ORIGINAL ARTICLE

A quantitative assessment of "chikungunya" research publications, 2004-2013

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Abstract

Introduction: This study has been carried out with an objective to analyze research publications on chikungunya virus (commonly known as "chikungunya") available in Scopus multidisciplinary database. The data were screened and retrieved from Scopus using keywords "chikungunya virus" or "chikungunya" published from 2004 to 2013. **Materials and Methods:** The quantitative analysis was carried out in terms of the characteristics of chikungunya publication, citation analysis, average citation per papers (ACPPs), productivity by country, institutions, authors and journals, and impact factor (IF) for the year 2013. **Results:** There were 1,783 chikungunya articles published in over 613 journals and have been written by 9,200 authors either singly or in joint authorship. India is found to be the most productive country (378; 21.27%), and M.M. Parida of the Defense Research and Development Establishment, India, is the most productive author. Most of the institutions with the highest productivity are in France. **Conclusion:** Chikungunya has emerged as a threat to public health in Africa, the Indian Ocean region, Southeast Asia, the Pacific Islands, Europe, and Latin America. The results of this study have shown the prevalence of literature in these regions.

Keywords: Bibliometric analysis, chikungunya, chikungunya virus, mosquito-borne diseases

Introduction

Chikungunya virus (commonly known as "chikungunya") is a ribonucleic acid (RNA) virus (genus: *Alphavirus*) causing acute dengue-like fever. The fever is caused due to an infection from arthropod-borne virus (arbovirus) transmitted through the bite of infected mosquitoes belonging to the genus *Aedes* (*Aedes aegypti* and *Aedes albopictus*).[1-3] The mosquito-borne viral disease was first described during its outbreak in southern Tanzania in 1952.[4,5] Chikungunya is characterized by an abrupt onset of fever accompanied by joint and muscle pain, headache, nausea, fatigue, and rashes. The recent resurgence of chikungunya fever characterized by an explosive onset, rapid spread, high morbidity, and myriad of clinical manifestation has attracted global attention.[6,7] According to the World Health Organization (WHO) reports, the epidemiology of the disease has been identified in nearly 40 countries around the world. These countries are located in Asia, Africa, Europe, and America.[8]

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Bibliometric and citation studies are increasingly being used as a tool for obtaining and assessing the information about the current research in these specific areas.[9,10] The bibliometric methods are now widely being used to analyze the research trend in various diseases and providing useful data for measuring their impact over the global health scenario.[11-13] The aim of this study is to have a closer look at the publication pattern of literature on the chikungunya disease with the help of bibliometric methods.

Literature review

The bibliometric studies open the door for exploration of research trends in several fields. According to

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Palmer (2010),[14] the bibliometric studies are applied primarily to illustrate the influences of scattering of knowledge structure and to the study of information behavior. It provides evidence of the actual work performed and the problems encountered by the scholars. Bibliometrics help in the identification of information on this specific topic scattered in various literature sources. The bibliometric study is a literature-based study that highlights the trends and strengths of the research in this field. There are a few studies that highlighted the research trends related to different diseases. However, there are bibliometric studies that specifically demonstrated the research trends in some of the specific diseases such as malaria, dengue fever, chikungunya, etc., These studies are related either to a specific geographical jurisdiction or to a specific time period and there was a lack of holistic overview. Al-Mutawakel *et al*. (2010)[15] carried out a scientometric analysis of the leishmaniasis research. Their result indicates the high research output in the USA, UK, Germany, along with Brazil and India. Dutt *et al*. (2010)[16] covered a global perspective of dengue fever research and analyses of 2,566 articles of the literature. They reported that the USA and India are the most productive countries. Raja *et al*. (2012)[17] studied the authorship pattern, degree of collaboration, geographical distribution, and other bibliometric indicators on dengue fever during 1999-2012 through the Science Citation Index (SCI) database. Again, Gupta *et al*. (2014)[18] studied the status of dengue research in India and highlighted that India's overall ranking remained in the second position for the period 2003-2012. Reidpath *et al*. (2011)[19] presented a study on social science research on neglected tropical diseases. Their research was focused on chikungunya, dengue, visceral leishmaniasis, and onchocerciasis. They reported a substantial variation in number of publications on each disease. The study was not focused on bibliometric analysis; rather it was focused towards the classification of these diseases into social science research field. The bibliometric studies on various mosquito-borne diseases have been conducted. These are dengue,[20,21] malaria,[22,23] and yellow fever.[24] These studies do not present any evidence of the bibliometric research involving chikungunya virus; however, in some of the studies chikungunya was a part of the study. The examples includes the analysis of Indian research output in medicine[25] and dengue research in India.[26] To compensate for the lack of an exhaustive research, a bibliometric study was undertaken with the following objectives:

