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Bibliometric analysis of the most cited articles on congenital cataract from 1980 to 2022

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ABSTRACT

Aim: It was aimed to present a summary of the articles published between 1980-2022 on congenital cataract, to identify the most cited articles in the field, to analyze the most active journals and the development in countries by years.

Material and Method: Search was made using keywords "Congenital Cataract", "OR: Pediatric Cataract", "OR: Infantile Cataract", "AND: 1980-2022 (Year Published)", "AND: English (Language)" in Web of Science (WOS) database via Boolean operators (Access Date: 01.11.2022). Bibliometric analyzes were made using VOSviewer (ver.1.6.18), statistical analyzes were made using rstudio (ver.2022.02.1), other analyzes were made using Microsoft Excel.

Results: In the bibliometric analysis, 1383 articles were included between the dates determined. Over the past few decades, the total number of publications on congenital cataracts continually increased from 2 in 1980 to 68 in 2022 November. The most productive year was 2021 (n=93), while the most cited year was 2004 (1,184 citations, 32 publications). The most studied WOS categories were ophthalmology (n=900), pediatrics (183) and genetics (167). The most widely used keywords were congenital cataract (n=235), cataract (n=124) and pediatric cataract (n=75). The most cited paper in congenital cataract was "Pax6 gene dosage effect in a family with congenital cataracts, aniridia, anophthalmia and central-nervous-system defects", which was published in Nature Genetics in 1994 and cited 562 times (impact factor: 8.78). In ophthalmology journals, the most cited article was published in Survey of Ophthalmology (267 times, 1996) and the Molecular Vision was the most attractive journal with 104 publications. The United States of America, England and Peoples R China had the highest total link strength (TLS), 226 (10,325 citations), 134 (3,621 citations) and 73 (3,871 citations), respectively.

Conclusion: These findings provide useful information on the status and trends of current clinical research on congenital cataracts. Our study can be used to identify areas of study and standard bibliographic references for better diagnosis and disease control.

Keywords: Bibliometric analysis, congenital cataract, infantile cataract, pediatric cataract.

INTRODUCTION

Congenital cataract is the most common cause of treatable childhood blindness. Worldwide, it is responsible for approximately 5% to 20% of all vision loss in children (1,2). The prevalence of congenital cataract has been reported as 3-4.5% per 10,000 live births (3). Since it affects the early period of vision development, it causes severe vision loss and amblyopia. Cataracts seen in childhood may be isolated, or they may present with systemic, genetic and infective diseases. Early diagnosis and appropriate surgery are very important for visual prognosis. If left untreated, social, economic and psychological negative effects on the child, family and society are observed.

Factors such as genetic structure, cultural and socioeconomic status of populations, access to health services and adequacy of screening programs cause great differences in the prevalence and morbidity of congenital cataracts between populations. These are important considerations when evaluating statistics.

About half of childhood cataracts are caused by mutations in genes that encode proteins involved in lens structure and transparency. While most of these genes are encoded in an autosomal dominant manner, a few of them are autosomal recessive or X-linked (4). In the last 20 years, advances in genetic testing, including next-generation sequencing, have allowed the genetic cause of most isolated congenital and syndromic cataracts to be determined (5).

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The aim of our study was to provide a bibliographic-historical perspective by evaluating the studies on congenital cataract after 1980 and the most cited articles.

MATERIAL AND METHOD

The study was carried out in accordance with the Helsinki Declaration, which was revised in 2013. Because the study did not have human and animal research, ethics committee approval was not obtained.

Search was made using the keywords "Congenital Cataract", "OR: Pediatric Cataract", "OR: Infantile Cataract", "AND: 1980-2022 (Year Published)", "AND: English (Language)" in Web of Science database via Boolean operators (Access Date: 01.11.2022). The search was refined to include only research articles and reviews in ophthalmology and non-ophthalmology peer-reviewed journals, and only human studies. Case reports, letters to the editor and book chapters etc. were not included in the study. Impact factors of journals were obtained from Incites Journal Citation Reports (Clarivate Analytics, June 2021).

