11-26-2019

Dengue Hemorrhagic Fever: A Scientometric Study

janarthanan pichai
janarthananpichai@hotmail.com

. Prabakar Stanleay Dr.
Bharath University, stanleay@gmail.com

. Nithyanandam Kannan Dr.
Bharath University, mail2knithi@gmail.com

Dengue Hemorrhagic Fever: A Scientometric Study

PI. Janaarthanan, Research Scholar, Bharath University Selaiyur, Chennai. Tamilnadu, India.

Email janarthananpichai@gmail.com

Dr. Prabakar Stanleay, Librarian, B.I.H.E.R – Deemed to be University, Chennai, Tamil Nadu. India.

Email stanleay@gmail.com

Dr.K. Nithyanandam, Research Supervisor, Bharath University, Selaiyur, Chennai, Tamil Nadu, India.

Email mail2knithi@gmail.com

Abstract

"Dengue Hemorrhagic Fever" is the topic selected for the Scientometric study to assess the responsibilities of the global scientists through the measurement of the impact of their research publications. "Dengue Hemorrhagic Fever" affects the health of the society and particularly the young generation are suffering a lot and many of them destined to "Early Death". The Scientometric study in this research reveals that only 646 publications were published from 2009 to 2018, which means the research contribution on "Dengue Hemorrhagic Fever" is very low. The country wise publications show that "India" leads the table with more number of publications than the other global countries. The language wise publications show that "English" language plays a dominant role over the global languages. The degree of collaboration is very high towards publishing research papers on "Dengue Hemorrhagic Fever". The law conceived by Alfred Lotka for the author productivity does not fit for the research productivity taken for the Scientometric study. It is suggested the global research bodies and the ministry of global countries to encourage the scientists to do many more research work on "Dengue Hemorrhagic Fever" to enhance the health of the society.

Key Words: Dengue Hemorrhagic Fever, Authorship Pattern, Degree of Collaboration, Scientometric, Lotka's Law, Kolmogorov Smirnov Test

---

1. Introduction

Scientometric is the application of mathematics to measure the research impact of scientific publications. “Dengue Hemorrhagic Fever” (DHF) a syndrome caused by dengue virus that tends to affects children under the age category of 10. The symptoms of the affected children are abdominal pain, hemorrhage (bleeding) and circulatory collapse (shock). DHF is diagnosed through continuous fever, head ache with a sore throat, cough nausea, vomiting along with abdominal pain, blood spots in the skin (petechiae), spitting up blood (hematemesis), blood in the stool (melena), bleeding gums and nosebleeds (Epistaxis). Statistics says that the mortality rate due to dengue were from 6 to 30% and most of the deceased victims were children.[1]

2. Review of Literature

Siva N, Vivekanandan S and Rajendran P(2019). The collaborative publication examined the global research publications published on Hepatitis C. The data indexed in SCOPUS database from 2009 to 2018 were taken for the study. The research study includes the year wise growth, country wise, author wise organization wise, type of document, citation analysis, impact factor of the journal productivity in the field of hepatitis C research publications.[2] **Govindarajan and Dhanavandan (2016).** The author analyzed the literature output on polio from 2011-2015. The analysis includes authorship pattern, literature growth and journal publication type. The data collected for the Scientometric from Pub Med database. From the collected data, the collaborative authors concluded that single authors contribution is higher than the multiple authors and he found that degree of collaboration is 0.82.[3] **Santhanakarthikeyan S., Grace M and Jeyshankar R(2014).** It was an analysis about the articles published in "Indian Journal of Cancer”. The metric includes the year wise literature growth, author productivity, authorship patter and pagination, countries collaboration. The journal is the official publication of the Indian Cancer Society and Indian Society of Oncology. The study revealed that multi-authored papers were more common

and that the average length of articles was 5-6 pages. It was further estimated that 70 per cent of all cancer affected cases were from the lower-income countries, and approximately one-fifth of these were Indians.[4] **Gupta, B. M., & Bala, A. (2011).** The collaborators analyzed about the research activities of India in medicine from 1999 to 2008. The data for the research were downloded from Scopus data base. The study results related to the total publication output, growth rate, rank of Indian global context, collaborative research partner countries of India. From the analysis it is found that India holds twelfth rank among the productive countries in medicine research. The author concludes with a suggestion that India need to improve the existing medical education system, which should foster research culture.[5]

