
Scientometric Analysis of Yoga Literature During 2006 To 2020

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Abstract

This study evaluates the growth of publications in yoga research during 2006-2020 (15 years). The required data has been accessed from the Web of Science citation database. A total of 4911 research papers has been identified during the study period. The findings of the study revealed that there is a fluctuation from 2006 to 2014 and increasing trend from 2015 to 2020. The journal articles covered 69.54% of the overall publications followed by review articles (18.57%). The United States of America stood first by producing 47.12% of publications followed by India secured the second rank with 12.34% publications. The rank list of journals shows that Journal of Alternative and Complementary Medicine stands at the first position with 211 articles..

Keywords

Scientometrics, Yoga, Web of Science, VOS Viewer

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1. Introduction

Scientometrics is a discipline which analyses scientific publication to explore the structure and growth of science. The bibliometrics /scientometrics/ informetrics techniques used to analyze various quantitative aspect of a publication (Hood and Wilson, 2001). It is a scientific field that studies the evolution of science through some quantitative measures of scientific information , as the number of scientific articles published in a given period of time ,their citation impact etc. The history of science and technology, philosophy of science and sociology of scientific knowledge are the related fields of scientometrics (Leydesdorff, 1989). The term scientometrics is often used with the meaning as the bibliometrics, originated in Russia. Scientometrics is the science of measuring the quantitative methods to the history of science of measuring the science, which involves counting artifacts to the production and use of information and arriving conclusions from the counts (Rajendran, Jeyshankar and Elango, 2011). Several quantitative and qualitative analysis of the literature on medical sciences published all over the world. Kaur and Gupta (2010) analyzed India's exhibition dependent on its distribution give in dental sciences; Abbasi and Biglu (2011) has analyzed the quality and quantity of scientific productions originated by Iranian medical sciences Universities during 1999-2008; Cao et al. (2012) conducted a study on scientific production of the subject category of "Limnology"; Gupta and Bala Adarsh (2013) considered the articles dealing with - Alzheimer's malady Research in India; Jeyshankar and Ramesh Babu (2013) studied Leukemia research output carried out during the year 1960 – 2011; Bala and Singh (2014) investigated Journal of Biochemistry and Biophysics by using scientometric method. Bhardwaj (2014) carried out a scientometric study on dengue disease; Chitra, Jeyshankar and Abu (2014) examined the research output of Lung cancer in the G7 and the BRIC countries; Dwivedi, Kumar and Garg (2015) studied research output in Organic chemistry in India; Ramin, Gharebaghi and Heidary (2015) presented a Scientometric analysis on Diabetic Retinopathy; Rahul and Nishy (2016) investigated Mycobacterium Tuberculosis and Sickness research in India; Rana et al. (2016) examined research productivity in immunology and microbiology in India; Singh (2016) investigated the research output in Zika infection; Bansal, Gupta and Bansal (2017) applied scientometric method to know the Celiac Disease research output in global level; Batcha (2017) investigated that Robotic Technology is a

quickly developing field; Naheem, Nagalingam and Ramesha (2017) tested the - Chronic Liver Disease (CLD) exploration in SAARC Countries; Kumar and Biradar (2017) in their investigation analyzed India's exhibition dependent on its production produce in Oceanography writing during 2011–2015; Costa et al. (2018) have conducted a scientometric study on Eutrophication in aquatic ecosystems; Gupta and Hasan (2018) has broken down the scientometric investigation of 200 research articles distributed in the diary Metamorphosis; Gupta et al. (2018) examined 3,966 global publications on yoga research; Chithiravel and Jeyshankar (2019) carried out a study on Eosinophilia research during the year 1998-2017; Lennox et al. (2019) analyzed the women authorship pattern of allergy/immunology journals during 1997-2017; Marisha and Singh (2019) in their examination found the certainties of the articles distributed in the diary 'Current Science'. Shilpa et al. (2019) examined the research contribution in the field of Leukemia during 2009 to 2018; Tharmar and Kalidasan (2019) examined the publication of the game of Hockey at global level indexed in web of science. Krishnan (2019) examined the growth of publication of International Journal of Yoga from 2008 to 2017; Poornima and Surulinathi (2020) study found that most of the prolific authors were from the highly productive institutions; The study done by Shah et al. (2020) revealed that prevalence of dyslipidemia in their study was 47.2% with abnormal low-density lipoprotein cholesterol being the most common lipid abnormality; Laksham (2020) have studied the global level perspective of Corona virus research output during the period of 1989 to March 2020; Surulinathi, Karthik and Balasubramani (2020) have evaluated the research performance on Hantavirus; Phull, Deshpande and Phull (2021) have studied the Dyslipidaemia publications retrieved from science direct database.