Bibliometric analysis is a method of analyzing research trends and knowledge structures in a field by statistical methods, first defined by Pritchard (6). It is widely used to describe the trending topics and contributions of academic studies, journals, countries and authors in quantitative terms. It also helps researchers understand current research trends, distribution and key issues in a given field.

Statistical Analyses

Bibliometric analyzes were performed using VOSviewer (Version 1.6.18) package program and statistical analyzes were performed using rstudio (Version 2022.02.1). Pearson correlation analysis was used for the relationship and significance was accepted as $p<0.05$.

RESULTS

A total of 1,383 publications on "congenital cataract", "infantile cataract", or "pediatric cataract" published from 1980 to 2022 in the English language were included in this study (**Figure 1**). The included publications were cited 24,531 times in total and 16,426 without self-citations. The average number of citations per item was 17.74 ranging from 1 to 1,383 citations. Over the past few decades, the total number of publications on congenital cataracts continually increased from 2 in 1980 to 68 in 2022 November. The most productive year was 2021 (n=93), while the most cited year was 2004 (1,184 citations, 32 publications)(**Figure 2**). The most prolific author in congenital cataracts research was Vanita Berry (n=10), the most studied WOS category was Ophthalmology (n=900). One thousand fifty six (90.8%) publications were articles, and 57 (4.1%) were reviews. The most widely used keywords were congenital cataract (n=235), cataract (n=124) and pediatric cataract (n=75) as shown in **Figure 3**. The most cited paper in congenital cataracts was "Pax6 gene dosage effect in a family with congenital cataracts, aniridia, anophthalmia and central-nervous-system defects" by Glaser, T. (Corresponding Author). It was published in Nature Genetics in 1994 and cited 562 times. The journal citation indicator was 8.78. The funding agency was United States Department of Health & Human Services National Institutes of Health (NIH) – USA NIH National Eye Institute (NEI). The most cited three paper in ophthalmology were 'Infantile cataract' review in Survey of Ophthalmology (240 citations), 'Good visual Function after neonatal surgery for congenital monocular cataracts' in American Journal of Ophthalmology (201 citations) and 'The critical period for surgical treatment of dense congenital unilateral cataract' in Investigative Ophthalmology & Visual Science journal (170 citations).

