

Global Research output on Mammography literature as Indexed in Web of Science: A Scientometric Analysis

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Abstract:

Scientometric analysis has to be given great attention in research centers, Institutions, and Universities for educational and research purposes. The main purpose of the particular study is to carry out a Scientometric analysis of Mammography authored globally and published in journals and indexed in the Web of Science database from 2012 to 2021 for the period of Ten years. The analysis found that the maximum number of publications was 1622 published in the year 2018. Concerning country-wise production, the United States has stood almost first among the top 20 countries in qualitative and quantitative studies with 6063 publications. It is found that among the top 20 journals the United States published a maximum share of 13 journals in the field of Mammography compared to other countries. Analysis disclosed the Language wise distribution, most prolific authors with h-index, Document type publications, and Core journals with impact factor.

Keywords: Scientometric Mapping, Mammography, Web of Science, Oncology, Author Affiliation, Core Journals, Impact Factor.

1. Introduction:

Mammography is specialized medical imaging that uses a low-dose x-ray system to see inside the breasts. A mammography exam, called a mammogram, aids in the early detection and diagnosis of breast diseases in women. An x-ray exam helps doctors diagnose and treat medical conditions. It exposes you to a small dose of ionizing radiation to produce pictures of the inside of the body.

X-rays are the oldest and most often used form of medical imaging. Three recent advances in mammography include digital mammography, computer-aided detection, and breast tomosynthesis. The paper gives an introduction to current medical Mammography systems. This paper shows several Scientometric indicators and statistical analysis on the study (radiologyinfo.2021)

2. Methodology:

The database of Web of Science (WoS) is considered for this study, which is a scientific citation indexing service maintained by Clarivate Analytics. Web of Science is a pioneer multidisciplinary bibliographic index of journal publications mapped out. It is accepted as an excellent data source for bibliometrics analysis. The quantitative specifications for this research have been withdrawn from Web of Science where Mammography, years between 2012-2021 publications were considered. 15,448 publications were redeemed for the above said period. The Word used in the Web of Science search engine was “Mammography”. Each content of the data redeemed from WoS comprises a number of fields such as abstract, title, author, author affiliation, citation record, and so on.

This study uses a gamut of statistical analysis and associations between several variables (author, organization, or country) have been investigated.

3. Objectives:

The dataset has been analyzed to achieve the following objectives:

- To assess the chronological growth of documents.
- To identify the types of documents published in the Mammography.
- To highlight the top productive authors, with their affiliation.
- To analyze the ranking list of Journals with an Impact factor.
- To ensure language-wise distribution of the publication.

4. Literature Review:

Scientometric studies on different types of oncology have been taking place by national and international researchers and analyzed scientific output, impact, core journals, and other factors. Nam & Kim (2021) conducted research on “Understanding the Research Landscape of Deep Learning in Biomedical Science: Scientometric Analysis” this study aimed to analyze the 978 publications in biomedicine from the PubMed database. The Study analyzed the affiliations of the author to know the major establishments and different goner in academics where they found affiliations of 4908 authors extracted.

Sweileh and Zyoud (2014) carried out research on “Assessing urology and nephrology research activity in Arab countries using the ISI web of science bibliometric database” authors found 3076 records in "Urology and nephrology" were retrieved from 104 journals. This speaks for 1.4% of the global research output in “urology and nephrology”. 402 records (12.66%) were published in Annales D Urologie Journal. The h-index of the redeemed records was 57. The total number of citations, during data analysis, was Thirty Thousand Four Hundred and One with an average citation of 9.57 per document. Egypt, having a total publication of 1284 (40.43%) ranked first among the Arab Countries in “urology and nephrology”. The author found that Mansoura University in Egypt was the most productive institution with a total of Five Hundred and Sixty One (15.33%) records. In urology and nephrology research collaboration of the Arab researchers was mostly with the researchers from the United States of America (226; 7.12%).

5. Analysis and Interpretation:

Table-01: Chronological growth rate of publications:

Publication Years	Number of Publications	Percentage
2021	1528	9.89
2020	1584	10.25
2019	1523	9.86
2018	1622	10.50
2017	1501	9.72

