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BIBLIOMETRICS STUDY ON BREAST CANCER RESEARCH DURING THE YEAR 2006-2015

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ABSTRACT

This study evaluates the breast cancer research output from the year 2006-2015. The data were downloaded from web of science database which was maintained by Thomson Reuters. Total number of records were 4206. The result of such studies may be very useful for the research administrators, policy makers and funding agencies. Breast cancer is a progressive disease, signs and symptoms slowly worsen over time. There is no change to do well. The collected data were analyzed with the help of 'Bibexcel tool'. The study also applied statistical tools such as Authorship pattern, Relative Growth Rate, Time Series Analysis, Zipf Law, Exponential Growth Rate.

Keywords: ***Bibliometrics, Web of science, Bibexcel, Breast cancer, Authors productivity.***

INTRODUCTION

Bibliometric is the type of research method; it is an emerging area of research in the Library and Information Science field. The term "bibliometrics" is coined from two words "biblio" and "metrics". The word biblio is derived from the combination of a Latin and Greek word biblion-means a book or paper, metrics indicates the science of metre i.e. measurement. Breast cancer can also be traced right back to ancient Egypt, with the earliest recorded case described on the 1600 BC Edwin Smith Papyrus. Because breast cancer is quite outwardly visible in its most advanced state (seldom reached today thanks to modern medicine) it frequently captured the vision and imagination of our ancestors enough for them to record it. In disease, however, it has challenged physicians since antiquity. Surgery, which ruled the roost for cancer therapy, inevitably caused disfigurement when the knife was applied to the breast.

The history of breast cancer is a complex maze of attempts to understand the wily nature of this hormone-responsive cancer and the willingness of physicians to conquer it by physical removal (surgery), cell destruction (chemo-radiotherapy) or targeted therapy to cell receptors (biomodulation). It is also a saga of intense exploration to find the tools to enable early diagnosis.

Breast Cancer Cell

REVIEW OF LITERATURE

Thirumagal A (2013)[1] this study deal with the bibliometrics study on the publication of "Osteoarthritis" research. The records are collected from Pub MED resource MEDLINE for the period of 2001 to Osteoarthritis 2012. Total number of records for this study was 31,465. Osteoarthritis is a progressive disease, signs and symptoms slowly worsen over time. However, available treatment may help with pain and swelling (inflammation), as well as keeping the patient mobile and active. The collected data were analyzed with the help of 'Bibexcel tool'.

RESEARCH METHODOLOGY AND LIMITATION OF THE STUDY

The data for the study were retrieved from wed of scientific database, which is a scientific and indexing service maintained by Thomson Reuters. The Breast Cancer research output from the year 2006-2015. For this study bibliographic detail such as author, document type, collaboration, etc. was analyzed using bibexcel. Bibexcel is a software package used for bibliometric analysis and information visualization. The collected data were analyzed with the bib excel software, Manual, Microsoft Excel Sheet and presented in the form of tables.

OBJECTIVES OF THE STUDY

- ✓ To find out the year wise distribution of the article, and Authorship pattern of publication
- ✓ To examine the Single Vs Multi authors
- ✓ To identify the Relative Growth Rate and Doubling Time
- ✓ To calculate the Language wise distribution
- ✓ To find out the key word wise distribution of articles
- ✓ To determine the document type distribution of breast cancer research.
- ✓ To identify the country wise distribution of the publication

DATA ANALYSIS AND INTERPRETATION

Table-1 Year wise distribution of articles

S. No	Year	Records	%
1	2006	145	3.45
2	2007	174	4.14
3	2008	226	5.37
4	2009	246	5.85
5	2010	347	8.25
6	2011	387	9.20
7	2012	499	11.86