Objectives of the study

The purpose of this study is to gain an insight into the patterns of growth and research performance through analysis of literature on chikungunya virus with reference to following:

- characteristics of publication in terms of annual output and citation
- document types and language
- most productive country, author, institution, and journals
- Citation status and research impact.

Material and Methods

The bibliographic data for this study were screened and retrieved from Scopus database (January-February 2015) using the keywords "chikungunya" or "chikungunya virus" available in title, abstract, and keyword fields. Data were collected for a period of 10 years from 2004 to 2013. The data were divided into two groups with a time span of 5 years each (2004-2008 and 2009-2013) in order to assess the publication trends. The articles published from England, Scotland, Northern Ireland and Wales were combined into the ones from the UK.[26] The citation count was taken as the number of citation scored by each articles since it was published till December 2013. The institutional productivity was determined by the address of at least one author in the article; further if all the authors belong to the same institute, it was considered as a single institution contribution. The impact factor (IF) of the journal has been taken from the Journal Citation Report 2013 published by ISI Web of Science Philadelphia, USA. In order to assess the research impact, *h*-index[27] was also obtained from the database.

Results and Discussion

Document types and language of publication

There were 1,783 articles published during the period 2004-2013 that met the selection criteria mentioned in the methodology. These articles were published in 10 document types. The publications appeared as research articles (1,140; 63.90%) followed by review articles (303, 16.98%), letters (107, 6%), editorials (70, 3.92%), note items (57, 3.20%), short surveys (53, 2.97%), and conference papers (35, 1.96%). Books, book chapters, and erratum comprise less than 1% of the total research publication output. The progression of document types in chikungunya research is given in Figure 1 and it can be observed that the documents and articles were displayed to reveal the growing tendencies over a period of 10 years. In the initial years (2004-2005), all the document types and articles are almost same but as time passes, there is an increase in the variety of document types.

The chikungunya studies were published in 19 different languages, with 84.77% of the articles published in

