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Bibliometric Analysis of TNAI's *The Nursing Journal of India*, 2014–2023

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Abstract

Since 1910, The Nursing Journal of India of the Trained Nurses' Association of India (TNAI) has been playing a vital role in the scattering of information and knowledge in various aspects of nursing and allied health care. This bibliometric (statistical) analysis is based on only 443 citing articles in English languages which are published in this journal in ten volumes (2014–2023). Out of the total, 442 papers are under personal and one under corporate authorship. This study shows various aspects of citing articles with related scientometric indicators including chronological distribution of research outputs, authorship patterns, degree of collaboration and collaborative index, author productivity and leading contributors, geographical collaboration, institutional collaboration, research outputs by academic positions, year-wise relative growth rate (RGR) and doubling time (DT) value, length of articles and references. Year-wise, the highest number of papers, i.e., 49 has been brought out in 2019. A total of 961 authors were involved in preparing 443 articles and author productivity is 0.46 per author. Collaborative papers are more than single-authored papers, i.e., 238, and DC for the data set comes out to be 0.5372 and CI is 2.1693. The leading contributors are Latha Venkatesan with the highest number of papers, i.e., 7, and the College of Nursing, All India Institute of Medical Sciences (AIIMS), New Delhi is the most productive institutional contributor (18 papers to its credit). The majority of the papers were produced in New Delhi (N62) and 124 (12.9%) were written by nursing students. The average length per article is found to be 4 or 5 pages, and the average citation per article is 12. The highest annual growth rate was 40% in 2019. The impact factor of Nursing Journal of India (NJI) is very low. Finally, it also tests validation of Lotka's Law for the data set of this study.

Keywords: Trained Nurses' Association of India (TNAI), Nursing Journal of India (NJI), bibliometric study, statistical analysis, citing article, Lotka's law

INTRODUCTION

Nursing is a prestigious profession in Japan. It is a vital and dynamic field in medical and healthcare services. It emphasizes patient care, clinical expertise, and pitying services. Once upon a time, there was no professional nursing training in India, and it was not popularly accepted by the people of our society. There was no such dignity or social status for the women who worked in nursing. Today, nursing education and research occupy a top position in teaching and healthcare services around the world. Theory and practice are equally important in teaching nursing methods. Nursing in India began in the 5th century BC. A British nurse, Florence Nightingale, the mother of modern nursing, had a significant influence on nursing in India. She was the first woman to start a nursing service in India. With technological advancements in medical services, nursing education and the role

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of nurses in health care are changing all the time. Nursing is a respected and essential profession, offering diverse opportunities to make meaningful differences in healthcare.

Brief History of Nursing Research

Regular research in nursing is identifying new facts, new knowledge, and new procedures that help improve nursing education, practices, and utilization of resources effectively. From the mid-1800s, nursing research began with *Nightingale and the Crimean War* at the international level. In 1859, Florence Nightingale published *'Notes on Nursing*: *What it is and what it is not.*' Since then, nursing has started going on a path with various problems in nursing education and staffing nurses. As a result of that effort, the *American Journal of Nursing* was first published in 1990. The doctoral program of philosophy in nursing was first started at Teachers' College at Columbia in 1924 [1–6]. This program was designed to prepare nurses for leadership roles in education, administration, and research, marking a significant milestone in the advancement of the nursing profession [7–9].

In India, TNAI plays an indispensable role in nursing research. The TNAI launched *The Nursing Journal of India* in 1910. As a result of continuous research, the *Central Institute of Nursing and Research* was established by *TNAI* in 2009 in Greater Noida, and gradually, a Ph.D. in nursing was also started in various nursing colleges in India. An Auxiliary Nurse Midwife (ANM) in India began in the 1950s for basic maternal health, including midwives. The four-year B.Sc. Nursing was first started in 1946 at the RAK College of Nursing, Delhi, and the CMS College of Nursing, Vellore. In 1960, M.Sc. in Nursing began in the RAK College of Nursing, Delhi. In 1980, the RAK College of Nursing started the M. Phil Course first. The first Indian Nurse Dr. Edith Buchanan, the then Vice Principal of RAK College of Nursing, New Delhi, was awarded a Ph.D. in nursing from Columbia University in 1953. Later, in 1985, the Ph.D in nursing was started for the first time in India in Postgraduate Institute of Medical Education and Research (PGIMER), Chandigarh, and its first Ph.D. scholar was Ms. Jogindravati Gupta [10].

Trained Nurses Association of India

The Trained Nurses Association of India (TNAI) is the oldest national organization for nursing professionals. It was established in 1908. It was formerly known as the Association of Nursing Superintendents (ANS), founded in Lucknow in 1905. TNAI organized its first conference held at Banaras in 2010, and *The Nursing Journal of India* was published for the first time. The TNAI was registered in 1917 under the Societies Registration Act XXI of 1860. The ANS and *Trained Nurses' Association of India* were amalgamated and named the Trained Nurses' Association of India in 1922 [11]. Several nursing schools and colleges were established around India in holding the hands of the TNAI in 1946, and with the efforts of the TNAI, the Indian Nursing Council was also established, and the Act was passed by an Ordinance on December 31, 1947. The first TNAI state branch was established in Delhi, in 1949. The TNAI now has 33 branches and union territories throughout India. The foundation stone for the TNAI Headquarters at New Delhi was laid by the then Vice President of India, Dr. S. Radhakrishnan, on October 17, 1960. The following year, the building was inaugurated by Smt. Indira Gandhi, then Prime Minister of India, on September 30, 1961. Its main aims are to maintain dignity, pay honor to the nursing profession, develop team spirit among all nurses, and promote the professional, educational, economic, and general welfare of nurses [12].

The Nursing Journal of India

Different medical colleges and institutions have nursing colleges, paramedical colleges, and so on, and they are also engaged in research activities in their fields. As a result of several research activities in nursing and allied healthcare in India, a number of nursing journals have appeared, such as *The Nursing Journal of India (f. 1910), Indian Journal of Continuing Nursing Education (f.1920), Indian Journal of Nursing and Midwifery Research (f.1996), Nightingale Nursing Time (f. 2004), Nursing and Midwifery Research Journal (f. 2005), Journal of Nursing Research Society of India (f. 2008),*

International Journal of Nursing Education (f.2009), Indian Journal of Nursing Sciences (f. 2016), etc. These journals serve as important communication channels for disseminating information and knowledge, promoting research, and advancing the nursing profession in India [13, 14].

