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INTERNATIONAL JOURNAL OF CANCER, 2005-2015: A SCIENTOMETRIC ANALYSIS

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ABSTRACT

All the research papers published in the International journal of cancer (IJC) in the period of 2005 to 2015 have been collected and created a dataset. A scientometrics research analysis of the above dataset has been executed using Histcite and Citespace software. In this study, an effort is made to analysis the Year-wise distribution of articles, authorship pattern, most productive authors, relative growth rate, doubling time, document type, the ranking by institution and countries. The dataset on research articles was downloaded from the Web of Science (WoS) Thomson–Reuters citation database.

KEYWORDS: *Authorship Pattern, Doubling Time, Ranking of Institution and Countries, Relative Growth Rates, Scientometric analysis.*

INTRODUCTION :

International Journal of Cancer (IJC) has been taken into account as a source journal for this study. IJC started in 1966 the frequency is bimonthly and 1974 to 1990 the frequency is monthly. Its quality of publication has led to a doubling in size subsequently from the year 2009 onward, it has been published to fortnightly publication. For this study, we have selected11 years foranalysis the Year-wise distribution of research articles, authorship pattern, most productive authors, relative growth rate, doubling time, document type, the ranking by institution and countries. The research articles cover the major subject heading are colorectal cancer, breast cancer, prostate cancer, lung cancer, colon cancer, gastric cancer, ovarian cancer, cervical cancer and pancreatic cancer.

OBJECTIVES OF THE STUDY

The present study aims to analysis the research output of the International Journal of Cancer (IJC) and this study is confined to the publications appeared in IJC during the period 2005 to 2015. The study has the following objectives:

✦ To analysis the annual distribution of publication during the period.
✦ To examine the relative growth rate, doubling time and degree of collaboration of the IJC
✦ To examine the authorship pattern and author productivity of the IJC

✦ To examine the country and the institution wise distribution of publication during the period.

METHODOLOGY AND LIMITATION

The bibliographic data for the analysis are limited to the publication of the international journal of cancer published during the year from January 2005 to December 2015. The data downloaded from the Thomson Reuters web of science core collection. A total of eight thousand one hundred and thirteen research papers of twenty five volumes was selected.

DATA ANALYSIS AND INTERPRETATION

The present study analysis 25 volumes of the IJC, published during 2005-2015. In addition, the downloaded data were imported into Microsoft Excel using Histcite software for further analysis.

ANNUAL DISTRIBUTION OF PUBLICATIONS

Table 1: Annual distribution of Publications and Citation

S No	Year	Volume number	TP	%	TLCS	TGCS	%
1	2005	113-117	737	9.1	852	29228	12.83
2	2006	118-119	903	11.1	1113	35121	15.42
3	2007	120-121	784	9.7	871	30437	13.36
4	2008	122-123	820	10.1	735	28016	12.30
5	2009	124-125	792	9.8	621	25990	11.41
6	2010	126-127	626	7.7	549	25113	11.03
7	2011	128-129	648	8	350	16006	07.03
8	2012	130-131	779	9.6	325	14558	06.39
9	2013	132-133	685	8.4	243	10663	04.68
10	2014	134-135	628	7.7	102	6670	02.93
11	2015	136-137	711	8.8	40	5947	02.61
			8113	100	5801	227749	100.00

* TP =Total Papers, TLCS=Total Local Citation Score,TGCS = Total Global Citation Score,

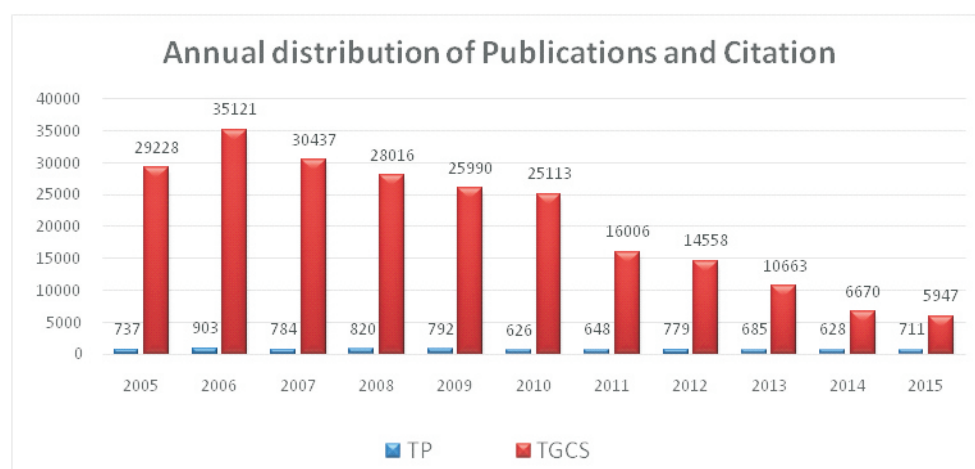**Figure 1: Annual distribution of Publications and Citation**

