



A scientometric analysis of research output in osteoporosis

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Abstract

The present study analyses the research output on Osteoporosis during the period of 2006-2012. The data has been collected from web of science database. The aim of the study is to find out year wise publications, exponential growth of articles, authorship productivity, publication contribution by institutions and frequently used key words. The result of the study shows maximum number of publications i.e., 4028 records in the year 2012 and the highest growth rate of 1.067 in the year 2010. It is also found that among the various institutions McMaster University occupies the first position with 50 publications.

Keywords: bibliometrics, scientometrics, osteoporosis, web of science, exponential growth rate

Introduction

Osteoporosis is a disease characterised by low bone mass and loss of bone tissue that may lead to weak and fragile bones. Osteoporosis weakens bone and increases risk of bones breaking. Osteoporosis literally leads to abnormally porous bone that is compressible, like a sponge. This disorder of the skeleton weakens the bone and results in frequent fractures (breaks) in the bones. Normal bone is composed of protein, collagen, and calcium, all of which give bone its strength. Bones that are affected by osteoporosis can break (fracture) with relatively minor injury that normally would not cause a bone to fracture. The fracture can be either in the form of cracking (as in a hip fracture) or collapsing (as in a compression fracture of the vertebrae of the spine). The spine, hips, ribs, and wrists are common areas of bone fractures from osteoporosis although osteoporosis related fractures can occur in almost any skeletal bone.

Osteoporosis is a multi factorial and slowly emerging global health problem. The lifetime risk of dying from hip fracture is same as that from breast cancer. One out of three women between age group of 50-60 years in India suffers from osteoporosis. Indian women have an early age of onset of osteoporosis as compared to western counterparts.

Scientometrics

Scientometrics is used in quantitative research assessment exercises of academic output and the measurement of science communication. 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”. Research publications are clearly one of the quantitative measures of the basic research activity

in a country or an institution. Publication activity is taken as measure of ‘scientific productivity’ and is expressed by the number of papers published by a selected unit in a given time period. The institution which generates a good number of the research papers in a particular field is considered as a frontier institution in that field. Such studies help decision makers and policy planners in the respective field to make available adequate facilities and directly research activities in proper direction.

Objectives of the Study

The main objectives of the study are:

- To find out Year-wise distribution of publications on Osteoporosis
- To study Exponential Growth Rate of articles in Osteoporosis
- To examine Authorship pattern of research output in Osteoporosis
- To find out Top 10 Institutions that contributed research output in Osteoporosis
- To find out the frequently occurring key words in Osteoporosis research

Methodology

Total records of 24881 have been collected using the keyword Osteoporosis from web of science database from the year 2006 to 2012. In the title bar, the search string “Osteoporosis” was used as a keyword to extract publications related to Osteoporosis. The related articles pertaining to the study period were compiled; the collected data were tabulated in Excel, and presented in the form of tables and graphs.

Table 1: Year-Wise Distribution of Publications

S. No	Year	Publications	Cumulative publications	Percentage	Cumulative percentage
1	2006	3298	3298	13.25	13.25
2	2007	3326	6624	13.37	26.62
3	2008	3335	9959	13.40	40.02
4	2009	3435	13394	13.81	53.83
5	2010	3666	17060	14.73	68.56
6	2011	3793	20853	15.24	83.81
7	2012	4028	24881	16.19	100
Total		24881		100	

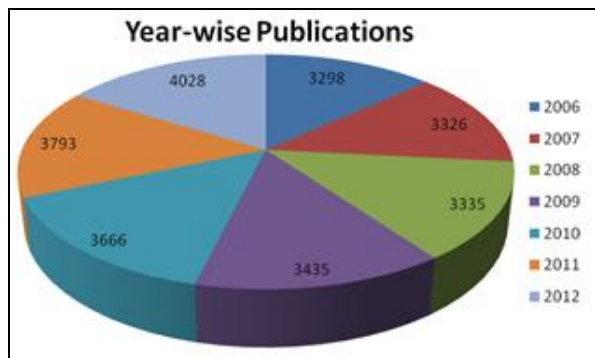


Fig 1

Table 1 reveals the year-wise distribution of Osteoporosis research output during the period 2006 -2012. Total publications of 24881 were published in the study period. Maximum publications output of 4028 was found in the year 2012. It is also found that the research output during the

period of study increases every year.