The source journal of this study is The *Nursing Journal of India (NJI),* published by TNAI, the oldest Indian nursing journal, with a legacy of more than 100 years. Its publication began in 1910 as a monthly period. Later, it became a bi-monthly organ of the *Trained Nurses' Association of India* and is available in February, April, June, August, October, and December every year. NJI was launched with ISSN 009-6503. The impact factor of the NJI as listed on exaly.com is 0.037 in 2023, and its h-index and g-index are 7 and 10, respectively, at the same site [15]. It is popularly accepted by Indian and foreign nursing institutes, researchers, and nursing professionals [16]. This journal aims to promote excellence in nursing practice, education, research, and policy development in the context of the Indian healthcare system. The NJI is a widely accepted communication channel for nurses, educators, researchers, and administrators to disseminate their knowledge, experiences, and innovative practices to enhance the quality of nursing care and contribute to the advancement of nursing as a profession in India. The NJI is abstracted and indexed in *Crossref and TNAI Database*. It was also indexed in *Scopus Database* from 1965 to 2015 [16, 17].

Citing Articles and Cited Articles

Citing articles refer to articles published in journals; in other words, source articles. Articles or papers appended at the end of citing articles or cited at the end and linked with the text of the citing articles are called cited articles, references, or citations, respectively.

Several bibliometric analyses have been conducted in different journals in various disciplines, highlighting bibliometric indicators of citing and cited articles [18–21]. No study in *The Nursing Journal of India* has been observed, and it is the right time to quantitatively assess citing articles published in NJI, as reflected in its online archives. Therefore, this journal is an important original work [22, 23].

OBJECTIVES

The main objectives of the study are:

a. To find out the chronological distribution of research outputs in NJI, 2014-2023
b. To determine the year-wise authorship pattern
c. To measure the degree of collaboration and collaborative index
d. To calculate author productivity
e. To identify leading authors
f. To work out the geographical allocation of outputs
g. To identify institution-wise collaborations
h. To make a list of research outputs by academic positions
i. To count annual growth rate, relative growth rate (RGR), and doubling time (DT)
j. To examine the validation of Lotka's Law

SCOPE AND METHODOLOGY

The present study covers research productivity and collaboration patterns in nursing, as reflected in the online archives of TNAI's The *Nursing Journal of India,* 2014–2023. A total of 445 citing articles have been published in TNAI's The Nursing Journal of India, volumes CV to CVXIV (60 issues) during the decade 2014-2023, and out of these, 443 papers were written in English and the remaining two papers were in Hindi that appeared in Vol. CXIII, Issue 3, 2022, Article 6, vol. CV Issue 4, 2014, Article 6. Two Hindi version papers were excluded from this study. Only 443 English version citing articles were accumulated and transferred into Microsoft Excel and Word and tabulated according to the insights of this study. Finally, based on this data, the results are discussed in the following section.

DATA ANALYSIS AND DISCUSSION

Volume- and Issue-wise Scattering of Articles

Table 1 enumerates the volume- and issue-wise distribution of research productivity in The *Nursing Journal of India* during 2014-2023. It maintained uniformity in the quantity of the papers. It ranges from 5 to 10 papers for each issue, or a total of 67 to 78 papers. It also uniformly placed papers ranging from 35 to 51 in volume. This table lists the 445 articles written in English and Hindi. Out Of these, the maximum number of papers, i.e., 443 (i.e., 99.55%) are English versions and the remaining two (i.e., 0.45%) are Hindi versions. This study used 443 English articles as the source materials. The average number of papers published per volume is 443/10, 44.3, or 44, and the overall average paper per issue is 443/ (6 × 10) or 7.38 or nearly 7.

Chronological Distribution of Citing Articles

Table 2 presents the year-wise distribution of research outputs for 2014–2023. Generally, the trend of research production is upward, that is, 43 in 2014 and 52 in 2023. During the first two years of research, production increased and then decreased. Later, it reached 45 in 2017 and 49 in 2019. From the following year (2020), its output gradually decreased to 38 in 2022. In the last year, it again increased to 51 in 2023, which was the highest output during 2014-2023. This table also shows that a total of 961 authors were involved in creating 443 research articles; here, author productivity was 0.46 per author. Of these, 960 were personal authors and 01 corporate authors. Graphically, the year-wise paper-author ratio is shown in Figure 1.

Authorship and Collaborative Pattern

Year-wise Authorship Pattern

Table 3 shows year-wise authorship pattern during 2104–2023 and Figure 1 represents the paper-author ratio. It is observed that there are the highest 205 one-authored papers produced by 205 authors followed by 116 two-authored papers by 232 authors, 68 three-authored papers by 204 authors, 18 four-authored papers by 72 persons, 13 five-authored papers by 65 authors, and so on. (Table 3 is divided into two parts: 1A to 6A and 7A to GT. Read it continuously as a single table.)

Author Productivity

Table 4 shows authorship patterns. Author-wise the highest number of papers 205 (45.27%) is single-authored paper followed by two-authored (N116, i.e., 26.19%), three-authored (N68, i.e., 25.57%), four-authored (18, i.e., 4.06%), five-authored (13, i.e., 2.93%) and so on. Here total author productivity is 961 according to the share of full credit of each author.

Table 1. Volume- and issue-wise Publications in NJI: 2014–2023.

Year	Volumes	Issues						No. of articles	Language	
		I	II	III	IV	V	VI		English	Hindi
2014	CV	9	6	9	6	6	8	44	43	01
2015	CVI	7	7	7	9	8	9	47	47	--
2016	CVII	8	5	7	8	8	8	44	44	--
2017	CVIII	8	7	7	8	8	7	45	45	--
2018	CVIX	5	7	5	5	6	7	35	35	--
2019	CVX	7	5	9	9	10	9	49	49	--
2020	CVXI	9	8	8	8	8	7	48	48	--
2021	CVXII	8	7	7	6	8	7	43	43	--
2022	CVXIII	6	7	6	7	7	6	39	38	01
2023	CVXIV	9	8	8	10	9	7	51	51	--
Total	--	76	67	73	76	78	75	445	443	02
Percentage	--	17.08	15.06	16.40	17.08	17.53	16.85	100	99.55	0.45

