

A Bibliometric analysis of Gout research output in India

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Abstract

This study evaluates the Indian research output on Gout during 1970–2017 using different bibliometric indicators. Data have been downloaded from Scopus database for the period 1970–2017 using the keywords Gout in the title and abstract fields. Out of 19,687 Gout research publications, 556 (2.82%) were Indian contribution. India stands tenth place with the contribution of 2.82%. The first Indian research output on gout appeared in the year 1973.. 556 papers were contributed by 3106 authors. Only 7.4% of gout research was solo research. In other words 92.6% were collaborative research. The average author per paper works out to 5.59 which indicate the collaborative research persists in gout research output and nearly 5 to 6 authors per paper. 17 countries collaborated with Indian authors at least in four papers. United states have collaborated nearly 20 (3.60%) articles. It is followed by United Kingdom (17, 3.06%); Australia (8, 1.44%) and Germany (8,1.44%). 556 papers fetch 5417 citation with an average of 9.74 citations per paper. If the average calculated to cite papers alone it works out 14 citations per paper. Out of 556 papers 382 (68.7%) papers were cited. The remaining 174 (31.3%) papers were uncited. More than 50% articles of single author papers goes uncited. Similarly 25% of articles goes uncited in the case of two, three and four authors publications.

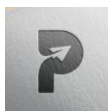
Key words: Gout research, Bibliometric analysis, Indian Research output on Gout, Gout Disease

Introduction

Gout is an ancient disease that is on the rise in the United States. Podagra was first documented in ancient Egypt. Hippocrates described it as an “unwalkable disease.” In keeping with Hippocratic medicine, medieval people associated gout with an imbalance of one of the four humors that maintained a person’s health. Advances in medicine eventually identified the actual excess “humor” in gout to be uric acid. Historically, the imbalance has been linked to excesses that could only be afforded by the wealthy. However, the Western diet has developed into one that is purine-rich, regardless of income levels, contributing to the rise in gout in the United States.

Bibliometric study

In order to identify the growth of literature in a given domain normally metric studies specifically bibliometric analysis has been employed by researchers. In this study the researcher has also employed bibliometric analysis in analyzing Gout Research output in scopus database. Bibliometric is defined as the application of statistical and mathematical methods to books and other communication. Pritchard (1969)¹.



Lotka's law (1926) of scientific productivity, Bradford's law (1934) of scattering and Zips law (1949) on frequency of words were the few famous laws of Bibliometric. These Bibliometric studies were started in late sixties.

Bibliometric method, a common research tool, has already been widely applied in scientific production and research-trend studies in many disciplines of Science and Engineering (Almind & Ingwersen, 1997; Cronin, 2001; Moed, Debruin, & Vanleeuwen, 1995). The popularity in the adaptation of bibliometric techniques in various disciplines stimulated stupendous growth of literature on bibliometrics and its related areas.

Objectives

The objectives of the study are

1. To know the Indian contribution on Gout research
2. To identify the related growth rate and chronological growth of literature on Gout.
3. To identify the collaborated country with Indian authors on gout research.
4. To identify the predominant organisation and preferred bibliographic form of Indian research output for Gout.
5. To identify the authorship pattern on gout research output
6. To identify the highly contributed authors in Gout.
7. To identify the journal preferred by the Indian authors on Gout.

Hypotheses

The hypotheses formulated for the study are

1. There exists substantial growth output on Gout research.
2. Collaborative research persist on Indian research contributions.
3. There exists more collaboration by developed nations on Gout.
4. Among various bibliographical forms, Journal articles seem to be most preferred for publication of Gout research.
5. Majority of the Indian articles on gout were finds citation.

Data collection

Today Scopus covers life science journals and now considered as primary data base for identifying the medical field. Therefore in this study scopus database has been considered for identifying the evaluating gout research literature. The study uses 48 years publications data from 1970 to 2017 on Gout research collected from Scopus database. A total of 21,328 records were identified in the field of "Gout", of which 19,687 research literatures (92.31%) are directly related to Gout. Out of which 556 publications were of Indian contribution. The search term used for retrieving the bibliographic records as follows:

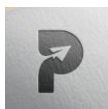
query : (TITLE-ABS-KEY(gout) AND PUBYEAR > 1969 AND PUBYEAR < 2018 AND (LIMIT-TO (AFFILCOUNTRY,"India")))

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The collected data has been classified by using Excel and the same was loaded in to SPSS (statistical package for social sciences) for the purpose of analysis. Statistical tools such as frequency distribution and percentage analysis and Scientometric techniques such as Relative Growth Rate (RGR), Doubling time (dt) citation analysis etc will be used for the study.