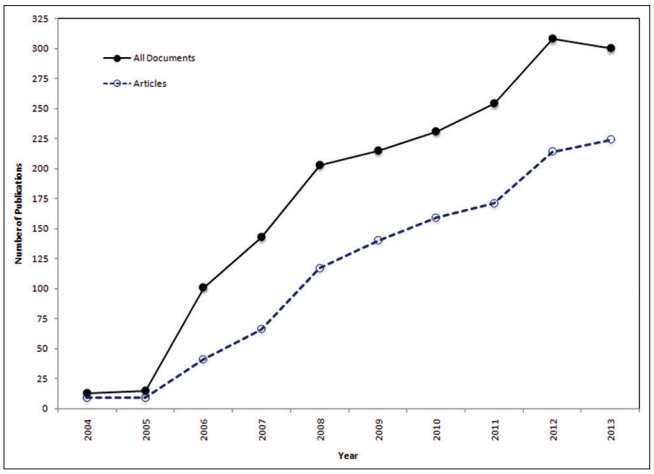

Figure 1: Progression of document types in chikungunya research, 2004-2013

Table 1: Characteristics of Chikungunya publication during 2004-2009

Year	TP	TP%	TC	ACPP	AU	AU/TP
2004	13	0.73	783	60.23	83	6.38
2005	15	0.84	520	34.67	68	4.53
2006	101	5.68	2,295	22.72	372	3.68
2007	143	8.04	4,330	30.28	718	5.02
2008	203	11.41	3,986	19.64	951	4.68
2009	215	12.09	3,876	18.03	1,025	4.77
2010	231	12.98	3,327	14.40	1,274	5.52
2011	254	14.28	2,494	9.82	1,304	5.13
2012	308	17.31	1,583	5.14	1,761	5.72
2013	300	16.86	588	1.96	1,644	5.48
2004-08	475	26.70	11,914	25.08	2,192	4.61
2009-13	1,308	73.52	11,868	9.07	7,008	5.36
2004-13	1,783	100	23,782	13.34	9,200	5.16

TP=Total publication, TC=Total citation, ACPP=Average citation per paper, AU=Author

English, the most prominent mode of communication, followed by French (9.50%) and German (1.29%). Other languages have less than 1% contribution.

Characteristics of chikungunya publications, 2004-2013

A total of 9,200 authors wrote 1,783 articles on chikungunya during the period 2004-2013 and the annual growth of the literature is detailed in Table 1. The characteristic of the literature growth pattern is compared between two periods of 5-years duration each. During the period 2004-08, percentage share was 26.70% of the total publication, while it was increased to 73.52% during the period 2009-2013. The annual percent growth rate has been found to be 220.76% during these 10 years. An increasing trend can be observed in case of author per paper (APP). During 2004-2008, the average number of author per paper was 4.61, which was increased to 5.37 per paper during the period 2009-2013.

During this study period, these 1,783 articles have accumulated 23,782 citations with an overall ACPP of 13.34. Of the 1,783 articles, 1,348 articles were cited at least once; 33 articles were cited more than 100 times, whereas 436 articles were not cited at all. The citation scored by the articles during both study periods was almost same but there was a huge gap in ACPP. The ACPP during 2004-2008 was 25.08, which abruptly went down to 9.07 during 2009-2013. The annual growth and citation pattern are given in Figure 2 and it can be observed that there was an abrupt increase in the number of citation during the period 2005-2007. The study of citation of scientific article has potentially important implications for understanding the knowledge accumulation process.[28] The citation to a paper depends upon the coverage of subject fields with high databases coverage such as Web of Science and Scopus.[29] One of the reasons behind the abrupt increase in the citation of a paper is due to the increased incidence rate of the spread of the chikungunya virus infection in Indian subcontinent and European region along with the African region.

Productive authors engaged in chikungunya research, 2004-2013

In terms of author's contribution on chikungunya research, Table 2 presents the most productive authors who have published more than 20 articles on different areas of chikungunya research. Table 2 shows the total publications, share of publication, number of citations, and *h*-index. M.M. Parida of the Defense Research and Development Establishment India and Alian Michault of La Runion University Hospital Sant-Denis France are the two most productive authors with 30 articles each. However, in terms of citation impact, Alian Mischault has more impact over others who have accumulated 1,581 citations on an average of 52.7 citations per paper, whereas M. M. Parida has only 539 citations with an average of 17.97 citations per paper. Two more authors, Stephen T. Higgs and Xavier Nicolas de Lamballerie, have scored more than 1,000 citations. Xavier Nicolas de Lamballerie has the highest ACPP (58.14) among all the authors in the group, which means Xavier's paper is cited very often compared to others. In terms of *h*-index, the group average is 13.25 and only four authors have higher *h*-index value than group average. Alain Michault has the highest *h*-index value (19) followed by Stephen T. Higgs (18) and Xavier Nicolas de Lamballerie (17).