8	2013	607	14.43
9	2014	782	18.66
10	2015	793	18.85
Total		**4206**	**100**

Figure -1 Year wise Distribution of Articles

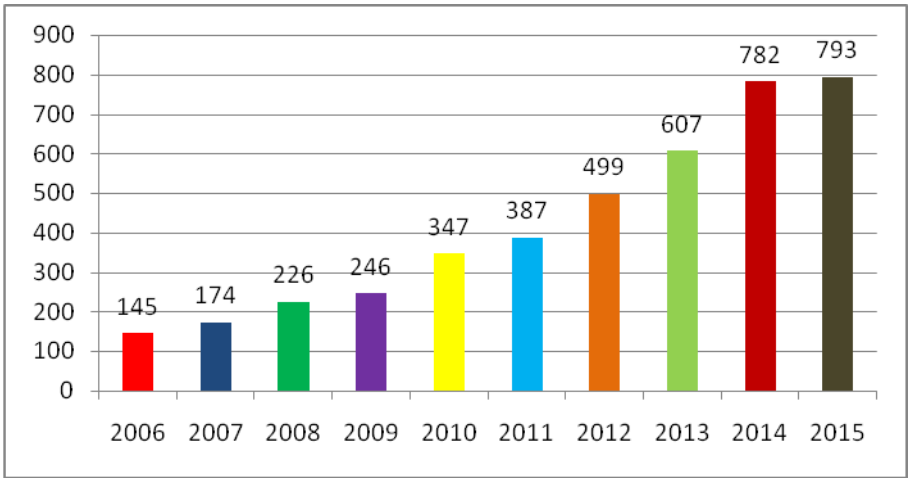


Table 1 and figure 1 shows that year wise distribution of publication of breast cancer research output during the year 2006 to 2015 (10 years) a total of publications 4206 were published. The highest number of publications 793 (18.85%) were published in the year 2015 followed by 2014 ie 782 (18.66%). The 2013 were 607(14.43%) followed by 2012 ie 499 (11.86%). Very lowest number of publications were 145 (3.45%) published in the year 2006. The study reveals that the majority of the articles published in the year 2015 ie 793 (18.85%).

Table – 2 Authorship pattern of Publication

S. No	**Authors**	**No. of. Publications**	**%**
1	Single author	131	3.11
2	Two authors	467	11.10
3	Three authors	570	13.55
4	Four authors	636	15.12
5	Five authors	609	14.48
6	Six authors	541	12.86
7	Seven authors	346	8.23
8	Eight authors	240	5.71
9	Nine authors	191	4.54
10	Ten authors	133	3.16
11	Above ten authors	342	8.13
Total		**4206**	**100**