Date analysis

Country wise Distribution

The countrywise distribution has identified and the countries whose publication were more than 500 contribution were shown in Table -1

Table 1 countrywise growth of publications

S.No	COUNTRY	Papers	%
1	United States	5213	26.48
2	United Kingdom	1493	7.58
3	Germany	1169	5.94
4	France	948	4.82
5	China	758	3.85
6	Japan	690	3.50
7	Italy	660	3.35
8	Spain	612	3.11
9	Australia	583	2.96
10	India	556	2.82
11	Canada	527	2.68
12	others	6478	32.91
	Total	19687	100

Nearly 11 countries contributed more than 500 publications in Gout research literature. Further it can be seen that 50% of the outputs were provided by six countries such as USA, United Kingdom, Germany, France, China and Japan. These 11 countries provide nearly 67.09% of the total contribution in Gout Research. USA contributes nearly 26.48%. It is followed by United Kingdom (7.58%) and Germany (5.94%). India stands tenth place with the contribution of 2.82%. In this study only Indian contribution were analysed.

Source type

The data of 556 records thus retrieved from Scopus data base has been analysed based on source type and the same has been shown in Table 2 Out of 556 Gout research publications, 10 (2.13%) were from open access sources and 546 (97.97%) were from other sources. The Indian authors were also contributing their research in Open access journals/



Table 2 types of journal

S.No	Type of journals	Papers	%
1	Open Access	10	2.13
2	Other	546	97.87
	Total	556	100

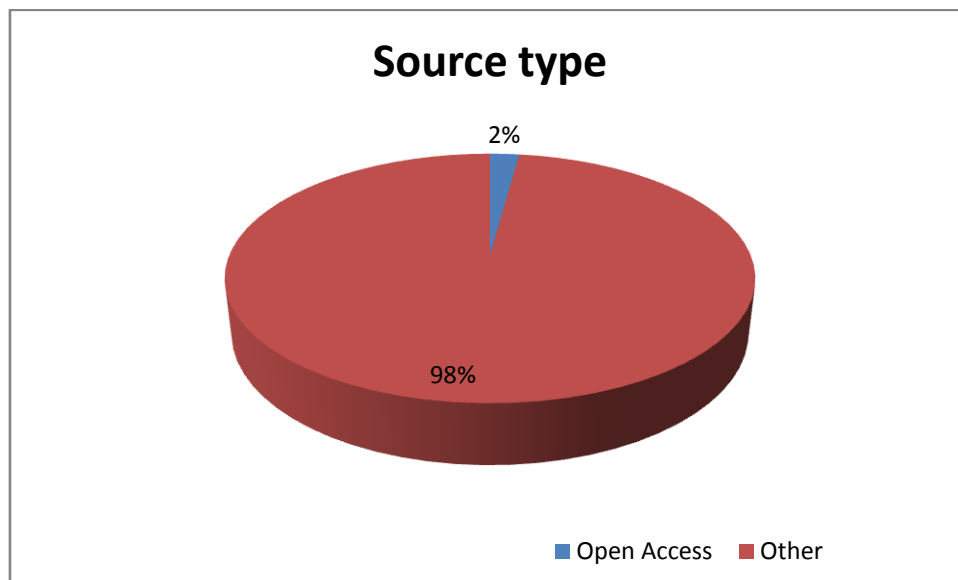


Fig 1 Source type

Chronological growth

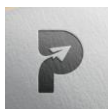
The Chronological growth of literature on gout has been analysed and the same has been shown in table 5. Further ratio of growth (RoG), Relative growth rate (RGR) and Doubling Time (Dt) has been calculated and the same has been shown in table.

Table Chronological growth

S.No.	Year	Papers	%	cum Papers	cum %	w1	w2	Rog	RGR	Dt
-------	------	--------	---	------------	-------	----	----	-----	-----	----



