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Scholarly Communications of Nephrology by Indian Scientists in Science Citation Index Expanded: a Scientometric Profile

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Abstract

Objectives: Nephrology is one the complicated diseases of the human body. This study tries to focus the scholarly communications of Nephrology which were indexed in Science Citation Index Expanded (SCIE) from the Web of Science (WoS) bibliometric database and to observe various elements in terms of yearly growth, author productivity, document, language, institution, geographical, most productive keywords, collaborative index (CI), degree of collaboration (DC) and many more characteristic features during the study period.

Method: The data were collected from the Web of Science Core Collection database by using the keywords as topic 'Nephrology' and refined by 'countries /Territories' (India) and the time span from 2011 to 2016 indexed in SCI-Expanded. All the records during the period of study have been downloaded completely from the Web of Science online database. The researcher has applied percentage analysis and average score analysis as the basic tools. Apart from the above the specific bibliometric statistical tools such as Collaborative index, Degree of Collaboration, R^2 value and Mean, Standard Deviation, C.V and softwares such as HistCite, VOS Viewer have also been applied.

Results: The study revealed that the degree of collaboration ranges from 0.79 to 0.91 and the average degree of collaboration is 0.86. The American Journal of Kidney Diseases was ranked first (global citation score) 1101 (5.5%), The Nephrology Dialysis Transplantation is in the second rank (global citation score) 765 (5.5%). The results showed that the range of collaborative index is from 0.15 to 0.19 between 2011 and 2016. The maximum range of collaborative index is 0.19 in 2011. USA has been placed with 845 research output and the percentage rate is 32.2 and also the global citation score is 5306 and has got the first place based on the record count and followed by Italy.

Conclusion: Scientometric analysis computes to a scientific publication which has highlighted the contribution of institutions, journals, and individual researchers. It can be concluded that the highest (19.5%) number of papers was published in 2014. The USA has maximum number of literature output, and ranked the first. The percentage of multi- authored research output was more than that of single-authored. The pattern of collaborative index was evaluated and the maximum range of collaborative index was 0.19 in the years 2011 respectively. It is concluded that the scholarly communications in Nephrology have been increasing year by year at a

substantial rate. This scientometric study will help to identify the relevant journals of subscription for health science librarians to provide effective service to the user community.

Keywords: Scientometrics; Bibliometrics; Nephrology, Web of Science; SCIE, Scholarly Communications; TLCS; TGCS, India.

Introduction

Nephrology is the Greek word nephros means "kidney", (combined with the suffix -logy, "the study of") is a specialty of medicine and pediatrics that concerns itself with the kidneys: deals with the adult and pediatric study of the kidneys and its related diseases.(Wikipedia, 2017). The nephrologists deal with the diagnosis and management of kidney diseases. The kidneys are vital for maintaining normal fluid and electrolyte balance in the body. Nephrologists deal with kidney disorders, including fluid and electrolyte disorders, acid-base disorders, kidney stones, glomerular diseases, tubulointerstitial diseases, mineral metabolism, acute kidney disease, acute renal failure, chronic kidney diseases, chronic renal failure and end stage renal disease and dialysis. (Ananya Mandal 2017). They need to be well aware of medications and clinical pharmacology, high blood pressure management, diabetes management and its complications, epidemiology of diseases and infections as well as nutritional management for prevention and treatment of kidney related diseases.

Scientometrics is one of the statistical and quantitative techniques which is widely used to identify the research trends in scientific and scholary communications on any discipline, topic, country, research institutions like IITs, IIMs, Universities, and even any individual scientists, or scholars, etc. According to Glossary of Thompson, 2008, Scientometric is the quantitative study of the disciplines of science based on published literature and communication. It includes identifying emerging areas of scientific research, examining the development of research over time, or geographic and organizational distributions of research. Moreover, Scientometrics is one of the most important measures for the assessment of scientific productions. It is part of the sociology of science and has applications to science policy-making. It involves quantitative studies of scientific activities, others, publications, and overlaps on bibliometrics to some extent (Tague-Sutcliffe, 1992; Mooghali et al, 2011). Scientific literature is a reflection of scientific activity and productivity (Garfield, 1979).