Figure – 2 Authorship pattern of Publications

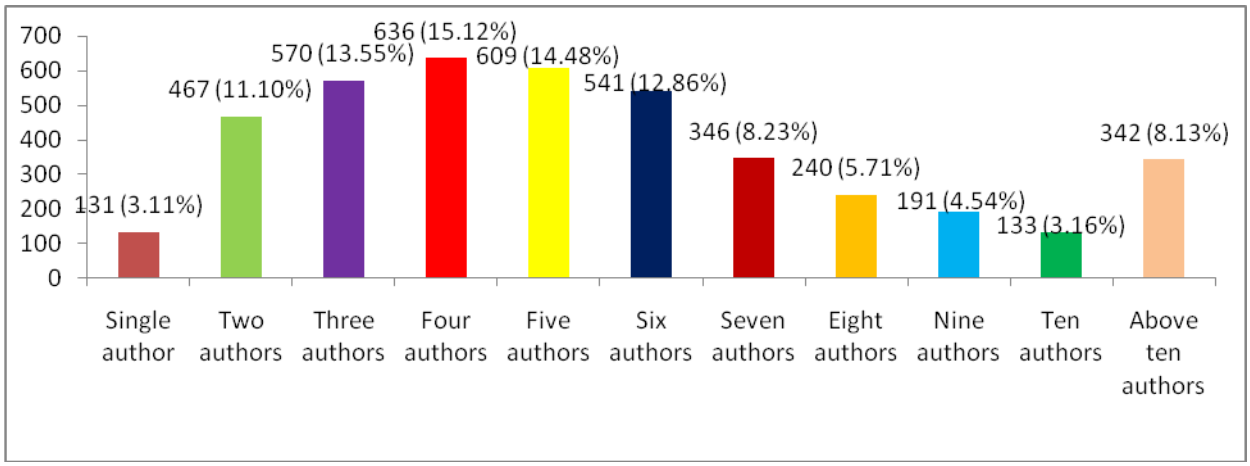


Table 2 and Figure 2 examine that the year wise authorship pattern. Among this authorship pattern, highest number of papers were published in the four authors 636 (15.12%), followed by five authors 609 (14.48%). Three authors were 570 (13.55%), Six authors were 541 (12.86%), Two authors were 467 (11.10%), Seven others were 346 (8.23%), More than ten authors were 342 (8.13%), Eight others were 240 (5.71%), Nine others were 191 (4.54%), Ten others were 133 (3.16%), Single authors 131 (3.11%). This study reveals that the majority of the articles published by four authors 636 (15.11%).

Table – 3 Single vs. Multi Authors

S. No	Authorship Pattern	Publications	%
1	Single author	131	3.11
2	Multiple Authors	4075	96.89
Total		4206	**100**

Figure– 3 Single vs. Multi Authors

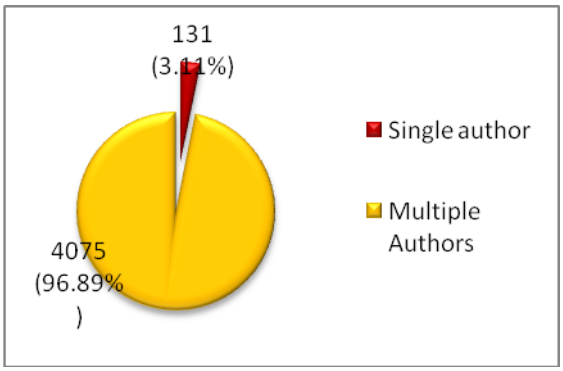


Table 3and figure 3 show that the single author Vs multiple authors research output. For the purpose of analysis, the researchers have classified the study two phase viz., the first phase was Single author and next phase Multi-authors. It is clear from the table Single author records are 131 (3.11%) and multiple authors were 4075 (96.89%). Finally the majority of the articles published in multiple authors in this period from 2006 to 2015.

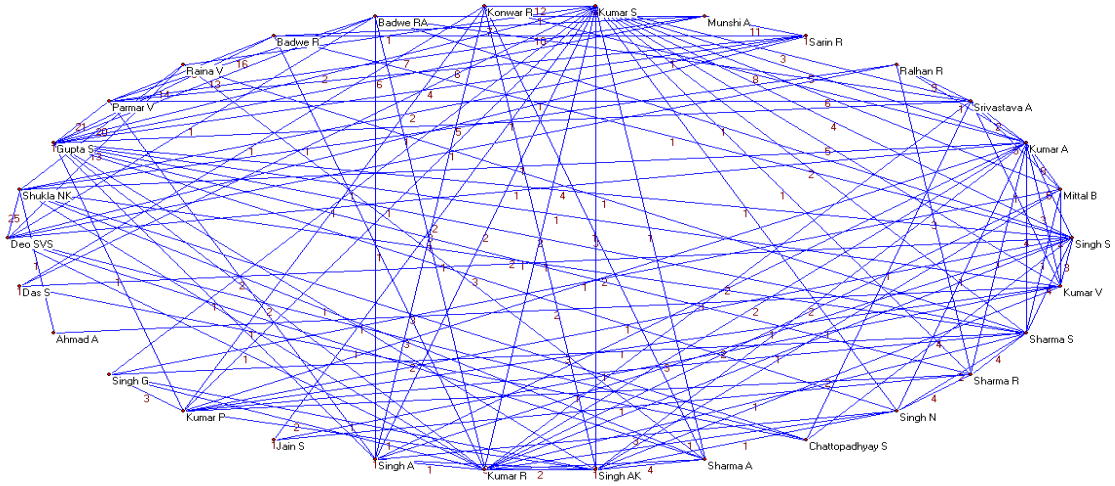
Table – 4 Prolific author's wise distribution of articles (Top Ten)

