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GLOBAL RESEARCH ON SCABIES: A SCIENTOMETRICS ASSESSMENT OF PUBLICATION OUTPUT DURING 2009–2018

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Abstract

Scabies is one of the most common dermatological conditions faced by a considerable proportion of population in many countries. The purpose of this study is to analyse the literature published on scabies from 2009–2018. The data were retrieved from the Scopus Database and computed in MS – Excel. Various scientometric techniques were used to find out the lead productive countries in scabies research, their share of publication, top institutes, journals, authors and their citation impact. Approximately, 2268 publications from 892 sources were fetched and 8639 authors with a collaboration index of 4.22 contributed towards them.

Keywords: Scientometrics Epidermal parasitic skin diseases, Scabies, R Software, Source title impact ratio.

Introduction

Epidermal parasitic skin diseases (EPSD) are an assorted category of infectious diseases in which parasite–host interactions are curbed to the upper layer of the skin. Chief EPSD include scabies, pediculosis (capitis, corporis and pubis), tungiasis and hookworm-related cutaneous larva migrans. Scabies is one of the most common dermatological conditions faced by a considerable proportion of skin disease among humans in developing countries. Human scabies is a parasitic infestation triggered by *Sarcoptes scabiei var hominis*. The mite, scarcely visible to the naked eye, burrows into the skin and lay eggs, triggering a host-immune response that causes extreme itching in response to just a few mites. Universally, it affects more than 130 million people at any time. Rates of scabies occurrence have increased sharply from 0.3% to 46%. Scabies affects people from every country. However, it is the most susceptible in young children and the elderly in resource-poor communities. The highest rates occur in countries with hot, tropical climates, where infestation is widespread, specifically in communities where overcrowding and poverty coexist. A rare but imperative clinical variant of scabies is "crusted scabies". This condition occurs generally in immuno-suppressed patients, including those with HIV/AIDS, and in this, the millions of mites, produce widespread scale and crust, often without any significant itching. The prime thing is to identify the patients with crusted scabies because they are a noteworthy source of reinfection to the surrounding community.

Several types of research on the diseases, their cure and medicines related to it are going on. Research activity is required to control and improve the health conditions. Therefore, the structure of available research in recent years needs to be probed and to be presented for subsequent action by the health policymakers.

The most widely used and reliable method to measure the amount and worth of research output on a certain scientific subject is scientometric analysis have been used to analyse the scabies. Nowadays, scientometric technique is extensively used to analyse the research trends and development in a specific field by evaluating the various parameters such as national and international research productivity, collaboration, citations analysis, etc. scientometric analysis has been applied to various medical field such as malaria research, antibiotic resistance, cancer, diabetes, and many other diseases and fields.

Objective

This work focuses on the productivity of research on scabies. Precisely, the following objectives will be sought:

- growth of world literature on scabies
- key countries, institutions, journals and authors contributing to the topic
- annual number of publications
- most frequently encountered keywords, and
- level of collaboration

Methodology

Present study is based on scientometrics tools. Data for present study has been limited to the period from 2009–2018. Scopus, established by Elsevier was used to retrieve publications about "Scabies". The database was explored for the keywords "Scabies" in the title, abstract and keywords fields. These data were further analysed for tabulating lead productive countries in scabies research, their share of publication, top institutes, journals, authors and their citation impact. The impact factor (IF) of a journal was based on the Journal Citation Report 2017 (IF2017). Collaboration among the authors was established based on the addresses of the authors. Collaborative research by the author or country has been analysed by the R software. The citation count was taken as the number of citations scored by each article till December 2018.

Results and Discussion

Table 1 : Most productive countries and their publication share on scabies

Country	Contribution		Number of Publications					Share the Publications %				
		%	2009–10	2011–12	2013–14	2015–16	2017–18	2009–10	2011–12	2013–14	2015–16	2017–18
USA	431	19.00	83	63	91	85	109	20.70	15.71	19.61	16.38	22.57
India	243	10.71	47	59	57	52	28	11.72	14.71	12.28	10.02	5.80
Australia	190	8.38	22	28	45	41	54	5.49	6.98	9.70	7.90	11.18
UK	172	7.58	29	28	35	38	42	7.23	6.98	7.54	7.32	8.70
France	156	6.88	15	24	37	47	33	3.74	5.99	7.97	9.06	6.83
Others	1076	47.44	205	199	199	256	217	51.12	49.63	42.89	49.33	44.93
World	2268	100.00	401	401	464	519	483	100.00	100	100	100	100

Table 1 reveals an almost typically inconsistent trend among all the top-scored countries contributing research publication output on scabies during the study period (2009–2018).