Velmurugan (2017) analyzed to identify the publications, trend on fossil fuels in Indian perspective with 943 and its h-index was 73 and average citations per item was 28.63, total sum of times cited was 26,997, without self citations was 26,159, citing articles was 21,694, without self citations was 21,324 scores. The results showed that there was no such a study carried out on Fossil Fuel towards the scientific publication research retrieved from the Web of Science bibliometric database using Scientometric tools and techniques so far. Further, Indian Journal of Biotechnology (Velmurugan 2016), Phytochemistry (Velmurugan & Radhakrishnan 2016, 2017), Nanotechnology (Velmurugan & Radhakrishnan 2016) research have been carried out in recent years to observe the various parameters. Fossil fuel (Velmurugan 2017) and single journal study such as publication performance of Journal of Intellectual Property Rights (Velmurugan 2013). Indian Journal of Pure and Applied Physics (Velmurugan 2014). This study has been

carried out Nephrology literature to investigate the various factors such as research growth, ranking of journals, author productivity, etc.

Objectives of the study

The major objectives are framed in the present study:

- To identify the growth rate of research productivity on Nephrology
- To trace the types of document and language wise distribution
- To study the subject and institution wise publication output.
- To identify the Ranking of Journals
- To find out the Year wise authorship pattern
- To know the Authorship pattern
- To verify the degree of collaboration and
- To know the most productive keywords

Material and Methods

The data were collected from the Web of Science Core Collection database by using the keywords which are given below:

- TOPIC: Nephrology
- Refined by: COUNTRIES/TERRITORIES: (INDIA)
- Time span: 2011-2016. Indexes: SCI-EXPANDED.

The data were exported to MS Excel spreadsheet to analyze statistically and tabulated and figured. This study covers a period of five years from 2011 to 2016 (both the years inclusive). All the records during the period of study have been downloaded completely from the Web of Science online database. The researcher has applied percentage analysis and average score analysis as the basic tools. Apart from the above the specific bibliometric statistical tools such as Collaborative index, Degree of Collaboration, R^2 value and Mean, Standard Deviation, C.V and softwares such as HistCite, VOS Viewer have also been applied.

Data Analysis

1. **Year-wise growth on Nephrology**

Table 1 shows that out of 2622 research papers, the highest number of papers, i.e. 510 (19.5%) scholarly publications along with 1707 Total Global Citation Score and 185 Total Local Citation Score which is ranked in first in 2014. The lowest number, i.e. 382 (14.6%) research output with 3098 Total Global Citation Score (TGCS) and the Total Local Citation Score (TLCS) is 365 in the year 2011. It is identified that the average number of research articles was 437 and standard deviation and co-efficient variance has also been calculated during the period of study.

Table. 1. Year-wise growth of literature on Nephrology

S. No	Year	Recs	%age	TLCS	TGCS
1	2011	382	14.6	365	3098
2	2012	400	15.3	411	2879
3	2013	473	18.0	306	3304
4	2014	510	19.5	185	1797
5	2015	466	17.8	88	789
6	2016	391	14.8	23	126
	Total	2622	100	1378	11993
Mean		437		229.67	1998.83
Standard Deviation		52.869		156.07	1318.95
C.V		0.121		0.67	0.65

2. **Document wise research output**

Table 2 indicates types of literature output in the forms of research Article, Review, Editorial Material, Meeting Abstracts, Letters, Article; Proceedings Paper News Item, Biographical-Item, Correction, Article; Book Chapter and Review; Book Chapter. Based on the analysis, the result shows that out of 2622, the majority of (69.5%) papers from journal articles with 9151 global citations has been placed in first position and followed by 304 (11.6%) reviews, 230 (8.8%) editorial material, 165 (6.3%) meeting abstract, 41 (1.6%) letter, 25 (1.0) proceeding papers, 11(0.4) News items, 9 (0.3) Bibliographic item, 9 (0.3) Correction, 3 (0.1) Article; book chapters, 2 (0.1) Reviews; book chapter were found during the study period. It is interesting to note that based on the global citation score in the field of Nephrology; review manuscript has been placed in first position with 9151 TGCS, and followed by articles with 2234 TGCS which has occupied in the second place. It is noticed that most of the manuscript has cited in the form of articles globally. When as compared with documents, there is a significant between journal articles and other document.

Table.2. Document Type wise distribution

S. No	Document Type	Recs	%age	TLCS	TGCS
1	Article	1823	69.5	1099	9151
2	Review	304	11.6	144	2234
3	Editorial material	230	8.8	103	461
4	Meeting abstract	165	6.3	0	1
5	Letter	41	1.6	18	31
6	Article; proceedings paper	25	1.0	4	70
7	News Item	11	0.4	10	14
8	Biographical-Item	9	0.3	0	2

9	Correction	9	0.3	0	1
10	Article; book chapter	3	0.1	0	18
11	Review; book chapter	2	0.1	0	10
	Total	**2622**	**100**	**1378**	**11993**

3. **Language wise Research Output**

It is identified in the language wise research output in the field of Nephrology for the present study. The languages such as English, Spanish, French, German, Portuguese, Polish, Russian, Italian, Serbian, Korean, Turkish, and Rumanian have been used in which the highest numbers of (91.0%) articles with11713 TGCS are published in the English language which is the predominant and followed by Spanish articles are in the second position with 120 (4.6%) and the small amount of articles are written in, Turkish , Korean, Serbian and Italian (each 0.1%) languages.

