1.

Malaria research output of research publication through various sources at a Local level is mainly concentrated in the table 6. This table indicates the total output made by the source wise distribution of total research output Vs Local citation score research publication in field of

malaria between 2003 and 2007. The highest number of publication is accounted to 11758 (74.96%) Vs LCS 44000 as Articles [Potapov and Kochetova (1984)] and lowest is as Bibliography - 1 Vs LCS.

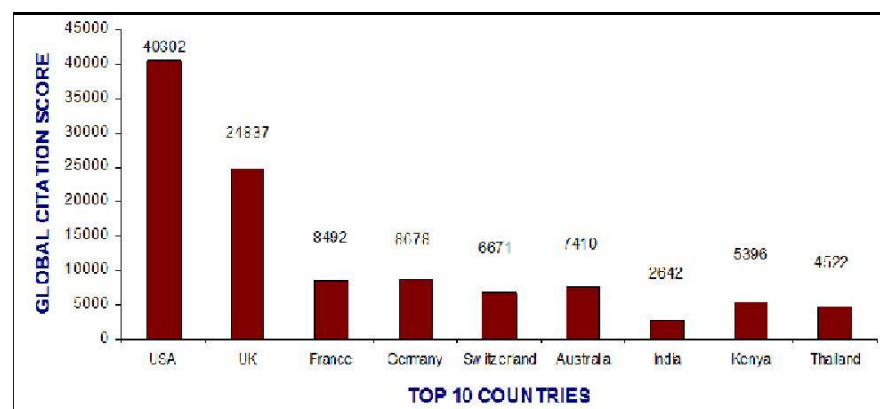
Malaria research output of research publication Country wise distribution at a Global level is mainly concentrated in the Figure 1. This table indicates the total output made by Country wise [Artamonova et al (1984)] distribution of total research output Vs Global citation score research publication in field of malaria between 2003 and 2007. The highest number of publication is at USA and accounted to 5151(32.8%) Vs GCS 40302 and lowest number of publication is at West Indis (Assoc.St.) 1. Malaria research output of research publication

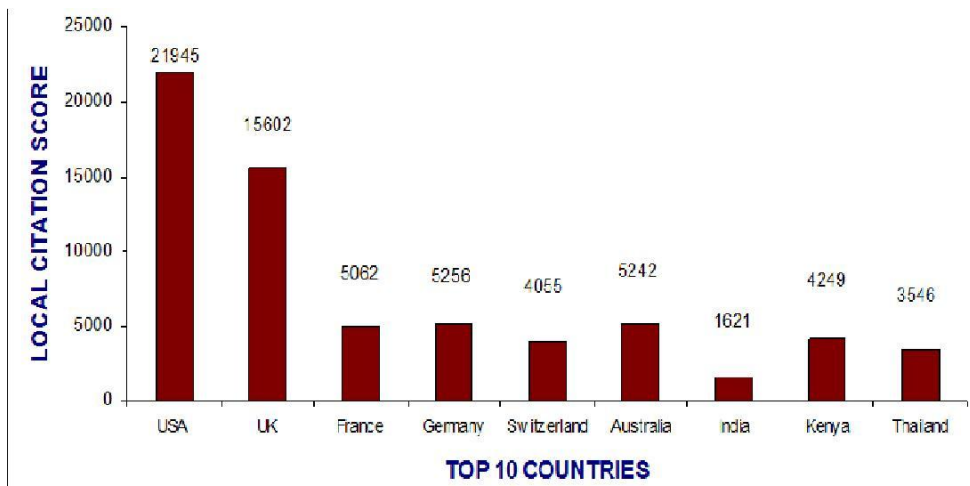
**Table 5.** Showing Source-wise Distribution of Malaria Output Vs Global Citation Score

