



Research Article

Applicability of Lotka's Law to Global Publications on Spondylotic Myelopathy: A Scientometric Analysis

P. Victoria* and E.S. Kavitha

Department of Library and Information Science, Periyar University, Tamil Nadu, India

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Correspondence

victo97riya@gmail.com

Abstract

The escalating demand for high-performance electronics necessitates innovative dielectric materials capable of efficient heat dissipation and robust interfacial stability. Herein, we present an interfacial engineering approach to fabricate multifunctional polyarylene ether nitrile (PEN)-based composite films, addressing critical challenges in thermal management and wear resistance. Through designing codeposition process, heterostructure fillers (Ag-SiCws, Ag-BNNS, and SiCws-BNNS) were synthesized and functionalized by polydopamine (PDA) and polyethyleneimine (PEI), ensuring optimal dispersion and interfacial adhesion within the PEN matrix. Results show that different heterostructure fillers are inconsistent for constructing heat transfer pathways, but all of them can achieve effective attenuation of interfacial phonon scattering. At the same time, the formation mechanism of heat conduction channels in the multi-component PEN-based films is deeply deduced with the help of finite element analysis and tribological behavior analysis. The excellent frictional performance is not only attributed to the rigid skeleton of filler, but also the synergistic effect of interfacial optimization, which effectively suppresses the accumulation of frictional heat during the sliding process. In addition, the effectiveness of interfacial optimization was further confirmed by a combination of mechanical and electrical property tests. Therefore, this study provides a way to solve the heat dissipation problem of electronic devices and to improve the stability and lifetime.

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I. INTRODUCTION

Myelopathy is a type of spinal cord injury that occurs due to severe compression resulting from various conditions such as spinal stenosis, disc degeneration, disc herniation, autoimmune disorders, or other traumas. Cervical spondylotic myelopathy (CSM) is a neurological disorder that develops slowly over time as degenerative changes in the spine lead to a reduction of the spinal canal and nearby structures. It is the most standard form of spinal cord injury in adults, but unfortunately, it often goes undiagnosed. Cervical spondylotic myelopathy is caused by spondylosis, or age-related regression, and is the most common spinal disorder in Americans over 55 years old. Common degenerative differences contributing to this disease include bone spurs (osteophytes), disc bulges, and thickened ligaments. Scientometrics, a field of study, involves the quantitative analysis of science, communication in science, and science policy, as defined by Hess (1997). In this field,

indexes serve as objective tools, providing data that reflects the significance of a study, researcher, or research institution. These indexes allow for straightforward comparisons of the impact of an article, journal, author, or institution within the scientific community. This approach fosters an objective evaluation of research quality and effect, a crucial step in identifying the most significant scientific contributions.

A. Lotka's Law of Scattering of Scientific Papers

In 1926, Alfred J. Lotka suggested his inverse square law correlating contributions of scientific papers to their number of contributions. His law provided a fundamental theoretical base for bibliometrics studies involving authorship. Lotka then planned the chart on a logarithmic ranking, the number of authors against the number of contributions made by each author in a straight line, having a slope of approximately two to one. Based on thesis data, Lotka deduced a general

equation for the relation between the frequencies of persons making 'x' contributions as follows:

$X \propto \frac{1}{n^2}$ And for the particular topic $n = 2$, the constant is 0.6079. Additionally, he summarized the impacts as follows:

"In the topic investigated, it is found that the number of persons earning 2 contributions is about one-fourth of those assembling one contribution, the number making 'n' contributions is about $\frac{1}{n^2}$ of those making one and the ratio of all contributions is about 60 percent". The formula is also called the Inverse Square Law (Tsay, 2003).

$$N = \frac{N \sum XY - \sum X \sum Y}{N \sum X^2 - (\sum X)^2}$$

$$C = \frac{1}{\sum 1/x^n}$$

Kolmogorov – Smirnow (K-S) test formula is:

$$K-S = \frac{1.63}{\sqrt{N}}$$

II. REVIEW OF LITERATURE

Huang *et al.*, (2022) study used bibliometric analysis to identify and summarize publications related to surgical interventions for cervical spondylosis. The study yielded 2,110 publications, with the United States being the most prolific country and the University of Toronto emerging as the most productive organization. Spine was the most productive journal, with 308 publications. The study identifies "Degenerative cervical myelopathy," "surgical outcomes," "association," "sagittal alignment," and "prognostic factors" as future research hotspots.