3. Research Design

3.1. Need and Objectives of the Study

In many places in the world and especially in India people are affected by dengue fever. "Dengue Hemorrhagic Fever" mainly affects the younger generation. The young generation of contemporary society are the corner stone of tomorrow. Therefore, in an intention to know about the responsibility of the global scientists to drive away "Dengue Hemorrhagic Fever", it was decided to assess the research impact of the same. Further, the following objectives were framed towards the assessment of the research impact on "Dengue Hemorrhagic Fever":

- To find the total number of Publication on Dengue Hemorrhagic Fever
- Ranking of Geographical wise contributions on the basis of Activity Index
- To find out the Language wise publications.
- To find out the Degree of collaboration using the formula of Subramanyam.[6]
- Application and Testing of Lotka's Law using Kolmogorov Smirnov Test[7]

3.2. Limitation

The data have been collected for only ten years from 2009 to 2018. The data source is limited to "Pub Med Database" only. The Bibliometric law is limited to "Lotka's Law". No other statistical test has been utilized other than Kolmogorov Smirnov Test.

3.3. Methodology

Dengue Hemorrhagic Fever data has been collected from PubMed database for the scientometric analysis from 2009 to 2018. A few related literatures were reviewed and cited according to the 'American Psychological Association' style manual. The downloaded data were tabulated in excel format for the implementation of a few scientometric techniques.

3.4. Hypothesis

H0: There is a significant relationship between the Law of Alfred Lotka and the author productivity of the research publications on "Dengue Hemorrhagic Fever" from 2009 to 2018.

4. Analysis & Interpretation

4.1. Quantum of literature output on "Dengue Hemorrhagic Fever" from the year 2009 to 2018.

Sl. No.	Year	No. of Articles	Percentage Analysis
1	2009	43	7%
2	2010	52	8%
3	2011	57	9%
4	2012	69	11%
5	2013	60	9%
6	2014	61	9%
7	2015	65	10%
8	2016	84	13%
9	2017	69	11%
10	2018	86	13%
Total		**646**	**100%**

Table 4.1. Percentage Analysis of the Year wise Research Publications

The table number 4.1. Reveals about the year wise research publication output on "Dengue Hemorrhagic fever" in Pub Med database. A total number of 646 research publications were published from the year 2009 to 2018. The year 2016 and 2018 were seems to be most productive with 84(13%) and 86(13%) research publications. The year 2010 was seems to be the lowest productivity year with a publication count of 52(8%).

4.2. Ranking of Top 15 Geographical Contribution on the basis of the Activity Index

The table number 4.2. Indicates that the publications of India are on top of all the countries on the basis of the Activity Index. India published 97 publications with an Activity Index Score of 14.22 and placed in the first place. The United States of America is placed in the second place with a publication count of 83 with an Activity Index Score of 12.83. Brazil published 68 publications and placed in the third place with an Activity Index Score of 10.51. Thailand placed in the fourth place with a publication count of 53 and an Activity Index Score of 8.19. Colombo with 28 publications and 4.33 of Activity Index Score and placed in the fifth place. Mexico with 24 publications and 3.71 of Activity Index Score and placed in the sixth place. Vietnam with 21 publications and 3.25 of Activity Index Score and placed in the seventh place. France and Japan shared the eighth place with 20 publications and 3.09 Activity Index Score. Indonesia placed in the ninth place with 17 publications and 2.63 Activity Index Score. Malaysia placed in the tenth place with 16 publications and 2.47 Activity Index Score. Srilanka and United Kingdom placed in the eleventh place with 14 publications and 2.16 Activity Index Score. Pakistan placed in the twelfth place with 13 publications and 2.00 Activity Index Score. Netherland and Singapore shared the thirteenth place with 11 publications and 1.70 Activity Index Score. Taiwan placed in the fourteenth place with 9 publications and 1.39 Activity Index Score. Argentina and Germany shared the fifteenth place with 7 publications and 1.08 Activity Index Score.

Sl. No.	Country	No. of Contributions	Activity Index	Rank
1	India	97	14.22	1
2	USA	83	12.83	2
3	Brazil	68	10.51	3
4	Thailand	53	8.19	4
5	Colombia	28	4.33	5
6	Mexico	24	3.71	6
7	Vietnam	21	3.25	7
8	France, Japan	20	3.09	8
9	Indonesia	17	2.63	9
10	Malaysia	16	2.47	10
11	Srilanka, United Kingdom	14	2.16	11
12	Pakistan	13	2.00	12
13	Netherland, Singapore	11	1.70	13
14	Taiwan	9	1.39	14
15	Argentina, Germany	7	1.08	15

Table No.4.2. Activity Index Ranking of Top 15 Global Countries

4.3. Language wise Publications on "Dengue Hemorrhagic Fever"

Sl. No.	Language	Total	Percentage Analysis
1	English	607	94%
2	Spain	23	4%
3	French	12	2%
4	Portuguese	4	1%
Total		**646**	**100%**

Table No.4.3. Language wise Publications

The table number 4.3. is crystal clear that the language "English" plays a predominant role in publishing 607(94%) publications on "Dengue Hemorrhagic Fever in Children ". The second place has been occupied by the language "Spain" with 23(4%) research publications. The language "French" placed in the third place with 12(2%) publications. The fourth and last place has been occupied by the language "Portuguese" with 4(1%) research publications.