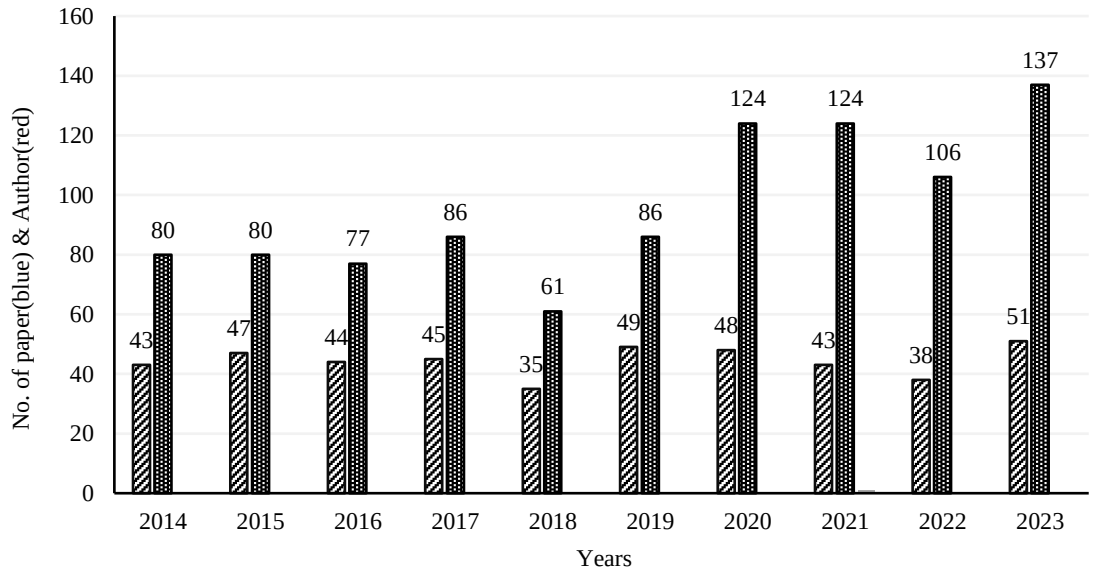

Figure 1. Year-wise paper-author ratio.

Table 2. Chronological list of research articles.

Year	No. of publications	Percentage	Authorship		Productivity per author
			Personal	*Corporate*	
2014	43	9.71	80	--	0.54
2015	47	10.61	80	--	0.58
2016	44	9.93	77	--	0.57
2017	45	10.15	86	--	0.52
2018	35	7.9	61	--	0.57
2019	49	11.06	86	--	0.56
2020	48	10.84	124	--	0.38
2021	43	9.71	123	01	0.35
2022	38	8.58	106	--	0.35
2023	51	11.51	137	--	0.37
Total	443	100	960	01	0.46

Table 3. Year-wise authorship pattern.

Year	1A		2A		3A		4A		5A		6A	
	TP	%	TP	%	TP	%	TP	%	TP	%	TP	%
2014	21	11.33	13	11.21	6	6.06	2	5.88	-	-	-	-
2015	26	12.26	10	8.62	10	15.15	1	5.88	-	-	-	-
2016	24	11.78	11	9.48	7	10.61	1	5.88	-	-	1	-
2017	28	13.67	8	6.89	5	7.58	1	5.88	-	-	-	-
2018	18	8.49	12	10.34	4	6.06	-	-	-	-	-	-
2019	29	14.16	14	11.21	2	3.03	-	-	2	15.38	1	25.00
2020	16	7.55	10	8.62	12	19.70	4	23.53	3	23.08	2	25.00
2021	14	7.08	13	11.21	4	6.06	4	23.53	2	15.38	2	50.00
2022	13	6.13	9	7.76	10	15.15	1	5.89	2	15.38	-	-
2023	16	7.55	16	14.66	8	10.60	4	23.53	4	30.78	-	-
TP	205	100	116	100	68	100	18	100	13	100	6	100
TA	205	--	232	--	204	--	72	--	65	--	36	--
TP:TA	1.: 1	--	1: 2	--	1:3	--	1: 4	--	1:5	--	1: 6	--

Year	7A		8A		9A		10A		>10A		CoP		GT
	TP	*%*	*TP*	*%*	*TP*	*%*	*TP*	*%*	*TP*	*%*	*TP*	*%*	
2014	1	25.00	-	-	-	-	-	-	-	-	-	-	43
2015	-	-	-	-	-	-	-	-	-	-	-	-	47
2016	-	-	-	-	-	-	-	-	-	-	-	-	44
2017	1	-	2	100	-	-	-	-	-	-	-	-	45
2018	1	25.00	-	-	-	-	-	-	-	-	-	-	35
2019	1	25.00	-	-	-	-	-	-	-	-	-	-	49
2020	-	-	-	-	1	33.33	-	-	-	-	-	-	48
2021	-	-	-	-	-	-	1	33.33	2	66.67	1	100	43
2022	1	25.00	-	-	1	33.33	-	-	1	33.33	-	-	38
2023	-	-	-	-	1	33.34	2	66.67	-	-	-	-	51
TP	5	100	2	100	3	100	3	100	3	100	1	100	443
TA	35	--	16	--	27	--	30	--	38	--	1	--	961
TP:TA	1:7	--	1:8		1:9	--	1. 10	---	1:13	--	1:1	--	1:2.2

Abbreviations: 1A=One-authored paper, 2A=One-authored paper, and so on. CoP= Corporate –authored paper; GT= Gross total; TP= Total papers; TA= Total authors; GT= Grand Total

Table 4. Authorship patterns of nursing publications.

Authorship Personal	Number of publications	%-age	Cum-%-age	Author productivity
Single-authored	205	46.27	46.27	205
Two-authored	116	26.19	72.46	232
Three-authored	68	15.57	88.03	204
Four-authored	18	4.06	92.09	72
Five-authored	13	2.93	95.09	65
Six-authored	6	1.13	96.15	36
Seven-authored	5	1.13	97.28	35
Eight-authored	2	0.46	97.74	16
Nine-authored	3	0.67	98.41	27
Ten-authored	3	0.67	99.08	30
Eleventh-authored	1	0.23	99.31	11
Twelfth-authored	1	0.23	99.54	12
Fifteen-authored	1	0.23	99.77	15
Corporate (Single)	1	0.23	100	01
Total	443	100		961

Note: Total collection of papers 445 -2 Hindi versions.