2016	1578	10.22
2015	1610	10.42
2014	1543	9.99
2013	1520	9.84
2012	1439	9.32

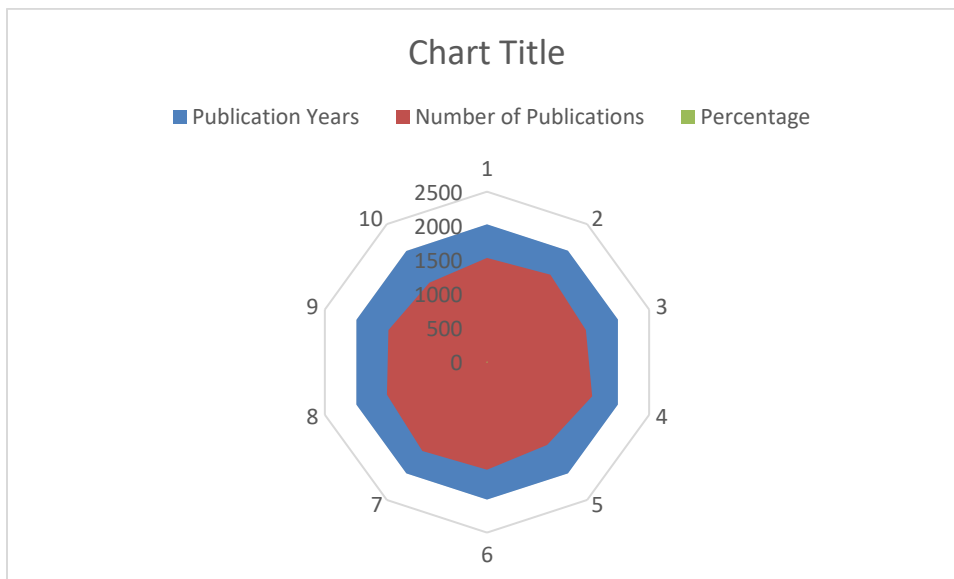
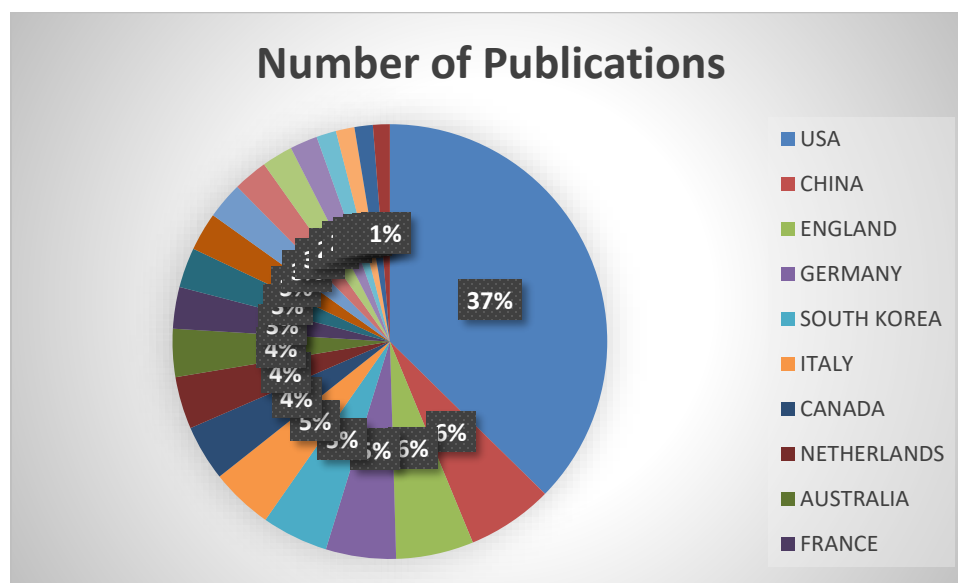


Table - 1 specifies the chronological productivity of the Mammography study. The global level output in Mammography research has increased from 1439 in 2012 to 1528 publications in 2021 and it is observed that the year 2018 had an elevated number of publications that is 1622. The Table shows a gradual increase in the literature growth swing during this study period.

Table-02: Country wise research output on Mammography research in the world

Countries/Regions	Number of Publications	Percentage
USA	6063	39.25
CHINA	1042	6.75
ENGLAND	937	6.07
GERMANY	847	5.48

SOUTH KOREA	802	5.19
ITALY	753	4.87
CANADA	673	4.36
NETHERLANDS	632	4.09
AUSTRALIA	579	3.75
FRANCE	503	3.26
SWEDEN	483	3.13
JAPAN	463	3.00
INDIA	445	2.88
BRAZIL	416	2.69
SPAIN	374	2.42
TURKEY	333	2.16
NORWAY	239	1.55
TAIWAN	225	1.46
SWITZERLAND	221	1.43
IRAN	203	1.31

