

Research Trends in Oncology: A Scientometric Analysis

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Received: 15/10/2021 **Accepted:** 29/10/2021 **Online Published:** 05/11/2021

***Abstract-**This paper highlights the publication status and growth of oncology research across the world and makes quantitative and qualitative assessment by way of analyzing various features of research output based on Web of Science database during the period 2011-2020. A total of 89,857 publications were published on oncology. The parameters studied include: year-wise growth of publications, country-wise distribution of publications, highly productive institutes, and highly preferred journals for publications by scientists. The highest numbers of articles were published in the year 2020 and the lowest number of articles was published in the year 2011. The majority of the researchers prefer to publish their research papers in journal articles. Devidas M an Indian researcher is in first place in global ranking by contributing 209 articles in the field of oncology. Harvard University from USA is at first place by contributing 5,133 articles. The USA is found to be the highest country that contributed 43.18% of articles. Journal of Clinical Oncology stands at the first position with 5,339 articles.*

Keywords: Oncology, Scientometrics, Web of Science, Cancer.

Introduction

Oncology is a field of medicine that is concerned with cancer prohibitions, treatment, and care. A physician who works in the field of oncology is an oncologist (Robson et al., 2010). Doctors should first make a diagnosis of cancer, which is typically managed to accomplish through biopsy, endoscopy, X-ray, CT scanning, MRI, PET scanning, ultrasound, or other radiological processes (Weissleder and Pittet, 2008). Nuclear medicine, as well as blood tests and tumor markers, can be used to diagnose cancer. Oncology is frequently associated with hematology, the branch of medicine concerned with blood and blood-related disorders. The major types of cancer are breast cancer, ovarian cancer, lung cancer, brain cancer, thyroid cancer, skin cancer, bladder cancer, prostate cancer, lymphoma, blood cancer, etc. Scientometrics is a branch of the science 'Science of Science' (Shilpa et al., 2019). Haitun treats 'Scientometrics', as a scientific discipline, which performs reproducible measurements of scientific activity (Haitun, 1983). Scientometric is a method of studying the growth and pattern of science by analyzing scientific publications. The bibliometrics, scientometrics, and informetrics techniques are used to evaluate various important factors of a publication (Hood and Wilson, 2001). The majority of

scientometric researches are conducted to examine an institution's or organization's quality of the research, publications of a specific subject discipline, research findings reported in a specific journal, or any other similar activity restricted to literary works or growth of research as well as its analysis through statistical methods published during a particular period.

Several scientometric studies on various subject disciplines have been conducted on a global level. Glynn et al. studied the research trend in breast cancer from 1945 to 2008 and revealed that research papers from countries with high levels of international collaboration had higher average citation rates. Raja, Ram Kumar, and Viji have analyzed global thyroid cancer research by using the scientometric technique. Pouris and Pourish have studied HIV/AIDS research output in the South Africa region. Senthilkumar and Muthukrishnan have conducted a citation analysis study on the British Journal of Cancer and found that a maximum number of citations were received in the year 2006. Shao et al. study revealed that 30 major international oncology journals do not represent the overall productivity in the field of oncology. Santhanakarthikeyan and Jeysankar (2014) estimated that by 2020, 70 percent of all cancer cases will be in developing countries, with India accounting for one-fifth of these, with a population of over one billion people.

Senthilkumar and Muthukrishnan (2016) have studied 10,681 research papers published in Annals of Oncology. The study analyzed year-wise research output, authorship pattern, author affiliation, international collaboration, etc. Sab, Kumar and Biradar (2017) studied the research productivity of Indian biomedicine literature. The study found that In India, high-quality research is inadequate, necessitating business strategy, financing, and resource assistance. Muthukrishnan & Senthilkumar (2017) analyzed research output in the British journal of cancer from 2005 to 2015. The study analyzed the growth of literature, most prolific authors, keyword occurrence, author affiliation, etc. Sadik Batcha (2018) indicated in his study that Indian oral cancer research is continuously increasing. Mushtaq and Loan (2019) study revealed that the assessment of the nature of authorship collaboration highly reflects that medical scientists from India and Iran work together as a team with other researchers from both within and without India to find the final treatment for colorectal cancer. Shilpa and Padmamma (2020) examined 12, 75,877 research papers indexed in the PubMed database from 2010 to 2019. The study found that the relative growth rate was in a declining trend and doubling time was in increasing trend during the study period. Masjedi et al. study revealed that the USA was the most collaborative country, with no close collaboration reported with China, which was introduced as the most productive country in the oncology field. Huang, Zhao and Xiang (2021) have found that most contributed countries, institutions/organizations, and authors are the United States of America, Mem Sloan Kettering Cancer Center, and Mao JJ, whose frequencies are 196 articles, 24 articles, and 17 articles, respectively.