Table 1 reveals that over the period 2005-2015, a total of 8113 publications was published. The highest number of publication is 903 (11.1%) in 2006 followed by 820 (10.1%) in 2008 and 792 (9.8%) in 2009. The lowest

number, i.e. 626 (07.70%) publications were published in 2010. The above Graph 1 gives a visual presentation, which shows the annual distribution of research documents and their citation counts. It is clearly noticed from the graph that year 2006 received a number of citation 35121 (15.42%) followed by 2007 received 30437 (13.36%) of citation and 2005 received 29228 (12.83%) of citation. According to the findings determined, it can be known that the year 2006 received best research performances based on the number of publications and as well as the number of citations.

RELATIVE GROWTH RATE (RGR) AND DOUBLING TIME (DT)

Two parameters like relative growth rate and doubling time are used to study the growth trend in publications related to IJC for the period 2005–2015.

Table 1: Relative growth rate (RGR) and doubling time (DT) of publications

S No.	Year	TP	%	Cumulative	W1	W2	RGR	DT
1	2005	737	9.1	737	…	6.60	…	…
2	2006	903	11.1	1640	6.60	7.40	0.80	0.87
3	2007	784	9.7	2424	7.40	7.79	0.39	1.78
4	2008	820	10.1	3244	7.79	8.08	0.29	2.39
5	2009	792	9.8	4036	8.08	8.30	0.22	3.15
6	2010	626	7.7	4662	8.30	8.44	0.14	4.95
7	2011	648	8	5310	8.44	8.57	0.13	5.33
8	2012	779	9.6	6089	8.57	8.71	0.14	4.95
9	2013	685	8.4	6774	8.71	8.82	0.11	6.30
10	2014	628	7.7	7402	8.82	8.90	0.08	8.66
11	2015	711	8.8	8113	8.90	9.00	0.10	6.93
	Total	8113	100	50431				

*TP =Total Papers, RGR =Relative Growth Rate, DT=Doubling Time

Figure 2: Relative growth rate (RGR) and doubling time (DT) of publications
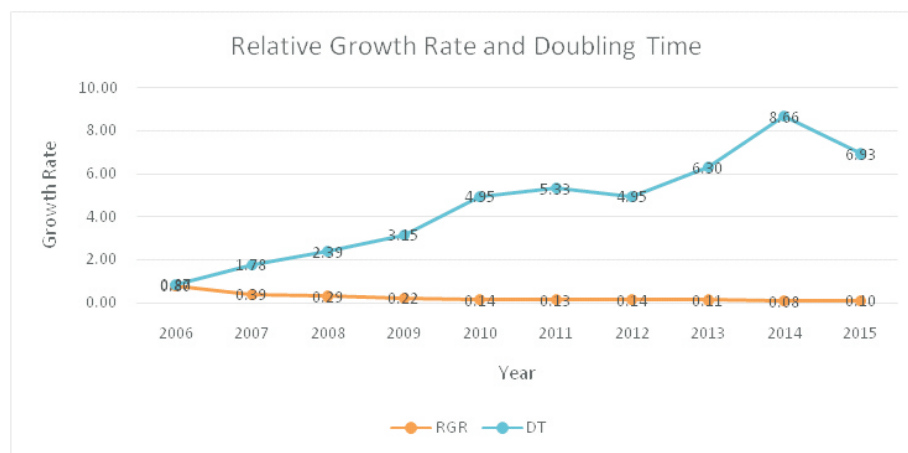

Table 2 and figure 2 shows that, the RGR is decreased from 0.80 in (2006) to 0.10 in (2015). Similarly, the DT of the research publications steadily increased from 0.87 in (2006) to 6.93 in (2015).According to the above analysis, it can be known that the RGR was less than DT and it almost shows that constant growth in research output.

