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Literature Output on Gout: A Bibliographic Study

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***Abstract*—** This study evaluates research output on Gout carried out in different parts of the world 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. The study examined the pattern of growth of the output, its geographical distribution. The study Gout research output is gradually increasing. The USA, followed by the UK and German contributed the highest number of papers. The majority of the prolific institutions were located in the USA, the UK, France and Australia. The last two decades have witnessed considerable growth in research output in this field. Interestingly, the countries like the USA, the UK and Australia.

***Keywords*—** Gout research, Bibliometric analysis, Research output on Gout, Gout Disease

I. INTRODUCTION

Gout is a form of recurrent inflammatory arthritis caused by hyperuricaemia and subsequent accumulation of monosodium urate crystal deposition in the joints, tendons and surrounding tissues. Uric Acid is completely natural. Human body breaks down certain foods that contain puriness, and the result of that breakdown is Uric Acid. It's only a problem when a body can't 'flush' it out fast enough and the body creates an excessive amount of Uric Acid (often due to diet). Left alone in the blood stream, usually near the feet, Uric Acid particles bind together and harden into little crystal. And these jagged, microscopic, crystals literally stab the soft tissues around the joint and create extreme discomfort that can last for days and sometimes weeks.

II. BIBLIOMETRIC STUDY

The bibliometrics has emerged as a thrust area of research, incorporating different branches of human knowledge. 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. Pritchard (1969) defined the term Bibliometric as the application of statistical and mathematical methods to books and other communication. There are famous Laws of Bibliometric i.e. Lotka's law (1926) of scientific productivity, Bradford's law (1934) of scattering and Zips law (1949) on frequency of words. But the Bibliometric studies started in late sixties.

III. OBJECTIVES OF THE STUDY

The objectives of the study are:

1. To identify the related growth rate and chronological growth of literature on Gout.
2. To identify the country wise and language wise distribution on Gout.
3. To identify the predominant organisation and preferred bibliographic form for the research output for Gout.
4. To identify the highly contributed authors in Gout.
5. To identify the primary journal on Gout.

IV. 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. The search term used for retrieving the bibliographic records as follows:

Your query: (TITLE-ABS-KEY (gout) AND PUBYEAR > 1969 AND PUBYEAR < 2018)

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.

V. DATA ANALYSIS

Year wise Distribution of Research Output

The year wise growth of literature on gout has been analyzed and the same has been shown in table 1. Further ratio of growth (ROG), Relative growth rate (RGR) and Doubling Time (DT) has been calculated and the same has been shown in table. Their exist uniform and study growth of publication in gout research year after year. Hence it can be stated that there exist a linear growth of publication output in the field of research of Gout. A total of 19,687 papers were published in 48 years of the study period. The growth ratio varies from 0.84 to 1.28. From the table 5 it is observed that there exists fluctuation throughout the study period. The RGR ranges between 0.03 and 0.69 and has been increasing from 2000 (0.03) to 2011 (0.05). On the other hand, the Doubling Time (DT) has been increasing from 1.01 to 22.20. The doubling time of 2017 works out to 13.12 which indicate that publication doubles in fourteen years.