Need for the study

Librarians, scientists, researchers, and academic professionals should identify and assess recent developments in their field of interest. Scientometric is a tool to evaluate the research trend in a particular subject. Many research studies on the oncology field are done during the past decade. Hence there is a need to identify the research trend, institution's research output, prominent researcher's productivity, and core journals in the field of oncology. Scientometric analysis divulges the scattering of research in a particular subject as well as its impact. This research assists policymakers during evolving library acquisition and collection. And also there have been no such studies conducted to identify the growth of literature in oncology research as a whole for such a long duration i.e., 2011 to 2020.

Objectives of the study

The main objective of the study is to present the growth of world literature on oncology and make a quantitative assessment of the status of the research by way of analyzing the following features of research output:

- Annual growth of publications.
- document types used by the scientists,
- most prolific authors in the field,
- organizational distribution,
- the extent of international collaboration,
- Ranking of journals based on number of publications.

Statement of the problem

The statement of the problem is "Research Trends in Oncology: A Scientometric Analysis".

Methodology

This study is conducted to analyze the global research output in oncology literature. The necessary data was collected from the Web of Science database for the period 2011-2020 i.e., for ten years. The researcher has accessed the www.webofscience.com website to retrieve the necessary data. In the basic search field, the word "Oncology" has been employed by selecting topic search to download the bibliographic data. A total of 89,857 publications were retrieved from the Web of Science database. The downloaded data was analyzed by using the Histcite software and Microsoft Excel spreadsheet application as per the objectives of the study. This research study explores the year-wise distribution of publications, most prolific authors, ranking of journals and institutions, the geographical distribution of publications in oncology research during the study period.

Results and Discussion

Annual growth of publications

Table 1 depicts the year-wise research output in oncology literature from 2011 to 2020. There is a total of 89,857 papers are published on oncology literature during the study period. The highest number of articles i.e. 12,879 (14.33%) was published in the year 2020. The lowest number of articles 6,039 (6.72%) was published in the year 2011. The global output in Oncology has gradually increased year by year from 6,039 in 2011 to 12,879 in 2020. The study found that there is an increasing trend during the study period (Figure 1).

Table 1: Annual Growth of Publications

Sl. No.	Year	No. of records	Percentage	Cumulative records	Cumulative percentage
1	2011	6039	6.72	89857	100
2	2012	7028	7.82	83818	93.28
3	2013	7448	8.29	76790	85.46
4	2014	7586	8.44	69342	77.17
5	2015	8132	9.05	61756	68.73
6	2016	8991	10.01	53624	59.68
7	2017	9914	11.03	44633	49.67

8	2018	10717	11.93	34719	38.64
9	2019	11123	12.38	24002	26.71
10	2020	12879	14.33	12879	14.33
Total		89857	100		