4. **Institution wise research output**

Table 3 shows that out of 380, researcher has selected only top 25 predominant institutions for the present study. To view this, the highest number of (3.4. %) literature output with 620 total global citations contributed by University of Amsterdam Research Center has occupied the first position and followed by the same record count contributed by unknown contributors and Mayo Clinical which contributed 12 articles each with a different citation score such as 29 and 43 respectively.

Table. 3. Institution- wise distribution

S. No	Institution	Recs	%age	TLCS	TGCS
1	Unknown	90	3.4	4	15
2	University of Toronto	61	2.3	61	453
3	Harvard university	46	1.8	69	393
4	University of Sydney	46	1.8	20	137
5	Mayo Clinical Lab	43	1.6	29	615
6	University of Alberta	43	1.6	85	493
7	University of Calgary	39	1.5	75	394
8	University of Western Ontario	38	1.4	85	497
9	University of Calif. los Angeles	37	1.4	26	325
10	University of Amsterdam	36	1.4	28	620

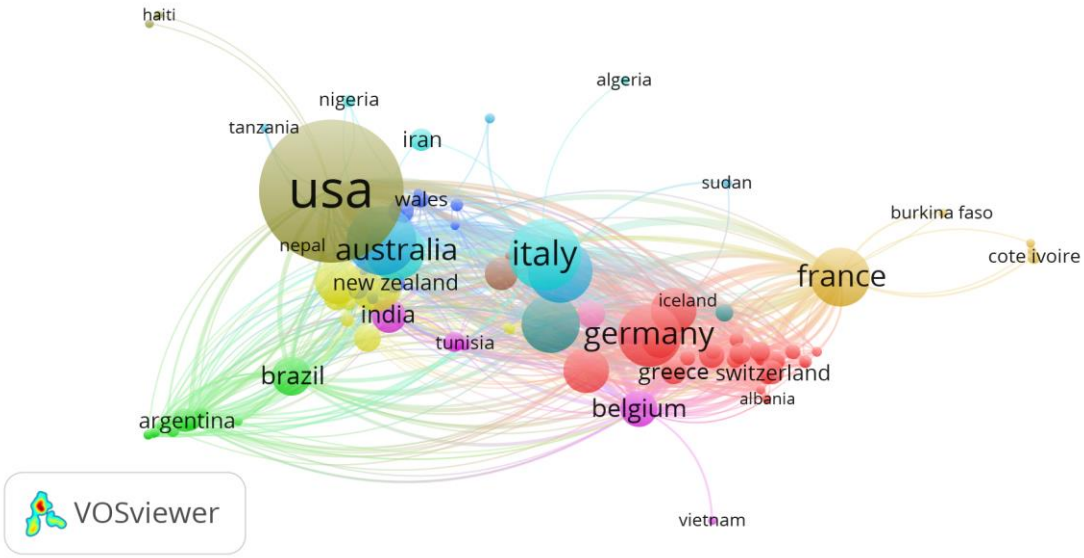
5. **Geographical wise production**

It can be observed from table 4 that 108 countries have contributed in the field of Nephrology during the period of 6 years. Out of 108 countries, USA has been placed with 845 research output and the percentage rate is 32.2 and also the global citation score is 5306 and has got the first place based on the record count and followed by Italy, which has 216 records with a 1634 global citation score and occupied the second rank, Canada got next position with 206 articles with a 1912 citation score, and followed by the UK has 202 records with a 1732 citation score globally which is ranked fourth. It is found that the USA has been placed in first place based on the majority of citation score, i.e. 5036 which got Canada has been ranked in the second position with a 1912 citation score and followed by the UK got placed in the third position with a 1732 citation score. Based on the above analysis, there is a significant relationship between institution and country production during the period of study.

