Growth of Literature in Neuroscience: A scientometric study (1972 -2011)

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Abstract

This paper analyses the growth pattern of Neuroscience literature during 1972 – 2011 (40 years). The Scopus database has been used to retrieve data in the field of Neuroscience. Scopus is the world's largest abstract and citation database of peer-reviewed literature. 35869 records were extracted from Scopus database. The growth in the publication is studied through Relative Growth Rate and doubling time. The authorship pattern is measured by different collaboration parameters like collaborative index, degree of collaboration, collaborative coefficient and modified collaborative coefficient. The quality of the journal is assessed by SJR and SNIP

Keywords

Scientometric, Relative Growth Rate, Degree of Collaboration, Neuroscience, SCImago Journal Rank, Source-Normalized Impact per Paper.

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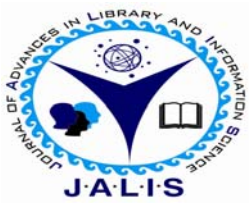

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INTRODUCTION

Scientometrics is one of the most important measures for the assessment of scientific production. Scientometrics is the science of measuring and analyzing science. In practice, scientometrics is often done using bibliometrics that is measurement of (scientific) publications. In 1969, Nalimov and Mulchenko(1969)[1] coined the Russian equivalent of the term "Scientometrics" ('naukomtriya'). This term has grown in popularity and is used to describe the study of science: growth, structure, interrelationships and productivity. Scientometrics is related to and has overlapping interests with bibliometrics and informetrics.

There are many definitions for the term "Scientometrics" in the literature; Scientometrics is the quantitative study of the disciplines of science based on published literature and communication. This could include identifying emerging areas of scientific research, examining the development of research over time, or geographic and organizational distributions of research (Glossary of Thompson…, 2008)[2]. Tague-Sutclifee (1992)[3] defines Scientometrics as "the study of the quantitative aspects of science as a discipline or economic activity. It is part of the sociology of science and has application to science policy-making. It involves quantitative studies of scientific activities, including, among others, publication, and so overlaps bibliometrics to some extent". Van Raan (1997)[4] believes that scientometric research is devoted to quantitative studies of science and technology. It aims at the advancement of knowledge and the development of science and technology; it is also in relation to social and political question. Neuroscience is the scientific study of the nervous system explained by Bear, Connors and Paradiso (1998)[5]. It is human nature to be curious about how we see and hear; why some things feel good and others hurt; how we move; how we reason, learn, remember, and forget; the nature of anger and madness. These mysteries are starting to be unraveled by basis Neuroscience research. Traditionally, neuroscience has been seen as a branch of biology. However, it is currently an interdisciplinary science that collaborates with other fields such as chemistry, computer science, engineering, linguistics, mathematics, medicine and allied disciplines, philosophy, physics, and psychology. The term neurobiology is usually used interchangeably with the term neuroscience, although the former refers specifically to

the biology of the nervous system, whereas the latter refers to the entire science of the nervous system. Neuroscience is one of the most interdisciplinary and rapidly expanding fields devoted to the scientific study of the nervous system. In the last one decade, the growth of neurosciences in India in terms of trained professionals, research scientists, specialized departments with state of the art infrastructure, and institutes with research facilities has been impressive[6].

