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EVIDENCE-BASED CONDUCT

Latin America's current contribution to scientific production in ophthalmology: a bibliometric analysis

A atual contribuição da América Latina para a produção científica em oftalmologia: uma análise bibliométrica

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KEYWORDS:

Ophthalmology; Bibliometric Analysis; Latin America; Brazil; Publications.

ABSTRACT

Objective: To investigate the contribution of Latin America to publications in the field of ophthalmology. **Methods**: A bibliometric analysis was performed using the Scopus database using periodicals present in SCImago Journal & Country Rank, covering all subject areas in the "Ophthalmology" category, all countries, and all types of scientific publications, from their respective creations until 2023. Data was collected using the "*Country/Territory*" option on each journal on the Scopus website, stored in a specific database, and analyzed using Microsoft Excel and Numbers. **Results**: Out of the 128 journals selected by SCImago Journal & Country Rank, 46 were open access and 82 were not, collectively publishing a total of 489,579 articles. Brazil contributed 9,113 of these articles, accounting for 1.86% of all publications and 60% of those from Latin America. Within this context, Brazil's contribution to the top 10 journals was 0.88%, while in open access journals it was 4.22%. In the 20th century, Brazil published 993 articles in ophthalmology, and this number saw a significant increase from 2000 to 2023, with Brazil's ophthalmology publications rising to 7,118 articles during this period. **Conclusion**: Scientific publication in ophthalmology by Latin America is limited globally. Brazil leads the way and is growing exponentially, but its figures are still modest compared with international output.

PALAVRAS-CHAVE:

Oftalmologia; Análise bibliométrica; América Latina; Brasil; Publicações.

RESUMO

Objetivo: Investigar a contribuição da América Latina para publicações na área de Oftalmologia. **Métodos**: Foi realizada uma análise bibliométrica utilizando a base de dados SCOPUS através dos periódicos presentes no Scimago Journal & Country Rank, abrangendo todas as áreas temáticas da categoria "Oftalmologia", todos os países, e todos os tipos de produção científica, desde suas respectivas criações até 2023. Os dados foram coletados através da opção "Country/*Territory*" presente em cada revista do site SCOPUS, armazenados em banco de dados específico e analisados com Microsoft Excel e Numbers. **Resultados**: Dos 128 periódicos selecionados pela Scimago Journal & Country Rank, 46 eram de acesso aberto e 82 não abertos, com 489.579 artigos. O Brasil contribuiu com 9.113 artigos, representando 1,86% do total de publicações e 60% da América Latina. A contribuição do país foi de 0,88% para os 10 principais periódicos e de 4,22% para periódicos de acesso aberto. No século XX, o Brasil tinha 993 contribuições em publicações na área de oftalmologia. Nos primeiros 23 anos do século XXI, esse número aumentou para 7.118 publicações. **Conclusão**: A produção científica em oftalmologia na América Latina é limitada globalmente. O Brasil lidera e cresce exponencialmente, mas seus números ainda são modestos em comparação internacional.

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INTRODUCTION

Scientific contributions to the field of ophthalmology play a vital role in advancing eye care and vision science worldwide. Peer-reviewed ophthalmic journals cover a range of disciplines, including ophthalmology, optometry, orthoptics, and vision sciences, and serve as the primary means of reporting and evaluating progress in this field[1]. Specific bibliometric analyses for some ophthalmic diseases and topics in the field have been conducted previously. However, despite the critical role of research in shaping advances, there is a paucity of medical literature with a segmented analysis for a group of countries in the ophthalmic literature[2-4].

This study aims to elucidate the current state of scientific production in ophthalmology in Latin America (LA) and identify possible opportunities for collaboration and advancement in the region. It will carry out a retrospective bibliometric analysis to compare the countries of LA, including Brazil, in terms of their scientific production in ophthalmology. By highlighting the diverse contributions of different countries, this review aims to promote new research efforts that will boost eye care and vision science in LA.

