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A Bibliometric Overview of the International Journal of “Ophthalmology” from 1999-2018

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Abstract

The analysis of the most leading journals by the American Academy of Ophthalmology, that serves society by publishing original, unbiased innovation/research/advancement, new diagnostic/therapy in the field of ophthalmology including eye diseases, anatomy and physiology of eyes have been reported in various languages. This paper focuses on the pattern of research targeted by the journals. The key factors covered are leading countries, top-notch authors, benchmark institutes or organizations and related. It also offers keywords searched in ophthalmology to give conduit ideas about researched field. These publications comprise the article, biographical-item, correction, editorial material, letter, reprint and review. The topmost organizations were Johns Hopkins University and the University of California System with 561 papers each. While, the developed countries are major contributors to ophthalmic research, but the productivity of some underdeveloped countries is also growing impressively. The research is supported by many funding agencies as the research is going in the direction of glaucoma.

Introduction:

Ophthalmology, is the top leading journal of the American Academy of Ophthalmology, with an impact factor of 7.732. 10,306 documents have been contributed by 21955 authors from 1999-2018. The collaboration index is 2.37, which clearly signifies that the multiple authorship is dominating. The journal “ophthalmology” serves society by publishing clinical and basic science research and other relevant manuscripts that relate to the sense of sight. The chief purpose of this study is to examine the published articles in context to the leading articles, authors, institutions, and countries. The best suitable method to evaluate the research output is the Bibliometric approach. The analysis of the published content gives an insight into the research trend in the particular field. Thus, this gives a qualitative and quantitative analysis of the journal's contribution to the scientific community. Understanding the trends in research provides valuable insight into the direction of future ophthalmology. The eyesight is a common problem of concern, therefore, several studies related to Ophthalmology have been reported earlier at national and international level.

The aim of this study is to use bibliometric analysis to

observe the research pattern of the top leading journal “ophthalmology”. The investigations were carried out to predict the country, organization, funding agencies, authors contributing the most to the ophthalmic literature and most popular keywords related to this domain.

Materials and methods:

The Web of Science (WoS) Core Collection, is the most reliable database, which is used to collect the information for the bibliometric analysis. The WOS has an indexing coverage since 1900 and it covers more than 18000 high impact journals, over 180,000 conference proceedings and more than 80,000 books around the world. In the present work, data is extracted from WOS for the leading International clinical journal ‘Ophthalmology’ during 1999-2018. The collected data were further categorized and abridged with the aid of quantitative and qualitative ways (Using MS Excel and R software). Further, the results were interpreted in context to publication growth of the journal over the years, productive authors in the field, funding organizations, productive countries, etc.

Results:

An analysis of published data for two decades (1999-2018)

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TECHNOSCIENCE ARTICLE

reveals a total production of 10,306, the majority in three languages including English, Spanish and Romanian, of which the English language had been used in almost 99.9% of publications. These 10,306 publications comprise of articles (6215), letter (3007), editorial (867) correction (127), review (86), biography (3) and reprint (1).

Table 1 represents a year-wise analysis of researched publications in the journal of Ophthalmology for two decades (1999--2018) along with a percentage analysis of the same and the citation received. Publication of researched data in the field of ophthalmology during the study period showed a consistent trend with a minor fluctuation of over 1% periodically, every 3-4 years. Within the study period, researched-based papers on Ophthalmology received the highest publication in 2001 with a total of 593 papers. During the very first year of the study period, i.e., in 1999, there were around 568 papers (5.5%) and till 2003, the growth remained almost consistent for a period of five years. During the next three consecutive years, i.e., 2004-2006, publication slowed at 4.5%, but grew back to almost 5% during the next two years (2007-2008) and there was a repetition of the cycle. On average 5 % of papers are publishing every year. The maximum citation received are in 1999 i.e. 21383 for 568 papers.

Table-1: Ophthalmological Research publications in the journal for two decades (1999-2018)

Year	No. of Papers	In (%)	No. of Citation
1999	568	5.51	21383
2000	579	5.62	19465
2001	593	5.75	19987
2002	519	5.04	18085
2003	539	5.23	20893
2004	490	4.75	19511
2005	471	4.57	18169
2006	513	4.98	19217
2007	536	5.20	19855
2008	520	5.05	20016
2009	498	4.83	18378
2010	495	4.80	16224
2011	545	5.29	17524
2012	570	5.53	16613
2013	570	5.53	13568
2014	466	4.52	12285
2015	478	4.64	7675
2016	520	5.05	5820
2017	423	4.10	2009
2018	413	4.01	723

