
Scientific Production of Journals in Heart Transplantation: A Bibliometric Study

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ABSTRACT

Heart transplantation is a surgical treatment that is performed on patients with end-stage heart failure for different causes. Since the increasing number of heart failures and dynamic growth in the research on heart transplantation, bibliometrics was performed to investigate the impact of the most productive journals in this domain. The bibliographical details of 49791 articles were extracted from the Scopus database from 1994 to 2023, which were scattered across 3914 journals. The Journal of Heart and Lung Transplantation secured the top rank, producing 3563 (7.16%) articles, and placed in second position, having 129600 (9.88%). However, the journal Circulation dominated by holding 142717 (10.88%) citations for 983 articles for 30 years. Likewise, the top 30 leading journals covered 43.91% of the total publications. Bradford's Law examines the research on the ratio of one-third of the total publications into 1: n: n² (3 zones) and the scattered as 13: 148: 3754, Bradford's multiplier is ~ 18.37. Initially, the Bradford distribution does not fit with the current data until Leimkuhler's mathematical model is applied. Finally, it is scrutinised with Leimkuhler's model, Bradford's multiplier ~ 2.8494 is validated, and the error percentage is -0.04229.

1. Introduction

The World Health Organisation (WHO) statistics say that Heart (Cardiovascular) disease is one of the dominant causes of death in the world, resulting in 16% of the total deaths globally as of 2019. It is projected that the number of deaths will reach 23.6 million from heart disease. With the evolution in medicine and clinical practices, the growth and causes of various heart diseases have also been discovered steadily. In cases of failing other treatments to treat heart diseases or heart failure, *Heart transplantation* stands as the final surgery (Shang et al., 2025).

Heart Transplantation is a gold-standard clinical treatment for patients with heart failure at the

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end stage. A study defined approximately 65 million adults as having heart failure due to modern lifestyle and rapid population growth (Jou et al., 2024). In 1905, Alexis Carrel and Guthrie made the first attempt at the University of Chicago, and later, Dr Shumway attempted in 1950, both in dogs. The first human heart transplantation was performed by Dr Christiaan Nethling Barnard at Groote Schuur Hospital in Cape Town, South Africa, on December 3, 1967 (Chrysakis et al., 2024). In India, Dr Prafulla Sen in Mumbai added his achievement to the history of heart transplantation on February 17, 1968 (Vaidya, 2021).

Alan Pritchard, the British librarian, introduced the term 'bibliometrics' in 1969, and he defined bibliometrics as "the application of mathematical methods to books, journals, and other media of communication". Bibliometrics denotes quantitative analysis and statistical methods to evaluate the various publication patterns within a discipline (Prichard A., 1969). In modern research trends, researchers can examine the quantitative overviews of the specific subject using Bibliometric tools. Several studies have been conducted to illustrate the trends in subjects, the contribution of countries and institutions, and to identify the dynamics of the journals, scientists, and researchers' global contribution.

Scientific journals are vital in sharing the growth of scientific inventions, discoveries, observations, and predictions. Most productive articles are drawn from the peer-reviewed journals, which the expert committees recommend. Journals are covered in an attractive and subjective collection of scientific works that can be used to understand the growth of science and generate innovative ideas for future studies. When research work is published in prestigious journals, it can increase the visibility and credibility of the researchers. Many studies have proved that academic journals are the most effective and reliable publishing method (Kumar, 2020).

The current study investigates and identifies the core journals, most cited sources, the impact of the dominant sources, and the application of Bradford's Law in the heart transplantation literature.

2. Objectives of the Study

The study was conducted based on the following objectives.

- a) To conduct a quantitative overview of the heart transplantation literature.
- b) To identify the core journals with more articles.
- c) Determining which journal has more citations by identifying the most cited sources in this field.
- d) To illustrate the Source Impact with h, g, and m index (s).
- e) To measure how articles on heart transplantation are scattered across the journal using Bradford's Law of scattering.

3. Scope and Limitation of the Study

The study of heart transplantation is the most life-saving treatment in medicine. The present study

is crucial in selecting core journals for clinical moves and research. The researcher used similar keywords to collect data on ‘heart transplantation’ or ‘cardiac transplantation’. The study is limited to 30 years, from 1994 to 2023, and the ‘Medicine’ area is restricted to publications.