Table.4. Geographical area wise distribution

S. No	Country	Recs	%age	TLCS	TGCS
1	USA	845	32.2	736	5306
2	Italy	216	8.2	101	1634
3	Canada	206	7.9	210	1912
4	UK	202	7.7	151	1732
5	Germany	169	6.4	53	1408
6	France	151	5.8	57	955
7	Australia	147	5.6	74	802
8	Spain	143	5.5	67	836
9	Unknown	129	4.9	8	85
10	Japan	107	4.1	60	1303

Country –wise –map



6. **Authorship pattern**

It is observed from the table 5 that about 90% of papers was contributed by multi authors. Out of 633 papers, the highest number of papers was published by double authors which accounts for 203 (32.07%) followed by three authored articles which lead 198 (31.28 %.) 17.38% of articles were published by four authors.

Table. 5. Authorship pattern

S. No	Author	Recs	%age	TLCS	TGCS	TLCR
1	Anonymous	36	1.4	0	0	0
2	Jager KJ	28	1.1	10	190	15
3	Zoccali C	26	1.0	9	230	15
4	Jhaveri KD	24	0.9	71	91	88
5	Craig JC	22	0.8	11	69	14
6	De Nicola L	16	0.6	6	109	12
7	Garg AX	16	0.6	30	242	12
8	Minutolo R	16	0.6	6	109	12
9	Ronco C	16	0.6	7	183	3
10	Schaefer F	16	0.6	9	77	17

7. **Authorship Pattern and Degree of Collaboration (DC)**

Table 6 represents that out of 2622 articles the maximum number publications 86.15% were done by joint authors while the rest 363 (13.85%) papers were contributed by single authors. It is found that the majority of the articles has been contributed only by solo author. The

table also shows the degree of collaboration (DC) on authorship in the field of Nephrology during the period of study. It is very clear that the percentage of single authored is more than multi- authored papers. To estimate the degree of collaboration in quantitative terms, the formula given by K Subramanyam was used. The degree of collaboration ranges from 0.79 to 0.91 and the average degree of collaboration is 0.86.

Table. 6. Authorship Pattern of Single and Joint Contributions

Author	Year						No of papers	%age
	2011	2012	2013	2014	2015	2016		
Single	78	61	56	86	49	33	363	13.85
Joint	304	339	417	424	417	358	2259	86.15
Total	382	400	473	510	466	391	2622	100
DC	0.79	0.85	0.88	0.83	0.89	0.91	0.86	

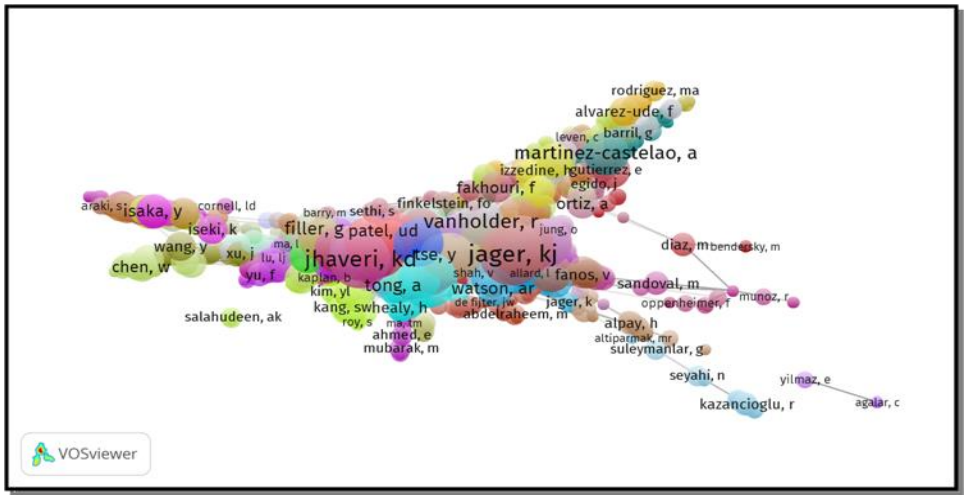
8. **Pattern of Collaborative Index**

It is identified from the Table 7 that the pattern of collaborative index has been evaluated among the total research papers and total number of authors on Nephrology during the period. The results showed that the range of collaborative index is from 0.15 to 0.19 between 2011 and 2016. The maximum range of collaborative index is 0.19 in 2011.