METHODS

Search protocol

Bibliometric analysis was conducted using Scopus[5] (Elsevier) through the journals present in the SCImago Journal & Country Rank, covering all thematic areas of the "Ophthalmology" category, all countries, and all types of scientific production, from their respective creations until February 28, 2023. Data were collected using the "Country/Territory" option in each journal on the Scopus website, stored in a specific database, and analyzed using Microsoft Excel and the software program Apple Numbers. The data were extracted independently, following search criteria.

SCImago Journal & Country Rank is a public access portal that uses the Scopus® database (Elsevier BV) and a country's scientific indicators. It is available at https://www.scimagojr.com. This portal has already been used in several previous bibliometric analyses[6,7].

SCImago Journal Rank (SJR) indicator was developed by SCImago, based on the Google PageRank™ algorithm. The indicator depicts the visibility of journals in the Scopus® database since 1996 and has already been compared with other visibility indicators[8]. SCImago is a research group of the Consejo Superior de Investigaciones Científicas, Universities of Granada, Extremadura, Carlos III (Madrid) and Alcalá de Henares. It is dedicated to analyzing, representing, and retrieving information through visualization techniques.

Contribution

Based on the data provided by Scopus, each country's scientific contribution was assessed by authors' participation in published articles, whether the primary authors or co-authors, in international or national journals[9]. Articles published in Latin American countries by non-Latin American authors were excluded.

LA

LA covers all the countries in Central and South America, including Mexico. LA includes 20 countries and ten dependencies, and has been used in previous bibliometric analyses[10]. Our study used prescriptors and keywords to select countries/dependencies: LA; regionalization; ethnocentrism; geopolitics. Thus, the countries were considered in an alphabetical order: Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Ecuador, El Salvador, Guatemala, Haiti, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Dominican Republic, Uruguay, and Venezuela.

RESULTS

Journals

The SJR retrieved 128 journals: 46 open access and 82 nonopen access. Ten ophthalmic journals with the highest SJR index for ophthalmic journal articles are listed in table 1 in rank order; SJR indices for ophthalmic journal articles were 6.022–1.653. The ophthalmology journal with the highest SJR index is Progress in Retinal and Eye Research (index 4.939). The journal in table 1 with the highest number of articles is the American Journal of Ophthalmology (36,834 articles).

Articles

A total of 489,579 articles were analyzed. LA (Figure 1A) contributed 15,189 articles, corresponding to 3.01% of the total articles. The Latin American country with the most significant contribution was Brazil, with 60% of the articles, followed by Mexico with 17%, Argentina with 7%, Colombia with 4.3%, Chile with 2.9%, Venezuela with 1.65%, and other countries with 6.87% (Figure 1B).

Open access and impact factor

When analyzing the ten journals with the highest impact factor according to the SJR indicator, the contribution of LA was 1.89%. The contribution of Brazil was 0.88%, which represents 46.5% of that of LA.

In LA, 41.5% of publications were not open access, and 58.5% were open access. When evaluating only nonopen access journals, the contribution of LA was 1.8%. However, when evaluating only open access journals, this figure increased to approximately 6.1%.

In Brazil, 32.6% of publications were nonopen access and 67.3% were open access. When evaluating only nonopen access journals, the contribution of Brazil is 0.8%. When evaluating only open access journals, this figure increases to approximately 4.2%.