4. Methodology

The Scopus database gathered bibliographical data on heart transplantation literature between 1994 and 2023. Scopus database is the largest abstract and citation database of scientific literature. The main reason for the selection of the Scopus database is its coverage. It covers 100% of the titles that are indexed in the MEDLINE and PubMed databases. It gives a comprehensive dataset that helps with quantitative analysis. Advanced search strategies used to extract accurate information, i.e., *SUBJAREA (MEDI) TITLE-ABS-KEY ({heart-transplantation} OR {cardiac-transplantation} OR {heart transplantation} OR {cardiac transplantation} OR {heart-transplant} OR {cardiac-transplant} OR "heart-transplant*" OR "cardiac-transplant*" OR "heart transplant*" OR "cardiac transplant*") PUBYEAR > 1993 AND PUBYEAR < 2024*. The data was downloaded on 28th May 2024.

The study area ‘heart transplantation’ is purely associated with ‘Medicine’, hence the study is strictly limited to the Subject Area ‘Medicine’ in the Scopus database. 49791 documents were found and downloaded into .csv format. The downloaded data was used in R Studio for statistical analysis using bibliometric indicators. Later, the data was analysed using the ‘Bibliometrix tool’, Biblioshiny, and MS Excel.

5. Review of Literature

‘Bibliometric’ is a tool used to analyse the growth of science. Bibliometric analysis is a globally recognised method of information processing. It helps to analyse the collected data on journals, authors, countries, keywords, institutions, and cited references using bibliometric indicators. These indicators enable visualisation of the data and trend analysis. Providing predictive references for upcoming research directions (Tu et al., 2024). The study identified a total of 1696 research articles from 583 journals. The most dominant journals are ranked according to their productivity within a specific area of research. The *Bibliometrix* tool has been used to identify the core zone, which consists of 27 journals with 534 (33.3%) articles. The Impact factor of the top 10 journals spanned from 3.752 to 13.801. Among the top journals, *Cancer Research* scored 39 for h-index. The top 5 dominant journals have received over 10,912 citations for 196 articles (Xie et al., 2024). The study chose the PubMed database to conduct a bibliometric analysis on the computerised physician order entry system (CPOE) and extracted 2,946 articles from 623 journals. Apart from these, eight dominant journals have covered one-third of the articles published between 2003 to 2022 (Gosselin et al., 2023). A study attempts to apply Bradford’s Law of scattering and Leimkuhler model on Information Science literature to 213 journals extracted from the Scopus database between 2001 to 2020. The minor percentage error of 0.0092357 has been examined and defined as a study fit

to Bradford's Law with the dominant journals' highest frequency (Borgohain et al., 2021). The study applied Bradford's Law to identify the core journals in the 'Surgical Robotics' field. A total of 6897 articles were retrieved from the 772 journals from 2015 to 2020. As per the rules applied to this study, the journals are scattered in the ratio of 16:64:692, and the Bradford Multiplier (k) is 8.75, which is used to fit the Bradford Law of Scattering (Kumar, 2020). A further study investigates drone technology literature, which scattered 3433 articles in 1155 core journals published between 2008 and 2017. It reveals that the top ten journals covered 682 (19.86%) articles. The journals are distributed at a ratio of 32:195:928, as per Bradford's Law, but drone technology is not satisfied. However, it has been tested and proven that the data fit the Leimkuhler model (Lakshminarasimhappa M C & Kemparaju T D, 2019). A global share of 48% is covered by the top 15 productive journals on quantum sensing. *Physical Review* ranked 1 with 30 papers, followed by *Physical Review Letters*, *New Journal of Physics* and *Physical Review Applied*, leading in global productivity (Gupta & Dhawan, 2022).

5.1 Bibliometric Studies on Cardiovascular and associated subjects.

A study attempted to analyse immune response in heart transplantation, which was collected from the Science Citation Index Expanded. A total of 1393 papers came up in 414 journals. Of these, 12 journals covered more than 20 papers, and 627 (45.01%) articles were published. '*Transplantation*', '*Journal of Immunology*', and '*Proceedings of the National Academy of Science of the United States of America*' are the top three most cited journals (Zhang X. et al., 2022; Du, Yihang et al., 2022). reviewed the heart transplantation literature using bibliometric indicators. The study has selected the Web of Science as a data source and extracted 19998 articles from 1990 to 2021. It analyses the core authors, country and institutions' collaboration and keywords using CiteSpace and VOSviewer software. The status journal 'Current Problems in Cardiology' has been selected for bibliometric study to highlight the total publications, citations, and dominance of journals, most prolific authors, institutions and country collaborations (Hassan et al., 2024).