S. No	Prolific Authors	Records	%
1	Kumar S	99	1.48
2	Gupta S	95	1.42
3	Kumar A	88	1.32
4	Kumar R	65	0.97

5	Singh S	56	0.84
6	Sharma S	50	0.75
7	Das S	43	0.64
8	Badwe R	42	0.63
9	Parmar V	40	0.60
10	Shukla NK	40	0.60

Table 4 shows in these analysis 501 prolific authors and 6673 records have produced with 4206 articles. It reveals that Kumar 99 (1.48%) is the most productive author contributing Gupta S 95 (1.42%) articles followed by Kumar A with 88 (1.32%) articles and Kumar R with 65 (0.97%) articles respectively. And a total of 501 prolific authors is contributed entire research output of the period under study. This study reveals that Kumar S is the most productive author contributing 99 (1.48%) articles.

Figure 4 Collaborative Authors



Above on the figure 4 shows that the authors collaborative. The "Deo SVS" author is collaborating with others in large level. Followed by Shukla NK, Gupta S, Parmar V, Raina V, Badwe R, Badwe RA and etc.

Table – 5 Relative Growth Rate and Doubling Time of Tuberculosis Publications

Year	**No. of. Publications**	**Cumulative No. of. Publications**	**W1**	**W2**	**R (a) (W1-W2)**	**Mean R (a) 1-2**	**Doubling Time**	**M Dt(a)1-2**
2006	145	145	-	4.98	-		-	
2007	174	319	5.16	5.77	0.61	0.77	1.13	
2008	226	545	5.42	6.30	0.88		0.79	0.62
2009	246	791	5.51	6.67	1.16		0.60	
2010	347	1138	5.85	7.04	1.19		0.58	
2011	387	1525	5.96	7.33	1.37	1.48	0.51	0.47
2012	499	2024	6.21	7.61	1.4		0.50	
2013	607	2631	6.41	7.88	1.47		0.47	
2014	782	3413	6.66	8.14	1.48		0.47	

2015	793	4206	6.67	8.34	1.67		0.41	
Total	**4206**					**1.13**		**0.54**

Table 5 shows that the relative growth rate of total contribution published had gradually increased. The growth rate in 0.61 in 2007, which is increased up to 1.67 in 2015. The mean relative growth rate during the period 2006-2010 was 0.77 and it was increased during the year 2011-2015 was 1.48. The overall study period has witnessed a mean Relative Growth Rate in 1.13. In general the relative growth rate of publications of all sources in tuberculosis output has shown an increasing trend. The mean doubling time during the period 2006-2010 is 0.62 and for 2011 to 2015 is 0.47. The overall study period has witnessed a mean doubling time as 0.54.

Table – 6 Exponential Growth rate

S. No	Year	No. of. Publication	Exponential Growth rate
1	2006	145	-
2	2007	174	1.2
3	2008	226	1.3
4	2009	246	1.1
5	2010	347	1.4
6	2011	387	1.1
7	2012	499	1.3
8	2013	607	1.2
9	2014	782	1.3
10	2015	793	1.0
Total		**4206**	**10.9**

Table 6 shows that Exponential Growth Rate of publications in breast cancer research during the period of 2006 to 2015 (10 years). The highest growth rate 1.4 was found during 2010 with 347 publications. Followed by the year 1.3 was found during 2013 (782), 2012 (499), 2008 (226) with the publications. Followed by 1.2 was found during 2013 (607), 2007 (174) with the publications. Followed by 1.1 was found during 2011 (387), 2009 (246) with the publication. The lowest growth rate 1.0 was found during 2015 with 793 publications. It is also found that the Exponential Growth Rate was found to be 10.9 and average growth rate has positive value showing the increasing trend in the breast cancer research.

Table – 7 Language wise distributions

S. No	Language	No. of. Publication	%
1	English	4205	99.98
2	French	1	0.02
Total		4206	100

The distribution of breast cancer literature by language is shown in table 7 the scholarly communication is effected through English language in almost all the countries, irrespective of the native language of the subject of breast cancer which published about 4205 (99.98%) of the research output in English. Only three records were published in the French Language 1 (0.02%). The study concludes that the majority of the articles is published in English Language i.e, 4205 (99.98%).

