Bibliometric Analysis of the Revista Colombiana de Radiología

Análisis bibliométrico de la *Revista Colombiana de Radiología*

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Key words (MeSH)

Bibliometrics
Literature based discovery
Bibliography of medicine
Index

Palabras clave (DeCS)

Bibliometría
Descubrimiento basado
   en la literatura
Bibliografía de medicina
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Summary

Objective: Describe bibliometric indicators of the Revista Colombiana de Radiología from its first issue in 1989 to the last one of 2018. **Materials and methods:** A database was created in the JabRef reference software with all the publications found. Each reference has information about the authors, volume, number, year of publication and abstract, as well as data such as institutional affiliation of the authors, geographical location, type of publication, type of study and topic. Through a simple statistical analysis, the main variables, production and bibliometric indicators were analyzed, such as the number of publications by number, year, author, institutional affiliation, location, topic and type of publication. For the impact indicators the citations of the entire journal production were searched in different databases and search engines with posterior analysis. **Results:** In total there were 902 publications. The year with more publications was 2011 and the most frequent type of publication was case report. The areas with the most publications were body image and neuroradiology. The cities in Colombia with the highest number of publications were Bogotá and Medellín. The institutions that published the most were the Hospital Universitario San Ignacio - Pontificia Universidad Javeriana and Fundación Santa Fe de Bogotá - Universidad del Bosque. **Conclusions:** The Revista Colombiana de Radiología is the leading journal on radiology in the country. This journal has a considerable amount of publications of different types and topics. This bibliometric review can serve as an input to make decisions regarding the future of the journal.

Resumen

Objetivos: Describir las estadísticas y los indicadores bibliométricos de la *Revista Colombiana de Radiología* desde su primer número, en 1989, hasta el último de 2018. **Materiales y métodos:** Se revisaron todos los números de la Revista tanto impresos como en versión digital. Se creó una base de datos en el *software* de referencias JabRef con todas las publicaciones encontradas. Cada referencia, aparte de la información de autores, volumen, número, año de publicación y resumen, contiene datos de filiación institucional, localización geográfica, tipo de publicación y tema. Por medio de un análisis estadístico simple se examinaron los indicadores de producción, como cantidad de publicaciones por número, año, autor, filiación institucional, localización geográfica, tópico y tipo de publicación. Para los indicadores bibliométricos de impacto se realizaron búsquedas de las citaciones sobre la producción de la revista en bases de datos y buscadores. **Resultados:** En total fueron 902 referencias. El año de más publicaciones fue el 2011 y el tipo de publicación más frecuente fue el de presentación de caso. Las áreas con más publicaciones fueron imagen corporal y neurorradiología. Las ciudades en Colombia con más publicaciones fueron Bogotá y Medellín. Las instituciones que más publicaron fueron la Pontificia Universidad Javeriana, Hospital Universitario San Ignacio y la Fundación Santa Fe de Bogotá y Universidad El Bosque. **Conclusiones:** La *Revista Colombiana de Radiología* es la principal publicación sobre radiología en el país. La Revista cuenta con una considerable cantidad de publicaciones de diferente tipo y tema. Este análisis bibliométrico podrá servir de insumo para tomar decisiones respecto al futuro de la Revista.

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1. Introduction

In 1988 the Revista Colombiana de Radiología (RCR) was created, the official organ of the Colombian Association of Radiology (ACR), for the popularization of science and the publication of scientific works. The first issue of volume 1 was published with the date May-August 1989 (1). Since then, it has been published continuously, to date with more than 85 issues, 500 articles and editorials (2,3). Since 2009, the RCR has been included in the Publindex National Bibliographic Index of Colciencias, in the 2014 classification and in force until 2017 in the C category (4). This Index classifies national scientific journals according to scientific quality, editorial quality, stability and visibility, as well as national and international recognition in four categories in descending order -A1, A2, B and C- (5). The Revista is not in the

latest classification of the 2016 which runs from 2017 to 2019 (4). At the international level, it is indexed in the Latin American and Caribbean Literature database. Caribbean in Health Sciences (LILACS) Latin American and Caribbean Literature in Health Sciences) and in Regional Online Information System for Scientific Journals of Latin America, the Caribbean, Spain and Portugal (Latindex). The Revista is not indexed in the database of the National Library of United States Medicine (Medline) or the Scopus database of Elsevier. However, the Revista has become the leading scientist journal in diagnostic imaging and radiology publications and related specialities in Colombia (3).