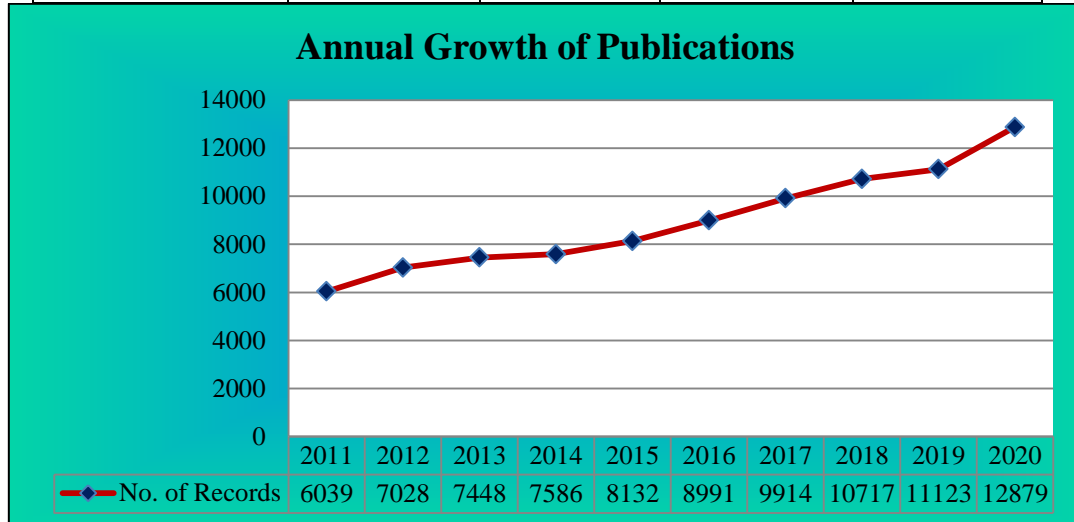


Figure-1: Annual Growth of Publications

Channels used for communicating oncology research

It has been observed from Table 2 that there are many communication channels were used by scientists to publish their research papers in oncology literature. The highest number of publications are published in the form of articles i.e. 56,166 (62.51%), followed by Meeting Abstracts 13,754 (15.31%) publications, Review Articles 12,597 (14.02%) publications, Editorial Materials 4,167 (4.64%) publications, Letters 1,136 (1.26%) publications and less than 1% of articles are published in other communication channels.

Table 2: Channels used for Communicating Oncology Research

Sl. No.	Communication channels	No. of records	Percentage
1	Articles	56166	62.51
2	Meeting abstracts	13754	15.31
3	Review articles	12597	14.02
4	Editorial materials	4167	4.64
5	Letters	1136	1.26
6	Proceedings papers	1002	1.12
7	Corrections	292	0.32
8	News items	231	0.26
9	Book chapters	182	0.20
10	Early access	181	0.20
11	Book reviews	67	0.07
12	Biographical-items	49	0.05
13	Data papers	14	0.02
14	Retracted publications	10	0.01
15	Reprints	3	0.00
16	Retractions	2	0.00
17	Bibliographies	1	0.00
18	Hardware reviews	1	0.00
19	Meeting summary	1	0.00
20	Poetry	1	0.00
Total		89857	100

Most productive authors

Table 3 shows the highly productive authors from global oncology research output during the study period. The top 25 authors having been identified as the most productive authors in global oncology research. According to the study highest publications are by Devidas M from India occupies the first rank with 209 (0.233%) articles and her h-index is 41, followed by Wang J published 206 (0.229%) and his h-index is 32, Kim J H published 203 (0.226%) articles and his h-index is 28, Liu Y published 185 (0.206%) articles and his h-index is 29 (Figure 2).

Table 3: Most Productive Authors

Sl. No.	Authors	No. of records	Percentage	Ranking	h-index
1	Devidas M	209	0.233	1	41
2	Wang J	206	0.229	2	32
3	Kim JH	203	0.226	3	28
4	Liu Y	185	0.206	4	29
5	Wang Y	185	0.206	4	32
6	Li J	183	0.204	5	39
7	Alonzo TA	166	0.185	6	29
8	Kim J	162	0.180	7	29
9	Zhang Y	162	0.180	7	25
10	Lee J	157	0.175	8	25
11	Kim S	156	0.174	9	28
12	Chen L	153	0.170	10	34
13	Wang L	153	0.170	10	29
14	Carroll WL	145	0.161	11	39
15	Zhang L	143	0.159	12	29
16	Hunger SP	141	0.157	13	42
17	Sung L	140	0.156	14	27
18	Chen Y	139	0.155	15	26
19	Zhang J	136	0.151	16	20
20	Aplenc R	134	0.149	17	20
21	Gamis AS	133	0.148	18	23
22	Bruera E	131	0.146	13	34
23	Meshinchi S	130	0.145	20	25
24	Miaskowski C	130	0.145	20	31
25	Li Y	126	0.140	21	26
Total		3908	4.35		