6. Results and Data Analysis

6.1 Quantitative overview of the heart transplantation literature (1994-2023)

Table 1 shows the overview of the heart transplantation literature covering 1994 to 2023. A total of 49791 research papers were extracted from the Scopus database and are scattered in 3914 productive journals. The results reveal a 2.1% growth rate in the research area for 30 years. A total of 13,11,936 citations received for 48473 (out of 49791) articles, an average of 27.06 citations per article. It accumulates a total of 1020854 references. Keywords play an essential role in Zipf's Law of bibliometrics. In this study, Keywords Plus (48559) dominates the keywords given by the authors (30094). A total of 114945 prolific authors has contributed to the area of research and identified 3458 single-authored and 5007 articles with collaboration. The present research area has

a good sign of international collaboration, with 12.42% of global publications. In addition, journal articles led with 66.11% in total publications.

Table 1. Quantitative overview of Heart transplantation literature

Description	Results
MAIN INFORMATION ABOUT DATA	
Timespan	1994:2023
Sources (Journals, Books, etc.)	3914
Documents	49791
Annual Growth Rate %	2.1
Document Average Age	14.8
Average citations per doc	27.06
References	1020854
DOCUMENT CONTENTS	
Keywords Plus (ID)	48559
Author's Keywords (DE)	30094
AUTHORS	
Authors	114945
Authors of single-authored docs	3458
AUTHORS COLLABORATION	
Single-authored docs	5007
Co-Authors per Doc	6.3
International co-authorships %	12.42
DOCUMENT TYPES	
Article	32915
Book	29
book chapter	718
conference paper	3135
Editorial	2414
Erratum	134
Letter	2138
Note	1200
Retracted	2
Review	6674
short survey	432

6.2 Journals with more articles

Scientific journals can be defined as a specific area of research that is a source of innovative thoughts. Table 2 lists the top 30 core journals with the most articles in the research area. The United States journal, the *Journal of Heart and Lung Transplantation*, ranked at the top of the

list, producing 3563 articles, which hold 7.16% of total articles published on heart transplantation from 1994 to 2023. Followed by *Transplantation Proceedings* ranked 2nd with 3035 articles, and *Transplantation* has obtained the 3rd rank with 1980 articles. The journals, *Annals of Thoracic Surgery*, *American Journal of Transplantation*, and *Journal of Thoracic and Cardiovascular Surgery* have published more than 1000 papers in the stipulated period. They are ranked in the following positions in the column. The top 30 listed journals covered 21861 (43.91%) articles out of 49791.

Table 2. The top 30 core journals with the most articles.

JOURNAL	NP	CNP	CNP%
Journal of Heart and Lung Transplantation	3563	3563	7.16
Transplantation Proceedings	3035	6598	13.25
Transplantation	1980	8578	17.23
Annals of Thoracic Surgery	1300	9878	19.84
American Journal of Transplantation	1044	10922	21.94
Journal of Thoracic and Cardiovascular Surgery	1032	11954	24.01
Circulation	983	12937	25.98
Journal of the American College of Cardiology	746	13683	27.48
Clinical Transplantation	743	14426	28.97
Pediatric Transplantation	681	15107	30.34
European Journal of Cardio-Thoracic Surgery	603	15710	31.55
American Journal of Cardiology	552	16262	32.66
International Journal of Cardiology	504	16766	33.67
Transplant International	493	17259	34.66
Journal of Cardiac Surgery	401	17660	35.47
Journal of Cardiac Failure	383	18043	36.24
European Heart Journal	371	18414	36.98
Artificial Organs	327	18741	37.64
Transplant Infectious Disease	309	19050	38.26
Transplant Immunology	282	19332	38.83
Journal of Cardiothoracic and Vascular Anaesthesia	279	19611	39.39
European Journal of Heart Failure	277	19888	39.94
Heart	270	20158	40.49
Pediatric Cardiology	270	20428	41.03
Circulation: Heart Failure	261	20689	41.55
Cardiology In the Young	239	20928	42.03
Journal Of Immunology	238	21166	42.51
Current Opinion in Organ Transplantation	235	21401	42.98
Canadian Journal of Cardiology	232	21633	43.45
ESC Heart Failure	228	21861	43.91

