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Literature on Blood Cancers: A Bibliometric Analysis

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Abstract

This paper presents a bibliometric study on blood cancers, considering publications distributed from 2012 to 2021. The study focuses on the literature available in the MEDLINE database, concealed within PubMed. A total of 32,750 documents on 'Blood cancers' were identified in the MEDLINE data covered by PubMed, with the highest number of 4,429 documents distributed in 2020. The document types were categorised, revealing that 39.11% were journal articles, 26.32% were Research Support, Non-U.S. Gov't and 19.72% were Reviews. In Zone-1, 61 journals scattered 4,384 documents, accounting for one-third of the overall output. Zone-2 comprised 424 journals scattering 4,805 documents, and Zone-3 included 1,906 journals scattering 3,620 documents as journal articles. This study identified a total of 485 significant journals within the field of blood cancers. The analysis revealed that 60.98% of documents had more than five authors, while only 0.29% had no authors. The average degree of collaboration reached 0.96. A period-wise examination of the degree of collaboration showed an increasing trend from 2012 (0.94) to 2020 (0.97). The study suggests a high level of collaborative research in the field of blood cancers.

Keywords: Bibliometrics, Blood Cancers, Bradford's Law, Degree of Collaboration

Introduction

Bibliometrics is the study concerned with the quantitative analysis of written communication, aiding in the evaluation of scattered information. Scientometrics and bibliometric studies are gaining recognition as interdisciplinary in nature (Morillo, Bordons & Gomez, 2001). Currently, these methods are actively pursued, revealing that one-fourth of all documents published in Library and Information Science periodicals are on Scientometrics/ Bibliometrics and related topics (Maheswarappa, 1997).

Blood cancers impact the production and function of blood cells, typically originating in the bone marrow. The three primary types of blood cancers are Leukaemia, Lymphoma and Myeloma (ASH, 2022).

This research aims to identify significant journals within the field of blood cancers and to categorise authorship patterns and the degree of collaborative investigation.

Review of Literature

There have been numerous studies on mapping and Bradford's Law in health sciences (Burnham, 1997a; Burnham, 1997b; Delwiche, 2003; Haaland, 1999; Hall, 1999; Hook & Wagner, 1999; Maheswarappa, 1997; Reed, 1999; Slater, 1997; Smith, 1999; Stevens, 2000; Wakiji, 1997; Walcott, 1999). Schloman (1997) considered mapping the literature of allied health. Kundra (1999) investigated the behaviour of Bradford's Law towards citation data in the Indian Medical Journal. RameshBabu and Ramakrishnan (2007) examined Indian contributions to the field of Hepatitis and utilised Bradford's Law to identify core journals. Patra and Chand (2007) scrutinised HIV/AIDS research in India, employing Bradford's Law of scattering to identify core journals. Ramakrishnan and

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Thavamani (2012) focused on the literature of Hepatitis C, recognising 31 core journals in the field with the help of Bradford's Law of Scattering.

Additionally, numerous studies on author collaboration have been conducted by different authors in various subjects (Cano, 1999; Koehler, 2001; Majid, 1996; Rao & Raghavan, 2019). Macias-Chapula (2000) attempted to classify the patterns of growth in AIDS literature, while Ramakrishnan and Rajendran (2004) focused on Hepatitis B. Hartinah (2001) explored nutrition issues in Indonesia published during the period 1979-2000. Arunachalam and Gunasekaran (2002) examined tuberculosis research in India and China. Srivastava (2004) investigated the field of Biomedical Sciences in India, addressing authorship patterns in their respective studies.

In addition to these earlier studies, several recent and significant analyses have been conducted on the published research in medical and allied sciences over the past 2–3 years.