AUTHORSHIP PATTERNS

Table 3: Presenting the Authorship pattern of the IJC

S No	Pattern	TP	%	AP	%
1	Single	137	1.69	137	0.19
2	Two	297	3.66	594	0.84
3	Three	433	5.34	1299	1.83
4	Four	589	7.26	2356	3.33
5	Five	741	9.13	3705	5.23
6	Six	864	10.65	5184	7.32
7	**Seven**	**875**	**10.79**	**6125**	**8.65**
8	Eight	826	10.18	6608	9.33
9	Nine	709	8.74	6381	9.01
10	Ten	620	7.64	6200	8.76
11	Eleven	474	5.84	5214	7.36
12	Twelve	374	4.61	4488	6.34
13	Thirteen	281	3.46	3653	5.16
14	Fourteen	188	2.32	2632	3.72
15	Fifteen	156	1.92	2340	3.30
16	Sixteen	88	1.08	1408	1.99
17	Seventeen	70	0.86	1190	1.68
18	Eighteen	68	0.84	1224	1.73
19	Nineteen	41	0.51	779	1.10
20	Twenty	35	0.43	700	0.99
21	Twenty+	247	3.04	8597	12.14
	Total	8113	100	70814	100

*TP: Total Paper, AP:Authorship pattern
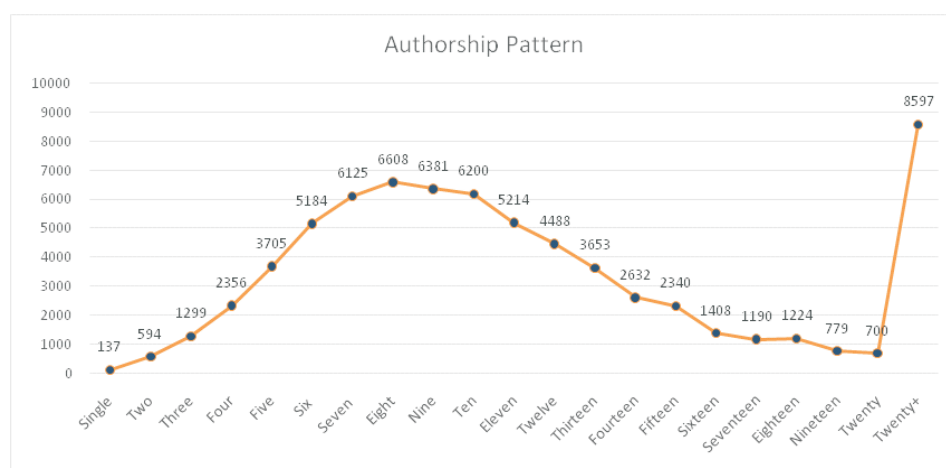
Figure 3: Presenting the authorship patternof IJC

Table 3 shows that the details about the authorship pattern of research publications published over the period of study. A total of 39427contributors has published the 8113 articles and the average number of authors per article observed to be 4.85. A total of 8113 publications, 137 (1.69%) papers are written by a single author and 7976 (98.31%) papers are written by multiple authors. We observed from the study that the Seven authored articles involved highest percentage 875 (10.79%), followed by Six authored articles 864 (10.65%) and eight authored articles 826 (10.18%).We observed from the study that the decreasing trends in the number of authors in terms of team research with respect to more than seven authors.

DEGREE OF AUTHOR'S COLLABORATION

Different strategies have been proposed for analysis the degree of collaboration. Here, in this study, the following formula proposed by Subramanyam (1983) has been utilized.

$$C = \frac{Nm}{Nm+Ns},$$ Where, C = Degree of collaboration, Nm = number of multi-authored papers (MAP), Ns =

number of single-authored papers (SAP)

Table 4. Degree of Collaboration

S No	Year	SAP	%	MAP	%	DC
1	2005-2015	137	1.69	7976	98.31	0.98

SAP = Single Authored Paper, MAP = Multi Authored Papers, DC = Degree of Collaboration
Here, Nm = 7976, Ns = 137

$$C = \frac{7976}{7976 + 137} = 0.98,$$ Thus, the degree of collaboration (C) is 0.98