Given the scientific production of the Revista, the advances in the specialty and the old and new gaps in radiology knowledge, it is necessary to have a detailed quantitative and qualitative analysis of the scientific production of the RCR. This is achieved with a bibliometric analysis of all publications throughout the history of the Revista.

In 1969, Pritchard defined the term bibliometry as the application of mathematical and statistical methods dedicated to the quantitative analysis of the scientific activity published by scientific societies and journals, and by countries (6).

In general, bibliometric indicators measure productivity, quantity, quality and connections between authors, groups of authors, journals and publications. There are several types of indicators, which can be divided into those that analyse authors or journals (7). With respect to the valuation of authors some parameters are quantity of publications, number of citations, h-Index, hc-Index g-Index, i-10 (i-n) Index, etc. On the other hand, in order to evaluate the journals there is the impact, Eigenfactor, influence score of an article, the Rank SCImago, among others (7).

The impact factor consists of all the indexed citations of a magazine among the number of articles published by the same magazine in a certain period. By convention, the time measured is 2 or Five years. The usefulness of this last parameter is that it allows to measure the importance of a magazine and compare it with others in the same field. The h-Index is the least malleable, because it is a metric system which quantifies an author's publication and citation count, given a number that represents the quantity, quality and impact of academic publications (7).

The aim of our study is to describe the statistics, production indicators and bibliometrics of the CCR from its first issue in 1989 to the last issue in 2018. Without a doubt, a bibliometric analysis with the standards mentioned above would be a determining factor for the editors and future authors interested in publishing in the Revista since it would a guide to take into account with regard to the issues that can be addressed, what methodology used and the type of publication to have the greatest impact. .

2. Materials and Methods

All the issues of the Revista in the period between 1989 and 2018 were reviewed, both the physical issues in different libraries in Bogotá and the ACR, as well as the issues available in electronic format from 2011 on the RCR website. A database was created in the JabRef reference software with all the publications found. Each reference included variables such as title, authors, volume, number, year of publication, institutional affiliation of the first author, geographic location and type of publication.

The database created with the JabRef software was exported in a format readable by Microsoft Excel 2017, in which by means of a simple statistical analysis the bibliometric production indicators were analyzed. These include publications by number, year, author, institutional affiliation, geographic location, topic and type of publication. The tools found on the website www.vosviewer.com and at www.openheatmap. com were also used for the qualitative visual analysis of the production indicators. For the bibliometric indicators of visibility, the citations about the production of the Revista were searched in databases and search engines such as Medline, Scopus, ISI Web of Science, Google Scholar and Microsoft Academic.

3. Results

A total of 902 references between 1989 and 2018 were included in the analysis. No issue of the Revista was published during 1995. Number 3, volume 8 of 1997, numbers 3 and 4 of volume 13 of 2002, number 1 of volume 15 of 2004, number 4 of volume 18 of 2007 and number 3 of volume 20 of 2009, for a total of 6 issues of the Revista were not available in physical or digital version, which corresponds to a total of 49 references that could not included in the bibliometric analysis performed.
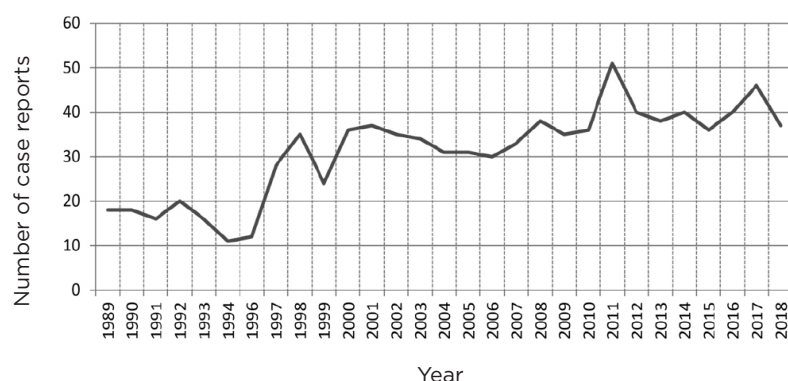

Figure 1. Distribution of publications by year.
Source: Own elaboration.