REVIEW OF LITERATURE

In the recent years, many researchers have conducted scientometric analysis in different subject fields. The following studies related to the objectives of this study have been reviewed. Savanur and Srikanth (2010)[7] cited that Collaborative Coefficient (CC) is a measure of collaboration in research, that reflects both the mean number of authors per paper as well as the proportion of multiauthored papers. Normally it lies between the value 0 and 1, and is 0 for a collection of purely single authored papers and it is not 1 for the case where all papers are maximally authored. They proposed a simple modification of CC which they call it as MCC. Unlike CC, which remains strictly less than 1 for finitely many authors, MCC smoothly tends to 1 as the degree of collaboration becomes maximal. Keerti Bala Jain and Kumar (2011)[8] studied the measurement of research productivity of Indian scientists contributing to world soybean research for the period 1989 -2008 and concluded that India obtains 2nd rank in world publication on soybean research after USA. Lotka's law is found almost applicable in the present study.
Rajendran, Jeyshankar, and Elango (2011)[9] analyzed 633 research articles published in Journal of Scientific and Industrial Research. They found that majority of papers was by multi authors and Indian authors. There was poor international collaboration by Indian authors. Karpagam et al (2011)[10] analyzed the growth pattern of Nanoscience and Nanotechnology literature in India during 1990 – 2009. They found that contribution of India has increased greatly in the last 5 years, field of Nanascience and Nanotechnology is currently led by USA, China and Japan. Mooghali A et al (2011)[11] tried to give a complete view of the evolution of the field of Scientometrics based on its literature published during 1980 to 2009. They found that researchers of several nationalities are working on the scientometric themes, with a predominance of USA researchers. Chronological analysis disclosed that the scientific production in the field of scientometrics shows a slow increase from 1980 to 2009. Jeyshankar, Ramesh Babu. and Rajendran, (2011)[12] analysed bibliographical details of 1282 research articles published by the scientists of CECRI during the period 2000-2009. From the study it is found that 194 articles (15.13%) published in the year 2009 was the most productive year. Collaborative research was dominant with the highest degree of collaboration being 0.98, in the year 2005. Further, the study investigated authorship pattern, co-authorship pattern, highly prolific authors and highly preferred journals by the scientists of CECRI. There are number of research in the field of medicine was undertaken in the emerging era. The review of literature indicates that the study on the growth of neuroscience has not been successfully attempted. Hence the discipline of neuroscience is taken up for the study.

OBJECTIVES OF THE STUDY

The main objective of the study is to identify / analyze the following

- Distribution and growth of Neuroscience for the period of 40 years (1972-2011) divided into 8 blocks of 5 years each.
- Growth in publication given by Relative Growth Index (RGR) and Doubling time (D_t)
- Measure of collaboration given by Collaborative Index (CI), Degree of Collaboration (DC), Collaboration Coefficient (CC) and Modified Collaborative Coefficient (MCC).
- Major countries contribution
- Language distribution
- Bibliographic form of Neuroscience research output
- Top 50 journals and their rank
- Two journal metrics ie SJR and SNIP

METHODOLOGY

The data in this study has been retrieved from Scopus (www.scopus.com). Scopus is the world's largest abstract and citation database of peer-reviewed literature. The time period considered in this study is from 1972 to 2011.

DISCUSSIONS

All document types published in the field of Neuroscience from 1972 to 2011have been processed. The total number of records is 35869.

Block year research output

Research output in neuroscience during the period 1972 - 2011 consists of 35869 records with an average publication per year as 897.

Table 1 shows the block year research output and average publication per year. It can be observed that the publication output is 50 during the block year 1972-1976 and gradually it increased. The publication output is higher ie. 18246 during the block year 2007 – 2011.

Table 1. Publication output in 5 year block

Sl. No	Year	No. of records	%	Average Publication per year	Cumulative	Cumulative %
1	1972-1976	50	0.14	10	50	0.14
2	1977-1981	97	0.27	19	147	0.41
3	1982-1986	261	0.73	52	408	1.14
4	1987-1991	792	2.21	158	1200	3.35
5	1992-1996	1796	5.01	359	2996	8.35
6	1997-2001	4123	11.49	825	7119	19.85
7	2002-2006	10504	29.28	2101	17623	49.13
8	2007-2011	18246	50.87	3649	35869	100.00
Total		**35869**	**100.00**	**897**		

Growth of publications

The growth of publications was analysed by using two parameters Relative Growth Rate and Doubling time (Mahapatra 1985)[13]. RGR is a measure to study the increase in number of articles of time. It is calculated as

$$RGR = (\ln N_2 - \ln N_1) / (t_2 - t_1)$$

Where N_2 and N_1 are the cumulative number of publications in the years t_2 and t_1.