Overall, 2268 publication output on scabies has been discovered across the world. The 2268 publications consist of 1631 articles, 11 articles in press, 1 book, 16 conference paper, 148 letter, 89 Note, 333, review and 39 short surveys. The US has contributed enormously with a total of 431 contributions during the study period and secured the first position, while India obtained the second position with a total of 243 contributions and Australia at third with 190 contributions. The UK and France secured 4th and 5th position with around 172 and 156 contributions each. Contributions from other countries accounted for 1076 publications.

The trend of output is very irregular for all the top scoring countries. In the year, 2009–2010, the US contributed 83 papers, which decreased to 63 during the next year (2011–2012) and again increased to 85 papers in (2015–2016). However, it boomed to produce a total of 109 papers during the last year (2017–2018), which is a total of 22.57% of the entire production.

Comparatively, India's research output on scabies during the study period was almost stable. India started with a modest contribution of 47 publications during the year (2009–2010), percentage share at 11.72%. In 2011–2012, India showed a modest increase of almost 5% with 59 papers. In the following year (2013–2014), again the output came down to 57 papers, and it further declined to 52 papers in 2015–2016, and consecutively deteriorated to 28 papers in 2017–2018, i.e., it stood to a meagre 5.8% in terms of the world share.

Top third-ranking country, Australia has almost showed a steady growth of 22 in (2009–2010), 28 in (2011–2012), 45 papers in (2013–2014), declined to 41 papers in (2015–2016), and finally during the year (2017–2018), it showed a hooping increase with 54 papers.

In contrast to the three top-class productive countries, the UK showed a modest growth. It started with 29 publications during the year (2009–2010), 28 publications during the next consecutive year (2011–2012), and since 2012 till 2018 it showed an almost constant growth of 35, 38 and 42 publications.

Even France showed a modest increase during the study period. It published 15 papers during the year 2009–2010 and then from 2011–16, it constantly kept increasing its productivity with 15, 24, 37, and 47 till 2016. However, during the year (2017–2018), it's production lowered to 33.

Except India, almost all the top-notch countries under the study showed a phenomenal growth during 2017–2018. A percentage share of all the top five countries under this study shows the U.S. taking the highest share with 22.57% while India's performance is lowest at 5.8% even though in the initial year of the study period, i.e., 2009–2010, India's share was 11.72% which was the second best compared to the U.S. in the lead with 20.7%. The pictorial representation of the year-wise trend of publication has been presented in Figure 1.

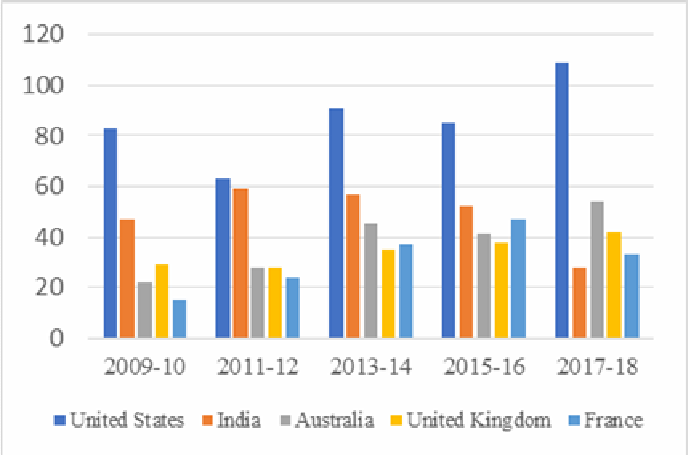

Fig. 1 : Top countries' contribution and growth on scabies from 2009–2018.

Figure 2 shows the number of researched papers published during tenure of 10 years (2009–2018) from India and the number of times they are being cited. Total number of papers shared globally during the study period was 2268 and the number of citations they received till the study period stood to 19,418. The average citation per document is 8.56.

The research output on scabies has shown a very inconsistent growth during the study period. There was a

modest start with 218 papers published in 2009, which went on decreasing till 2012 and then gradually increased till 2018.