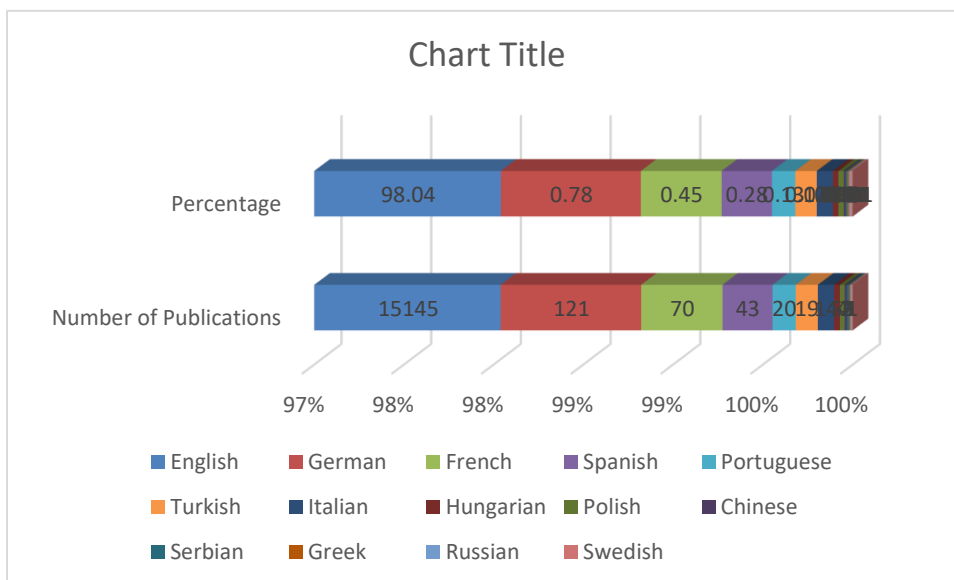


One Hundred and Thirty Three countries furnished their research on Mammography. As presented in Table 2, USA and China furnished the most articles/reviews and other countries published less than 1000 documents. The top three countries account for 52.07 % of contributions. The study shows that many European countries as well as other developing nations have extended very minimum contributions to Mammography research.

Table-03: Language-wise Research output on Mammography

Languages	Number of Publications	Percentage
English	15145	98.04
German	121	0.78
French	70	0.45
Spanish	43	0.28
Portuguese	20	0.13
Turkish	19	0.12
Italian	14	0.09
Hungarian	5	0.03
Polish	4	0.03
Chinese	2	0.01
Serbian	2	0.01
Greek	1	0.01
Russian	1	0.01

Swedish	1	0.01
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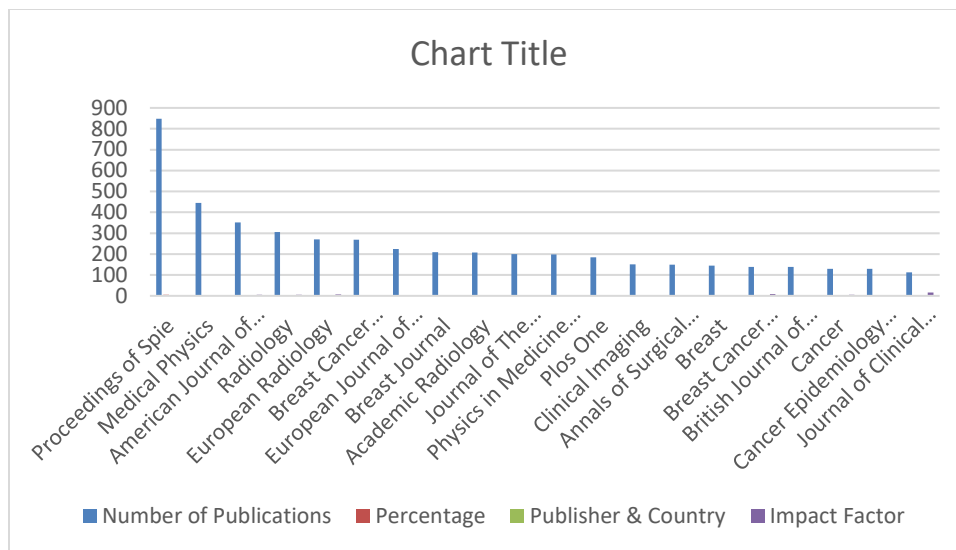


The study reveals that the maximum number of publications have been published in the English language with 15,145 publications (98.04%), followed by the German language with 121 publications (0.78), and the French language ranks 3rd position with 70(0.45%). And the remaining languages such as Spanish, Portuguese, Turkish, and other languages are published less than 1%. The Study shows that the English language is leading in publication in the study period.

