LOTKA'S LAW AND PATTERN OF AUTHOR PRODUCTIVITYOFORTHOPEDICSIN PUB MED DATABASE: A BIBLIOMETRIC STUDY

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Abstract –
Orthopedic surgery or orthopedics is the branch of surgery concerned with conditions involving the musculoskeletal system. Orthopedic surgeons use both surgical and nonsurgical means to treat musculoskeletal trauma, spine diseases, sports injuries, degenerative diseases, infections, tumors, and congenital disorders. USA ranks at top position with 42240 (33.48 %) contribution. The Year wise distribution of contribution is out of the total 126181 contributions majority of the contributions 29970 contributions were contributed in 2018. Author wise distribution of contribution it was observed that Zhang Y ranked the top position with 162 (0.13 %) contributions. The highest number of publications was published by single author 127068 (17.54 %) contributions. highest number of author's productivity is 185858 (25.66 %) contributions were contributed in 2018. Single author highest with 10960 (41.70 %) contribution were contributed in 2017 and the Co- Authorship pattern for multi authored papers highest with 24972 publication (83.32%) contribution were contributed in 2018. The Lotka's law (Number of Authors), the total 724380 authors the highest number of publications were published by single authors 127068(log of Y 5.10 %) contributions.

Keywords: Orthopedics, Lotka's Law , Pattern of Author Productivity, PubMed Database, Biblioshiny, Bibliometrics.

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Introduction:

Kovack, T. J., Jacob, P. B., &Mighell, M. A. (2014).The elbow is a complex joint that is the mechanical link in the upper extremity between the hand and the shoulder. Loss of elbow function can severely affect activities of daily living. Arthrodesis of the elbow results in greater functional disability than arthrodesis of the ankle, hip, or knee joints. Arthrodesis is mainly performed for severe joint destruction most commonly due to posttraumatic arthrosis, instability, or infection. The authors describe a new technique of elbow arthrodesis using a step-cut osteotomy that has not been previously reported. They believe that this can increase the surface area for healing with the outcome of a higher fusion rate. It is most important, however, to achieve good compression with lag screws across the fusion site after the desired angled has been achieved. Elbow arthrodesis is not a common orthopedic procedure, but the authors believe that their novel technique provides a reproducible and reliable way to achieve a high fusion rate and desired fusion angle.

Grubor, P., Falzarano, G., Medici, A., Grubor, M., Franzese, R., Errico, G., Martino, A., Lucio Roberto, V., Meccariello, L., Orthopedics, U., &Ospedaliera, A. (n.d.).The Damage Control Orthopedics (DCO) with external fixation is the most valuable aid for a surgeon, when a quick and efficient solution to war and civil injuries to the extremities and pelvis is needed.The complications in War trauma with external fixators were as follows: 86 (5.46%) pin tract infections, 3 (0.19%) pin breakages, 42 (2.66%) fixator reassembly procedures due to inadequate primary placement of the external fixator, 6 (0.38%) iatrogenic vascular lesions inflicted with the drill or pin, and 4 (0.25%) iatrogenic nerve lesions. The complication in Traffic accident with external fixation as follows: Pin tract infection 18(3.02%), Pin breakage 0(0%), Fixator reassembly 8(1.34%) , Vascular lesions 1(0.16%), Neurological lesions 2 (0.33%).War injuries, External Fixation, Damage Control Orthopedics, Bosnian War, Traffic accident.

Bibliometrics:

Bibliometrics is the use of statistical methods to analyse books, articles and other publications, especially in regard with scientific contents. Bibliometric methods are frequently used in the field of library and information science. Bibliometrics is closely associated with scientometrics, that is the analysis of scientific metrics and indicators, to the point that both fields largely overlap.Bibliometrics is the use of statistical methods to analyse books, articles and other publications, especially in regard with scientific contents. Bibliometric methods are frequently used in the field of library and information science.

