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Mapping of Research Output in the Indian Veterinary Journal through Google Scholar

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ABSTRACT

This paper presents a scientometric study of Indian Veterinary Journal (IVJ) using Publish or Perish (PoP) during the period 1977-2016 (39 years). The study used Google Scholar to obtain raw citations and analyze various citation metrics to find the impact of Indian Veterinary Journal on emerging research. The growth of contributions by year, authorship trends, author productivity by Lotka's law, single and multi-authored papers by year, and the most prolific contributors was examined in a total of thousands of research papers. Also, the relative IVJ growth rate and doubling time are evaluated for the period of the sample. The data analysis revealed that the highest number of submissions, i.e. 223 (22.30 percent), was published in the years 1992-1996. The total number of authors per paper is 2.97, the highest number of the output of authors, i.e. 15 research papers; the collaboration degree is 0.91% . For a more comprehensive evaluation of the effects of research and scholarly production, the paper suggests journal and author productivity collaborative practice using sensibly selected metrics.

KEYWORDS

Scientometric Study; Indian Veterinary Journal; Lotka's Law; Publications; Author Productivity.

1 Introduction

The reputation of a scientific journal dominates investigators' choice of publication and is strongly influenced by the impact factor-a high impact factor demonstrates that recent journal publications are consistently cited in other journals (Garfield, 2006). The Impact Factor is determined by applying the citations for the previous two years to papers in the journal, separated by the number of items cited for those two years in the journal (Dong et al., 2005). Nonetheless, different fields show variable citation patterns (Kear & Colbert-Lewis, 2011). Usually, publication citation metrics provide a broad range of accomplishments focused on scientific and scholarly practices, and others serve as a valuable way to illustrate the success of the researchers and the importance of their current literature (Narin, 1976). The impact of a published work (and its host journal) in a subsequent publication through acknowledgement is monitored in the form of a citation.

1.1 About Indian Veterinary Journal

The Indian Veterinary Journal (https://ivj.org.in/en/webhome.aspx) is an official organ of the Indian Veterinary Association. It is the only publication in India representing the workers of academic veterinary science, growth and extension. The journal has been published since 1924, initially as a bimonthly publication and later as a regular monthly publication of the In-

dian Veterinary Association. The Indian Veterinary Journal's office has kept volumes of the Indian Veterinary Journal (IVJ) right from its inception in 1924. At this moment, a mapping of IVJ's contributions to academic science over three decades seems opportune. Bibliometric metrics are widely used to calculate study efficiency since they include views of a field that might not be apparent otherwise. The current study aimed to explore data on the output of publications to establish a picture of IVJ's research efficiency that could be useful to veterinary professionals and researchers. Figure 1 specifies the aims of the Indian Veterinary Journal.

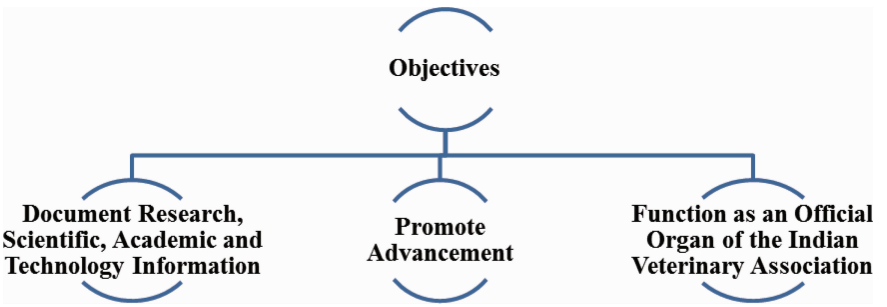

Figure 1 Objectives of the Indian Veterinary Journal

The Indian Veterinary Journal is dedicated to the cause of veterinary science and the advancement of the veterinary profession, with international status. The journal publishes original work as an official organ of the Indian Veterinary Association in the fields of veterinary medicine, surgery, reproduction, husbandry, fisheries and other related subjects, useful to professionals in the veterinary, dairy, livestock and poultry sectors. Of special interest to the journal are both large and small animal general veterinarians, researchers, field inspectors, cattle, poultry and dairy production officers, marketing officers and all animal health professionals. As a pioneer in veterinary journalism in the East, Balaraman (2018) has a much-unrivalled reputation as an authentic source of knowledge on all tropical diseases. This is a globally recognized arbitration publication. (http://www.connectjournals.com/ivj). This is real. This journal ranked by the National Academy of Agricultural Sciences (NAAS) with a mark of 6.0 on a scale of 1 to 10.

