Indian Contribution to Medicinal Plants Research: A Scientometric Study

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Abstract

The objective of this work is to analyse the scientometric parameters for Medicinal plants research output in India. Investigators have analysed the research productivity and Global Citation Scores of the scientists. It could clearly see that during the period 1956-2012, a total of 12083 publications were published at national level and the data has reflected in Scopus online database. This paper finds trend towards collaborative research is gaining momentum. As every work of researchers depends mainly on the library and electronic resources since it provides more scholarly information and hence this kind of studies are more relevant in identifying thrust areas of research

Keywords

Scientometrics; Medicinal Plants Research; Citation Scores; h-index;
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Introduction

Medicinal plants have played an essential role in the development of human culture, for example religions and different ceremonies. (e.g.Dutura has long been associated with the worship of Shiva, the Indian god). Ever since ancient times, in search for rescue for their disease, the people looked for drugs in nature. The beginnings of the medicinal plants' use were instinctive, as is the case with animals. In view of the fact that at the time there was not sufficient information either concerning the reasons for the illnesses or concerning which plant and how it could be utilized as a cure, everything was based on experience. In time, the reasons for the usage of specific medicinal plants for treatment of certain diseases were being discovered; thus, the medicinal plants' usage gradually abandoned the empiric framework and became founded on explicatory facts. Until the advent of iatrochemistry in 16th century, plants had been the source of treatment and prophylaxis. Nonetheless, the decreasing efficacy of synthetic drugs and the increasing contraindications of their usage make the usage of natural drugs topical again. Since time immemorial people have tried to find medications to alleviate pain and cure different illnesses. In every period, every successive century from the development of humankind and advanced civilizations, the healing properties of certain medicinal plants were identified, noted, and conveyed to the successive generations. The benefits of one society were passed on to another, which upgraded the old properties, discovered new ones, till present days. The continuous and perpetual people's interest in medicinal plants has brought about today's modern and sophisticated fashion of their processing and usage. By keeping this view in mind, the researcher intends to undertake the study on "Indian Contribution to Medicinal Plants Research: A Scientometric Study". This study attempts to analyse the performance of researcher working in the field of medicinal plants in terms of growth rate, areas of research concentration, authorship pattern, scattering of articles in different sources, institution wise distribution and so on.

Objectives of the Study

The main objectives framed for the purpose of the study are:

- To identify the year wise distribution of publications on Medicinal Plants in India
- To identify the document wise distribution of publications.

- To analyze the authorship pattern.
- To assess the Institution wise research concentration.
- To identify the Journal wise distribution of Medicinal Plants research output.
- To find the co-author network.
- To find h-index of ranked authors.
- To find the Global Citation Scores of top ranked authors.

Methodology

The study entitled "Indian contribution to Medicinal Plant Research: A Scientometric study" is a case study encompassing records output on Scopus online database. The growth rate of output in terms of both at absolute level and relative level are analysed from 1956 to 2012. The authorship pattern and author productivity are examined to identify the pattern of research contribution in the field of Medicinal Plants. Further, an attempt is made to measure the performance of researchers and their research concentration in the field of medicinal plants. The study is mainly exploratory in nature in identifying research output on Medicinal Plants.

ANALYSES AND INTERPRETATION

Year wise Distribution of Publications

Table 1 reveals that during the period 1956-2012, a total of 12083 publications were published at National level. The highest number of publication is 1984 in 2011 followed by 1853 papers in 2012 and 1443 papers in 2010. From 1956 to 1972 publications are less than 20.

Table 1 year wise distribution of publications

Year	Publica -tions	%		Year	Publica -tions	%
2012	1853	15.34		1984	48	0.40
2011	1984	16.42		1983	35	0.29
2010	1443	11.94		1982	39	0.32
2009	901	7.46		1981	46	0.38
2008	675	5.59		1980	45	0.37
2007	557	4.61		1979	67	0.55
2006	450	3.72		1978	45	0.37
2005	405	3.35		1977	71	0.59
2004	345	2.86		1976	47	0.39
2003	341	2.82		1975	51	0.42
2002	278	2.30		1974	52	0.43
2001	282	2.33		1973	24	0.20
2000	297	2.46		1972	4	0.03
1999	198	1.64		1971	4	0.03
1998	195	1.61		1970	11	0.09
1997	195	1.61		1969	10	0.08
1996	153	1.27		1968	8	0.07
1995	120	0.99		1967	9	0.07
1994	144	1.19		1966	3	0.02
1993	106	0.88		1965	7	0.06
1992	107	0.89		1964	4	0.03
1991	90	0.74		1963	2	0.02
1990	95	0.79		1962	1	0.01
1989	56	0.46		1961	2	0.02
1988	57	0.47		1959	2	0.02
1987	45	0.37		1958	1	0.01
1986	33	0.27		1957	1	0.01
1985	38	0.31		1956	1	0.01
				Total		12083