Biblioshiny:

Biblioshiny is a shiny app providing a web-interface for bibliometrix. + It supports scholars in easy use of the main features of bibliometrix: Data importing and conversion to data frame collection. Data gathering using Dimensions, Pub Med and Scopus APIs collection.bibliometrix is an open-source tool for executing a comprehensive science mapping analysis of scientific literature. It was programmed in R language.

Orthopedics:

Orthopedic surgery or orthopedics, is the branch of surgery concerned with conditions involving the musculoskeletal system. Orthopedic surgeons use both surgical and nonsurgical means to treat musculoskeletal trauma, spine diseases, sports injuries, degenerative diseases, infections, tumors, and congenital disorders.

orthopedics, also called orthopedic surgery, medical specialty concerned with the preservation and restoration of function of the skeletal system and its associated structures, i.e., spinal and other bones, joints, and muscles.

Pub Med:

PubMed is a free search engine accessing primarily the MEDLINE database of references and abstracts on life sciences and biomedical topics. The United States National Library of Medicine at the National Institutes of Health maintain the database as part of the Entrez system of information retrieval.

Review of Literature

Alcaide Munoz, L., Rodriguez Bolívar, M. P., Cobo, M. J., & Herrera Viedma, E. (2017). This study presents a science mapping approach to analysing the thematic evolution of the e-Government field. We combine different bibliometric tools to analyses the evolution of the cognitive structure of this research topic, allowing us to discover the dynamics over different years and detecting the most prominent, productive, and highest-impact subfields. Science mapping provides a novel perspective to reveal the scientificfrontiersanddy-namic structure with visualization methods. Findings indicate symptoms of a researchfield in constant evolutionthat has not yet reached a stage of maturity, and specially, in the following areas of study: smart cities (provision ofpublic services), e-Participation (political area) and technologies used and citizen's acceptance

(technological tools).e-Government, Science mapping, Co-word analysis, Bibliometric studies, Thematic evolution

Bhagat M. P., (2021),*Mapping of Osteoarthritis Research Output at Global Level: A Scientometric Study*. This Paper analyzed research review articles output for a period of five years between 2016 to and 2020. Web of Science database a service from Clarivate Analytics has been used to download citation and source data. His cite application software has been used to present the datasets. Analysis part focuses on the parameters like citation impact at local and global level, influential authors and their total output, ranking of contributing institutions and countries and scientographical mapping of data is presented through graphs usingVOSviewer software mapping technique.

Khaparde V., (2013),*TheBibliometric Analysis of Research Publication of Department of Chemistry, Dr. Babasaheb Ambedkar Marathwada University, from 1975 to 2012*. It analyzed all the 774 research publications from the 144 journals. It examines year- wise distribution of papers, authorship pattern, journal in which author publish, it revealed that the number of publications has increased consistently from the year 1975 to the year 2012. 25% of the total publications have been made in 2009, 2010, and 2011. And the majority of the publications are made with 4 authors. And also the majority of the research paper published in Journal of Heterocyclic Chemistry.

Objectives of the Study:

The primary objective of this study is toOrthopedics lotka's law and pattern of author productivity in Pub Med database: A Bibliometrics Study. and their research output in during the period 2014 -2018. More specific objectives are as follows:

- To study the Year wise distribution of contributions.
- To study the Author wise distribution of contribution.
- To study the Number of Authors wise distribution of contribution.
- To study the Lotkas Law distribution of contribution.
- To study the Papers Productivity Per Authors (PPA) distribution of contribution.
- To study the Co – Authorship Index distribution of contribution.
- To find out Geographical distribution of contributions at international level.

Scope and Limitation of the Study:

The present study is based on the Bibliometrics Profiles of Orthopedics lotka's law and pattern of author productivityin Pub Med database: A Bibliometrics Study. The present study is based on over all 126181articles during 2014 -2018.

Data Collection:

Data can be numerically expressed that is quantified quantifiable or objective (Fasibs off and Dely, 1990) the data was collected from Articles of Orthopedics lotka's law and pattern of author productivity in Pub Med database, with the help of Excel. total 126181 articles, during 2014 - 2018.