2 Overview of bibliometric research

Unsurprisingly, for a research method rooted in information science, many bibliometric studies have examined aspects of information science research and authors in information science. Voos (1974), for example, researched authors' effectiveness in the field of information science. Two recent books guide librarians on bibliometrics and altmetrics, and the contested area of research evaluation using metrics linked to publications tested a version of Lotka's law for writers writing in the field of knowledge science between 1996 and 2007 (Sobrino et al., 2009). Roemer and Borchardt (2015) present a guide for librarians on bibliometrics, altmetrics and research impact, Cronin and Sugimoto (2015) discussed multidimensional indicators of scholarly impact. Agarwal et al. (2016) offered a broad overview of the broad range of metrics commonly used in science and academia, and Dhiman (2015) discussed some of the newer metrics such as h-index, g-index, and I-index. Michael et al. (2010) discussed the benefits and drawbacks of the h-index.

There has been considerable interest in the applicability of Lotka's law to assess the author's efficiency in a sector. Gupta (1987) researched and analyzed writers' productivity models and checked the applicability of Lotka's law to four separate groups of data. Vlachy (1978) provided a bibliography of Lotka's and related work. Ahmed and Rahman (2009) checked the validity of the Lotka's law on the distribution of authorship in the field of nutrition study in Bangladesh. A list of periodic articles were published during 1972-2006 on various aspects of Bangladesh's nutrition research compiled for review. Using 'absolute productivity' of authorship, 998 personal author names were defined. Using both generalized and modified fonns-test and Kolmogorov-Smirnov goodness-of-fit tests, Lotka's law was tested. The findings suggested that in the generalized inverse square Lotka's law, the distribution of author productivity predicted did not apply to nutrition research in Bangladesh. Lotka's law, excluding highly efficient authors and maximum likelihood methods, was found to apply to Bangladesh's nutrition study using least-squares. Narendra (2016) discussed the applicability of Lotka's law in the Science and Industrial Council as a general inverse force for the distribution of research productivity. Wildgaard et al. (2014) explored the characteristics, including effect indicators over time, of 108 bibliometric indicators at the level of the author.

The subject of research into bibliometrics is very varied. For example, Majhi et al. (2016) aimed to analyze the content of wiki articles published in the journals of the Science Direct database. The identified research methods used, the type of data analysis techniques used for wiki articles, the most common country contributes to the largest number of articles, the largest contributing author, the annual publication and the history of the authors. Much research examines changes in the patterns of research and publication. Kumar (2016) analyzed 380 peer-reviewed articles published in IETE Technical Review-journal during 2007 to 2014, examining the growth pattern of research output, authorship patterns/co-authorship index/, collaboration coefficient, the geographical distribution of output and the average length of articles. Jesubright et al. (2014) studied the growth of forensic science literature from 1975 to 2011, the productivity of authors, the top-ranking source journal, and the productivity of the country.

Wan et al. (2009) reviewed bibliometric studies on single journals, noting that 28% of studies examined Indian journals. The study of Indian Economic Analysis (Nandi & Bandyopadhyay, 2008) generally examined the pattern of authorship, the degree of collaboration between authors, and the distribution of authors geographically. Swain (2014) completed a 10-year bibliometric overview of the International Information and Library Review. In a bibliometric analysis of the 104 African medical and health journals hosted in the African Journal Online database, Ezema and Onyancha (2016) used Harzing's Publish or Perish app.

3 Objectives

The primary objective of this review was to understand the development of the Indian Veterinary Journal during the period from 1977 to 2016 and the research output of contributors worldwide. The concrete goals were:

- Analyze the impact of IVJ on publication productivity through citation metrics.
- Study the distribution of articles and authorship patterns by year.
- Identify author collaboration, single and multi-authored papers by year.
- Find the Relative Growth Rate (RGR) and double the duration of the papers for study.
- Determine the application of the research productivity of Lotka's law of Author in IVJ.

