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RESEARCH OUTPUT ON ACUPUNCTURE RESEARCH ACROSS THE GLOBE: A SCIENTOMETRIC ASSESSMENT ON WEB OF SCIENCE DATABASE

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Abstract

The present study explores the Scientometric analysis of the Keyword Research on “Acupuncture Research”. This study covered 6257 records worldwide from 2014 to 2018. The data were collected from the web of science database. In this study discussed the Keyword Research on “Acupuncture Research” year by year in this study. The study was undertaken to examine the year wise distribution of contributions, authorship pattern, and degree of collaboration, relative growth rate and doubling time, Document wise distribution of records. A Number of publications published in the year of 2017 with 1406(22.4%) records. China ranked first in the Acupuncture Research with 2202 (35%) records followed by USA (1368), and South Korea (620), with second, and third position. A number of records published through the article 4305. Only 11% of the total publications were contributed by the single authors and rest of the 89% research publications were contributed by multi-authors in this study. The study revealed that the average Degree of Collaboration was 0.88. The study analyzed the relative growth rates (RGR) has Increased from 2015(0.68) to 2018 (1.97) in the span of 2014-2018. The doubling time (DT) has rapidly decreased while calculated year wise i.e.2013 (1.01) to 2017(0.35).

Keywords: Scientometric, Relative Growth Rate, Doubling Time, Acupuncture, Authorship Pattern, Activity Index.

INTRODUCTION TO SCIENTOMETRICS

Scientometric is a quantitative measurement of publication patterns of all micro and macro communications along with their authorship by statistical and mathematical analysis.” Scientometric is “the measurement of scientific output and the impact of scientific findings on public policy”. Some of the areas of Scientometrics application are To identify research trends and growth of information. To estimate comprehensiveness of secondary periodicals. To identify authorship and its trends in documents on various science subjects. To identify users of different subjects, The term Scientometrics were introduced by Nalimov and Mulchenko in 1969. Nalimov and Mulchenko defined

Scientometrics as “the application of those quantitative methods which are dealing with the analysis of science viewed as an information process”. Scientometrics is a wide-ranging field with vague boundaries. It is generic term for a system of knowledge, which endeavors to study the Scientific and Technological system, using a variety of approaches within the areas of Science and Technology Studies (STS). Scientometrics is a “Science of Science”.

INTRODUCTION TO ACUPUNCTURE

Acupuncture is a technique in which practitioners stimulate specific points on the body most often by inserting thin needles through the skin. It is one of the practices used in Traditional Chinese Medicine. Acupuncture is a method of inserting fine needles through the skin at specific points especially to cure diseases or to relieve pain. The origin of Chinese medicine is an attractive story and acupuncture represents only one facet of their medical system. The first recorded attempt at conceptualizing and treating disease dates back to about 1500 BC during the Shang dynasty. The word “Acupuncture” derived from two words ‘accus’ meaning of needle and ‘puncture’ means insert it. The origin of this therapy can be traced as far back as the Stone Age, when stone knives were used to relieve many diseases. Acupuncture is originated approximately 100 BC in China, around the time of the Yellow Emperor’s classic of medicine. The technique of acupuncture rapidly developed during the period of 475 to 221 B.C. Acupuncture treatment is first recorded in Korea in the 6th century AD, then following reached to Japan through the medical missionaries and then to Europe. In the 20th century, acupuncture spread to the United States and western countries. Acupuncture does not produce long-term benefits. Acupuncture is generally safe when using the clean needle technique and single-use needles. Acupuncture, along with moxibustion, is one of the oldest practices of traditional Chinese medicine. Most historians believe the practice began in China, though there are some conflicting narratives on when it originated. Academics David Ramey and Paul Buell said the exact date acupuncture was founded depends on the extent to which the dating of ancient texts can be trusted and the interpretation of what constitutes acupuncture.