Document wise distribution of Publications

The highest numbers of publications were 10656 (88.19%) as journal article and other publications were 936(7.75%) as Reviews, 145(1.20%) as conference papers and other publication followed by other forms.

Table 2 Document wise distribution of Publications

Document type	Publications	%
Article	10656	88.19
Review	936	7.75
Conference Paper	145	1.20
Letter	82	0.68
Short Survey	47	0.39
Note	28	0.23
Editorial	23	0.19
Article in Press	21	0.17
Erratum	1	0.01
Undefined	144	1.19
Total	**12083**	**100.00**

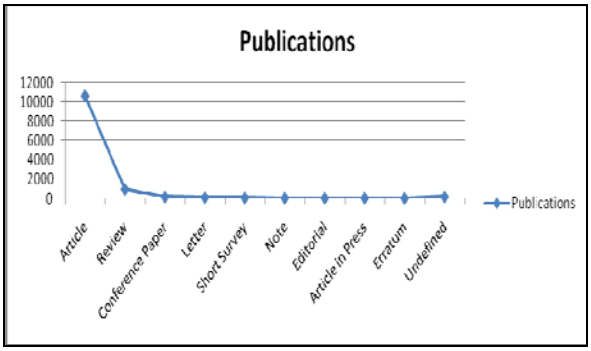

Figure 1. document wise distribution of Publications

Journal wise distribution of publications

The research finds that the literature on medicinal plants research proliferated more than 160 scholarly journals for the study period covered by Scopus Database. The Journals of Ethno Pharmacology, International Journal of Pharmacy and Pharmaceutical Sciences and Indian Journal of Experimental Biology were published major chunk of the research literature in medicinal plants among the journals. As 20 percent of the total literature for the study period has been published by top 10 journals. It is also found that the Journal of Ethno Pharmacology has got highest number of publications with 579 and followed by other journals.

Table 3 journal wise distribution of Publications

Name of the Journal	Publications	%
Journal of Ethnopharmacology	579	4.79
International Journal of Pharmacy and Pharmaceutical Sciences	364	3.01
Indian Journal of Experimental Biology	348	2.88
Fitoterapia	302	2.50
Pharmacologyonline	217	1.80
Indian Drugs	207	1.71
International Journal of Pharma and Bio Sciences	192	1.59
International Journal of Pharmtech Research	185	1.53
Phytotherapy Research	156	1.29
Pharmaceutical Biology	147	1.22
Pharmacognosy Journal	146	1.21
Planta Medica	145	1.20
Indian Journal of Pharmaceutical Sciences	144	1.19
Asian Pacific Journal of Tropical Biomedicine	128	1.06
Journal of Herbs Spices and Medicinal Plants	123	1.02
Indian Journal of Traditional Knowledge	122	1.01
International Journal of Pharmaceutical Sciences Review and Research	119	0.98
Research Journal of Pharmaceutical Biological and Chemical Sciences	118	0.98
Asian Journal of Microbiology Biotechnology and Environmental Sciences	114	0.94
Asian Journal of Pharmaceutical and Clinical Research	108	0.89
Indian Journal of Pharmacology	107	0.89
Biosciences Biotechnology Research Asia	102	0.84

Institution wise distribution of Medicinal Plants Research

Table 4 indicates Institution-wise research productivity. It is noted that Central Institute of Medicinal & Aromatic Plants ranks first in order by contributing 251(2.08%) of total research output of 12083. Jadavpur University records the second place with 228 (1.89%) in order and Annamalai University, which shares third position with 224 (1.85%) and followed by University of Madras 220(1.82%), Bharathidasan University has contributed 72 papers and ranked 35th position in national level. The publications of other Institutions are as follows:

Table 4 Institution wise distribution of Publications

Institution	Publications	%
Central Institute of Medicinal and Aromatic Plants India	251	2.08
Jadavpur University	228	1.89
Annamalai University	224	1.85
University of Madras	220	1.82
Central Drug Research Institute India	217	1.80
National Botanical Research	177	1.46

Institute India		
University of Rajasthan	175	1.45
Dr. Harisingh Gour University, Sagar	164	1.36
Banaras Hindu University Institute of Medical Sciences	156	1.29
Banaras Hindu University	152	1.26
Jamia Hamdard University	137	1.13
Aligarh Muslim University	132	1.09
All India Institute of Medical Sciences	123	1.02
University of Calcutta	116	0.96
Bhabha Atomic Research Centre	113	0.94
University of Mysore	109	0.90
Bharathiar University	108	0.89
Loyola College India	105	0.87
Sri Venkateswara University	102	0.84
Jamia Hamdard Faculty of Pharmacy	99	0.82
Govind Ballabh Pant Institute of Himalayan Environment and Development	99	0.82
Indian Institute of Chemical Biology	98	0.81
Andhra University	97	0.80
Indian Institute of Integrative	97	0.80

Collaboration of Medicinal Plants Research with other countries

Table 5 indicates that 264 (24.84%) articles contributed in collaboration with United States of America, which is followed by United Kingdom 72 (6.77%), Japan 64 (6.02%) Saudi Arabia 58 (5.46%). Indian Researchers have collaborated with more than 80 countries in the area of research in Medicinal Plants.

Medicine, Srinagar		
University of Delhi	95	0.79
Amala Cancer Hospital and Research Centre	90	0.74
Kasturba Medical College, Manipal	89	0.74
The Maharaja Sayajirao University of Baroda	88	0.73
Indian Institute of Chemical Technology	87	0.72
Hemwati Nandan Bahuguna Garhwal University	86	0.71
Jawaharlal Nehru University	78	0.65
Institute of Himalayan Bioresource Technology India	76	0.63
Central Food Technological Research Institute India	73	0.60
University of Pune	73	0.60
Bharathidasan University	72	0.60

Collaboration of Medicinal Plants Research with other countries

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Ranking of Authors

Authors are ranked by number of publications and Investigators find the most published author in Medicinal Plants (Table 6). Thus the most-published ones are distinguished from the most-cited authors.

The individual citation frequencies for these papers are totaled. Calculation of h-index is based on a list of publications ranked in descending order by the Times Cited. The value of h is equal to the number of papers (N) in the list that have N or more citations.

Table 5 shows that Country wise collaboration of research among the Indian Scientist

Country	Publications	%		Country	Publications	%
United States	264	24.84		Slovakia	2	0.19
United Kingdom	72	6.77		New Zealand	2	0.19
Japan	64	6.02		Portugal	2	0.19
Saudi Arabia	58	5.46		Philippines	2	0.19
Germany	57	5.36		Luxembourg	2	0.19
South Korea	56	5.27		Sudan	2	0.19
France	36	3.39		Algeria	2	0.19
Malaysia	32	3.01		Syrian ArabRepub.	2	0.19
Canada	26	2.45		Cote d'Ivoire	2	0.19
Ethiopia	24	2.26		Tanzania	2	0.19
Italy	21	1.98		Cameroon	2	0.19
Austria	20	1.88		North Korea	1	0.09
Taiwan	19	1.79		Hungary	1	0.09
China	19	1.79		Malawi	1	0.09
Australia	18	1.69		Kenya	1	0.09
South Africa	16	1.51		Puerto Rico	1	0.09
Denmark	16	1.51		Hong Kong	1	0.09
Nigeria	16	1.51		Guyana	1	0.09
Singapore	14	1.32		Serbia	1	0.09
Brazil	12	1.13		Guatemala	1	0.09
Libyan Arab Jamahiriya	12	1.13		Romania	1	0.09
Sweden	9	0.85		Argentina	1	0.09
Nepal	9	0.85		Grenada	1	0.09
Israel	9	0.85		Ghana	1	0.09
Iran	9	0.85		Finland	1	0.09
Belgium	7	0.66		Estonia	1	0.09
Bangladesh	7	0.66		Armenia	1	0.09
United Arab Emirates	7	0.66		Bahrain	1	0.09
Sri Lanka	6	0.56		Czech Republic	1	0.09
Mexico	6	0.56		Barbados	1	0.09
Spain	6	0.56		Bhutan	1	0.09
Netherlands	6	0.56		Botswana	1	0.09
Switzerland	6	0.56		Slovenia	1	0.09
Oman	6	0.56		Ireland	1	0.09
Russian Federation	5	0.47		Tunisia	1	0.09
Eritrea	5	0.47		Jordan	1	0.09
Turkey	4	0.38		Uganda	1	0.09
Egypt	4	0.38		Ukraine	1	0.09
Pakistan	4	0.38		Costa Rica	1	0.09
Norway	4	0.38		Colombia	1	0.09
Poland	4	0.38		Indonesia	1	0.09
Thailand	4	0.38		Uruguay	1	0.09
Bulgaria	3	0.28		Virgin Islands	1	0.09
Morocco	3	0.28		Zimbabwe	1	0.09
Trinidad and Tobago	3	0.28				

