Stroke Research Productivity in India During 2001-2016 : A Scientometric Study

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This paper is a scientometric study on stroke research from India. The global literature in stroke research is also described in this paper. The data for research was retrieved from Web of Science database during the period 2001-2016.The study aims to apprise the growth, productivity,domainwise scattering, the preferred journals and citation classics in the field. It was revealed during the study that the growth rate of literature is on the rise,the preferred journals is an international journal. Multinational collaboration increases the visibility of publication.

Stroke, Scientometrics, Citation classics

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INTRODUCTION

Stroke is a form of cardiovascular disease affecting the blood supply to the brain. Also referred to as cerebrovascular disease or apoplexy, strokes actually represent a group of diseases that affect about one out of five people in the United States. When physicians speak of stroke, they generally mean there has been a disturbance in brain function, often permanent, caused by either a blockage or a rupture in a vessel supplying blood to the brain. In order to function properly, nerve cells within the brain must have a continuous supply of blood, oxygen, and glucose (blood sugar). If this supply is impaired, parts of the brain may stop functioning temporarily. If the impairment is severe, or lasts long enough, brain cells die and permanent damage follows. Because the movement and functioning of various parts of the body are controlled by these cells, they are affected also. The symptoms experienced by the patient will depend on which part of the brain is affected.

Stroke patients are often cared for by neurologists, because of the complex nature of the symptoms caused by damage to the brain. However, strokes are very closely related to heart disease. Heart attacks (myocardial infarctions) and stroke are both caused by diseases of the blood vessels. They share many of the same risk factors, and modifying these risk factors may reduce the possibility of stroke. Many of the therapies
used for cardiac disease show promise for some types of stroke. Finally, people who already have coronary disease may be at greater risk for stroke, and vice versa.

This study is a retrospective scientometric study which focuses on stroke research output during the last fifteen years (2001-2016).Scientific literature is a reflection of scientific activity and productivity. Scientometric analysis aims to integrate the cognitive or intellectual structure of research with a view to appraise the relations among the authors, institutions, journal articles and as a means of assisting the peer-review procedure.

METHODOLOGY

The web of science database of Clarivate Analytics(earlier of ISI, USA) was used to retrieve data. The search was done using the keyword ”Stroke” and “India”and the timespan was given as 2001-2016.The result thus obtained was filtered and only relevant items were used for the study.About

1702 articles were found relevant for the study. Hence an estimated 1702 journal publications were produced in India during the last fifteen years.The data was further analysed using various scientometric techniques.

OBJECTIVES

The main objective of the study is to assess the national output in stroke research from 2001-2016.The other objectives include:

1. To sketch year wise growth of publications
2. To find out the highly preferred journals in the field
3. To evaluate the domain wise distribution of articles
4. To find out the highly contributing authors in the field
5. To examine the contribution of Indian institutions to stroke research

REVIEW OF LITERATURE

Stroke related research was conducted by Fisher way back in 1965[1]. During 2007 a study on stroke research and citations in Taiwan was made by Chuang et al.[2]The findings of this study highlighted the improvement of the quality and efficiency of stroke research, continuity in research focuses and funding allocation to institutes with proven record of success.It was also found that there was an inverse relationship between stroke mortality and number of published articles in Taiwan.In a more recent study during 2012 by Kjell Asplund et al[3] it was found that there is a need for stroke research in countries with high burden of stroke and highlight the role of multinational collaboration.

ANALYSIS

About 1,54,154 records were downloaded .Again this was filtered and only items strictly pertaining to storke were taken. It was found the United states of America is the leading producer in stroke reseach with a contribution about 32.7%% of the articles.Germany 8.4%England 8.3% Canada with about 6.5% .Peoples republic of China with 6.2% .Japan with 6.0%. India is among the top 25 countries in stroke research but the contribution is meger with about 1.104%.only.

In the analysis of literature it was found that "Stroke " is the most productive journal. It publishes 11.2% of the world literature. "Cerebrovascular disease" is the second productive journal with a publication of about 4967 articles . and a percentage of about3.22. " International journal of stoke" with 4757 , and a percentage of 3.08.

Name of Journal		%
Stroke	17274	11.2
Cerebrovascular disease	4967	3.22
International journal of stroke	4757	3.08
Neurology	4248	2.75
Circulation	2839	1.842
European Journal of Neurology	2267	1.471
Journal of stroke cerebrovasular disease	2056	1.334

Domain wise distribution

The various subject field in stroke research was assessed.When the scattering of journals subjectwise was done it was found that Clinical neurology was the most researched area.37.654%. Peripheral vascular disease with 27.875%. Neurosciences in general formed 19.177%. Cardiovasular systems formed 15.16% . Internal medicine formed 7.98%. Surgery formed 7.425%. Rehabilation formed 6.421% . Pharmacology fromed 4.8% Radiology formed 4.57% while Experimental medicine formed 2.9%.

Name of subject		%
Clinical neurology	58045	37.654
Peripheral vascular disease	42970	27.875
Neurosciences	29562	19.177
Cardiac cardiovascular systems	23373	15.162
Medicine General Internal	12302	7.98
Surgery	11446	7.425
Rehabilation	9898	6.421
Pharmacology	7400	4.8
Radiology	7055	4.577
Experimental medicine	4586	2.975

Stroke in India

In countries like India, which fall under the category of developing countries stroke has taken the toll. It is fast becoming a major reason of death and disability in the country. It is highly imperative that stroke

research be carried out in India at a larger scale. This paper is a study on stroke research articles in India. From the data obtained in the study it was found that India is one of the top twenty countries in stroke research. The contribution of India is just 1.104%. 1702 article on stroke were produced during 2001-16 from India.