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The trend in documentary production shows an upward growth in annualized trend analyses, as shown in Figure 1.

The production analysis on the typology of references shows that the highest percentage of documents are oriented towards the presentation of cases (445), followed by review articles and originals with 25%, as shown in table 1.

With regard to the distribution of publications by year according to typology, Figure 2 shows how case presentations lead the trend, followed by original and review articles in most years.

The distribution of publications by area shows that body image is the most published topic, followed by neuroradiology, chest, pediatric and musculoskeletal radiology and that, among all these, they account for more than 50% of publications, as evidence table 2.

The publication sub-areas by keywords of the different references showed a network of co-occurrences illustrated in figure 3. The main authors of the references showed the following association clusters visualized in figure 4.

The distribution of production by city showed that the main city with 61% of production is Bogotá, followed by Medellín with 20%. Between these two cities, they account for 80% of the of the Magazine. Table 3 and Figure 5 show the distribution. The The Not Applicable box applies to editorials and editor's notes.
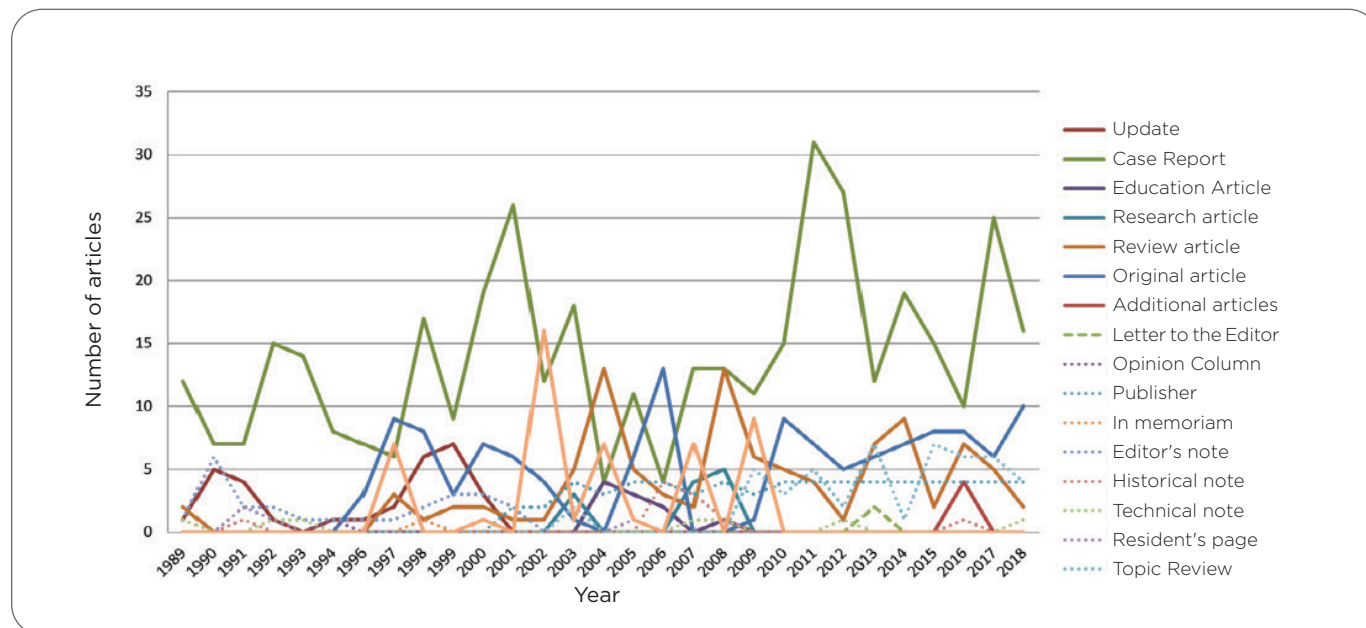

Figure 2. Distribution of publications by year according to type.
Source: Own elaboration.