2. Objectives of the Study

- To know the growth of literature on yoga research.
- To know the form-wise distribution of publications.
- To illustrate the geographical distribution of publications.
- To identify the most prolific authors.
- To study the institution-wise distribution of publications.
- To identify the top ranked journals.

3. Methodology

The necessary data were obtained from the Web of Science database over a fifteen-year period, from 2006 to 2020. The researcher visited the Kuvempu University Library to access the Web of Science database i.e. www.webofscience.com website to retrieve the necessary data. By selecting topic search, the word "Yoga" has been used in the basic search field to download the bibliographic data. The Web of Science database yielded a total of 4,911 records. The downloaded data was evaluated by employing the Histcite software, VOS viewer visualization software, and Microsoft Excel spreadsheet application as per the objectives of the study.

4. Data Analysis and Interpretation

The study analyze the global research trend in the field of yoga literature during 2006 to 2020 i.e. for fifteen years. The study analyzed the data in the form of tables and graphs as described below;

4.1. World Research Output in yoga

A total of 4,911 research papers were published during the year 2006 to 2020. Table 1 reveals that the year 2020 has highest number of publications 705(14.36%) and values were scaled and being a first position among the years output for 15 years. This is followed by the year 2019 which has 554 (11.28 %) records and the year 2018 has third position with 513(10.45%) research papers. The lowest number of publications i.e. 86 (1.75%) were published in the year 2006. The data shows that there is a fluctuation from 2006 to 2014 and increasing trend from 2015 to 2020. Similar results were found in previous studies Chen, 2014; Sachithanatham, 2015; Basu, 2017; Tran, 2019; Sudhier, 2020; Sahu, 2020 which have indicated the fluctuation in research productivity in their studies.

Table 1: World Research Output in yoga

Year	No of Records	Perce ntage	Cumulative Records	Cumulative Percentage
2006	86	1.75	86	1.75
2007	128	2.61	214	4.36
2008	124	2.52	338	6.88
2009	144	2.93	482	9.81
2010	167	3.40	649	13.22
2011	229	4.66	878	17.88

2012	254	5.17	1132	23.05
2013	336	6.84	1468	29.89
2014	368	7.49	1836	37.39
2015	365	7.43	2201	44.82
2016	450	9.16	2651	53.98
2017	488	9.94	3139	63.92
2018	513	10.45	3652	74.36
2019	554	11.28	4206	85.64
2020	705	14.36	4911	100
Total	4911	100		

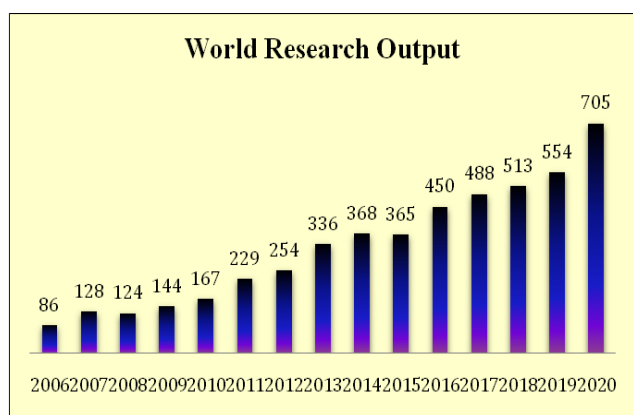


Figure 1: Year-wise Research Output

4.2. Form-Wise Distribution of Records

It has been observed from table 2 that there are several types of documents preferred by the researcher to publish their research articles in yoga literature. Out of 4,911 publications, the highest number of articles are published in the form of journal articles i.e. 3,415 (69.54%), followed by 912 (18.57%) Review Articles, 186 (3.79%), and Editorial Materials (3.46%). Remaining Early Access, News Items, Book Chapters, Poetry, Art Exhibit Reviews, Biographical-Items, Film Reviews have less than 1 percent records.

