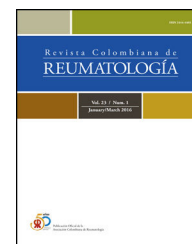




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Original Investigation

Literature analysis of economic aspects of rheumatoid arthritis[☆]



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ABSTRACT

Introduction: Rheumatoid arthritis is an inflammatory disorder with a prevalence of up to 5%, and with a significant impact on the quality of life. Rheumatoid arthritis is a high cost medical condition. According to a study carried out in the United States by 2010 an annual expenditure of 4.8 million dollars was estimated.

Objective: To perform a descriptive analysis of the Medline-indexed biomedical literature on economic aspects of rheumatoid arthritis published between 1996 and 2016.

Materials and methods: The design is retrospective descriptive literature analysis, with a search performed in Medline using GoPubMed and Fabumed, with the following search strategy: ("Arthritis, Rheumatoid" [Majr]) AND ("Costs and Cost Analysis" [Majr]) AND (1996:2016 [dp]).

Results: A total of 350 references were obtained on economic aspects of rheumatoid arthritis indexed in 80 different journals. *Rheumatology*, with 6 (1.71%) references was the top journal, followed by *Clinical and Experimental Rheumatology* with 5 (1.42%). The United States was the most productive country with 30 (8.57%) publications. In Latin America, Brazil and Colombia each contributed with 3 (0.85%) references. During the period studied, there was a growth rate of 41.4%.

Conclusions: Colombia has contributed with less than 1% of scientific production worldwide, and taking into account that the economic analysis cannot be decontextualised, the development of new proposals and contributions in this research area in our country is considered necessary.

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Análisis bibliométrico de temas económicos en artritis reumatoide

R E S U M E N

Palabras clave:

Artritis
Reumatoide
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Colombia

Introducción: La artritis reumatoide es una enfermedad inflamatoria con una prevalencia de hasta el 5% y con un impacto significativo sobre la calidad de vida. La artritis reumatoide representa una condición médica de alto costo; para el año 2010 se estimó un gasto anual de 4,8 millones de dólares, según un estudio realizado en Estados Unidos.

Objetivos: Realizar el análisis descriptivo de la literatura biomédica indexada en Medline entre 1996 y 2016 sobre temas relacionados con aspectos económicos de la artritis reumatoide.

Materiales y métodos: El diseño es un análisis bibliométrico retrospectivo, de tipo descriptivo. Se realizó una búsqueda bibliográfica en Medline utilizando GoPubMed y Fabumed, y la siguiente estrategia de búsqueda: («Arthritis, Rheumatoid» [Majr]) AND («Costs and Cost Analysis» [Majr]) AND (1996:2016 [dp]).

Resultados: Se obtuvieron un total de 350 referencias indexadas en 80 revistas diferentes. *Rheumatology* con 6 (1,71%) referencias fue la revista con mayor número de publicaciones, seguida por *Clinical and Experimental Rheumatology* con 5 (1,42%). Estados Unidos fue el país más productivo con 30 (8,57%) publicaciones. En Latinoamérica, Brasil aporta 3 publicaciones (0,85%), al igual que Colombia con 3 publicaciones (0,85%). A lo largo del periodo estudiado se observó una tasa de crecimiento de 41,4%.

Conclusiones: Colombia ha aportado menos del 1% de la producción científica a escala mundial; teniendo en cuenta que los análisis económicos no son extrapolables, consideramos necesario el desarrollo de nuevas propuestas y contribuciones en esta área de investigación en nuestro país.

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Introduction

The bibliometric analyses quantify and evaluate the evolution of the scientific production of the main biomedical fields.¹ Their fundamental objectives are usually quantitative and include the study of the number of publications, the topics addressed, and the geographical distribution of scientific documents. These studies are useful to know the panorama of current research, compare its evolution over time and give orientation for new proposals.^{2,3}

Rheumatoid arthritis (RA) is an inflammatory disease of the musculoskeletal system. Its prevalence varies according to the study population, but is estimated to be between 0.2% and 5% worldwide⁴; in addition, it produces a significant affectation of the quality of life of the patients. It is known that, in the first 10 years of illness, RA generates a complete loss of employment in 50% of people suffering from this disease; this percentage can reach 59%.⁵ When reviewing the main databases, we did not find bibliometric studies on the economic impact of RA.