Leading Contributors

Table 5 shows individual name-wise author productivity in nursing research through NJI of TNAI during the decade. Here, name-wise, 832 authors have produced 443 research papers during 2014–2023. Out of the total, 820 are Indian and only 12 are foreign- contributors, i.e., 5 each from the UK, 5 each from Saudi Arabia, and 1 each from the USA and Irelands. *Latha Venkatesan* is the more productive or prolific author in this study, who produced 7 papers for three years, i.e., nearly 2 papers per year. Another group of two authors *Nanthini Subbiah, and Poonam Joshi* have produced 6 papers each within 9 years. They are in 2nd position and next a category of three authors has published five papers each such as *Anil Kumar Parashar*, *Rathish Nair*, *Shani Sd*, and so on. 747 authors have written one paper each during the decade.

Table 5. Leading contributors in nursing research during 2014-2023.

P-NJI	Name of authors	Time span	AP/Y
7	Latha Venkatesan (01)	3	2.33
6	Nanthini Subbiah; Poonam Joshi (02)	9, 9	0.67, 0.67
5	Anil Kumar Parashar; Rathish Nair; Shani Sd (03)	6, 7, 7	0.83, 0.71, 0.71
4	Anice George; Jyoti Sarin; Meena Ganapathy; Ramandeep Kaur; Roy K. George (05)	5, 6, 5, 2, 2	0.80, 0.67, 0.80, 2.00, 2.00,
3	Alwin Issac; Jaya Bijoy; Karesh Prasad; Lily Podder; Mamta Parihar; Philomina Thomas; R. Sudha; Sujatha R.; Suresh K. Sharma; Ulfat Amin; Varsha Rawat; Vijayalakshmi Poreddi (12)	6, 4, 6, 4, 4, 7, 3, 3, 6, 2, 4, 7	0.5, 0.75, 0.5, 0.75, 0.75, 0.43, 1, 1, 0.5, 1.5, 0.75, 0.43.
2	A. Jayasudha; A. Jeganathan; Arunjyoti Barauah; Asha Sharma; Ashok Kumar; Baby S. Nayak; Bijayalakshmi Dash; Bindu Shaiju; Dayabati Soyam; Elizabeth Varkey; Fathima Lathif; Geeta Bhardwaj; Gomathi B.; Harbans Kaur; I Safreena; Jasleen Kaur Brar; Jayalakshmi Namasivayam Pillai; M. Baskaran; Manjit Kaur Salwan; Manju; Manju Chhugani; Manju Vatsa; Manpreet Kaur; Maria Duaso; Marie Therese Sangy; Milan Tirwa; Mini George; Munira Bashir; Navjot Kaur; Neeraj Kumar Bansal; Nilima Sonawane; Nipin Kalal; Poonam Ahlawat; Prerana Dixit; Prince Mathew; Radha K.; Ramachandra; Rashmimala Pradhan;; Rohini T.; S. Kanchana; S. Vatchala Dhinakaran, Sabitha Nayak; Sailaxmi Gandhi; Sasi Kumar; Shahnaz Maqbool; Shawn Walker; Simarjeet Kaur; Sindhu Devi M.; Soya Kattil; Srinivasan Gandhi; Suman Dabas; Suvashri Sasmal; Sylaja PN; Usha Mallick; Usha Marath; Usha Phulara; Vandana Pakhide; Vanita Kumari; Vijaya Raghavan; Vikas Choudhary; Yashoda Satish; Yumnam Surbala Devi (62)	1, 7, 7, 1, 2, 3, 7, 1, 4, 1, 1, 3, 2, 3, 2, 7, 2, 1, 2, 2, 7, 2, 8, 3, 3, 3, 2, 3, 7, 1, 4, 2, 6, 5, 3, 8, 7, 2, 4, 1, 3, 2, 7, 4, 2, 3, 2, 3, 2, 5, 1, 2, 4, 5, 5, 1, 1, 1, 1, 1, 3, 2.	2, 0.29, 0.29, 2, 1, 0.67, 0.29, 2, 0.5, 2, 2, 0.67, 1, 0.67, 1, 0.29, 1, 2, 1, 1, 0.29, 1, 0.25, 0.67, 0.67, 0.67, 1. 0.67, 0.29, 2, 0.5, 1, 0.33, 0.4, 0.67, 0.25, 0.29, 1, 0.5, 2, 0.67, 1, 0.29, 0.5, 1, 0.67, 1, 0.67, 1, 0.4, 2, 1, 0.5, 0.4, 0.4, 2, 2, 2, 2, 2, 0.67, 1.
1	747 authors	1 year each	1 paper each
Grand Total	832 authors (single name-wise)		

Abbreviation: P-NJI = Papers published in Nursing Journal of India; AP/Y = Average paper per year.

Table 6. Degree of collaboration among authors.

S.N.	Authorship pattern	Publications	Percentage
1	Single-authored papers	205 (= N_s)	46.28
2	Multiple-authored papers	238 (=N_m)	53.72
Total		443	100

Degree of Collaboration

Table 6 shows the calculation for the degree of collaboration (DC), i.e., the degree of relationship among authors. Degree of Collaboration is calculated by the formula = $Nm/(N_m+ N_s) = 238/(238+205) = 0.5372$. DC is a total multiple-authored paper divided by the total paper. So, the DC for the data set comes out to be 0.5372.

Collaborative Index

The CI can be calculated for the dataset used in this study using the following formula:
CI = TA/TP = 961/443 = 2.1693.

Corporate Collaborative Pattern

This section describes national and international collaboration patterns.

National Institutional Collaboration

Table 7 enumerates national collaboration. It is learned that The highest number of research articles (i.e., 18 or 2.98%) were produced by *College of Nursing, All India Institute of Medical Sciences*

(AIIMS), New Delhi followed by 12 (1.98%) *from Pragyan College of Nursing, Bhopal (Madhya Pradesh);* 8 each from *Manipal College of Nursing Manipal (Karnataka), and AIIMS, New Delhi*; 7 each from *Baby Memorial College of Nursing, Kozhikode (Kerala*), and *College of Nursing, AIIMS Rishikesh (Uttarakhand*); 6 each from *National Institute of Health and Family Welfare*, *New Delhi*, and *National Institute of Nursing Education (NINE), PGIMER, Chandigarh*. Five institutions produced five papers each from the Islamic University of Science and Technology, Awantipora (Jammu and Kashmir), Nitte Usha Institute of Nursing Sciences, Mangalore (Karnataka), Pal College of Nursing and Medical Sciences, Haldwani (Uttarakhand), Rufaida College of Nursing, Delhi, and Sree Chitra Tirunal Institute for Medical Sciences and Technology, Thiruvananthapuram (Kerala). It must be noted that most of the research has been published by AIIMS and other institutions of AIIMS around the country.