REVIEW

Zhou, L, et al (2018) have described a Scientometrics study and analyzed publication trends in articles on “disaster medicine”. Data were collected from the Web of Science Core Collection of Thomson Reuters. A total of 564 publications on disaster medicine were identified from 2008 to 2016. There was a mild increase in the number of articles on disaster medicine from 2008 (55) to 2016 (83). Disaster Medicine was published in the majority of articles in the United States, and the leading institution was Tohoku University. F. Della Corte, M. D. Christian, and P. L. Ingrassia were the most prolific authors on the topic, and the field of public health generated the most publications. It was pointed out that emergency medicine, public health, disaster preparedness, natural disasters, medicine, and management are the major research hotspots. Hurricane Katrina research focused on mechanical ventilation, occupational medicine and intensive care. European journals

deal with the frontiers of disaster medicine research. Overall analysis revealed that disaster medicine studies are closely related to other medical fields and provides researchers and policy-makers in this area with new insight into the hotspots and dynamic directions.

Zacca-Gonzalez, G., et al (2018) the main focus of the this study is to classify the scientific output of the most productive Latin American countries with a aim on the international collaboration and impact. The period of 2003-2013 was taken for the descriptive study based on the SCImago Institutions Ranking (SIR) portal in the medicinal field. The indicator's application was based on documents, citation, and collaboration. End of the study show about the world wide, surgery, cardiology, oncology, neurology and public health as the most productive subjects in medicine; in Latin America is the most prolific title are Public Health, Infectious Diseases, Surgery, Neurology, and Cardiology and Cardiovascular Medicine. The most prolific countries are Brazil, Mexico and Argentina, though the ones having greater impact and more collaboration are Peru, Puerto Rico, and Argentina. The most prolific and evident fields, such as Oncology, Cardiology, and Infectious Disease, are major global health problem involving chronic and emerging diseases. This information could be useful to design pragmatic policies to encourage research in key fields in order to respond better to the health needs of a given populatio.

Krauskopf, E., Garcia, F., & Funk, R.(2017) the purpose of this study was to investigate the association between language and total number of citations found among documents in journals written in English and other languages. They selected all the Under the subject category" Veterinary Sciences" journals were clustered together in the Journal citation Reports 2014 has downloaded all the data registered between 1994-2013 by Web of science for the journals that stated publishing documents in languages other than English they classified each of these journals by quartile and extracted information concerning their impact factor, language, country, published documents, total number of reviews published, percentage of documents published in English. Almost of the journals are multi-lingual. The results of this study suggest that journals considers in using English as the major languages 6 and it will automatically increase citation counts and the impact factor of the journal.

Takahashi, R., & Kajikawa, y.(2017) this study determined CAD research which has been classified and categorized according to disease type and imaging modality in Bibliometric analysis. This classification starts with the CAD of mammograms and eventually progressed to that of brain disease. Moreover, based on this result, it recommended future directions and opportunities for CAD research. Primarily, in contrast to the typical hypothetical approach, the data-driven approach has shown promise. And flowingly, the normalization of the best datasets and an evaluation method is necessary when adopting an algorithm and a system. Third, it discusses opportunities for the co-evolution of CAD research and imaging instruments-for example, the CAD of bones and pancreatic cancer. Fourth, the potential of synergy with computer-aided and clinical support systems is also discussed.

Objectives

The following are objectives of the study:

- To analysis the year-wise publication of Acupuncture Research,
- To know the Country wise Records,
- To analysis the document wise Distribution,
- To analyze the Authorship pattern,
- To determine the degree of collaboration,
- To measure the relative growth rate and doubling time,
- To find out the most productive Keywords,
- To find out the Time Series Analysis
- To determine the Activity Index,

Methodology

The data were collected from the Web of science database by using the topic provision. The research was conducted for the term “Acupuncture”, research field selected was Web of Science core journals. The study evaluates the overall literature output over a period of 2014 - 2018. The papers published from 2014 to 2018 by the Medical scientists are accounted as 6257. We arranged in different ways with a view to identify the scientists of Medical Science

