

Authorship Pattern and Collaborative Research in the Field of Hepatitis C

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Abstract - This paper presents a Bibliometric analysis of the authorship pattern in the field of Hepatitis C covered in the Journal "Gastroenterology". The literature covered for the period 2006-2010 in the Journal was considered. Citation Analysis was used for this study. Records covered in the citation from the year 1908 to 2010 were identified. This study was aimed to examine authorship pattern in the field of Hepatitis C. There were 137 articles from the source journal during the study period and these articles had a total of 5132 cited items. Hence, only authorship pattern in the field of Hepatitis C is discussed in this paper. 93.26% of the total contributions represent collaborative research. The degree of collaboration has been arrived at 0.93 during the study period. The value of Co-Authorship Index (CAI) for single author paper shows a declining trend from one block year period to another block. On the other hand, for multi authored papers, the Co-Authorship Index reveals an increasing trend.

I. INTRODUCTION

The study of authorship pattern or productivity is one of the important aspects in the bibliometric analysis. This study was aimed to examine the authorship pattern and collaborative research in the field of 'Hepatitis C' with the help of the Journal "Gastroenterology". Generally, it is necessary to concentrate on authorship pattern to assess the research contributions in a field and Hepatitis C research is not an exception.

We have already discussed the "Bibliometric Analysis of the Literature of Hepatitis-C"¹ and "Growth of literature in the field of Hepatitis-C"² in our previous papers. First paper presents a bibliometric analysis of the literature output in the field of Hepatitis C covered in the Journal Viz., Gastroenterology. The purpose of the study was to identify the core journals in the discipline of Hepatitis C Virus which relates to the Gastroenterology literature through citation analysis. 31 Core Journals were identified with the help of Bradford's Law of Scattering. Second study was aimed to examine quantitatively the growth of literature in the field of 'Hepatitis C'. This paper was aimed to examine the authorship pattern and collaborative research in the field of 'Hepatitis C'

II. LITERATURE REVIEW

Authorship pattern and collaborative research in Psychology has been analysed by Karisiddappa et al. (1990)³ based on the data collected from 'Psychological Abstracts'. Narendra Kumar and Ramesh Babu (1999)⁴ analysed the literature published in ILA bulletin during the year 1986-1996 discussing authorship pattern, citation pattern, subjects covered, ranking of the contributors, nature of contributions, bibliographic forms of cited documents etc. Bhagavathi Sudha and Ramesh Babu (2000)⁵ analysed the Indian contributions on 'Information Technology' covered in the Indian Library and Information Science Literature during the period 1990-1993, with respect to degree of collaboration, bibliographic forms, sub-fields of information technology etc. Farahat (2002)⁶ examined the pattern of authorship in 19 Egyptian journals of agricultural sciences. The scientific productivity of authors in theoretical population 'Genetics' was examined by Karisiddappa et al. (2002)⁷. Shirabe and Tomizawa (2002)⁸ studied on the likelihood of overseas access to international co-authorship, proposed a new index for international scientific co-authorship, which was based on a simple model of domestic and international co-authorship. Wilkes et al. (2002)⁹ have reported investigations on Nursing Research published by Australian authors from 1995-2000 in 11 Nursing journals from Australia, UK and the USA. Dutt, Garg, and Bali (2003)¹⁰ analysed 1317 papers published in the volumes of the international journal *Scientometrics* during 1978 to 2001. They noticed that the single authored papers dominated the scientometric output, but however, multi-authorial papers were gaining momentum. Koteswara Rao and Raghavan (2003)¹¹ in their study on collaboration in superconductivity research in India indicates an increased interaction between countries, institutions, and disciplines, leading to "global research networks". The Indian output on Air Pollution research covered in E-CD was analysed quantitatively by Parameswaran, Ramesh Babu and Gopalakrishnan (2003)¹². The various bibliometric indicators have been used in the analysis, with regard to the authorship pattern, Relative Growth Rate, Doubling time, and Ranking of core journals, and core research institutions in India. Mapping global science using international co-authorship and a comparison of 1990 and 2000 using the Science Citation Index (CD-ROM version) for 1990 and

2000 were examined by Wagner and Leydesdorff (2003)¹³. Rajendran, Ramesh Babu and Gopalakrishnan (2005)¹⁴ analysed the global output of “fiber optics” research with regard to Growth of literature by year wise, country wise, authorship pattern, bibliographic forms, ranking of core journals and nature of research have been analysed.