NP=Number of Publications, CNP=Cumulative Number of Publications

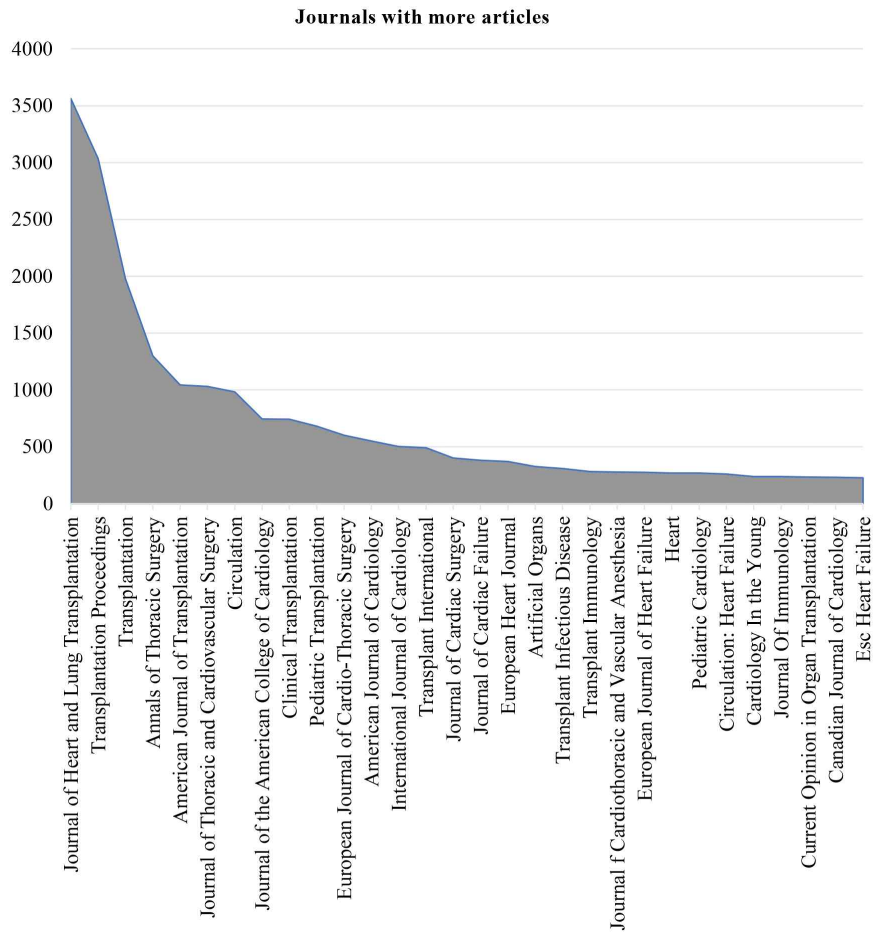


Fig. 1. Graphical representation of Journals with more articles

6.3 Most Cited Sources

Citations are metrics that denote the frequency of articles cited by other articles and help to assess the popularity and rank the research within a specific field. The impact of a research journal or an article can be measured based on the quality index of citations received. Table 3. It shows the top 30 most productive sources with the highest citations. A total of 1311936 citations received for 3038 out of 3914 sources, and the listed top 30 sources are dominated, holding 65.67% of the total citations. An average of 431.84 citations was received for the productive journals of the heart transplantation literature. Among the list of sources, the dominant journal, *Circulation*, was ranked first with 142717 (10.88%) citations for 983 articles over 30 years and captured an average of 4757.23 citations per year. Followed by *Journal of Heart and Lung Transplantation* secured 2nd rank with 129600 (9.88%) citations for 3563 articles with an average of 4320 citations per year. *Journal of the American College of Cardiology* stands in 3rd position, holding 71243 (5.43%) of the overall citations. *Transplantation*, *European Heart Journal*, *American Journal of Transplantation*

and *New England Journal of Medicine* seized the following positions, having a total of 217321 (16.58%) citations. Interestingly, the *American Journal of Transplantation* obtained 44411 citations (3.39%), an average of 1930.91 citations over 23 years.