Table 1
Year wise Distribution, ROG, RGR and DT

S.No	Year	papers	%	Cum papers	Cum %	ROG	w1	w2	RGR	DT
1	1970	255	1.30	255	1.30	1.00		5.541264	5.54	0.13
2	1971	252	1.28	507	2.58	0.99	5.541264	6.228511	0.69	1.01
3	1972	265	1.35	772	3.93	1.05	6.228511	6.648985	0.42	1.65
4	1973	400	2.03	1172	5.96	1.51	6.648985	7.066467	0.42	1.66
5	1974	448	2.28	1620	8.23	1.12	7.066467	7.390181	0.32	2.14
6	1975	386	1.96	2006	10.19	0.86	7.390181	7.603898	0.21	3.24
7	1976	275	1.40	2281	11.59	0.71	7.603898	7.732369	0.13	5.39
8	1977	287	1.46	2568	13.05	1.04	7.732369	7.850883	0.12	5.85
9	1978	279	1.42	2847	14.47	0.97	7.850883	7.954021	0.10	6.72
10	1979	244	1.24	3091	15.71	0.87	7.954021	8.03625	0.08	8.43
11	1980	243	1.23	3334	16.94	1.00	8.03625	8.111928	0.08	9.16
12	1981	281	1.43	3615	18.37	1.16	8.111928	8.192847	0.08	8.56
13	1982	246	1.25	3861	19.62	0.88	8.192847	8.258681	0.07	10.53
14	1983	245	1.24	4106	20.86	1.00	8.258681	8.320205	0.06	11.26
15	1984	207	1.05	4313	21.91	0.84	8.320205	8.369389	0.05	14.09
16	1985	209	1.06	4522	22.97	1.01	8.369389	8.41671	0.05	14.64
17	1986	195	0.99	4717	23.96	0.93	8.41671	8.458928	0.04	16.41
18	1987	193	0.98	4910	24.95	0.99	8.458928	8.499029	0.04	17.28
19	1988	190	0.97	5100	25.91	0.98	8.499029	8.536996	0.04	18.25
20	1989	202	1.03	5302	26.94	1.06	8.536996	8.575839	0.04	17.84
21	1990	195	0.99	5497	27.93	0.97	8.575839	8.611958	0.04	19.19
22	1991	205	1.04	5702	28.97	1.05	8.611958	8.648572	0.04	18.93
23	1992	219	1.11	5921	30.08	1.07	8.648572	8.686261	0.04	18.39
24	1993	189	0.96	6110	31.04	0.86	8.686261	8.717682	0.03	22.06
25	1994	217	1.10	6327	32.14	1.15	8.717682	8.752581	0.03	19.86
26	1995	224	1.14	6551	33.28	1.03	8.752581	8.787373	0.03	19.92
27	1996	227	1.15	6778	34.43	1.01	8.787373	8.821437	0.03	20.34
28	1997	231	1.17	7009	35.61	1.02	8.821437	8.85495	0.03	20.68
29	1998	275	1.40	7284	37.00	1.19	8.85495	8.893435	0.04	18.01
30	1999	231	1.17	7515	38.18	0.84	8.893435	8.924656	0.03	22.20
31	2000	250	1.27	7765	39.45	1.08	8.924656	8.957382	0.03	21.18
32	2001	257	1.31	8022	40.75	1.03	8.957382	8.989943	0.03	21.28
33	2002	322	1.64	8344	42.39	1.25	8.989943	9.029298	0.04	17.61
34	2003	411	2.09	8755	44.48	1.28	9.029298	9.07738	0.05	14.41
35	2004	446	2.27	9201	46.74	1.09	9.07738	9.127067	0.05	13.95
36	2005	469	2.38	9670	49.12	1.05	9.127067	9.176784	0.05	13.94
37	2006	535	2.72	10205	51.84	1.14	9.176784	9.230633	0.05	12.87
38	2007	528	2.68	10733	54.52	0.99	9.230633	9.281078	0.05	13.74
39	2008	653	3.32	11386	57.84	1.24	9.281078	9.34014	0.06	11.73
40	2009	703	3.57	12089	61.41	1.08	9.34014	9.400051	0.06	11.57
41	2010	790	4.01	12879	65.42	1.12	9.400051	9.463353	0.06	10.95

42	2011	863	4.38	13742	69.81	1.09	9.463353	9.528212	0.06	10.68
43	2012	923	4.69	14665	74.50	1.07	9.528212	9.593219	0.07	10.66
44	2013	963	4.89	15628	79.39	1.04	9.593219	9.656819	0.06	10.90
45	2014	979	4.97	16607	84.36	1.02	9.656819	9.71758	0.06	11.41
46	2015	1036	5.26	17643	89.62	1.06	9.71758	9.778094	0.06	11.45
47	2016	1031	5.24	18674	94.86	1.00	9.778094	9.834887	0.06	12.20
48	2017	1013	5.15	19687	100.00	0.98	9.834887	9.887714	0.05	13.12
		19687	100.00							