DATA ANALYSIS AND INTERPRETATION

Table: 1. Year wise Publication

S.No	Publication year	Records	Percentage
1.	2018	1,349	21.560 %
2.	2017	1,406	22.471 %
3.	2016	1,258	20.105 %
4.	2015	1,314	21.000 %
5.	2014	930	14.863 %

To analyses the yearly output on acupuncture research at world level from 2014 to 2018. There are about 6257 total output on acupuncture research in the year 2014-2018. In the year 2017, the output measured is 1406(22.47%); this is the highest records out of 6257 records. In the year 2014 the output measured is 980(14.86%); this is the lowest records out of 6257 records. The output performance rate is to below 15 Percentage, on 2014. Onwards the output performance is to more than 15 percentages on 2015 to 2018.

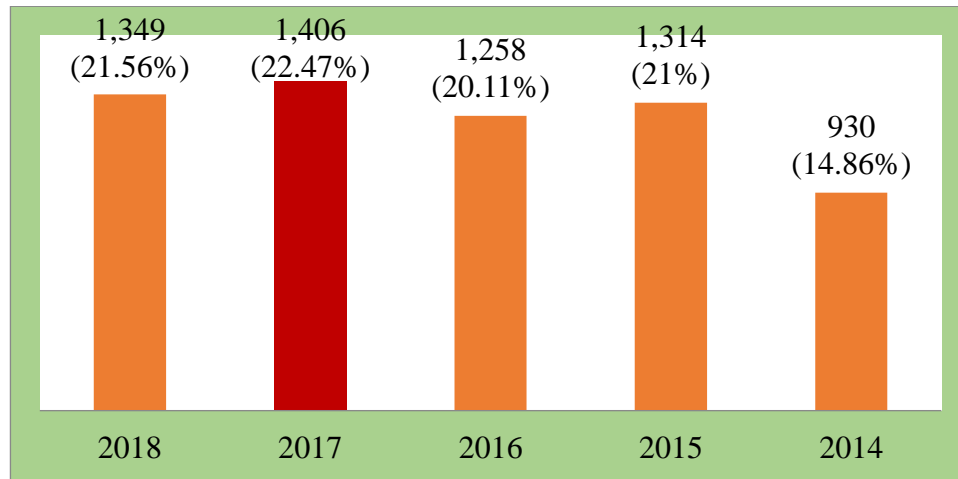


Figure: 1. Year wise Publication of Acupuncture Research

Table: 2. Country wise distribution

S.No	Country	Records	Percentage
1.	China	2,202	35.193 %
2.	USA	1,368	21.864 %
3.	South Korea	620	9.909 %
4.	Germany	327	5.226 %
5.	England	314	5.018 %
6.	Australia	301	4.811 %
7.	Taiwan	250	3.996 %
8.	Brazil	213	3.404 %
9.	Canada	169	2.701 %
10.	Japan	148	2.365 %

The table shows countries wise publication output China is the top ranked with highest records of 2202 and Japan is the last in the list with 148 records of publications. United States America (USA) is the second in the list of countries with 1368 publication output, sharing 21.864% followed by South Korea in third position is having 620 records (9.909%). Germany is the fourth position, and its publication share is 5.226% with 327 publication output, followed by England, Australia, and Taiwan has fifth, sixth and seventh position respectively. And India is in nineteenth place with 62 records in research publication.

Table: 3. Documents with Citation and H-Index

h-index	Documents	Citation sum within h-core	All citations	All articles
32	Article	1916	14543	4305
27	Review	2164	6251	981
7	Editorial Material	135	364	304
6	Letter	57	203	207
5	Proceedings Paper	60	89	27
3	Book Chapter	8	10	8
2	News Item	5	6	96
1	Retraction	1	1	6
1	Meeting Abstract	1	10	250
1	Early Access	1	1	10
1	Correction	2	10	39
0	Data Paper	0	0	1
0	Book Review	0	0	19
0	Biographical-Item	0	0	3
0	Retracted Publication	0	0	1
				6257

Above the table shows the citation and h-index of documentation in the subject of acupuncture medicine. It is found that fifteen types of documents are there. Out of fifteen types of documents, review has the most number of citing papers with 2164 with 27 h-

index. Followed by article 1916 citation and 32 citation, and editorial material has 135 citations with 7 h-index, then another documents are followed below 60 citations with below six h-index. Data Paper, Book Review, Retracted Publication and Biographical-Item are having zero citations and zero h-index.