S.NO	TYPE OF DOCUMENT	RESEARCH OUTPUT	PERCENTAGE	TOTAL GCS
1	Article	11758	74.96	73103
2	Review	1488	9.49	15974
3	Meeting Abstract	957	6.10	22
4	Editorial Material	586	3.74	1583
5	Letter	529	3.37	652
6	News Item	211	1.35	143
7	Correction	118	0.75	51
8	Book Review	16	0.10	0
9	Reprint	15	0.10	9
10	Biographical-Item	6	0.03	2
11	Bibliography	1	0.01	1
	<b>Total</b>	<b>15685</b>	<b>100.00</b>	<b>91540</b>

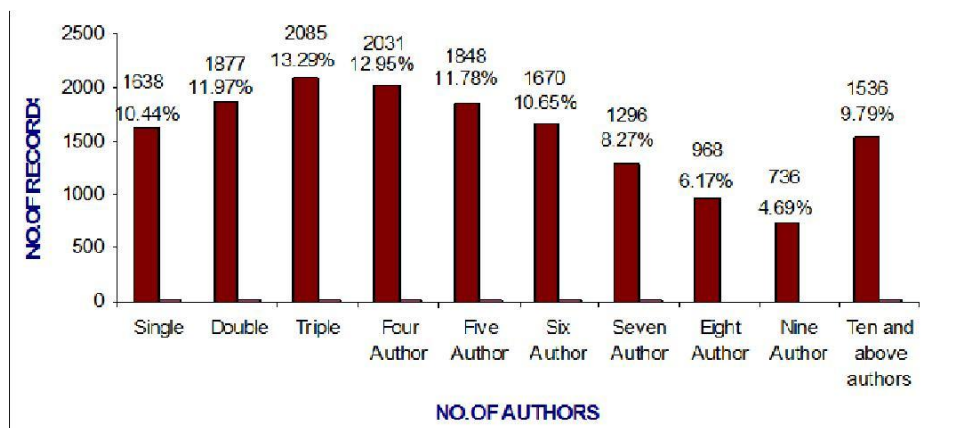
**Table 6.** Showing Source-wise Distribution of Malaria Output Vs Local Citation Score

S.NO	TYPE OF DOCUMENT	RESEARCH OUTPUT	PERCENTAGE	TOTAL LCS
1	Article	11758	75.0	44000
2	Review	1488	9.5	7430
3	Meeting Abstract	957	6.1	5
4	Editorial Material	586	3.7	1005
5	Letter	529	3.4	495
6	News Item	211	1.3	97
7	Correction	118	0.8	23
8	Book Review	16	0.1	0
9	Reprint	15	0.1	5
10	Biographical-Item	6	0.0	2
11	Bibliography	1	0.0	0
	<b>Total</b>	<b>15685</b>	<b>100.00</b>	<b>53062</b>

**Figure 1.** Bar Chart showing Country-wise Distribution of Malaria Output Vs Global Citation Score



**Figure 2.** Bar Chart showing Country-wise Distribution of Malaria Output Vs Local Citation Score



**Figure 3.** Bar Chart showing Authorship Pattern on Scientific Literature

between 2003-2007 is 756 (4.8%) in India and GCS is 2642.

Malaria research output of research publication Country wise distribution at a Local level is mainly concentrated in the table 2. This table indicates the total output made by Country wise distribution of total research output Vs Local citation score research publication in field of malaria between 2003 and 2007. The highest number of publication is at USA and accounted to 5151(32.8%) Vs LCS 21945 and lowest number of publication is at West Indis (Assoc.St.) 1. Malaria research output of research publication between 2003-2007 is 756 (4.8%) in India and LCS is 1621.

Figure 3 reveals that multi-authorship contribution dominates this field of research. From the total output of 15685 between 2003-2007, Single authors [Rothman, (author account for 1877(11.97%), three authors 1985)] contribution accounts for 1638 (10.44%), two

2085(13.29%), four authors 2031(12.95%), five authors 1848(11.78%) and more than five authors 6206(39.47%).

The figure 4 shows the contribution of Single and Multi Authored research publication on Malaria from 2003-2007. The data in table 10 reveals that multi-authorship contribution dominates this field of research. From the total output of 15685, Single authors contribution accounts for 1638 (10.44%) and Multiple authored output accounts for 14047 (89.56%).

