International Journal of Multidisciplinary Approach and Studies

ISSN NO:: 2348 – 537X

Growth of Research Publications on Breast Cancer during 2005 to 2015 - A Study.

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ABSTRACT:

This article deals with the growth of research publications on "Breast Cancer" which is one of the most dreaded diseases that need to be controlled at the world level. Relevant data were collected from PUBMED resource MEDLINE for the study Period and statistically analyzed to arrive at the results.

Key words: Breast Cancer, Women, Oncology, PubMed, MEDLINE Database

INTRODUCTION:

Breast cancer is the cancer that develops from breast tissue. Breast cancer affects one in eight women during their lives. Breast cancer kills more women in the United States than any cancer except lung cancer. No one knows why some women get breast cancer, but there are a number of risk factors. Risks that you cannot change include

- Age - the chance of getting breast cancer rises as a woman gets older
- Genes - there are two genes, BRCA1 and BRCA2, that greatly increase the risk. Women who have family members with breast or ovarian cancer may wish to be tested.
- Personal factors-beginning periods before age 12 or going through menopause after age 55

Other risks include being overweight, using hormone replacement therapy (also called menopausal hormone therapy), taking birth control pills, drinking alcohol, not having children or having your first child after age 35 or having dense breasts. Symptoms of breast cancer may include a lump in the breast, change in size or shape of the breast or discharge from nipple. Breast self-exam and mammography can help find breast cancer early when it is most treatable. Treatment may consist of radiation, lumpectomy, mastectomy, chemotherapy and hormone therapy.

OBJECTIVES:

1. To know year wise growth of publication
2. To identify the Authorship pattern of this research
3. To find out the Degree of Collaboration
4. To find out the Relative Growth Rate
5. To find out the Distribution of Research productivity according to country

6. To find out the repeatedly used Keywords
7. To find out the country wise distribution of this research

METHODOLOGY:

Publications on "Breast Cancer" research from 2005 to 2015 has been selected for this study period. This study has been carried out to find the research contribution in this field. The data were collected from PUBMED. For each analysis year wise growth of this research, number of author contributed to this research, author's productivity and the authorship pattern of the research papers were noted down for the study. These data were analyzed and then organized, calculated, tabulated and presented by using simple arithmetic and statistical methods for its results.

1. **Details about Year wise growth of research publication:**

This table shows the year wise publication of research articles on Breast cancer.

Table.1 Yearwise Growth of Breast Cancer Research

Sl. No.	Year	No.of Publication
1.	2005	935
2.	2006	2446
3.	2007	2459
4.	2008	2670
5.	2009	2767
6.	2010	3000
7.	2011	3152
8.	2012	3507
9.	2013	2129
10.	2014	3755
11.	2015upto June	2658
	TOTAL	29478

2. **Authorship pattern of Breast Cancer (Single Vs Multiple Authors)**

The authorship pattern with number of articles published on Breast Cancer is shown in table 2. This table shows that out of 29478 papers 1828 papers are in single authored pattern with 6.2% . Two authors contributed 2,681 papers which is 9% , Three authors contributed 3,212 papers which is 10.8%. Four authors contributed 3539 papers which is 12% and so on. It clearly shows that collaboration research evident in the Breast Cancer and it is in most of the scientific research.

Table.2 Authorship Pattern in Breast Cancer

Authors	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total	%
Single	67	223	172	199	189	227	169	202	104	180	96	1828	6.2
Joint	100	257	300	261	301	259	285	287	164	276	191	2681	9
Three	117	285	254	310	313	350	346	348	208	372	309	3212	10.8
Four	102	316	330	335	326	367	375	406	263	438	281	3539	12
Five	119	258	277	319	317	379	400	401	241	460	295	3466	11.7
Six	110	260	261	291	294	345	375	454	237	437	318	3382	11.4
Seven	86	211	214	224	243	255	286	325	190	374	268	2676	9
Eight	58	163	153	192	195	219	243	254	180	305	207	2175	7.3
Nine	45	128	116	154	161	146	166	199	132	207	169	1623	5.5
Ten	42	88	115	107	118	130	141	158	114	173	135	1321	4.4
More than Ten	89	257	261	278	310	323	366	473	305	533	389	3584	12.1
Total	935	2446	2459	2670	2767	3000	3152	3507	2129	3755	2658	29478	100