Research publication output soared in 2015 with the highest number (263 papers, i.e., 11.60%) published on scabies, while highest number of citations recorded at 3503 (18.04%) was in 2009.

From 2009–2013, researched output on scabies from India showed a gradual upward trend and since 2014, the trend remained inconsistent.

However, even though in 2018, the number of publications in scabies was quite high (255), the number of citations received stood at 174.

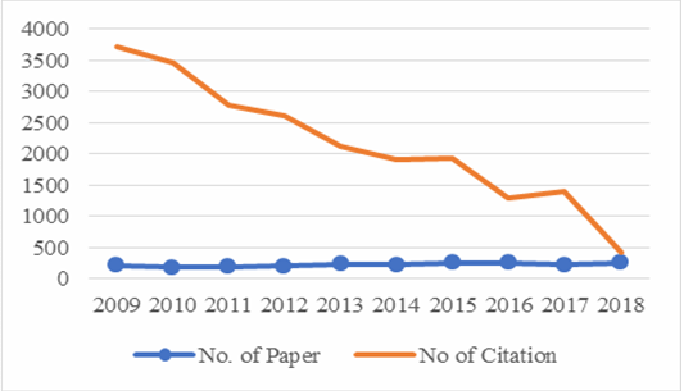

Fig. 2 : Pictorial representation of yearly publication and citation on scabies

Table 2 : Highly cited articles on scabies for the period from 2009–2018

Rank	Title	Year	Source Title	No. of Citations
1	Rescuing the bottom billion through control of neglected tropical diseases	2009	The Lancet	463
2	Global, regional, and national incidence, prevalence, and years lived with disability for 328 diseases and injuries for 195 countries, 1990–2016: a systematic analysis for the global burden of disease study 2016	2017	The Lancet	443
3	The global burden of skin disease in 2010: an analysis of the prevalence and impact of skin conditions	2014	Journal of investigative dermatology	291
4	Acaricide resistance mechanisms in the two-spotted spider mite tetranychus urticae and other important acari: a review	2010	Insect biochemistry and molecular biology	272
5	Global, regional, and national disability-adjusted life-years (dalys) for 333 diseases and injuries and healthy life expectancy (hale) for 195 countries and territories, 1990–2016: a systematic analysis for the global burden of disease study 2016	2017	The lancet	271
6	Permethrin and ivermectin for scabies	2010	New England journal of medicine	175
7	A survey of medicinal plants used by Kavirajes of Chalna area, Khulna district, Bangladesh	2010	African journal of traditional, complementary and alternative medicines	169
8	Clinical practice guideline for the evaluation of fever and infection in older adult residents of long-term care facilities: 2008 update by the infectious disease's society of America	2009	Clinical infectious diseases	133
9	An ethnobotanical survey of medicinal plants in sivrice (elazidotlessĝ-turkey)	2010	Journal of ethnopharmacology	132
10	Phyllanthus amarus: ethnomedicinal uses, Phytochemistry and pharmacology: a review	2011	Journal of ethnopharmacology	122

Publication growth and citedness of Indian publication on scabies. The 2268 articles have been published on scabies from 2009–2018 in 892 sources including journals, books, conference proceedings, etc. Table 2 represents the top 10 highly cited articles titles along with year, name of journals and citations. Among the top 10, three are from "The Lancet". The article on the second position "Global, regional, and national incidence, prevalence, and years lived with disability for 328 diseases and injuries for 195 countries, 1990–2016: a systematic analysis for the global burden of disease study 2016" from "The Lancet" has received great attention. It was published in 2017 and within a year touched the second position in terms of citations. The article on the first position was published in 2009 and had maintained its momentum since the time of this study. It is worth mentioning that out of 2268, only 1545 were cited one or more than one time.