Data Analysis and Interpretation:

Scientometrics analysis is a branch of bibliometrics. It is an important research tools for understanding of the subject it aims at measuring the utility of documents and relationship between documents and fields. The present study is based on the Bibliometrics Profiles of Orthopedics lotka's law and pattern of author productivityin Pub Med database:A Bibliometrics Study during 2014-2018. The present study is based on over all 126181articles during 2014 -2018.

1. Year Wise Distribution of Contributions

Sr. No.	Year	Output	Output %	Cumulative output	Cumulative %
1	2014	19700	15.61	19700	15.61
2	2015	23760	18.83	43460	34.44
3	2016	26470	20.98	69930	55.42
4	2017	26281	20.83	96211	76.25
5	2018	29970	23.75	**126181**	**100**
Total		**126181**	**100**		

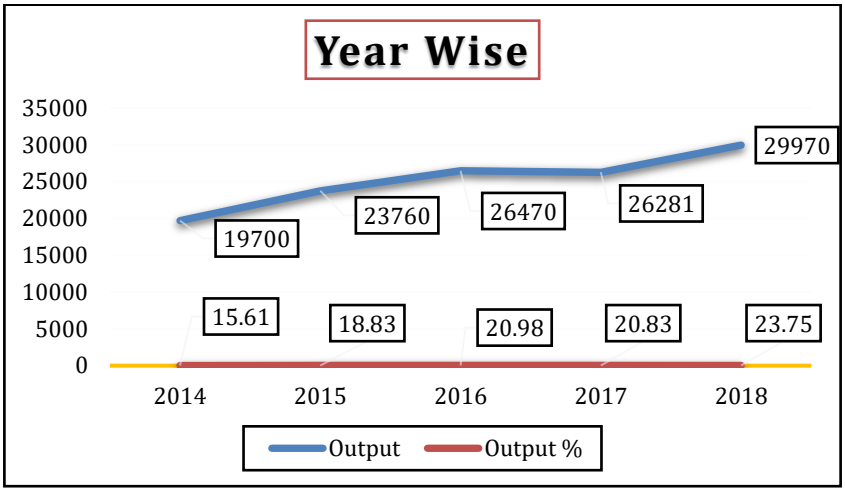

Figure No.1 Year Wise (2014-2018)

The distribution of contribution (year – wise) is shown in Table Number 1 and FigureNo.1 out of the total 126181 contributions majority of the contributions i.e., 29970 contributions were contributed in 2018 were as minimum contributions i.e., 19700 contributions were contributed in 2014.

2. Author wise distribution of contribution

Sr. No	Name of Authors	Frequency	%	Cumulative	Cumulative %
1	Zhang Y	162	0.13	162	0.13
2	Wang Y	122	0.10	284	0.23
3	Wang J	115	0.09	399	0.32
4	Wang H	113	0.09	512	0.41
5	Li J	102	0.08	614	0.49
6	Li Y	100	0.08	714	0.57
7	Wang L	96	0.08	810	0.64
8	Wang X	85	0.07	895	0.71
9	Liu Y	84	0.07	979	0.78
10	Li X	82	0.06	1061	0.84
	More Authors	125120	99.16	**126181**	**100.00**
Total		**126181**	**100.00**		