Top productive countries in chikungunya research, 2004-2013

Table 3 presents the global publication share, rank, and citation status of the top 17 most productive countries with more than 25 publications during the study period. India is at the top in this list with 378 publications (21.25%

share, first rank) followed by France (21.25% share, second rank) and the USA (19.17% share; third rank). The UK, Italy, Singapore, Australia, Germany, and Thailand have their global share ranging 3.60-5.12% and ranked from ninth to fourth places. Other countries such as the Netherlands, Malaysia, Switzerland, Réunion, Belgium, Canada, Sweden, and Japan have their global publication share ranging 1.41-2.19% and these are ranked from 10th to 17th place.

Among these 17 most productive countries, (i) the publication of G7 countries have shown an increasing trend (except France); Canada (0.84-1.84%), Germany (3.59-3.83%), Italy (4.85-5.06%), Japan (0.21-1.84%), the UK (2.74-5.98%), and the USA (11.81-21.85%). France has shown a decrease in the publication share from 25.32% to 18.85%. (ii) Almost all developing countries except some have also shown an increasing trend. India has shown increasing trends and its publication has increased from 19.20% in 2004-2008 to 21.99% in 2009-2013.

The growth patterns can be seen in Table 3. Figure 3 presents the tendency curves of the top five most productive countries in terms of the highest number of documents during these 10 years. India had contributed the most to the chikungunya research, while the USA has shown a continued growth from 2004 to 2013. France too has shown an increasing trend but 2009 onward, the productivity decreased as compared to the previous years. Further, Italy has also shown an increasing trend, while the UK followed an increasing trend till 2008 and once again from 2011 and an increasing trend continued. However, the positive trends and progresses had great

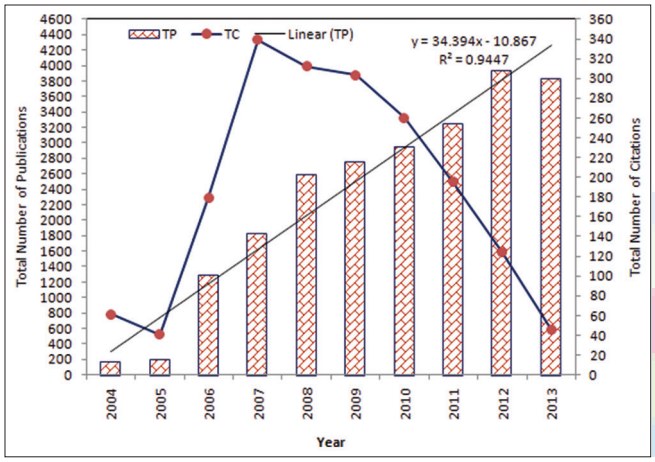

Figure 2: Publication pattern and citation characteristics of chikungunya publications, 2004-2013

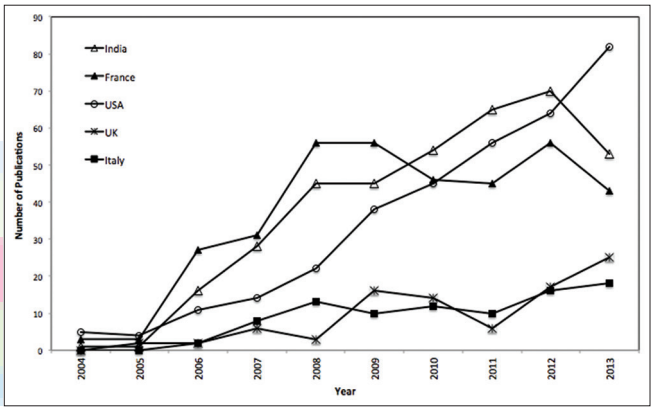

Figure 3: Growth trends of top five most productive countries on chikungunya research