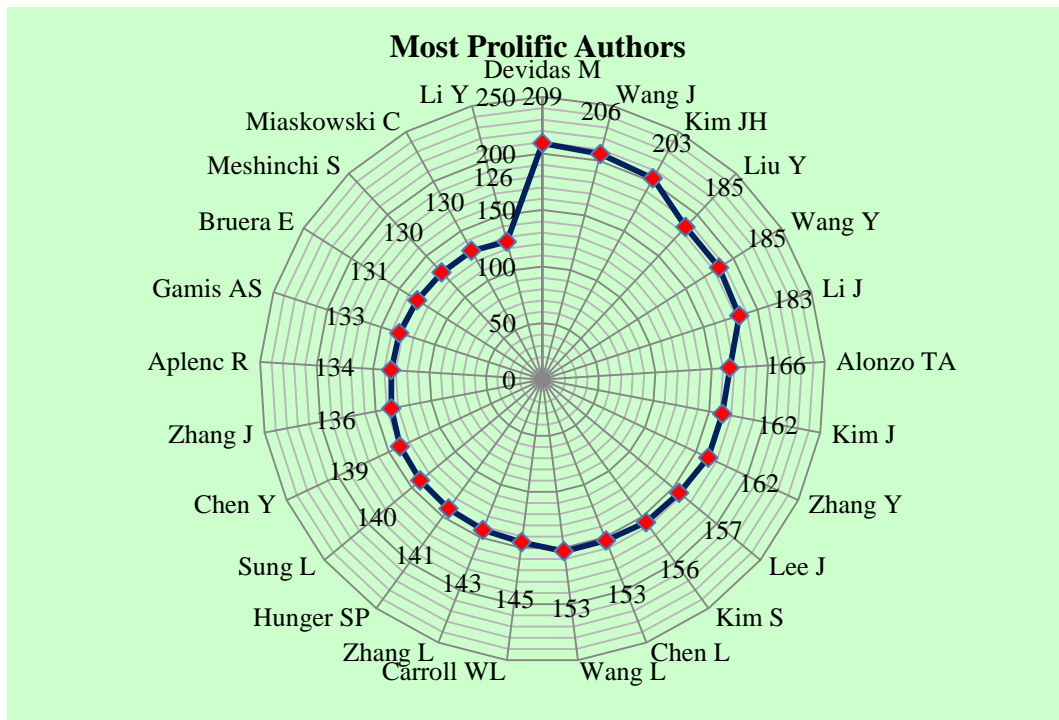


Figure-2: Most Prolific Author

Institution/organizational productivity in oncology literature

Table 4 reveals the ranking list of the top 25 highly productive institutions/organizations based on their highest publications. According to the web of science database Harvard University, USA contributed the highest publications to the field of oncology i.e. 5,133 (5.71%) publications, followed by University of Texas System, USA published 5,044 (5.61%) articles, University of California System, USA contributed 4,011 (4.46%) articles, UTMD Anderson Cancer Center, USA published 3,898 (4.34%) articles, University of Toronto, Canada produced 3,132 (3.49%) publications.

Table 4: Institution/Organizational Productivity

Sl. No.	Institutions	Records	Percentage
1	Harvard University, USA	5133	5.71
2	University of Texas System, USA	5044	5.61
3	University of California System, USA	4011	4.46
4	UTMD Anderson Cancer Center, USA	3898	4.34
5	University of Toronto, Canada	3132	3.49
6	Memorial Sloan Kettering Cancer Center, USA	2989	3.33
7	Dana Farber Cancer Institute, USA	2807	3.12
8	UNICANCER, France	2797	3.11
9	University of Pennsylvania, USA	2197	2.44
10	Mayo Clinic, USA	2068	2.30
11	University of London, UK	2024	2.25
12	Johns Hopkins University, USA	1991	2.22
13	University of California San Francisco, USA	1796	2.00
14	National Institutes of Health, USA	1774	1.97
15	Massachusetts General Hospital, USA	1671	1.86