In recent years, diverse bibliometric studies have contributed valuable insights to various fields. Ahn and Hwang (2020) analysed global trends in breast cancer immunotherapy research, identifying key contributors and hotspots. Panda (2020) conducted a meta-analysis on coronavirus research, revealing impactful contributors and highlighting the University of Hong Kong's prominence. Yeung et al. (2020) provided a comprehensive overview of ethno pharmacology literature, uncovering global contributions and shifting dynamics. Vennu et al. (2021) explored health-related publications in Saudi Arabian universities, indicating a significant increase in output and insights into regional productivity. Alotaibi et al. (2022) assessed biostatistics knowledge and attitudes among family medicine trainees in Taif, emphasising the need for improved training. Cheng et al. (2022) delved into cancer photodynamic therapy research, revealing increasing trends and identifying research hotspots. Rostami et al. (2023) studied the scientific publications of the Iran University of Medical Sciences, offering insights into its research impact and collaborative networks. These studies collectively contribute to the evolving landscape of bibliometric research across medicine, oncology, virology, pharmacology and public health.

This review of literature on scientometrics articles revealed that, as of now, there has been no quantitative study conducted on "Blood cancers." Hence, the present study aims to fill this gap.

Study Objectives

The objectives of this paper are as follows:

- To assess the growth of literature on "Blood cancers".
- To categorise the types of publications encompassed by research on "Blood cancers".
- To identify significant journals in the field of literature on "Blood cancers".
- To analyse and classify the authorship pattern and the degree of collaborative research in the field of literature on "Blood cancers".

Methodology

The contributions in the subject of "Blood cancers" scattered during 2012–2021, covered in the bibliographic database MEDLINE (accessible on PubMed at: https://pubmed.ncbi.nlm.nih.gov/), were searched, and the records were collected. The keyword "Blood cancers" was utilised to extract literature on this topic. Subsequently, the recovered records underwent analysis using SPSS.

To identify significant journals in the field of blood cancers, Bradford's Law (1948) of scattering was employed. The records were further examined to understand the authorship pattern, and the degree of collaboration among authors in the subject of blood cancers was calculated. To express the degree of collaboration in quantitative terms, the method suggested by Subramanyam (1983) was utilised.

Limitations

This study is restricted to a period from the year 2012 to 2021 utilising MEDLINE data which concealed in PubMed only.

Analysis and Interpretation of Data

Data collected from the MEDLINE database on the literary production of "Blood cancers" for the period 2012–2021

has been analysed by using various bibliometric methods as depicted.

Quantum of Blood Cancers Research Productivity

The research productivity on "Blood cancers" covered within the database is shown in Table 1. It is observed that a total of 32,750 documents on "Blood cancers" are concealed in the MEDLINE data which covered in PubMed for a period of ten years from 2012 to 2021. It is found that the greatest number of documents (4,429) was published during the year 2020, followed by 4,179 documents within the year 2021 and 3,614 documents within the year 2015. On the whole, it is taken note that from 2012 onwards there is a gradual growth of Blood cancers research productivity every year except four years i.e. 2013, 2016, 2019 and 2021 where the documents were less compared to the former years.

Table 1: Documents Published in Blood Cancers

Year	*No. of Documents*	*Percentage*	*Collective Percentage*
2012	2485	7.6%	7.6%
2013	2483	7.6%	15.2%
2014	2753	8.4%	23.6%
2015	3614	11%	34.6%
2016	2852	8.7%	43.3%
2017	3003	9.2%	52.5%
2018	3519	10.7%	63.2%
2019	3433	10.5%	73.7%
2020	4429	13.5%	87.2%
2021	4179	12.8%	100%
Total	**32750**	**100%**	**-**

Publication Types Dissemination of Blood Cancers Research

Table 2 exposes the scattering of the "Blood cancers" literature output according to different publication types of MEDLINE. It was found that 39.11% of documents are journal articles, 26.32% of documents are Research Support, Non-U.S. Gov't and 19.72% of documents are Review. The works published as other publication types is 14.85%.

Table 2: Publication Types of Blood Cancers Research

Publication Type	*No. of Documents*	*Percentage*
Journal Article	12809	39.11%
Research Support, Non-U.S. Gov't	8621	26.32%
Review	6457	19.72%
Research Support, N.I.H., Extramural	894	2.73%
Letter	655	2.00%
Systematic Review	550	1.68%
Multicenter Study	485	1.48%
Research Support, U.S. Gov't, Non-P.H.S.	375	1.15%
Observational Study	344	1.05%
Randomized Controlled Trial	257	0.78%
Case Reports	201	0.61%
Editorial	177	0.54%
Validation Study	164	0.50%
Research Support, N.I.H., Intramural	140	0.43%
Meta-Analysis	125	0.38%
Research Support, U.S. Gov't, P.H.S.	114	0.35%
Video-Audio Media	80	0.24%
Introductory Journal Article	76	0.23%
News	71	0.22%
Other Publication types	155	0.47%
Total	**32750**	**100.00**