Table 2: Research output, relative growth rate and doubling time in the field of neuroscience

Sl. No	Year	No. of records	Cumulative	$\log_e N_1$	$\log_e N_2$	RGR	D_t
1	1972-1976	50	50		3.91		
2	1977-1981	97	147	3.91	4.99	0.22	3.21
3	1982-1986	261	408	4.99	6.01	0.20	3.40
4	1987-1991	792	1200	6.01	7.09	0.22	3.21
5	1992-1996	1796	2996	7.09	8.01	0.18	3.79
6	1997-2001	4123	7119	8.01	8.87	0.17	4.00
7	2002-2006	10504	17623	8.87	9.78	0.18	3.82
8	2007-2011	18246	35869	9.78	10.49	0.14	4.88

Doubling time is the time required for articles to become double of the existing amount. This is expressed as

$$D_t = (t_2 - t_1) \ln 2 / (\ln N_2 - \ln N_1)$$

or

$$D_t = \ln 2 / RGR$$

D_t is directly related to RGR. Table 2 represents the block year wise distribution of RGR and D_t in the field of neuroscience during the period 1972-2011. From the table 2 it is observed that the RGR decreased from a value of 0.22 in the block year 1977- 1981 to 0.14 in the block year 2007 – 2011. The corresponding Dt increased from 3.21 for the block year 1977- 1981 to 4.88 for the block year 2007-2011. Thus RGR and D_t are inversely proportional ie rate of growth of publication was decreased the corresponding D_t was increased.

Measures of collaboration

Let the collection k be the research papers published in a discipline or in a journal during a certain period of interest. In the following, we write
F_j – the number of papers having j authors in collection;
N = the total number of paper in K . $N = \Sigma jf_j$; and
A = the total number of authors in collection k.

Collaborative Index (CI) is defined as (Lawni 1980)[14]

$$CI = \frac{\sum_{j=1}^{A} if_j}{N}$$

This index is a measure of mean number of authors per paper. It has the disadvantage that it cannot be easily interpreted as a degree, for it has no upper limit and it gives a non-zero weight to single-authored papers, which involve no collaboration.

Degree of Collaboration (DC) is expressed as (Subramanyam 1983)[15]

$$DC = 1 - \frac{f_1}{N}$$

where f_1 is the number of single authored papers. DC can be easily calculated and interpreted as a degree (it lies between zero and one), gives zero weight to single authored papers. It always ranks higher a discipline with a higher number of multiauthored papers. DC gives a value of 1 for maximum collaboration. However, DC does not differentiate among levels of multiple authorships.

Collaboration Coefficient (CC) was designed to remove the above shortcomings pertaining to CI and DC. It is expressed as (Ajiferuke et al, 1988)[16]

$$CC = 1 - \frac{\sum_{j=1}^{A} \frac{1}{j} f_j}{N}$$

It vanishes for a collection of single authored papers, and distinguishes between single-authored, two authored etc., papers. However, CC fails to yield 1 for maximal collaboration, except when number of authors is infinite. The derivation of the new measure MCC which is almost the same as that of CC is expressed as (Savanur and Srikanth 2010)[17].

$$MCC = \frac{\sum_{j=1}^{A} (1/j) f_j}{A-1} \left\{ 1 - \frac{A}{N} \right\}$$

We present values for these four coefficients in table 3.

Table 3: Authorship Collaboration

Sl. No	No. of Authors	1972-1976	1977-1981	1982-1986	1987-1991	1992-1996	1997-2001	2001-2006	2007-2011
1	0	3	17	38	79	97	151	237	262
2	1	26	50	138	361	711	1691	2679	3975
3	2	13	17	47	175	377	883	2028	3532
4	3	6	8	24	79	265	522	1467	2781
5	4	2	3	11	49	155	348	1161	2160
6	5	0	2	3	24	81	215	873	1559
7	6	0	0	0	12	38	112	636	1173
8	7	0	0	0	3	28	79	434	829
9	8	0	0	0	1	17	49	323	626
10	9	0	0	0	3	9	22	224	416
11	10	0	0	0	2	7	19	158	273
12	>10	0	0	0	4	11	32	284	660
		50	97	261	792	1796	4123	10504	18246
Total authors		**88**	**130**	**363**	**1469**	**4155**	**10059**	**36956**	**69603**
CI		1.76	1.34	1.39	1.85	2.31	2.44	3.52	3.81
DC		0.48	0.48	0.47	0.54	0.60	0.59	0.74	0.78
CC		0.30	0.36	0.34	0.37	0.41	0.40	0.53	0.56
MCC		0.31	0.36	0.34	0.38	0.41	0.40	0.53	0.56

Table 3 shows that 884 nearly 2% of article have no author details. Overall the 71% (25354) of the articles were collaborative and 27% (9631) of the articles are single authored.