16	INSERM, France	1665	1.85
17	Pennsylvania Commonwealth System of Higher Education, USA	1643	1.83
18	Duke University, USA	1618	1.80
19	Assistance Publique Hopitaux Paris, France	1596	1.78
20	University of Michigan, USA	1544	1.72
21	University of Michigan System, USA	1544	1.72
22	University Health Network Toronto, Canada	1530	1.70
23	University of Washington, USA	1512	1.68
24	Ohio State University, USA	1501	1.67
25	University of Washington Seattle, USA	1500	1.67
Total		58985	65.64

Ranking of countries

Table 5 indicates the ranking of the top 25 countries based on the number of publications. It is observed from Table 5 that the United States of America ranked first by producing 38,799 (43.18%) publications, Germany secured the second rank with 7,461 (8.30%) publications followed by England 7,351 (8.18%) publications, Canada contributed 7,109 (7.91%) publications and Italy produced 6,322 (7.04%) publications. India is in 18th place in global ranking by contributing 1402 (1.56%) publications. Compare to the USA, Germany, UK, Canada, France India has contributed very little in the field of oncology (Figure 3).

Table 5: Ranking of Countries

Sl. No.	Country	Records	Percentage
1	USA	38799	43.18
2	Germany	7461	8.30
3	England	7351	8.18
4	Canada	7109	7.91
5	Italy	6322	7.04
6	France	5894	6.56
7	Peoples R China	4649	5.17
8	Australia	4453	4.96
9	Netherlands	4196	4.67
10	Japan	3694	4.11
11	Spain	3187	3.55
12	Switzerland	2457	2.73
13	Belgium	2107	2.34
14	South Korea	1922	2.14
15	Turkey	1691	1.88
16	Brazil	1481	1.65
17	Sweden	1468	1.63
18	India	1402	1.56
19	Austria	1368	1.52
20	Poland	1323	1.47
21	Denmark	1243	1.38