Table 3: Organization-wise contribution

Rank	Name of Organization	Frequency N = 2268	Percentage	Country
1	QIMR Berghofer Medical Research Institute	52	2.29	Australia
1	Menzies School of Health Research	52	2.29	Australia
2	University of Melbourne	48	2.12	Australia
3	Charles Darwin University	44	1.94	Australia
4	University of Queensland	40	1.76	Australia
5	University of the Sunshine Coast	33	1.46	Australia
6	Murdoch Children's Research Institute	26	1.15	Australia
6	AP–HP Assistance Publique - Hopitaux de Paris	26	1.15	France
6	Hôpital Henri Mondor	26	1.15	France
7	Charité – Universitätsmedizin Berlin	25	1.10	Germany
7	University of Western Australia	25	1.10	Australia
8	CSIC- Estación Biológica de Doñana EBD	24	1.06	Spain
8	Universitat Autònoma de Barcelona	24	1.06	Spain
9	Telethon Kids Institute	21	0.93	Australia
10	Royal Children's Hospital, Melbourne	20	0.88	Australia
10	Sichuan Agricultural University	20	0.88	China
10	London School of Hygiene & Tropical Medicine	20	0.88	UK

Table 3 gives top 10 organisations with contribution on scabies. The top 5 rank organizations are from Australia. First rank shared by two organization are "QIMR Berghofer Medical Research Institute" and "Menzies School of Health Research" with 52 contribution each. Sixth rank is shared by three organizations namely "Murdoch Children's Research Institute" from Australia, "AP-HP Assistance Publique - Hopitaux de Paris" and "Hôpital Henri Mondor" from France with 26 contributions each. The highly ranked organizations are from Australia, France, Germany, Spain, China and UK. It is noteworthy that Australia is on the third rank among the world share but is at the top on the basis of organizations.

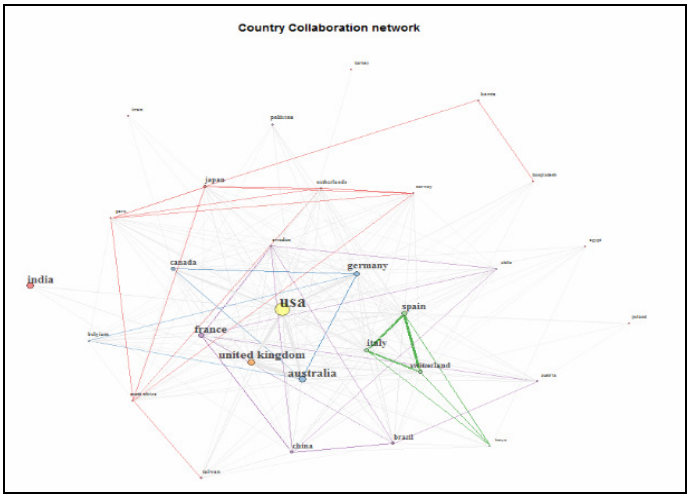

Fig. 3 : Country-wise collaboration network (top 30 countries)

Figure 3 shows a country-wise researched output on scabies carried under collaboration globally. Collaborative studies always encourage and enrich the research area with greater scope of knowledge sharing.

Among the top scorer countries, the US and the UK has maximum collaboration of six and five countries each, towards scabies research. Four countries have collaborated with at least two countries including third topmost scorer Australia and Canada, Germany and Belgium. Seven countries have seen collaboration with at least four more countries/regions including Pakistan, France, China, Austria, Brazil, Sweden and Chile. Spain, Italy, Switzerland and Kenya have collaborated with three countries each for carrying out research output in scabies. India has a majority collaboration with the USA. However, research has shown that over the years, collaboration has risen, thus increasing the scope and impact of scientific research output globally.

A total of 8639 authors have contributed towards literature on scabies from 2009–2018. There were 3.81 authors per document. Figure 4 represents top 15 authors around the world with a total contribution of 289 research output receiving 5933 citations during a period of 10 years.

Top authors contributing in this field include O. Chosidow with 28 publications receiving 350 citations. Highest citation of 865 was received by J.R. Carapetis with 20 research output. Other authors who have fairly contributed during the study period and secured 2nd and 3rd positions, respectively include K. Fischer and B.J. Currie with 26 and 25 contributions and 439 and 697 citations, respectively.