Table 2: Form-Wise Distribution of Records

Sl. No.	Document Type	No of Records	Percentage
1	Articles	3415	69.54
2	Review Articles	912	18.57
3	Meeting Abstracts	186	3.79
4	Editorial Materials	170	3.46
5	Letters	83	1.69
6	Proceedings Papers	56	1.14

7	Early Access	29	0.59
8	Early Access	22	0.45
9	News Items	16	0.33
10	Book Chapters	8	0.16
11	Poetry	8	0.16
12	Art Exhibit Reviews	3	0.06
13	Biographical-Items	2	0.04
14	Film Reviews	1	0.02
Total		4911	100



Figure 2: Form-wise Distribution of Publications

4.3. Country-Wise Distribution of Records

It is observed from the Table 3 that the United States of America ranked first by contributing 2,314 (47.12%) publications, India secured the second rank with 606 (12.34%) publications followed by Australia 314 (6.39%) publications, England 313 (6.37%) publications and Canada 289 (5.88%) publications. It can be found from the study that United States of America is actively engaged in yoga research.

Table 3: Country-wise Distribution

Countries	No of Records	Percentage	Ranking
USA	2314	47.12	1
India	606	12.34	2
Australia	314	6.39	3
England	313	6.37	4
Canada	289	5.88	5
Germany	282	5.74	6
Peoples R China	208	4.24	7
Brazil	113	2.30	8
Japan	89	1.81	9

South Korea	83	1.69	10
Italy	82	1.67	11
Sweden	71	1.45	12
Netherlands	70	1.43	13
Spain	64	1.30	14
Taiwan	59	1.20	15

Nagarathna R	32	0.65	10
Khalsa SBS	30	0.61	11
Michalsen A	30	0.61	12
Schmid AA	29	0.59	13
Sherman KJ	27	0.55	14
Van Puymbroeck M	27	0.55	15
Total	636	12.95	

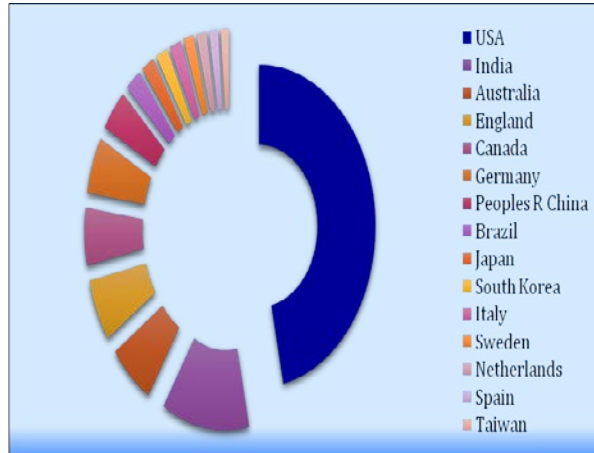


Figure 3: Country-Wise Distribution

4.4. Most Prolific Authors

Table 4 shows the most prolific authors who have contributed more than 25 publications on yoga research in global level. The data reveals that the highest publications are contributed by Cramer H is in first rank with 91 (1.85%) publications, Dobos G is in second position with 61 (1.24%) publications and Telles S secured 3rd rank by contributing 59 (1.20%) publications followed by Lauche R produced 56 (1.14%) publications, Gangadhar BN an Indian author published 46 (0.94%) publications, Nagendra HR contributed 39 (0.79%) publications. Exultantly, 4 Indian authors namely; Gangadhar BN, Nagendra HR, Varambally S, Nagarathna R, have secured in top 15 most prolific authors list in global level.