International Institutional Collaboration

Table 8 depicts the leading international institutions and foreign researchers participating in the production of research articles in the field of nursing in collaboration with India. TNAI received 11 research contributions from eight international institutions. That is *Kings' College London, UK (N2); College of Nursing for Girls, King Khalid University, Saudi Arabia (N2); one* paper each from *Peterborough NHS Trust, UK; Pace University, USA; College of Applied Medical Sciences, University of BISHA, Saudi Arabia; College of Nursing, King Saud University, Saudi Arabia; College of Pharmacy, King Khalid University, Saudi Arabia;* Northern Border University, Arar, KSA, *Saudi Arabia*; *National Forensic Mental Health Service*, *University College Dublin, Ireland.* Six joint collaborative institutions are shown in the last column of Table 8. Only three institutions in serial numbers 1, 4, and 5 had no collaborative institution, that is, a single institution. There are three Saudi Arabia-India collaborative institutions, two UK-India collaborative organizations, and one Irelands Saudi Arabia collaborative institution.

Table 7. Leading national collaborations.

Rank	Name of affiliated institutions	TP	Percentage	FYP	LYF
1	College of Nursing, AIIMS, New Delhi	18	2.98	2014	2023
2	Pragyan College of Nursing, Bhopal (Madhya Pradesh)	12	1.98	2014	2020
3	Manipal College of Nursing Manipal (Karnataka)	8	1.34	2014	2023
3	All India Institute of Medical Sciences (AIIMS), New Delhi	8	1.34	2014	2023
5	Baby Memorial College of Nursing, Kozhikode (Kerala)	7	1.17	2014	2023
5	College of Nursing, AIIMS Rishikesh (Uttarakhand)	7	1.17	2016	2023
5	National Institute of Health and Family Welfare, New Delhi	6	0.99	2014	2022
5	National Institute of Nursing Education (NINE), PGIMER, Chandigarh	6	0.99	2018	2023
6	Islamic University of Science and Technology, Awantipora, (Jammu and Kashmir)	5	0.83	2022	2023
6	Nitte Usha Institute of Nursing Sciences, Mangalore (Karnataka)	5	0.83	2018	2020
6	Pal College of Nursing & Medical Sciences, Haldwani (Uttarakhand)	5	0.83	2018	2022
6	Rufaida College of Nursing, Delhi	5	0.83	2014	2020
6	Sree Chitra Tirunal Institute for Medical Sciences and Technology, Thiruvananthapuram (Kerala)	5	0.83	2015	2020
7	8 institutions published @ 4 papers each	32	5.33	--	--
8	18 institutions @ 3 papers each	54	8.99	--	--
9	62 institutions @ 2 papers each	124	20.64	--	--
10	294 institutions @ 1 paper each	294	48.93	--	--
	Total	601	100	--	--

Abbreviation: TP = Total papers; FYP= First year of publication; LYP= Last year of publication

Table 8. Leading international affiliated institutions.

S.N.	Name of Institution	TP	Country	Collaboration
1	King's College London	2	UK	Single
2	College of Nursing for Girls, King Khalid University	1	Saudi Arabia	College of Pharmacy, King Khalid University, Abha, Asir Province, Saudi Arabia; Nursing College, Yenepoya University, Deralakatte, Mangalore
3	Peterborough NHS Trust	1	UK	Mother Theresa Post Graduate Institute of Medical Sciences, Puducherry; and National Institute of Health and Family Welfare, New Delhi
4	Pace University	1	USA	Single
5	College of Applied Medical Sciences, University of BISHA	1	Saudi Arabia	Single
6	College of Nursing, King Saud University	2	Saudi Arabia	College of Nursing, All India Institute Medical Sciences, New Delhi
7	College of Pharmacy, King Khalid University	1	Saudi Arabia	College of Nursing for Girls, Saudi Arabia
8	Northern Border University, Arar, KSA	1	Saudi Arabia	College of Nursing, Sri, Ramachandra University, Chennai
9	National Forensic Mental Health Service and University College Dublin	1	Ireland,	College of Nursing for Girls, Saudi Arabia
	Total	11		

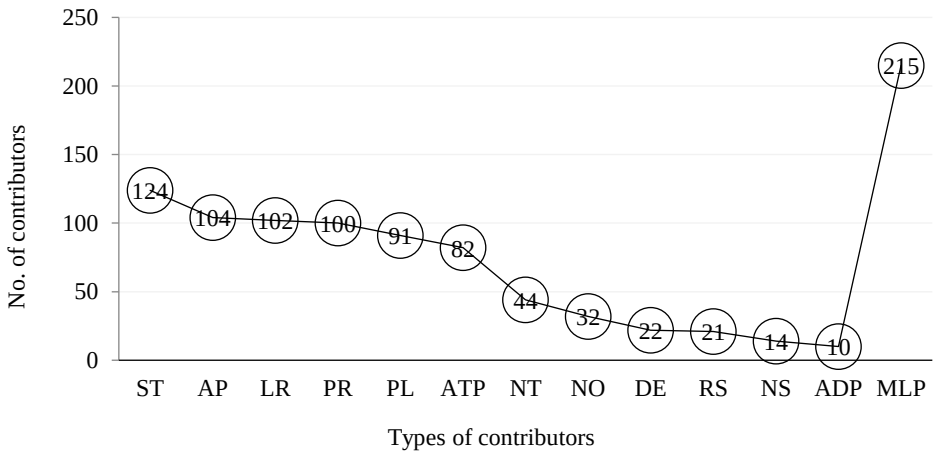

Figure 2. Ranks of types of contributors participated.

Geographical Distribution of Research Outputs

Table 9 shows rank-wise research contributions by geographical areas in nursing during 2014-2023. It is observed that the highest number of contributions, i.e., 62 (10.09%) has been animated from New Delhi followed by Kerala (N59, 9.77%), Karnataka (N57, 9.44%) respectively in the rank list, and so on. Out of foreign countries, six research articles were produced from Saudi Arabia (0.99%), three from the United Kingdom (0.49%), and one each from Irelands and USA.