Figure 3. Network of co-occurrences based on publication sub-areas. The colours represent the number of productions.
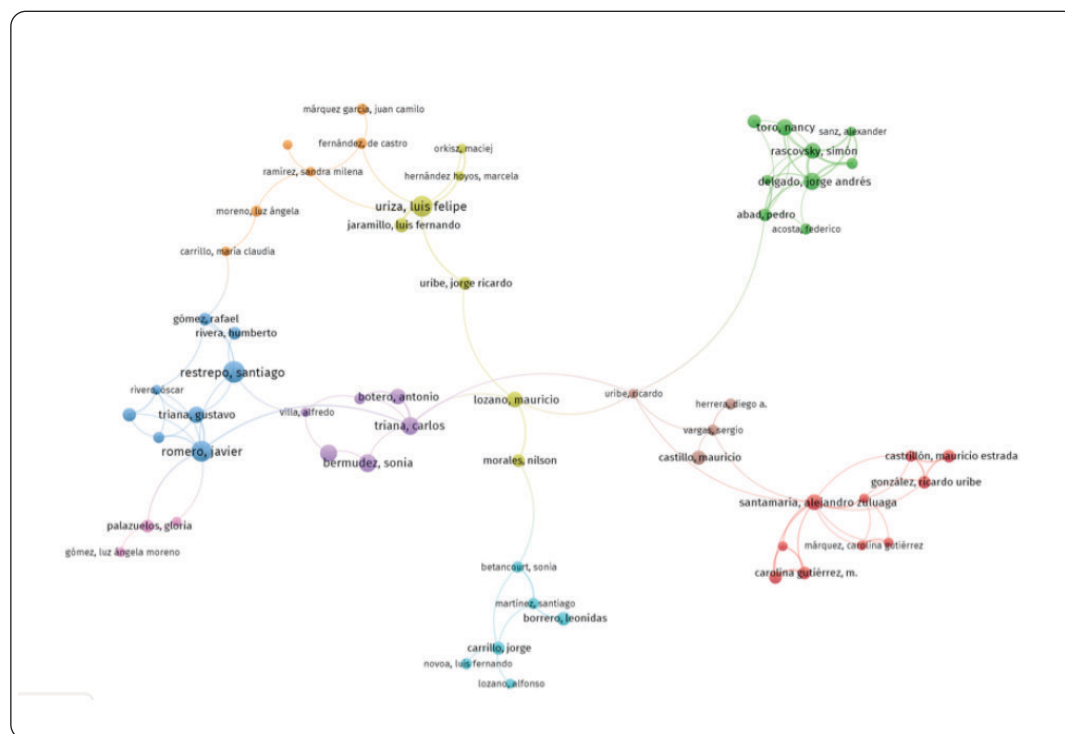Source: Own elaboration.