The figure 5 represents the contribution by the authors on research publications of Malaria. The total research published output 15686 between 2003-2007 was written by 38942 authors from which the first 200 authors were shown. Author - White N J was the highest contributor on Malaria research [Arunachalam and Singh (1985)] publication. His contribution was 136 records (0.9%), TLCS 1244, TGCS 1532 and TLCR is 530. Author May J was the lowest contributor among the first 200 authors.

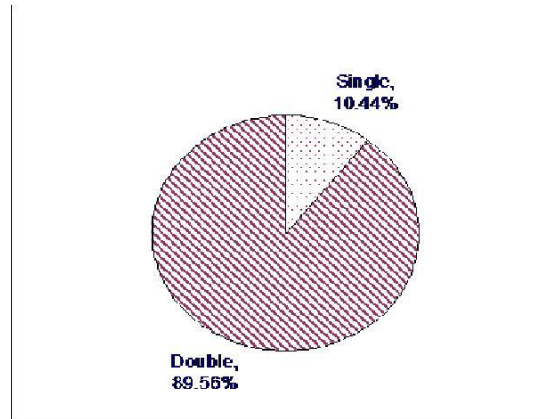


Figure 4. Pie Chart showing Single and Multiple Authored Output

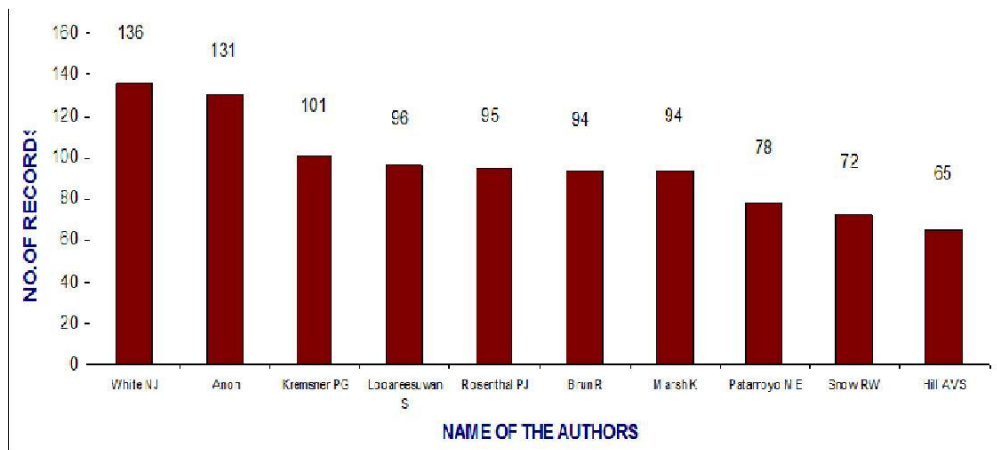


Figure 5(a). Bar Chart showing distribution of Authors according to number of Contributions