4.4. Degree of Collaboration

The table number 4.4. Shows about the domination of the collaborative publications over the single author publications. A total of 27 publications are identified as solo publications. The remaining 619 publications are collaboratively published. To find out the Degree of Collaboration, the suggested formula of Subramanyam is applied. The formula is as follows:

Degree of Collaboration (C)= Nm/Nm+Ns

C= Degree of Collaboration in a discipline
Nm=Number of Multiple Authored papers
Ns= Number of Single Authored papers

The application of the formula of Subramanyam reveals that 95.82 is the Degree of Collaboration, which can be interpreted as high degree of collaboration in publishing 646 number of publications on the research key word "Dengue Hemorrhagic Fever".

Sl. No.	Year	Publications of Single Author	Publications of Multiple Authors	Total No. of Publications	Degree of Collaboration
1	2009	1	42	43	0.977
2	2010	4	48	52	0.923
3	2011	2	55	57	0.965
4	2012	5	64	69	0.928
5	2013	1	59	60	0.983
6	2014	1	60	61	0.984
7	2015	2	63	65	0,969
8	2016	8	76	84	0.905
9	2017	1	68	69	0.986
10	2018	2	84	86	0.977
Total Publications		**27**	**619**	**646**	**0.960**

Table No.4.4. Degree of Collaboration

4.5. Application and Testing of Lotka's Law

It is the prediction of Alfred Lotka that the total productivity of scientific literatures is based on the inverse square of the number of authors contributed with a single publication. Further the applied Lotka's Law for the research publications is tested with Kolmogorov Smirnov Test. An appropriate hypothesis has been framed to test the prediction of Lotka's Law. The null hypothesis is as follows:

H0: There is a significant relationship between the Law of Alfred Lotka and the author Productivity of the research publications on “Dengue Hemorrhagic Fever in Children” from 2009 to 2018.

The Lotka’s power law has been applied to get the expected value. Logarithm rules have been applied to the ‘x’ value (No. Of Works) and ‘y’ value (No. of Authors) to find out the Observed Value. Kolmogorov Smirnov Statistical Test has been applied to test the observed value and the expected value. The result reveals that the value of 0.22 is the (dmax value) maximum deviation observed during the process of application and testing of Lotka’s Law. The Threshold value or critical value is 0.064. Since the dmax value of 0.22 is greater than the Threshold value or critical value of 0.064, the null hypothesis is rejected and the alternate hypothesis of “H1: There is no significant relationship between the Law of Alfred Lotka and the author productivity of the research publications on “Dengue Hemorrhagic Fever” from 2009 to 2018 is approved.

x	y	Mean of y	cum. Mean y	X (logx)	Y (logy)	XY	XX	Lotka's Power Law	fe	cum fe	Diff
1	27	0.04	0.04	0.00	1.43	0.00	0.00	1.00	0.21	0.21	0.16
2	36	0.06	0.10	0.30	1.56	0.47	0.09	0.55	0.11	0.32	0.22
3	63	0.10	0.20	0.48	1.80	0.86	0.23	0.39	0.08	0.40	0.21
4	64	0.10	0.29	0.60	1.81	1.09	0.36	0.31	0.06	0.46	0.17
5	66	0.10	0.40	0.70	1.82	1.27	0.49	0.25	0.05	0.52	0.12
6	60	0.09	0.49	0.78	1.78	1.38	0.61	0.22	0.04	0.56	0.07
7	48	0.07	0.56	0.85	1.68	1.42	0.71	0.19	0.04	0.60	0.04
8	58	0.09	0.65	0.90	1.76	1.59	0.82	0.17	0.04	0.64	-0.02
9	59	0.09	0.74	0.95	1.77	1.69	0.91	0.15	0.03	0.67	-0.08
x	y	Mean of y	cum. Mean y	X (logx)	Y (logy)	XY	XX	Lotka's Power Law	fe	cum fe	Diff
10	35	0.05	0.80	1.00	1.54	1.54	1.00	0.14	0.03	0.70	-0.10
11	22	0.03	0.83	1.04	1.34	1.40	1.08	0.13	0.03	0.72	-0.11
12	28	0.04	0.88	1.08	1.45	1.56	1.16	0.12	0.02	0.75	-0.13
13	15	0.02	0.90	1.11	1.18	1.31	1.24	0.11	0.02	0.77	-0.13