Table 2: Productive authors engaged in chikungunya research, 1993-2013

Author's name	Name of the organization	TP	TC	ACPP	*h*-lindex
M.M. Parida	Defense Research and Development Establishment India, Gwalior, India	30	539	17.97	13
Alain Michault	La Reunion University Hospital Saint-Denis/Saint-Pierre, France	30	1,581	52.7	19
Stephen T. Higgs	Kansas State University, Department of Diagnostic Medicine/ Pathobiology, Manhattan, United States	29	1,277	44.03	18
Scott C. Weaver	UT Medical Branch at Galveston, Institute for Human Infections and Immunity, Galveston, United States	28	656	23.43	12
Anna Bella Failloux	Institut Pasteur, Paris, Paris, France	27	718	26.59	15
Marc Grandadam	Institut de Recherche Biomedicale des Armees-Antenne de Marseille, Marseille, France	24	760	31.67	12
Hugues J G Tolou	Groupe d'Etude en Preventologie (GEP), Villenave-d'Ornon, France	23	821	35.7	13
Bernard Alex Gauzere	CHU la Reunion, Saint-Denis, France	22	549	24.95	9
Christophe Paupy	Centre International de Recherches Medicales de Franceville, Franceville, Gabon	21	530	25.24	10
Xavier Nicolas de Lamballerie	Aix Marseille Universite, EHESP French School of Public Health, Marseille, France	21	1,221	58.14	17
Ann M. Powers	Institut Pertanian Bogor, Bogor, Indonesia	20	699	34.95	12
Fabrice Simon	Laveran Military Teaching Hospital, Department of Tropical Medicine and Infectious Diseases, Bordeaux, France	20	328	16.4	9
	Total	295	9,679	32.64	13.25

TP=Total publication, TC=Total citation, ACPP=Average citation per paper

relationships with the whole world's attention and acknowledgement, implying a promising prospect as compared to similar studies in other fields.[30] Among the top 17 most productive countries, the publication rank has been increased for India (2nd to 1st), the USA (3rd to 2nd), the UK (7th to 4th), Singapore (15th to 4th), Australia (9th to 7th), Thailand (11th to 8th), the Netherlands (14th to 10th), Sweden (16th to 15th), and Japan (17th to 16th), while the countries that have shown a decline in ranking are France (1st to 3rd), Italy (4th to 6th), Germany (5th to 9th), Malaysia (10th to 11th), Switzerland (8th to 12th), Réunion (6th to 17th), Belgium (12th to 13th), and Canada (13th to 14th) [Figure 4].

The research impact in terms of citation count, the USA has scored highest number of citations of 8,322 followed by France (6,183 citations) and India (3,624 citations). In terms of ACPP, Belgium tops the rank with 28.36 citations per paper followed by the USA (24.40) and Switzerland (21.18) [Table 3].

Chikungunya has emerged as a threat to the public health especially in Africa, the Indian Ocean region, Southeast Asia, and the Pacific Islands and in Europe and Latin America.[31-33] The results of this study have shown the prevalence of the literature in these regions [Figure 5].

Productive journals in chikungunya research, 2004-2013

The articles on chikungunya were published in a wide range of 613 journals. Table 4 presents the top 20 most productive journals that published at least 15 articles. The result is presented as percent share of publication, rank,

Table 3: Publication output, share, and research impact of the most productive countries on chikungunya research, 2004-2013