Table-04: Core Journals with Impact Factor

Journal	Number of Publications	Percentage	Publisher & Country	Impact Factor
Proceedings of Spie	848	5.49	SPIE, United States	0.59
Medical Physics	445	2.88	John Wiley and Sons Ltd, United States	4.45
American Journal of Roentgenology	351	2.27	American Roentgen Ray Society, United States	4.75
Radiology	306	1.98	Elsevier Inc., United States	5.40
European Radiology	270	1.75	Springer Verlag, Germany	7.18
Breast Cancer Research and Treatment	269	1.74	Springer New York, United States	4.06

European Journal of Radiology	224	1.45	Elsevier Ireland Ltd, Ireland	4.28
Breast Journal	209	1.35	Wiley-Blackwell Publishing Ltd, United Kingdom	1.01
Academic Radiology	208	1.35	Elsevier USA, United States	3.69
Journal of The American College of Radiology	200	1.30	Elsevier BV, Netherlands	2.88
Physics in Medicine and Biology	199	1.29	IOP Publishing Ltd, United Kingdom	3.92
Plos One	184	1.19	Public Library of Science, United States	3.58
Clinical Imaging	151	0.98	Elsevier Inc., United States	2.40
Annals of Surgical Oncology	149	0.97	Springer New York, United States	2.57
Breast	144	0.93	Churchill Livingstone, United States	3.71
Breast Cancer Research	139	0.90	Biomed Central Ltd, United Kingdom	7.69
British Journal of Radiology	138	0.89	British Institute of Radiology, United Kingdom	3.30
Cancer	130	0.84	John Wiley Sons & Inc., United States	5.06
Cancer Epidemiology Biomarkers Prevention	129	0.84	American Association for Cancer Research Inc., United States	4.09
Journal of Clinical Oncology	113	0.73	American Society of Clinical Oncology, United States	15.37



Twenty top core journals have been presented in Table 4. Proceedings of Spie published a maximum number of articles/reviews with 848 publications, Medical Physics has taken the next position with 445 publications. It is observed that the United States publishes the maximum number of Journals in the field of Mammography in the top 20 Journals list compared to other countries. The study reveals that the Journal of Clinical Oncology is the highest Impact Factor with 15.37 and next is Breast Cancer Research with a 7.69 Impact Factor.

Table-05: Top 20 Most Prolific Authors

Rank	Authors	Number of Publications	Percentage	Affiliation	h-index
1.	Kerlikowske K	154	1.00	University of California, USA	54
2.	Miglioretti DL	116	0.75	Kaiser Permanente Washington Health Research Institute, USA.	68
3.	Houssami N	114	0.74	University of Sydney, Australia	07
4.	Wolk A	106	0.69	The Cyprus Institute of Neurology and Genetics, Sweden	89
5.	Sprague BL	96	0.62	Larner College of Medicine, The	17

				University of Vermont	
6.	Karssemeijer N	91	0.59	The Radbound University Medical Center, Netherlands	48
7.	Conant EF	88	0.57	Department of Radiology, University of Pennsylvania, USA	45
8.	Hofvind S	88	0.57	Cancer Registry Norway	34
9.	Onega T	88	0.57	Dartmouth Cancer Centre, United States	34
10.	Lehman CD	87	0.56	Harvard Medical School, Massachusetts General Hospital, Boston	55
11.	Brennan PC	84	0.54	The University of Sydney, Australia	01
12.	Young KC	83	0.54	Royal Surrey Breast Unit, Guildford, England	24
13.	Zheng B	82	0.53	The University of Oklahoma, USA	01
14.	Moon WK	81	0.52	Seoul National University College of Medicine, South Korea	40
15.	Mann RM	79	0.51	Radboud University Medical Center, Netherlands	04
16.	Moy L	78	0.51	Center for Advanced Imaging Innovation and Research, United States	37
17.	Maidment ADA	77	0.50	Department of Radiology, University of Pennsylvania, USA	03
18.	Bosmans H	76	0.49	Hasselt University, Belgium	00
19.	Buist DSM	76	0.49	University of Washington, USA	57
20.	Zackrisson S	75	0.49	Department of Translational	26

				Medicine, Lund University, Sweden	
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Table 5 presents the 20 most productive authors in this goner with h-index. Most of these authors are from the USA who contributed to the top 20 highest publications. Kerlikowske K from University of California, USA affiliation, presented the maximum number of papers-154, Miglioretti DL from University of California, USA affiliation, and Houssami N from the University of Sydney, Australia affiliation with 116 and 114 publications, and Wolk A with 106 publications respectively has taken the next positions. The Remaining authors published less than 100 publications. It is observed that Wolk, A from The Cyprus Institute of Neurology and Genetics, Sweden is having highest h-index 89 based on the Web of Science author profile.