III. HEPATITIS C

According to Stedman’s Medical Dictionary “Hepatitis is an inflammation of liver, due usually to viral infection but sometimes to toxic agents. Previously endemic throughout much of the developing world, viral Hepatitis now ranks as a major public health problem in industrialized nations. The 3 most common type of viral Hepatitis (A, B, and C) affect millions worldwide”¹⁵.

Until a few years ago, the only types of viral hepatitis that could be confirmed were type A and type B. All others were described as non-A, non-B, that is neither hepatitis A nor hepatitis B, viral infection could be confirmed in blood tests of patients. Since the hepatitis C virus (HCV) was identified in the year 1989, it has been shown to be the major cause of parenterally transmitted non-A, non-B (PT-NANB) hepatitis. The incidence of HCV infection worldwide is not well known, but from the review of published prevalence studies, WHO estimates that 3 per cent of the world population is infected with HCV and around 170 million individuals are chronic carriers at risk of developing liver cirrhosis and liver cancer. In many countries, in particular population subgroups, such as voluntary blood donors have a very high prevalence of HCV infection especially in the developing world. In the USA, an estimated 4 million people have contracted the disease, 4 times more than HIV infection. Approximately 3-4 million new acute infections and about 54000 deaths occur each year. It has also become a leading reason for liver transplantation¹⁶.

For the past several years, worldwide clinicians, epidemiologists, microbiologists, pathologists, molecular biologists and other basic scientists have contributed immensely to the knowledge on hepatitis C.

A review of the literature showed that no Bibliometric analysis of the authorship pattern studies have been

conducted for the field of Hepatitis C. So, this study helps to examine authorship pattern in the field of Hepatitis C.

IV. OBJECTIVES

1. To analyse the extent of authorship pattern. i.e. Single Vs. Multiple authors in the field of Hepatitis C.
2. To examine the Author productivity and degree of collaboration in Hepatitis C literature output.
3. To analyse the Co-Authorship Index (CAI) in the field of literature on Hepatitis C.

V. LIMITATION

This study is confined to the literature output in the field of Hepatitis C covered in the Journal Viz., Gastroenterology for the period 2006-2010.

VI. METHODOLOGY

The journal selected as source journal in this study is Gastroenterology; published monthly (semi-monthly in February) in two indexed volumes per year by W.B. Saunders, since this problem related to Gastroenterology also. All cited references appearing in the source article published in the five years period of 2006 to 2010 were recorded in a separate white sheet and results were entered in Microsoft Excel. Statistical Package for Social Sciences (SPSS) is used for the analysis purpose. Citation Analysis is used for this study. The format type and publication year of each cited reference were noted. Citations have been categorized as journal articles, books (includes monographs and conference proceedings) and miscellaneous (dissertations, theses, technical manuals, abstracts, patents and personal communication etc.). The source journal was identified with the help of the standard bibliographies (such as the Brandon/Hill list)¹⁷ and Journals Citation Index¹⁸. The article in each issue of the source journal is called the “source” article.

Citations used by the authors in this study to examine to analyze the extent of authorship pattern. i.e. Single Vs. Multiple authors in the field of Hepatitis C, examine the Author productivity and degree of collaboration in hepatitis C literature output and analyse the Co-Authorship Index (CAI) in the field of literature on hepatitis C.

VII. ANALYSIS AND DISCUSSION

Table I shows that there were 137 articles from the source journal during the five-year from 2006 to 2010. These articles had a total of 5132 cited items covered from the year 1908 to 2010. (Fig.1).

Table II shows that 5028 (97.97%) of the citations were publications from journals; 36 (0.7%) of the cited items were books, including proceedings; and 68 (1.33%) were miscellaneous formats were covered in the source journal viz., Gastroenterology.