Collaboration Index that is a measure of mean number of authors per paper varies between 1.76 for the block year 1972-1976 and 3.81 for the block year 2007- 2011 with a mean value of 2.30. DC varies from 0.48 to 0.78 shows a predominance of multiple author papers. (DC = 1 indicates that the number of single author paper is zero).To differentiate between the levels of multiple authors, two parameters CC and MCC were calculated and presented in Table 3. CC is between 0.30 for the block year 1972-1976 and 0.56 for the block year 2007- 2011. MCC varies between 0.31 for the block year 1972-1976 and 0.56 for the block year 2007- 2011.

Geographical distribution of articles

Table 4 shows that the distribution of research output of different countries in the field of neuroscience during 1972-2011. This table reveals that 41.34 % of the total articles were contributed by the authors from Unites States, followed by United Kingdom (9.56%), Germany (7.23 %), Japan (6.86%) and Canada (5.10%). Only 0.59% of the articles were contributed by authors in India ranking 18th among top 20 countries. Generally speaking, the study indicates that the field has evolved considerably in different regions of the world.

Table 4: Geographical distribution of articles

Sl. No	Country	No. of records	%	Cumulative	Cumulative %	Rank
1	USA	14829	41.34	14869	41.34	I
2	UK	3428	9.56	18257	50.90	II
3	Germany	2595	7.23	20852	58.13	III
4	Japan	2461	6.86	23313	64.99	IV
5	Canada	1830	5.10	25143	70.10	V
6	France	1651	4.60	26794	74.70	VI
7	Italy	1263	3.52	28057	78.22	VII
8	Switzerland	786	2.19	28843	80.41	VIII
9	Australia	784	2.19	29627	82.60	IX
10	Spain	748	2.09	30375	84.68	X
11	China	744	2.07	31119	86.76	XI
12	Netherlands	730	2.04	31849	88.79	XII
13	Sweden	480	1.34	32329	90.13	XIII
14	Belgium	371	1.03	32700	91.17	XIV
15	Israel	349	0.97	33049	92.14	XV
16	Brazil	330	0.92	33379	93.06	XVI
17	South Korea	281	0.78	33660	93.84	XVII
18	**India**	**211**	**0.59**	**33871**	**94.43**	**XVIII**
19	Finland	206	0.57	34077	95.00	XIX
20	Austria	202	0.56	34279	95.57	XX
21	others	1590	4.43	35869	100.00	
	Total	**35869**	**100.00**			

Language wise distribution of articles

Maximum number of articles were published in English language (94.92%) followed by French (1.34 %), Spanish (1.10%). 2.64% of the articles were published in various languages like German, Japanese, Chinese, Italian, Portuguese, Czech and Russian and other languages (Table 5).

Table 4: Language wise distribution of articles

Sl. No	Language	No. of records	%	Cumulative	Cumulative %
1	English	34046	94.92	34046	94.92
2	French	482	1.34	34528	96.26
3	Spanish	396	1.10	34924	97.37
4	German	306	0.85	35230	98.22
5	Japanese	167	0.47	35397	98.68
6	Chinese	162	0.45	35559	99.14
7	Italian	112	0.31	35671	99.45
8	Portuguese	90	0.25	35761	99.70
9	Czech	39	0.11	35800	99.81
10	Russian	34	0.09	35834	99.90
11	Other	35	0.10	35869	100.00
Total		**35869**	**100.00**		

Document types of neuroscience literature

As mentioned earlier, the data contain all types of documents. Results disclosed that Scientific articles 'strongly encouraged among researchers' (Lolis et al, 2009)[18] constitute the format of most publications (59.99%), as only 40.01% were found in the form of other document types. Table 6 illustrates the different types of documents in the field of neuroscience.