Table: 4. Authorship pattern

S.No	No. of authors	Frequency	percentage	Cumulative percentage
1	Single author	730	11%	11%
2	Two author	638	10%	21%
3	Three author	745	12%	33%
4	Four author	796	13%	46%
5	Five author	737	12%	58%
6	Above five author	2611	42%	100%
Total		6257	100%	

The authorship pattern in the acupuncture research publications ranged from single author to above five authors. The category of above five authors has published 2611 records in during the study period, followed by four authored papers published 796 records, three authored papers published 745 records, five authored papers published 737 records, single authored papers published 730 publications and two authored papers published 638 publications.

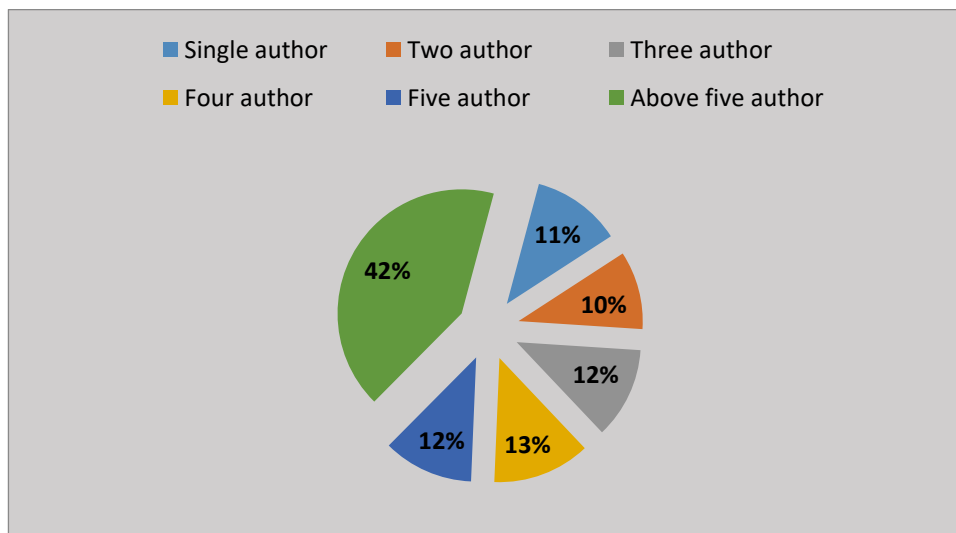


Figure 2 Authorship pattern

Table: 5. Degree of Collaboration

S.No	Year	Single Authors (NS)	Multiple Authors (NM)	Total Authors (NS+NM)	Degree of collaboration (NM/NM+NS)
1	2014	56	874	930	0.94
2	2015	176	1138	1314	0.87
3	2016	153	1104	1257	0.88
4	2017	182	1224	1406	0.87
5	2018	163	1187	1350	0.88
Total		730	5527	6257	AVRG 0.88

The table shows the details about the degree of collaboration which indicate tend in single and multiple authors during 2014 – 2018 as shown in Table. The degree of collaboration ranges from 0.88 to 0.94 and the average degree of collaboration is 0.88. The DC is calculated by using the formula K. Subramanian, 1982:

The formula is where

DC = Degree of Collaboration

NM = Number of Multi Authors

NS = Number of Single Authors

$$DC = \frac{NM}{NM+NS}$$

$$DC = \frac{5527}{6257}$$

$$DC = 0.88$$

In the present study the value of DC is 0.88.