4 Research Methodology

The research data was gathered from an online edition of the Indian Veterinary Journal accessible from 1977 to 2016 using Publish or Perish (PoP) (www.harzing.com). PoP is a Microsoft Windows program that, with the support of an appropriate emulator such as cross-over Mac or Wine, can also be installed and compatible on OSX and GNU/Linux computers; PoP retrieves and analyses scholarly citations. To evaluate different metrics, this analysis used Google Scholar to obtain raw citations. An important and realistic explanation for this is that Google Scholar is widely accessible and well known for its speed to anyone with an Internet connection (Notess, 2005). In contrast to other databases, Google Scholar offers a full image of academic effect (Pauly & Stergiou, 2005). A broad variety of publications are covered by the Indian Veterinary Journal, including academic articles, brief correspondence, reviews, and case studies. Based on citation metrics, necessary data were collected to evaluate the impact of the Indian Veterinary Journal and analyze bibliometric components such as article contributions by year, number of writers, authorship pattern, and authors productivity through Lotka's law to meet the objectives of the present study. As a final point, the data was organized, weighed, tabulated, assessed and presented as tables and graphs for interpretation and discussion.

The current standards for evaluating journal quality need to be understood by every reader. The evaluation of a particular journal's academic value helps to determine its merits and relevance to academic research and distinguishes it among other journals. The higher the impact metrics, the more highly ranked the journal is, but opinions differ as to what constitutes a "good" impact factor (Majhi et al., 2016). However, opinions differ. Although there is no 'correct' answer to this issue, in terms of various simple statistics (number of articles, number of citations and number of authors) and various other citation metrics of the Indian Veterinary Journal, there is a certain background in Table 1.

Table 1 Impact of Indian Veterinary Journal through citation metrics

S.No	Citation metrics	Value
1	Papers	1000
2	Citations	4863
3	Years	39
4	Cites/Year	124.69
5	Cites/Paper	4.86
6	Cites/Author	1885.11
7	Papers/Author	388.63
8	Authors/Paper	2.97
9	h index	17
10	g index	21
11	hc index	6
12	hI index	5.25
13	hI norm	9
14	AWCR	296.31
15	AW index	17.21
16	AWCRpA	111.89
17	e index	10.68
18	hm index	13.77
19	Cites Author Year	48.33
20	hIannual	0.23
21	h coverage	8
22	g coverage	10

The benefit of using Publish or Perish with Google Scholar is that it offers a much more accurate image of the impact of a journal than what would be possible with ISI impact factors / Thomson Journal Citation Reports. While the total number of publications (1000) provides useful information on productivity, which is strongly influenced by the number of years in which the journal has been producing research (39), the impact of their work, which is a limitation of the study to date, is not described. To assess the impact of a journal, different citation metrics are considered. Hirsch's h-index attempts to provide a rigorous single-number measure of an academic's impact, balancing quality with quantity (Hirsch, 2005). To calculate the performance of papers, Braun et al. (2006) suggest using the h index as an alternative to the impact factor given by Thomson Reuters (2019). The h-Index from IVJ is 17. The example worked on accounting journals in the Publish or Perish book (Harzing, 2013) has an h-index of 17 for the Accounting Horizons journal, with citations/paper of 8.45 (compared to IVJ's 4.86). The h-index may not, however, be a reliable indicator of recent results (Bornmann & Daniel, 2007). Egghe's g-index aims at boosting the h-index by giving more weight to frequently cited papers (Egghe, 2006; Sidiropoulos el at., 2007). The G-Index of the Indian Veterinary Journal is 21. In contrast, in accounting journals, the very high-impact (and international) ranges are 15-20 citations per article, h-indexes (28-43) and g-indexes (45-74). For every article, per author count (388.63) is determined to give the normalized author count for the paper. The sum of the author counts, separated by the total number of articles, across all papers was 2.97. The AWCR (296.31) calculates the total number of citations for the whole body of work, modified for the process of each paper (Jin, 2006). The individual h-index (5.25) and hI norm (9) as adjusted by Publish or Perish normalize the number of citations for each paper by dividing the number of citations by the number of authors for that paper and measuring the h-index of the uniform quotation count. Instead of minimizing citation counts, the multi-authored h-index (hm) uses fractional paper counts to account for the shared authorship of papers and then calculates the multi-authored hm index (13.77) based on the corresponding active rank of papers using undiluted citation counts (Schreiber, 2008). These seem to be more valid metrics where journal impact variables are immediately available and provide a simple way to test individual scientists or research groups. To obtain an objective and quantitative measure of the scientific achievement of the author, the journal impact factors of an author's publications can simply be applied, assuming that the journal is representative of its papers. Nevertheless, journal citation metrics are not statistically representative of individual journal publications and are poorly related to actual individual citations of articles (Seglen, 1997). Looking at the statistics provided in Table 1 and also as stated by Starbuck (2005), it is possible to conclude the impact of a journal on the productivity of publishing, but the confidence limits for such estimates are broad, particularly as the Journal Impact Factor changes every year.