Table 6: Document type of neuroscience literature

Sl. No	Document type	No. of records	%	Cumulative	Cumulative %
1	Articles	21517	59.99	21517	59.99
2	Reviews	5312	14.81	26829	74.80
3	Conference Papers	2798	7.80	29627	82.60
4	Editorials	2023	5.64	31650	88.24
5	Erratums	1283	3.58	32933	91.81
6	Short Surveys	997	2.78	33930	94.59
7	Notes	915	2.55	34845	97.15
8	Letters	326	0.91	35171	98.05
9	Articles in Press	76	0.21	35247	98.27
10	Conference Reviews	43	0.12	35290	98.39
11	Books	16	0.04	35306	98.43
12	Undefined	563	1.57	35869	100.00
Total		**35869**	**100.00**		

Top Journals of Neuroscience

Table 7 shows the top 50 journals in the field of Neuroscience which are listed in descending frequency order. This table also reveals the ranking of the journals based on the research output on Neuroscience during the year 1972-2011. Journal of Neuroscience holds the first rank and published maximum number of articles as 7136 (19.89%) followed by European Journal of Neuroscience and Neuroscience research which holds the 2nd and 3rd rank respectively.

Table 7: Top Journal of Neuroscience

Source Title	No. of Records	%	Rank
Journal of Neuroscience	7136	19.89	1
European Journal of Neuroscience	2195	6.12	2
Neuroscience Research	1696	4.73	3

Science	414	1.15	4
Nature	407	1.13	5
Neuroscience	358	1.00	6
Journal of Neuroscience Methods	303	0.84	7
Nature Neuroscience	297	0.83	8
Journal of Visualized Experiments	276	0.77	9
Annals of the New York Academy of Sciences	275	0.77	
Trends in Neurosciences	261	0.73	10
Behavioral and Brain Sciences	260	0.72	11
Nature Reviews Neuroscience	249	0.69	12
Neuroimage	245	0.68	13
Journal of Neuroscience Nursing Journal of the American Association of Neuroscience Nurses	233	0.65	14
Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics	210	0.59	15
Acta Neurobiologiae Experimentalis	187	0.52	16
Journal of the History of the Neurosciences	182	0.51	17
Brain Research Bulletin	181	0.50	18
Journal of Neuroscience Nursing	168	0.47	19
Neuroscience Letters	162	0.45	20
Trends in Cognitive Sciences	156	0.43	21
Journal of Cognitive Neuroscience	143	0.40	22
Current Opinion in Neurobiology	142	0.40	
Journal of Neurophysiology	139	0.39	23
Neuroscience and Biobehavioral Reviews	135	0.38	24
Neurosurgery	122	0.34	25
Neuron	121	0.34	
Brain Research	121	0.34	
Progress in Brain Research	117	0.33	26
Proceedings of the National Academy of Sciences of the United States of America	110	0.31	27
Neurocomputing	110	0.31	27
Revista De Neurologia	109	0.30	28
Neural Networks	108	0.30	
American Journal of Psychiatry	107	0.30	
Journal of Undergraduate Neuroscience Education	107	0.30	
Neuropsychologia	103	0.29	29
Cortex	94	0.26	30
Experimental Brain Research	93	0.26	
Psychiatry and Clinical Neurosciences	93	0.26	
Neuroscientist	89	0.25	31
Journal of Comparative Neurology	86	0.24	32
Biological Psychiatry	84	0.23	33
Plos One	84	0.23	
Neuroinformatics	84	0.23	
Neurology	82	0.23	
Current Biology	82	0.23	
Canadian Journal of Neurological Sciences	82	0.23	
Philosophical Transactions of the Royal Society Sciences	81	0.23	
Brain and Cognition	80	0.22	34
Other	17110	47.70	
	35869	**100.00**	

