Indian Research Output on Malaria: A Bibliometric Study using Scopus Data Base

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Abstract

This study evaluates Indian malaria research out put during 1974–2013 using different bibliometric indicators. Data have been downloaded from Scopus database for the period 1974–2013 using the keywords Indian and malaria in the title and abstract fields. The study examined the pattern of growth of the output, its collaboration with other countries, profile of different countries in different subfields. The study Malaria vaccine research output is gradually increasing. The Indian authors collaboration with USA, followed by the UK and Australia has the highest number of papers. The majority of the prolific institutions are located North India. The last two decades have witnessed considerable growth in research output in this field.

Keywords
Bibliometics, Scientometics,.Malaria

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INTRODUCTION

Malaria is a major public health problem in India, accounting for sizeable morbidity, mortality and economic loss. Around 1.5 million confirmed cases are reported annually by the National Vector Borne Disease Control Programme (NVBDCP), of which 40–50% are due to Plasmodium falciparum. Malaria is curable if effective treatment is started early. Apart from preventive measures, early diagnosis and complete treatment are the important modalities that have been adopted to contain the disease. In view of widespread chloroquine resistance in Plasmodium falciparum infection, and other recent developments, the national policy has been revised to meet these challenges. This paved way for number of research articles in the malaria research in India. This study reviews the growth of literature on malaria research in India during the period 1974-2013.

BIBLIOMETRIC STUDY

Bibliometric analysis is employed by researchers to study the growth of literature in given field. Pritchard (1969) defined the term Bibliometric as the application of statistical and mathematical methods to books and other communication. The bibliometrics has emerged as a thrust area of research, incorporating different branches of human knowledge. There are famous Laws of Bibliometric i.e. Lotka's law (1926) of scientific productivity, Bradford's law (1934) of scattering and Zips law (1949) on frequency of words. But the Bibliometric studies started in late sixties.

REVIEW OF RELATED LITERATURE

Few bibliometric studies dealing with malaria research have been reported in the literature in the past. Maclean *et al*. and Lewison *et al*. estimated the financial resources going into malaria research. Garg *et al*. estimated the quantum of malaria research output during 1990 and 2000 using PubMed (the online edition) and the Commonwealth Agricultural Bureaux International (CABI) CD-ROM incorporating the Tropical Disease Bulletin (TDB). Lewison and Srivastava mapped the malaria research output during the years 1980–2004 using the Science Citation Index (SCI) and malaria vaccine research. However, none of these studies deals with the status of malaria research other than the medical data bases, which constitutes approximately 9% of the total malaria research output.

OBJECTIVES

Main objectives of the study are

1. To examine the Indian research production in Malaria research.
2. To identify the document type of the publications in Malaria research.
3. To identify the organizations conducting the research in Malaria research.
4. To study the language wise distribution of research output.
5. To study the authorship pattern of research output.

HYPOTHESIS

The following hypotheses will be formulated for this study based on objectives.

1. There exists substantial literature on Malaria research in India.
2. There exists domination of collaborative research in Malaria research.
3. The research productivity in Malaria research is dominated by English language.
4. Journals are major source of publications for Malaria research.
5. There exists steady growth in publication production in Malaria research.

METHODOLOGY

Normally the medical data base was selected for the purpose of identifing the growth of lietrature on medicine. But in this case the scopus data base is considered for research in order to identify the coverage of secondary periodical in the field of malaria research rather than the primary periodicals. Though Scopus covers life science journals, it is not considered as primary data base for identifing the medical field.

For this study, the literature on malaria research data has been downloaded from 'Scopus', multidisciplinary online database, which is an international indexing and abstracting database, using the search term " ((TITLE-ABS-KEY(india) AND TITLE-ABS-KEY(malaria)) AND PUBYEAR > 1974 AND PUBYEAR < 2013)" For this study, publications commencing from 1974-2013 (40 years) has been downloaded from the database. A total of 2924 data has been identified.

The collected data has been classified by using Excel and the same was loaded in to SPSS (statistical package for social sciences) for the purpose of analysis. Statistical tools such as frequency distribution and percentage analysis and Scientometric techniques such as Authorship pattern, Relative Growth Rate (RGR), Doubling time (dt) citation analysis etc will be used for the study.