Academic Designation-wise Research Contributors

Table 10 and Figure 2 show academic designation-wise participation in the production of research articles in nursing from 2014 to 2023. Designation-wise, different categories of researchers participated in the research and produced research articles. It was observed that nursing students, mostly 124 during 2014–2023, were attached to research activities followed by 104 assistant professors, 102 lecturers/readers, 100 professors, 91 principal/vice principal level researchers, 82 associate professors, and 10 additional professors. Other contributors are designated as nursing tutors/tutors, nursing officers, research scholars, clinical instructors, staff nurses, etc. Nursing directors/deans and departmental heads

have also participated in nursing research with their contributions of 22 and 14, respectively. Twenty-one (21) research scholars preferred this journal for the publication of their research articles during the study period. In addition, many researchers have been involved in the research outputs of the NJI over the past decade. The academic designations of the 34 researchers could not be ascertained throughout the study. It should be mentioned that some of the Ph.D. guides and co-guides were not directly associated with the statement of authorship/responsibility because their names and designations were not found along with the title of the research contributions. Therefore, their names cannot be considered as authors of this research paper. For the graphical presentation in Figure 2, miscellaneous (MLP) is indicated by the abbreviation (OT), which consists of clinical instructors, Head of Department (HOD), no designation/faculty, and others.

Table 9. Country-wise scattering of research contributions.

Rank	Country	Papers	Percentage
India			
1	New Delhi	62	10.32
2	Kerala	59	9.82
3	Karnataka	57	9.48
4	Tamil Nadu	50	8.32
5	Punjab	45	7.48
6	Maharashtra	44	7.32
7	Madhya Pradesh	34	5.65
8	Haryana	24	3.99
8	Uttarakhand	24	3.99
9	West Bengal	20	3.32
10	Andra Pradesh	18	2.99
10	Jammu and Kashmir	18	2.99
10	Uttar Pradesh	18	2.99
11	Delhi	17	2.83
11	Odisha	17	2.83
11	Rajasthan	17	2.83
12	Gujarat	13	2.17
13	Assam	11	1.83
14	Goa	9	1.49
15	Himachal Pradesh	7	1.17
16	Bihar	6	0.99
16	Telangana	6	0.99
16	Chhattisgarh	5	0.83
17	Meghalaya	4	0.66
18	Manipur	2	0.34
19	Bhutan	1	0.18
19	Jharkhand	1	0.18
19	Sikkim	1	0.18
Foreign Country			
1	Saudi Arabia	6	0.99
2	United Kingdom (UK)	3	0.49
3	Ireland	1	0.18
4	United States of America (USA)	1	0.18
Total		601	100

Table 10. Designation-wise participation in research productions.

Academic designations	No. of contributors	Percentage
Students (ST)	124	12.9
Assistant Professor (AP)	104	10.82
Lecturer/Reader (LR)	102	10.61
Professor (PR)	100	10.51
Principal/Vice Principal (PL)	91	9.46
Associate Professor (ATP)	82	8.53
Nursing Tutors/Tutors (NT)	44	4.57
Nursing officers' (NO)	32	3.32
Directors/Dean (DE)	22	2.26
Research Scholars (Ph.D.) (RS)	21	2.18
Clinical instructors (OP)	14	1.45
HOD (No complete designation) (OP)	14	1.45
Staff Nurses (NS)	14	1.45
Additional Professors (ADP)	10	1.04
Others (OP)	153	15.92
No designation/Faculty (OP)	34	3.53
Total	961	100

Table 11. Length of articles.

Range of Pages	No. of Articles	Percentage
1–2	21	4.74
3–4	244	55.08
5–6	157	35.44
7–8	19	4.29
9–10	02	0.45
Total	443	100.00

Length of Articles

This study regarding the length of articles in Table 11 forecasts that 55.08% of articles cover three to four pages, and 35.44% of articles published cover five to six pages. It is also observed that 4.74% of papers take one to two pages, and 4.29% of papers are printed on seven to eight pages. Only two papers, very few, covered 9 to 10 pages. Thus, the average length per article was four or five pages.

Range of References

Table 12 and Figure 3 show the reference lengths. A total of 5131 references were cited at the end of 435 papers, and eight papers were published without references. Thus, the average reference per article is 11.79 (around 12) with respect to 435 papers. Out Of 435 articles that appeared with references in the journals, the maximum number of the papers 188 have references between 6 and 10 (42.43%), followed by 100 papers citing citations between the range 11–15 (22.57%).

Sixty-one papers have references in the range of 16-20 and 46 articles have appended references between 1 to 5, and so on. Only two papers cited the largest number of citations whose range is 46-50. Overall, the average number of citations per article is 11.58, that is, 12.

Annual Growth Rate of Research Articles

Table 13 shows the annual growth rate (AGR) for the data set of this study. To measure the AGR, the following formula can be used, that is AGR= (End value – First value) × 100/ First value. For example, here first one has been worked out for hints, for the years 2014 to 2015. So here, the End value corresponding to the year 2015 =47, First value corresponding to the year 2014= 43. Therefore, AGR = (47-43) × 100/43= 9.30 in 2015 and so on. The highest AGR was 40% in 2019.

Table 12. Study of length of references.

Range of references	Class boundaries	No. of articles	Percentage
Up to 0	--	08	1.81
1-5	0.5-5.5	46	10.38
6-10	5.5-10.5	188	42.43
11-15	10.5-15.5	100	22.57
16-20	15.5-20.5	61	13.77
21-25	20.5-25.5	22	4.97
26-30	25.5-30.5	09	2.03
31-35	30.5-35.5	05	1.13
36-40	35.5-40.5	01	0.23
41-45	40.5-45.5	01	0.23
46-50	45.5-50.5	02	0.45
Total		443	100.00

Table 13. Annual growth rate of research articles.

Year	Research articles	Cumulative total	AGR = (End value – First value) × 100/First value	
			Results	
			AGR (%)	*Cumulative-AGR (%)*
2014	43	43	---	---
2015	47	90	9.30	109.30
2016	44	134	-6.38	48.89
2017	45	179	2.27	33.58
2018	35	214	-22.22	19.55
2019	49	263	40.00	22.89
2020	48	311	-20.41	18.25
2021	43	354	-10.42	13.83
2022	38	392	-11.63	10.73
2023	51	443	34.21	13.01
Total	443			

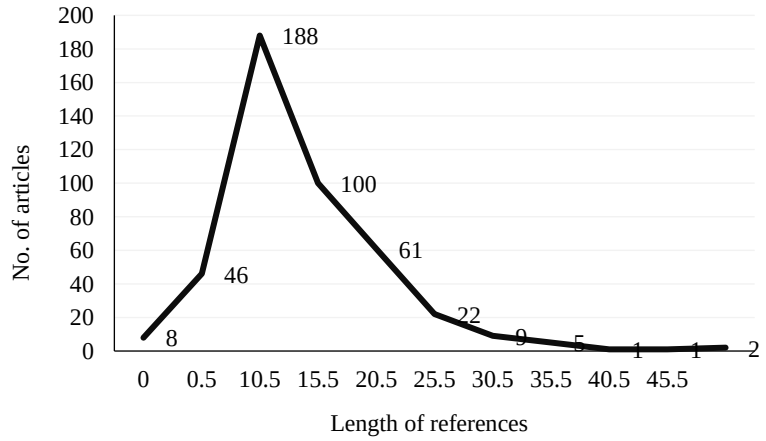

Figure 3. Frequency polygon of length of references.