22	Greece	1131	1.26
23	Israel	1029	1.15
24	Scotland	907	1.01
25	Taiwan	881	0.98

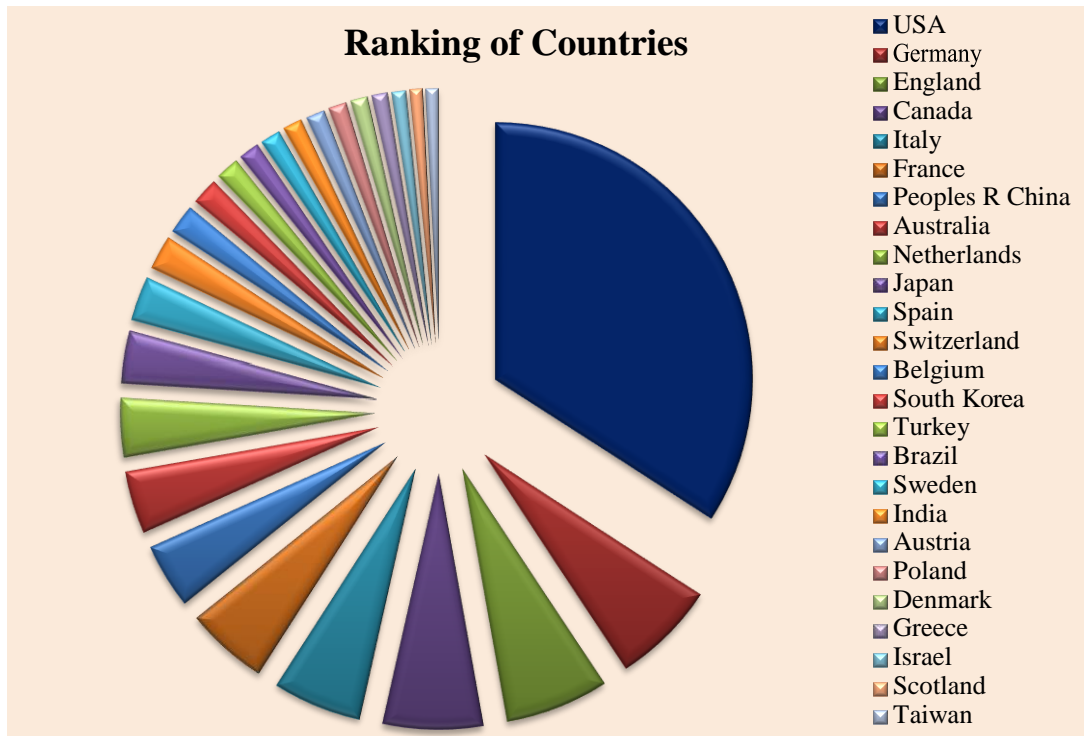


Figure-3: Ranking of Countries

Subject-wise distribution of oncology research

Table 6 indicates the subject-wise distribution of oncology research during the study period. Oncology with 49, 275 (54.84%) publications, Radiology Nuclear Medicine Medical Imaging with 8,366 (9.31%) publications, Surgery with 6,000 (6.68%) publications, Hematology With 5654 (6.29%) publications, Pediatrics with 4,779 (5.32%) publications, Health Care Sciences Services with 4,707 (5.24%) publications were considered based on the total number of publications. It is observed from Table 6 that Oncology and Radiology Nuclear Medicine Medical Imaging and Surgery have been identified as the three high-priority research areas of global oncology research.

Table 6: Subject-Wise Distribution of Oncology Research

Sl. No.	Subject category	No. of records	Percentage
1	Oncology	49275	54.84
2	Radiology Nuclear Medicine Medical Imaging	8366	9.31
3	Surgery	6000	6.68
4	Hematology	5654	6.29
5	Pediatrics	4779	5.32
6	Health Care Sciences Services	4707	5.24
7	Nursing	4354	4.85

8	Pharmacology Pharmacy	4273	4.76
9	Obstetrics Gynecology	3861	4.30
10	Clinical Neurology	3712	4.13
11	Medicine General Internal	3585	3.99
12	Social Sciences Biomedical	2746	3.06
13	Psychology	2697	3.00
14	Respiratory System	2665	2.97
15	Psychology Multidisciplinary	2653	2.95
16	Medicine Research Experimental	2237	2.49
17	Public Environmental Occupational Health	2194	2.44
18	Health Policy Services	1805	2.01
19	Rehabilitation	1712	1.91
20	Urology Nephrology	1514	1.68
21	Pathology	1337	1.49
22	Biochemistry Molecular Biology	1215	1.35
23	Immunology	1209	1.35
24	Multidisciplinary Sciences	1110	1.24
25	Cell Biology	1055	1.17

Ranking of journals based on number of publications

Based on the publications the Journal of Clinical Oncology from by American Society of Clinical Oncology, USA published the highest publications i.e. 5,339 articles and the journal has 44.54 impact factor, followed by Pediatric Blood Cancer journal from Wiley-Liss Inc., the USA is in the second rank by publishing 2,625 (2.92%) articles and the journal has 2.634 impact factor, Psycho-Oncology journal from John Wiley and Sons Ltd, the UK published 2,418 (2.69%) articles and the journal has 3.455, International Journal of Radiation Oncology Biology Physics from Elsevier Inc., the USA published 1,862 (2.07%) publications and its impact factor is 7.038, Oncology Nursing Forum from Oncology Nursing Society, the USA published 1,474 (1.64%) articles and the journal has 1.728 impact factor (Table 7).

Table 7: Ranking of Journals based on Number of Publications

Sl.No.	Journals	Publisher	Impact Factor	Records	Percentage
1	Journal of Clinical Oncology	American Society of Clinical Oncology, USA	44.54	5339	5.94
2	Pediatric Blood Cancer	Wiley-Liss Inc., USA	2.634	2625	2.92
3	Psycho Oncology	John Wiley and Sons Ltd, UK	3.455	2418	2.69
4	International Journal of Radiation Oncology Biology Physics	Elsevier Inc., USA	7.038	1862	2.07
5	Oncology Nursing Forum	Oncology Nursing Society, USA	1.728	1474	1.64
6	European Respiratory Journal	European Respiratory	12.34	1402	1.56
7	Radiotherapy and Oncology	Elsevier Ireland Ltd.,	4.856	1320	1.47