Analysis of Journal Metrics: SJR and SNIP

Table 8: Analysis of Journal Metrics: SJR and SNIP

Sl. No	Journal	year	SJR	SNIP	Citation	Docs
1.	European Journal of Neuroscience	1996	-	-	4976	288
2.	European Journal of Neuroscience	1997	-	-	5414	293
3.	European Journal of Neuroscience	1998	-	-	6558	406
4.	European Journal of Neuroscience	1999	1.026	1.057	8262	469
5.	European Journal of Neuroscience	2000	1.097	1.203	10062	475
6.	European Journal of Neuroscience	2001	0.933	1.159	10889	437
7.	European Journal of Neuroscience	2002	1.026	1.268	12669	537
8.	European Journal of Neuroscience	2003	0.908	1.255	14444	665
9.	European Journal of Neuroscience	2004	0.824	1.268	17212	737
10.	European Journal of Neuroscience	2005	0.748	1.364	19943	697
11.	European Journal of Neuroscience	2006	0.687	1.408	22070	715
12.	European Journal of Neuroscience	2007	0.633	1.366	24589	720
13.	European Journal of Neuroscience	2008	0.592	1.288	25563	572
14.	European Journal of Neuroscience	2009	0.537	1.269	26073	478
15.	European Journal of Neuroscience	2010	0.490	1.346	26627	453
16.	European Journal of Neuroscience	2011	0.359	1.394	28826	444
17.	Journal of Neuroscience	1996	-	-	39684	763
18.	Journal of Neuroscience	1997	-	-	42172	906
19.	Journal of Neuroscience	1998	-	-	48298	984
20.	Journal of Neuroscience	1999	3.344	2.886	58792	1104
21.	Journal of Neuroscience	2000	3.131	2.965	66769	1105
22.	Journal of Neuroscience	2001	2.918	2.809	70963	1101
23.	Journal of Neuroscience	2002	2.850	2.866	79174	1221
24.	Journal of Neuroscience	2003	2.554	2.923	88195	1318
25.	Journal of Neuroscience	2004	2.259	2.812	95742	1274
26.	Journal of Neuroscience	2005	2.044	2.919	103504	1294
27.	Journal of Neuroscience	2006	1.864	2.884	110163	1522
28.	Journal of Neuroscience	2007	1.775	2.887	119472	1555
29.	Journal of Neuroscience	2008	1.755	2.915	124945	1517
30.	Journal of Neuroscience	2009	1.613	2.852	129842	1614
31.	Journal of Neuroscience	2010	1.414	2.92	138913	1749
32.	Journal of Neuroscience	2011	0.971	2.909	154986	1896
33.	Neuroscience Research	1996	-	-	1590	123
34.	Neuroscience Research	1997	-	-	1574	124
35.	Neuroscience Research	1998	-	-	1823	116
36.	Neuroscience Research	1999	0.393	0.485	1903	113
37.	Neuroscience Research	2000	0.419	0.569	2229	127
38.	Neuroscience Research	2001	0.404	0.531	2302	137
39.	Neuroscience Research	2002	0.375	0.537	2486	126
40.	Neuroscience Research	2003	0.474	0.622	2831	159
41.	Neuroscience Research	2004	0.444	0.665	3067	151
42.	Neuroscience Research	2005	0.403	0.734	3394	158
43.	Neuroscience Research	2006	0.322	0.736	3450	155
44.	Neuroscience Research	2007	0.341	0.728	3931	189
45.	Neuroscience Research	2008	0.359	0.774	3917	147
46.	Neuroscience Research	2009	0.324	0.825	4146	160
47.	Neuroscience Research	2010	0.246	0.75	4228	146
48.	Neuroscience Research	2011	0.180	0.754	4688	162

Table 8 shows the value of SJR, SNIP, number of citation and number of documents for the top three journals. SJR (SCImago Journal Rank) is developed by Professor Felix de Moya, Research Professor atConsejo Superior de Investigaciones Consejo Superior de Investigaciones Científicas and Vicente Guerrero Bote at University of Extremadura. SCImago Journal Rank (SJR) is a prestige metric based on the idea that 'all citations are not created equal'. It is a size-independent indicator and it ranks journals by their 'average prestige per article' and can be used for journal comparisons in science evaluation processes[19].

Figure 2 reveals that the Journal of Neuroscience has high SJR value varies between 3.344 to 0.971 during the year 1999 to 2011. Relatively high SJR is worth more than a citation from a source with a relatively low SJR.