TABLE I QUANTUM OF RECORDS IN LITERATURE ON HEPATITIS C

S.No.	YEAR	No. of Article	No. of Reference	Percentage
1	2006	38	1570	30.59
2	2007	14	449	08.75
3	2008	18	841	16.39
4	2009	21	669	13.04
5	2010	46	1603	31.24
	TOTAL	137	5132	100.00

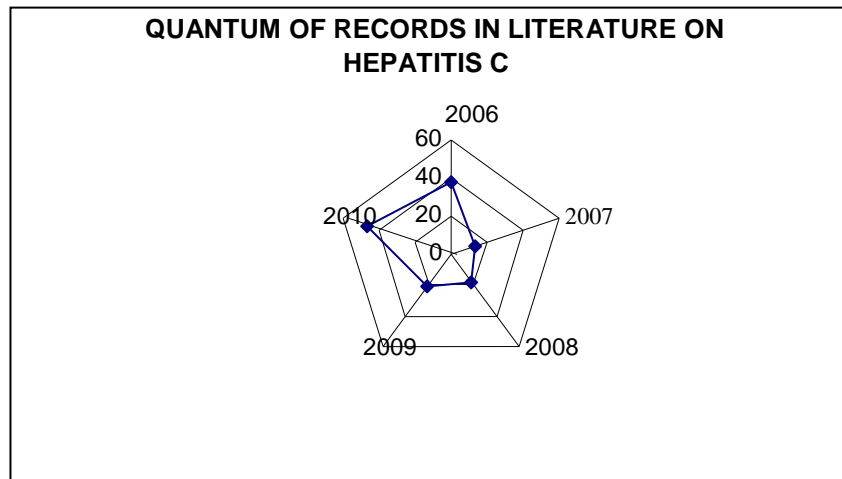


Fig. 1 Quantum of Records in Literature on Hepatitis C

TABLE II CITED FORMAT TYPES BY SOURCE JOURNAL AND FREQUENCY OF CITATIONS

S.No.	CITED FORMAT TYPE	TOTAL No.	TOTAL (%)
1	JOURNAL ARTICLES	5028	97.97
2	BOOKS	36	0.70
3.	MISCELLANEOUS	68	1.33
TOTAL		5132	100.00

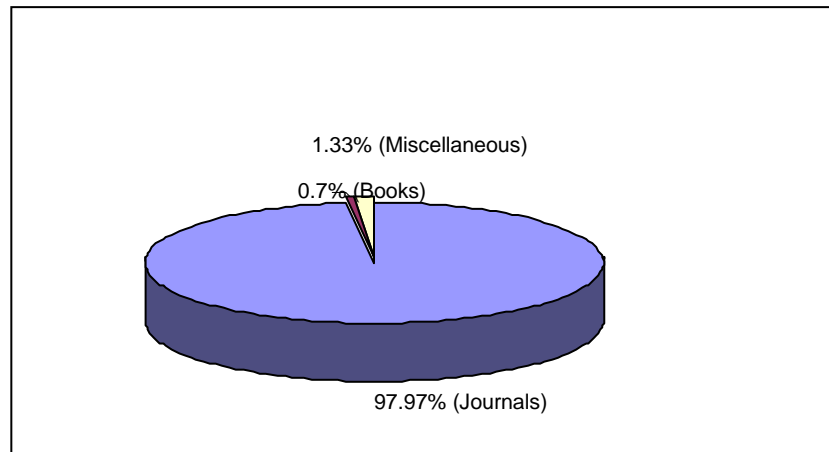


Fig. 2 Cited Format Types by Source Journal and Frequency of Citations

AUTHORSHIP PATTERN

To identify author productivity and authorship pattern, this paper has attempted to analyse the following aspects:

1. Extent of authorship pattern. i.e. Single Vs. Multiple authors.
2. Degree of Collaboration (DC).
3. Pattern of Co-Authorship Index (CAI).

Single Vs Multiple Authors

The years received from the citations were from the year from 1908 to 2010. The data were given in three tables. The year wise (1908 to 1980) distribution of contributions according to number of authors is shown in Table III.