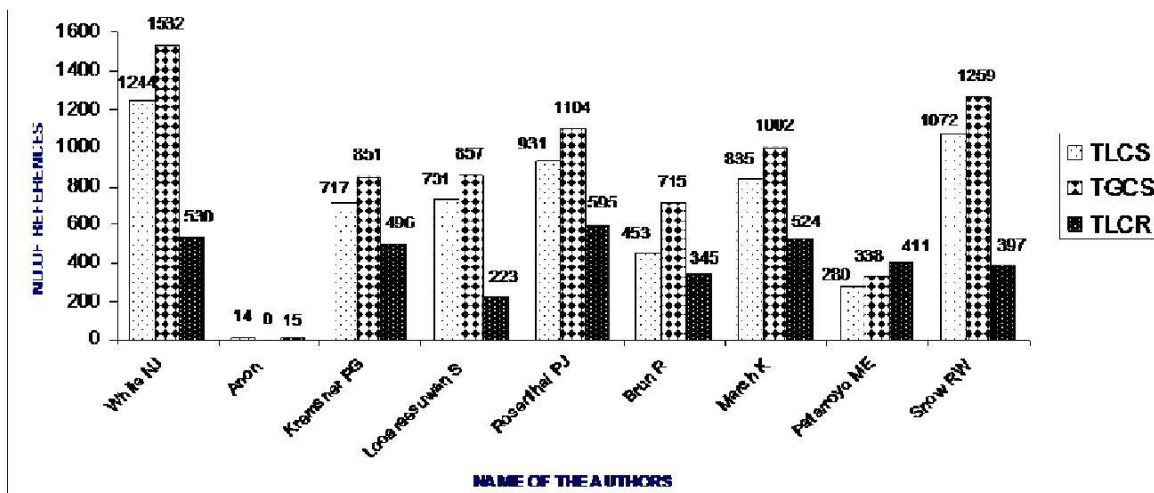


Figure 5(b). Bar Chart showing distribution of Authors according to Local Citation Score, Global Citation Score and Local Cited Reference



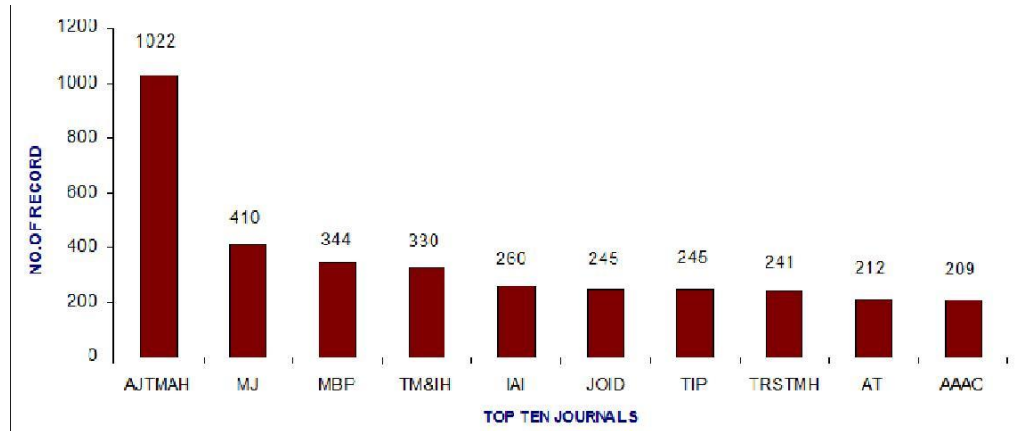


Figure 6(a). Bar Chart showing Ranking of Individual Journals according to Output Journal List

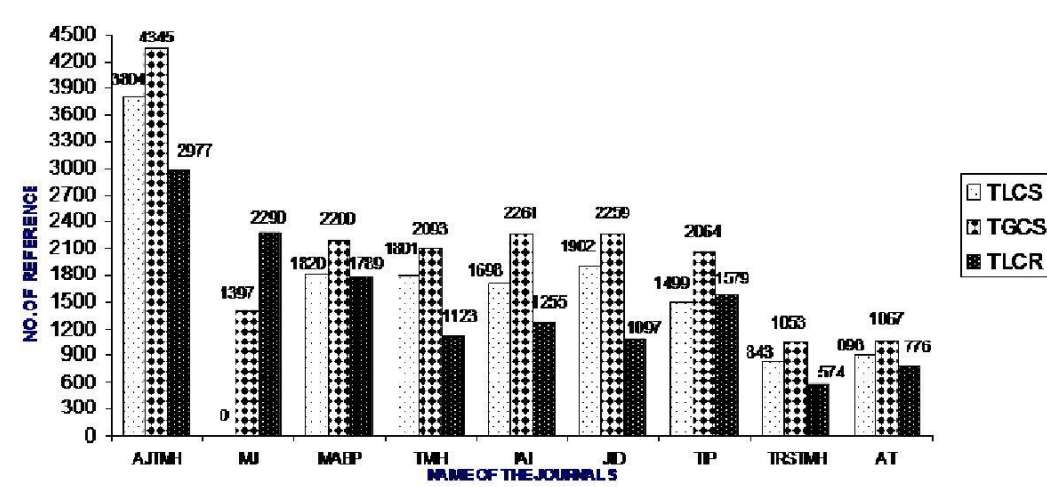


Figure 6(b). Bar Chart showing the Individual Journals Vs Local Citation Score, Global Citation Score, Local Cited References

He had contributed 24 records (0.2%), TLCS 73 (21.07 per year), TGCS 83 (23.05 per year) and TCR is 112.