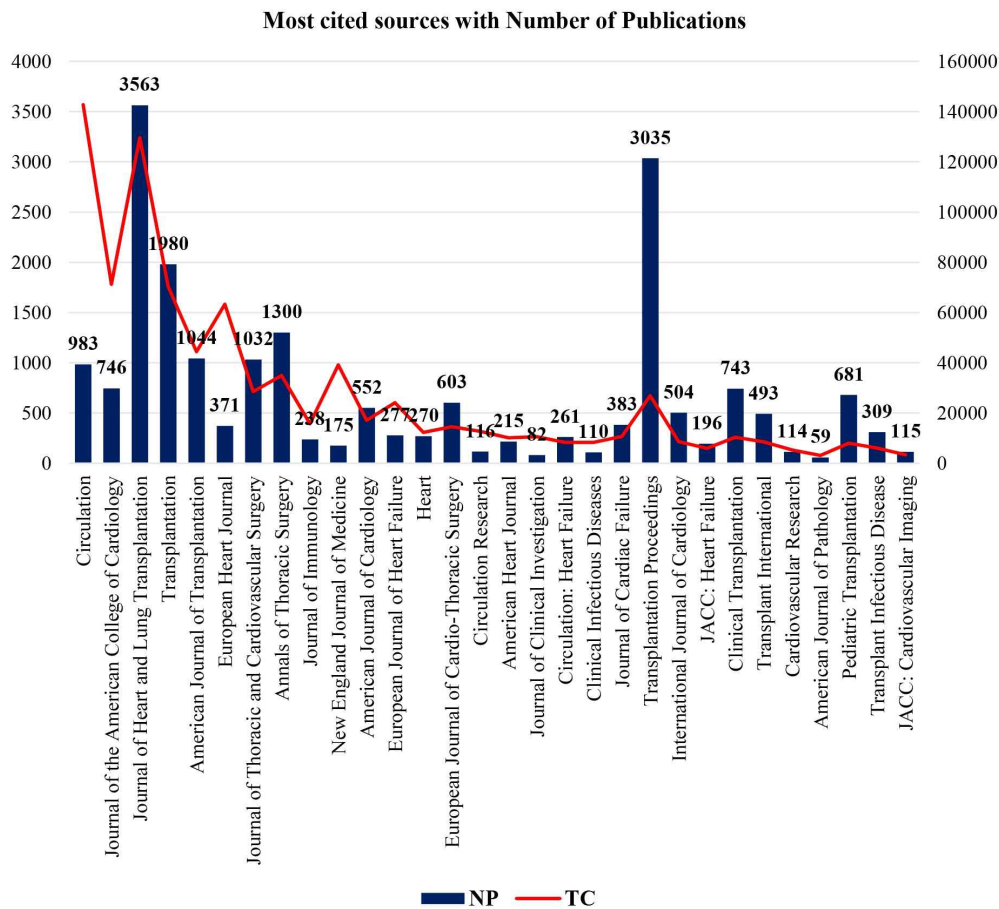


Fig. 2. Most cited sources with the number of articles

Table 3. Top 30 Most Cited Sources.

Source	TC	% TC	ACP	NP	PYS	YCR
Circulation	142717	10.88	4757.23	983	1994	30
Journal of Heart and Lung Transplantation	129600	9.88	4320.00	3563	1994	30
Journal of the American College of Cardiology	71243	5.43	2374.77	746	1994	30
Transplantation	70402	5.37	2346.73	1980	1994	30
European Heart Journal	63327	4.83	2110.90	371	1994	30
American Journal of Transplantation	44411	3.39	1930.91	1044	2001	23
New England Journal of Medicine	39181	2.99	1306.03	175	1994	30

Source	TC	% TC	ACP	NP	PYS	YCR
Annals of Thoracic Surgery	34991	2.67	1166.37	1300	1994	30
Journal of Thoracic and Cardiovascular Surgery	28554	2.18	951.80	1032	1994	30
Transplantation Proceedings	26870	2.05	895.67	3035	1994	30
European Journal of Heart Failure	24098	1.84	963.92	277	1999	25
American Journal of Cardiology	17102	1.30	589.72	552	1995	29
Journal of Immunology	15732	1.20	524.40	238	1994	30
European Journal of Cardio-Thoracic Surgery	14575	1.11	485.83	603	1994	30
Circulation Research	12740	0.97	424.67	116	1994	30
Heart	12293	0.94	409.77	270	1994	30
Journal of Cardiac Failure	10689	0.81	368.59	383	1995	29
Journal of Clinical Investigation	10553	0.80	351.77	82	1994	30
Clinical Transplantation	10345	0.79	344.83	743	1994	30
American Heart Journal	10172	0.78	339.07	215	1994	30
International Journal of Cardiology	8676	0.66	289.20	504	1994	30
Transplant International	8592	0.65	286.40	493	1994	30
Circulation: Heart Failure	8370	0.64	558.00	261	2009	15
Clinical Infectious Diseases	8302	0.63	276.73	110	1994	30
Paediatric Transplantation	8054	0.61	298.30	681	1997	27
Journal of the American Society of Echocardiography	7315	0.56	243.83	141	1994	30
Transplant Infectious Disease	6072	0.46	242.88	309	1999	25
JACC: Heart Failure	5910	0.45	537.27	196	2013	11
Heart Rhythm	5399	0.41	269.95	121	2004	20
Cardiovascular Research	5275	0.40	175.83	114	1994	30

TC = Total Citations, ACP = Average Citations per Paper, NP = Number of Papers, PYS = Starting Year of Publication, YCR = Years of Citation Received.