Kumar *et al.*, (2022) conducted a bibliometric analysis of clinical studies on cervical spondylotic myelopathy (CSM) published over the past 50 years, identifying trends, themes, and top-performing countries, journals, authors, and articles. The study revealed two main research themes, with emerging trends focusing on scale-based objective evaluations and nonoperative management. The United States emerged as the most productive country, with a shift toward noninvasive procedures observed.

ES, Kavitha, and Kumari, E. N. (2021) analyzed how bibliometrics can assist libraries in understanding local community journal usage and identifying influential journals for subscription. A Cancer Journal for Clinicians from 2010 to 2019, analyzing 419 articles that received 252,572 citations. Key findings include citation per year, citation per paper, cites per author, H-index, G-index, HC-index, HI-index, HI-norm, AWCR, AW-index, and AWCRpA.

The study also highlighted prolific authors and predicted future research productivity growth. Yu-Chun Chen, Chao-Hung Kuo *et al.*, (2019) researched the increasing prevalence of Cervical Spondylotic Myelopathy (CSM) as a cause of spinal cord issues in older people globally. The study aimed to analyze current trends in CSM studies and recent surgical technique developments for its treatment. The authors

reviewed 1,008 papers published between 1975 and 2018, mainly focusing on disease progression, diagnosis, and treatment. They noted a growing number of studies from Asian countries and an increasing trend toward anterior neck surgeries for CSM.

The authors emphasized further research on optimal timing and surgical approaches for CSM. In 2017, Chinnaraj Murugan conducted a comprehensive review of nephrology research output from 2007 to 2016. He utilized data from the Web of Science database maintained by Thomson Reuters and analyzed 4,655 records with 47,384 citations. On average, each article had 10.05 citations. Nephrology is a technological area of medicine focused on diagnosing and managing kidney diseases in adults and children.

As the kidneys are critical in maintaining proper fluid and electrolyte balance, it is an essential study area. The analysis employed different statistical tools to analyze the collected data, including Authorship Pattern, Relative Growth Rate, Time Series Analysis, Zipf Law, Exponential Growth Rate, and the 'Bib excel tool'. A study conducted by Wu *et al.*, (2013) analyzed hospitalization rates for cervical spondylotic myelopathy (CSM) using the National Health Insurance Research Database (NHIRD) in Taiwan. The study discovered that CSM-related hospitalizations occurred at a rate of 4.04 per 100,000 person-years, with higher rates in older and male patients. Patients who underwent nonoperative management were more likely to develop subsequent spinal cord injury (SCI) compared to those who underwent surgery. As such, patients with CSM who choose nonoperative management should be made aware of the potential risks of SCI.

III. METHODOLOGY

We conducted a thorough search for data on spondylotic myelopathy using reliable sources such as Web of Science Core Collection citation databases, including SCI-Expanded, SSCI, and A&HCI. Our search was focused on the topic field and limited to a 10-year range from 2013 to 2022, resulting in a sample of 2,242 world records. To analyze the data, we transferred it to an Excel spreadsheet. We utilized VOSviewer and Bibexcel software to visually represent author productivity using Lotka's inverse law of scientific productivity. These rigorous methodological processes have resulted in a valuable resource for investigators and practitioners in the field, providing them with recent and dependable data.

IV. OBJECTIVES OF THE STUDY

1. To access the year-wise publication and growth pattern of literature on spondylotic myelopathy.
2. To study the most prolific authors and country-wise production.
3. To describe the CAI (Co-Authorship Index) and year-wise authorship pattern.

4. To show the keywords of literature output and the degree of collaboration.
5. To analyze the applicability of Lotka’s law of author productivity.
6. To identify the languages.

A. Data Analysis and Interpretation

Provided in Table I is a comprehensive summary of the global research publications on spondylotic myelopathy spanning a decade, from 2013 to 2022. The data reveal that a total of 2,242 research papers were published during this period, with the highest number of articles, 260 (7.18%), appearing in 2021. In contrast, 2014 saw the lowest productivity with only 106 (11.51%) articles published. Overall, the table demonstrates a steady growth in the development and research trends associated with spondylotic myelopathy over the 10 years.