5 Data Analysis and Interpretation

In this research, data were obtained from the Google Scholar online search engine on the bibliometrics records of the Indian Veterinary Journal for the period 1977-2016. A total of 1000 papers were gathered that produced the source data for the report. One of the most important metrics for determining the annual grade of publication growth and identifying the most efficient year of publication is year-by-year improvements in many published papers. Through Figure 2 it could be understood that the maximum number of articles were published during the years 1992-1996 (22.30%) and 19.20% articles during the years 2002-2006 and research publication was smaller during 1977-1986.

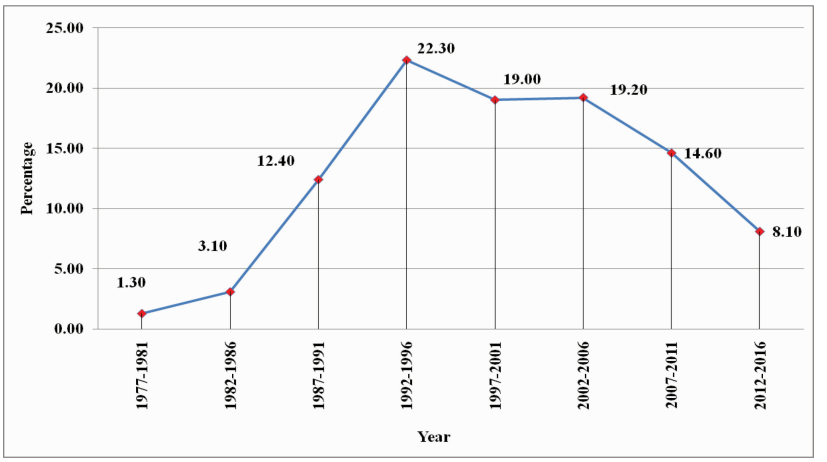

Figure 2 The growth rate of articles from 1977 to 2016

5.1 Relative Growth Rate (RGR)

Employed to detect a rise in the number of articles/pages per time unit. From the following equation, the mean Relative Growth Rate over a given period of the interval can be estimated (Hunt & Cornelissen, 1997).

$$\text{Relative Growth Rate (RGR)} = \frac{\log x_e w_2 - \log x_e w_1}{T_2 - T_1}$$

RGR = Average relative growth rate over the stated duration.

$\text{Log}x_e\ W_1$ =The initial number of papers is logged.

$\text{Log}x_e\ W_2$ = Log of the final number of articles a specific period of interval.

$T_2 - T_1$= The difference in units between the original time and the final time.

The year is taken as a unit of time for the RGR calculation in this study.