1	1973	1	0.18	1	0.18		0	1.00	0.00	0.00
2	1979	1	0.18	2	0.36	0	0.693147	1.00	0.69	1.00
3	1980	2	0.36	4	0.72	0.693147	1.386294	2.00	0.69	1.00
4	1981	1	0.18	5	0.90	1.386294	1.609438	0.50	0.22	3.11
5	1982	1	0.18	6	1.08	1.609438	1.791759	1.00	0.18	3.80
6	1984	1	0.18	7	1.26	1.791759	1.94591	1.00	0.15	4.50
7	1985	1	0.18	8	1.44	1.94591	2.079442	1.00	0.13	5.19
8	1986	1	0.18	9	1.62	2.079442	2.197225	1.00	0.12	5.88
9	1989	1	0.18	10	1.80	2.197225	2.302585	1.00	0.11	6.58
10	1991	1	0.18	11	1.98	2.302585	2.397895	1.00	0.10	7.27
11	1992	4	0.72	15	2.70	2.397895	2.70805	4.00	0.31	2.23
12	1993	4	0.72	19	3.42	2.70805	2.944439	1.00	0.24	2.93
13	1994	1	0.18	20	3.60	2.944439	2.995732	0.25	0.05	13.51
14	1995	2	0.36	22	3.96	2.995732	3.091042	2.00	0.10	7.27
15	1996	3	0.54	25	4.50	3.091042	3.218876	1.50	0.13	5.42
16	1997	2	0.36	27	4.86	3.218876	3.295837	0.67	0.08	9.00
17	1998	1	0.18	28	5.04	3.295837	3.332205	0.50	0.04	19.06
18	1999	5	0.90	33	5.94	3.332205	3.496508	5.00	0.16	4.22
19	2000	6	1.08	39	7.01	3.496508	3.663562	1.20	0.17	4.15
20	2001	5	0.90	44	7.91	3.663562	3.78419	0.83	0.12	5.74
21	2002	11	1.98	55	9.89	3.78419	4.007333	2.20	0.22	3.11
22	2003	8	1.44	63	11.33	4.007333	4.143135	0.73	0.14	5.10
23	2004	9	1.62	72	12.95	4.143135	4.276666	1.13	0.13	5.19
24	2005	9	1.62	81	14.57	4.276666	4.394449	1.00	0.12	5.88
25	2006	12	2.16	93	16.73	4.394449	4.532599	1.33	0.14	5.02
26	2007	21	3.78	114	20.50	4.532599	4.736198	1.75	0.20	3.40
27	2008	21	3.78	135	24.28	4.736198	4.905275	1.00	0.17	4.10
28	2009	26	4.68	161	28.96	4.905275	5.081404	1.24	0.18	3.93
29	2010	47	8.45	208	37.41	5.081404	5.337538	1.81	0.26	2.71
30	2011	64	11.51	272	48.92	5.337538	5.605802	1.36	0.27	2.58
31	2012	50	8.99	322	57.91	5.605802	5.774552	0.78	0.17	4.11
32	2013	44	7.91	366	65.83	5.774552	5.902633	0.88	0.13	5.41



33	2014	45	8.09	411	73.92	5.902633	6.018593	1.02	0.12	5.98
34	2015	37	6.65	448	80.58	6.018593	6.104793	0.82	0.09	8.04
35	2016	52	9.35	500	89.93	6.104793	6.214608	1.41	0.11	6.31
36	2017	56	10.07	556	100.00	6.214608	6.320768	1.08	0.11	6.53

The first Indian research output on gout appeared in the year 1973. There were no contribution during the period 1974 to 1978. During the years 1979, 1981 to 1991, 1994 and 1998 there finds only one article per year. Substantial publications, that too 20 publications, can be seen only from 2007 onwards. More than 50 publications can be seen during the year 2011 (64); 2012(50); 2016 (52) and 2017(56). This shows that the spreading of gout disease awareness only from 2007 onwards and gaining momentum only from 2011.

It can be seen from the figure there exist a linear growth of publication output in the field of research of Gout. A total of 556 papers were published in 48 years of the study period. The growth ratio varies from 0.50 to 5.00. It is observed from the table that there exists fluctuation throughout the study period. The RGR ranges between 0.00 and 0.27 and has been increasing from 2000 (0.17) to 2011 (0.27). During the last two years RGR works out 0.11. On the other hand, the Doubling Time (Dt) has been increasing from 1.00 to 19.060. The doubling time of 2017 works out to 6.53 which indicates that publication doubles in once in seven years.