Table 5: Year Wise Degree of Collaboration

S No	Year	SAP	%	MAP	%	Total	%	DC
1	2005	12	8.76	725	9.09	737	9.10	0.98
2	2006	29	21.17	874	10.96	903	11.10	0.97
3	2007	14	10.22	770	9.65	784	9.70	0.98
4	2008	17	12.41	803	10.07	820	10.10	0.98
5	2009	17	12.41	775	9.72	792	9.80	0.98
6	2010	11	8.03	615	7.71	626	7.70	0.98
7	2011	10	7.30	638	8.00	648	8.00	0.98
8	2012	7	5.11	772	9.68	779	9.60	0.99
9	2013	10	7.30	675	8.46	685	8.40	0.99
10	2014	4	2.92	624	7.82	628	7.70	0.99
11	2015	6	4.38	705	8.84	711	8.80	0.99
	Total	137	100.00	7976	100.00	8113	100.00	Mean 0.98
SAP = Single Authored Paper, MAP = Multi Authored Papers, DC = Degree of Collaboration								

Table 4 demonstrates that the degree of collaboration for the period of eleven years (2005-2015) is 0.98. The single-authored articles are secured just 137 (1.69%) amid the years. The multi-authored articles 7976 (98.31%) are top consistently. Which clearly shows its strength upon multi-authored collaborative research.Table 5 demonstrates that the year the wise number of multi-authored articles and their degree of collaboration the results arise in a different value and the Mean value is 0.98.Therefore, it was found that the degree of collaboration withInternational journal of cancer (IJC) is 0.98. The analysis found that a single author papers are decreased every year and the multi-authorship pattern is increasingconsistently.

TOP PRODUCTIVE AUTHORS AND HIGHLY CITED AUTHORS

Table 6: Top Productive and Highly Cited Authors with average Citations per Paper

Productive author by publication				Productive author by citation			
Author	TP	TGCS	ACPP	Author	TP	TGCS	ACPP
Overvad K	112	2692	24.04	Franceschi S	87	4331	49.78
Tumino R	111	2741	24.69	Meijer CJLM	44	2889	65.66
Tjonneland A	109	2636	24.18	Riboli E	107	2888	26.99
Riboli E	107	2888	26.99	Tumino R	111	2741	24.69
Bueno-de-Mesquita HB	99	2240	22.63	Overvad K	112	2692	24.04
Trichopoulou A	99	2173	21.95	Tjonneland A	109	2636	24.18
Khaw KT	93	2046	22.00	Boffetta P	76	2489	32.75
Boeing H	95	2336	24.59	Kaaks R	91	2443	26.85
Franceschi S	87	4331	49.78	Snijders PJF	37	2351	63.54
Palli D	88	2116	24.05	Boeing H	95	2336	24.59
Boutron-Ruault MC	73	1741	23.85	Bueno-de-Mesquita HB	99	2240	22.63
Weiderpass E	70	1045	14.93	Trichopoulou A	99	2173	21.95
Kaaks R	91	2443	26.85	Palli D	88	2116	24.05
Snijders PJF	37	2351	63.54	Khaw KT	93	2046	22.00
Boffetta P	76	2489	32.75	Panico S	69	2021	29.29
Meijer CJLM	44	2889	65.66	Vineis P	65	1788	27.51
Trichopoulos D	62	1435	23.15	Boutron-Ruault MC	73	1741	23.85
Panico S	69	2021	29.29	Trichopoulos D	62	1435	23.15
Vineis P	65	1788	27.51	Weiderpass E	70	1045	14.93
Wareham N	48	764	15.92	Wareham N	48	764	15.92

TP = Total Papers, TGCS = Total Global Citation Score, ACPP = Average Citations per Paper

Table 6 demonstrates that twenty top productive authors and twenty highly cited author for each author we have shown Total Paper and Total Global Citation Score values. We observed "Overvad K" as most productive author followed by "Tumino R, Tjonneland A and Riboli E in terms of Total Paper value with 112, 111, 109 and 107 articles respectively. Others have contributedbelowhundred articles during the time of the study. The above citation analysis showed "Franceschi S" as highly cited author followed by Meijer CJLM, Riboli E, Riboli E in terms of total citation value with 4331, 2889, 2888 and 2741 respectively.The average citation per paper registered by Meijer CJLM (65.66) ranked in first place and followed by Snijders PJF (63.54) ranked in second place and Franceschi S (49.78) ranked in third place.