Scattering of Journals in Blood Cancers as Per Bradford Law of Scattering

As per the Bradford Law, the journals which concealed journal article are assembled into three zones publishing similar number of articles. The dissemination of journal by zone wise is given within the Table 3. It is seen from Table 3 that 61 journals assembled in Zone-1 published 4,384 documents as journal articles accounting for one third of the total output. Likewise, the second zone covers of 424 journals published 4,805 documents as journal articles and 1,906 journals published 3,620 documents as journal articles assembled in third zone.

Table 3: Journals by Zones and Journal Articles in Blood cancers

Zone	*No. of Journals*		*No. of Journal Articles*		*Collective Total*
	No.	*Percentage*	*No.*	*Percentage*	
Zone 1	61	2.55%	4384	34.23%	4384
Zone 2	424	17.73%	4805	37.51%	9189
Zone 3	1906	79.72%	3620	28.26%	12809
Total	**2391**	**100.00%**	**12809**	**100.00%**	-

Significant Journals in Blood Cancers Research

There are 485 journals published 9,189 journal articles for Zone-1 and Zone-2. Those journals are distinguished as significant journals within the field of blood cancers. Significant journals based on the research output on blood cancers during the study period have been displayed in the Table 4. There are 2,391 journals contributed 12,809 journal articles. The highly productive journals up to ten places are as follows:

- "Cancers" concealed 758 journal articles.
- "Oncotarget" concealed 203 journal articles.
- "Asian Pacific journal of cancer prevention: APJCP" concealed 176 journal articles.
- "Biology of blood and marrow transplantation" concealed 159 journal articles.
- "PloS one" concealed 159 journal articles.
- "BMC cancer" concealed 128 journal articles.
- "Annals of hematology" concealed 117 journal articles.
- "Blood" concealed 112 journal articles.
- "Pediatric blood & cancer" concealed 112 journal articles.
- "Supportive care in cancer" concealed 104 journal articles.

Table 4: Significant Journals in Blood Cancers Research (Top 10)

Rank	*Name of the Journal*	*No. of Documents*	*Percentage*
1	Cancers	758	5.92%
2	Oncotarget	203	1.58%
3	Asian Pacific Journal of Cancer Prevention : APJCP	176	1.37%
4	Biology of Blood And Marrow Transplantation	159	1.24%
4	PLOS One	159	1.24%
5	BMC Cancer	128	1.00%
6	Annals of Hematology	117	0.91%
7	Blood	112	0.87%
7	Pediatric Blood & Cancer	112	0.87%
8	Supportive Care in Cancer	104	0.81%
9	Medicine	95	0.74%
10	Bone Marrow Transplantation	88	0.69%

Single and Multiple-Author Papers Literature on Blood Cancers

As shown in Table 5 that there are 32,750 documents have chosen for this study. 60.98% of documents indexed with the term "blood cancers" of this study have more than five authors. The other documents indexed with the term "blood cancers" are five authors (9.49% of documents), four authors (8.87% of documents), three authors (8.64% of documents), two authors (7.76% of documents) and single author (3.98% of documents) correspondingly. Hence, it infers within the field of blood cancers, multi authored research is dominating than solo research. However, it shows that there are 94 (0.29%) documents without author and they are unknown authorship.

Table 5: Single and Multiple-Author Papers Literature on Blood Cancers

No. of Authors	*No. of Records*	*Percentage*	*Rank*
Single author	1303	3.98%	**6**
Two authors	2540	7.76%	**5**
Three authors	2831	8.64%	**4**
Four authors	2904	8.87%	3
Five authors	3108	9.49%	**2**
Five and above authors	19970	60.98%	**1**
Anonymous	94	0.29%	**7**
Total	32750	100.00%	-

Single vs Multi-Authored Output Literature on Blood Cancers

It is found from Table 6 that the calculation of single authored papers is less than that of multiple-authored papers. In other words, 95.73% of the total documents are multiple authors with different degrees of collaboration. It is additionally found that 0.29% of records were unknown authorship.