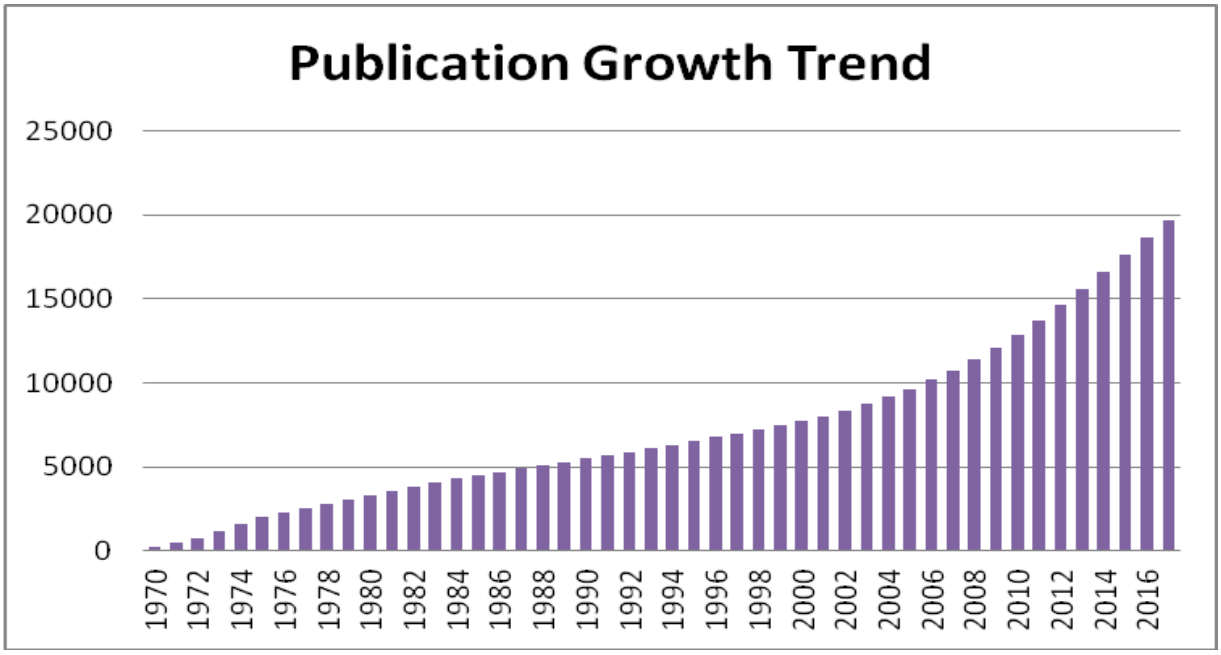

Fig 1: Publication Growth Trend

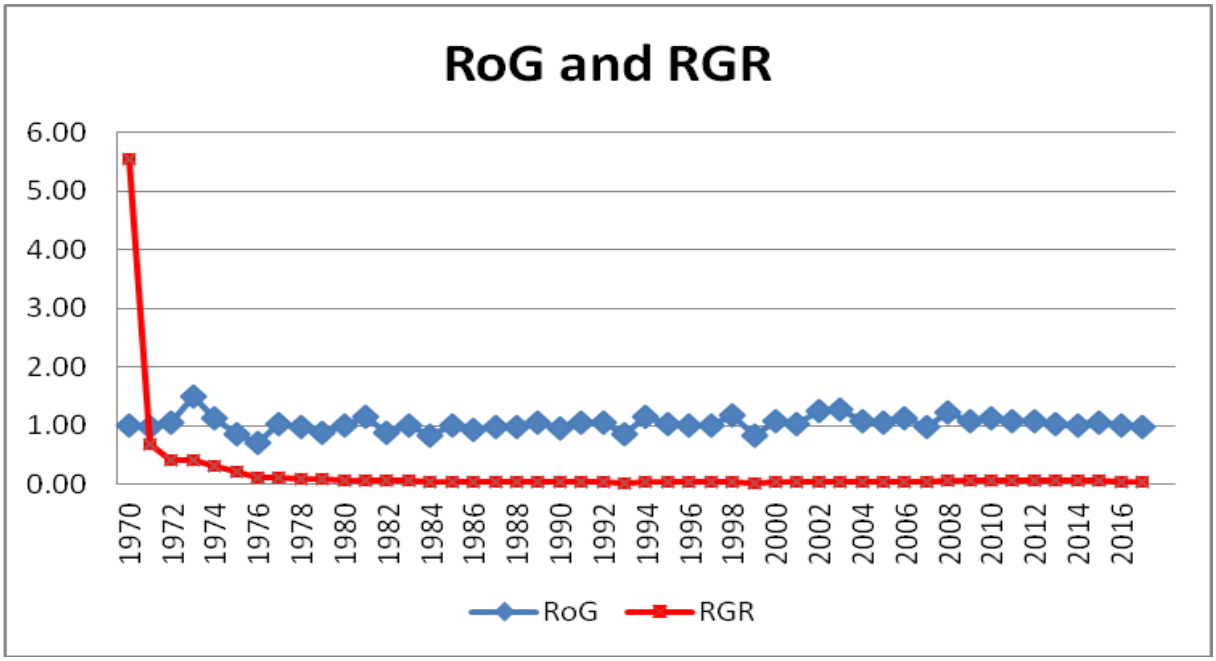

Fig 2 ROG and RGR

Country wise Distribution of Research Output

The country wise distribution has identified and the countries whose publication was more than 500 contributions were shown in table 2. 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%.

Table 2: Country wise Growth 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

Form wise Distribution of Research Output

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 12 different bibliographic formats. Nearly 69.47% of publications are published has journal articles. It is followed by Review papers (15.74%) and Letters (4.87%). The Conference papers account to 1.86% only in Gout research output.