8	Supportive Care in Cancer	Springer Verlag, Germany	2.698	1220	1.36
9	Gynecologic Oncology	Academic Press Inc., USA	4.54	1192	1.33
10	Annals of Oncology	Elsevier Ltd., UK	32.98	1178	1.31
11	EJSO	W B Saunders Ltd., UK	3.959	1100	1.22
12	International Journal of Gynecological Cancer	B M J Publishing Group, UK	3.437	813	0.90
13	Cancer	John Wiley and Sons Ltd, USA	5.791	805	0.90
14	Value in Health	Elsevier Ltd., UK	5.725	736	0.82
15	European Journal of Cancer	Elsevier Ltd., UK	5.417	722	0.80
16	Journal of Neurosurgery	American Association of Neurological Surgeons, USA	4.13	712	0.79
17	Clinical Journal of Oncology Nursing	Oncology Nursing Society, USA	1.224	613	0.68
18	Lancet Oncology	Lancet Publishing Group, UK	33.752	612	0.68
19	Plos One	Public Library of Science, USA	3.24	610	0.68
20	Neuro Oncology	Oxford University Press, UK	10.09	567	0.63
21	Journal of Oncology Practice	American Society of Clinical Oncology, USA	3.84	553	0.62
22	Practical Radiation Oncology	Elsevier BV, Netherlands	3.539	546	0.61
23	BMC Cancer	Biomed Central Ltd., UK	4.4	527	0.59
24	Blood	American Society of Hematology, USA	22.11	478	0.53
25	Oncologist	Alpha Med Press, USA	5.025	454	0.51
Total				29878	33.25

Findings

- There are a total of 89,857 research papers published on oncology during 2011-2020.
- The highest numbers of articles 12,879 (14.33%) were published in the year 2020 and the lowest number of articles 6,039 (6.72%) were published in the year 2011.
- The study revealed that there is an increasing trend in oncology research from 2011 to 2020.
- The majority of the researchers prefer to publish their research papers in journal articles (62.51%).
- Devidas M an Indian researcher is in first place in global ranking by contributing 209 (0.233%) articles in the field of oncology.
- Harvard University, USA is at first place by contributing 5,133 (5.71%) articles.
- The majority of the most contributed institutions/organization is from the USA. Out of the top 25 institutions, 19 institutions are in the USA.
- The USA is found to be the highest country that contributed of 38,799 (43.18%) articles.
- The highest number of research papers i.e. 49275 (54.84%) published under the oncology subject category.
- Journal of Clinical Oncology stands at the first position with 5,339 (5.94%) articles.

Conclusion

The present study attempts to analyze the growth of literature on oncology based on research papers indexed in the Web of Science database. The results of the study indicate that oncology research is increasing trend in every year. India is in 18th rank in the global ranking. But in terms of most prolific authors, the Indian author Devidas M (Meenakshi Devidas) is in first place in global ranking by contributing the highest number of publications. It shows that the Indian authors are interested to research in the oncology field. Hence, the Indian government and concerned departments should support financial assistance and provide infrastructure facilities in this regard. In respect of the h-index, Hunger S P author is stood first by having 42 h-index. When it comes to most contributed institutions, 19 institutions are from the USA, 3 institutions from France, 2 institutions from Canada, and 1 institute from the UK. These four countries occupied the ranking list of most prolific institutions by conducting excessive research in oncology; naturally, the USA is in first place in the global ranking. The highest number of research articles published under oncology and Radiology Nuclear Medicine Medical Imaging subjects. Based on a number of publications, the Journal of Clinical Oncology published by the American Society of Clinical Oncology, USA is secured first place by publishing 53.94% of articles, and also the journal has the highest impact (44.54) factor among the top 25 journals. All the top-ranked journals have the highest impact factor. The findings of the present study will be beneficial for scholars and scientists, and doctors who are engaged in research of various disciplines of oncology as well as policymakers in the field.