TABLE I YEAR WISE PUBLICATIONS ON SPONDYLOTIC MYELOPATHY

Sl.No.	Year	Records	Percentage
1	2013	145	11.60%
2	2014	106	11.51%
3	2015	205	11.42%
4	2016	207	11.42%
5	2017	256	11.11%
6	2018	258	10.93%
7	2019	249	9.23%
8	2020	256	9.14%
9	2021	260	7.18%
10	2022	245	6.47%
Total		2242	100%

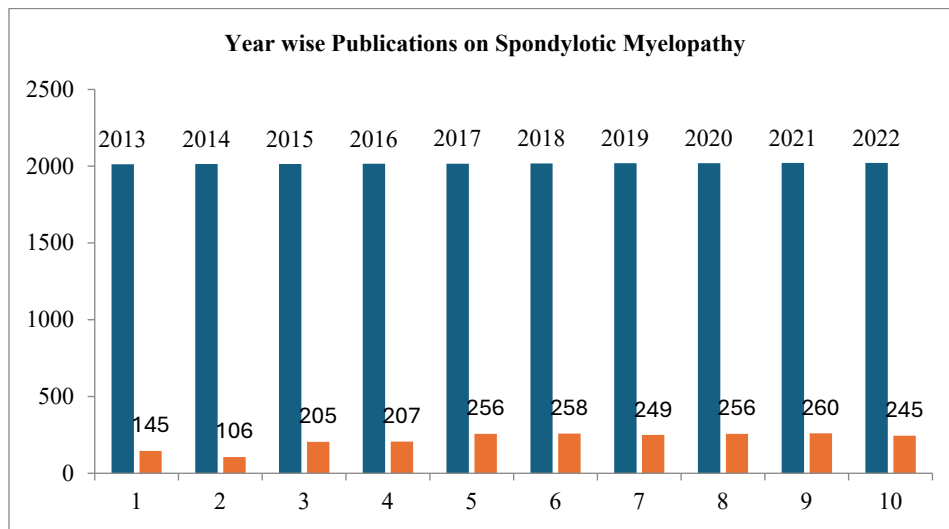


Fig.1 Year-wise Publications on Spondylotic Myelopathy

TABLE II YEAR WISE PUBLICATIONS WITH CITATION AND H-INDEX

Year	Publications	Citing Articles	Time Cited	Percentage	H-Index
2013	145	3539	6188	42.68	44
2014	106	2502	3424	21.27	33
2015	205	3400	5651	27.57	37
2016	207	2490	3554	17.17	30
2017	256	3006	4769	18.63	35
2018	258	2262	3265	12.66	27
2019	249	1789	2526	10.14	23
2020	256	1262	1885	7.36	18
2021	260	736	1079	4.15	12
2022	245	312	487	1.99	8
Total	2242	21298	32828	163.62	267

According to Table II, the research productivity of global spondylotic myelopathy has demonstrated a growth pattern from 2013 to 2022. The data show that the maximum number

of scientific papers with more than three digits was published in 2021, with 260 research articles (4.15%). These articles received 736 citations, were cited 1,079 times, and had an H-

index of 12. On the other hand, the least number of papers (106, 21.27%) were found in 2014. The growth rate of global productivity has gradually increased, except for 2015, and the

growth rate has slightly decreased compared to global literature on spondylotic myelopathy during the study period.

TABLE III LANGUAGE-WISE DISTRIBUTIONS

Sl. No.	Languages	Records	Percentage
1	English	2,224	99.20%
2	German	7	0.31%
3	Czech	5	0.22%
4	Spanish	4	0.18%
5	French	1	0.05%
6	Slovenian	1	0.05%
Total		2242	100%

For the analysis of language-wise literature, it is worth noting that the study articles have been published in six languages worldwide. The vast majority (99.20%) of the total research output is written in English. In addition to the English

language, German has been seen as the second position with 7 (0.31%), followed by Czech with 5 (0.22%) research articles published on spondylotic myelopathy.