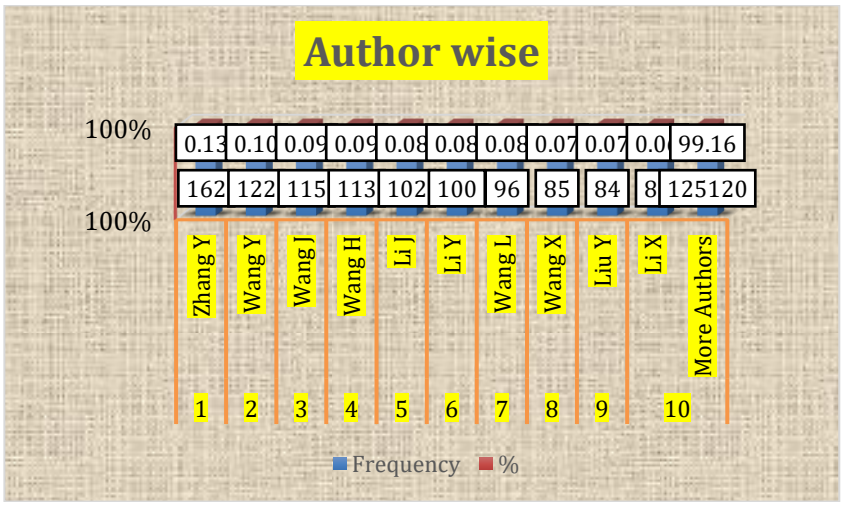

Figure No. 2 Author wise

It was observed from Table Number. 2 and FigureNumber. 2 that Zhang Y ranked the top position with 162 (0.13 %) contributions followed by Wang Y with 122 (0.10 %)contributions, Wang J with 115 (0.9 %) contributions, Wang H 113 (0.09 %) contributions, LiY 100 (0.08%) contributions, and 125120 (99.16 %) contributions with more authors.

3. Number of Authors wise distribution of contribution

Sr.No	Number of Authors	Frequency	Precentage	Cumulative Number of Authors	Cumulative %
1	Single	127068	17.54	127068	17.54
2	Two	98505	13.60	225573	31.14
3	Three	94577	13.06	320150	44.20
4	Four	75184	10.38	395334	54.58
5	Five	68956	9.52	464290	64.09
6	Six	55539	7.67	519829	71.76
7	Seven	42280	5.84	562109	77.60
8	Eight	38844	5.36	600953	82.96
9	Nine	16170	2.23	617123	85.19
10	Ten	4153	0.57	621276	85.77
	More Than Ten Authors	103104	14.23	**724380**	**100.00**
Total		**724380**	**100.00**		

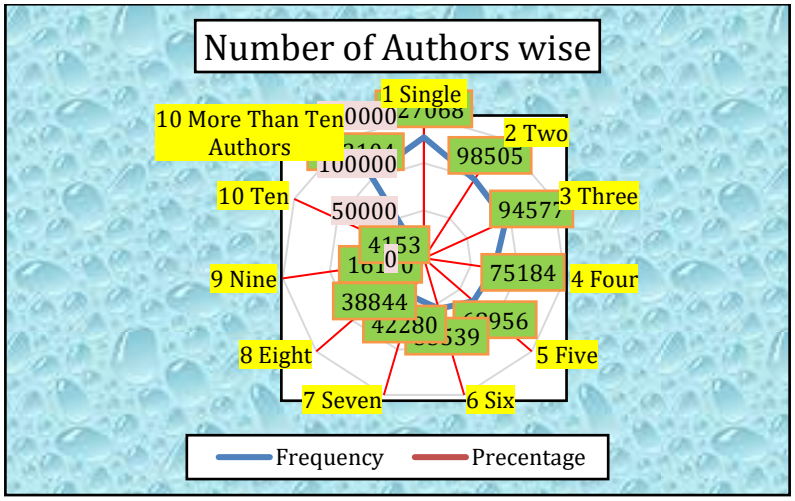

Figure No.3 Number of Authors wise

Table Number. 3 and Figure Number. 3 it was seen that the highest numbers of publications were published by single author 127068 (17.54 %)contributions, followed by two authors 98505 (13.60 %) contributions, then three authors 94577 (13.06 %) contributions. The lowest numbers of articles were published by ten authors 4153 (0.57 %)contributions. more then ten authors 103104 (14.23 %)contributions.