Figure 4. Co-authorship structure in production. Colours indicate the association cluster.
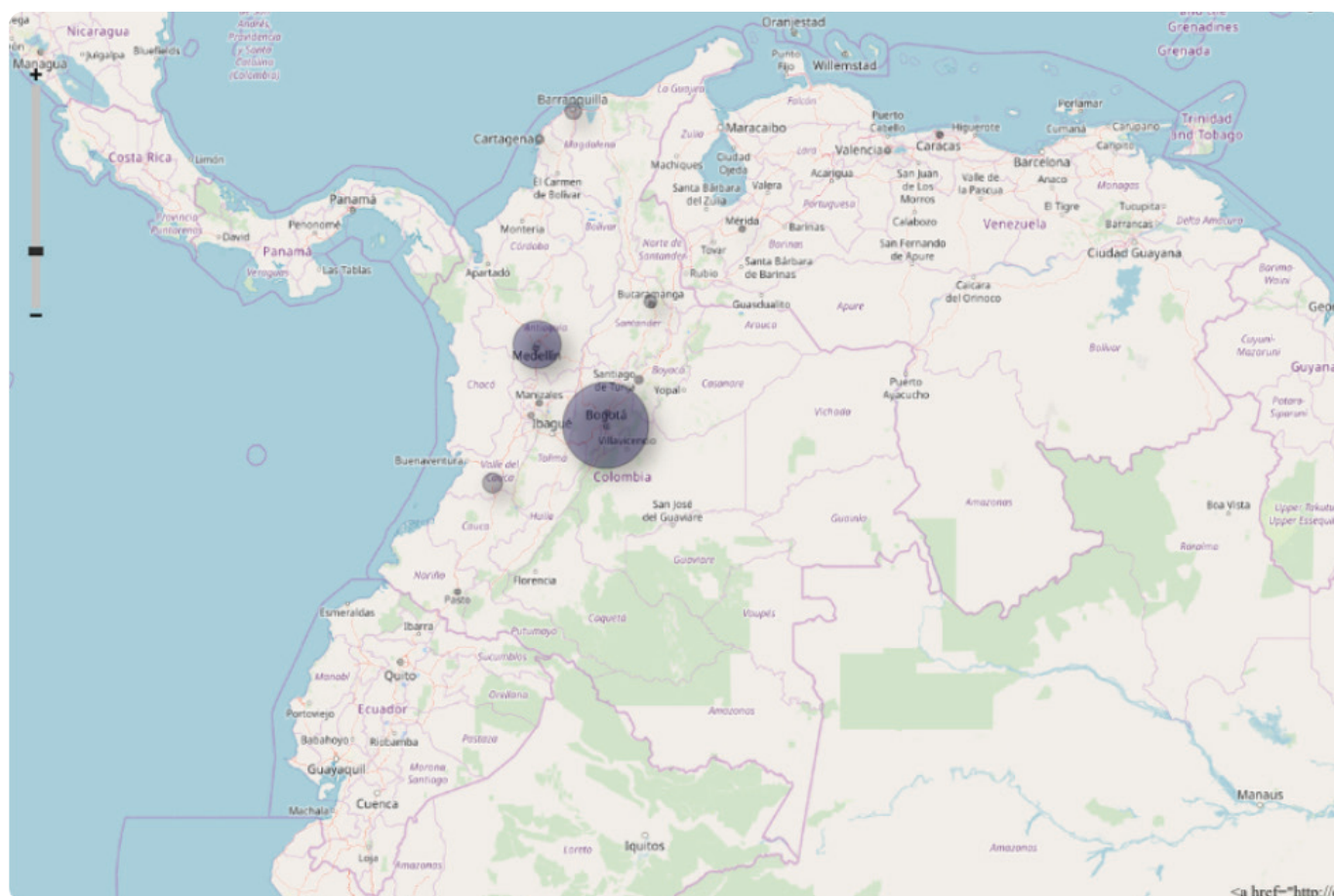Source: Own elaboration.

Figure 5. Production represented on the map of Colombia.
Source: Own elaboration.

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Table 1. Distribution of article types

Type	Number	Percentage (%)
Presentation of case	403	44,7
Original article	127	14,1
Revision article	101	11,2
Editorial	65	7,2
No data	49	5,4
Review of theme	48	5,3
Update	31	3,4
Editor's note	25	2,8
Historical note	12	1,3
Research article	12	1,3
Education article	10	1,1
Miscellaneous	7	0,8
Resident's page	4	0,4
Additional items	4	0,4
Letter to the Editor	2	0,2
In memoriam	1	0,1
Opinion column	1	0,1
Total	902	100

Tabla 2. Distribución de producción por áreas

Area	Number	Percentage (%)
Body image	198	23,1
Miscellaneous*	147	17,3
Neuroradiology	118	13,8
Chest radiology	78	9,1
Pediatric Radiology	72	8,4
Musculoskeletal	58	6,8
No data	49	5,4
Interventionism	46	5,4
Breast image	44	5,1
Head and Neck Radiology	31	3,6
OB/GYN Radiology	24	2,8
Vascular image	18	2,1
Neurointerventionism	12	1,4
Nuclear medicine	7	0,8
Total	902	100

*Refers to article types as editorials, editor's note, historical note, in memoriam, opinion column, letter to the editor, resident's page, additional items and miscellaneous.