Table 2: Exponential Growth Rate (EGR)

S. No	Year	Publications	Exponential Growth Rate
1	2006	3298	---
2	2007	3326	1.008
3	2008	3335	1.002
4	2009	3435	1.029
5	2010	3666	1.067
6	2011	3793	1.034
7	2012	4028	1.061
Total		24881	6.201

Table 2 shows the exponential growth rate of publications for the period of seven years (2006-2012). The highest growth rate of 1.067 was found in the year 2010 with 3666 records. The lowest growth rate of 1.002 was found in the year 2008 with 3335 publications. It is also found the exponential growth rate 6.201 at the study period.

Table 3: Authorship Productivity

S. No	Year	Total No of articles	Total No of authors	AAPP*	Productivity per year**
1	2006	3298	11477	3.48	0.29
2	2007	3326	11940	3.59	0.28
3	2008	3335	11439	3.43	0.29
4	2009	3435	12606	3.67	0.27
5	2010	3666	13270	3.62	0.28
6	2011	3793	14640	3.86	0.26
7	2012	4028	15870	3.94	0.25
Total		24881	91242	3.67	0.27

* Average Authors per Paper (AAPP) = Number of authors / Number of articles.

** Productivity per author = Number of articles / Number of authors

Table 3 reveals the data related to authorship productivity, which shows that the total average number of authors per paper is 3.67 for 24881 articles and the average productivity per author is 0.27. The average number of authors per paper

and productivity per author in the year 2009 equals the overall average number of authors per paper as well as productivity per author for the seven years study period.

Table 4: Institution-Wise Distribution of Research Output

S. No	Institution	Records	TLCS	TGCS
1	McMaster University	50	15	1346
2	University of California	49	25	2940
3	Columbia University	45	43	3106
4	Harvard University	39	7	4313
5	University of Pittsburgh	39	9	860
6	University of Sheffield	36	31	2688
7	University of Sydney	35	20	981
8	University of Cambridge	34	8	781
9	McGill University	28	9	1602
10	University of Alabama	28	13	707

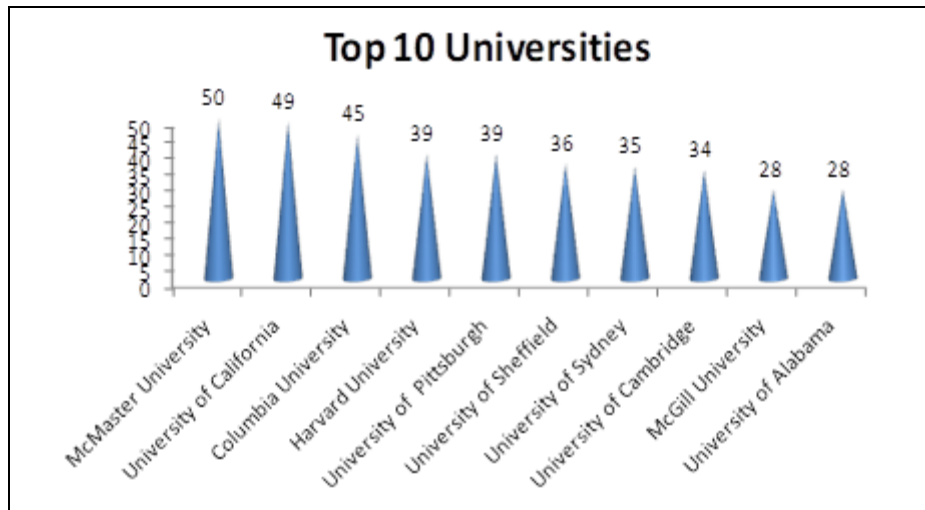


Fig 2

Table 4 shows the Institution wise distribution of research publications. Among the various universities, McMaster University occupies the first position with 50 number of publications and its Global and Local citation score are 1346 and 15 respectively. In the Total Global Citation Score

(TGCS), Harvard University stands in the first position with a score of 4313 and a total of 39 publications. Also, Columbia University stands first with a Total Local Citation Score (TLCS) of 31 with 36 publications.