14	12	0.02	0.92	1.15	1.08	1.24	1.31	0.11	0.02	0.79	-0.12
15	16	0.02	0.94	1.18	1.20	1.42	1.38	0.10	0.02	0.81	-0.13
16	6	0.01	0.95	1.20	0.78	0.94	1.45	0.09	0.02	0.83	-0.12
17	10	0.02	0.97	1.23	1.00	1.23	1.51	0.09	0.02	0.85	-0.12
18	1	0.00	0.97	1.26	0.00	0.00	1.58	0.09	0.02	0.87	-0.10
19	3	0.00	0.97	1.28	0.48	0.61	1.64	0.08	0.02	0.89	-0.09
20	6	0.01	0.98	1.30	0.78	1.01	1.69	0.08	0.02	0.90	-0.08
21	2	0.00	0.99	1.32	0.30	0.40	1.75	0.08	0.02	0.92	-0.07
22	2	0.00	0.99	1.34	0.30	0.40	1.80	0.07	0.01	0.93	-0.06
23	2	0.00	0.99	1.36	0.30	0.41	1.85	0.07	0.01	0.95	-0.04
24	2	0.00	1.00	1.38	0.30	0.42	1.90	0.07	0.01	0.96	-0.03
25	1	0.00	1.00	1.40	0.00	0.00	1.95	0.06	0.01	0.97	-0.02
26	1	0.00	1.00	1.41	0.00	0.00	2.00	0.06	0.01	0.99	-0.01
28	1	0.00	1	1.45	0.00	0.00	2.09	0.06	0.01	1.00	0.00
Total	646	1		28.05	27.44	23.66	32.63	4.86			

Table No.4.5. Application and Testing of Lotka's law of Author Productivity

5. Conclusion: Findings and Suggestion

The Scientometric study on "Dengue Hemorrhagic Fever" on the basis of the literature indexed in Pub Med database from 2009 to 2019 reveals that a total number of 646 research publications are published. The year 2016 and 2018 were seems to be most productive with 84(13%) and 86(13%) research publications. The country wise publication reveals that India published 97 publications with an Activity Index Score of 14.22 and placed in the first place. "English" language played dominant role to publish 607(94%) research publications to dominate the entire research. The degree of collaboration of the authorship pattern is 95.82, which denotes high collaboration. The bibliometric law conceived by Alfred Lotka does not fit for the author productivity of the publications published on "Dengue Hemorrhagic Fever". The Scientometric study on "Dengue Hemorrhagic Fever" can be a platform for the researchers doing further research on this topic. It is humbly suggested that all the research bodies of both private and government and the ministry of global countries involved in various research to show focus on the research

productivity of “Dengue Hemorrhagic Fever” to protect the contemporary society and the young generation, which can be a firm foundation for the next generation.

References:

1. https://en.wikipedia.org/wiki/Dengue_fever
2. Siva, N., Vivekanandan, S., & Rajendran, P. (2019). Global Research Publications on Hepatitis C from SCOPUS Database (2009-2018): A Scientometric Study. *Library Philosophy and Practice*, 1-11.
3. Govindarajan, R., & Dhanavandan, S. (2016). A Scientometric Analysis of Polio Literature during 2011-2015. *Journal of Advances in Library and Information Science*, *5*(4), 342-347.
4. Santhanakarthikeyan, S., Grace, M., & Jeyshankar, R. (2014). Research publications to Indian Journal of Cancer: a Scientometric analysis. *Library hi tech news*, *31*(3), 21-25.
5. Gupta, B. M., & Bala, A. (2011). A Scientometric analysis of Indian research output in medicine during 1999–2008. *Journal of natural science, biology, and medicine*, *2*(1), 87.
6. Navaneethakrishnan, S. (2014). Authorship patterns and degree of collaboration of Sri Lankan scientific publications in Social sciences and Humanities-a picture from SCOPUS. *Library Philosophy and Practice*, 0_1.
7. Andreas, Ana. (2009). Measuring Academic Research. Chandos Publishers, New Delhi. ISBN 9781843345282.

***