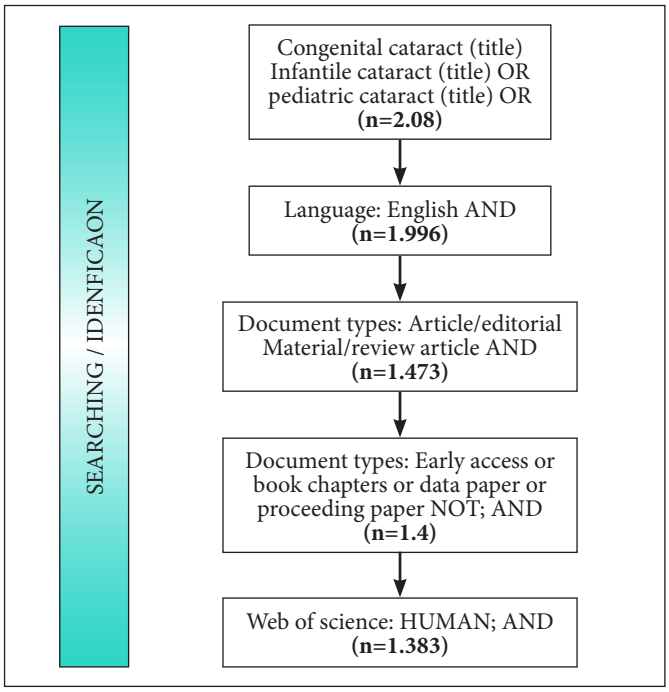

Figure 1. Current study flow diagram

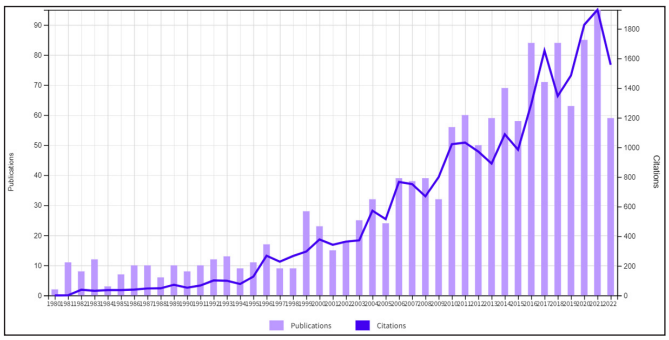

Figure 2. Publications and citations from 1980 to 2022 November.

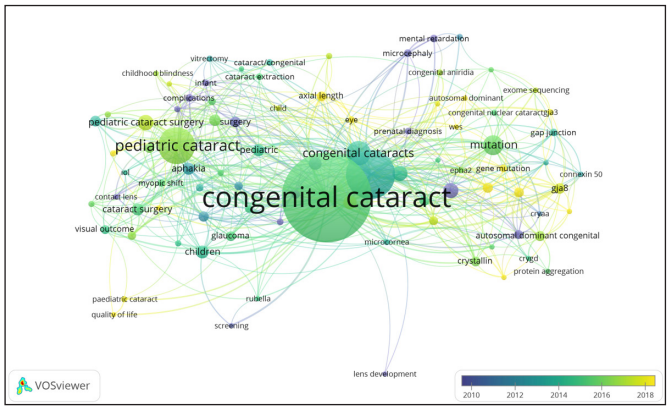

Figure 3. Most frequently used keywords in congenital cataract

The retrieved dataset was plotted for co-authorship visualization network mapping, and the minimum number of publications of a country was fixed at 5. A total of 44 countries were plotted. The USA, England and China had the highest total link strength (TLS), 226 (10,325 citations), 134 (3,621 citations) and 73 (3,871 citations), respectively, as shown in **Figure 4**. The minimum cluster size was selected at 5 and the document co-authored by a large number of countries was set at 25. A total of 5 clusters were formed, and each color represented a different cluster for years.

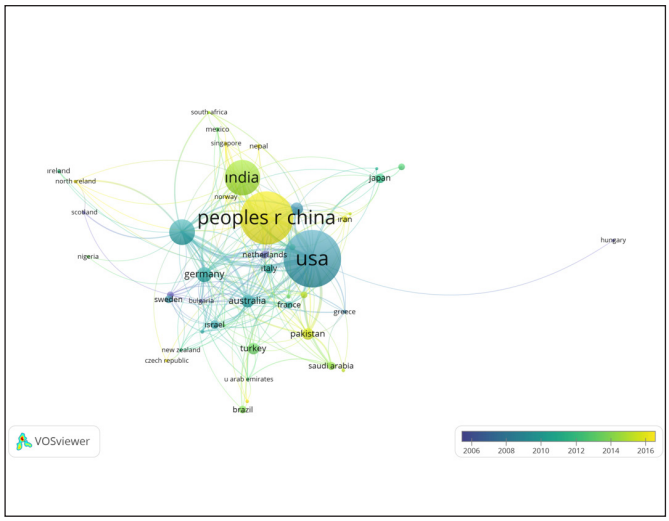

Figure 4. Co-authorship visualization network mapping, Countries

The university with the most studies was the University of London (84), followed by the University of College London (78) and Sun Yat Sen University (52). Infant Aphakia Treatment Study Group published highest number of studies on congenital cataract (5).

The top 200 most cited articles (top 100 most cited articles in Ophthalmology journals- top 100 most cited articles in non-Ophthalmology journals) were originated from 26 countries led by the United States (n=60; cited=5,959), England (n=28;cited=1,982) and China (n=28;cited=1,286) (**Figure 5**).