Relative Growth Rate and Doubling Time

RGR and DT are shown year-wise in Table 14, and their graphically designed curves are shown in Figure 4. RGR and DT are two important indicators used in bibliometric studies. RGR is the increment in the number of research articles per unit of time. The RGR and DT were measured for the years 2014–

2023. The RGR is calculated year-wise. The following formula was used to determine the RGR [24–26]:

$$RGR = W_2 - W_1/T_2 - T_1$$

Where,

W_1 = Natural log of the initial number of research articles
W_2 = Natural log of the final number of research articles
$T_1 - T_2$ = Unit difference between the initial year (time) and final year (time)

Here, the time difference was one year. Therefore, the formula was as follows:

$$RGR = W_2 - W_1.$$

DT is directly related to the RGR. Therefore, the number of articles of a subject must be double during a specific period, and then the difference between the natural logarithms of numbers at the beginning and end of the period should be the natural logarithm of number 2, that is, 0.693. Thus, the corresponding DT was measured as DT = 0.693/ RGR. The RGR decreased from 0.738 in 2014 to 0.122 in 2023 over the time span of 10 years. Over 10 years, the DT increased from 2014 (0.939) to 2018 (3.871), reached 1.800 in 2019, and then started to increase from 2020 to 2022. All over its curve has been up and down in the time span of ten years.

Table 14. Relative growth rate and doubling time of publication of research articles.

Year	Research articles	Cumulative total	W_1	W_2	RGR = (W_2 minus W_1) / 1	DT = 0.693/ RGR
2014	43	43	--	3.7612	--	--
2015	47	90	3.7612	4.4998	0.738	0.939
2016	44	134	4.4998	4.8978	0.398	1.741
2017	45	179	4.8978	5.1873	0.289	2.397
2018	35	214	5.1873	5.3659	0.179	3.871
2019	49	263	5.3659	5.5721	0.385	1.800
2020	48	311	5.5721	5.7397	0.168	4.125
2021	43	354	5.7397	5.8692	0.129	5.372
2022	38	392	5.8692	5.9712	0.102	6.794
2023	51	443	5.9712	6.0935	0.122	5.680

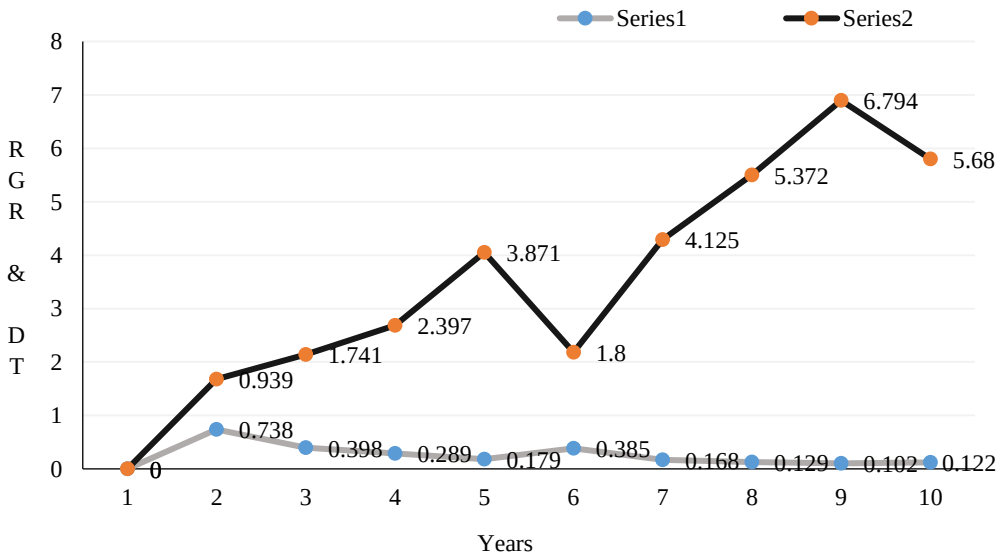

Figure 4. Relationship of RGR and DT in a graphical image.

Validation of Lotka's Law

Table 15 counts observed values corresponding to Standard Percentage as per Lotka's Law and thus a comparison statement between observed and expected values has been prepared for testing validation of Lotka's Law. This law is used to calculate based on the number of contributions by an author in the field of a particular subject. Shortly, Lotka's Law [27, 28] assumes 60% of the total authors should have one publication, 15% will have two, i.e., (n=2) publications (i.e., $1/n^2$ of 60), 7% of authors must have three (n=3) publications and so on. From the data set furnished in Table 15, it is seen that the value of an expected author is 1130 and observed, i.e., actual authors based on the data set of this study is 832. While n=2 in the first column, the value observed is 62 (8.10%) but it should be 187 (i.e., 15%). Similarly, in the case of n=3, the observed value is 12 (1.75%) but it must be 83 (3.75%) as per rule; when n=4, the expected value is 47, and the observed value is 5. Again, if n=5, the observed value is 3 which is much different compared to the expected value of 30 and so on. Thus, a comparative analysis in Table 15 represents the productivity of authors (observed) showing many differences from the expected authors. Two curves drawn in Figure 5 represent their distance. They cannot come close or overlap each other. Therefore, the data set does not satisfy Lotka's Law in this study.

Table 15. Calculation of author productivity for Lotka's Law.