Table 1. Ten ophthalmology journals with the highest impact factors in the SJR

Journals	SJR	Brazil	Latin America	Total Latin America	Total articles in the journal
Progress in Retinal and Eye	6.022	17	5	22	980
Ophthalmology	4.412	180	226	406	18485
Annual Review of Vision Science	3.038	0	0	0	186
JAMA	2.311	57	50	107	3918
Ophthalmology American Journal of Ophthalmology	2.301	241	292	533	36834
Survey of Ophthalmology	2.063	27	37	64	3889
Ophthalmology	1.843	27	32	59	1375
British Journal of Ophthalmology	1.800	172	220	392	19032
Ocular Surface	1.685	30	15	45	1121
Current Opinion in Ophthalmology	1.653	151	95	56	2940

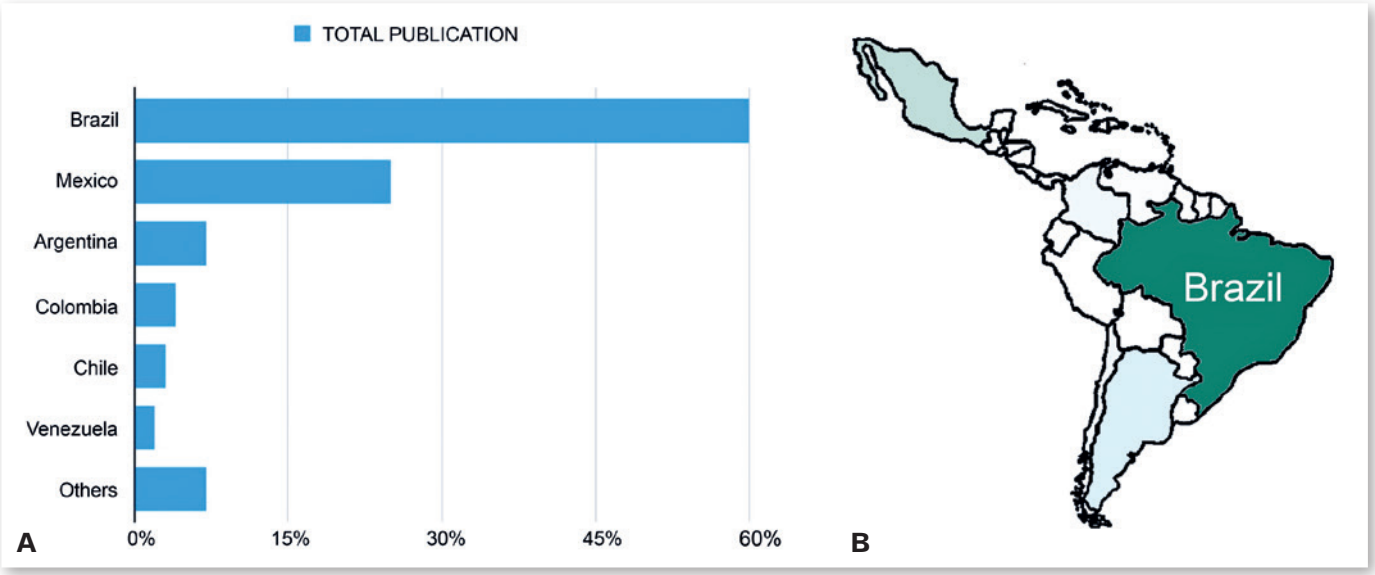

Figure 1. Brazil is the Latin American country that contributes most to the production of articles in the field of ophthalmology. (A) Heat map of Latin America highlighting the numerical contribution of each country. (B) Bar graphs showing the percentage contribution of each country.

LA

For a subanalysis of the data, we chose the five Latin American countries with the most publications: Brazil (9,113 publications), Mexico (2,621 publications), Argentina (1,048 publications), Colombia (663 publications), and Chile (448 publications), and the journals with the highest SJR listed in table 1. Adding all these publications together, we obtained a total of 2,412 scientific articles by authors from the countries included in this analysis. Brazil stood out, with a total of 1,618 publications, which represents approximately 67.08% of total contributions. Mexico had 322 publications (13.349% of the total), and Argentina contributed 264 publications (10.95%). Colombia had 113 publications (4.68%), followed by Chile with 95 publications (3.94%).