Table 3: Type of Document

S.No.	Type	papers	%
1	Article	13677	69.47
2	Review	3099	15.74
3	Letter	958	4.87
4	Note	517	2.63
5	Short Survey	393	2.00
6	Editorial	377	1.91
7	Conference Paper	366	1.86
8	Book Chapter	197	1.00
9	Erratum	46	0.23
10	Article in Press	34	0.17
11	Book	21	0.11
12	Conference Review	2	0.01
	Total	19687	100

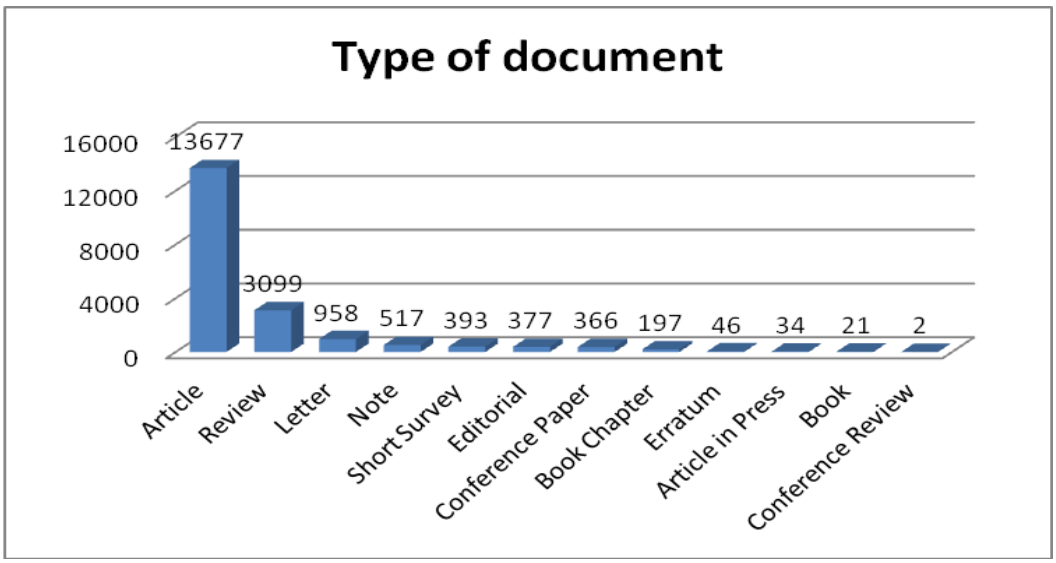

Fig 3 Type of document

Language wise Distribution of Research Output

The language wise contribution of Gout research output has also been identified and the same is shown in table 4. Out of 19,687 papers, 15,110 (76.75%) of papers were published in English language. Nearly 23.25% of articles were published in other languages.