Table 6 shows that ranking of authors

Author	Publications Medicinal Plant	Ranking	H-index	Total Publications	No of Citations
Ignacimuthu, S.	74	1	23	245	2440
Kuttan, G.	48	2	29	202	4144
Rawat, A.K.S.	47	3	15	126	967
Mukherjee, P.K.	46	4	26	128	2544
Pushpangadan, P.	44	5	23	104	1941
Maurya, R.	42	6	23	134	1710
Kumar, S.	40	7	23	377	2936
Dixit, V.K.	39	8	18	220	1429
Bhattacharya, S.K.	39	9	25	323	4170
Mandal, S.C.	37	10	21	108	1293

The below map shows the author Ignacimuthu has co-published articles or books. The number of co-authors displayed is limited to the top 30. He has published 245 papers with 2440 Global Citation Scores (h-index 29) ranked first based on number of publications and 74 papers in the field of Medicinal Plants.

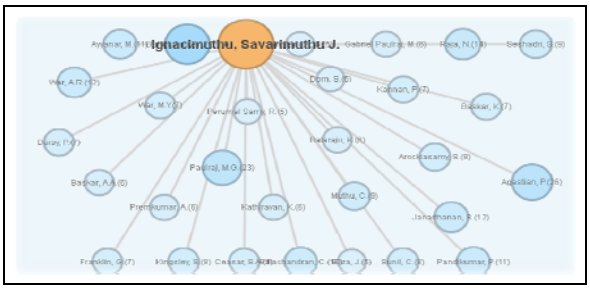

Figure 2 shows co-author network of Ignacimuthu

Kuttan has published 202 papers with 4144 Global Citation Scores (h-index 23) and 48 papers in the field of medicinal plants.

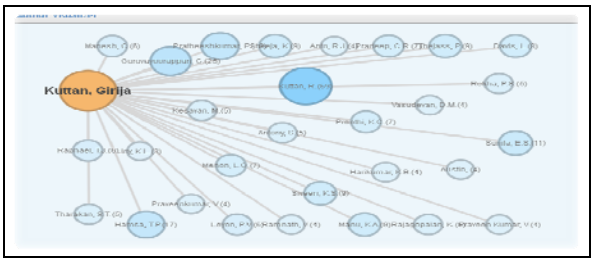

Figure 3 shows co-author network of Kuttan

Findings and Conclusion

The findings of the year wise distribution of research output on Medicinal Plant bring out the fact that the highest number of publication is 1984 in 2011 followed by 1853 papers in 2012 and 1443 papers in 2010. From 1956 to 1972 the number of publications is less than 20. The finding of the ranking of authors based on their publications brings out the fact that Ignacimuthu has published 245 papers with 2440 Global Citation Scores (h-index 29) ranked first based on number of publications and 74 papers in the field of medicinal plants and followed by other scientist.The finding of the source wise distribution of research output brings out the fact that the journal articles occupied the predominant place among the other sources of publications.

It is to conclude that the sum of citations of the Medicinal Plants research publications and the h index scored is good. Since, the database found contributions only from 1956, that the research begins during the period.

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