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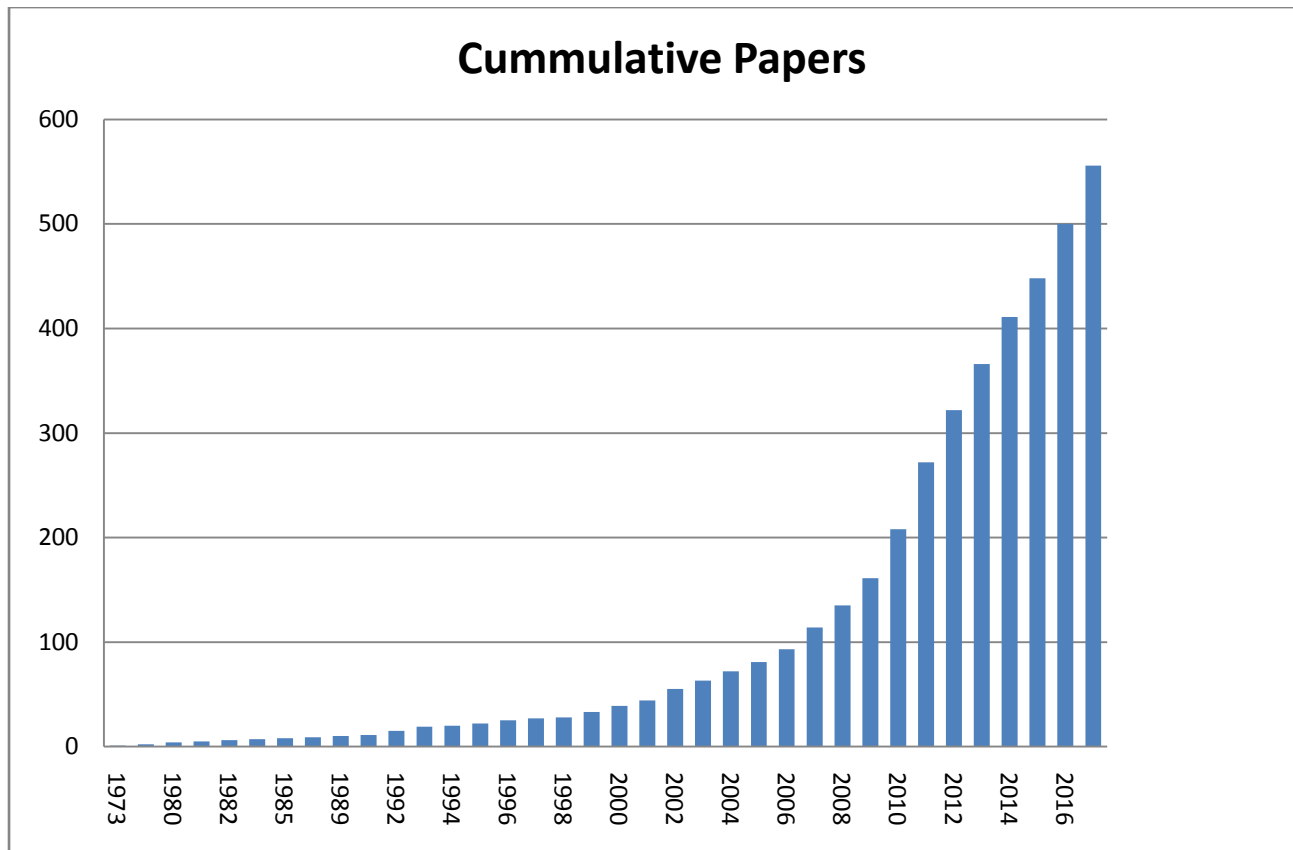