Table 4: Most Prolific Authors

Authors	No of Records	Percentage	Ranking
Cramer H	91	1.85	1
Dobos G	61	1.24	2
Telles S	59	1.20	3
Lauche R	56	1.14	4
Gangadhar BN	46	0.94	5
Nagendra HR	39	0.79	6
Varambally S	38	0.77	7
Cohen L	37	0.75	8
Langhorst J	34	0.69	9

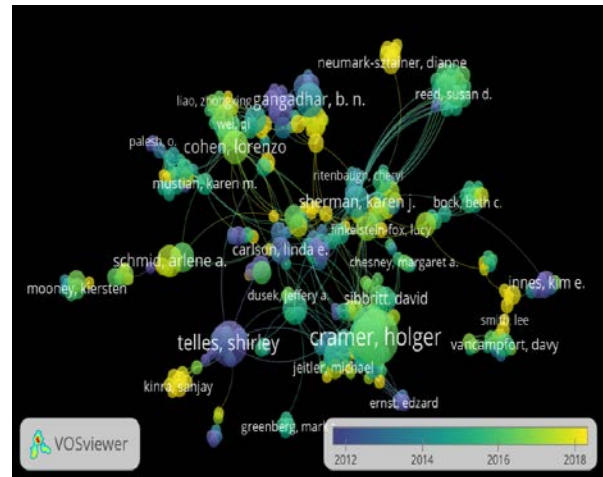


Figure 4: Authors Productivity

4.5. Institution-wise distribution of Records

Table 5 shows the institution-wise distribution of records in yoga research from 2006 to 2020. The data shows that the University of California System is in the first rank by contributing 235 (4.79%) publications, followed by Harvard University, is in the second rank by contributing 212 (4.32%) publications, US Department of Veterans Affairs is in third place by publishing 120 (2.44%) research papers, Veterans Health Administration has contributed 118 (2.40%) research papers, University of Duisburg Essen published 100 (2.04%) papers, University of Texas System published 96 (1.95%) papers on yoga research during 2006 to 2020.

Table 5: Institution-wise distribution of Records

SI No	Institution	No of records	Percentage
1	University of California System	235	4.79
2	Harvard University	212	4.32
3	US Department of Veterans Affairs	120	2.44
4	Veterans Health Administration	118	2.40
5	University OF Duisburg Essen	100	2.04
6	University of Texas System	96	1.95
7	Kliniken Essen Mitte	86	1.75
8	Pennsylvania Commonwealth System of Higher Education	86	1.75
9	University of California Los Angeles	85	1.73
10	Brigham Women's Hospital	78	1.59
11	State University System of Florida	78	1.59
12	University of London	78	1.59
13	Harvard Medical School	77	1.57
14	National Institute of Mental Health Neurosciences, INDIA	75	1.53
15	University of Washington	74	1.51

4.6. Ranking of Journals based on Number of Publications

The top most productive journals in yoga research contributed 1,302 papers which accounts for 26.51% share in the total publications output. Based on the number of publications Journal of alternative and Complementary Medicine journal from USA published the highest publications i.e. 211 (4.30%) articles, followed by Complementary Therapies in

Medicine from USA published 156 (3.18%) articles, Medicine and Science in Sports and Exercise from USA published 115 (2.34%) articles, Complementary Therapies in Clinical Practice from USA contributed 114 (2.32%) articles, Library Journal (an American trade publication for librarians. It was founded in 1876 by Melvil Dewey) from USA contributed 106 (2.16%) publications. The study found that the top most productive journals are published from USA.

Table 6: Ranking of Journals based on Number of Publications

Journals	Records	Percentage	Ranking
Journal of Alternative and Complementary Medicine	211	4.30	1
Complementary Therapies in Medicine	156	3.18	2
Medicine and Science in Sports and Exercise	115	2.34	3
Complementary Therapies in Clinical Practice	114	2.32	4
Library Journal	106	2.16	5
Evidence-based Complementary and Alternative Medicine	105	2.14	6
Annals of Behavioural Medicine	100	2.04	7
BMC Complementary and Alternative Medicine	58	1.18	8
Cochrane Database of Systematic Reviews	57	1.16	9
Alternative Therapies in Health and Medicine	55	1.12	10
Indian Journal of Psychiatry	53	1.08	11
Explore-the Journal of Science and Healing	49	1.00	12
International Journal of Environmental Research and Public Health	42	0.86	13
Plos One	41	0.83	14
Frontiers in Psychology	40	0.81	15