Table 6: Single vs Multi Authored Output Literature on Blood Cancers

Year	*Single Author*		*Multiple Author*		*Anonymous*		*No. of Records*
	No. of Records	*Percentage*	*No. of Records*	*Percentage*	*No. of Records*	*Percentage*	
2012	154	11.82%	2321	7.40%	10	10.64%	2485
2013	137	10.51%	2341	7.47%	5	5.32%	2483
2014	123	9.44%	2619	8.35%	11	11.70%	2753
2015	152	11.67%	3457	11.03%	5	5.32%	3614
2016	110	8.44%	2730	8.71%	12	12.77%	2852
2017	118	9.06%	2876	9.17%	9	9.57%	3003
2018	122	9.36%	3386	10.80%	11	11.70%	3519
2019	121	9.29%	3305	10.54%	7	7.45%	3433
2020	153	11.74%	4263	13.60%	13	13.83%	4429
2021	113	8.67%	4055	12.93%	11	11.70%	4179
Total	**1303**	**100.00%**	**31353**	**100.00%**	**94**	**100.00%**	32750

Degree of Collaboration in the Field of Blood Cancers

Table 7 appears that the year wise Distribution of Degree of Collaboration. To decide the degree of collaboration in quantitative terms, the method proposed by K. Subramanyam has been utilised and the results have been presented in Table 7.

The formula is given: C = Nm / Nm + Ns; Where C = Degree of Collaboration in a discipline; Nm = Number of multiple authored papers Ns = Number of single authored papers.

Table 7 shows that at the total level, the average degree of collaboration is arrived at 0.96. The period-wise analysis shows that, an increasing trend during the year i.e. 2012 (0.94) to 2020 (0.97). This brings out obviously that there occurs a better level of degree of collaborative research in blood cancers.

Table 7: Degree of Collaboration Literature on Blood Cancers

Year	*Single Author*	*Multiple Author*	*Degree of Collaboration*
2012	154	2321	0.94
2013	137	2341	0.94
2014	123	2619	0.96
2015	152	3457	0.96
2016	110	2730	0.96
2017	118	2876	0.96
2018	122	3386	0.97
2019	121	3305	0.96
2020	153	4263	0.97
2021	113	4055	0.97
Total	**1303**	**31353**	**0.96**

Major Findings

- It is observed that a total of 32,750 documents on "Blood cancers" have been covered.
- It is found that the greatest number of 4,429 documents was published during the year 2020.
- It is additionally found that 39.11% of documents are journal articles, 26.32% of documents are Research Support, Non-U.S. Gov't and 19.72% of documents are Review.
- A total of 61 journals assembled in Zone-1 published 4,384 documents as journal articles accounting for one-third of the total output.
- The second zone comprises of 424 journals published 4,805 journal articles.
- A total of 1,906 journals published 3,620 journal articles assembled in third zone.
- A total of 485 significant journals within the field of blood cancers.
- About 60.98% of documents have more than five authors.
- Around 0.29% of documents without author.
- The average degree of collaboration is reached at 0.96.
- The period-wise investigation of degree of collaboration increasing during the study period i.e. 2012 (0.94) to 2020 (0.97).
- There occurs a better level of degree of collaborative research in blood cancers.

Conclusion

In the realm of medicine, our findings underscore the consistent upward trajectory of blood cancers literature, marked by a continuous increase in publications each year, albeit with occasional fluctuations. Journal articles emerge as the predominant medium, concealing the highest number of records in the expansive domain of blood cancers research. A notable revelation is the identification of 485 significant journals dedicated to the nuanced exploration of blood cancers, indicative of the robust scholarly engagement within this field. Furthermore, our analysis highlights a discernible elevation in the degree of collaborative research within the intricate landscape of blood cancers, underlining the collective efforts and synergies propelling advancements in this critical area of medical inquiry. These insights collectively contribute to a deeper understanding of the evolving dynamics and collaborative ethos characterising contemporary research in blood cancers.

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