DATA ANALYSIS

Table 1: Year wise Distribution of Malaria Research Output

S.No	Year	Research output	Perce-ntage	Cumm-ulative output	Cumm-ulative percentage
1	1974	17	0.6	17	0.6
2	1975	14	0.5	31	1.1
3	1976	14	0.5	45	1.5
4	1977	19	0.6	64	2.2
5	1978	15	0.5	79	2.7
6	1979	46	1.6	125	4.3
7	1980	28	1.0	153	5.2
8	1981	22	0.8	175	6
9	1982	33	1.1	208	7.1
10	1983	23	0.8	231	7.9
11	1984	30	1.0	261	8.9
12	1985	38	1.3	299	10.2
13	1986	26	0.9	325	11.1
14	1987	28	1.0	353	12.1
15	1988	34	1.2	387	13.2
16	1989	50	1.7	437	14.9
17	1990	54	1.8	491	16.8
18	1991	50	1.7	541	18.5
19	1992	49	1.7	590	20.2
20	1993	40	1.4	630	21.5
21	1994	59	2.0	689	23.6
22	1995	61	2.1	750	25.6
23	1996	83	2.8	833	28.5
24	1997	81	2.8	914	31.3
25	1998	88	3.0	1002	34.3
26	1999	77	2.6	1079	36.9
27	2000	95	3.2	1174	40.2
28	2001	94	3.2	1268	43.4
29	2002	75	2.6	1343	45.9
30	2003	90	3.1	1433	49.0
31	2004	100	3.4	1533	52.4
32	2005	102	3.5	1635	55.9

33	2006	134	4.6	1769	60.5
34	2007	115	3.9	1884	64.4
35	2008	134	4.6	2018	69.0
36	2009	149	5.1	2167	74.1
37	2010	170	5.8	2337	79.9
38	2011	223	7.6	2560	87.6
39	2012	229	7.8	2789	95.4
40	2013	135	4.6	2924	100
	Total	2924	100	100	

Their exist uniform and study growth of publication in malaria research year after year. Hence it can be stated that there exist a linear growth of publication out put in the field of research of malaria. The forty years were further divided into five years block in order to identify the growth rate of malaria publications. The data were shown in table 2. Further the ratio of growth has also been calculated with base block year 1974-78 and the same is shown in table 2.

Table 2: Block Year Wise Distribution and Ratio of Growth

S.No	Block year	Research output	%	Cumm-ulative %	Ratio of growth
1	1974-1978	79	2.7	2.7	1.00
2	1979-1983	152	5.2	7.9	1.92
3	1984-1988	156	5.3	13.2	1.97
4	1989-1993	243	8.3	21.5	3.08
5	1994-1998	372	12.7	34.3	4.71
6	1999-2003	431	14.7	49	5.46
7	2004-2008	585	20	69	7.41
8	2009-2013	906	31	100	11.47
		2924	100		

The block year wise growth also shows the linear trend. There exists a substantial increase in every block year. Doubling of the publication can be seen in every decade. Nine times of growth of articles on malaria research can be seen in eight block years. This indicates that the decise malaria has still persist and there needs exhaustive research in eradicating the same.

The output can be seen in thirteen different bibliographic formats. Nearly 76.33% of publications are published has journal articles. It is followed by Review papers (8.38%) and Letters (5.13%). The "Note form" of literature output account to 2.50% in Indian malaria research.

Table 3: Document Type

S.No	Description	No of Records	Percentage
1	Article	2232	76.33
2	Review	245	8.38
3	Letter	150	5.13
4	Note	73	2.50
5	Editorial	51	1.74
6	Conference Paper	49	1.68
7	Short Survey	38	1.30
8	Article in Press	16	0.55
9	Erratum	4	0.14
10	Undefined	66	2.26
		2924	100.00

Normally it is belived that the Indian articles will appear only in english language. In order to identify whether all the indian research output are only in english or in other language too, language wise distribution has been ascertain and the same is shown in table 4.

Table 4: Language Of The Research Output

S.No	Language	Output	%
1	English	2839	97.09
2	French	21	0.72
3	German	21	0.72
4	Russian	18	0.62
5	Polish	5	0.17
6	Czech	3	0.10
7	Norwegian	2	0.07
8	Swedish	2	0.07
9	Dutch	2	0.07
10	Italian	2	0.07
11	Japanese	2	0.07
12	Portuguese	1	0.03
13	Spanish	1	0.03
14	Afrikaans	1	0.03
15	Danish	1	0.03
16	Hebrew	1	0.03
17	Romanian	1	0.03
18	Turkish	1	0.03
		2924	100

It is surprise to note that the 2.91 percent of articles are published in other 17 languages. However 97.09% of articles are published in English. Indian authors also produced articles in French, German, Russian etc. This may be due to collaborative research.

Table 5: Authorship Pattern

No of authors	Frequency	Percent	Cumulative Percentage
Single Author	556	19.0	19.0
Two Author	459	15.7	34.7
Three Author	500	17.1	51.8
More than three authors	1409	48.2	100.0
Total	2924	100.0	

It can be seen that only 19% of Indian research article on malaria appeared as individual author publications. Remaining 81% of articles are collobarative in nature. 15.7% articles are by two authors and 17.1% are by three others. 48.2% of Indian articles are authored by more than three authors. This may be due to collaborative research. Single author publications are considered as solo research and other than the single author publications are considered as collaborative research. Type of research, whether it is a solo research or collaborative research, over the year has been ascertained and the same is shown in table 6. Further ratio of collaboration and degree of collaboration using Subramaniam formula has been calculated and the same is shown in table 6.

