

Scientometric Profiles of Popular Indian Forensic Science Authors: A Study of the Literature Published During The Period 1975 to 2012

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Abstract

Forensic science is the application of science and technology to the detection of crime. Scientometric studies on individual scientists, which is also known as scientometric portraits can throw light on the evolution of the subjects. This study is aimed at drawing the scientometric portraits of a group of top productive 40 authors contributing to Indian forensic science. The relationships between productivity and citations and also between relative quality index and relative citation rate are also examined in the light of the data on these 40 authors. Bibliographical and citation data pertaining to Indian forensic science during the period 1975 to 2012 were downloaded from SCOPUS database. Data analysis and visualization are done using Ms-Excel, VOSviewer and Pajek software.

Keywords: *Scientometrics, authorship productivity, relative citation rate, relative quality index, h-index, forensic science*

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INTRODUCTION

Forensic science is derived from the Latin word *forensis*, which means forum, public or market-place. In the ancient Roman Empire, the senate used to conduct its meetings in a public place called the forum. Since the term forensic means the forum, in the broadest sense, forensic science can be defined as the methods of science applied to public matters. By this definition, forensic science does not necessarily has to do with crime, but the term has evolved in modern times to refer to the application of science to court or criminal matters. Most forensic scientists work in the criminal area of the justice system, although civil cases are an important component of forensic science [1].

The application of science and technology to the detection of crime and administration of justice is not new to India. However modern forensic science owes its development to the formation of chemical examiner's laboratory. During the 19th century, when cases of death due to poisoning posed a problem to the law enforcement agencies, a need was felt for isolating, detecting and estimating various

poisons absorbed in the human system. The first chemical examiner's laboratory was, therefore, set up for this purpose at the then Madras Presidency during 1849.

According to Nanda and Tewari, four central forensic science laboratories, 20 state forensic science laboratories, three central document examination laboratories, 31 regional forensic science laboratories, nine state document examination laboratories and 131 mobile forensic science laboratories exist in India [2].

Apart from these establishments, various other units like the forensic science laboratory of CBI, Lok Nayak Jayaprakash Narayan National institute of criminology and forensic science, Bureau of police research and development, Indian academy of forensic science, Centre for DNA fingerprinting, research institutions like BARC, Universities, departments of forensic medicine of medical colleges, and dental colleges contribute to the growth of forensic science literature in India.

Scientometrics can be defined as the quantitative study of science and technology.

Jean Tague-Sutcliffe defines, “Scientometrics is 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” [3].

According to Brookes the techniques of scientometrics and bibliometrics are closely similar; their different roles are distinguished by their very different contexts. Bibliometrics stresses the material aspects of the analyzed unit such as a paper, citations or any other information irrespective of the subject orientation.

Scientometrics on the other hand emphasizes on the measurement of specific information related to its scientific value. Scientometrics includes all quantitative aspects and maps related to the production and dissemination of scientific and technological knowledge [4].

REVIEW OF LITERATURE

Sinha and Bhatnagar and Sinha and Ullah have used the term ‘information profile’ for bibliometric studies on scientists [5–6]. Kalyane and Kalyane have used the term scientometric portrait for these studies [7]. Sen has proposed the term ‘Microbibliometrics’ for the studies on individual scientists [8].

Studies have been conducted to draw scientometric portraits of Nobel laureates like Sir. C.V. Raman, S. Chandrasekhar, Harold W. Kroto, and Wolfgang Ketterle. Besides, numerous scientometrics studies on other eminent scientists have also been conducted. Some of them are the studies on Eugene Garfield, G.N. Ramachandran, Sir K.S. Krishnan, and R. Chidambaram. However, no such study has been carried out in the field of forensic sciences. The present study is a scientometric study of most prolific author-group in Indian forensic sciences.

OBJECTIVES OF THE STUDY

The objectives of the study are:

- (i) To find the most prolific Indian forensic science authors during the study period.

- (ii) To analyse the citedness, citation per paper (CPP), and h-index of this author-group.
- (iii) To study the relative citation rate (RCR) and relative quality index (RQI) of the authors.
- (iv) To examine the relationship between the productivity and h-index ranks of the authors.
- (v) To study the publication activity of the authors and to map and visualize their co-authorship.

MATERIALS AND METHOD

Bibliographic and citation data pertaining to Indian forensic science from 1975 to 2012 are retrieved from the SCOPUS database. SCOPUS is a bibliographic database containing abstracts and citations for academic journal articles. The following relational search query is used for retrieving data from the database:

TITLE-ABS-KEY (forensic) OR TITLE-ABS-KEY (criminalistics) OR TITLE-ABS-KEY (crime investigation) OR TITLE-ABS-KEY (criminal investigation) OR TITLE-ABS-KEY (police science) OR TITLE-ABS-KEY (legal medicine) OR TITLE-ABS-KEY (medical jurisprudence) AND AFFL (INDIA) AND PUBYEAR>1974 AND PUBYEAR<2013.