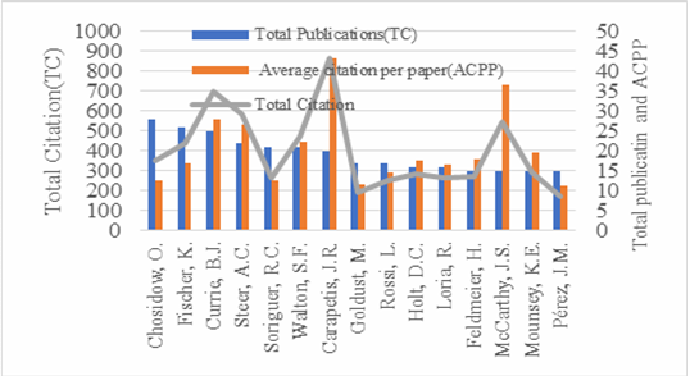

Fig. 4 : Prolific authors engaged in scabies research

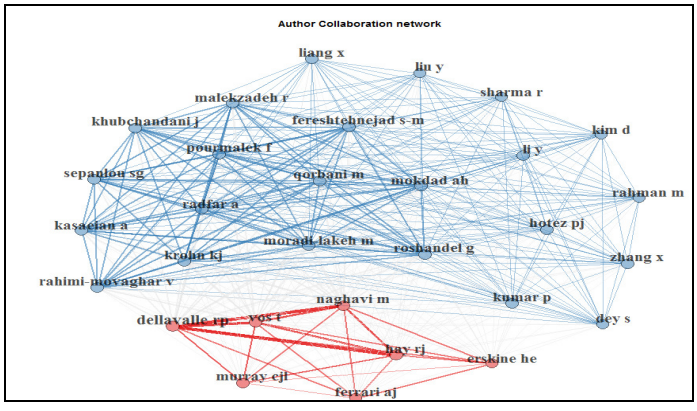

Fig. 5 : Collaboration of authors limit 30 authors

Figure 5 shows the collaborative network of authors. It is clearly visualised that there are two cluster working in collaboration with each other. The first cluster comprises of orange colour comprising of the authors Dellavalle RP, Murray EJl, Ferrari AJ, Erskine HE, Jay RJ, Naghavi M, Vos T. Among these Dellavalle RP, Naghavi M and Hay RJ has a strong network. The second cluster comprises of 23 authors. All the authors are connected to each other and working in good collaboration in small networks.

A total of 2268 articles on scabies were published during the study period of 10 years (2009–2018). The list of top 20 journals that published articles on scabies research is given in Table 4. The journal "Plos Neglected Tropical Diseases" is on top with 46 articles. The rest of the journals that have published moderately till 30 articles during the study period include "International Journal of Dermatology (39)", "Journal of Ethnopharmacology (34)", "Veterinary Parasitology (32)", "Parasites and Vectors (31)" and "Journal of the American Academy of Dermatology (30)".

The highest IF of 6.898 is of the "Journal of the American Academy of Dermatology" followed by the "British Journal of Dermatology" with 6.129 IF. "Plos Neglected Tropical Diseases" and "Journal of the European Academy of Dermatology and Venereology" ranked consecutively with 4.367 and 4.287 IF. Among the top 20 journals, two journals have IF in the range of 3–4, six journals have IF ranging from 2–3, four journals have IF from 1–2, one journal was having the impact factor is less than 1. Three journals do not have an IF yet till the ongoing study period.

Source Title Impact Ratio

All these 2268 publications were accommodated by over 892 sources. An attempt has been made to analyse all the publications and highlight the top 20 most impactful sources titles by assessing the source title impact ratio (STIR). This enables to know the sources titles which are in the favourite list of researchers. The STIR is measured on the basis of the following metric

$$STIR = \frac{TP + CR + ACPP}{100}$$

Here,

TP = total publications in the respective source title.

CR= the cited rate

ACPP = average citations per publication

The STIR for top 20 sources has been computed and rank is allocated as per STIR. The Table 4 shows that "Journal of Ethnopharmacology" is on top with 0.71 STIR. This source has publications 34 publications, which were so impactful that these publications received 1152 citations with an average citation rate of 33.68 and 2.86. "Plos Neglected Tropical Diseases" achieved the second rank with STIR 0.69 and third rank with IF. This clearly signifies the impact of this title. "Journal of the American Academy of Dermatology" was on the top with respect to IF but, with reference to STIR it is on seventh position.