Country	No. of publications			Rank and (%) share			No. of citations	ACPP
	2004-08	2009-13	2004-13	04-08	09-13	2004-13		
India	91	287	378	2 (19.20)	1 (21.99)	1 (21.25)	3,624	9.59
France	120	246	366	1 (25.32)	3 (18.85)	2 (20.57)	6,183	16.89
United States	56	285	341	3 (11.81)	2 (21.84)	3 (19.17)	8,322	24.4
United Kingdom	13	78	91	7 (2.74)	4 (5.98)	4 (5.12)	1,267	13.92
Italy	23	66	89	4 (4.85)	6 (5.06)	5 (5.00)	875	9.83
Singapore	2	75	77	15 (0.42)	5 (5.75)	6 (4.33)	1,485	19.29
Australia	9	63	72	9 (1.90)	7 (4.83)	7 (4.05)	1,339	18.6
Germany	17	50	67	5 (3.59)	9 (3.83)	8 (3.77)	440	6.57
Thailand	4	60	64	11 (0.84)	8 (4.60)	9 (3.60)	1,113	17.39
Netherlands	3	36	39	14 (0.63)	10 (2.76)	10 (2.19)	559	14.33
Malaysia	5	34	39	11 (1.05)	11 (2.61)	11 (2.19)	314	8.05
Switzerland	10	24	34	12 (2.11)	12 (1.84)	12 (1.91)	720	21.18
Reunion	14	20	34	13 (2.95)	17 (1.53)	13 (1.91)	212	6.24
Belgium	4	24	28	14 (0.84)	13 (1.84)	14 (1.57)	794	28.36
Canada	4	24	28	15 (0.84)	14 (1.84)	15 (1.57)	335	11.96
Sweden	2	24	26	16 (0.42)	15 (1.84)	16 (1.46)	358	13.77
Japan	1	24	25	17 (0.21)	16 (1.84)	17 (1.41)	330	13.2
World Total	474	1308	1783				23,782	13.37

ACPP=Average citation per paper

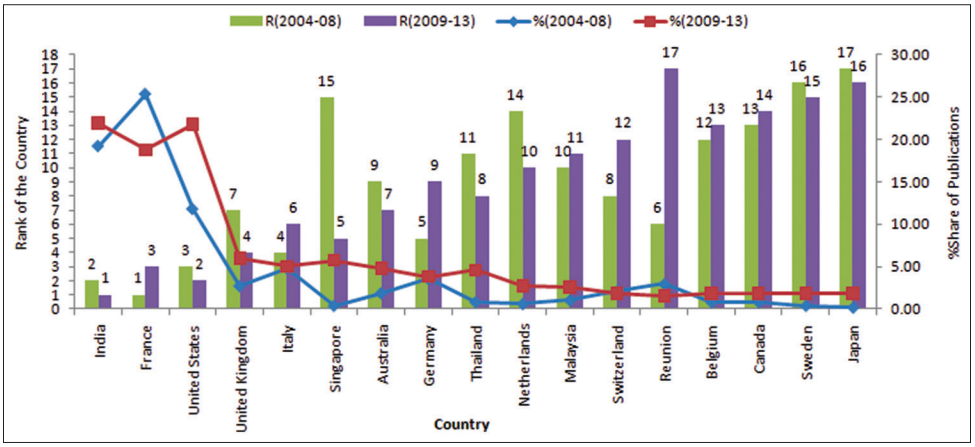

Figure 4: Ranking and share of publication by the most productive countries on chikungunya research, 2004-2013

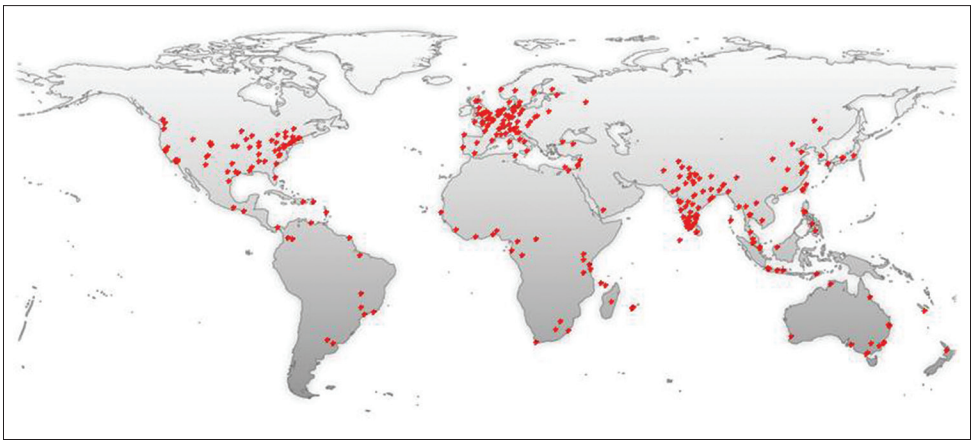

Figure 5: Prevalence of chikungunya research literature worldwide (Source: http://www.gopubmed.com/) [Last accessed on 2015 April 04]