The figure 6 represents the individual journals [Vlachy, (1986)] list who had published the articles on Malaria from 2003-2007. The total number of journals published the articles on Malaria were 1907 from which the first 268 Journals were shown. The American Journal of Tropical Medicine and Hygiene has published 1022 (6.8%) articles, TLCS 3807, TGCS 4345 and TCR is 2977. Southern Medical Journal had published the lowest number of articles on Malaria among the first 268 journals. It had published 10 articles (0.1%), TLCS-4, TGCS-8 and TCR is 20.

The figure 7 represents the language wise [Arunachalam, et al (1986)] distribution of research output 15281(97.4%) and GCS 91246. The lowest research of research output was in English language accounted to on Malaria Vs GCS from 2003-2007. The highest number

output was in Turkish language accounted to 1. Major research output had published widely in English language.

The figure 8 represents the language wise distribution of research output on Malaria Vs LCS from 2003-2007. The highest number of research output was in English language accounted to 15281(97.4%) and LCS 52889. The lowest research output was in Turkish language accounted to 1.

The figure 9 represents the institution wise [Stefaniak, (1987)] distribution of research output on Malaria from 2003-2007. The total number of institutions - 7522 has published the research publications on Malaria from 2003 – 2007. The first 125 institutions published the research publications on Malaria is shown. Oxford University had published the highest number of research publication on Malaria accounted to 401 publications (2.6%) and TLCS is 3122, TGCS 49200.