Table 8 – Key word wise distribution of publications (Top ten)

S.No	Key words	Records	%
1	Breast-Cancer	1196	7.21
2	Expression	425	2.56
3	In-vitro	294	1.77
4	Breast-cancer cells	291	1.76
5	Apoptosis	267	1.61
6	Cells	240	1.45
7	Carcinoma	232	1.40
8	Growth	189	1.14
9	Prostate-cancer	187	1.13
10	Activation	185	1.12

Word list (502) word count (16580)

Figure 8.1 Key word wise distribution of publications (Top ten)

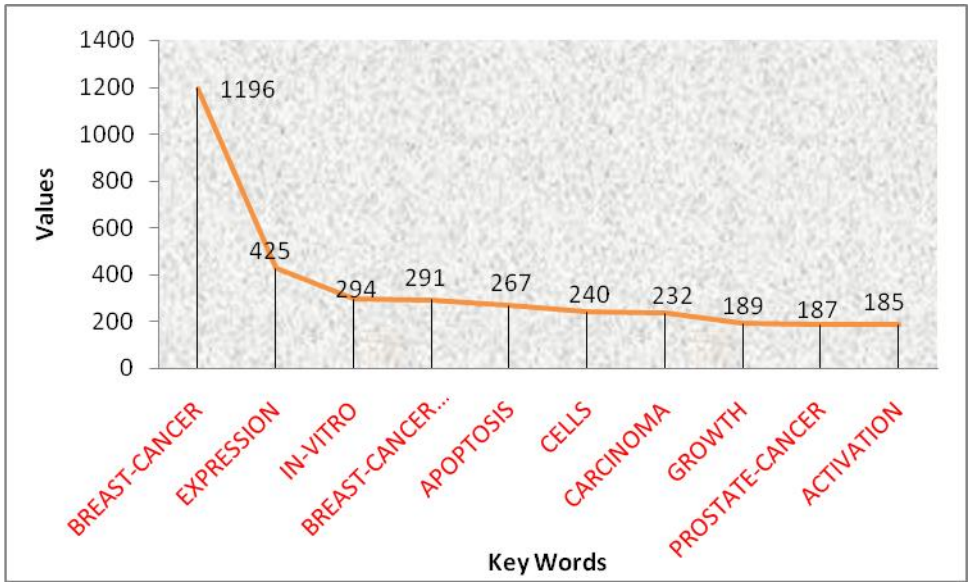


Table 8 and figure 8.1 shows that the current study the keywords appeared in the 'Keywords' field of Breast cancer was analyzed for the purpose. The frequency of occurrence of words among the publications as key words revealed that the word 'Breast Cancer' is highest with 1196 (7.21%). This is followed by the word 'Expression' which occurred in 425 (2.56%) publications. Followed by the word 'In-vitro' which occurred in 294 (1.77%) publications. Followed by the word 'Breast-Cancer-cells' which occurred in 291 (1.76%) publications From the above analysis, it can observe that the word 'Breast Cancer', 'Cells', films which have also been frequently occurred.

Table – 9 Type of document wise distribution of Publications

S. No	Document Type	Records	%
1	Article	3151	74.92
2	Meeting Abstract	469	11.15

3	Review	451	10.72
4	Letter	60	1.43
5	Editorial Material	47	1.13
6	Article; Proceedings Paper	21	0.50
7	Article; Book Chapter	3	0.07
8	Review; Book Chapter	2	0.05
9	Correction	1	0.02
10	News Item	1	0.02
Total		4206	100

Table 9 reveals that the type of document wise distribution of publications. It is an accepted fact that most of the scholarly communication of scientific research is published in articles 3151 (74.92%). Followed by Meeting abstracts 469 (11.15%), Review were 451 (10.72%), Letter were 60 (1.43%), Editorial Material were 47 (1.13%), Article; proceeding papers were 21 (0.50%), Article; Book Chapter were 3 (0.07%). Review; Book Chapter 2 (0.05%), The minimum level of Correction were 1 (0.02%), News Item (0.02%). Finally, most of the scholarly communication of scientific research is published in articles 3151 (74.92%).