References

1. Bala, A., & Gupta, B. M (2010). Research Activities in Biochemistry, Genetics and Molecular Biology during 1998-2007 in India: A Scientometric Analysis. *DESIDOC Journal of Library & Information Technology*, 30(1).
2. Glynn, R. W., Scutaru, C., Kerin, M. J., & Sweeney, K. J. (2010). Breast cancer research output, 1945-2008: a bibliometric and density-equalizing analysis. *Breast Cancer Research*, 12(6), 1-9.
3. Haitun S. (1983). Scientometrics: state and out-look. *Nauka, Moscow, Russia*.
4. Hood, W. W., & Wilson, C. S. (2001). The literature of bibliometrics, scientometrics, and info metrics. *Scientometrics*, 52(2), 291-314.
5. Huang, L., Zhao, Y., & Xiang, M. (2021). Knowledge Mapping of Acupuncture for Cancer Pain: A Scientometric Analysis (2000–2019). *Journal of Pain Research*, 14, 343.
6. Masjedi, M. R., Bazrafshan, A., Jarrahi, A. M., Mohagheghi, M. A., Abasahl, A., Attarian, H., & Afsharpad, M. (2020). An Overview of Oncology Researches in Iran: A Scientometric Approach (1974–February 2019). *Archives of Iranian medicine*, 23(3), 181-188.
7. Mushtaq, R., & Loan, F. A. (2019). Research Productivity in Colorectal Cancer-A Scientometric Study of India and Iran. *International Journal of Knowledge Management and Practices*, 7(1), 32.
8. Pouris, A., & Pouris, A. (2011). Scientometrics of a pandemic: HIV/AIDS research in

9. Raja, S., Ram Kumar, P., & Viji, P. (2011). Scientometric dimension on gender in worldwide thyroid cancer: A study based on web of science database. *Indian Journal of Science and Technology*, 4(4), 425-428.
10. Robson, M. E., Storm, C. D., Weitzel, J., Wollins, D. S., & off it, K. (2010). American Society of Clinical Oncology policy statement update: genetic and genomic testing for cancer susceptibility. *J Clin Oncol*, 28(5), 893-901.
11. Sab Chaman., Kumar, P. D., & Biradar, B. S. (2017). Mapping of Indian Biomedicine Research: A Scientometric Analysis of Research Output During 2012-2016. *International Journal of Current Advanced Research*, 6(7).
12. Sadik Batcha, M. (2018). Research Contributions on Oral Cancer in India: A Scientometric Analysis. *Research Journal of Library and Information Science*, 2(1), 1-8.
13. Santhanakarthekeyan, S., Grace, M., & Jeysankar, R. (2014). Research publications to Indian Journal of Cancer: a scientometric analysis. *Library hi tech news*, 31(3), 21-25.
14. Senthilkumar, R., & Muthukrishnan, M. (2012). Citation Analysis of British Journal of Cancer During 2005–2015. *Journal of Advancements in Library Sciences*, 4(1), 15-21.
15. Senthilkumar, R., & Muthukrishnan, M. (2016). Scientometric analysis of “annals of oncology” during 2010–2014. *Kongunadu Research Journal*, 3(2), 117-122.
16. Senthilkumar, R., & Muthukrishnan, M. (2017). British Journal of Cancer: A Scientometric Study. *Kongunadu Research Journal*, 4(3), 98-102.
17. Shao, H., Yu, Q., Bo, X., & Duan, Z. (2013). Analysis of oncology research from 2001 to 2010: a scientometric perspective. *Oncology reports*, 29(4), 1441-1452.'
18. Shilpa, B. S., & Padmamma, S. (2020). Growth of Literature on Oncology: A Scientometric Analysis. *International Journal of Library and Information Studies*, 10(4), 1-9.
19. Shilpa, B. S., Padmamma, S., Kumara, A. T., & Walmiki, R. H. (2019). Mapping of scientific articles on Leukemia: A scientometric study. *Library Philosophy and Practice*, 1-14.
20. Weissleder, R., & Pittet, M. J. (2008). Imaging in the era of molecular oncology. *Nature*, 452(7187), 580-589.