5.2 Doubling Time (DT)

The Doubling Time (DT) parameter is specifically correlated to RGR and signifies the time required to double the current volume for publications. Double Time is the exponential growth equation unit. The Doubling Time is computed as follows: Doubling Time = {(t2 - t1)* ln 2} / (ln c2 - ln c1). Again, in the per year growth case, the expression for Doubling Time can be written as: Doubling Time = ln 2/RGR

Table 2 Relative Growth Rate and Doubling Time of Indian Veterinary Journal

Year	Year Output	Cumulative total output	LogXeW1	LogXeW2	RGR	Block Period	Doubling time (Dt)	Block Period
1981	13	13	2.5649	2.5649	0		0	
1986	31	44	3.4340	3.7842	0.07004		9.894277449	
1991	124	168	4.8203	5.1240	0.060736	0.0608	11.40994619	−130.2326
1996	223	391	5.4072	5.9687	0.112307		6.170577318	
2001	190	581	5.2470	6.3648	0.223545		3.100042298	−137.1013
2006	192	773	5.2575	6.6503	0.278557		2.487823528	
2011	146	919	4.9836	6.8233	0.367936	0.2172	1.883480247	
2016	81	1000	4.3944	6.9078	−0.00125		555.8765749	

The data relating to the growing output of IVJ are presented in Table 2. To calculate the mean RGR and mean DT, the study period (1981-2016) is divided into two block periods, i.e. 1981-1996 and 2001-2016. The quantum output of IVJ has increased from 13 in the year 1981 to 81 in the year 2016, however, research publication is found to be maximum in the year 1996. It is therefore noted that the average RGR has increased in the second block from 0.0608 in the first block to 0.217. Mean DT, on the other hand, has decreased to -137.1013 in the second block from -130.2326 in the first block. Also, RGR has decreased from 0.070 in the year 1986 to -0.001 in the year 2016; correspondingly DT has gradually decreased from 9.8 to -555.8 in the same period.

Table 3 Authorship Pattern

S.No	Year	Single	Double	Three	Four	Five	Total	%
1	1977–1981	2	10	1	0	0	13	1.3
2	1982–1986	3	24	4	0	0	31	3.1
3	1987–1991	29	112	28	1	0	170	17
4	1992–1996	20	130	52	17	1	220	22
5	1997–2001	11	68	68	28	1	176	17.6
6	2002–2006	9	49	83	35	4	180	18
7	2007–2011	6	34	65	38	3	146	14.6
8	2012–2016	6	22	21	15	0	64	6.4
	Total	86	449	322	134	9	1000	100

Authorship patterns in Indian Veterinary Journal publications are shown in Table 3. It is known that 2531 authors, either single or multi-authored, published 1000 articles. It is evident from the table that 44.9% of publications contained double-authored articles, with 130 double authored articles published during 1992-1996. Multi-authored papers (5 authors) showed a declining trend (0.9%) during the study period. Further, single-authored articles accounted for 8.6% of the total. Far fewer papers were published during more recent periods (2007-2011) (2012-2016) than in the 1990s.

5.3 Authors´ Collaboration

Table 4 Degree of Collaboration during the study period

S.No	Year	Single Authors (Ns)	Multiple Authors (Nm)	Total	Degree of Collaboration
1	1977–1981	2	11	13	0.85
2	1982–1986	3	28	31	0.90
3	1987–1991	29	141	170	0.83
4	1992–1996	20	200	220	0.91
5	1997–2001	11	165	176	0.94
6	2002–2006	9	171	180	0.95
7	2007–2011	6	140	146	0.96
8	2012–2016	6	58	64	0.91
	Total	86	914	1000	0.91