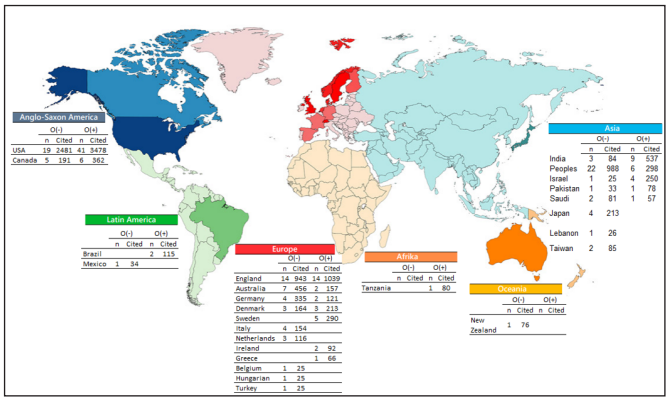

Figure 5. Distribution of Citation Numbers by Country in Ophthalmology and non-Ophthalmology journals

The most cited articles in the top 100 ophthalmology journals were published in Investigative Ophthalmology & Visual Science (n=15, 1376 citations), American Journal of Ophthalmology (n=12, 983 citations), and Ophthalmology (n=12, 822 citations). The most cited articles in the top 100 non-ophthalmology journals were published in American Journal of Human Genetics (n=11, 1067 citations), Nature genetics (n=3, 741 citations), and Human Molecular Genetics (n=3, 552 citations). The 20 journals with the highest citation frequency published in ophthalmology and non-ophthalmology journals are shown in **Table 1**.

Table 1. The most cited top 10 journals and impact factors (IF) of top 100 Ophthalmology and non-ophthalmology journals

T100 Ophthalmology Journals	**N**	**Cititaion**	**If**
Investigative Ophthalmology & Visual Science	15	1376	4.925
American Journal of Ophthalmology	12	983	5.488
Ophthalmology	12	822	14.277
Journal of Cataract and Refractive Surgery	9	568	3.528
Molecular Vision	8	521	2.711
British Journal of Ophthalmology	6	451	5.908
Archives of Ophthalmology	6	414	4.399
Journal of Aapos	5	323	1.325
Acta Ophthalmologica	4	245	3.988
Survey of Ophthalmology	1	240	6.197
T100 Non-Ophthalmology Journals			
American Journal of Human Genetics	11	1067	11.043
Nature Genetics	3	741	41.307
Human Molecular Genetics	3	552	5.121
Human Genetics	7	478	5.881
Journal of Medical Genetics	6	395	5.941
Human Mutation	7	330	4.700
Journal of Cell Biology	1	316	8.077
Seminars in Cell & Developmental Biology	1	268	7.499
Nature Biomedical Engineering	1	157	5.420
American Journal of Physiology-Cell Physiology	3	155	5.282

In both ophthalmology journals and non-ophthalmology journals, the number of citations increased as the age of publication increased (r=0,235; p=0,019 and r=0,205; p=0,041, respectively). Pearson correlation analysis showed that impact factor (IF) of both ophthalmology and non-ophthalmology top 100 journals did not have a significant effect on the total number of citations (p>0.05) (**Table 2**).

Table 2. Comparison of citations and impact factors (IF) by years

	T100 non-ophthalmology journals		T100 ophtalmology journals	
	r*	p	r*	p
	YEARS (n=100)		YEARS (n=100)	
Times Cited	0.235**	0.019	0.205**	0.041
IF	0.149	0.145	0.054	0.595

*pearson correlation coefficient; statistically significant (p<0.05)

DISCUSSION

Bibliometric analyzes in the health sciences and other fields are used to identify global research studies and trends, and to evaluate publication progress in a particular field. Such analyzes allow to evaluate the impact and effectiveness of scientific work by monitoring citations and other important bibliometric indicators (7-12). Although bibliometric studies are a point of reference for researchers, politicians and ophthalmologists, to the best of our knowledge, there is only one bibliometric analysis of congenital cataract indexed in the WOS database (13).

In our study, a significant increase was observed in the publications related to congenital cataract in the last 20 years. We thought that the reason for this might be related to technological advances, the increase in health investments of each country, easier access to science and information, or the emergence of new journals in these fields.