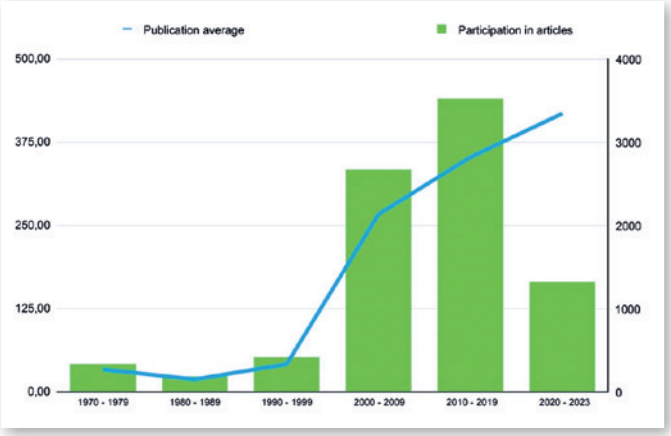

Figure 2. Evolution of Brazil's contribution to the production of articles in the field of ophthalmology from 1970 to 2023.

Brazil

Brazil had 9,113 articles, corresponding to 1.86% of the total. Of these publications, 47.06% were published in two Brazilian journals-Arquivos Brasileiros de Oftalmologia and Revista Brasileira de Oftalmologia, which were present in the sample, highlighting the importance of national journals in encouraging research.

In the last century, Brazil contributed to 993 publications in the field of ophthalmology. However, in the first 23 years of the 21st century, Brazil has already contributed to 7,118 publications, an increase of approximately 700%. Notably, the average number of publications per year has also increased. For 2000–2009, 2010–2019, and 2020–2023, the average number of publications per year was as follows, respectively: 266.9, 352.4, and 417.98 (Figure 2).

DISCUSSION

This analysis aimed to evaluate the evolution of scientific publications in ophthalmology against the backdrop of LA, showing regional progress in eye health care. From a socioeconomic perspective, LA still requires greater technological development without external dependence, as this will have a directly impact the evolution of scientific studies, especially in ophthalmic care. Thus, progress in resolving ophthalmic diseases and disorders is often hindered by a lack of resources, despite regional advances in publications and scientific production.

Our bibliometric analysis does not cover all the literature in ophthalmology but focuses only on the area of ophthalmology and study of visual alterations, and excludes literature in areas of medicine not directly related to ophthalmology.

This study used the SJR as a parameter to rank journals according to their impact on publications, ranking journals from highest to lowest impact.

Journals

The journals Arquivos Brasileiros de Oftalmologia and Revista Brasileira de Oftalmologia (SJR 0.345 and 0.125, respectively) have a significant impact on national scientific production. Arquivos Brasileiros de Oftalmologia, the official source of publication for the Brazilian Council of Ophthalmology, was created in 1939 and promotes publications aimed not only at disseminating science in the field of ophthalmology but also in the visual sciences and promotion of public health[11,12]. This journal had a total of 83 citations between 2019 and 2022, according to the Scopus website.

Revista Brasileira de Oftalmologia has existed since 1942 and is in its 82nd volume. It is open access[13]. Like other publications in the field of ophthalmology, its main mission is to develop scientific studies that have a strong impact on the development and dissemination of high-level knowledge. It is made up of a national and international editorial board in the field of ophthalmology.

Articles

Ragghianti et al[14] demonstrated that between 1996 and 2004 in LA, the themes of retina and vitreous headed the list of subspecialties, followed by oculosystemic diseases, cornea and conjunctiva, with neurophthalmology in fourth place. From 2006 to 2015, the topic with the highest number of publications was retina, followed by strabismus, cornea, and glaucoma[15].

Fu et al.[16] performed a bibliometric analysis of systematic reviews and meta-analyses in ophthalmology from 2000 to 2020, considering LA, where the majority of publications were in the areas of retina and vitreous, glaucoma, cornea, and cataract/anterior segment. Thus, it is obvious that the participation of each subspecialty in publications varies over time and between regions of the world.