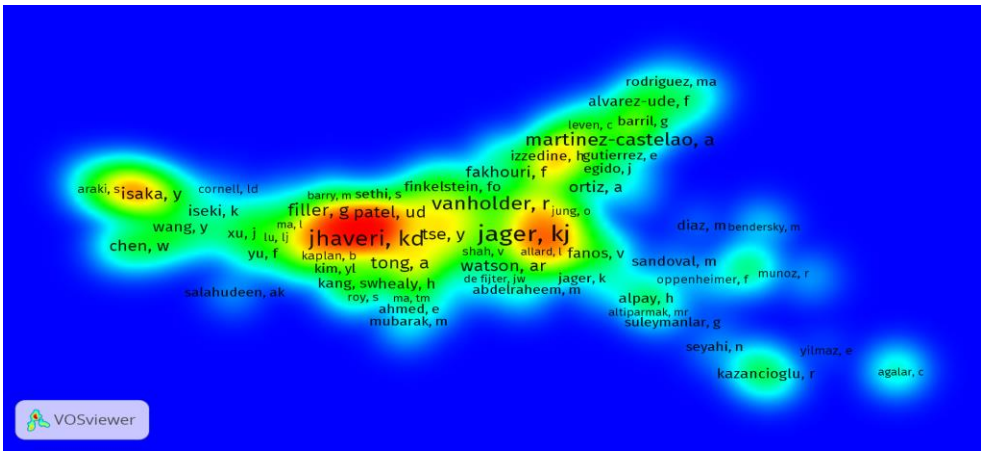
Table. 7. Pattern of Collaborative Index

Year	Total Articles	Total Authors	CI
2011	382	1922	0.19
2012	400	2149	0.18
2013	473	2705	0.17
2014	510	2743	0.18
2015	466	3008	0.15
2016	391	2531	0.15
Total	2622	15058	0.17

Pattern of co-authorship - map



Pattern of co-authorship - Density value



9. **Ranking of Journals**

Table 8 shows that top 12 ranking of journals according to their productivity. Six journals have published 2622 articles. The American Journal of Kidney Diseases was ranked first (global citation score) 1101(5.5%), The Nephrology Dialysis Transplantation is in the second rank (global citation score) 765 (5.5%), The Clinical Journal of the American Society of Nephrology got ranked third (global citation 1324) (5.3%) during the period of study. The Pediatric Nephrology was placed fourth (global citation score) 404 (5.0%) articles during the period of study.

Table.8. Ranking of core journals in Nephrology

S.No	Journal	Recs	%	TLCS	TGCS	TLCR
1	American journal of kidney diseases	143	5.5	239	1101	154

2	Nephrology dialysis transplantation	142	5.4	72	765	64
3	Clinical journal of the American society of Nephrology	140	5.3	271	1324	127
4	Pediatric Nephrology	130	5.0	52	404	49
5	Kidney international	93	3.5	79	899	58
6	Nefrologia	79	3.0	39	230	60
7	Journal of Nephrology	75	2.9	21	140	24
8	Nephrology Nursing Journal	66	2.5	16	89	21
9	Nephrology	65	2.5	13	101	21
10	American Journal of transplantation	62	2.4	0	120	2
11	Seminars In Dialysis	57	2.2	22	265	40
12	Nephron clinical practice	51	1.9	40	221	20

10. **Most productive keywords**

It is also measured to know about the most productive keywords on Nephronology research output during the study period. Out of 4702 words; researchers have considered the top 15 words for research purpose. It was noted hat the majority of the papers (32.1%) with TLCS is 566 and TGCS is 2093 which got placed in the first position for being used the word ‘‘NEPHROLOGY’’, followed by ‘‘KIDNEY’’ with 671 papers (25.6%), ‘‘PATIENTS’ ‘with 530 articles (20.2%), ‘‘DISEASE’’wioth 465 research output (17.7%), and ‘‘RENAL ‘with 450 papers (17.2%) respectively.

Conclusion

Scientometric analysis computes to a scientific publication which has highlighted the contribution of institutions, journals, and individual researchers. This study has been carried on Research productivity of Indian Scientists on Nephrology from 2011 to 2016. The data were collected from web of science database by using the document search provision in science citation index and analyzed through HistCite software. It was measured that the highest (19.5%) of papers were published in 2014 and the collaborative research has also been measured in the field of Nephrology in terms of literature output. The USA has maximum number of literature output, which is 32.2% with 5306 total global citations and it ranks in the first position. The degree of collaboration (DC) was determined among the productivity authors. The percentage of multi- authored is more than that of single-authored papers and the average degree of collaboration was 0.86. The pattern of collaborative index was evaluated and the maximum range of collaborative index was 0.19 in the years 2011 respectively. It is concluded that the scholarly communications in Nephrology have been increasing year by year at a substantial rate. This scientometric study will help to identify the relevant journals of subscription for health science librarians to provide effective service to the user community.

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