While USA was the most productive country in ophthalmology journals in congenital cataracts, China was the most productive in non-ophthalmology journals. As they invest more in scientific research and development, it is not surprising that the contribution of developed countries is higher than other countries in such studies (14). Compared to developed countries, fewer publications on cataract were produced in least developed countries. This may be attributed to the fact that countries with weak economies do not have adequate funding to support cataract research. For this reason, least developed countries should attach importance and support to more research on this issue, and the developed world should encourage more least developed countries with aid and cooperation programs to eliminate the visual impairment caused by cataracts.

Although China ranks first in terms of number of publications, it ranks 3rd in terms of citation and TLS, suggesting that the quality of research still needs to be improved. This discrepancy can be attributed to the lack of standardization of the academic evaluation system, unequal competence in clinical and scientific research among institutions, and the lack of high-quality multicenter randomized clinical trials.

The most studied areas have been ophthalmology, genetic inheritance, biochemistry and molecular biology. Epidemiology, clinical outcomes, complications and surgical techniques in the field of ophthalmology, and genetic etiologies and molecular mechanisms outside of ophthalmology have been the most researched topics (15-19). About half (47%) of the 100 most cited ophthalmology articles were on clinical outcomes and surgical technique. As it is known, the treatment of cataract is surgical, so it is inevitable that studies will be more about surgical treatment and its clinical outcomes. In the top 100 most cited studies in the field of ophthalmology, 20 journals came to the fore. The three journals with the highest number of articles were the Investigative Ophthalmology & Visual Science, the American Journal of Ophthalmology and the Ophthalmology, they were also the most cited journals (1376, 983 and 822, respectively). The most cited publications were in the Survey of Ophthalmology (240 citations) and the American Journal of Ophthalmology (201 citations). In our study, it was seen that the IF of the journals did not have a significant effect on the total citations, and a significant relationship was found between the year and the citations. As the year increased, there was a significant increase in the number of articles and citations. Especially the newest studies attracted more attention and receive more citations might cause the IF to remain in the background. The fact that ophthalmology journals target a very specific and limited audience and the articles are generally cited by this audience may partially explain the low IF values. Another explanation might be that the ophthalmology journals included in this study were quite successful in their own fields. The American Journal Of Human Genetics and Nature Genetics journals were non-ophthalmology journals with very high IF. Studies on basic science topics such as cell biology and molecular genetics have been published in journals with high IF (20). In our study, the citation numbers of ophthalmology journals were found to be higher when compared to non-ophthalmology journals, while non-ophthalmology journals had higher IFs. One study found that ophthalmology articles published in general medical journals with high IF had a lower risk of bias assessment compared to those published in ophthalmology journals with high IF. Another study

found that general medical journals had significantly lower self-citation rates (21,22). Bibliometric analyzes in different fields have revealed over time that IFs alone will not be a comprehensive indicator of the quality or impact of an article (23).

There were some limitations in our study, most importantly because we worked with the WOS database, which was frequently used in bibliometric studies, some highly cited articles in other databases had to be neglected. Our study was also limited by the title field, article language and document types in the search strategy. Since 2022 is not fully completed, data were included until November, so studies and citations for this year might be missing. Finally, self-citations were not included in the study, considering that some self-citations might be inappropriate and affect the analysis results.

In conclusion, significant advances were made in the genetic etiologies and surgical treatment of congenital cataracts in the last 20 years. As we can see from the studies, the contribution of developed countries to the literature cannot be ignored. Least developed countries should be supported in terms of both diagnosis and treatment and should be encouraged to share their results in peer-reviewed journals. Bibliometric analyzes can provide authors with useful information about the current situation and trends in the field of congenital cataracts.

ETHICAL DECLARATIONS

Ethics Committee Approval: Because the study did not have human and animal research, Ethics committee approval was not obtained.

Informed Consent: Because the study was not a human research, no written informed consent form was obtained from patients.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The author has no conflicts of interest to declare.

Financial Disclosure: The author declares that this study has received no financial support.

Author Contributions: The author declares that she has participated in the design, execution, and analysis of the paper, and she has approved the final version.

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