TABLE IV THE MOST PROLIFIC AUTHORS (TOP 20 OUT OF 7134)

Sl. No.	Authors	Records	Percentage
1	Fehlings MG	169	7.54%
2	Wilson JR	54	2.41%
3	Tetreault L	53	2.36%
4	Nouri A	49	2.19%
5	Davies BM	46	2.05%
6	Kotter MRN	43	1.92%
7	Kopjar B	34	1.52%
8	Shen Y	34	1.52%
9	Martin AR	33	1.47%
10	Riew KD	33	1.47%
11	Vaccaro AR	33	1.47%
12	Okawa A	31	1.38%
13	Yoshii T	31	1.38%
14	Arnold PM	29	1.29%
15	Tanaka S	29	1.29%
16	Tetreault LA	29	1.29%
17	Imagama S	28	1.25%
18	Watanabe K	28	1.25%
19	Harrop JS	27	1.20%
20	Hirai T	27	1.20%

Author productivity is one of the essential characteristics in the field of scient metrics. It is used to measure and identify an author’s output in terms of research publications. A total number of 7,134 authors were found in the domain of spondylotic myelopathy during the period. Among the 7,134 productive authors, only the top 20 most predominant authors have been taken for analysis. It was examined that out of the top 20 prolific authors, Fehlings MG was ranked first with (7.54%) records, followed by Wilson JR with 54 (2.41%)

scientific publications. The third productive author was Tetreault, with 53 (2.36%) research articles produced in spondylotic myelopathy research at the global level. Table V indicates the international collaborative research on Spondylotic Myelopathy at the Global level. Out of 65 scientific publications, the maximum number of outputs (672, 29.97%) in Peoples R China research outputs. The other countries such as the USA (624, 27.83%) and Japan (363, 16.19%) got the third position, and then India got Eighth

place (74, 3.30%) in the research field of Spondylotic Myelopathy. Other countries are Canada, South Korea, England, Germany, Italy, Switzerland, etc. The results

indicate that very few papers were published by some big countries, and it shows that the collaborative countries

TABLE V INTERNATIONAL COLLABORATION ON SPONDYLOTIC MYELOPATHY (TOP 20 OUT OF 65)

Sl. No.	Countries	Records	Percentage
1	Peoples R China	672	29.97%
2	USA	624	27.83%
3	Japan	363	16.19%
4	Canada	223	9.95%
5	South Korea	121	5.40%
6	England	111	4.95%
7	Germany	85	3.79%
8	India	74	3.30%
9	Switzerland	64	2.86%
10	Italy	47	2.10%
11	Taiwan	39	1.74%
12	Turkey	39	1.74%
13	France	31	1.38%
14	Iran	29	1.29%
15	Ireland	26	1.16%
16	Brazil	24	1.07%
17	Netherlands	22	0.98%
18	Czech Republic	20	0.89%
19	Australia	18	0.80%
20	Singapore	18	0.80%

TABLE VI YEAR-WISE AUTHORSHIP PATTERN

Year	1	2	3	4	5	6	7	8	9	10	10+	Total
2013	4	7	7	15	27	26	19	12	10	5	13	145
2014	7	15	10	18	22	31	16	16	12	4	10	161
2015	8	9	18	24	33	49	20	21	7	5	11	205
2016	10	15	14	19	26	47	25	18	15	8	10	207
2017	7	7	19	25	38	43	38	28	14	9	28	256
2018	7	12	23	40	35	44	27	25	11	10	24	258
2019	0	12	18	23	44	43	32	24	16	9	28	249
2020	3	7	17	36	35	36	23	16	28	13	42	256
2021	3	10	18	23	27	33	27	26	20	14	59	260
2022	3	4	16	17	29	39	30	25	14	13	55	245
Total	52	98	160	240	316	391	257	211	147	90	280	2242

Table VI displays the authorship patterns of publications arising from collaborative research endeavors. The table presents year-wise data on the number of authors per publication. Notably, 2013 to 2022 have witnessed the highest number of single-authored contributions. Similarly, the maximum number of contributions from two authors was recorded during the same time frame. The analysis’s results indicate that the distribution of author groups and their publication count over a decade is diverse. Specifically, the

table suggests that the number of multi-authored papers steadily increased during the study period, underscoring the high productivity of collaborative authorship. Table VII provides detailed information on the co-authorship index of Spondylotic Myelopathy Research Literature from 2013 to 2022.

The table shows that the highest CAI score for single and multi-authors was recorded in 2016, with a score of 208.29.