The field of rheumatology was selected because it represents high-cost medical conditions; particularly in older adults, in whom rheumatologic diseases, and more specifically RA, generate annual costs of up to \$4.8 million dollars per year in the United States, according to a study conducted in 2010.⁶

The evolution over time and the characteristics of the scientific literature regarding the economic impact of RA were evaluated through this bibliometric analysis.

Methods

It was conducted a retrospective descriptive bibliometric analysis of literature concerning the economic aspects related to RA, which include both the direct costs arising from medical care and treatment, and the indirect costs related to the loss of labor activity and the disability-adjusted life years.

The literature indexed in the last 20 years (1996–2016) was evaluated, and this period was chosen since it is in recent years in which the majority of advances in terms of knowledge, diagnosis and management of this disease have been produced. The year 2017 was not included in order to generate comparable full annual results. The references derived from the Medline database were analyzed through PubMed®, GoPubMed® and Fabumed® in May 2017.

A theme filter was designed with the MeSH terms referring to RA and its economic impact, constituting the following search strategy: (“Arthritis, Rheumatoid” [Majr]) AND (“Costs and Cost Analysis” [Majr]). “[Majr]” was used for the bibliographic search, since the search with this method is much more specific, with precise results and focused on the main objective, thus excluding the terms that alter the number of articles found and that as a consequence could modify the direction of the search. However, when more specific results are generated, a search bias may occur and possibly leave some economic aspects outside the goal. As mentioned above, the search results were limited by publication date to the period between 1996 and 2016 (“1996”[dp]:“2016”[dp]).

Through GoPubMed® and its statistics option, the following variables were obtained: total number of publications, number and percentage of publications per year, journal and country. Prevalence, follow-up and descriptive studies in populations were included for the selection of the literature. All types of non-scientific information were omitted and only articles defined as Journal articles were taken into account; these include original research articles, reviews, essays and other scientific reports. The analysis of the results of the data was carried out by means of descriptive statistics and based on this information, tables and graphs were prepared in the Microsoft Excel program, version 2017 for Mac.

In order to compare the scientific journals and evaluate the relative significance of each according to the citations received of the articles published, the impact factor of the Journal Citation Reports 2015/2016 was used. At present, despite having contradictors, the impact factor is the most important bibliometric indicator used to estimate the scientific quality of a journal.⁷

Results

A total of 350 references on RA and economic issues were found in the 1996–2016 period. These references were published in 80 indexed journals, of which, 38 (10%) references were published in the first half of the period (1996–2006) and 341 (89.9%) in the second decade (2006–2016).

Of the studies found in the literature, 83 (23.71%) deal with the topic of direct and indirect costs related to the disease and 44 (12.57%) are analyses of cost-effectiveness of the different treatment options; biological vs. conventional, being the burden of the disease the most used clinical outcome.

The journals with the greatest number of publications are *Rheumatology* with 6 publications (1.71%), followed by *Clinical and Experimental Rheumatology* and *Annals of Rheumatic Diseases* with 5 publications (1.42%). In Table 1 are found the 10 journals with the greatest number of publications related to this topic during the period studied, including the number of

articles published therein, their publication language, and the impact factor for the year 2016 according to the Journal Citation Reports. No High Impact Journal appeared among the 20 journals with the greatest number of publications.

The absolute number of publications increased from 2 (0.52%) in 1996 to 8 (2.11%) in 2016, with corresponds to a growth rate of 41.4%. However, it can be observed a variable behavior in terms of the number of publications per year (Fig. 1).