Fig 5 Publication Growth Trend

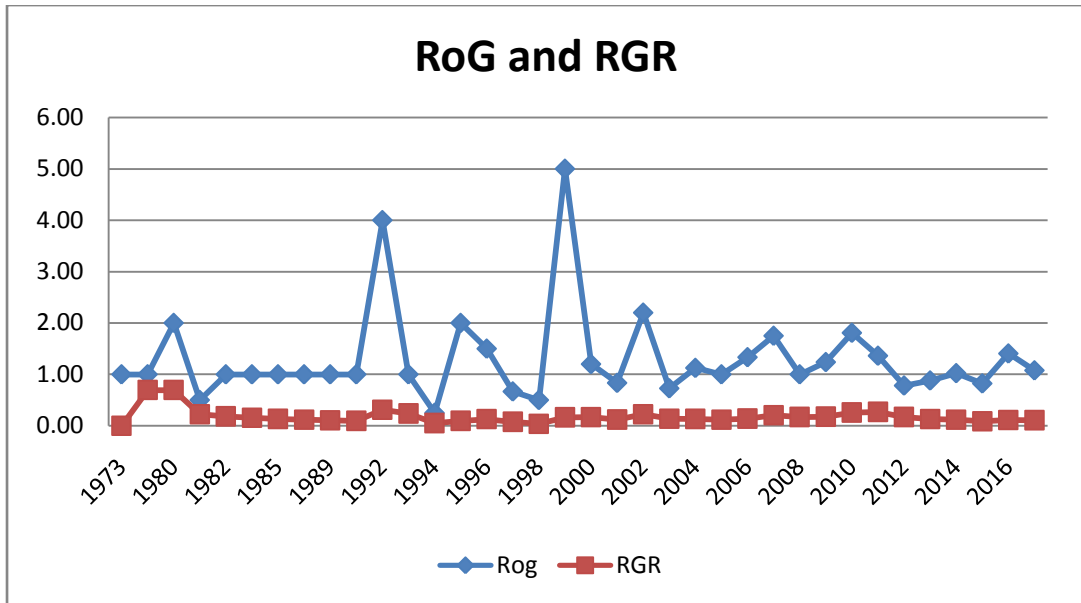


Fig 6 RoG and RGR

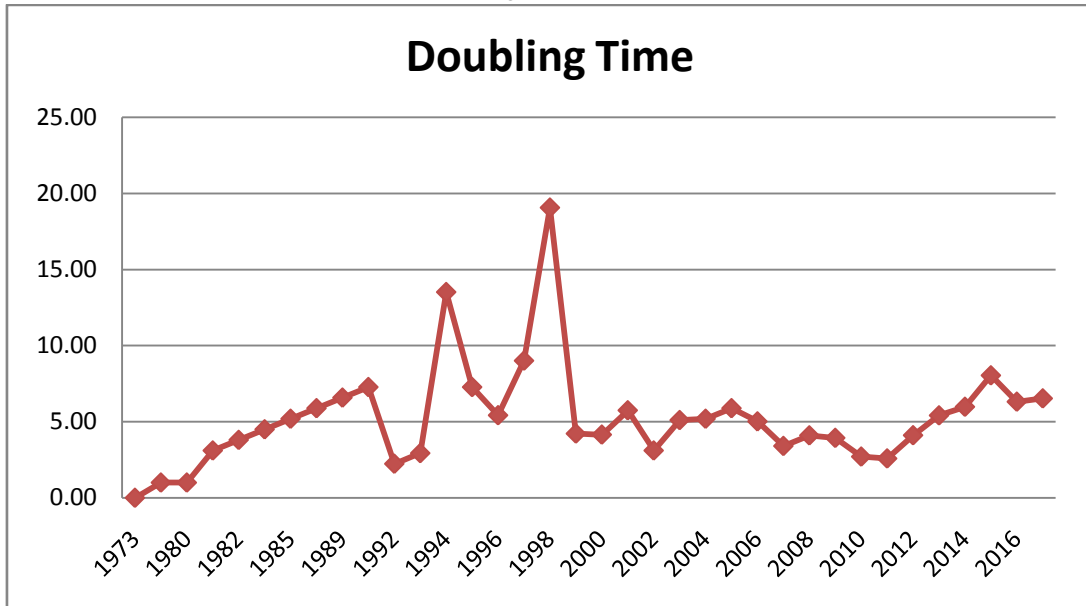


Fig 7 Doubling Time

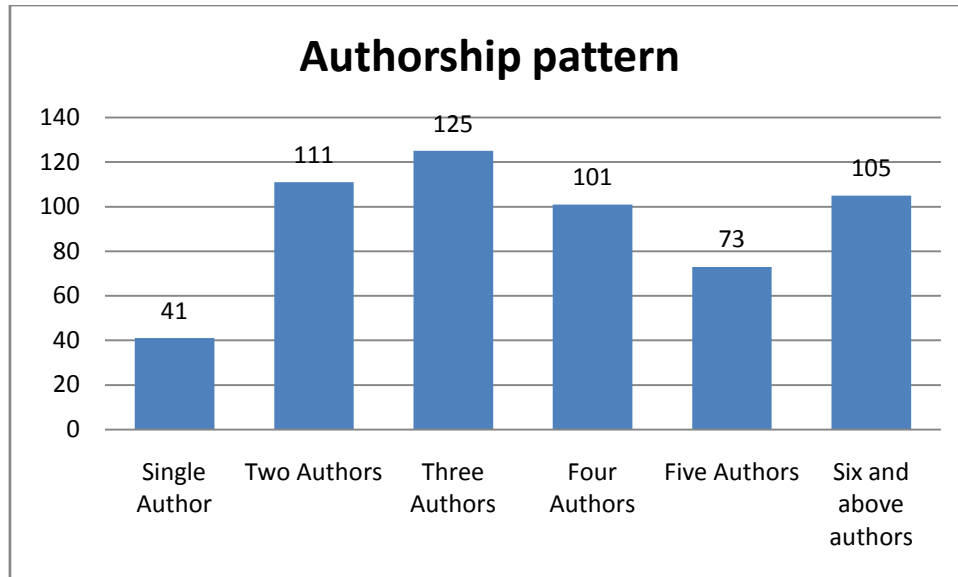


Authorship pattern

The authorship pattern of the Indian research out put on gout research has been analyzed and the same has been shown in Table Out of 556 papers, 41 (7.4%) papers were contributed by single author. Three authors contribution (125,22.5%) were more comparing the other author ship pattern. It is followed by two authors (111, 20.0%); Six and above authors (105,18.9%) and four authors (101, 18.2%). 556 papers were contributed by 3106 authors. The average author per paper works out to 5.59 which indicates the collaborative research persist in gout research output and nearly 5 to 6 authors per paper. Only 7.4% of gout research were solo research. In other words 92.6% were collaborative research.