3. Degree of Collaboration:

The Degree of Collaboration of year wise is shown in table 3. The extent of degree of collaboration in Breast Cancer has been measured with the help of the formula devised by K. Subramanian. His formula has been adopted to examine the extent of research collaboration in the study.
The formula is

$$C = Nm / Nm + Ns$$

Where

C= Degree of collaboration in a discipline
Nm = Number of Multiple authored papers
Ns = Number of Single authored papers
Accordingly, the Degree of Collaboration has been calculated for the year 2005 is as follows:

$$C = \frac{868}{868 + 67} = \frac{868}{935} = 0.92$$

Table.3 Degree of collaboration in Breast Cancer

Year	Single	More than one Author	Total	Degree of Collaboration
2005	67	868	935	0.92
2006	223	2223	2446	0.90
2007	172	2287	2459	0.93
2008	199	2471	2670	0.92
2009	189	2578	2767	0.93
2010	227	2773	3000	0.92

2011	169	2983	3152	0.94
2012	202	3305	3507	0.94
2013	104	2025	2129	0.95
2014	180	3575	3755	0.95
2015	96	2562	2658	0.96
Total	1828	27650	29478	0.93

4. Relative Growth Rate and Doubling Time for Breast Cancer Research Output by yearwise:

The Relative Growth Rate (RGR) is the increase in number of articles/pages per unit of time. The definition is derived from the definition of relative growth rates in the study of growth analysis of individual plants and effectively applied in the field of Botany, which in turn had its origin from the study of the rate of interest in the financial investment. The mean Relative Growth Rate (R) over the specific period of interval can be calculated from the following equation:

$$1\text{-}2^{-R} = \frac{\text{Log}_{e\ 2}W - \text{Log}_{e\ 1}W}{2^{T} - 1^{T}}$$

Whereas

$1\text{-}2^{-R}$ = mean relative growth rate over the specific period of interval
$\text{Log}_{e\ 1}W$ = log of initial number of articles
$\text{Log}_{e\ 2}W$ = log of final number of articles after a specific period of interval
$2^{T} - 1^{T}$ = the unit difference between the initial time and the final time.

The year can be taken here as the unit of time. The RGR for articles is hereby calculated.

Therefore

$1\text{-}2^{-R}$ (aa-1 year-1) can represent the mean relative growth rate per unit of articles per unit of year over a specific period of interval.

It is seen from Table that there is decrease in Relative Growth Rate from 1.28538 to 0.150832 for the years 2006 and 2014.

Table.4 Relative Growth Rate and Doubling Time for Breast Cancer

S. No.	Year	Quantum of Output	Cumulative Total of Output	W1	W2	RGR	DT(A)
1	2005	935	935		6.840546		
2	2006	2446	3381	6.840546	8.125926	1.28538	0.539140
3	2007	2459	5840	8.125926	8.608860	0.482934	1.434978
4	2008	2670	8510	8.608860	9.048997	0.440137	1.574550
5	2009	2767	11277	9.048997	9.330520	0.281522	2.461612

6	2010	3000	14277	9.330520	9.566405	0.235885	2.937872
7	2011	3152	17429	9.566405	9.765890	0.199485	3.473945
8	2012	3507	20936	9.765890	9.949225	0.183335	3.779965
9	2013	2129	23065	9.949225	10.046071	0.096846	7.155690
10	2014	3755	26820	10.046071	10.196903	0.150832	4.594515
11	2015	2658	29478	10.196903	10.291399	0.094496	7.333643

5. Doubling Time (DT):

There exists a direct equivalence between the relative growth rate and the doubling time in Breast Cancer literature research. If the number of articles/pages of a subject doubles between the logarithms of numbers at the beginning and end of this period must be logarithms of number 2, if natural logarithm is used this difference has a value of 0.693. Thus the corresponding doubling time for each specific period of interval and for both articles and pages can be calculate by the formula:

$$\text{Doubling Time (DT)} = \frac{0.693}{R^-}$$

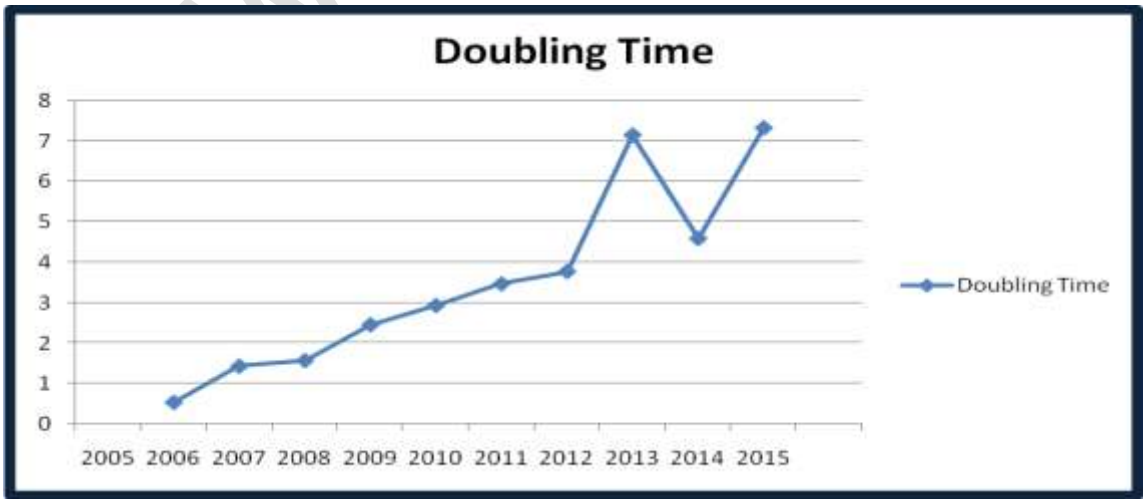
Therefore,
Doubling time for articles

$$Dt\,(a) = \frac{0.693}{1\text{-}2\ R^-\ (aa\text{-}1\ year\text{-}1)}$$

And Doubling time for articles

$$Dt\,(p) = \frac{0.693}{1\text{-}2\ R^-\ (pp\text{-}1\ year\text{-}1)}$$

The Doubling Time increase from 0.53 in the year 2005 to 2015 (7.33) in the time span of 11 years. The Graph shows the Doubling time of Breast Cancer research.



6. Distribution of Breast Cancer Research Production by Language:

The following table indicates the distribution of Breast Cancer literature by language. English language is most occupied in this research to 90% among other language covered in the field of Breast Cancer. This is followed by German (5.1%) and Russian (1.3%) as second and third positions respectively.

Table.5 Breast Cancer Research Production by Language

Language	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
English	1309	1474	1692	1877	2110	2578	2962	2364	3741	3918	1508	26533
German	67	73	81	104	127	147	175	204	230	254	66	1529
Russian	30	47	29	33	1	46	22	63	49	56	10	386
French	07	34	43	20	20	64	12	45	27	25	8	305
Japanese	13	17	19	08	10	16	24	35	8	9	3	162
Chinese	9	16	8	15	6	13	14	18	13	11	2	125
Italian	7	10	10	13	15	11	16	17	6	10	8	123
Spanish	3	7	4	5	8	10	8	02	07	08	07	70
Other	18	24	20	23	19	22	26	29	24	27	13	245

7. Publication Types of Breast Cancer:

The following table shows that 79.3% of the publications are Journals Articles, 8.89% are clinical trials and 4.56% are reviews. The literature published as other bibliographic form such as clinical Reports, English abstract, Practice Guidelines is about 7%.

Table.6 Publication Types of Breast Cancer:

Publication	Total	Percentage
Journals	23,386	79.3
Clinical Trials	2,621	8.89
Reviews	1,347	4.56
Clinical Reports	696	2.36
English Abstract	547	1.86
Practice Guideline	323	1.09
Other	558	1.89
Total	29478	100

8. Ranking of Journals in Breast Cancer:

Ranking of the Journals on the research output on “Breast Cancer” during the study period has been shown in the following table. 7 with the more contributions select in top most Ten Ranking of the Journals.

“Journal of Clinical Oncology” with 687 contributions got the First Rank.

“Cancer Epidemiology Biomarkers Prev.” with 659 contributions got the second Rank.

“Asian Pac. Journal Cancer Prev.” with 614 contributions got the third Rank

Table.7 Ranking of Journals in Breast Cancer

Journal Name	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total	Ranking
J. Clin. Onc.	53	68	77	84	84	71	63	63	43	47	34	687	1
Cancer Epid.Bio markers Prev.	34	65	87	89	89	62	47	56	49	53	28	659	2
APJCP	3	14	15	20	35	38	77	93	105	146	68	614	3
Cancer	31	50	51	64	47	44	52	74	49	40	43	544	4
Breast	23	42	40	45	33	43	52	39	75	33	46	470	5
Int. J. Cancer	16	64	42	41	40	32	29	49	47	41	52	453	6
J. Br. Cancer	18	47	35	48	38	37	36	43	53	44	23	422	7
BMC Cancer	4	26	21	38	34	38	38	40	38	67	32	376	8
J. Nat. Cancer	12	42	34	41	34	36	30	30	35	44	36	357	9
Breast J	7	39	27	25	35	31	32	41	30	26	23	316	10

CONCLUSION:

The study confirms the importance of the research on Breast Cancer and the respective increase in the publication of articles on the subject. The global research on the prevention / treatment of the dreaded research is going in a positive direction to curtail the havoc caused to the human kind. The rapid growth of publication and participation of number of authors on this research gives a hope that in a period of time Mankind would be saved from this killer disease. Let us hope that the Indian Funding agencies would continue to support this research and save the mankind.

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