Table 4: Top most productive journals published on chikungunya research

Journals	No of publications	R (%) share	IF (2013)
Plos One	57	1 (3.20)	3.534
Emerging Infectious Diseases	56	2 (3.14)	7.327
Plos Neglected Tropical Diseases	47	3 (2.63)	4.489
American Journal of Tropical Medicine and Hygiene	40	4 (2.24)	2.736
Journal of Virology	35	5 (1.96)	4.648
Vector Borne and Zoonotic Diseases	30	6 (1.68)	2.531
Virology Journal	28	7 (1.57)	2.089
Indian Journal of Medical Research	26	8 (1.46)	1.661
Medecine Tropicale Revue Du Corps De Sante Colonial	25	9 (1.40)	-
Plos Pathogens	21	10 (1.18)	8.057
Euro Surveillance Bulletin Europeen Sur Les Maladies Transmissibles European Communicable Disease Bulletin	21	11 (1.18)	4.659
Parasitology Research	16	12 (0.90)	2.327
Southeast Asian Journal of Tropical Medicine and Public Health	16	13 (0.90)	0.546
Infection Genetics and Evolution	16	14 (0.90)	3.264
Transactions of the Royal Society of Tropical Medicine and Hygiene	15	15 (0.84)	1.931
Total share of publications	411	23.05%	

R=Rank, IF=Impact factor

and IFs of journals in 2013. In the field of chikungunya research, "PloS One" is the most productive journal and published the highest number of articles (57, 3.20% share) followed by "Emerging Infectious Diseases" (56, 3.14%) and "Plos Neglected Tropical Diseases" (47, 2.63%), and these journals ranked from one to three. Other journals are ranked from four to fifteen. In terms of IF, "PloS Pathogen" is ranked one with highest IF of 8.057 in the list of most productive journals. Though, in terms of publication it is ranked at the 10th position. Other journals with high IF were "Emerging Infectious Diseases" (IF = 7.327), "Euro Surveillance" (IF = 4.659), and "Journal of Virology" (IF = 4.648). It can be clear from Table 3 that these 15 most productive journals have published only 23.05% of the total chikungunya research output, while rest of the articles have been published in a wide range of journals (598). In this way, it can be observed that the articles are scattered in a wide range of publications but does not follow the standard Bradford distribution[34] of 1:n: n^2. There is one study, which reported the application of Bradford law of scattering for the literature on psoriasis disease.[35] All the journals have their IF more than one; however, only "Southeast Asian Journal of Tropical Medicine and Public Health" has its IF less than one (0.546). In terms of IF, all the journals have IF except one journal named "Medecine Tropicale Revue Du Corps De Sante Colonial."

Top most productive institutions on chikungunya research, 2004-2013

The names of the top most productive institutions engaged in chikungunya research are given in Table 5 and it highlights the total number of article, total citations of the institute, the average citations per paper, and *h*-index value. These 13 institutions have published 480 articles with a share of 27.48% of global output. The institutions

Table 5: Productive institutions engaged in chikungunya research, 2004-2013

Affiliations	TP	TC	ACPP	*h*-Index
Institut Pasteur, Paris, France	83	2,671	32.18	27
UT Medical Branch at Galveston, USA	63	2,047	32.49	27
Centers for Disease Control and Prevention, USA	39	1,045	26.79	17
IRD Centre de Montpellier, France	35	956	27.31	16
Inserm, France	34	802	23.59	15
Yong Loo Lin School of Medicine, Singapore	34	383	11.26	10
Institut de Veille Sanitaire, France	32	938	29.31	13
CNRS Centre National de la Recherche Scientifique, France	30	1,146	38.2	13
IMTSSA Institut de Medecine Tropicale du Service de Sante des Armees, France	30	773	25.77	15
Defence Research and Development Establishment India	30	424	14.13	11
National Institute of Virology India	29	676	23.31	14
Mahidol University, Thailand	26	169	6.5	8
Agency for Science, Technology and Research, Singapore	25	437	17.48	11
Total	490	12,467	25.44	15.15
World Total	1,783			
Share	27.48			