Table 4 : Most Prolific Journals publishing articles on Scabies

Name of Journal	TP	TC	CR	ACPP	STIR	Rank
Plos Neglected Tropical Diseases	46	816	4.90	17.74	0.69	2
International Journal of Dermatology	39	301	10.30	7.72	0.57	4
Journal of Ethnopharmacology	34	1152	2.86	33.88	0.71	1
Veterinary Parasitology	32	338	8.58	10.56	0.51	5
Parasites and Vectors	31	413	6.54	13.32	0.51	5
Journal of the American Academy of Dermatology	30	324	7.10	10.80	0.48	7
Pediatric Dermatology	28	212	8.49	7.57	0.44	10
Journal of The European Academy of Dermatology and Venereology	25	292	8.56	11.68	0.45	9
Annales De Dermatologie Et De Venereologie	24	66	19.70	2.75	0.46	8
Plos One	24	301	7.64	12.54	0.44	10
Indian Journal of Dermatology	22	112	14.29	5.09	0.41	11
Journal of Pakistan Association of Dermatologists	21	45	26.67	2.14	0.50	6
Korean Journal of Dermatology	18	22	40.91	1.22	0.60	3
Journal of Dermatology	18	140	10.71	7.78	0.36	13
Dermatology Online Journal	16	37	29.73	2.31	0.48	7
British Journal of Dermatology	16	290	4.83	18.13	0.39	12
Parasitology Research	16	149	10.74	9.31	0.36	13
Indian Journal of Dermatology Venereology and Leprology	15	111	13.51	7.40	0.36	13
Clinics in Dermatology	15	138	10.14	9.20	0.34	14
Anais Brasileiros De Dermatologia	15	92	11.96	6.13	0.33	15