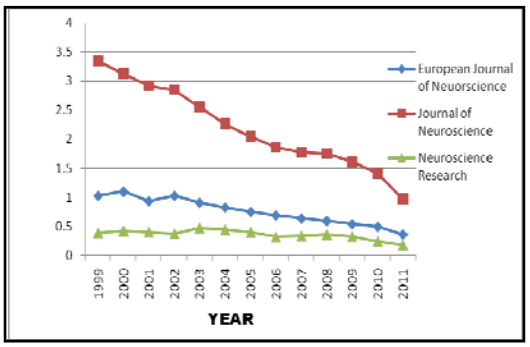

Figure 2 : SJR vs Year for the top three journals

SNIP (Source-Normalized Impact per Paper) created by Professor Henk Moed at CTWS, University of Leiden, measures contextual citation impact by weighting citations based on the total number of citations in a subject field. The impact of a single citation is given higher value in subject areas where citations are less likely, and vice versa[20]. Figure 3 shows the value of SNIP for the top three journals.

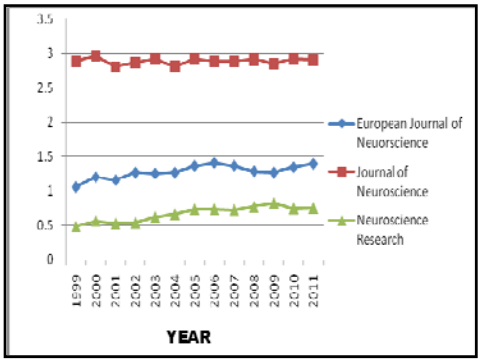

Figure 3 : SNIP vs Year for the top three journals

Figure 4 shows the number of documents published every year for the top three journals. Journal of Neuroscience has more number of documents ranges from 763 to 1896.

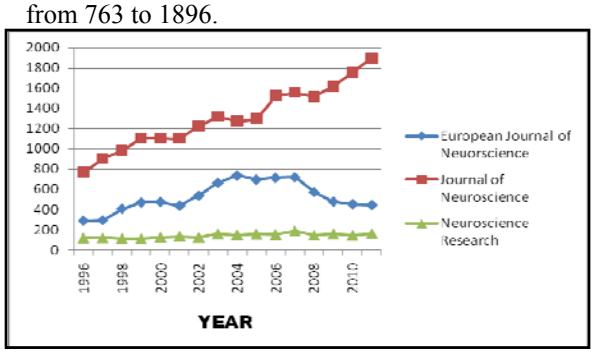

Figure 4: No. of documents vs Year for the top three journals

Figure 5 shows the number of citations per year for the top three journals. It reveals that Journal of neuroscience has citations varies between 39684 and 154986 during the year 1999 to 2011. So Journal of Neuroscience ranks first among the journals which published neuroscience research output.

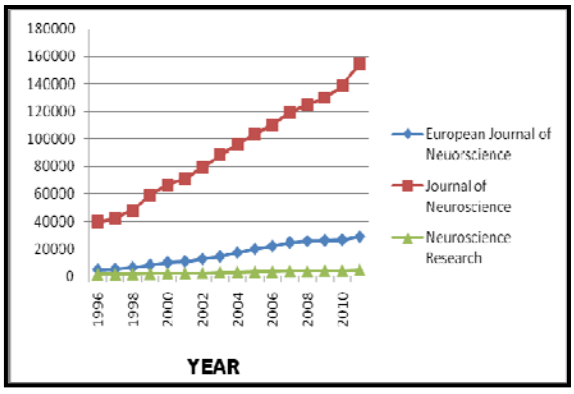

Figure 5: No. of citations vs Year for the top three journals

CONCLUSION

Considering the above facts it is concluded that the research output in the field of Neuroscience was higher i.e. 18246 during the block year 2007- 2011. RGR and D_t are inversely proportional i.e. rate of growth of publication was decreased and the corresponding D_t was increased. To evaluate the author collaboration Collaborative Index (CI), Degree of Collaboration (DC), Collaborative Coefficient (CC) and Modified Collaborative Coefficient (MCC) were employed and proved that 71% of the research outputs were of collaborative in

nature. In this study 2.46% of the articles have no author information. USA obtains 1st rank in world research output, only 0.59% of the articles were contributed by authors in India ranking 18th among top 20 countries. Two Journal metrics SJR and SNIP were analysed. It shows that Journal of Neuroscience was the prestigious and popular journal in the field of Neuroscience. In India the research in this field is infantile stage. This may be due to non availability of funds and supportive training programs. Strengthening of training programs at institutional level, national and international level becomes mandatory. The lacking on the contribution may be due to non availability of international collaboration.

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