Table-06: Types of Documents

Document Types	Number of Publications	Percentage
Article	10843	70.19
Proceeding Paper	2137	13.83
Review Article	978	6.33
Meeting Abstract	731	4.73
Editorial Material	541	3.50
Letter	288	1.86
Correction	40	0.26
Early Access	38	0.25
News Item	35	0.23
Book Chapters	15	0.10
Book Review	3	0.02
Data Paper	1	0.01

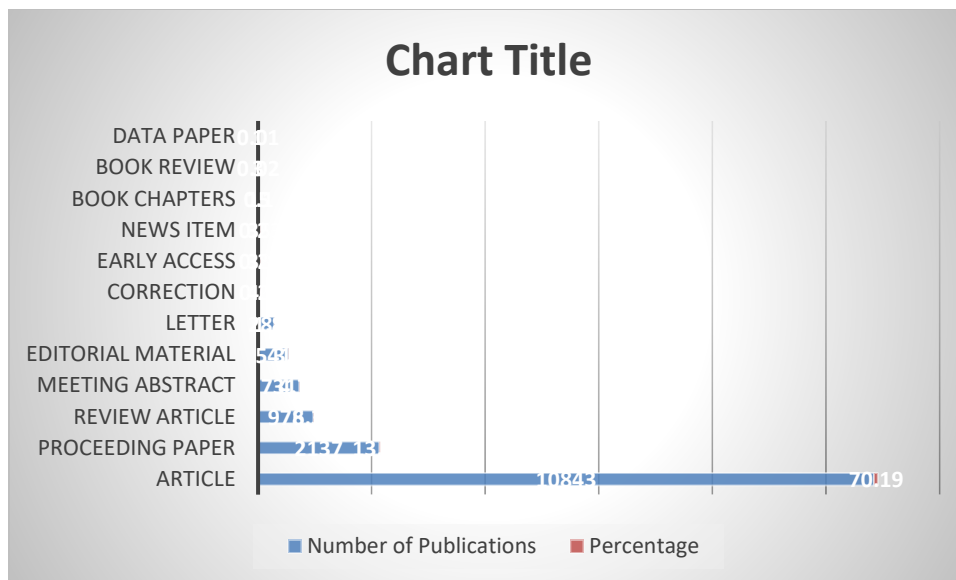


Table 06 reveals that the 12 types of published documents on the subject of Mammography. 10843 of the 15448 documents in the search are classified as articles by the Web of Science database which represents 70.19 percent of total documents followed by 2137 classified under Proceeding paper and the remaining documents are classified either as Review article, Meeting Abstract, Editorial Material, and so on.

Table-07: Web of Science Categories on Mammography research

Web of Science Categories	Number of Publications	Percentage
Radiology Nuclear Medicine Medical Imaging	5179	33.53
Oncology	3590	23.24
Public Environmental Occupational Health	1682	10.89
Medicine General Internal	1226	7.94
Optics	1038	6.72
Engineering Biomedical	1011	6.55
Obstetrics Gynecology	998	6.46
Engineering Electrical Electronic	826	5.35

Surgery	544	3.52
Health Care Sciences Services	504	3.26
Physics Applied	461	2.98
Imaging Science Photographic Technology	444	2.87
Computer Science Artificial Intelligence	411	2.66
Computer Science Theory Methods	369	2.39
Health Policy Services	356	2.31
Computer Science Interdisciplinary Applications	352	2.28
Multidisciplinary Sciences	339	2.19
Medical Informatics	282	1.83
Nuclear Science Technology	274	1.77
Instruments Instrumentation	240	1.55

As per the subject categories in Web of Science, the top 20 research areas are mentioned in Table 07. Presents the outcomes of Radiology Nuclear Medicine Medical Imaging, Oncology, along with Public Environmental Occupational Health were the top three popular research categories in this field.

Findings and Conclusion:

This Scientometric analysis shows that most research on Mammography originated from USA and China. It provides insights into the categories like Radiology, Medical Imaging, Oncology, Nuclear Medicine, Gynecology, and other subcategories publications. 42,756 different authors were found who contributed to Mammography research, where the top 50 authors contributed more than 50 publications remaining authors contributed less than 50 publications. A total of 133 countries concentrated on the field were the USA, China, England, Germany, and South Korea and the remaining countries contributed less than 5% of the total publications. The Study reveals that most of the authors preferred publication in article format and least in Date Paper which is

only 01 Publication. Maximum authors preferred the English language for publication i.e. 98.40% remaining in German, French, Spanish, and other languages. In 2018 highest number of publications was recorded and it shows a gradual increase in the trend of growth of literature. It can be concluded that this study helps policymakers to develop research policies and librarians to build collection development.

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