As the result, the degree of collaboration in the study Acupuncture Research is 0.88 which shows the collaboration of multiple authors

Table: 6. Relative Growth Rate (RGR) and Doubling time (Dt)

Year	No. of publications	Cumulative Tot. of publications	Log w1	Log w2	RGR(W2-W1) R(a)	Mean	Doubling time	Mean
2014	1349	1349	-	7.20	-	1.03		0.48
2015	1406	2755	7.24	7.92	0.68		1.01	
2016	1258	4013	7.13	8.29	1.16		0.59	
2017	1314	5327	7.18	8.58	1.40		0.49	
2018	930	6257	6.83	8.74	1.97		0.35	
Total	6257					1.03		0.48

It has been analyzed the growth of publication in acupuncture medicine by Relative Growth (RGR) and Doubling Time (DT). The span of time during the period 2014-2018 has represented 1.03 as mean RGR. Doubling time of this study period is observed as 0.48 for the during the study period 2014-2018. RGR increased from the rate of 0.68 in 2015 to 1.97 in 2018. The mean RGR for the 2014-2018 is 1.03. As the doubling same time doubling time decreased from 2015(1.01)-2018(0.35). The mean DT for the 2014-2018 is 0.48. Thus as the rate of growth of research publications was increased and doubling time was decreased.

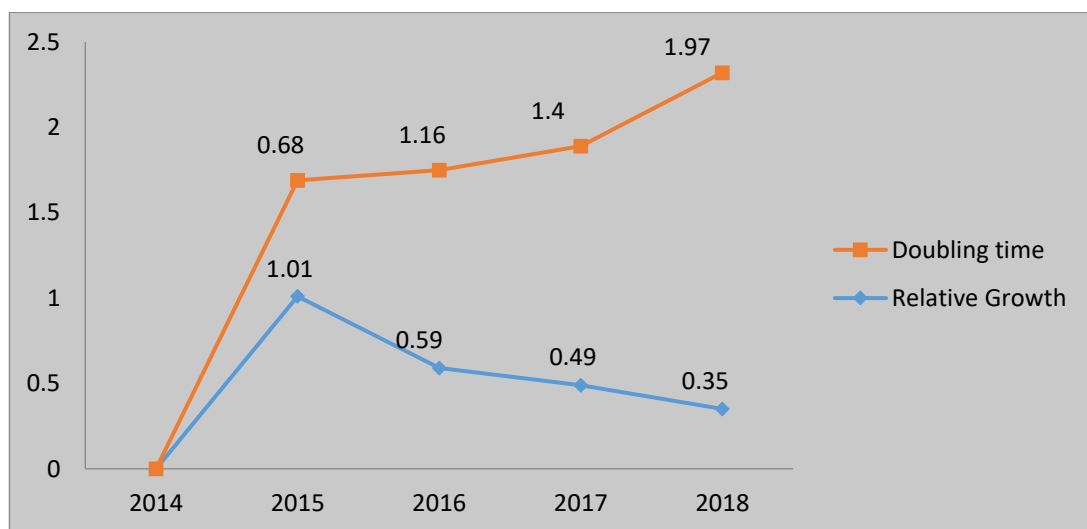


Figure 3 Relative Growth and doubling time

Table: 8. Time Serious Analysis

Year	No. of Publications	X	X ²	XY
2014	930	-2	4	-1860
2015	1314	-1	1	-1314
2016	1257	0	0	0
2017	1406	1	1	1406
2018	1350	2	4	2700
Total	6257		10	932

Straight line equation:

$$Y_c = a + bX$$

$$\text{Since } \sum X = 0$$

$$a = \sum Y / N = 6257 / 5 = 1251.4$$

$$b = \sum XY / \sum X^2 = 932 / 10 = 93.2$$

Estimated literature in 2028 is when $X = 2029 - 2019 = 10$

$$= 1251.4 + (93.2 \times 10) = 2183.4$$

Estimated literature in 2033 is when $X = 2034 - 2019 = 15$

$$= 1251.4 + (93.2 \times 15) = 2649.4$$

$$= 1251.4 + (93.2 \times 20) = 3115.4$$

On the application of the formula of time series analysis and subsequently, from the results obtained separately for the years 2029 and 2034, it is found that the future trend of growth in the study acupuncture research output may take increasing trend during the years to come. The inference is that there is a positive growth at the global level in research output in the acupuncture medicine.