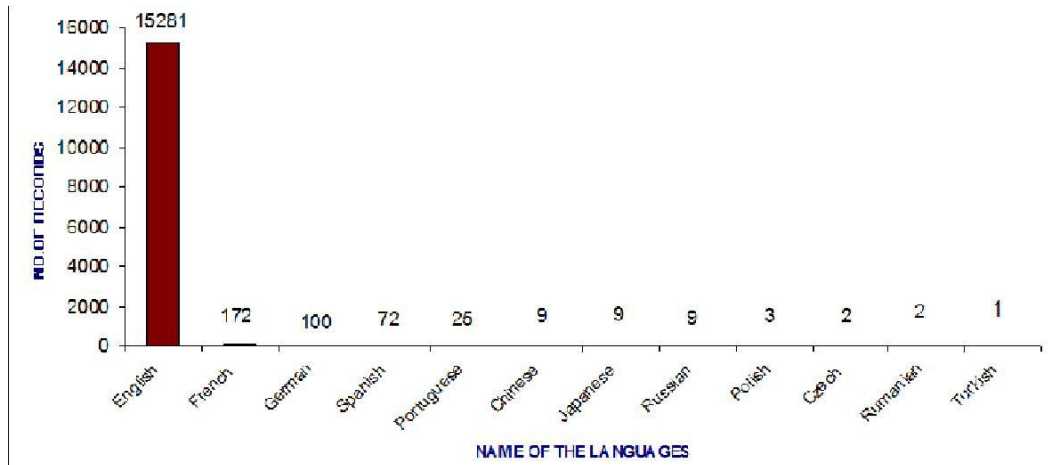


Figure 7(a). Showing Language-wise Distribution of Research Output

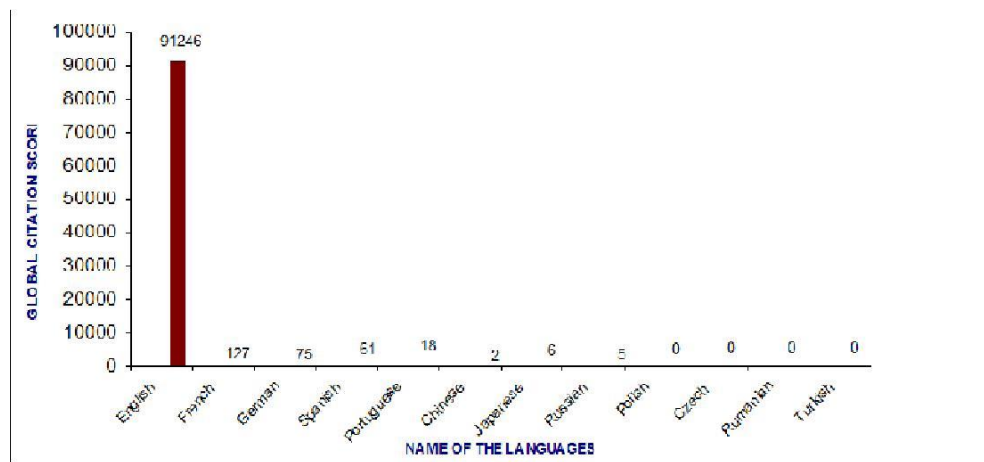


Figure 7(b). Showing Language-wise Distribution of Research Output Vs Global Citation Score

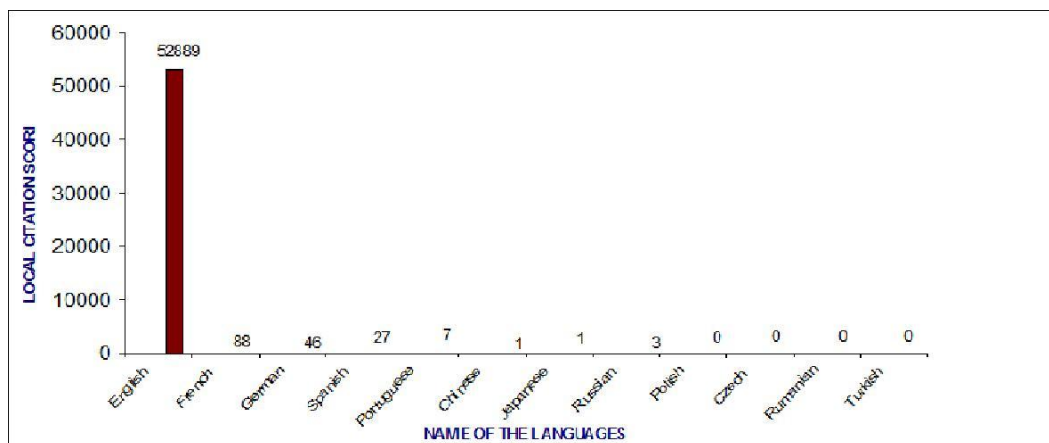


Figure 8. Bar Chart showing Language-wise Distribution of Research Output Vs Local Citation Score