Table Authorship pattern

S.No	Authorship	No of papers	Percent	Cumulative Percent	Total authors
1	Single Author	41	7.4	7.4	41
2	Two Authors	111	20.0	27.3	222
3	Three Authors	125	22.5	49.8	375
4	Four Authors	101	18.2	68.0	404
5	Five Authors	73	13.1	81.1	365
6	Six and above authors	105	18.9	100.0	1699
	Total	556	100.0		3106



Bibliographic form preferred

The bibliographic form of the literature growth of Gout research output has also been identified and the same is shown in Table-3. The output can be seen in 8 different bibliographic formats. Nearly 68.71% of publications are published as journal articles. It is followed by Review papers (22.11%) and Letters (3.60%). The Conference papers account to 2.34% only in Gout research output.

Table 3 type of document

S.No.	Type	papers	%
1	Article	382	68.71
2	Review	123	22.11
3	Letter	20	3.60
4	Conference Paper	13	2.34
5	Note	8	1.44
6	Book Chapter	4	0.72
7	Short Survey	4	0.72

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8	Editorial	2	0.36
	Total	556	100.00

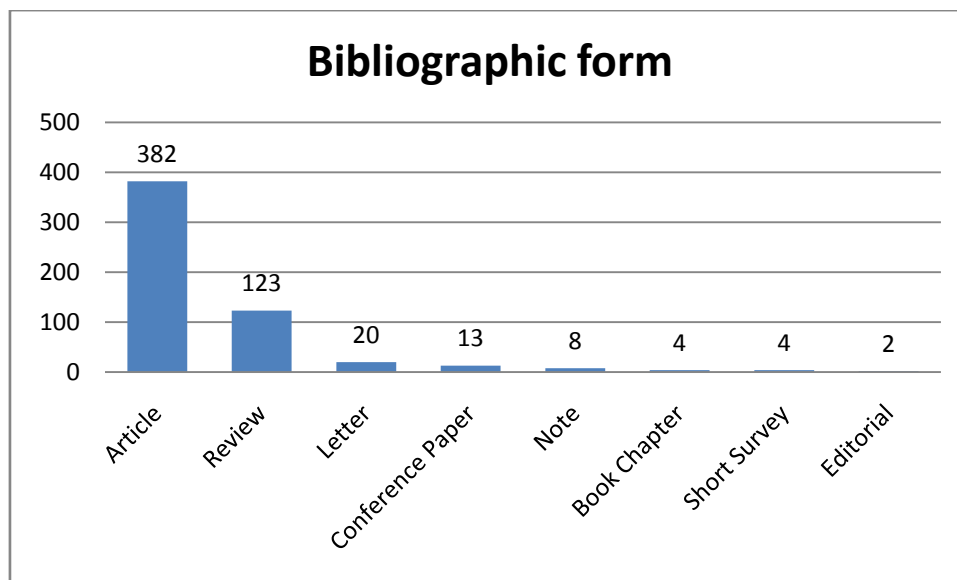


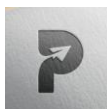
Fig. 3 Bibliographic form

Contributors of gout research

The Indian authors who have contributed more than 5 articles in gout research has been identified and the same has been shown in Table 8. A total of 48 (8.64%) articles were published by 8 authors. These 8 authors has contributed more than 5 articles each in gout research, Rasool contributed 8 (1.44%) papers. It is followed by Chopra (7, 1.26%); Khobragade (6, 1.08%); Mahajan (6,1.08%) and Pundir (6,1.08%). The remaining 3 authors contributed 5 pages each.

Table 8 Authors' Contribution

S.No.	Author	Papers	%
1	Rasool, M.	8	1.44
2	Chopra, A.	7	1.26
3	Khobragade, C.N.	6	1.08



4	Mahajan, A.	6	1.08
5	Pundir, C.S.	6	1.08
6	Green, R.E.	5	0.90
7	Paul, B.J.	5	0.90
8	Umamaheswari, M.	5	0.90
	Total	48	8.64

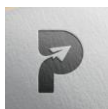
Keywords of gout literature

The keywords used by Indian authors in Gout literature have been identified and the same has been shown in Table 9. Majority of the articles carries the keyword "Gout" (60.79%). It is followed by "Human" (57.37%) ; "Article" (52.70%) and "Nonhuman" (36.15%).