Table: 9. Activity Index

S. No.	Year	Global output	Indian output	Activity Index
1	2014	930	06	153.67
2	2015	1314	08	162.79
3	2016	1257	21	59.28
4	2017	1406	17	81.97
5	2018	1350	10	133.80
Total		6257	62	118.30

Activity Index is the ratio of the country's share in the worlds publication output in the given field to the country's share in world's publication output in all fields.

Mathematically, activity index has identified by the following formula as

$$\text{ActivityIndex} = \left[\frac{\frac{C_i}{W_i}}{\frac{C_o}{W_o}} \right] * 100$$

If the Activity index is =100 indicates that a country's research effort in the given field corresponds precisely to the world average,

If the activity index is > 100 reflects higher than average activity

If the activity index is < 100 indicates lower than average activity.

For Example: $0.1486/0.0967*100 = 153.67$

$$0.2100/0.1290*100 = 162.79$$

It has been identified the activity index of India during the period 2014-2018. In India most number of publications published in the year 2016 with 21 records and the highest activity index value is 162.79 in the year 2015 and the lowest activity index contributed in the year of 2016 (59.28) in India.

Findings

- ❖ It was computed the year wise distribution of contributions and out of 6257 articles, the highest 22.47% of papers were published in 2017 and The lowest number 930 (14.86%) papers were published in 2014.
- ❖ The contributions of countries with acupuncture research output, China contributed more number of articles (2202) published.
- ❖ As far as citation and H-index are concerned, article is the most cited (14543) documents with having 32 H-index in acupuncture research output during the period 2014-2018.
- ❖ Out of the 6257 articles, the major proportion of 42% was contributed by above five authors, and followed by four authors 13%, minimum number of authors contributed by two authors 10% were contributed during 2014-2018.
- ❖ The degree of collaboration (DC) among the authors was determined in Acupuncture research. It was very clear that ssingle authored is more than that of multi- authored papers. The degree of collaboration ranges from 0.87 to 0.94 and the average degree of collaboration is 0.88.
- ❖ The findings of relative growth and doubling time for research publications of scientists reveal the following facts, the relative growth rate of publications has shown an increasing trend from the started value is 0.68 to 1.97and the average value is 1.03, the doubling time of publications have decreased value started from 1.01 to 0.35 and the average value is 0.48.
- ❖ It was observed keyword analysis literature output on acupuncture research during the period of study. In this regard, the prime keyword observed in the study is “Acupuncture” (1375) which reflects 22 percentages of research papers. It is occupied in the first position.
- ❖ The results found that the estimated future growth increased as 1251.4 (2018), 2183.4 (2029) and 2649.4 (2034), it clearly explains the progressive trend continued up to estimated year. It is inferred that the rate of growth is relation by the year wise publications of acupuncture research.
- ❖ During the study period of five years, the activity index of India value is more than 100 during the period of 2014, 2015 and 2018 with the activity index values of 153.67, 162.79 and 133.80 respectively. The remaining two years had the lower level of productivity in acupuncture publications.

CONCLUSION

The application of Scientometrics analysis computes to scientific publications has highlighted the contribution of institutions, journals, authors, countries and individual researchers. This study deals with the Research productivity on acupuncture research from 2014 to 2018. This data collected from web of science database by using the keyword “ACUPUNCTURE” search provision in science citation index and analyzed from HistCite and Bibexcel software. For mapping the data, VOS viewer software has been used. In the research analysis, it was measured that the highest 22.47% of papers were published in 2017 and the collaborative research has also measured in the field of acupuncture research in terms of literature output. China has maximum number of literature output i.e. 35.19% and it is ranked in the first position. The degree of collaboration (DC) was determined among the authors productivity, the analysis shows the percentage of multi- authored is more than that of single-authored papers and the average degree of collaboration was 0.88. It is concluded that the research of acupuncture medicine has been increasing year by year at substantial rate.