Tabla 3. Producción por ciudad

City	Number	Percentage (%)
Bogotá	554	61,5
Medellín	170	18,8
No data	48	5,4
Cali	28	3,1
Barranquilla	20	2,2
Bucaramanga	11	1,2
Buenos Aires, Argentina	8	0,9
Cartagena	6	0,7
Tunja	6	0,7
Santiago, Chile	5	0,6
Caracas, Venezuela	4	0,4
Manizales	3	0,3
Houston, Texas, Estados Unidos	3	0,3
Chapel Hill, Carolina del Norte, Estados Unidos	3	0,3
Barcelona, Spain	2	0,2
Chía	2	0,2
Córdoba, Argentina	2	0,2
Havana, Cuba	2	0,2
México City, México	2	0,2
Segovia, Spain	2	0,2
Zaragoza, Spain	2	0,2
Alzira, Spain	1	0,1
Castellón, Spain	1	0,1
Cusco, Perú	1	0,1
Envigado	1	0,1
Floridablanca	1	0,1
La Rioja, Spain	1	0,1
Lima, Perú	1	0,1
Merida, Venezuela	1	0,1
Montreal, Canadá	1	0,1
New Orleans, Louisiana, Estados Unidos	1	0,1
Pasto	1	0,1
Pereira	1	0,1
Filadelfia, Pennsylvania, Estados Unidos	1	0,1
St. Louis, Missouri, Estados Unidos	1	0,1
Tegucigalpa, Honduras	1	0,1
Valencia, Spain	1	0,1
Valencia, Venezuela	1	0,1
Total	902	100 %

The institutions with the most publications were the Hospital Universitario San Ignacio in association with the Pontifica Universidad Javeriana (11 %), followed by the Fundación Santa Fe de Bogotá in association with the Universidad del Bosque (10 %) and then the Hospital Universitario San Vicente de Paul in association with the Universidad de Antioquia (8 %). Table 4 below shows this data.

Tabla 4. Producción por institución

Institution	#	%
Hospital Universitario San Ignacio	97	10,8
Fundación Santa Fe de Bogotá	91	10,1
Universidad de Antioquia	38	4,2
Hospital Universitario San Vicente de Paul	37	4,1
Hospital de San José	31	3,4
Universidad CES	30	3,3
Instituto Nacional de Cancerología	25	2,8
Instituto de Alta Tecnología Médica de Antioquia	24	2,7
Universidad Nacional de Colombia	23	2,5
Hospital Pablo Tobón Uribe	20	2,2
Hospital Militar Central	19	2,1
Fundación Cardioinfantil	19	2,1
Fundación Valle del Lilí	17	1,9
Hospital Universitario de la Samaritana	16	1,8
Clínica Universitaria Colombia	15	1,7
Centro Avanzado de Diagnóstico Médico (Cedimed)	14	1,6
Fundación Hospital de La Misericordia	14	1,6
Clínica Reina Sofía	11	1,2
Universidad del Norte	10	1,1
Hospital San Juan de Dios	9	1,0
Clínica de Marly	9	1,0
Clínica del Country	9	1,0
Instituto de Ciencias de la Salud (CES)	7	0,8
Clínica Infantil Colsubsidio	7	0,8
Hospital Universitario del Valle	6	0,7
Hospital Universitario Mayor Méderi	6	0,7
Instituto Neurológico de Colombia	6	0,7
Universidad Pedagógica y Tecnológica de Colombia	6	0,7
Universidad de Cartagena	5	0,6
Centro de diagnóstico ultrasonográfico e imágenes (Cediul)	5	0,6
Universidad de la Sabana	4	0,4
Clínica del Niño Jorge Bejarano	4	0,4
Centro de Diagnóstico Uribe Uribe	4	0,4
Clínica Carlos Ardila Lulle	4	0,4
Idime	4	0,4
Clínica Colsanitas	3	0,3
Clínica Las Américas	3	0,3
Clínica Palermo	3	0,3
Clínica Foscal	3	0,3
Fundación Universitaria Sanitas	3	0,3
Hospital Central de la Policía Nacional	3	0,3