Table 6: Year Vs type of Research

S.No	Year	Solo		Colla borative		Ratio of collabora tion	DC
1	1974	10	0.30%	7	0.20%	0.70	0.41
2	1975	6	0.20%	8	0.30%	1.33	0.57
3	1976	3	0.10%	11	0.40%	3.67	0.79
4	1977	7	0.20%	12	0.40%	1.71	0.63
5	1978	6	0.20%	9	0.30%	1.50	0.60
6	1979	9	0.30%	37	1.30%	4.11	0.80
7	1980	7	0.20%	21	0.70%	3.00	0.75
8	1981	3	0.10%	19	0.60%	6.33	0.86
9	1982	10	0.30%	23	0.80%	2.30	0.70
10	1983	13	0.40%	10	0.30%	0.77	0.43
11	1984	6	0.20%	24	0.80%	4.00	0.80
12	1985	13	0.40%	25	0.90%	1.92	0.66
13	1986	5	0.20%	21	0.70%	4.20	0.81
14	1987	8	0.30%	20	0.70%	2.50	0.71
15	1988	8	0.30%	26	0.90%	3.25	0.76
16	1989	13	0.40%	37	1.30%	2.85	0.74
17	1990	6	0.20%	48	1.60%	8.00	0.89
18	1991	7	0.20%	43	1.50%	6.14	0.86
19	1992	8	0.30%	41	1.40%	5.13	0.84
20	1993	8	0.30%	32	1.10%	4.00	0.80
21	1994	15	0.50%	44	1.50%	2.93	0.75
22	1995	13	0.40%	48	1.60%	3.69	0.79
23	1996	17	0.60%	66	2.30%	3.88	0.80
24	1997	26	0.90%	55	1.90%	2.12	0.68
25	1998	21	0.70%	67	2.30%	3.19	0.76
26	1999	18	0.60%	59	2.00%	3.28	0.77
27	2000	27	0.90%	68	2.30%	2.52	0.72
28	2001	18	0.60%	76	2.60%	4.22	0.81
29	2002	13	0.40%	62	2.10%	4.77	0.83
30	2003	16	0.50%	74	2.50%	4.63	0.82
31	2004	20	0.70%	80	2.70%	4.00	0.80
32	2005	12	0.40%	90	3.10%	7.50	0.88
33	2006	27	0.90%	107	3.70%	3.96	0.80
34	2007	20	0.70%	95	3.20%	4.75	0.83
35	2008	35	1.20%	99	3.40%	2.83	0.74
36	2009	20	0.70%	129	4.40%	6.45	0.87
37	2010	23	0.80%	147	5.00%	6.39	0.86
38	2011	25	0.90%	198	6.80%	7.92	0.89
39	2012	28	1.00%	201	6.90%	7.18	0.88
40	2013	6	0.20%	129	4.40%	21.50	0.96
	Total	556	19.00%	2368	81.00%	4.26	0.81

It can be seen from the table 6 that solo research is more in the year 1974 and 1983, whereas the collaborative research are more in remaining years. From the year 2009 onwards the collaborative research is increasing trend.

Table 7: Top institutions that has 20 above publications

S.No	Name of the Institutions	No. of publications
1	National Institute of Malaria Research India	453
2	All India Institute of Medical Sciences	82
3	Vector Control Research Centre India	76
4	Indian Council of Medical Research	70
5	Organisation Mondiale de la SantÃ©	59
6	Regional Medical Research Centre, Bhubaneswar	57
7	London School of Hygiene & Tropical Medicine	56
8	Regional Medical Research Centre, Dibrugarh	45
9	Netaji Subash Chandra Bose Medical College & Hospital	45
10	Ispat General Hospital	40
11	Calcutta School of Tropical Medicine	39
12	Civil Hospital Ahmedabad	39
13	National Institute of Communicable Diseases India	38
14	Sardar Patel Medical College	31
15	King Edward Memorial Hospital India	30
16	Mahidol University	27
17	Postgraduate Institute of Medical Education and Research	26
18	Christian Medical College, Vellore	23
19	Defence Research Laboratory	20
20	Banaras Hindu University Institute of Medical Sciences	20

National Institute of Malaria Research has published 453 research articles. It is followed by All india Institute of Medical Sciences (82 Publications), Vector control research centre India (76) and Indian council of Medical Research (70).

CONCLUSION

Malaria imposes great socio-economic burden on humanity, and with six other diseases (diarrhea, HIV/AIDS, tuberculosis, measles, hepatitis B, and pneumonia), accounts for 85% of global infectious disease burden.Reports of malaria are increasing in India as like that of many countries and in areas thought free of the disease. One of the factors contributing to the reemergence of malaria is human migration. People move for a number of reasons, including environmental deterioration, economic necessity, conflicts, and natural disasters. These factors are most likely to affect the poor, many of whom live in or near malarious areas. Identifying and understanding the influence of these population movements can improve prevention measures and malaria control programs. Till such time the eradication of malaria fully in a global environment, there will be a research publication persist in the field of malaria research.

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