The CAI score indicates the degree of collaboration between authors in a publication, and a higher score indicates greater cooperation. Conversely, the lowest CAI score for single authors was recorded in 2019, with no records, while for multi-authors, it was scored at 249. The trend of CAI for single and multi-authored publications oscillated from 2013 to 2016. However, from 2017 to 2022, the trend consistently

decreased CAI. This trend could be due to various factors, such as changes in research trends, funding, or research collaboration practices. In conclusion, the tables provide essential information on the authorship pattern and co-authorship index of Spondylotic Myelopathy Research Literature over ten years.

TABLE VII CAI CO-AUTHORSHIP INDEX

Year	1	CAI	2	CAI	3	CAI	4	CAI	5	5+	CAI	Total
2013	4	118.94	7	110.44	7	67.65	15	96.64	27	85	132.11	145
2014	7	187.46	15	213.14	10	87.03	18	104.44	22	89	96.95	161
2015	8	168.26	9	100.44	18	123.04	24	109.37	33	113	114.21	205
2016	10	208.29	15	165.78	14	94.77	19	85.74	26	123	89.12	207
2017	7	117.89	7	62.56	19	104.00	25	91.23	38	160	105.32	256
2018	7	116.98	12	106.41	23	124.92	40	144.83	35	141	96.25	258
2019	0	0.00	12	110.25	18	101.30	23	86.29	44	152	125.37	249
2020	3	50.53	7	62.56	17	93.05	36	131.37	35	158	97.00	256
2021	3	49.75	10	87.99	18	97.01	23	82.64	27	179	73.68	260
2022	3	52.79	4	37.35	16	91.51	17	64.82	29	176	83.98	245
Total	52		98		160		240		316	1376		2242

TABLE VIII DEGREE OF COLLABORATION

Year	Single Authors (NS)	Multi Authors (NM)	NM/NS+ NM	DC
2013	4	141	145	0.97
2014	7	154	161	0.96
2015	8	197	205	0.96
2016	10	197	207	0.95
2017	7	249	256	0.97
2018	7	251	258	0.97
2019	0	249	249	1.00
2020	3	253	256	0.99
2021	3	257	260	0.99
2022	3	242	245	0.99
Total	52	2190	2242	0.98

Table VIII amounts to calculate the degree of collaboration in Spondylotic Myelopathy research by using the formula given by (K. Subramanyam, 1982), which was,

$C = \frac{NM}{NM + NS}$ Where,
 C = the degree of collaboration
 NM = no. of multi-authored papers
 NS = no. of single-authored paper

The results presented in Table VIII show that the average degree of collaboration in Spondylotic Myelopathy research output is 0.98. Notably, the degree of collaboration first emerged in 2013 and has since fluctuated, with increases and decreases recorded. The degree of collaboration oscillated between 0.97 and 1, indicating a shift from no joint

publication to one hundred percent collaborations. These findings suggest that Spondylotic Myelopathy research literature researchers have been increasingly engaging in collaborative research problem-solving activities. Analysing the research output, it's essential to consider author productivity. The author's productivity was measured in the spondylotic myelopathy research, and the results are shown in Table IX. On average, there were 6.93 authors per paper.

The Average Author Per Paper (AAPP) varied from 6.50 in 2013, 8.95 in 2014, 5.94 in 2015 and 2016, and 6.83 in 2017 to 8.47 in 2022. The highest AAPP was 8.95 in 2014, and the lowest was 5.94 in 2015 and 2016, indicating a collaborative research trend. The Average Productivity Per Author (APPA) ranged from 0.15 in 2013 to 0.12 in 2022. The highest APPA

was 0.17 in 2015 and 2016, and the lowest was 0.11 in 2014. On average, the productivity per author was 0.14,

which suggests that sole authorship is more common than joint authors.