A total of 2096 bibliographic records pertaining to Indian forensic science literature and 5725 citations obtained by these publications, are retrieved from the SCOPUS database and subjected to further analysis. MS-Excel spreadsheets, VOSviewer and Pajek are used for analysis and visualization. VOSviewer is a software tool specifically designed for constructing and visualizing bibliometric maps, paying special attention to the graphical representation of such maps. Pajek is a program, for Windows, for analysis and visualization of large networks having some thousands or even millions of vertices. The latest version of Pajek is freely available for non-commercial use at its home page: <http://pajek.imfm.si>.

RESULT AND DISCUSSIONS

Most Prolific Indian Authors

Indian authors who have contributed at least 0.5 per cent or more of the total 2096 articles published are enumerated in Table 1 in-order to find the most prolific authors.

Table 1: Top Ranking Indian Authors.

Sl. no	Author	No. of Articles	Percent	Rank	Sl No	Author	No. of Articles	Percent	Rank
1	Kanchan T.	89	4.25	1	21	Paliwal PK.	15	0.72	21
2	Menezes, RG	70	3.34	2	22	Kumar GP.	15	0.72	21
3	Murty OP.	37	1.77	3	23	Sodhi GS.	15	0.72	21
4	Kashyap VK.	35	1.67	4	24	Jauhari M.	14	0.67	24
5	Millo T.	33	1.57	5	25	Arun M.	14	0.67	24
6	Jaiswal AK.	33	1.57	5	26	Monteiro FNP.	13	0.62	26
7	Krishan K.	31	1.48	7	27	Lobo SW.	13	0.62	26
8	Dogra TD.	27	1.29	8	28	Pradeep Kumar G.	13	0.62	26
9	Sharma BR.	26	1.24	9	29	Rautji R.	13	0.62	26
10	Seshadri M.	25	1.19	10	30	Harish D.	13	0.62	26
11	Rastogi P.	24	1.15	11	31	Shetty M.	13	0.62	26
12	Jasuja OP.	22	1.05	12	32	Sirohiwal BL.	12	0.57	32
13	Sekharan PC.	22	1.05	12	33	Thakar MK.	12	0.57	32
14	Garg RK.	20	0.95	14	34	Das B.	12	0.57	32
15	Trivedi R.	20	0.95	14	35	Dikshit PC.	11	0.52	35
16	Acharya AB.	19	0.91	16	36	Mohanty MK.	11	0.52	35
17	Behera C.	18	0.86	17	37	Thangaraj K.	11	0.52	35
18	Nagesh KR.	17	0.81	18	38	Vijayanath V.	11	0.52	35
19	Singh L.	17	0.81	18	39	Palimar V.	11	0.52	35
20	Damodaran C.	16	0.76	20	40	Yoganarasimha K.	11	0.52	35
						Total	854	40.43	

Forty authors have contributed at least 0.50 per cent or more of the total Indian forensic science literature. Among them, Kanchan is the top most contributor with 89 papers. In other words the total contribution of Kanchan is 4.25 percent of the total Indian forensic science literature output during the study period. Menezes and Murty are respectively the second and third highest contributors. These 40 authors together have contributed about 40% of the country's total quantity of forensic science literature produced during the study period.

Author Ranking

The citedness, CPP and h-index are calculated for these 40 leading authors. These authors are also ranked according to the number of citations received by them, citedness, CPP and h-index and listed in Table 2. Though these 40 authors together have contributed about 40% of the country's total forensic science literature output, these contribution have received a total of 3838 citations, which is 67% of the country's total citation share.

The h-index was proposed by J.E. Hirsch. A scientist has index h if h of his/her N_p papers have at least h citations each, and the other (N_p-h) papers have not more than h citations each. It aims to measure the cumulative impact of a researcher's output by looking at the amount of citation his/her work has received [9]. Kanchan the top productive author also ranks first in terms of total number of citations and h-index. However, this is not true in case of other authors. The second, third, fourth ranked authors in terms of total citations received are Krishan, K., Menezes, R.G., and Kashyap, V.K. respectively. In terms of citedness, Trivedi, R. is ranked first followed by Kashyap, V.K., Sodhi, G.S., and Lobo, S.W. in the subsequent places. Singh, L. is ranked first in terms of CPP. Thangaraj, K. and Krishan, K. follow him. H-index rank first place is shared by Kanchan, T. and Kashyap, V.K. The third h-index rank belongs to Menezes, R.G. Fourth place is shared by Krishan, K. and Sharma, B.R. It is inferred from the table that there is no inter-relationship between these indicators.

Table 2: Author Ranking.