It is evident from the Table III that nearly one-third (29.03%) of the contributions were by two authors. 80.65% represent two and more authors.

The year wise (1981 to 2000) distribution of contributions according to number of authors is shown in Table 4. It is evident from the Table 4 that 44.38% of the contributions were by three authors. 92.09% represent two and more authors. The year wise (2001 to 2010) distribution of contributions according to number of authors is shown in Table 5. It is evident from the Table 5 that 62.80% of the contributions were by three authors. 93.8% represent two and more authors.

It shows that collaborative research is evident in the field of Hepatitis C and it is same in most of the scientific fields. (Figure 3).

TABLE III AUTHORSHIP PATTERN IN HEPATITIS C FROM THE YEAR 1908 TO 1980

Authors	1908	1924	1931	1938	1951	1954	1956	1959	1966	1968	1969	1971	1972	1973	1974	1975	1977	1978	1979	1980	No. of records	%
Single Author	1		1	1		1								1			1				6	19.35
Two Authors		1		1				1		1	1	1						1	1	1	9	29.03
Three Authors							1		2					2	1	1			1		8	25.81
Four Authors					1												1				2	6.45
Five Authors										1									1		2	6.45
More than Five Authors											1		1								4	12.90
Total	1	1	1	2	1	1	1	1	2	2	2	1	1	3	1	2	2	2	3	1	31	100.00

TABLE IV AUTHORSHIP PATTERN IN HEPATITIS C FROM THE YEAR 1981 TO 2000

Authors	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	No. of records	%
Single Author	1		3	3		1		3	2	1	7	2	2	11	8	5	12	9	25	12	107	7.91
Two Authors		3	2	1	1	4	1			3	1	2	3	4	9	12	6	11	15	27	105	7.77
Three Authors	3		4	3	4		3	4	6	6	14	25	19	31	35	59	72	88	98	126	600	44.38
Four Authors			1				2		2		3	4	2	2	10	10	5	13	8	15	77	5.70
Five Authors		2	1							2	2	1	2	5		6	4	4	7	11	47	3.48
More than Five Authors	1						2	2	6	3	5	19	12	25	28	33	46	76	78	80	416	30.77
Total	5	5	11	7	5	5	8	9	16	15	32	53	40	78	90	125	145	201	231	271	1352	100.00

TABLE V AUTHORSHIP PATTERN IN HEPATITIS C FROM THE YEAR 2001 TO 2010

Authors	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	No. of records	%
Single Author	10	73	19	30	32	25	13	11	13		226	6.20
Two Authors	19	29	29	39	51	35	18	23	14	2	259	7.11
Three Authors	149	189	211	258	296	290	386	257	209	44	2289	62.80
Four Authors	16	17	25	30	8	3	1	1	2		103	2.83
Five Authors	9	17	26	31	13	1	1	1	1		100	2.74
More than Five Authors	97	114	113	149	124	62	6	2	1		668	18.33
Total	315	454	438	552	539	431	340	310	255	46	3645	100.00