No. of papers by each author (n)	Standard/expected Percentage as per Lotka's Law	Calculations as per Lotka's Law =	Data set		Observed percentage
			Observed/ actual authors	Calculated/ expected authors	
1	60%	Out of 100	747	747	88.78
2	15%	$60 \times 1/2^2$	62	187	8.10
3	6.69% or 7%	$60 \times 1/3^2$	12	83	1.75
4	3.75% or 4%	$60 \times 1/4^2$	5	47	0.75
5	2.4% or 2%	$60 \times 1/5^2$	3	30	0.25
6	1.67%	$60 \times 1/6^2$	2	21	0.25
7	1.22%	$60 \times 1/7^2$	1	15	0.12
Total			832	1130	

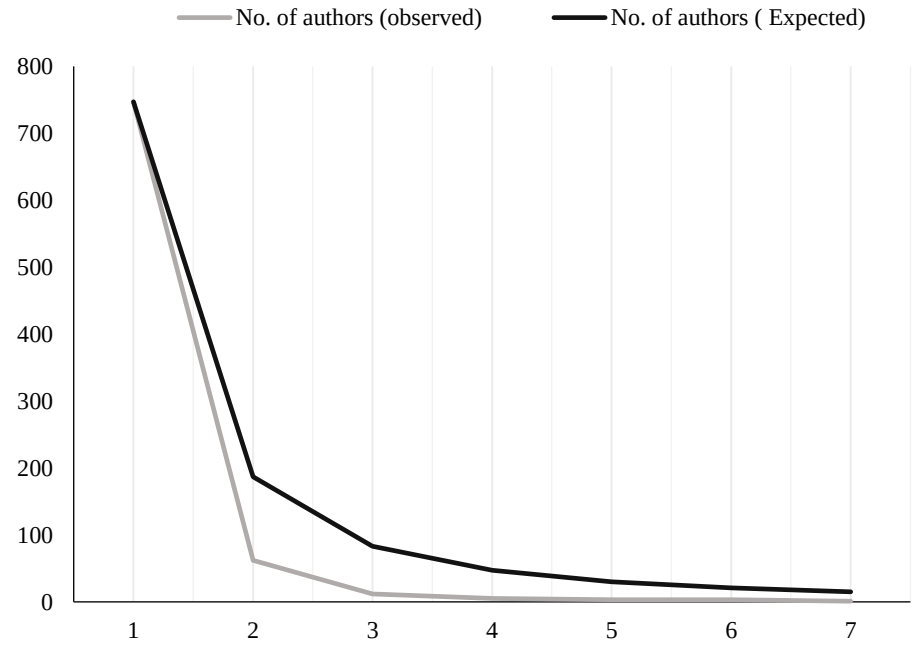

Figure 5. Application of Lotka's Law.

Findings

The major findings from the above studies on NJI are:

1. The average paper per volume is nearly 44 papers and 7 papers per issue.
2. The highest percentage of publications with multiple authors indicates the trend in group research.
3. Most publications are of Indian origin. Only 2.48% of the papers belonged to the international level.
4. The largest number of contributors belonged to students. This was a positive trend.
5. The most productive contributors were *Latha Venkatesan* (seven papers), *Nanthini Subbiah, and Poonam Joshi* (six papers each).
6. Most of the participating scientists in nursing research belonged to *New Delhi, Kerala, Karnataka, Tamil Nadu, Punjab, and Maharashtra* in the ranking list. A large number of Delhians are from the *All India Institute of Medical Sciences (AIIMS),* and *College of Nursing, under AIIMS.*
7. The majority of collaborators are from Indian institutions and a small number of articles are from foreign institutions.
8. The average length per article was found to be four or five pages, which is less than the standard length of papers (i.e., ideally not more than 11 typeset pages). Here, papers within one or two pages(s) have been considered research articles. In this regard, it is suggested that papers be categorized into review articles, research articles, case studies, short communication, preprint, etc.
9. On average, 12 citations per article were appended throughout this journal. Some papers have no citation at the end of citing articles which indicates the unhealthy structure of a renowned journal.
10. The highest growth rate was 40% in 2019; the RGR decreased from 0.738 in 2014 to 0.122 in 2023 during the time span of 10 years, and the DT curve shows its ups and downs from 2014-2023.
11. In the case of testing the validation of Lotka's Law, it is observed that the dataset of this study does not satisfy this law.
12. The Nursing Journal of India did not follow any particular style such as APA, IEEE, ACM, or Vancouver format in citing references at the end of the papers. In the case of web documents cited as references, detailed information was not provided. Only URLs are given, which reveals a lack of elements of information to the readers. This is not expected for good communication channels.
13. The link between textual parts and citations in some papers, but the reference list at the end of the articles, could not be ascertained.
14. Impact Factor (IF) is a tool used to measure the importance of a journal. NJI's impact factor of the NJI is low.
15. There is no uniform use of structural elements in writing papers in NJI, such as only some papers having keywords or acknowledgments but not throughout the journal. Thus, uniformity must be maintained.
16. Many authors have no proper academic designation. NJI allows implicit terms such as HOD or faculty members that are not clearly stated designations and even sometimes no designation at all. These ethical omissions should be avoided.
17. In the case of some authors, more than one corporate affiliation was given in the affiliation portion. To avoid unnecessary information load, anyone with which he or she is currently regularly associated should be mentioned.
18. As this journal claims to have an international reputation, papers in local languages should be avoided, that is, its publication medium in English is better and will be widely accepted.

CONCLUSIONS

LIS professionals or information scientists live in data-information-knowledge mines or the heap of information explosion. Their work is to find, obtain, and provide the right information at the right time

to the right users in an organized manner from the heap. In this study, the information mine/source was the NJI. It is one of more than a hundred years old famous nursing journals in India, regularly published by the TNAI since 1910. Going down to this information mine, this bibliometric study found its strangeness and weakness. Therefore, it highlights some points that emphasize the findings of this study. By age, more improvements in this journal are needed. A small number of foreign papers (from the UK, USA, Saudi Arabia, etc.) have been published in this journal during the last ten years that cannot fully support the claim of its international reputation. It can become a high-impact journal if NJI publishes more high-quality papers contributed by Indian and foreign authors. The impact factor (IF) of a journal is a very important scientometric indicator in bibliometric research. The IF of this journal will be low in 2023. The IF of a journal indicates the standard, popularity, and status compared to other journals in the same field; that is *'the higher the impact factor, the more highly ranked the journal'* [29]. The association should also look at foreign contributions, large circulation, rigorous refereeing, international representation on the editorial board, large circulation (print as well as online with e-ISSN), foreign subscription, financial and modern technological support, etc. Such efforts can improve its visibility in India and abroad [30].

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