Growth of Literature

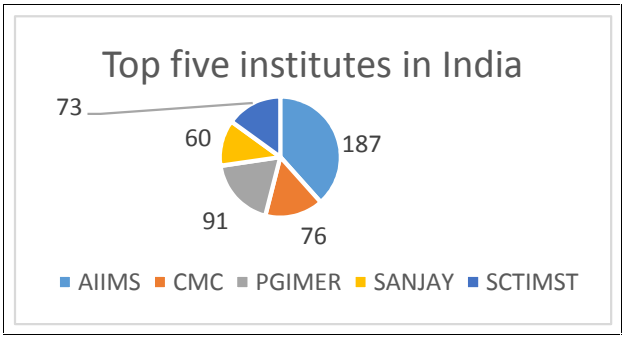
The literature on stroke research is shown to be growing. There seems to be an exponential growth in the case of stroke research from 2001-2016. The year 2016 is found to be the most productive year in stroke research. There is a steep rise in the publications during this period. The graph gives a detailed picture.

Productive journals in stroke research

In the study carried out it was found that there are seven most productive journals which the Indian authors have contributed . International Journal of stroke is the journal with the highest ranking. 295 articles were contributed to this journal alone. Neurology India ranked second with about 142 articles. Journal of Neurological Sciences was third in the list.

Institutions

Five institutions in India contribute about 28.6% of the research articles in stroke . About 11% of these articles are provided by All India Institute of Medical Sciences, New Delhi. Postgraduate Institute of Medical Education and Research (PGIMER) Chandigarh is second in the list contributing about 5.34% of articles. Christian Medical College and Hospital, Ludhiana, Punjab is third in the list 4.46% of articles.



Top authors in stroke research

The authors from India was evaluated based on the articles they produced. The top authors who contributed more than 40 articles were taken into account. The listing is given in the table below.

Sl .No.	Author	No of articles	Institution
1	Prasad, K	87	All India Institute of Medical Sciences, New Delhi
2	Kumar, A	75	All India Institute of Medical Sciences, New Delhi
3	Kaul, S	74	Nizam's Institute of Medical Sciences, Hyderabad
4	Bhatia, R	66	All India Institute of Medical Sciences, New Delhi
5	Pandian, JD	58	Christian Medical College and Hospital, Ludhiana, Punjab
6	Kalita J	47	Sanjay Gandhi Post Graduate Institute of Medical Sciences, Lucknow,
7	Misra, UK	47	Sanjay Gandhi Post Graduate Institute of Medical Sciences,
8	Sylaja, PN	45	Sree Chitra Tirunal Institute for Medical Sciences and Technology, Trivandrum, Kerala
9	Khurana, D	41	Sanjay Gandhi Post Graduate Institute of Medical Sciences

Citation classics in stroke research

Citation classics are those highly cited papers which are an important reference point in a research field. There is a fixed threshold value for each subject field. Articles with more than 400 citations are always considered as citation classics.

Sl	Title	Authors	Times Cited	Journal
1	Global and regional mortality from 235 causes of death for 20 age groups in 1990 and 2010: a systematic analysis for the Global Burden	Lozano, Rafael; Naghavi, Mohsen; Foreman, Kyle; Lim, Stephen; et al	2732	Lancet

	of Disease Study 2010			
2	Risk factors for ischaemic and intracerebral haemorrhagic stroke in 22 countries (the INTERSTROKE study): a case-control study	O'Donnell, MJ; Xavier, D; Liu, LS; Zhang, HY; Chi	791	Lancet
3	Efficacy and safety of dabigatran compared with warfarin at different levels of international normalised ratio control for stroke prevention in atrial	Wallentin, L; Yusuf, S; Ezekowitz, MD; Alings, M; Flather, M; Franz et al	484	Lancet
4	Aspirin and extended-release dipyridamole versus clopidogrel for recurrent stroke	Sacco, RL; Diener, H; Yusuf, S; Cotton, D; Ounpuu, S; Lawton,	422	New England Journal of medicine

It was found during the research that four artilces had more than 400 citations. The peculiarity of these articles was that they were all international colloborations or was a result of a particular international study.

FINDINGS

1. The growth pattern of literature in stroke showed an irregular pattern. But from 2010 onwards the growth is steady with a steep increase in 2016. If this pattern is repeated then a steady growth of literature in stroke research is predicted.
2. International journal of stroke is the highly preferred journal. Neurology India is the second preferred journal.
3. All India Institute of Medical Sciences, New Delhi ranks first in the list of top ranking instuties in the country. Three top ranking authors are also contributed by this institute.
4. The study also revealed that the most cited articles were the one with international collaboration.
5. India has produced citation classics and the prominent articles were multiauthored and had international collaboration.

CONCLUSION

Stroke based research studies has taken a gaint leap durng 2010-16. During the year 2016 there is sudden increase in the number of articles. Papers with multinational collaboration have been highly cited. International and national funding is a great necessity to increase the number of publication in the field.

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