6.4 Source Impact (h-index, g-index, and m-index)

The impact of journals can be measured based on the number of journal citations over a specific period. There are several studies and tools to evaluate the effect of the most productive journals. The present study used h, g, and m-indices to examine the impact of the productive sources in heart transplantation. These indices are primarily author-level metrics and can be applied to measure the impact of journals, sources, and institutions. *Jorge E. Hirsch* recommended the H-index to measure the scientific productivity of a specific source based on the individual's contribution to the area of research. The journal *Circulation* received 142717 citations for 983 articles, calculated a 181 h-index, a 351 g-index and a 5.66 m-index, and was listed first among the top 30 sources. The Journal of the American College of Cardiology obtains the second-highest metrics (h,g,m index) for 746 articles. Subsequently, *the Journal of Heart and Lung Transplantation* secured the 3rd position with 129600 citations, obtaining 132 h-index, 229 g-index, and 4.13 m-index. Followed by Transplantation (112, 160, & 3.50) and American Journal of Transplantation (101, 154, & 4.04)

were calculated on received citations, respectively h, g, and m index. Interestingly, the *European Heart Journal* has a 251 g-index for 371 articles. The rest of the sources obtained less than a 100 h-index. The study observed that the top 30 journals proved the most impactful sources in heart transplantation.

Table 4. Source impact (h, g, m index) - Top 30 sources.

Source	NP	PYS	TC	Metrics (Index)		
				H	G	M
Circulation	983	1994	142717	181	351	5.66
Journal of the American College of Cardiology	746	1994	71243	141	245	4.41
Journal of Heart and Lung Transplantation	3563	1994	129600	132	229	4.13
Transplantation	1980	1994	70402	112	160	3.50
American Journal of Transplantation	1044	2001	44411	101	154	4.04
European Heart Journal	371	1994	63327	91	251	2.84
Journal of Thoracic and Cardiovascular Surgery	1032	1994	28554	91	132	2.84
Annals of Thoracic Surgery	1300	1994	34991	89	123	2.78
Journal of Immunology	238	1994	15732	72	110	2.25
New England Journal of Medicine	175	1994	39181	69	175	2.16
American Journal of Cardiology	552	1995	17102	65	101	2.10
European Journal of Heart Failure	277	1999	24098	65	152	2.41
Heart	270	1994	12293	59	104	1.84
European Journal of Cardio-Thoracic Surgery	603	1994	14575	58	83	1.81
Circulation Research	116	1994	12740	56	112	1.75
American Heart Journal	215	1994	10172	55	92	1.72
Journal of Clinical Investigation	82	1994	10553	55	82	1.72
Circulation: Heart Failure	261	2009	8370	54	79	3.18
Clinical Infectious Diseases	110	1994	8302	54	91	1.69
Journal of Cardiac Failure	383	1995	10689	53	86	1.71
Transplantation Proceedings	3035	1994	26870	51	67	1.59
International Journal of Cardiology	504	1994	8676	45	65	1.41
JACC: Heart Failure	196	2013	5910	45	74	3.46
Clinical Transplantation	743	1994	10345	44	68	1.38
Transplant International	493	1994	8592	43	65	1.34
Cardiovascular Research	114	1994	5275	42	69	1.31
American Journal of Pathology	59	1994	3120	39	55	1.22
Pediatric Transplantation	681	1997	8054	39	51	1.35
Transplant Infectious Disease	309	1999	6072	39	61	1.44
JACC: Cardiovascular Imaging	115	2008	3387	36	56	2.00

NP = Number of Publications, PYS = Starting Year of Publication, TC = Total Citations, H = h-index, G = g-index, M = m-index