4. Lotka's lawdistribution of contribution

X	g(x)	X = ln(x)	Y = ln(y)	XY= ln(x)*ln(y)	X^2=ln(x)*ln(x)
1	127068	0.000	5.104	0.000	0.000
2	98505	0.301	4.993	1.503	0.091
3	94577	0.477	4.976	2.374	0.228
4	75184	0.602	4.876	2.936	0.362
5	68956	0.699	4.839	3.382	0.489
6	55539	0.778	4.745	3.692	0.606
7	42280	0.845	4.626	3.910	0.714
8	38844	0.903	4.589	4.145	0.816

9	16170	0.954	4.209	4.016	0.911
10	4153	1.000	3.618	3.618	1.000

The Distribution of contributions (Number of Authors – wise) is shown in Table Number .4 the Lotka's law (Number of Authors), the total 724380 authors has published the papers in the PubMed databases during 2014-2018.The highest numbers of publications were published by single authors 127068(log of Y 5.10 %) contributions, followed by two authors 98505 (log of Y 4.99%) contributions, then three authors 94577 (log of Y 4.97%) contributions. The lowest numbers of articles were published by ten authors 4153 (log of Y 3.61 %) contributions.

5. Papers Productivity Per Authors (PPA) distribution of contribution.

Sr.No	Year	Total No.of Papers	%	Total No.of Authors	%	AAPP*	Producativity per Authors
1	2014	19700	15.61	109487	15.11	5.558	0.180
2	2015	23760	18.83	138948	19.18	5.848	0.171
3	2016	26470	20.98	126593	17.48	4.783	0.209
4	2017	26281	20.83	163494	22.57	6.221	0.161
5	2018	29970	23.75	185858	25.66	6.201	0.161
Total		**126181**	**100.00**	**724380**	**100.00**	**5.741**	**0.174**

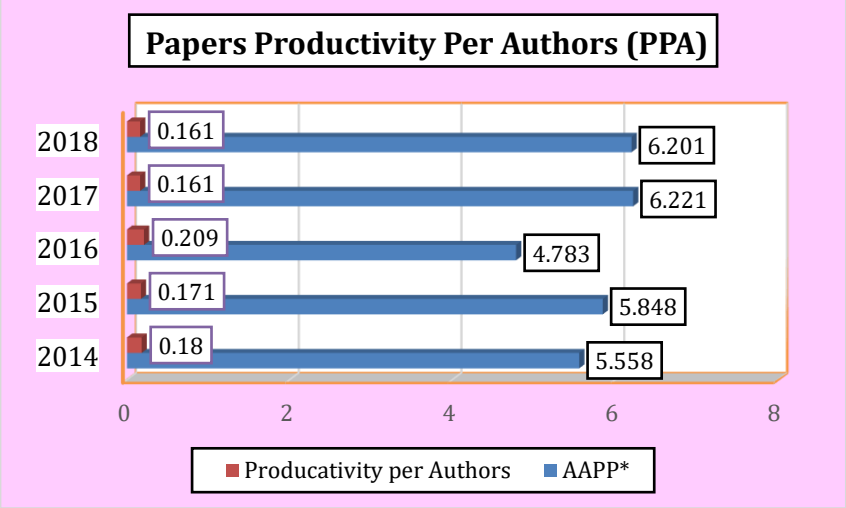

Figure No. 4Papers Productivity Per Authors (PPA)

(Notes: *Average Authors per paper (AAPP) =Number of authors /Number of papers. Productivity per author = Number of papers / Number of authors.)

Table Number. 5 and FigureNumber.4 Shows the data related to author's productivity. The total average number of authors per paper is 5.741 and the average productivity per authors is 0.174.The highest number of author's productivity is 185858 (25.66 %) contributions were contributed in 2018. The minimum number of author's productivity is 109487(15.11%) contributions were contributed in2014.