The search presented a worldwide geographical distribution, which included the participation of the 5 continents. The continent with the highest number of publications was Europe with 54 references (15.4%); the countries within the European continent with greater scientific production, contributing with 35 publications (10%) in total, were: the United Kingdom (10 references), the Netherlands (8 references), Germany (5 references), Spain (4 references), Finland (4 references) and Sweden (4 references). In the second place is America with 44 publications (12.6%). North America contributed with a total of 37 publications (10.6%) from the USA, Canada, Mexico and Dominican Republic. South America contributed with 7 publications (2%) from Brazil, Colombia and Argentina. Asia published a total of 11 references (3.1%), from China, Taiwan, South Korea, India and Japan. The continents of Africa with one publication (0.28%) and Oceania with 4 publications (1.14%) are located in the last place. The top 10 countries with the highest number of publications were: the USA, the United Kingdom, the Netherlands, China, Germany, Canada, Spain, Finland, Sweden and Turkey, contributing with 79 publications in total (22.5%) (Fig. 2).

A total of 480 authors were identified. Saag, who is part of the University of Alabama in Birmingham, USA, and Sokka, from the Department of Medicine, Central Hospital, Jyväskylä, Finland, were the authors with more publications, each one contributing with 2 references. Among the top 20 authors, only one resides in the United States. The main authors of research on this area, with their country of residence and the total number of publications are shown in Table 2.

Table 1 – Journals with the greatest number of articles on the economic impact of rheumatoid arthritis from 1996 to 2016, their impact factor for the year 2016, number of publications, publication language and country.

Journal	Articles	Impact factor 2015/2016 ^a	Language	Country
<i>Rheumatology</i>	6	1.563	English	USA
<i>Clinical and Experimental Rheumatology</i>	5	1.010	English	USA
<i>Annals of Rheumatic Diseases</i>	5	7.014	English	USA
<i>Rheumatology (Oxford)</i>	4	4.818	English	USA
<i>Pharmacoeconomics</i>	4	3.630	English	USA
<i>Arthritis and Rheumatism/Arthritis Care & Research</i>	4	2.418	English	USA
<i>The Journal of Rheumatology</i>	4	1.86	English	Canada
<i>American Journal of Managed Care: AJMC</i>	3	0.57	English	USA
<i>Journal of Managed Care & Specialty Pharmacy</i>	2	2.12	English	USA
<i>Aesthetic Surgery Journal</i>	2	2.502	English	USA

^a Scimago Journal and Country Ranks. 2016. Available in: <http://www.scimagojr.com/journalrank.php?category=2745>.

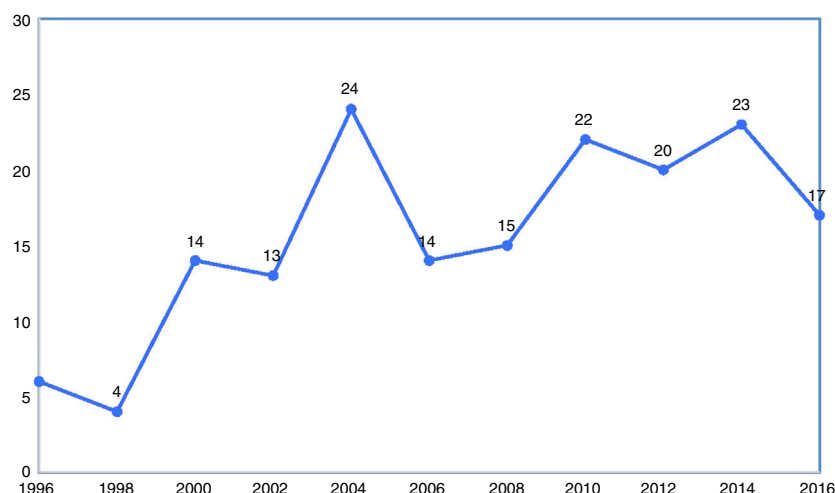


Fig. 1 – Total number of publications on the economic impact of rheumatoid arthritis from 1996 to 2016.

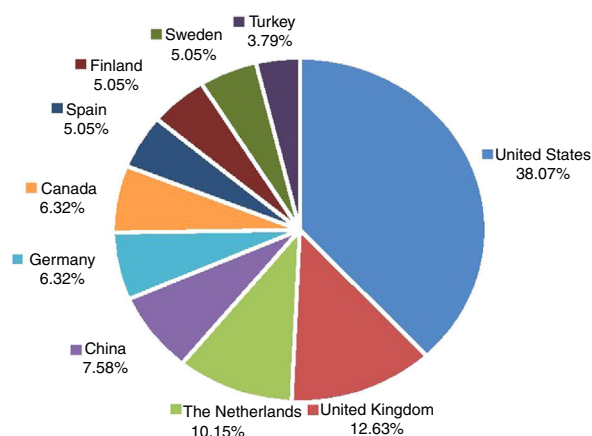


Fig. 2 – Distribution of countries of origin of the identified articles.