Author	tp	tc	c_ness	CPP	h-Index	Rank				
						tp	tc	c_ness	CPP	h-Index
Kanchan T.	89	422	76	4.74	12	1	1	11	17	1
Menezes RG.	70	344	76	4.91	11	2	3	11	16	3
Murty OP.	37	39	35	1.05	4	3	23	34	29	20
Kashyap VK.	35	334	97	9.54	12	4	4	2	5	1
Millo T.	33	27	22	0.82	2	5	26	38	35	30
Jaiswal AK.	33	26	36	0.79	2	5	27	31	36	30
Krishan K.	31	376	87	12.13	10	7	2	6	3	4
Dogra TD.	27	97	56	3.59	5	8	12	23	21	15
Sharma BR.	26	222	88	8.54	10	9	6	5	7	4
Seshadri M.	25	25	56	1.00	2	10	29	23	30	30
Rastogi P.	24	93	58	3.88	6	11	14	21	20	11
Jasuja OP.	22	86	77	3.91	4	12	17	10	19	20
Sekharan PC.	22	43	36	1.95	4	12	22	31	25	20
Trivedi R.	20	166	100	8.30	9	14	7	1	9	6
Garg RK.	20	105	55	5.25	5	14	11	26	13	15
Acharya AB.	19	120	84	6.32	7	16	10	7	10	8
Behera C.	18	15	28	0.83	3	17	33	35	34	25
Singh L.	17	244	76	14.35	8	18	5	11	1	7
Nagesh KR.	17	85	65	5.00	5	18	18	17	14	15
Damodaran C.	16	39	56	2.44	4	20	23	23	23	20
Kumar GP.	15	67	71	4.47	6	21	20	14	18	11
Sodhi GS.	15	87	93	5.80	4	21	16	3	11	20
Paliwal PK.	15	4	27	0.27	1	21	37	36	37	37
Arun M.	14	14	43	1.00	2	24	34	30	30	30
Jauhari M.	14	14	36	1.00	2	24	34	31	30	30
Harish D.	13	141	69	10.85	7	26	9	15	4	8
Pradeep Kumar G.	13	69	62	5.31	5	26	19	19	12	15
Lobo SW.	13	65	92	5.00	5	26	21	4	14	15
Shetty M.	13	35	69	2.69	3	26	25	15	22	25
Monteiro FNP.	13	22	62	1.69	3	26	30	19	26	25
Rautji R.	13	18	46	1.38	3	26	31	28	28	25
Thakar MK.	12	18	58	1.50	3	32	31	21	27	25
Das B.	12	12	50	1.00	2	32	36	27	30	30
Sirohiwal BL.	12	3	25	0.25	1	32	38	37	38	37
Yoganarasimha K.	11	94	63	8.55	7	35	13	18	6	8
Thangaraj K.	11	148	82	13.45	6	35	8	8	2	11
Mohanty MK.	11	92	82	8.36	6	35	15	8	8	11
Palimar V.	11	26	45	2.36	2	35	27	29	24	30
Dikshit PC.	11	1	18	0.09	1	35	39	39	39	37
Vijayanath V.	11	0	0	0	0	35	40	40	40	40
Total/Mean	854	3838	59	4.49	tp – total publications			c_ness - citedness		
% of the country	41	67			tc – total citations					

Relative Quality Index of Leading Authors

Papers that received more than twice the average citations are considered as high quality papers (NHQ). Relative quality index (RQI) is the ratio of the proportion of high quality papers to the proportion of the publications (TNP%). The measure relates to the incidence of high quality papers for a country or an institution. However, RQI of

individual authors are calculated using the same method. Value of RQI greater than 1 indicates higher than average value, whereas the value of RQI less than 1 indicates lower than average quality.

The NHQ, NHQ% and RQI of the 40 top ranking authors are calculated and listed in Table 3.

Table 3: RQI of Leading Authors.

Author	NHQ	NHQ%	TNP%	RQI
Harish D.	9	3.08	0.62	4.97
Kashyap VK.	23	7.88	1.67	4.72
Yoganarasimha K.	7	2.40	0.52	4.62
Singh L.	10	3.42	0.81	4.22
Trivedi R.	11	3.77	0.95	3.97
Thangaraj K.	6	2.05	0.52	3.94
Mohanty MK.	6	2.05	0.52	3.94
Sharma BR.	14	4.79	1.24	3.86
Acharya AB.	9	3.08	0.91	3.38
Krishan K.	13	4.45	1.48	3.01
Kumar GP.	6	2.05	0.72	2.85
Pradeep Kumar G.	5	1.71	0.62	2.76
Lobo SW.	4	1.37	0.62	2.21
Nagesh KR.	5	1.71	0.81	2.11
Menezes RG.	20	6.85	3.34	2.05
Kanchan T.	25	8.56	4.25	2.01
Garg RK.	5	1.71	0.95	1.80
Rastogi P.	6	2.05	1.15	1.78
Shetty M.	3	1.03	0.62	1.66
Damodaran C.	3	1.03	0.76	1.36
Sekharan PC.	4	1.37	1.05	1.30
Dogra TD.	4	1.37	1.29	1.06
Jasuja OP.	3	1.03	1.05	0.98
Palimar V.	1	0.34	0.52	0.65
Dikshit PC.	1	0.34	0.52	0.65
Thakar MK.	1	0.34	0.57	0.60
Monteiro FNP.	1	0.34	0.62	0.55
Jauhari M.	1	0.34	0.68	0.50
Sodhi GS.	1	0.34	0.72	0.47
Millo T.	1	0.34	1.57	0.22
Jaiswal AK.	1	0.34	1.57	0.22
Murty OP.	1	0.34	1.77	0.19
Seshadri M.	0	0	1.19	0
Behera C.	0	0	0.86	0
Paliwal PK.	0	0	0.72	0
Arun M.	0	0	0.68	0
Rautji R.	0	0	0.62	0
Das B.	0	0	0.57	0
Sirohiwal BL.	0	0	0.57	0
Vijayanath V.	0	0	0.52	0