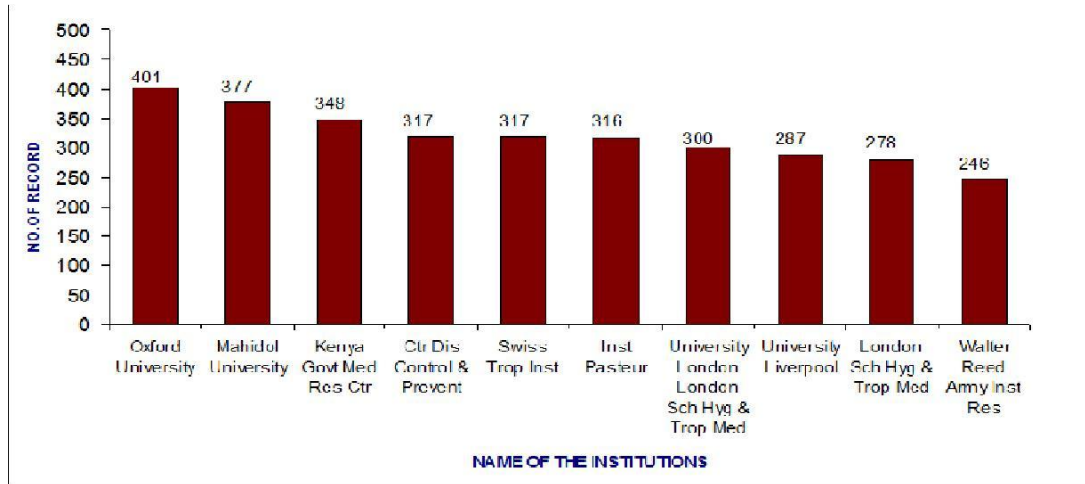


Figure 9(a). Bar Chart showing Institution-wise Distribution of Research Output

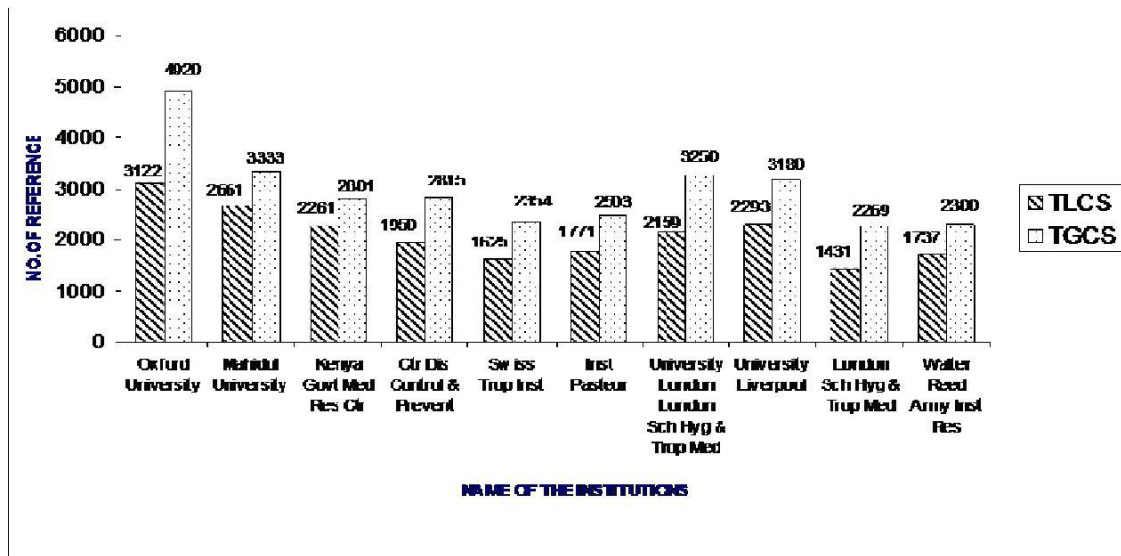


Figure 9(b). Bar Chart showing Institution-wise Distribution of Research Output Vs Local Citation Score

**Word-wise Distribution of Research Output Zipf’s Law**

The figure 10 represents the word wise distribution of research output on Malaria by Zipf’s Law [Swarna, et al (2002)] and [Mohan, et al (2003)]. The word Malaria was the most occurred word. It had occurred 4930 times (31.4%) in the research output, TLCS-3122 and TGCS-27859. The second most occurred word is Plasmodium accounted to 3487 times (22.2%) in the research publications, TLCS-19248 and TGCS-23338. The least occurred word was Genes and it has occurred 201 times (1.3%), TLCS-1066 and TGCS-1887.

**Suggestions**

The researcher upholds the following impact measures to improve the Malaria research base on the findings of the present study:

Based on the findings, scientists should focus on the neglected areas by being encouraged to carry out more research activities in those areas of Malaria research.

From the conclusion of the present study, the productivity of the author could be recognized. Therefore, the individual scientist may be inspired to distribute more number of contributions instead of single contributions.