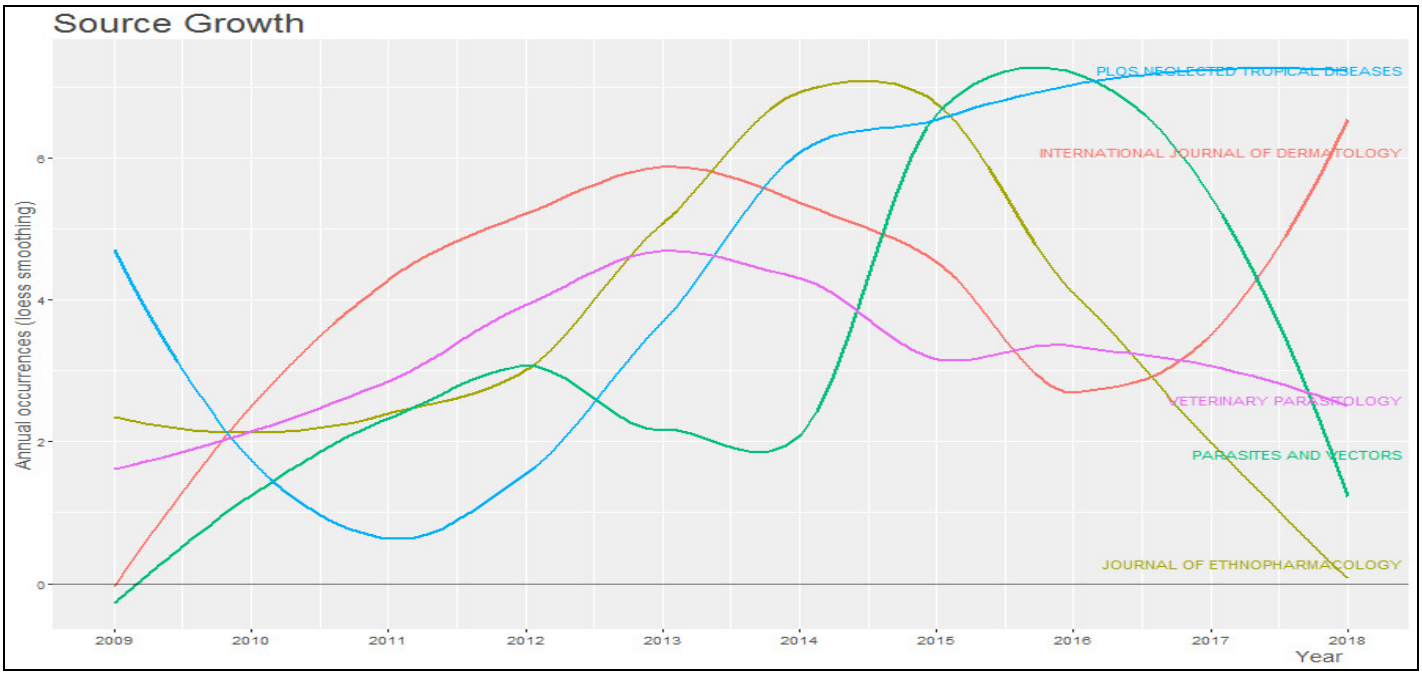

Fig. 6 : Growth of top rank sources

Table 5: Top keyword and their frequency year wise

Year	Keyword by Author	Frequency	Keyword by Publisher	Frequency
2009	Scabies	328	Scabies	2424
2010	Sarcoptes Scabiei	148	Human	1567
2011	Ivermectin	81	Male	1347
2012	Sarcoptic Mange	44	Female	1259
2013	Medicinal Plants	43	Article	1077
2014	Streptomyces Scabies	43	Humans	1021
2015	Skin Diseases	42	Sarcoptes Scabiei	716
2016	Permethrin	41	Ivermectin	557
2017	Crusted Scabies	35	Child	516
2018	Epidemiology	35	Non-human	513

In total, 3662 keywords have been used by authors in the scabies literature published from 2009–2018. Table 5 gives an analysis of top keywords associated with scabies research from the perception of authors and publishers. Keywords in an article represent the core research area of a study. The central idea represented in the research area can also be indicated from an analysis of the keywords. Table 5 represents top 10 popular keywords by authors and publishers along with their frequency during the years.

Our research indicated that scabies had been used most widely during the study period, both by the authors and the publishers. During 2009, the word "Scabies" had been used 328 times by authors and 2424 times by the publishers. Another commonly used term, both by the publisher and author is "*Sarcoptes Scabei*" with a frequency of 148 by authors in 2010 and a frequency of 716 times by publishers in 2015. Yet another commonly used term by publisher and author is "Ivermectin" used 81 times in 2011 by authors and 557 times in 2016 by publishers.

Other keywords popularly used by authors include "*Sarcoptic Mange*" (44 times in 2012), "Medicinal Plants" (43 times in 2013), "Skin Diseases" (42 times in 2015), "Permethrin" (41 times in 2016), and terms like "Crusted Scabies" and "Epidemiology" appeared with a frequency of 35 each during 2017 and 2018.

By publisher count, the term "Human" had a frequency of 1567 during 2010 and in 2014, the term had occurred in 1021 articles. Other popularly used words in terms of publishers include "Male" (used 1347 times in 2011) and "Female" (1259 times in 2012). The keyword "Child" and "Non-human" have appeared in almost 500 articles by publisher search.

Thus, the authors' top keywords are surrounded by the types of scabies and their remedial medicines. The publisher's keywords segregate the mode of study i.e., whether the study is on human, non-human, child, etc.

The growth of top keywords given by authors and publishers is represented in Figures 7–8.