Four authors have very high RQI value of above 4. Harish, D. ranked 26th in the productivity rank-list, ranks first with the highest value of 4.97 followed by Kashyap, V.K. with the value of 4.72. Yoganarasimha, K. with a RQI value 4.62 is ranked third and L. Singh with the value of 4.22 is ranked fourth. Out of the 40 authors, 22 authors have RQI value above 1. Ten authors have RQI less than 1. Eight authors have RQI value of zero.

Relative Citation Rate of Leading Authors

Relative citation rate (RCR) is the ratio between a summation of observed values and a

summation of expected values for all the papers published in a country in a given research field. It is expressed mathematically as:

$$RCR = \frac{\Sigma \text{Observed Citation Rate}}{\Sigma \text{Expected Citation Rate}}$$

Here author is substituted in place of the country and the RCR of the 40 leading or most prolific authors are calculated. These authors are listed along with their CPP in Table 4 in RCR rank order.

Table 4: RCR Ranking of Leading Authors.

Author	CPP	RCR	RCR Rank	Author	CPP	RCR	RCR Rank
Singh L.	14.35	5.26	1	Dogra TD.	3.59	1.32	21
Thangaraj K.	13.45	4.93	2	Shetty M.	2.69	0.99	22
Krishan K.	12.13	4.44	3	Damodaran C.	2.44	0.89	23
Harish D.	10.85	3.97	4	Palimar V.	2.36	0.86	24
Kashyap VK.	9.54	3.49	5	Sekharan PC.	1.95	0.71	25
Yoganarasimha K.	8.55	3.13	6	Monteiro FNP.	1.69	0.62	26
Sharma BR.	8.54	3.13	6	Thakar MK.	1.50	0.55	27
Mohanty MK.	8.36	3.06	8	Rautji R.	1.38	0.51	28
Trivedi R.	8.30	3.04	9	Murty OP.	1.05	0.38	29
Acharya AB.	6.32	2.32	10	Seshadri M.	1.00	0.37	30
Sodhi GS.	5.80	2.12	11	Arun M.	1.00	0.37	30
Pradeep Kumar G.	5.31	1.95	12	Jauhari M.	1.00	0.37	30
Garg RK.	5.25	1.92	13	Das B.	1.00	0.37	30
Nagesh KR.	5.00	1.83	14	Behera C.	0.83	0.30	34
Lobo SW.	5.00	1.83	14	Millo T.	0.82	0.30	34
Menezes RG.	4.91	1.80	16	Jaiswal AK.	0.79	0.29	36
Kanchan T.	4.74	1.74	17	Paliwal PK.	0.27	0.10	37
Kumar GP.	4.47	1.64	18	Sirohiwal BL.	0.25	0.09	38
Jasuja OP.	3.91	1.43	19	Dikshit PC.	0.09	0.03	39
Rastogi P.	3.88	1.42	20	Vijayanath V.	0	0	40

It is observed from the Table, Singh, L. with RCR of 5.26 is ranked first. Thangaraj, K. with RCR of 4.93 and Krishan, K. with RCR 4.44 are placed in 2nd and 3rd ranks respectively. The next six rank-holders have RCR between 3.00 and 4.00. Altogether, 21 authors have RCR above 1; 18 authors have

RCR below 1 and one author has RCR value 0.

The RQI and RCR of the leading authors are plotted as graph to visualise and examine the similarity between the two and the resultant graph is given in Figure 1.