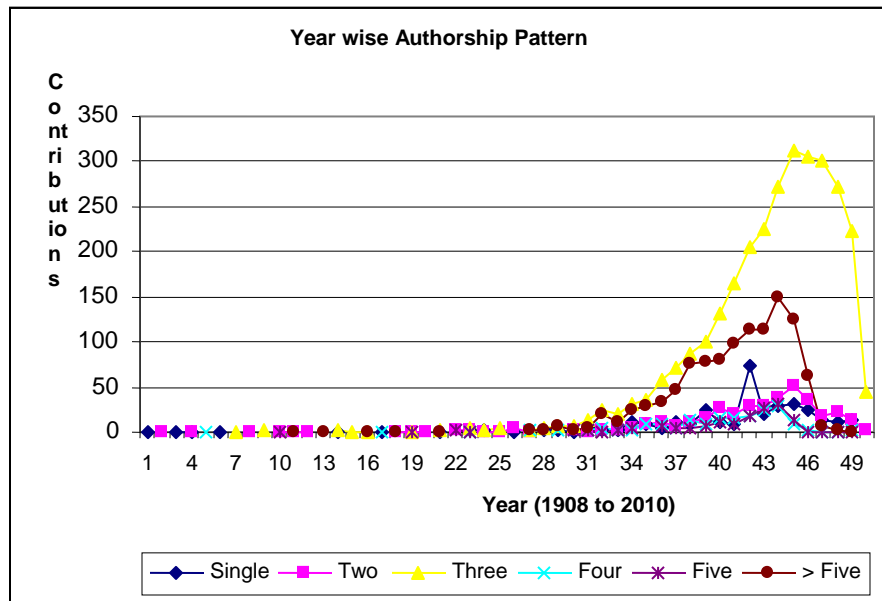


Fig. 3 Year-wise Authorship Pattern

Data in Table VI reveals the state of authorship pattern. As already mentioned, multiple authors' papers constitute the major percentage (93.26%). The ratio of single and multi authored papers is 1:15. The high incident by multiple authorship is the phenomena of scientific research. (Figure 4). Similar studies in Phytomorphology¹⁹, Applied Sciences²⁰, Geology²¹, Plant Breeding²², Zoological Sciences²³, Agricultural Sciences²⁴, Medicinal and Aromatic Plants²⁵, and Environmental Genetic Toxicology²⁶ also The formula is

$$C = \frac{Nm}{Nm + Ns}$$

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 2007 is as follows:

$$C = \frac{412}{412 + 13} = \frac{412}{425} = 0.97$$

showed that the number of single authorship papers is much less when compared to multi-authored papers.

Degree of Collaboration

The Degree of Collaboration of authors by year wise is shown in Table VII. The extent of Degree of Collaboration in Hepatitis C research has been measured with the help of the formula devised by K. Subramaniam²⁷.

Likewise the Degree of Collaboration is calculated for every year and presented in the Table VII.

The year wise Degree of Collaboration falls between from 0.00 to 1. The Degree of Collaboration for any subject

ranges from 0.01 to 0.99 and it is always below 1 which has been proved by Karisiddappa, Maheswarappa and Shirol²⁸ in Psychology and Bandyopadhyay²⁹ in different disciplines such as Mathematics, Physics, Philosophy, Political Science and Mechanical Engineering.

TABLE VI SINGLE VS MULTI AUTHORED PAPERS IN HEPATITIS C RESEARCH

Year	Single Authored		Multi Authored		Total	%
	Papers	%	Papers	%		
1908	1	0.29		0.00	1	0.02
1924		0.00	1	0.02	1	0.02
1931	1	0.29		0.00	1	0.02
1938	1	0.29	1	0.02	2	0.04
1951		0.00	1	0.02	1	0.02
1954	1	0.29		0.00	1	0.02
1956		0.00	1	0.02	1	0.02
1959		0.00	1	0.02	1	0.02
1966		0.00	2	0.04	2	0.04
1968		0.00	2	0.04	2	0.04
1969		0.00	2	0.04	2	0.04
1971		0.00	1	0.02	1	0.02
1972		0.00	1	0.02	1	0.02
1973	1	0.29	2	0.04	3	0.06
1974		0.00	1	0.02	1	0.02
1975		0.00	2	0.04	2	0.04
1977	1	0.29	1	0.02	2	0.04
1978		0.00	2	0.04	2	0.04
1979		0.00	3	0.06	3	0.06
1980		0.00	1	0.02	1	0.02
1981	1	0.29	4	0.09	5	0.10
1982		0.00	5	0.11	5	0.10
1983	3	0.88	8	0.17	11	0.22
1984	3	0.88	4	0.09	7	0.14
1985		0.00	5	0.11	5	0.10
1986	1	0.29	4	0.09	5	0.10
1987		0.00	8	0.17	8	0.16
1988	3	0.88	6	0.13	9	0.18
1989	2	0.59	14	0.30	16	0.32
1990	1	0.29	14	0.30	15	0.30
1991	7	2.06	25	0.53	32	0.64
1992	2	0.59	51	1.09	53	1.05
1993	2	0.59	38	0.81	40	0.80
1994	11	3.24	67	1.43	78	1.55
1995	8	2.36	82	1.75	90	1.79
1996	5	1.47	120	2.56	125	2.49
1997	12	3.54	133	2.84	145	2.88
1998	9	2.65	192	4.09	201	4.00
1999	25	7.37	206	4.39	231	4.59
2000	12	3.54	259	5.52	271	5.39
2001	10	2.95	290	6.18	300	5.97