4.7. Co-occurrence of Author Keywords

Table 7 demonstrate the analysis of keywords used by authors in yoga research during the study period. The study revealed that the most often used keyword is 'Yoga' which occurred in 1,147 publications. This is followed by the term 'Mindfulness' which occurred in 265 publications, 'meditation' occurred in 222 publications, exercise occurred in 212 publications, 'depression' occurred in 173 publications, and so on.

Table 7: Co-occurrence of Author Keywords

Sl. No.	Keyword	Occurrences	Total Link Strength
1	Yoga	1147	1260
2	Mindfulness	265	434
3	Meditation	222	368
4	Exercise	212	337
5	Depression	173	377
6	Quality of Life	152	250
7	physical activity	141	181
8	Anxiety	139	334
9	Stress	132	237
10	Systematic Review	109	155
11	Meta-Analysis	94	185
12	Mental Health	77	131
13	Cancer	75	133
14	Complementary and Alternative Medicine	70	80
15	Integrative Medicine	64	75

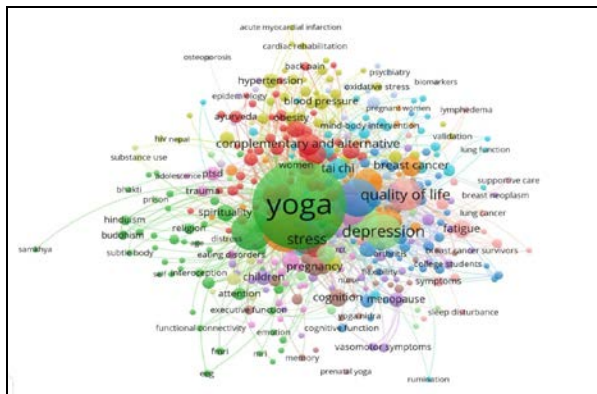


Figure 5: Density Visualization of Co-occurrence of Keywords

5. Findings

The following are some of the major findings that are drawn from this study.

- ✦ The study has identified that 4911 research papers were appended to the area of yoga during 2006-2020.
- ✦ The study found that the highest number of research papers was found in the year 2020 (14.36%) and the lowest percentage of research papers were found in the year 2006 (1.75%). There is a fluctuation from 2006 to 2014 and increasing trend from 2015 to 2020.
- ✦ The journal articles covered 69.54% of the overall publications followed by review articles (18.57%) and Meetings Abstracts (3.79%).
- ✦ The United States of America stood first by producing 2,314 (47.12%) publications followed by India secured the second rank with 606 (12.34%) publications.
- ✦ Among top 15 most prolific authors, Cramer H is a highly productive author in yoga research who has 91 articles to his credit. Gangadhar BN, Nagendra HR, Varambally S, Nagarathna R, Indian authors have secured in top 15 most prolific authors list in global level.
- ✦ The University of California System is in the first rank by contributing 235 (4.79%) publications, followed by Harvard University is in the second rank by contributing 212 (4.32%) publications
- ✦ The rank list of journals shows that Journal of Alternative and Complementary Medicine stands at the first position with 211 articles. It is followed by Complementary Therapies in Medicine stands at second position in the rank list which has 156 articles.
- ✦ The most often used keyword is 'Yoga' which occurred in 1,147 publications.

6. Conclusion

Scientometric studies are helpful in defining and before works. This study allows for inferences and references to trends in research approaches in the field of yoga literature. Librarians are expected to become well in major topics for the sake of assist patrons with their research needs. The study shows that yoga research is producing and being cited a lot, as proven by the fact that it is indexed in the web of

science. At the global level there is a need to increase the evolving research strategies and delineating specific direction to investigate the recent trends. These is also need to increase international collaboration, which will increase both quality and quantity of research in yoga literature.

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