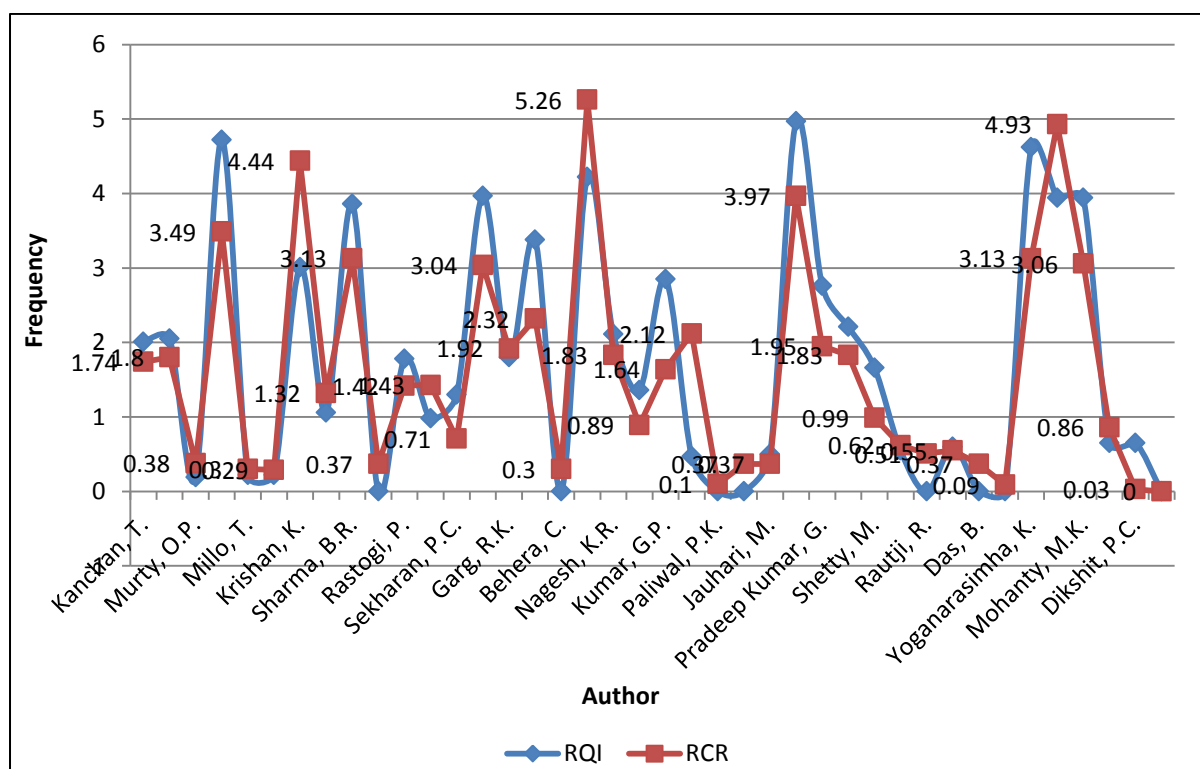


Fig. 1: RQI and RCR of Leading Authors.

The RQI value increases with the increase in RCR value and RQI value decreases with the decrease in RCR value. However, the increase and decrease are not proportionate. In Figure 2

the CPP and h-index values of the top prolific 40 authors are plotted as a graph. Though these values are not proportionate, they follow a similar wave-like pattern.

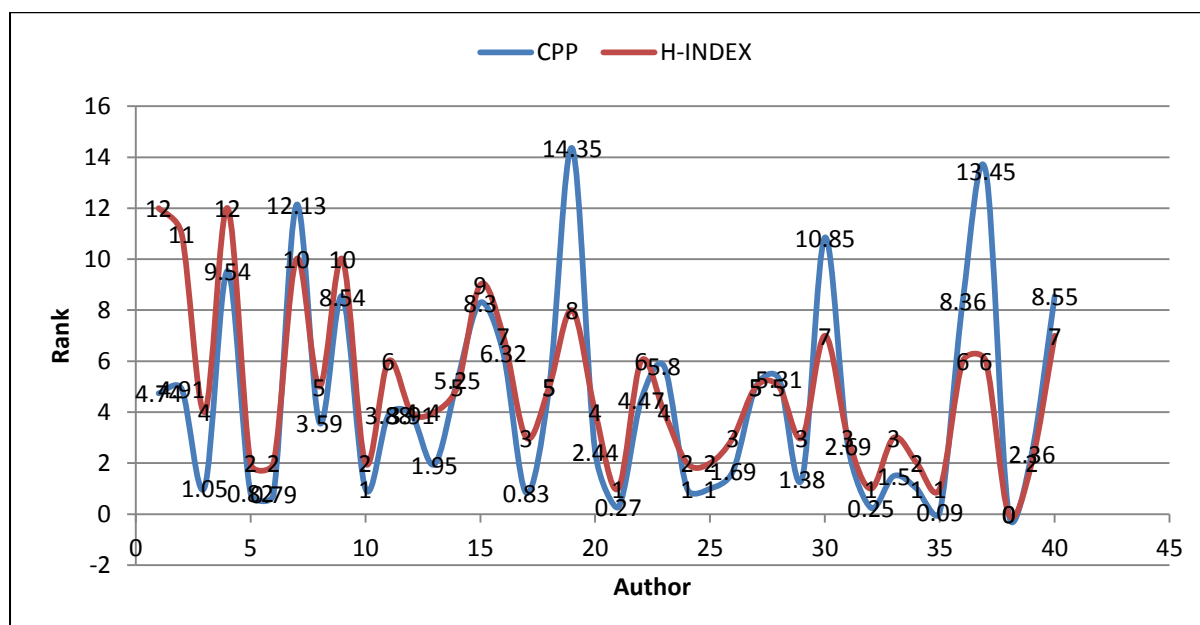


Fig. 2: CPP and h-Index of Leading Authors.