2002	73	21.53	366	7.81	439	8.73
2003	19	5.60	404	8.62	423	8.41
2004	30	8.85	507	10.81	537	10.68
2005	32	9.44	492	10.49	524	10.42
2006	25	7.37	391	8.34	416	8.27
2007	13	3.83	412	8.79	425	8.45
2008	11	3.24	284	6.06	295	5.87
2009	13	3.83	227	4.84	240	4.77
2010			46	0.98	46	0.91
	339	100.00	4689	100.00	5028	100.00

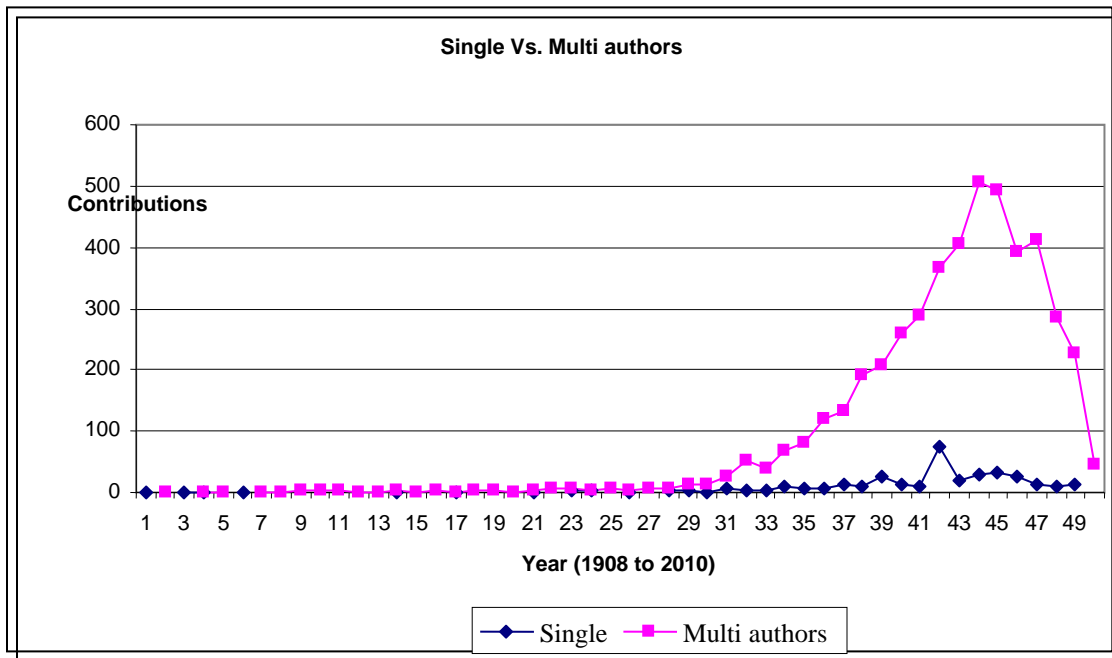


Fig. 4 Single Vs. Multi authored Papers in Hepatitis C Research

Pattern of Co-Authorship Index (CAI)

In order to find out how the pattern of co-authors has changed during 1908 to 2010, the formula of Co-Authorship Index (CAI) suggested by Garg and Padhi³⁰ has been used.

For calculating CAI the entire data set was divided into four blocks.

$$CAI = \{(N_{ij} / N_{io}) / (N_{oj} / N_{oo})\}$$

N_{ij} : Number of papers having j authors in block I;
 N_{io} : Total output of block I;

N_{oj} : number of papers having j authors for all blocks;

N_{oo} : total number of papers for all authors and all blocks;

$$j = 1, 2, 3 \geq 4$$

CAI = 100 implies that co-authorship in a particular block for a particular types of authorship corresponds to the world average, CAI > 100 reflects higher than average co-authorship effort and CAI < 100 lower than average co-authorship effort in a particular block for a particular type of authorship. For calculation of CAI the entire data were divided into four blocks as per the procedure laid down in the formula and the results of CAI given in Table VIII.