Table 4|: Language wise Growth of Publications

S.No.	Language	Papers	%
1	English	15110	76.75
2	German	1357	6.89
3	French	1168	5.93
4	Spanish	327	1.66
5	Japanese	314	1.59
6	Russian	302	1.53
7	Italian	282	1.44
8	Others	827	4.21
	Total	19687	100.00

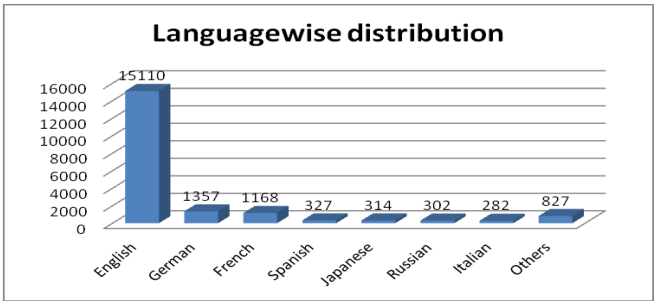

Fig 4 Language wise distribution

Primary sources in Gout Literature

The primary source of gout literature has been identified and the same has been shown in table 5. The journal that has more than 100 articles were identified and the same has been shown in table. 3,051 (15.5%) articles appeared in 18 journals. Among the 18 journals "Journal of Rheumatology" has 458 (2.33%) articles. It is followed by "Annals of the Rheumatic Diseases" (376, 1.91%); "Arthritis Rheumatism" (189. 0.96%); and "Advances in Experimental Medicine and Biology" (184, 0.93%).

Table 5: Ranked List of Top 18 Journals

S.No	Journal Name	Papers	%
1	Journal of Rheumatology	458	2.33
2	Annals Of The Rheumatic Diseases	376	1.91
3	Arthritis Rheumatism	189	0.96
4	Advances In Experimental Medicine And Biology	184	0.93
5	Journal Of Clinical Rheumatology	181	0.92
6	Clinical Rheumatology	161	0.82
7	Arthritis And Rheumatism	152	0.77
8	Rheumatology	149	0.76
9	American Journal Of Medicine	143	0.73
10	Seminars In Arthritis And Rheumatism	135	0.69
11	New England Journal Of Medicine	130	0.66
12	Current Opinion In Rheumatology	123	0.62
13	Rheumatology International	120	0.61
14	Nippon Rinsho Japanese Journal Of Clinical Medicine	116	0.59
15	Arthritis Research And Therapy	115	0.58
16	Clinical And Experimental Rheumatology	112	0.57
17	Therapiewoche	106	0.54
18	Joint Bone Spine	101	0.51
	Total	3051	15.5

Organization in Gout Research

The organization that involved in research on gout has been identified and the same has been shown in table 6. The organization that has published more than 100 articles were identified and the same has been shown in table. Nearly 17 organizations has published more than 100 articles during the study period. A total of 2,736 (13.89%) articles were produced by 17 organizations. Among the 17 organizations "VA Medical Center" has contributed 500 (2.54%) publications. It is followed by "University of Auckland" (252, 1.28%); "University of Otago" (212, 1.08%) and "Harvard Medical School" (182, 0.92%)

Table 6 :Contribution by Organization

S.No.	Organization	Papers	%
1	VA Medical Center	500	2.54
2	University of Auckland	252	1.28
3	University of Otago	212	1.08
4	Harvard Medical School	182	0.92
5	University of California, San Diego	159	0.81
6	University of Pennsylvania	150	0.76
7	Hopital Lariboisiere AP-HP	138	0.70
8	Inserm	136	0.69
9	Brigham and Women's Hospital	130	0.66
10	Duke University School of Medicine	128	0.65
11	Universite Paris 7- Denis Diderot	115	0.58

12	Chang Gung Memorial Hospital	111	0.56
13	University of Toronto	110	0.56
14	Ludwig-Maximilians-Universitat Munchen	106	0.54
15	Boston University School of Medicine	104	0.53
16	Guy's and St Thomas' NHS Foundation Trust	103	0.52
17	Massachusetts General Hospital	100	0.51
	Total	2736	13.89

Contributors of Gout Research

The authors who have contributed more than 50 articles in gout research has been identified and the same has been shown in table 7. A total of 2,043 (10.37%) articles were published by 27 authors. These 27 authors has contributed more than 50 articles each in gout research, Dalbeth contributed 243 (1.23%) papers. It is followed by Schumacher (115, 0.58%); Choi (96, 0.49%) and Perez-Ruiz (92, 0.47%).