In this study, where Degree of Collaboration $C = \frac{Nm}{Nm+Ns}$

C= 914/914+86 = 0.91%

The degree of cooperation C is therefore 0.91 percent. Statistics on the degree of collaboration between single-authored research and multi-authored research are provided in Table 4 during the study period. On a total of 1000 research articles, 86 were contributed by the single authors whereas 914 contributed by multi authors. This is high although a study on chemical sciences (Goyal et al., 2013) found a degree of collaboration of 0.97. "Is there a significantly higher probability for highly productive researchers to produce top-cited papers? Or, a sea of irrelevant papers is mainly produced by highly productive researchers. The response to these questions is important because it can help answer the question of whether or not there are perverse effects of increased competition and increased use of research evaluation and accountability focus metrics (Sandström & Besselaar, 2016). Highly active and cited researchers seem to have fresh prospects. Perceptibly, such researchers should be considered for different reasons, including policymaking and scholarly awareness of the related discipline (Klavans & Boyack, 2016). The decisive difference in this perspective, instead of counting publications and citations, is whether or not a researcher contributes to the limited number of very high-cited papers (Glänzel & Schubert, 1998). Table 5 shows statistics on the number of citations per article. It could be noticed from the table, around 1215 citations were received for publications during 1992-1996 and 22.31% citations during the year 1997-2001. However, as noted by Ioannidis et al. (2014), less than 1 percent of all researchers who published anything (indexed in Scopus) between 1996 and 2011 published in each of these 16 years, and that this limited set of core scientists is far more cited than others. What is noticeable is the decline in some citations for more recent periods - this may be due to a time lag between publication and citation but there are fewer papers published in more recent years, and that is likely to have an impact on the number of citations.

Table 5 Citation per Article

S.No	Year	No of Articles	Cited Articles	Percentages
1	1977–1981	13	78	1.60
2	1982–1986	31	134	2.76
3	1987–1991	170	1009	20.75
4	1992–1996	220	1215	24.98
5	1997–2001	176	1085	22.31
6	2002–2006	180	836	17.19
7	2007–2011	146	489	10.06
8	2012–2016	64	17	0.35
Total		1000	4863	100.00

In 1926, his pioneering article *The Frequency Distribution of Scientific Productivity* was published by Alfred J. Lotka (1926), in which he described a predictable pattern for the relative contributions of a body of authors to a body of literature. Out of the 2531 unique authors, Table 6 provides a list of the most productive authors.

Table 6 Core Authors Frequency

S.No	Name of the Author	No. of Articles	Cited Articles	Rank
1	A Kumar	15	122	1
2	S Kumar	11	42	2
3	M Singh	9	30	3
4	A Singh	8	53	4
5	KK Baruah	7	32	5

A. Kumar is the most productive of all, with 15 articles to his name, followed by S. Kumar holding the second rank with 11 articles. It is interesting to note an article entitled "Efficacy of some indigenous drugs in tissue-repair in buffalos (1993) authored by Kumar (1993) and two others had received 54 cites, and he had published research articles with 45 co-authors on various topics. Subsequently, S. Kumar and Khan et al. (2008) had contributed a lot of research work in this journal, coauthoring with 34 scholars and with 42 citations. Their research on "Prevalence of Phthirapteran ectoparasite on poultry (2008)" had received 10 citations. As reported by Ian Rowlands (2005), repeat-publishing authors are of explicit interest to publishers because they can be expected to submit manuscripts in the future as current and perceptibly please patrons, thereby guaranteeing an editor's access to a robust flow of research findings. Besides, these researchers transmit unintended advantages to the publisher of the journal, such as a position of advocacy within the academic environment, motivating their research students and colleagues to consider publishing with that journal and to subscribe and send to IVJ. A peer-reviewed study paper acts as a forum for disseminating the findings of a scientific inquiry, providing an opportunity to publicly uncover the work and support the available information for other researchers (Pendlebury, 2009). Other researchers may further validate, refute, or change the hypotheses in improving their research or clinical practice by consuming the findings of the analysis (Steele et al., 2006). As Christopher et al. (2014), noted, however, that publication data is merely a single chapter in an author's academic and research history. Publication data alone does not provide a full narrative of an author's effect or effects, nor is it necessarily reflective of meaningful empirical results that may have resulted from an author's investigation.

Lotka´s law = Productivity of Scientific Research

No.of Pairs	No.of Articles	No.of Authors Observed (Y)	Log Value Articles (X)	Log Value of Authors (Y)	X Y	X^2

$$\text{Lotka's Law} = n = \frac{N\sum XY - \sum X \sum Y}{N\sum X^2 - (\sum X)2}$$

N = Number of Pairs of Authors

X = Logarithm of article X

Y = Logarithm of Authors Y

More simply, the law can be expressed as $Y=C/X^n$, where X is the number of publications, Y is the relative frequency of authors with X publications, and n and C are constants, depending on the field, with n usually around 2. So for C=100, X=2, $Y=100/2^2$ (=25), and for X=3, $Y=100/3^2$ (11.1) (see Table 7).