MAPPING AND MOST PRODUCTIVE COUNTRIES ON IJC

The investigation of 8113 research papers distributed in IJC amid 2005-2015 exhibited, that they were contributed by 114 countries and the countries distributed more than 140 research papers had been chosen in visualization map as shown in Figure 4.

Table 7: Research Output, Mapping and Citation Result of Top Twenty Institutions

S No	Country	TP	TLCS	TGCS	ACPP
1	USA	2755	2087	79164	28.73
2	Germany	1308	1002	34426	26.32
3	Japan	863	617	24922	28.88
4	UK	812	885	33436	41.18
5	Peoples R China	788	484	21402	27.16
6	Italy	700	601	18830	26.90
7	France	679	759	28761	42.36
8	Sweden	610	604	16311	26.74
9	Netherlands	552	624	16009	29.00
10	Canada	409	335	11285	27.59
11	Spain	354	317	8949	25.28
12	Finland	321	252	7220	22.49
13	Australia	319	250	8139	25.51
14	Denmark	305	320	8093	26.53
15	Norway	284	244	7011	24.69
16	South Korea	250	138	6139	24.56
17	Switzerland	237	304	15119	63.79
18	Taiwan	195	148	4745	24.33
19	Greece	176	203	4450	25.28
20	Belgium	140	107	4192	29.94
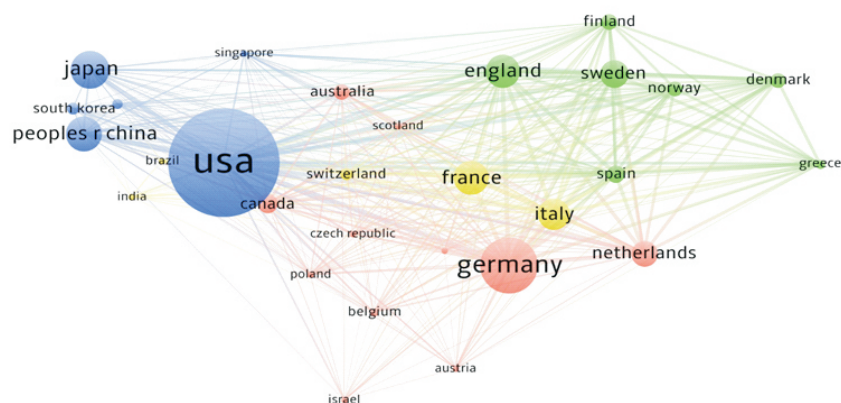
Figure 2: Mapping and Cluster on Publication Output of Top 20 Countriesby number of Documents

For each of the 20 countries, the total relationship strength of the co-authorship links with other countries will be analyzed. We observed from the figure 4, different sizes of circle nodes, which clarify to the number of research articles published by every country. The nodes size greater means the more number of research articles published. Table 7 shows that, Research Output and Citation Result of Top Twenty Institutions in term of number of records, The major research output comes from USA 2755 (34.0%) with a global citation score (GCS) of 79164 (34.8%) followed by Germany 1308 (16.1%) with GCS of 34426 (15.10%), Japan 863 (10.6%) with GCS of 24922 (10.9%), UK 812 (10.0%) with GCS of 33436 (14.7%) Peoples R China 788 (9.7%) with GCS of 21402 (9.4%) and the rest below 9.0%. India is in 24th position among the countries with its global citation score of 4142 (1.8%) during 2005 to 2015.

CONCLUSION

The interesting findings of the study are summarized as follows:

• It shows that the year 2006 received best research performances based on the number of publications and as well as the number of citations.

• It is conceded that theRGR is decreased from 0.80 in (2006) to 0.10 in (2015). Similarly, the DT of the research publications steadily increased from 0.87 in (2006) to 6.93 in (2015).

• It is observed a total of 39427 contributors has published the 8113 articles and the average number of authors per article observed to be 4.85.

• It finds from the analysis that the decreasing trends in the number of authors in terms of team research with respect to more than seven authors.

• The analysis found that the degree of collaboration in International journal of cancer (IJC) is 0.98.

• It is also observed "Overvad K" as most productive author followed by "Tumino R, Tjonneland A and Riboli E in terms of Total Paper value with 112, 111, 109 and 107 articles respectively, and The major research output comes from USA 2755 (34.0%) with a global citation score (GCS) of 79164 (34.8%).

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