Table - 10 Country wise distributions of publications (Top Twenty)

S. No	Country	Records	%
1	India	4186	1.25
2	USA	584	1.20
3	UK	103	1.06
4	Canada	85	1.04
5	France	79	1.25
6	Germany	76	1.20
7	Saudi Arabia	67	1.06
8	South Korea	66	1.04
9	Peoples R China	62	0.98
10	Italy	60	0.95
11	Spain	60	0.95
12	Japan	58	0.91
13	Singapore	56	0.88
14	Australia	55	0.87
15	Belgium	41	0.65
16	Malaysia	41	0.65
17	Switzerland	36	0.57
18	Egypt	34	0.54
19	Taiwan	34	0.54
20	Netherlands	31	0.49

The total number of publications in breast cancer were 91 international collaboration during the period 2006 to 2015, of which contribution of top 20 countries are listed in table 10 the largest contribution to international collaborative papers of India in breast cancer research comes from 4186 (66.04%) it is dominated first position. Followed by the country USA were 584 (9.21%), UK were 103 (1.62%), Canada were 85 (1.34%). The study reveals that the Indians were published majority of the articles are 4186 (66.04%).

Table 11 - Time Series Analysis of Single Authored articles

Year	**No. of Publications**	**X**	**X^2**	**Xy**
2006	145	-4	16	-580
2007	174	-3	9	-522
2008	226	-2	4	-452
2009	246	-1	1	-246
2010	347	0	0	0
2011	387	1	1	387
2012	499	2	4	998
2013	607	3	9	1821
2014	782	4	16	3128
2015	793	5	25	3965
Total	**4206**		**85**	**8499**

The Straight line equation is applied to arrive at estimates for future growth under the time Series Analysis.

Straight Line Y c= a+bX

Since $\sum x = 0$

$$a = \frac{\sum Y}{N} = \frac{4206}{10} = 420.6$$

$$b = \frac{\sum Y}{\sum X^2} = \frac{8499}{85} = 99.99$$

Estimated literature in 2020 is when X = 2020 – 2010 = 10

= 420.6 + 99.99 × 10 = 5205.9

Estimated literature in 2025 is when X = 2025 – 2010 = 15

= 420.6 + 99.99 × 15 = 1652.85

On the application of formula of time series analysis and subsequently, from the results obtained separately for the years 2020 and 2025, it is found that the future trend of growth may take an increasing trend during the year to come. The inference is that there is a positive growth level of breast cancer research in India research output.

FINDINGS AND CONCLUSION

- This study extent the total number of research literature published in the web of science database regarding breast cancer was 4206 or the period of 2006 to 2015. The highest number of publications 793 (18.85%) in the year 2015.
- The majority of the articles published in four authors in the year of 2011 were 605 (17.14%).
- It is clear from the majority of the articles published in multiple authors 4206 (96.89%) in this period of 2010 to 2014.
- The study finalized the authors collaborative. The "Deo SVS" author is collaborating with others in large level.
- These analyses 501 prolific authors and 6673 records have produced with 4206 articles. It reveals that Kumar is the most productive author contributing 99 (1.48%)

- The overall study period has witnessed a mean Relative Growth Rate in 1.13. The overall study period has witnessed a mean doubling time as 0.53.
- It is also found that the Exponential Growth Rate was found to be 10.6.
- English language in almost all the countries, irrespective of the native language of the subject of breast cancer,which published about 4205 (99.98%) of the research output in English.
- The frequency of occurrence of words among the publications as key words revealed that the word 'Breast Cancer' is highest with 1196 (7.21%).
- In this study, about a maximum of 3151 (74.92%) has published in articles.
- The largest contribution to international collaborative papers of India in breast cancer research comes from 4186 (66.04%). The inference is that there is a positive growth level of breast cancer research in India research output.

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