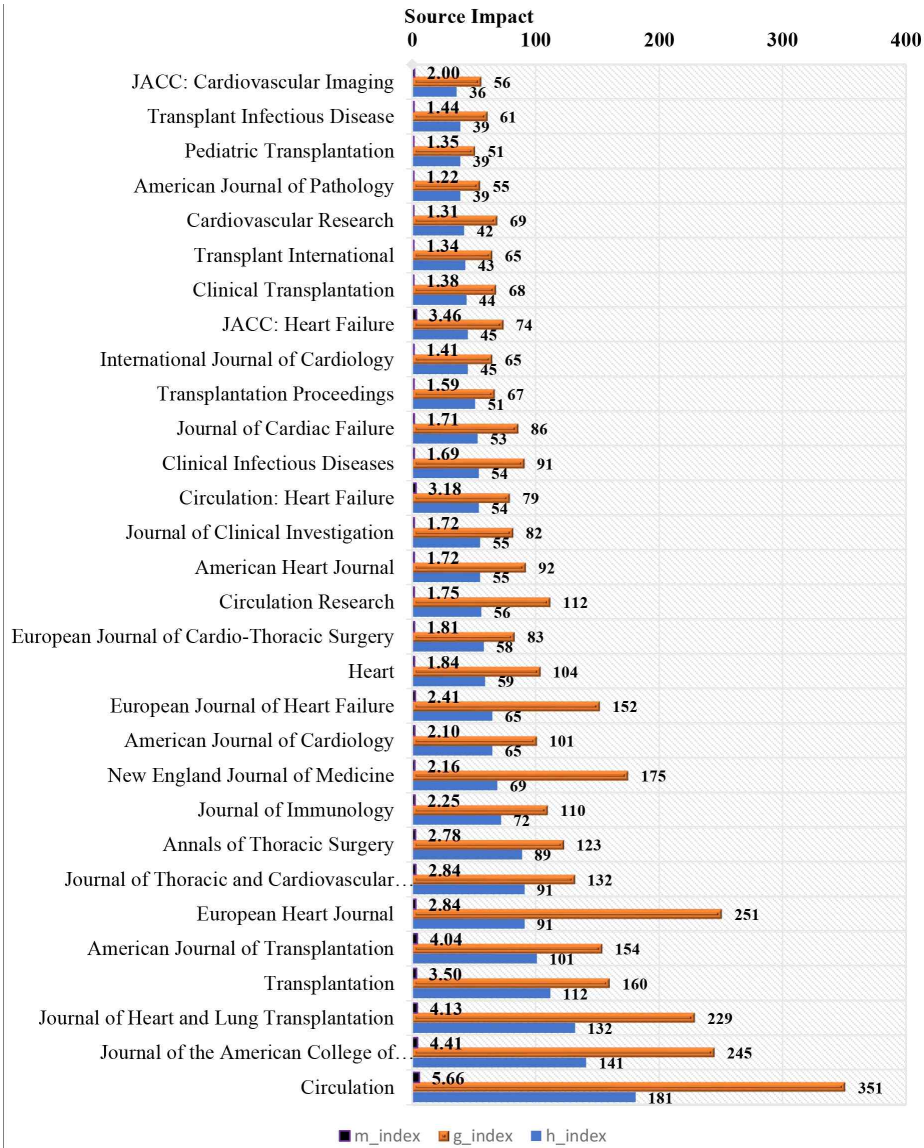


Fig. 3. Source Impact (h, g, m index) of heart transplantation literature.

6.5 Bradford Distribution of Journals

Bradford's law defines scientific journals measured and ranked according to their published articles in a specific area of research, which can be approximately categorised into three zones, each containing an equal number of articles in the total publications (Xie et al., 2024).

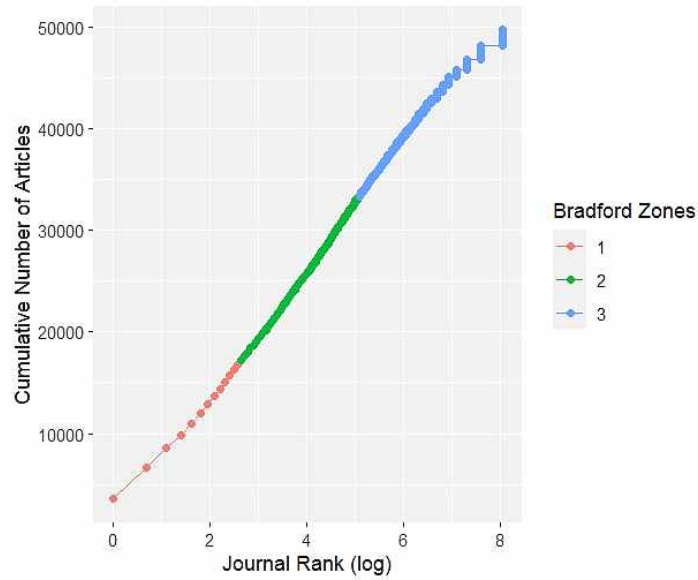


Fig. 4. Bradford distribution of the journals

Table 5. Zone 1 covers 16766 (33.67%) of 49791 articles in 13 core journals, the most productive and the core zones. Zone 2 covers 16609 (33.36) articles in 148 journals, a prolific zone containing the same number but more journals than Zone 1. Zone 3 includes 16416 (32.97%) articles in 3754 journals, which is a low-productivity zone, and it has more journals than Zone 2, covering the same number of articles. These three zones cover one-third of the total published articles. The distribution of journals into Bradford's zones is as follows: 1: n: n², and the research output is scattered into 13:148:3754. Whereas the Bradford Multiplier mean is 18.37. Bradford's Law on current data is divided into 13:13 (18.37):13 (18.37)², and the percentage error calculated is 112.0833, which is technically wrong. Hence, the present data does not fit Bradford's Law of Scattering.