Subject area of gout literature

Table 9 Keywords used

S.No.	Keyword	No. of times	%
1	Gout	338	60.79
2	Human	319	57.37
3	Article	293	52.70
4	Nonhuman	201	36.15
5	Male	148	26.62
6	Unclassified Drug	139	25.00
7	Humans	135	24.28
8	Priority Journal	125	22.48
9	Controlled Study	121	21.76
10	Review	120	21.58
11	Uric Acid	113	20.32
12	Adult	104	18.71
13	Female	92	16.55
14	Allopurinol	86	15.47
15	Antiinflammatory Activity	76	13.67
16	Plant Extract	75	13.49
17	Case Report	74	13.31
18	Rheumatoid Arthritis	73	13.13



19	Hyperuricemia	72	12.95
20	Diabetes Mellitus	65	11.69
21	Arthritis	64	11.51
22	Antioxidant Activity	62	11.15
23	Phytochemistry	62	11.15
24	Colchicine	61	10.97
25	Uric Acid Blood Level	61	10.97
26	Drug Efficacy	58	10.43
27	India	58	10.43
28	Animals	56	10.07
29	Rheumatic Disease	56	10.07
30	Osteoarthritis	53	9.53
31	Plant Leaf	52	9.35
32	Fever	50	8.99
33	Hypertension	50	8.99
34	Skin Disease	50	8.99

The subject area of Indian gout literature has been ascertained and the same has been shown in Table. Nearly 44.60% of articles were of Medicine subject area. It is followed by Pharmacology, Toxicology and Pharmaceutics (222, 39.93%); Biochemistry, Genetics and Molecular Biology (101, 18.17%) and Agricultural and Biological Sciences (38, 6.83%).

Table : subject area of indian gout literature

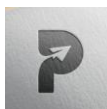
S.No.	Subject Area	No. of Times	%
1	Medicine	248	44.60

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2	Pharmacology, Toxicology and Pharmaceutics	222	39.93
3	Biochemistry, Genetics and Molecular Biology	101	18.17
4	Agricultural and Biological Sciences	38	6.83
5	Chemistry	35	6.29
6	Veterinary	20	3.60
7	Immunology and Microbiology	19	3.42
8	Engineering	16	2.88
9	Environmental Science	14	2.52
10	Materials Science	11	1.98
11	Physics and Astronomy	11	1.98
12	Chemical Engineering	9	1.62
13	Health Professions	5	0.90
14	Multidisciplinary	3	0.54
15	Neuroscience	3	0.54
16	Computer Science	2	0.36
17	Decision Sciences	1	0.18
18	Earth and Planetary Sciences	1	0.18
19	Energy	1	0.18
20	Mathematics	1	0.18
21	Nursing	1	0.18

Cited publications

The citation of these 556 papers were analysed and the same has been shown in Table.

Table cited/uncited Publications

S.No.	Cited/Uncited	papers	Percent	Cumulative Percent	Total citation	Avg Citation
1	Cited	382	68.7	68.7	5417	14.18
2	uncited	174	31.3	100.0	0	
	Total	556	100.0		5417	9.74

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The total number of 556 papers fetches 5417 citation with an average of 9.74 citations per paper. If the average calculated to cited papers alone it works out 14 citations per paper. Out of 556 papers 382 (68.7%) papers were cited. The remaining 174 (31.3%) papers were uncited.

Table: Author pattern Vs cited/uncited

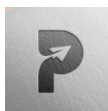
S.No.	Authorship pateren	Cited		uncited		Total	
1	Single Author	20	3.6%	21	3.8%	41	7.4%
2	Two Authors	74	13.3%	37	6.7%	111	20.0%
3	Three Authors	87	15.6%	38	6.8%	125	22.5%
4	Four Authors	65	11.7%	36	6.5%	101	18.2%
5	Five Authors	46	8.3%	27	4.9%	73	13.1%
6	Six and above authors	90	16.2%	15	2.7%	105	18.9%
Total		382	68.7%	174	31.3%	556	100.0%

More than 50% articles of single author papers goes uncited. Similarly 25% of articles goes uncited in the case of two, three and four authors publications. Only 10% of articles of six and above authors were goes unnoticed or uncited publications.