The productivity rank and h-index rank are plotted in X and Y axes of a graph respectively in Figure 3 to examine whether there is any

inter-relationship between author's productivity and h-index.

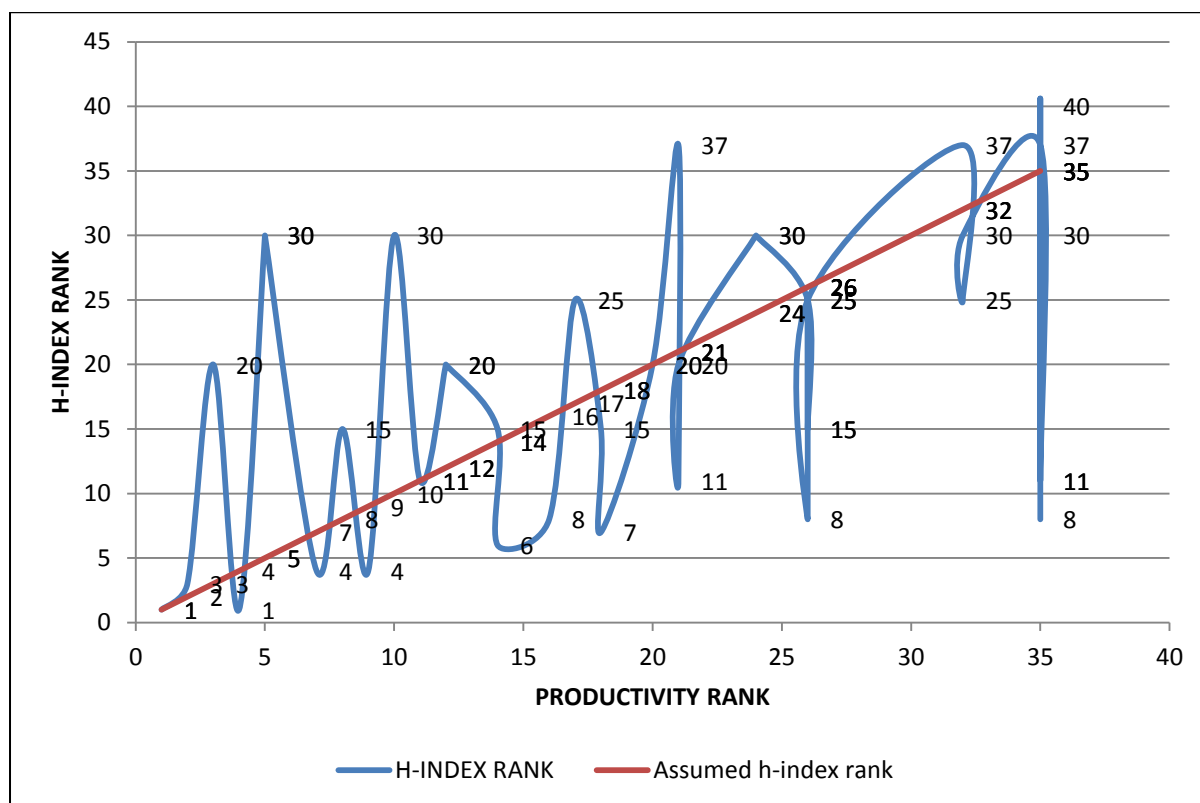


Fig. 3: Productivity and h-Index Ranks of Leading Authors.

If they are inter-related the resultant graph would have been a straight line as shown in the assumed h-index of the figure. But the resultant plot observed in the figure is totally a different one with ups and downs. Hence it is concluded that productivity alone has no impact on h-index.

Publication Activity of Top Prolific Authors

Table 5 contains the year-wise publication activities, such as the total publications, publication cited, total number citations received and the year-wise TAI of the ten top ranking prolific authors. Transformative activity index (TAI) proposed by Guan and Ma (2004) is as follows:

$$TAI = \frac{Ci/Co}{Wi/Wo} \times 100$$

Where,

Ci= Number of publications for a particular country in a particular year.

Co= Total output for a particular country during the study period.

Wi= Number of publications for all the countries in a particular year.

Wo= Total output for all the countries during the study period.

In this study the publications of a particular scientist in-stead-of a particular country are analysed. Hence,

Ci= Number of publications by a particular author in a particular year.

Co= Total output of all the authors during the study period.

Wi= Number of publications for all the authors in a particular year.

Wo= Total output for all the authors during the study period.