TP=Total publication, TC=Total citation, ACPP=Average citation per paper

performance was evaluated based on the affiliation of at least one author in the contributed paper. Out of 1,783 articles, 673 (37.75%) were published as single institution articles and 1,110 (62.25%) were published in association with other institutions. Institut Pasteur, Paris, France, was the most productive institution with 83 articles and 2,671 citations with an ACPP of 32.18 followed by UT Medical Branch at Galveston with 63 articles and 2,047 citations and the Centers for Disease Control and Prevention USA with 39 articles and 1,045 citations. In terms of citation impact, these three institutions are ranked first, second, and fourth, while CNRS Centre National de la Recherche Scientifique, France is ranked third with 1,146 citations. Further, in terms of *h*-index value, Institut Pasteur, Paris, France and UT Medical Branch at Galveston, USA have value of *h*-index as 27 each followed by Centers for Disease Control and Prevention USA (*h*-index: 17), IRD Center de Montepellier France (*h*-index: 16), INSERM, and IMTSSA Institute de Medicine Tropicale du Service de Sante des Armees France (*h*-index: 15). The average value of *h*-index of the group is 15.15. Eight institutes have higher *h*-index values than the group average while nine have lower value than the group average.

The value of *h*-index is directly associated with the number of citation scored by each article. So, to promote the research impact, it is essential to maintain the quality of the research and accelerate the research for future impact.

Conclusion

According to the WHO reports, the prevalence of chikungunya disease has been found in Africa, Asia, and the Indian subcontinent. It has spread to Europe and has been reported that this spread is associated with the time when the Indian Ocean had epidemic at its peak. Many other countries of Southeast Asia such as Indonesia, Thailand, Maldives, and Myanmar have reported millions of cases. Because of an epidemic nature of the disease, the WHO in association with the respective governments made efforts to eradicate the disease from population. Through this study, significant results can be observed that illustrates the research efforts and growth of publication on this disease. Scopus database has indexed 1,783 documents during 2004-2013. The outbreak of chikungunya disease was more severe in 2005-2006 in India[36] and it spread into the European region around 2007.[37,38] India and France are top ranked countries in terms of the number of publications on chikungunya. The literature growth during the two time spans is quite representative of the research performance due to the spread of this disease in the region. During 2004-2008, only 26.70% of the literature was published while it has grown to 73.50% in 2009-2013. Further, the growth of literature in the country like India and France also increased in response to the spread of this disease in these regions. France has shown a decline in the literature growth during 2009-2013 due to effective research mechanism and intensive mosquito control measure, and therefore, no further cases were reported from the region.[39] These 1,783 articles were spread in 613 journals of which "PloS One" is one of the most productive journals. The research impact in terms of citation is the highest for the papers published in the USA, which are cited more often compared to the research papers published in the most productive countries such as France and India. Although, India is one of the most productive countries, the paper has scored only 3,624 citations and is ranked third in terms of citation scored by papers. The ACPP has a great role in assessing the research impact.[40]

Belgium has the highest ACPP (24.40). Institut Pasteur, Paris, France, was the most productive institution in the area of chikungunya research (83 publications). In terms of author's productivity, M. M. Parida of the Defense Research and Development Establishment India and Alain Michault of La Reunion University France were the most productive authors with 30 publications each.

Chikungunya disease is spreading globally and research activities are being carried out worldwide that can be witnessed through the result of this research. Organizations are coming up with new drug and better medical facilities in order to eradicate the disease from society. The findings of this study will help the researcher to improve the performance and collaborate in their research with potential authors in this field as well as institutions globally.

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Conflicts of interest
There are no conflicts of interest.

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