Discussion

Our study demonstrated a clear increase in the total number of publications dealing with the economic aspects of RA, with a growth rate of 41.4% in the last 20 years. The economic impact on the health care systems and the rapid increase in

the global prevalence of RA, in both developed and developing countries, can justify the increase in scientific production, as well as the costs associated with the burden of the disease.⁸ However, despite the increase in the number of publications during the period studied, the differences mediated by the economic development of the countries are still notable.

Bibliometric analysis is a tool of science that allows to study and characterize the scientific production around a specific topic. In this way, it manages to obtain a global overview of the performance and repercussion of the scientific activity in a specific region, which facilitates decision making when establishing policies or allocating resources to research lines.^{9,10}

When analyzing the results of the geographical distribution, it can be observed that the continent with the highest number of publications is Europe, followed by America, mainly because of the contribution of North America, probably related to the high economic development. In Latin America, the average number of publications per country is one. Colombia has 3 indexed publications, one indexed in the journal *Biomedica* and 2 in the *REVISTA COLOMBIANA DE RENUMATOLOGÍA* (Colombian Journal of Rheumatology), contributing with less than 1% of the world's scientific production. We consider that this makes evident not only the scarce scientific production that exists around this topic, but also that the little that has been published is not fully reflected, since it has been published in non-indexed journals, preventing it from being visible at the

Table 2 – Authors with the highest number of references indexed in Medline.

Author	Number of publications	Country
Saag K.	2	Canada
Sokka T.	2	Finland
Boonen A.	1	The Netherlands
Hifinger M.	1	The Netherlands
Hiligsmann M.	1	The Netherlands
Ramiro S.	1	The Netherlands
Severens J.L.	1	The Netherlands
Fautrel B.	1	The Netherlands
Watson V.	1	The Netherlands
Gong L.	1	China

global level in this database, and regarding Colombia, the publication of the *Biomédica* journal is only found in Medline. The foregoing demonstrates the need to promote research on the economic impact of RA, among other pathologies with a high disease burden, in order to develop applicable scientific products with the ability to guide decisions in the socioeconomic and resource fields.¹¹

The main limitation of this study is that through the bibliometric indicators, only information about the number of publications is obtained, and to be able to speak about the quality of the publications, in this study was used the impact factor of the Journal Citation Reports,¹² which is limited in its essence, since it is a global measure obtained from the number of citations that a journal receives during one year, but this count of citations does not distinguish between those that are made to research articles and those that are made to other types of articles of less importance, such as letters and editorials, and this is the reason why it cannot be used as a single indicator of scientific quality.

Conclusions

Based on the bibliometric analysis carried out on the scientific production during the period from 1996 to 2016, it can be evidenced that there is a significant number of articles available and at the service of researchers. The number of publications dealing with economic aspects in RA has steadily grown during the period studied according to the indicators of distribution by year, authorial production and production by country, showing promising the number of publications in the future. However, regarding Latin America, Colombia has contributed with less than 1% of the scientific production worldwide, with the great limitation that in addition to having scarce scientific production regarding the topic under study, not all publications are indexed in the Medline database. Taking into account that economic analyzes cannot be extrapolated, it is deemed necessary the development of new proposals and contributions that foster an increase in the activity in this area of research in our country. Moreover, through this type of analysis it is possible to know which is the global panorama in terms of clinical research around a topic as relevant as RA, a disease that currently affects almost 1% of the world population, this being of great usefulness not only to generate proposals that seek to promote research, but also to achieve significant advances in knowledge and treatment options for this disease in the medium and long term.

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Conflict of interest

The authors declare they do not have any conflict of interest in relation to the publication of this manuscript.

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