Twenty top-notch organizations contributing in the Journal of Ophthalmology from various parts of the world over a period of 20 years are listed in Table-2. Johns Hopkins University and the University of California System with 561 (5.44%) papers each, have been identified as the top-most organizations with the highest production. University of London, University College London, Wilmer Eye Institute and Moorfields Eye Hospital NHS Foundation Trust are the

other top 5 institutes subsequently publishing in ophthalmology. Other upcoming institutes publishing in ophthalmology include Harvard University, Bascom Palmer Eye Institute, Thomas Jefferson University, University of Miami and Singapore National Eye Centre with more than 300 papers, each. Upcoming organizations with almost 200 papers during the study period include the University of Melbourne, University of California, Los Angeles, University of Sydney, Doheny Eye Institute, and National Institutes of Health NIH, USA.

Table-2: Contribution of Top-ranking Organisation in Ophthalmology

Rank	Name of Organisation	Total Papers	In (%)
1	Johns Hopkins University	561	5.443
1	University of California System	561	5.443
2	University of London	450	4.366
3	University College London	385	3.736
4	Wilmer Eye Institute	366	3.551
5	Moorfields Eye Hospital Nhs Foundation Trust	329	3.192
6	Harvard University	325	3.154
7	Bascom Palmer Eye Institute	303	2.94
8	Thomas Jefferson University	289	2.804
9	University of Miami	259	2.513
10	Singapore National Eye Center	245	2.377
11	National University of Singapore	239	2.319
12	Va Boston Healthcare System	225	2.183
13	University of Southern California	210	2.038
14	University of Wisconsin System	208	2.018
15	University of Wisconsin Madison	207	2.009
16	University of Melbourne	200	1.941
17	University of California Los Angeles	199	1.931
18	University of Sydney	198	1.921
19	Doheny Eye Institute	197	1.912
20	National Institutes of Health Nih, USA	187	1.814

Table 3 provides a listing of funding agencies contributing to the Journal of Ophthalmology during the study period along with their percentage share. Around 2,522 studies have been funded with grants / financial aids/supports among which, National Eye Institute (NEI) National Institutes of Health (NIH) is dedicated to vision research and the only institute identified to have contributed enormously during the years in 595 records, accounting for 5.8% of the total funded papers. The study reveals a positive outlook of research statistics over a period of 20 years as almost 20 funding agencies had been contributing in this field. Other significant agencies contributing funds for research in ophthalmology include Research to Prevent Blindness Inc in New York, Allergan, National Eye Institute and Alcon.

Table 4 presents a listing of top-ranked authors' contributing in the field of ophthalmology. Twenty top-notch authors had been identified contributing around 1805 records during the study period. Wong TY, Mitchell P, Shields CL, Shields JA and Weinreb RN had been

contributing enormously with more than 100 records. Seven authors had been contributing in the range of (78-98) articles and 10 authors in the range of (54-64) articles.

Table 3. Top-Funding Agencies in Ophthalmology

Funding Agencies	Total Papers	In %
NeiNihHhs	595	5.773
Research to Prevent Blindness Inc New York	190	1.844
Allergan	165	1.601
National Eye Institute	149	1.446
Alcon	131	1.271
Research to Prevent Blindness	130	1.261
National Institutes of Health	126	1.223
National Institutes of Health Bethesda Maryland	123	1.193
Novartis	121	1.174
National Eye Institute National Institutes of Health Bethesda Maryland	113	1.096
Genentech	108	1.048
National Institute for Health Research	74	0.718
Bayer	70	0.679
Pfizer	70	0.679
Medical Research Council	67	0.65
Heidelberg Engineering	63	0.611
Carl Zeiss Meditec	60	0.582
Regeneron	57	0.553
Research to Prevent Blindness New York	56	0.543
Research to Prevent Blindness New York	54	0.524

Table 4. Top-ranked Authors in Ophthalmology Research

Rank	Name of Authors	No. of Papers	In (%)
1	Wong TY	136	1.32
2	Mitchell P	121	1.174
3	Shields CL	120	1.164
4	Shields JA	113	1.096
5	Weinreb RN	109	1.058
6	Aung T	98	0.951
7	Friedman DS	93	0.902
7	Klein R	93	0.902
8	Lam DSC	91	0.883
9	Wang JJ	83	0.805
10	Jonas JB	82	0.796
11	Varma R	78	0.757
12	Klein Bek	64	0.621
13	Foster CS	63	0.611
14	Jaffe GJ	62	0.602
15	Bressler NM	61	0.592
16	Jabs DA	60	0.582
17	Medeiros FA	58	0.563
18	Feuer WJ	57	0.553
19	Chew EY	55	0.534
20	Lee Ag	54	0.524
20	Zangwill Lm	54	0.524