Table 5. Bradford distribution of journals

	No. of journals	% of journals	No. of articles	%of articles	Bradford multiplier
Zone 1	13	0.33	16766	33.67	
Zone 2	148	3.78	16609	33.36	11.38
Zone 3	3754	95.91	16416	32.97	25.36
Total	3914		49791		18.37 (Mean)

n=18.37, Therefore, 1x13:13x18.37:13x18.37² :: 1: n: n²

13:238.81:4386.94, which is a total of 4386.94

The percentage of error is $= \frac{4386.94}{3914} \times 100 = 112.0833 \%$

Hence, the Leimkuhler model (1967) is used to verify the current data with Bradford's Law of Scattering.

6.5.1 Application of the Leimkuhler model

3914 journals are divided into three zones (one-third of the total publications) in descending order of their productivity to test Bradford's Law of Scattering. Bradford assumes the minimum zones, i.e. $p = 3$ (zones), hence the value of k =Bradford's multiplier can be formulated using $k (e^y y_m)^{1/p}$ and Euler's number ($e^y = 1.781$), and y_m is the number of articles in the most productive journals (3914).

$$k=(1.781 \times 13)^{1/3}$$

$$k=2.850159$$

$$Y_0 = A/P :: 49791/3 = \mathbf{16597}$$

$$r_0 = \frac{T(k-1)}{k^3 - 1} \therefore T = \text{total number of Journals, } r_0 = \text{number of core journals in zone 1.}$$

$$r_0 = \frac{7241.522}{22.153} = \mathbf{326.8868 - (zone 1)}$$

$$r_1 = r_0 \times k = 326.8868 \times 2.850159 = \mathbf{931.6792 - (zone 2)}$$

$$r_2 = r_0 \times k^2 = 326.8868 \times (2.850159)^2 = \mathbf{2655.434 - (zone 3)}$$

$$a = \frac{Y_0}{\log k} = \frac{16597}{0.454869} = 36487.42$$

$$b = \frac{(k-1)}{r_0} = \frac{1.850159}{326.8868} = 0.005659939$$

The result of the calculations is shown in Table 5. The number of core journals is 326.8868, and Bradford's multiplier is 2.8494. Therefore, the Bradford distribution is

$$1: n: n^2 :: 326.8868: 326.8868 \times 2.8494: 326.8868 \times (2.8494)^2$$

$$:: 326.8868: 931.4312: 2654.0266 = \mathbf{3912.3446}$$

$$\text{Percentage of error} = \frac{3912.3446 - 3914}{3914} \times 100 = \mathbf{-0.04229}$$

Table 6. Bradford distribution of journals with the Leimkuhler model

	No. of journals	% of journals	No. of articles	%of articles	Bradford multiplier
Core	327	8.35	38021	76.36	
Zone 2	932	23.80	7696	15.46	2.8502
Zone 3	2655	67.84	4074	8.18	2.8487
Total	3914		49791		2.8494 (Mean)

The study presents a percentage of error in the distribution of -0.04229. Zone 1 or 38021 (76.36% of total publication) articles were scattered in 327 (8.35% of total journals), the most productive journals, considered the core zone. Zone 2 contains 7696 articles with 932 journals, which are regarded as fairly prolific journals, and zone 3 covers the remaining 4074 articles in 2655 journals, which are poorly productive.

7. Concluding Remarks

The scientific or productive journals measure the quality of the research area. Likewise, the core journals play a leading role in heart transplantation literature. The *Journal of Heart and Lung Transplantation* secured the top rank, producing 3563 (7.16% of total publications) articles and the journal, *Circulation*, was ranked first by holding 142717 (10.88%) citations with 181h, 351g, and 5.66 m-index frequencies for 983 articles over 30 years from 1994 to 2023. In addition, the top 30 most productive journals covered 43.91% of articles in 49791 and 65.67% of citations. The output of the Bradford distribution of journals is 1: n: n², and the research scattered as 13:148:3754. However, it found that the current study does not fit Bradford's Law since the percentage error is 112.0833. Alternatively, Leimkuhler's mathematical formulation has been adopted to evaluate Bradford's distribution. It scrutinised Bradford's 1:n:n² and found the error percentage is -0.04229. Hence, it declares that Bradford's Law of Scattering is fit when it applies to the Leimkuhler model to validate the current data.

The present study helps researchers, doctors, and medical and clinical practitioners understand the research area's growth and gain in-depth knowledge on heart transplantation and its branches. It is also used by academic librarians, teaching professionals, and LIS students to explore bibliometric studies in the future and make collection development decisions. Bradford's Law of Scattering lists the most productive journals in a specific domain. This directly helps and guides in the selection of productive journals in the field of cardiology and heart transplantation.

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