TABLE VII DEGREE OF COLLABORATION IN HEPATITIS C RESEARCH

Year	Single author	Two authors	Three Authors	Four Authors	Five Authors	More than Five author	Total	More than one author	Degree of Collaboration
1908	1						1		0.00
1924		01					1	1	1.00
1931	1						1		0.00
1938	1	01					2	1	0.50
1951								1	1.00
1954	1			01			2		0.00
1956			01				1	1	1.00
1959		01					1	1	1.00
1966			02				2	2	1.00
1968		01			01		2	2	1.00
1969		01				01	2	2	1.00
1971		01					1	1	1.00
1972						01	1	1	1.00
1973	1		02				3	2	0.67
1974			01				1	1	1.00
1975			01			01	2	2	1.00
1977	1			01			2	1	0.50
1978		01				01	2	2	1.00
1979		01	01		01		3	3	1.00
1980		01					1	1	1.00
1981	1		03			01	5	4	0.80
1982		03			02		5	5	1.00
1983	3	02	04	01	01		11	8	0.73
1984	3	01	03				7	4	0.57
1985		01	04				5	5	1.00
1986	1	04					5	4	0.80
1987		01	03	02		02	8	8	1.00
1988	3		04			02	9	6	0.67
1989	2		06	02		06	16	14	0.88
1990	1	03	06		02	03	15	14	0.93
1991	7	01	14	03	02	05	32	25	0.78
1992	2	02	25	04	01	19	53	51	0.96
1993	2	03	19	02	02	12	40	38	0.95
1994	11	04	31	02	05	25	78	67	0.86
1995	8	09	35	10		28	90	82	0.91
1996	5	12	59	10	06	33	125	120	0.96
1997	12	06	72	05	04	46	145	133	0.92
1998	9	11	88	13	04	76	201	192	0.96
1999	25	15	98	08	07	78	231	206	0.89
2000	12	27	126	15	11	80	271	259	0.96
2001	10	19	149	16	09	97	300	290	0.97
2002	73	29	189	17	17	114	439	366	0.83
2003	19	29	211	25	26	113	423	404	0.96
2004	30	39	258	30	31	149	537	507	0.94
2005	32	51	296	08	13	124	524	492	0.94
2006	25	35	290	03	01	62	416	391	0.94
2007	13	18	386	01	01	06	425	412	0.97
2008	11	23	257	01	01	02	295	284	0.96
2009	13	14	209	02	01	01	240	227	0.95
2010		02	44				46	46	1.00
	339	373	2897	182	149	1088	5028	4689	0.93

It is observed from Table VIII that the value of CAI for single author papers during 1908-1971 were the highest (370.80) which started declining in other blocks. Similarly, for two authored papers, during 1908-1971, the CAI was 505.50, and started declining in other blocks. The CAI for

multi authored papers was lowest (43.69) in the first block and enhanced to 100.85 in the fourth block period from 1998 to 2010. This indicates that the team work in Hepatitis C research is in increasing trend.

TABLE VIII PATTERN OF CO-AUTHORSHIP INDEX (CAI) BY YEAR WISE

Sl.No.	Year	Single Author	Two authored	More than Two authors	Total
1	1908-1971	4 (370.80)	6 (505.50)	6 (43.69)	16
2	1972-1984	9 (310.43)	9 (282.14)	25 (67.73)	43
3	1985-1997	54 (128.97)	46 (99.85)	521 (97.74)	621
4	1998-2010	272 (92.78)	312 (96.73)	3764 (100.85)	4348
Total		339	373	4316	5028

VII. CONCLUSION

Most (93.26%) of the total contributions represent the collaborative research. The degree of collaboration has been arrived at 0.93 during the study period. The value of Co-Authorship Index (CAI) for single author paper shows a declining trend from one block year period to another block. On the other hand, for multi authored papers the Co-Authorship Index reveals an increasing trend.

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