In Table 5, top 20 productive countries publishing in the Journal of Ophthalmology have been enlisted, among which the US bagged the top position with an unbeatable 4324 records, counting to around 42% of the total production of 10,306. The other countries with a production

of more than 400 records during the study period following the US include England (724), Australia (491), Japan (444) and Germany (409). India scored the eighth position with 276 records, accounting to 2.68%. People's Republic of China and Canada are almost close to India with 350 and 278 records. Ten countries including Singapore, Italy, The Netherlands, France, Spain, South Korea, Israel, Switzerland, Brazil, and Austria are in the moderate range with over 100--271 records. Taiwan and Saudi Arabia still needs to revive in the competition.

Table-5: Top 20 Most Productive Countries in Ophthalmology

Rank	Countries/Regions	No. of Papers	In (%)
1	USA	4324	41.956
2	England	724	7.025
3	Australia	491	4.764
4	Japan	444	4.308
5	Germany	409	3.969
6	Peoples R China	350	3.396
7	Canada	278	2.697
8	India	276	2.678
9	Singapore	271	2.63
10	Italy	265	2.571
11	Netherlands	228	2.212
12	France	219	2.125
13	Spain	198	1.921
14	South Korea	194	1.882
15	Israel	140	1.358
16	Switzerland	138	1.339
17	Brazil	120	1.164
18	Austria	103	0.999
19	Taiwan	85	0.825
20	Saudi Arabia	73	0.708

Table 6 reveals a list of 20 frequently occurring keywords in the Journal Ophthalmology by the publisher, title of articles and abstract. Keywords are a concrete expression of the topic under discussion and can be correlated to the significance/occurrence/prevalence of the issue under discussion. The keywords are further segregated in terms of usage by publishers and authors. The most frequently occurring keywords by the publisher

Figure-1: Growth of Top 10 keywords by Author

Figure-2: Growth of top 10 keywords from title

Figure-3: Growth of keywords(term) used in abstract

Figure-4: Mapping top 20 countries along with top contributor and top organisations

Figure-5: Mapping top 20 countries along with top cited paper and top sources

include prevalence, open-angle glaucoma, management, surgery, eye and risk factors with over 400 occurrences. Author-used words have greater frequency and with around 17336 frequency and the word, 'patient' received the highest frequency of occurrence followed by ophthalmology, eyes, visual, participant and study.

Figure 1-3 reveals a year-wise growth of keywords in ophthalmology during the study period. A positive trend visible from the ground however shows that the term 'surgery' has seen a downward trend since 1999, which may be a positive feat indicating positive development of alternative medicines.

The Figure 4-5. gives the summary of bibliometric indicators in the Ophthalmology literature under consideration. Figure 4 maps the countries with authors and their affiliated universities. Clearly signifying the USA has deep roots in ophthalmology literature. Figure 5 gives the mapping of the top 20 countries along with the top-cited paper and sources. Although the USA is in 6th position but has a wider loop.

Conclusion:

This article offers a bibliographic overview of research published in the Journal of Ophthalmology for the time period (1999-2019). Data for the study is extracted from the WOS and bibliometric indicators are used in the study. A total number of papers published during the last two decades (1999-2018) is 10306. The journal has seen different stages with a moderate impact on the scientific community. The first stage, a period of 5 years (1999-2003) was a drastic year with the highest production in the field, with 2003 producing 593 publications. The growth trend in this field is showing a cyclic pattern with high-moderate-high production. During the last two years of the study period, the publication rate was comparatively moderate, with over 400 papers per year with 2017 producing the lowest publication rate of 413 papers. Analysis of the institutions/organizations and countries reveals Johns Hopkins University and the University of California System with highest publication of 561 papers each. Three other organizations with optimum publication production include the University of London, University College London, Wilmer Institute and Moorfields Eye Hospital NHS Foundation Trust. Leading countries with publication production in the field of ophthalmology include USA, UK, Australia, Japan and Germany with US at the highest production of 4324 papers. Top authors publishing in the field include Wong Ty, Mitchell P., Shields CL, Shields JA and Weinreb RN with Wong TY having the highest production of 136 records. Top funding agencies include The National Eye Institute (NEI), Research to Prevent Blindness, Allergan plc, National Eye Institute and Alcon.

Finally, this bibliometric analysis also has some limitations that should be noted. In future, the data may change, evolve or be modified but the Journal of Ophthalmology must still

continue to grow and position itself among similar journals, which will definitely encourage researchers to develop a more comprehensive bibliometric analysis involving other complementary methodologies to scientific mapping and continue their effort to support and contribute in this field.

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