TABLE IX AUTHORS PRODUCTIVITY (AAPP/APPA)

Year	Total no. of Publications	Total no. of Authors	AAPP	APPA
2013	145	942	6.50	0.15
2014	106	949	8.95	0.11
2015	205	1217	5.94	0.17
2016	207	1235	5.97	0.17
2017	256	1748	6.83	0.15
2018	258	1609	6.24	0.16
2019	249	1708	6.86	0.15
2020	256	1800	7.03	0.14
2021	260	2244	8.63	0.12
2022	245	2076	8.47	0.12
Total	2242	15528	6.93	0.14

(*Average Authors Per Paper (AAPP) = No. of authors/Number of papers)

(*Average Productivity Per Author (APPA) = No. of publications/Number of authors)

TABLE X CORRELATION BETWEEN CONTRIBUTIONS AND CONTRIBUTORS

Sl. No.	Year	Total no of Authors X	Total no of Publications	XY	X ²	Y ²
1	2013	942	145	136590	887364	21025
2	2014	949	106	100594	900601	11236
3	2015	1217	205	249485	1481089	42025
4	2016	1235	207	255645	1525225	42849
5	2017	1748	256	447488	3055504	65536
6	2018	1609	258	415122	2588881	66564
7	2019	1708	249	425292	2917264	62001
8	2020	1800	256	460800	3240000	65536
9	2021	2244	260	583440	5035536	67600
10	2022	2076	245	508620	4309776	60025
Total		15528	2242	3583076	25941240	504397

The degree of relationship between any two variables of a set of data can be measured through the correlation coefficient. This coefficient varies between -1 and 1. When two variables correlate -1, it shows an ideal negative correlation, while a value of 1 signifies a perfect positive correlation. A correlation coefficient of zero for two variables indicates no correlation between them. It is important to note that the correlation coefficient can be calculated for any two variables, regardless of their nature and unit. Still, ensuring that the variable is relevant to the study is crucial. This table shows that the correlation and coefficient of the number of contributors and contributions work is strong and positive. This means that as the number of publications increases, the number of authors also increases. Lotka’s law of author productivity is a bibliometric law that explains how research literature is distributed among authors in a given field.

According to this law, a few researchers make significant contributions to most of the articles, while the proportion of researchers contributing to just one publication is high. The law summarizes the logarithmic relation between researchers and the number of publications they produce, stating that about 60 percent of all contributors make a single contribution. The formula $XY = C$, where X is the number of publications, Y is the relative frequency of authors with X publications, and n and C are constants that count on the specific area, is used to calculate the proportion of authors making n contributions. In essence, an author who publishes two articles’ accounts for 1/4 of the total number of publications. In comparison, an author who publishes three articles’ accounts for about 1/9th of the total number of publications. The formula is also known as the Inverse Square Law.

TABLE XI THE APPLICABILITY OF LOTKA’S LAW OF AUTHOR PRODUCTIVITY

No. of Papers	No. of Authors	Log of X	Log of Y	XY	X ²	1/X ⁿ	yx/Σyx	Σ(yx/Σyx)	Fe=C(1/xn)	ΣFe	D
1	145	0	4.98	0	0	1	0.06	0.06	0.15	0.15	-0.09
2	161	0.69	5.08	3.52	0.48	0.83	0.07	0.13	0.12	0.27	-0.14
3	205	1.10	5.32	5.85	1.21	0.74	0.09	0.22	0.11	0.38	-0.16
4	207	1.39	5.33	7.39	1.92	0.69	0.09	0.32	0.10	0.48	-0.17
5	256	1.61	5.55	8.92	2.59	0.65	0.11	0.43	0.10	0.58	-0.15
6	258	1.79	5.55	9.95	3.21	0.62	0.12	0.54	0.09	0.67	-0.12
7	249	1.95	5.52	10.74	3.79	0.59	0.11	0.66	0.09	0.76	-0.10
8	256	2.08	5.55	11.53	4.32	0.57	0.11	0.77	0.08	0.84	-0.07
9	260	2.20	5.56	12.22	4.83	0.55	0.12	0.89	0.08	0.92	-0.03
10	245	2.30	5.50	12.67	5.30	0.54	0.11	1.00	0.08	1.00	0.00
Total	2242	15.1	53.94	82.79	27.65	6.77	-	-	-	-	-

B. Calculation of the exponent “n.”

To apply Lotka’s law, the first step is to determine the value of the exponent’ n ‘. This value can be calculated using the Linear Least Square method and the following formula. In our case, the data provided in Table 11, which represents the number of authors and the number of articles they published, is used to compute the parameter ‘n.’