The analysis of the publication activity of the ten most prolific authors reveals that first two authors, Kanchan, T. and Menezes, R.G. have the highest number of citations. 68 papers out of the 89 papers published by Kanchan, T. have received a total of 422 citations. 53 of Menezes' 70 papers have received 344 citations. Murty, O.P. has published 37 papers and 13 papers have been cited. He has received only 39 citations. Kashyap, V.K. has published 35 papers. Out of these, 34 papers have received citations totalling 334. 9 papers of Millo, T.'s total 33 papers have received 22 citations. Jaiswal too has low number of citations. He has received a total of 26 citations for 12 of his 33 papers. However, the

seventh ranked Krishan, K. has received 376 citations for 27 of his 31 papers. While eighth ranked Dogra, T.D. has only 97 citations, the ninth ranked Sharma, B.R. has 222 citations. The tenth ranked Seshadri, M. has published 25 papers and 14 of these have attracted 25

citations. Hence it is inferred from the above facts, that productivity has no relationship with the number of citations. This can also be visualised from Figure 4. Hence it can be stated that most prolific authors do not always receive more citations.

Table 5: Publication Activity of Most Prolific Authors.

Year	Kanchan T.				Menezes RG.				Murty OP.				Kashyap VK.				Millo T.			
	tp	pc	C	TAI	tp	pc	C	TAI	tp	pc	c	TAI	tp	pc	C	TAI	tp	pc	c	TAI
1982																				
1996																				
1997																				
1998									1	0	0	270					1	0	0	300
1999									2	1	4	540								
2000									0	0	0	0	2	2	23	300				
2001									1	0	0	150	1	0	0	161	1	0	0	167
2002									2	2	5	200	11	11	191	1163				
2003									3	0	0	245	6	6	41	518				
2004													2	2	5	190				
2005													4	4	21	326				
2006	2	2	19	51	2	2	12	67	4	2	13	245	5	5	30	325	4	3	12	275
2007	6	3	17	124	3	2	7	80	4	2	5	200	4	4	23	211	7	2	5	393
2008	12	10	134	233	10	9	124	247	3	2	3	140					5	2	3	262
2009	22	19	116	274	22	19	110	349	8	3	8	240					6	1	1	202
2010	19	16	90	190	19	15	81	242	6	1	1	145					7	1	1	189
2011	11	10	31	87	6	5	9	61	2			38					2	0	0	42
2012	17	8	15	126	8	1	1	75	1			18								
Tot	89	68	422		70	53	344		37	13	39		35	34	334		33	9	22	
%	4	7	7		3	6	6		2	1	1		2	4	6		2	1	0.4	
1982									1	1	36	336								
1996									1	1	7	617								
1997					1	1	2	457												
1998									1	0	0	370								
1999																				
2000													1	0	0	200				
2001									1	0	0	206	1	1	23	211	1	1	2	222
2002									2	2	11	274	3	3	59	426	6	6	12	889
2003									2	2	6	224	5	5	54	582	4	3	4	485
2004									4	2	21	493	2	1	2	257	10	2	4	1333
2005													4	4	23	440	2	1	2	229
2006	5	5	15	345									3	3	13	261	1	0	0	91
2007	6	3	6	337	3	3	153	180	1	1	1	69	5	4	30	356	1	1	1	74
2008	4	2	3	209	5	5	129	278	2	1	3	128	1	1	17	66				
2009	6	1	1	202	3	3	27	108	4	1	2	164	1	1	1	42				
2010	7	1	1	189	6	5	35	173	5	3	8	165								
2011	5	0	0	107	3	3	16	68	1	1	2	26								
2012					10	7	14	213	2	0	0	49								
Tot	33	12	26		31	27	376		27	15	97		26	23	222		25	14	25	
%	2	1	0.5		1	3	7		1	2	2		1	2	4		1	1	0.4	

tp- Total Publications; pc- Publications Cited; c- Citations.