6. Co – Authorship Index distribution of contribution

Year	Author Nature	Frequency	Total	Precentage
2014	Single Authors	9046	19700	45.92
	Co - Authors	10654		54.08
2015	Single Authors	10453	23760	43.99
	Co - Authors	13307		56.01
2016	Single Authors	8479	26470	32.03
	Co - Authors	17991		67.97
2017	Single Authors	10960	26281	41.70

	Co - Authors	15321		58.30
2018	Single Authors	4998	29970	16.68
	Co - Authors	24972		83.32
Total			**126181**	**100**

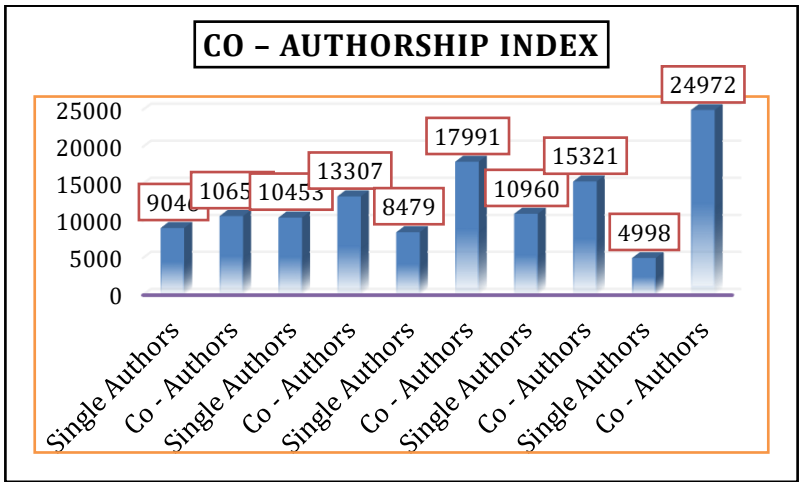

Figure. 5 Co – Authorship Index distribution of contribution

Table Number. 6and Figure Number.5 observed that the value of Co-Authorship Pattern for Single authored papers during 2014-2018 was highest with 10960 (41.70 %) contribution were contributed in 2017 and the Co- Authorship pattern formulti authored papers highest with 24972 publication (83.32%)contribution were contributed in 2018 ,which indicates that the collaborative research is increasing in the study. Single Author 10960 (41.70 %)contribution were contributed in 2017 and Co – Authors 24972 (83.32%) contribution were contributed in 2018.

7. Geographical distribution of contributions at international level

Sr.No	**Country**	**Frequency**	**%**	**Cumulative**	**Cumulative %**
1	United States	42240	33.48	42240	33.48
2	United Kingdom	13109	10.39	55349	43.86
3	Germany	11707	9.28	67056	53.14
4	Netherlands	6938	5.50	73994	58.64
5	France	3053	2.42	77047	61.06
6	Japan	1551	1.23	78598	62.29
7	Italy	1017	0.81	79615	63.10
8	Greece	919	0.73	80534	63.82
9	Scotland	783	0.62	81317	64.44
10	Ireland	641	0.51	81958	64.95
	More Country	44223	35.05	**126181**	**100.00**
Total		**126181**	**100.00**		

Figure. 6 Geographical distribution of contributions at international level

Table Number. 7 &Figure Number .6Most relevant countries the top 20 countries (out of 126181 in total) are presented in Fig. 6The picture above shows the country names, USA ranks at top position with 42240 (33.48 %) contribution followed by second position United Kingdom 13109 with (10.39 %) contribution. Third position Germany 11707 (9.28 %) contribution. and 44223 (35.05%)countries contributed multiple contribution.

Conclusion:

The occurence of an intrathoracic fracture dislocation of the proximal humerus represents a true emergency despite the initial clinical presentation being benign.Subtle clinical indicators of an intrathoracic dislocation include subcutaneous emphysema and the absence of a palpable radial head in the anterior shoulder or axilla.Definitive Management should include concurrent orthopaedic and thoracic surgical consultation. Orthopaedic management would generally consist of hemiarthroplasty, although internal fixation may be attempted in a young patient. The indications for thoracotomy and extraction of the humeral head include progressive cardiopulmonary compromise. Most importantly, awareness of this entity is important as it can be easily overlooked as it was by our trauma service.

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