Table 7: Authors' Contribution

S.No.	Author	Papers	%
1	Dalbeth, N.	243	1.23
2	Schumacher, H.R.	115	0.58
3	Choi, H.K.	96	0.49
4	Perez-Ruiz, F.	92	0.47
5	Stamp, L.K.	91	0.46
6	Doherty, M.	89	0.45
7	Schlesinger, N.	84	0.43
8	Singh, J.A.	83	0.42
9	Mertz, D.P.	81	0.41
10	Bardin, T.	76	0.39
11	Becker, M.A.	76	0.39
12	Simmonds, H.A.	72	0.37
13	Taylor, W.J.	65	0.33
14	Moriwaki, Y.	63	0.32
15	Merriman, T.R.	61	0.31
16	Yamamoto, T.	61	0.31
17	Pascual, E.	59	0.30
18	Terkeltaub, R.	58	0.29
19	Hosoya, T.	56	0.28
20	Puig, J.G.	55	0.28
21	Scott, J.T.	55	0.28
22	Roddy, E.	54	0.27
23	LiotÃ©, F.	53	0.27
24	Ichida, K.	52	0.26
25	Neogi, T.	51	0.26
26	Richette, P.	51	0.26
27	Takahashi, S.	51	0.26
	Total	2043	10.37

VI. FINDINGS OF STUDY

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.
- 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%.
- 19,687 papers appeared in 12 different bibliographic formats. Nearly 69.47% of publications are published has journal articles. It is followed by Review papers (15.74%) and Letters (4.87%).
- Only 76.75% of papers were published in English language. Nearly 23.25% of articles were published in other languages.
- 18 journals that has more than 100 articles. Nearly 3,051 (15.5%) articles appeared in 18 journals. Among the 18 journals "Journal of Rheumatology" has 458 (2.33%) articles. It is followed by "Annals of the Rheumatic Diseases" (376, 1.91%); "Arthritis Rheumatism" (189. 0.96%); and "Advances in Experimental Medicine and Biology" (184, 0.93%).
- Nearly 17 organizations has published more than 100 articles during the study period. A total of 2,736 (13.89%) articles were produced by 17 organizations. Among the 17 organisations "VA Medical Center" has contributed 500 (2.54%) publications. It is followed by "University of Auckland" (252, 1.28%); "University of Otago" (212, 1.08%) and "Harvard Medical School" (182, 0.92%)
- A total of 2,043 (10.37%) articles were published by 27 authors. These 27 authors has contributed more than 50 articles each in gout research, Dalbeth contributed 243 (1.23%) papers. It is followed by Schumacher (115, 0.58%); Choi (96, 0.49%) and Perez-Ruiz (92, 0.47%).

- Their exist uniform and study growth of publication in gout research year after year. Hence it can be stated that there exist a linear growth of publication output in the field of research of Gout.
- The growth ratio varies from 0.84 to 1.28. From the table it is observed that there exists fluctuation throughout the study period. The RGR ranges between 0.03 and 0.69 and has been increasing from 2000 (0.03) to 2011 (0.05). On the other hand, the Doubling Time (DT) has been increasing from 1.01 to 22.20. The doubling time of 2017 works out to 13.12 which indicate that publication doubles in fourteen years.

VII. CONCLUSION

The study shows that their exist substantial growth of research output on gout research. This indicates that the deceases get the attentions of the researchers towards identifying the remedy for the decease. 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. English seems to be the preferred language for Gout research. The study also shows that only 75% of articles were in English which indicates that the research on gout was presented in the language familiar to the people of their country in order to reach the community.

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