By substituting the values in the equation below, the value of ‘n’ can be calculated as:

$$n = \frac{N \sum XY - \sum X \sum Y}{N \sum X^2 - (\sum X)^2}$$

$$n = \frac{10 \times 82.79 - 15.1 \times 53.94}{827.9 - 814.494}$$

$$n = \frac{276.5 - 228.01}{48.99}$$

$$n = \frac{13.406}{48.99}$$

$$n = 0.27$$

Where,

N = number of pairs of data

X = logarithm of x i.e., number of publications

Y = logarithm of y, i.e., number of authors

The constant C is calculated using the formula:

$$C = \frac{1}{\sum 1/x^n}$$

$$C = \frac{1}{6.77}$$

$$C = 0.147$$

D = Maximum difference in the D value Column.

$$D = -0.17$$

Kolmogorov – Smirnov (K-S) test formula is:

$$CV = \frac{1.63}{\sqrt{\sum Y_x + \sqrt{\sum Y_x/N}}}$$

$$CV = \frac{1.63}{\sqrt{53.94\sqrt{53.94/10}}}$$

$$CV = \frac{1.63}{\sqrt{53.94+2.32}}$$

$$CV = \frac{1.63}{\sqrt{56.26}}$$

$$CV = \frac{1.63}{7.50}$$

$$CV = 0.217$$

The study employed formulas to calculate the values of n and c and evaluate the compatibility of Lotka’s law with the current findings. The computed values of n and c were 0.27 and 0.147, respectively.

The maximum deviation value, D max, was -0.17, while the estimated critical value was 0.217. Unfortunately, the actual value of D max exceeded the critical value, implying that Lotka’s rule was unsuitable for the literature data. Consequently, a research output regarding Spondylotic Myelopathy was produced.

The presented table provides an exhaustive keyword-wise distribution of twenty terms employed in the Spondylotic Myelopathy field during the study period spanning 2013 to 2022. The data analysis reveals that “Spondylotic Myelopathy” was the most frequently cited keyword, appearing in 97 of the 501 records analysed. The second most commonly utilized term was “Surgery,” which appeared in 48 records during the study period. It is imperative to note that these findings could have significant implications for healthcare professionals and researchers in the field, as they provide insight into the most commonly used terminology related to Spondylotic Myelopathy.

TABLE XII HIGHLY PRODUCTIVE KEYWORDS ON SPONDYLOTIC MYELOPATHY (TOP 20 OUT OF 501)

SL. No.	Keywords	Records
1	Spondylotic Myelopathy	97
2	Surgery	48
3	Outcomes	46
4	Spine	38
5	Decompression	37
6	Laminoplasty	36
7	Fusion	36
8	Management	28
9	Laminectomy	26
10	Spinal-Cord	24
11	Discectomy	24
12	Ossification	24
13	Alignment	22
14	Cervical Spondylotic Myelopathy	21
15	Follow-Up	17
16	Anterior	16
17	Complications	14
18	Impact	14
19	Myelopathy	13
20	Diagnosis	13

V. FINDINGS AND CONCLUSION

The research on Spondylotic Myelopathy has been extensively conducted from 2013 to 2022. 2,242 research papers were published during this period, with 2021 having the highest number of articles (260 or 7.18%) and 2014 having the lowest productivity, with only 106 (11.51%) articles published. Interestingly, the maximum number of scientific papers with more than three digits were published in 2021. These articles received 736 citations, 1079 times cited, and had a 12 H-index. The data also shows that most (99.20%) of the total research output is written in English. Among the 7134 productive authors, Fehlings MG was ranked first with 169 (7.54%) records out of the top 20 prolific authors.

There have been 65 scientific publications on international collaborative research on Spondylotic Myelopathy globally, with the maximum number of outputs (672, 29.97%) from Peoples R China research outputs. The analysis of language-wise literature reveals that the study articles have been published in 6 languages worldwide. Between 2013 and 2022, single authors contributed most to Spondylotic Myelopathy research. In 2016, single and multi-authors achieved the highest CAI score of 208.29. The Average Author Per Paper (AAPP) varied over the years, with an

average of 6.50 in 2013. The correlation coefficient was utilized to calculate the degree of relationship between any two variables within a data set. Unfortunately, Lotka's rule did not fit the literature data well. The most frequently cited keyword was "Spondylotic Myelopathy," which appeared in 97 of the 501 records analysed.

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