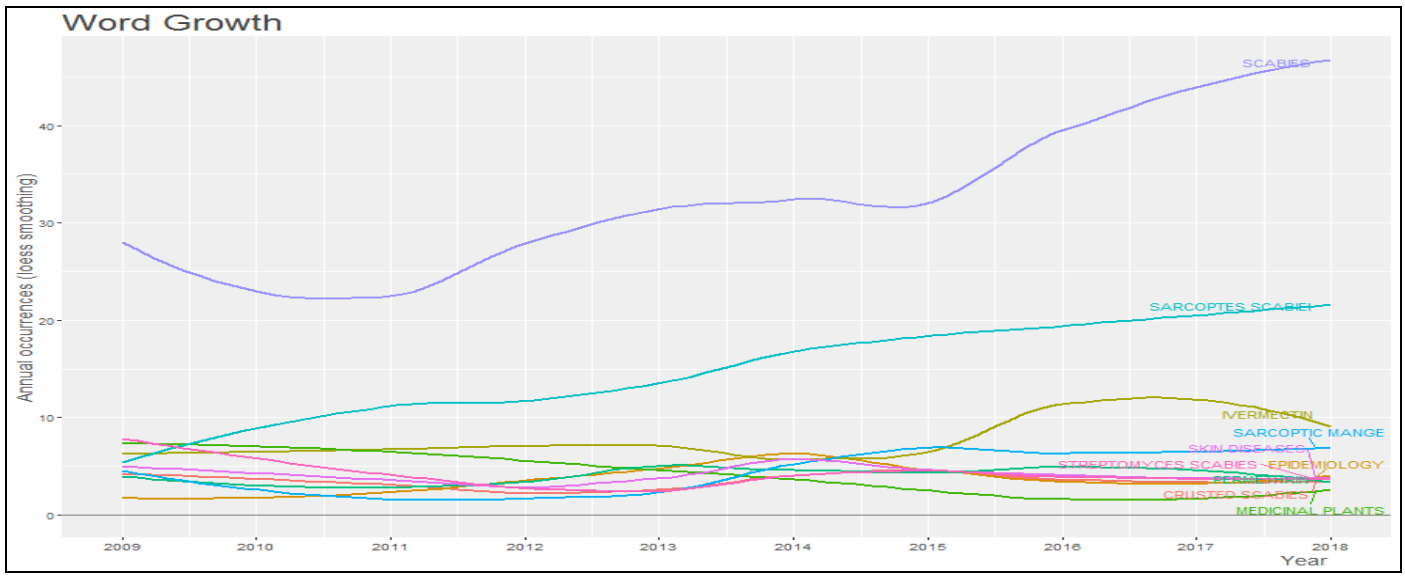

Fig. 7 : Growth of top keywords given by authors

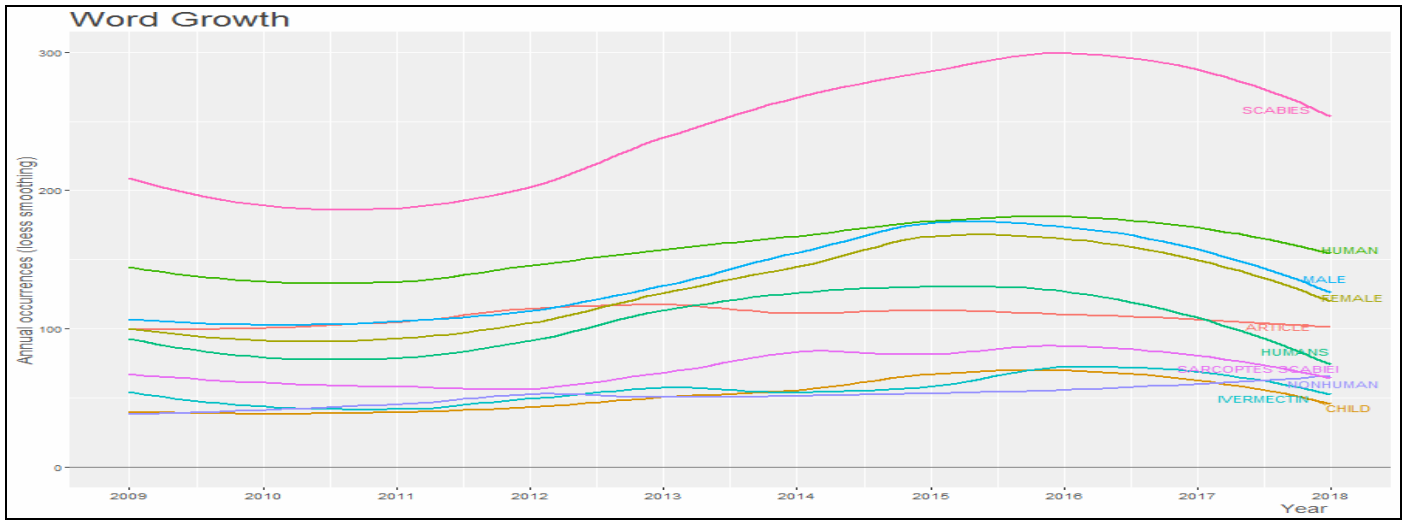

Fig. 8 : Growth of top keywords given by publisher

Conclusion

In total, 2268 publications were there on scabies during the last decade. The study determined that multiple authorship patterns prevailed as there were only 275 single authored documents. The leading countries working on Scabies research include the USA, India, Australia, the UK and France, etc. Indian contribution is 10.71% of the total publication. The citations received were 19418 and the highly cited articles are from the source "The Lancet". Top organizations working in the field are from Australia. The highly cited author is J.R. Carapetis with 865 citations and 20 publications. "Journal of Ethnopharmacology" has the highest STIR. The highest IF journal is "Journal of the American Academy of Dermatology". Scabies is skin diseases caused by mites, so the keyword analysis shows that top keywords are related to the diseases and their remedy. This work can be beneficial for the scientific community and policy makers to collaborate and discover the potential remedies for the cure of scabies.

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