FINDINGS

The findings of the study were

- During the period 1970 to 2017 (48 years), a total of 21,328 records were identified in the field of "Gout", of which 19,687 research literatures (92.31%) are directly related to Gout from Scopus database.
- Out of 19,687 Gout research publications, 556 (2.82%) were from open access sources and 19,131 (97.97%) were from other countries.
- India stands tenth place with the contribution of 2.82%.
- The first Indian research output on gout appeared in the year 1973. There were no contribution during the period 1974 to 1978. During the years 1979, 1981 to 1991, 1994 and 1998 there finds only one article per year. Substantial publications, that too 20 publications, can be seen only from 2007 onwards. More than 50 publications can be seen during the year 2011 (64); 2012(50); 2016 (52) and 2017(56). This shows that the spreading of gout disease awareness only from 2007 onwards and gaining momentum only from 2011.
- The growth ratio varies from 0.50 to 5.00. It is observed from the table that there exists fluctuation throughout the study period. The RGR ranges between 0.00 and 0.27 and has



been increasing from 2000 (0.17) to 2011 (0.27). During the last two years RGR works out 0.11.

- Out of 556 papers, 41 (7.4%) papers were contributed by single author. Three authors contribution (125,22.5%) were more comparing the other author ship pattern. It is followed by two authors (111, 20.0%); Six and above authors (105,18.9%) and four authors (101, 18.2%). 556 papers were contributed by 3106 authors. The average author per paper works out to 5.59 which indicates the collaborative research persist in gout research output and nearly 5 to 6 authors per paper.
- Only 7.4% of gout research were solo research. In other words 92.6% were collaborative research.
- 556 papers appeared in 8 different bibliographic formats. Nearly 68.71% of publications are published as journal articles. It is followed by Review papers (21.11%) and Letters (3.60%).
- Majority of the articles carries the keyword "Gout" (60.79%). It is followed by "Human" (57.37%); "Article" (52.70%) and "Nonhuman" (36.15%)
- A total of 48 (8.64%) articles were published by 8 authors. These 8 authors has contributed more than 5 articles each in gout research, Rasool contributed 8 (1.44%) papers. It is followed by Chopra (7, 1.26%); Khobragade (6, 1.08%); Mahajan (6,1.08%) and Pundir (6,1.08%).
- Nearly 44.60% of articles were of Medicine subject area. It is followed by Pharmacology, Toxicology and Pharmaceutics (222, 39.93%); Biochemistry, Genetics and Molecular Biology (101, 18.17%) and Agricultural and Biological Sciences (38, 6.83%).
- 556 papers fetches 5417 citation with an average of 9.74 citations per paper. If the average calculated to cited papers alone it works out 14 citations per paper. Out of 556 papers 382 (68.7%) papers were cited. The remaining 174 (31.3%) papers were uncited.
- More than 50% articles of single author papers goes uncited. Similarly 25% of articles goes uncited in the case of two, three and four authors publications.

Conclusion

The study shows that there exist substantial growth of research output on gout research in India. This indicates that the disease gets the attentions of the researchers towards identifying the remedy for the disease. There exists more contribution by developed nations on Gout indicates the attention of developed countries. Among various bibliographical forms, Journal articles seem to be most preferred for publication of Gout research.

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1. **Almind, T.C. & Ingwersen, P. (1997).** Informatic analysis on the World Wide Web, Methodological approaches to "Webometrics". *Journal of Documentation*, 53(4): 404-426.
2. **Cronin, B. (2001).** Bibliometrics and beyond: some thoughts on web-based citation analysis, *Journal of Information Science*, 27(1): 1-7.
3. **Gupta BM, Mueen Ahmed KK, Ritu Gupta (2017)** Arthritis Research in India: A Scientometric Assessment of Publications Output during 2007-2016. *SF J of Orthopedics & Rheumatology* 1: 1-10.
4. **Krishnamoorthy G., Ramakrishnan, J., & Devi. (2009).** Bibliometric analysis of literature on diabetes (1995-2004), *Annals of Library and Information Studies*, 56, 150-155.
5. **Rahman, M., Haque, T.L., & Fukui, T. (2005).** Research articles published in clinical radiology journals: Trend of contribution from different countries, *Academic Radiology*, 12(7), 825-829.
6. **Rao, I. K. R. (2010).** *Growth of literature and measurement of scientific productivity*. New Delhi: Ess Ess Publication.
7. **Sangam, S. L. (2008).** Areas in the field of scientometrics and informetrics. In: Koganuramath, M., Kumbhar, B. D., & Kademani, B. S. (Eds), *Library and information science profession in the knowledge society*. New Delhi: Allied Publishers. 265-271.