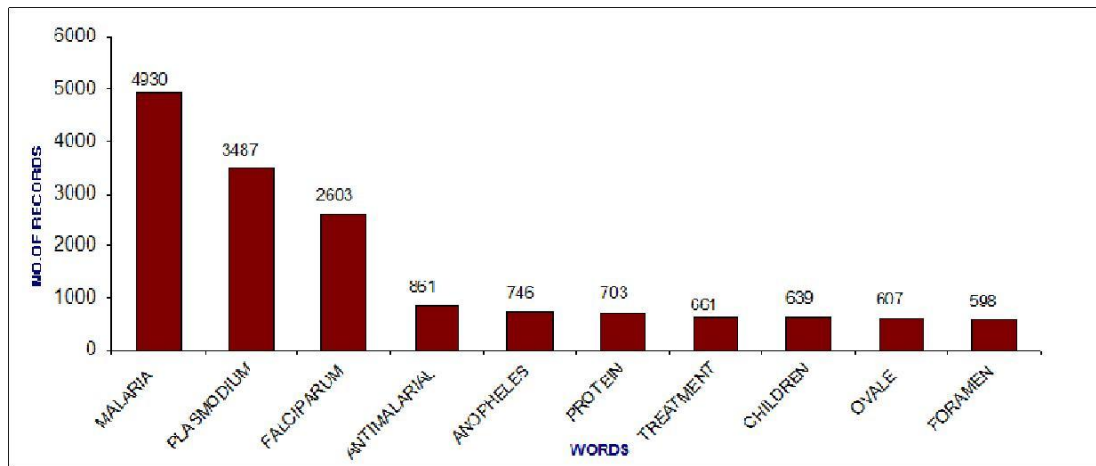


Figure 10(a). Bar Chart Showing Word-wise Distribution of Research Output

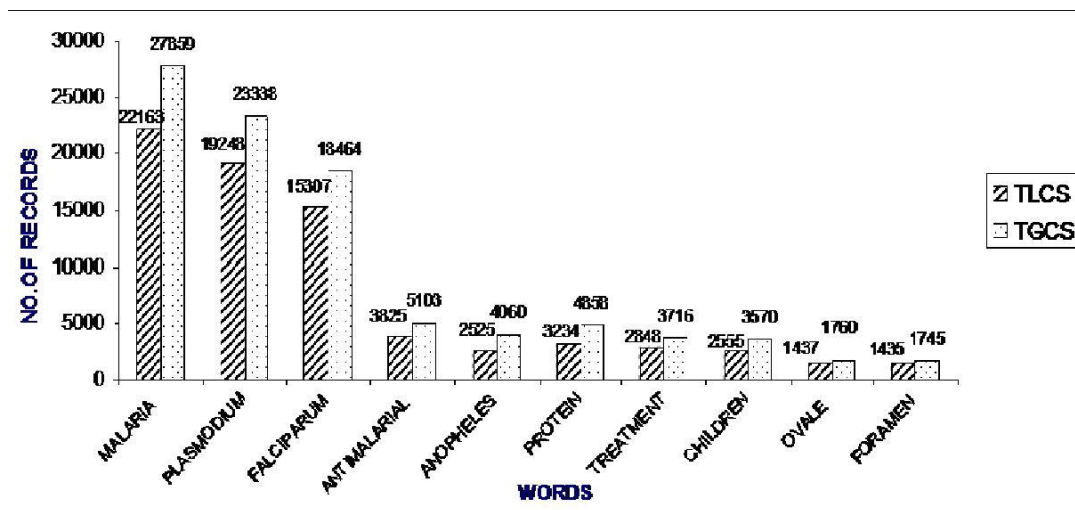


Figure 10(b). Bar Chart Showing Word-wise Distribution of Total LCS and Total GCS

Among the continents of the world, Europe, North America and Africa dominate in the research output on Malaria.

The environment and infrastructure are also very operative for the complete growth of Malaria research area.

Technology scientists should be given adequate safety and security pertaining to occupational risk and external threats so that they can bestow their full attention in research.

## CONCLUSION

Malaria research literature is an important aspect of the content and meaning of the present study. Scientometrics studies are used to identify frequency distribution of articles in journal by the year; citing authors in Books, papers published in conference proceedings, year-wise

distribution of citations is highest, use pattern of different type of documents cited, year wise publication of citations in journals and their distribution, Authors wise citation in the book, the publications of conference proceedings for distinctive period. New technologies are creating new opportunities for libraries. The review was conducted through this study is very helpful for the identifying the potential feature.

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