Table 7 Author productivity of Indian Veterinary Journal established on Lotka's law

Number contribution	The observed number of Authors	Observed % Authors	Expected % Authors	Expected number of authors predicted by Lotkas Law (P)	(F–P) ²/P
1	1392	100.00	100.00	1392.00	0.00
2	520	37.36	25.00	348.00	85.01
3	276	19.83	11.11	154.67	95.18
4	124	8.91	6.25	87.00	15.74
5	90	6.47	4.00	55.68	21.15
6	54	3.88	2.78	38.67	6.08
7	21	1.51	2.04	28.41	1.93
8	8	0.57	1.56	21.75	8.69
9	9	0.65	1.23	17.19	3.90
11	22	1.58	0.83	11.50	9.58
15	15	1.08	0.44	6.19	12.56
Total	2531				

5.4 Applicability in the Indian Veterinary Journal of the data collection of Lotka´s law of author productivity

Table 7 describes the productivity of the authors produced during the study period by the PoP software application. Lotka's law is often referred to as the inverse square law, meaning that there is an inverse relationship between the number of publications and the number of writers writing these publications (Araú jo, 2014). The proportion of writers at different productivity levels is estimated by Lotka's law. Newby et al. (2003) presented empirical findings suggesting that the Lotka's law was not intended to predict a particular author's performance. Instead, its prediction lies in the cumulative and collective actions of a great number of authors. The versatility of Lotka's law has been essential in bibliometric studies since its introduction by Lotka (1926), and expanded over the years (Leydesdorff et al., 2013); Lotka estimated that the number of authors making x contributions is about 1/x of those making one and that the proportion of all those making a single contribution is 60%. This means that 60% of all writers in a given field will each have only one publication, 15% will each have two publications (1/22 times 60), 7% of authors will each have three publications (1/32 times 60) and only about 6% of authors will each produce up to 10 contributions in any field's literature. According to this data collection, out of 1000 papers contributed, a total of 2531 authors were interested. Where 1392 contributors have one article each (54.99 percent), 520 authors have contributed two articles (20.54 percent), 276 authors (10.90 percent) have three articles sponsored and 124 authors have four articles (4.89 percent) each and to credit, it demonstrates that all these values disprove Lotka's law at every stage. Furthermore, it is found that, as per the Lotka's law, the values observed do not correspond to the predicted values. Therefore, the findings of the analysis do not follow the Indian Veterinary Journal's Lotka's law of Author Productivity. In Figure 3, a graphical plot of Lotka's law on author productivity is presented.

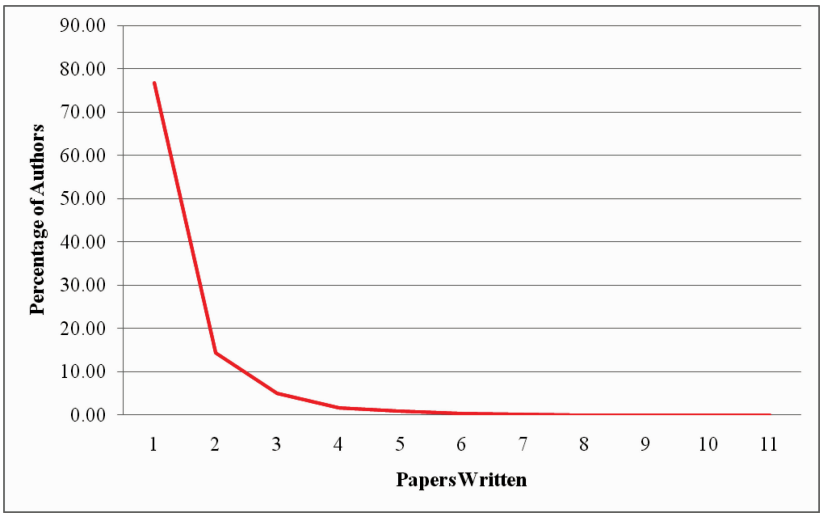

Figure 3 Graphical plot of the Lotka's law

6 Discussion

As indicated by Wan et al. (2009) bibliometric studies on the single journal:

- depicts the picture of the journal,
- Provides an interpretation that is above the trivial,
- Indicate the consistency, maturity and productivity of the journal irrespective of field/country/area,
- Offer details on studies that it supports

The IVJ is almost always considered significant in the veterinary community, valuable enough to be studied, to make decisions that the journal talks to authors who write in this field and represents the research activity in the field. During 2006, bibliometric studies showed that the IVJ was particularly concerned with animal health disciplinary articles and major junk of articles were from South India educational institutions. The report indicated that better communication between the researchers and the editorial offices of the journals in Chennai may be the explanation for this, and added 70% publications were from India and 28% were from other countries including Turkey, Iran, Malaysia, Korea and Poland (Vishwakarma, 2013). However, the present study showed a decline in publication output from 2007 (14.6) to 2016 (8.1). As noted by Rathinasabapathy et al. (2014), the NAAS (National Academy of Agricultural Sciences) rating of IVJ has come down from 6.00 (2011) to 4.33 (2015) and maintains the same position during the study period which is considered to be steep fall as it is one of the reputed journals. Nebelong-Bonnevie and Frandsen (2006) clarified that a big picture of that journal was given by single journal studies. To show the features, quality and status of the journal, the evaluation method used is mostly bibliometric indicators. Mahendra Kumar (2014) conducted a similar bibliometric analysis for the period 2011 to 2014 in the journal entitled "Library Herald." The research included several articles, the pattern of authorship, the distribution by topic of articles, the average number of references per article, the types of cited papers, the year-round distribution of cited journals, etc. The author pointed out that single journal studies represent the journal's merits and

limitations that would be useful for its further growth. In this analysis the decline in the number of papers published per year could be affecting the number of citations, and hence the wider impact of the journal. Authors have to pay (indirectly) to publish in the journal. Correspondingly Abdi et al. (2018) made a bibliometric analysis of the journal "Information Processing & Management (IP & M)" for the period from 1980 to 2015. Seglen (1997) notes that journal impact factors are contingent on their search field and high impact factors may be associated with journals covering a wide range of basic research with intensifying but unstable literature that uses many references per article and cites recent literature. Besides, the journal impact factor is regulated by article citation rates, not vice versa. Journal impact factors do not reflect individual journal articles statistically and are poorly associated with actual citations of individual articles.

The followings are several useful facts discovered from the analysis of the journal IVJ.

- The analysis displays a trend of growth in contributions published from 1992 to 1996 and of an average number of contributions per year is 125.
- The Number of documents cited per year is 124.69 with 4.86 citations per paper. It shows that during the study period from 1977 to 2016 dual authorship is the most frequent authorship arrangement.
- The mean number of authors per article was 2.97.
- The authorship pattern study aimed to identify the percentage of single, and multiple authorships. The results showed that the number of multi-authored articles increased rapidly and the degree of collaboration was found to be 0.91
- The findings of year-wise distribution of citations showed that a good number of citations was in 1992 to 1996 (1215 citations) followed by 1997 to 2001 with 1085 citations, and 1987 to 1991 with 1009 citations respectively.
- A.Kumar was found to be the most productive author with 15 publications and 122 citations followed by Kumar (11 publications and 42 citations).

Generally, Lotka's law determines the frequency of publications by writers in a given topic/discipline. In this paper, an attempt was made to analyze the applicability of the Lotka's law to journal publications instead of a subject or discipline. The findings acquired in this research do not comply with Lotka's law of author productivity as such. It may be due to long periods of research involvement, and maybe a changed Lotka's law may be a better match, as found in the nutrition report in Bangladesh (Ahmed & Rahman 2009).

7 Conclusion

This study may trigger more such research to evaluate an academic research journal and author productivity of those who published their work in this or another journal. Future research could be directed toward examining the patterns of collaborative authorship. For the journal itself, an understanding of the minimum number of high-quality papers required each year to ensure a reasonable impact factor would be desirable, and ways of encouraging authors to publish in the journal should be explored.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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