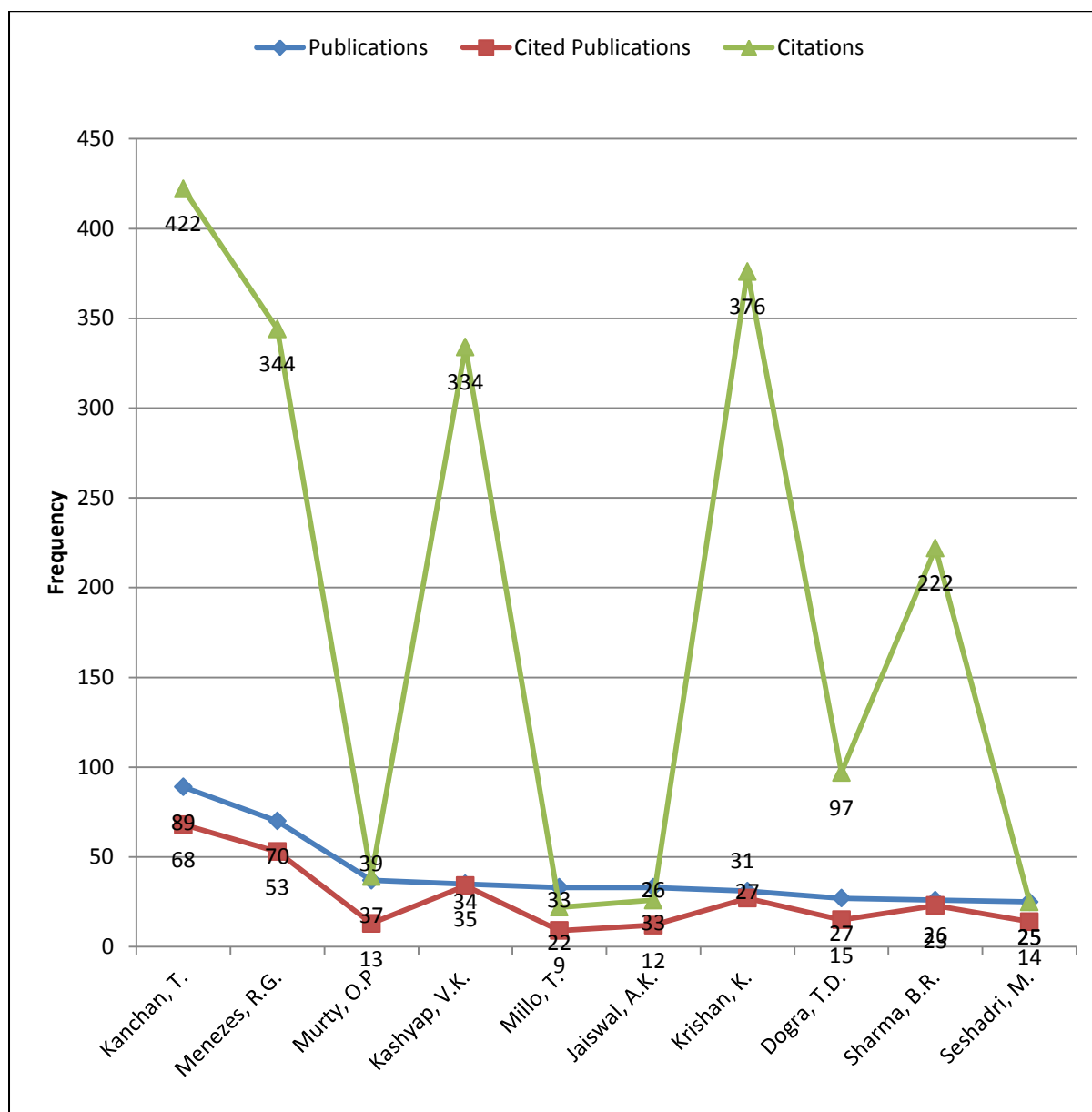


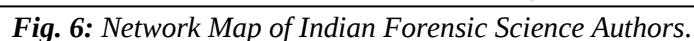
Fig. 4: No. of Citations of Top Ten Authors.

The publishing activity of the top ten authors reveals that T.D. Dogra is one to start the publishing career as early as 1982. The second person to start publishing is K. Krishan in the year 1997. O.P. Murty and T. Millo have started publishing from 1998. However, a look into the Table reveals that activities of these scientists are not regular. Hence the TAI also vary accordingly.

TAI does not have any relationship with the citations and it does not have any impact on the quality of research. Nevertheless, TAI is related to the number of publications of a particular author and the total number of publications of the country in a particular year.

Author Network Maps

A map is created using VOSViewer to visualise the most prolific Indian forensic science authors. VOSViewer is an algorithm to visualise co-occurrences on the basis of their similarities. Here authors who co-author papers are linked and visualised together. In the cluster map of Indian forensic science authors, 84 items or authors in 23 clusters are found. Since the map is created with a threshold value of 5, this means 84 authors have contributed a minimum of 5 papers and have some relationship as co-authors. The Kashyap, VK cluster and Sekharan, PC cluster are the two prominent clusters identifiable in this Figure 5.



A network map of all the authors who have contributed to the Indian forensic science during the study period is created with Pajek. This network map is illustrated in Figure 6.

In the network map of all authors, 1868 vertices each representing a different individual author is found. Hence it is inferred that 1868 individual authors are responsible for the 6475 authorships in contributing the total 2096 papers during the study period.

CONCLUSION

The study reveals that the most productive 40 Indian forensic science authors together have contributed 40% of the total forensic science literature produced during the study period. These publications have attracted 67% of the total citations. Kanchan, T is the most productive author and also ranks first in terms of the citations received and also h-index. However, the study finds no inter-relationship between productivity and h-index. There is some kind of relationship between CPP and h-index and similarly between RQI and RCR. Nevertheless these relationships are not proportionate. Author network analysis shows two prominent clusters, viz. Kashyap, V K cluster and Sekharan, P C. cluster.

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