Table 5: Word-Wise Distribution of Publications

S. No	Word	Records	TLCS	TGCS
1	Osteoporosis	858	115	11240
2	Bone	779	95	18417
3	Women	358	80	7782
4	Density	263	29	5181
5	Postmenopausal	240	61	5395
6	Patients	239	26	3907
7	Mineral	229	26	4487
8	Treatment	214	43	3839
9	Fracture	213	47	5174
10	Risk	199	40	4436

Table 5 shows word wise distribution in Osteoporosis publications. The high frequency keyword found is Osteoporosis with 858 records, TLCS of 115 and TGCS of 11240. Followed by it, the next high frequency word is Bone with 779 records, TLCS of 779 and TLGS of 18417. Apart

from these two words, Women is found to be prominent keyword with 358 records, TLCS of 7782 and TLGS of 80. The other keywords like Density, Postmenopausal, Patients, Mineral, Treatment, Fracture and Risk are found to be with less than 300 records.

Table 6: Top 10 Journals in Osteoporosis Research Output

S. No	Journal	Records	TLCS	TGCS
1	Osteoporosis International	331	72	5335
2	Bone	241	31	3636
3	Journal of Bone and Mineral Research	85	44	4067
4	Journal of Bone and Mineral Metabolism	39	5	829
5	Calcified Tissue International	31	1	708
6	Journal of Clinical Endocrinology & Metabolism	26	10	1582
7	Value in Health	26	0	50
8	Menopause - The Journal of the North American Menopause Society	24	4	621
9	Spine	19	1	358
10	Journal of Clinical Densitometry	17	0	152

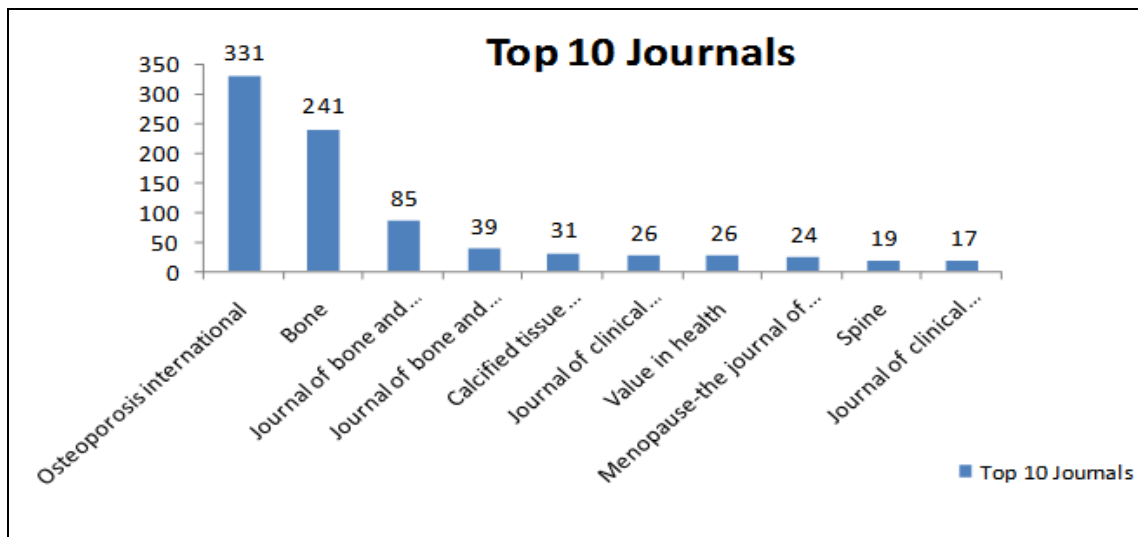


Fig 3

Table 6 represents the top ten journals with more number of publications, highest Total Local Citation Score (TLCS) and Total Global Citation Score (TGLS). It is found that the most prolific journals are Osteoporosis International with 331 records and Bone with 241 records. Osteoporosis International Journal and Journal of Bone and Mineral Research have highest Total Local Citation Score and Total Global Citation Score.

Findings of the study

The important findings of the study are:

- A maximum number of 4028(16.19%) publications were published in the year 2012.
- The average productivity per author in the year 2009 equals the total average productivity per author
- McMaster University occupies a prominent position with higher number of records on Osteoporosis. Harvard University stands first both in the local and global total citation score among the other universities.
- Osteoporosis is the high frequency keyword used in search of Osteoporosis research.
- Osteoporosis International Journal stands in the first position with a research output of 331 publications.

Conclusions

The study analyzed research output on Osteoporosis during the period 2006-2012. The results of the study have identified the maximum research publications and the most productive year with more publications. The study has identified the prominent university that contributes on Osteoporosis research. The study will be helpful for the researchers who are working in the area of Osteoporosis and have made significant contributions.

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