Countries

Most of the journals listed in table 1 are included in this ranking. There have been some changes in position since their respective creations, considering that most of them cover topics in general ophthalmology, ophthalmic subspecialties, and other related topics.

Worldwide, the United States heads the list, with the largest number of publications in ophthalmology, followed by the United Kingdom. There is some disagreement in the literature regarding the other positions in the ranking[17]. Fu et al.[16] lists Brazil as the 19th most cited of 20 countries.

Global comparison

Scientific production in LA in the field of ophthalmology is modest when compared to those of North America and Europe. This is due to several factors, including the scope of funding available for research, organization of data and access to it, remuneration of professors and researchers, and institutional incentive[18]. Countries like the United States and the United Kingdom have considerably larger budgets for scientific research, which allows them to invest in advanced infrastructure, cutting-edge technologies, and research incentive programs. Additionally, the efficient organization of data and access to large international databases make it easier to carry out more comprehensive, high-impact studies. Competitive remuneration also attracts and retains talent, encouraging more robust scientific production. Conversely, in LA, the lack of financial resources, limited infrastructure, and lack of adequate institutional incentives hinder scientific progress, resulting in lower production than in other regions of the world. Previous publications indicate that the number of ophthalmologists per inhabitant is not directly related to a country's scientific output, but is influenced by factors such as limited economic resources and political and financial crises[15,19]. For example, crises of currency devaluation can result in reduced support for research and force doctors to prioritize their private practices, while financial circumstances often lead ophthalmologists to migrate to countries in search of better opportunities to carry out research[15,20,21].

Limitations

Bibliometric analysis has some limitations. First, the search was based exclusively on the Scopus database. This resulted in the exclusion of relevant research sources, such as the new electronic ophthalmology journal "Eoftalmo"[22] of the Brazilian Council of Ophthalmology, which is not yet indexed on the platform. The study was completed in February 2023, but figures and trends may have changed since. Thus, ongoing analyses are needed to obtain an up-to-date picture of ophthalmic research in LA. The choice of the SJR indicator as a measure of the impact factor of journals is another limitation, as other indicators can provide different perspectives. The analysis focused on a specific subset of countries in LA, excluding smaller countries, which may have affected regional representation. The study did not explore the specific subareas of ophthalmology most frequently covered in publications, which could guide future research. The distortion of institutional affiliations, in which authors often report multiple affiliations to increase prestige, is a critical limitation in bibliometric studies. This is due to the need to publish and a desire, on the part of institutions, to improve their ranking and funding. However, this practice can lead to misuse of public funds and distortion of performance indicators, compromising the integrity of the research and the reliability of the results[23,24]. Lack of standardization in institutional affiliations is a major limitation in bibliometric studies. Authors often do not provide consistent information about their affiliations, which can lead to inaccurate data and make it difficult to accurately analyze the contribution of each institution[25-27].

Scientific production in the field of ophthalmology in LA is limited compared to the global scenario. Brazil stands out as the main contributor in the region, showing significant growth in the publication of articles over the years. However, when compared to countries on other continents, such as the United States, the United Kingdom, Spain, and Portugal, Brazil's output is not as expressive and its impact is not as significant in relation to the total number of articles published worldwide. Furthermore, other Latin American countries face considerable challenges in publishing articles in ophthalmology, finding it difficult to achieve the same level of scientific recognition. Brazil has a significant share of scientific production in the region, whereas other countries have relatively smaller production.

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FBOP is Editor-in-Chief of eOftalmo. This article was independently handled by a member of the Editorial Board.

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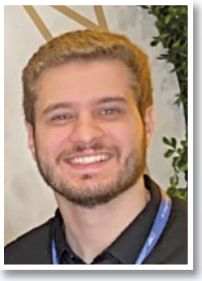

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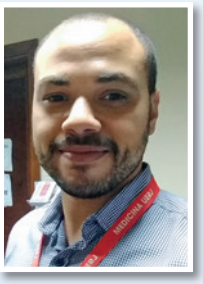

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