Institution	#	%
Instituto Materno-Infantil	3	0,3
Universidad Autónoma de Bucaramanga (UNAB)	3	0,3
Universidad de los Andes	3	0,3
Pontificia Universidad Católica de Chile	3	0,3
University of North Carolina (UNC)	3	0,3
Clínica Cardiovascular Santamaría	2	0,2
Clínica Santa Bibiana	2	0,2
Clínica Shaio	2	0,2
Instituciones con 2 publicaciones	10	2,2
Instituciones con 1 publicación	59	6,5
No aplica	89	9,9
Sin datos	49	5,4
Total	902	100 %

4. Discussion

An analysis of the global trend in the number of publications shows a progressive increase in the number of publications, from the first to the current volume, as has occurred in other journals (7, 8) and in most fields of medical research (9-11).

This study shows that historically the presentation of cases is the most frequent type of publication in the CCR. When compared with journals with high visibility in the scientific community and in publications in other developing countries, it is found that the main type of publication is the original research article, as is the case in the New England Journal of Medicine and in journals such as the Journal of Infection and Public Health (7, 8). Despite the fact that original articles are often the second type of publication in the CCR, they represent 14% of the sample evaluated. This result is of great importance taking into account that among the requirements in the main international and national databases one of the factors with the greatest weight corresponds to the number of original articles published. It can be highlighted that in the period 2000 to 2008 review articles and original articles for some years exceeded the number of case presentations published per volume, but subsequently their trend was oscillating. The RCR should stimulate more original research article type publications which could improve its impact factor and be included in databases such as Medline or Scopus.

In terms of the subspecialty field of study, body imaging, neuroradiology and chest radiology were the areas with the highest scientific production, a result similar to that obtained in a bibliometric study in Radiology and in the American Journal of Roentgenology (12). However, in contrast to this study, pediatric radiology articles had greater weight in CCR and interventionist articles are more numerous in the North American publications (13).

Taking into account the key words used in the different articles, the term human beings stands out. Similarly, diagnostic imaging modalities such as magnetic resonance, ultrasonography and computerized tomography were frequently used as key words.

This research allowed us to recognize the leading authors in our country, to evaluate the leading research groups and their co-authorship network. This factor is important because it influences the potential

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● ● ●   Original article

number of citations that articles published in the Revista receive (14, 15), since it is known that the greater the number of authors and institutions that participate in the publication, the greater the impact they have on the scientific community (11).

Bogota and Medellin contributed approximately 80% of the bibliographic production, this is mainly due to the fact that they have the largest number of radiology residency programs in the country, where institutions such as the San Ignacio University Hospital, the Santa Fe de Bogota Foundation and the San Vicente de Paul University Hospital stand out. When evaluating the contribution by authors and international institutions, the plurality of the geographical affiliations of the authors stands out, with publications coming from the United States, Spain, Mexico and diverse countries of South America.

The main limitation of the study is the absence of indexing of the Revista in the main databases of the world, such as Medline, Scopus, ISI Web of Science, Scielo or a unique identifier of the references, which prevents an adequate bibliometric revision, mainly of the visibility indicators as the impact factor of the Revista, the Eigenfactor and for the authors the count of citations, count of publications and the h-index among others.

Among the limitations of this study is the lack of information on specific numbers and volumes described above, because they could not be retrieved in electronic or physical form.

Similarly, during the evolution of the RCR in recent years, there has been no unanimity in the different categories of publication, which in some cases limits the classification of an article in terms of its design and methodology.

Difficulties were also found in the variety of institutional affiliations of the different authors of the Revista, since in certain references they appear with a health institution and in others with the university with which they are related. However, several of these health institutions have historically been related to a certain university, as is the case of the San Ignacio University Hospital and the Pontifical Javeriana University or the San Vicente de Paul University Hospital and the University of Antioquia, which made it possible to make certain groupings for the analysis.

Another limitation of this research is that for several years MeSH terms were not used in the articles, which led to a wide variety of assigned keywords.

5. Conclusions

The RCR has been the main means of disseminating scientific production and advances in the area of radiology in Colombia, with a progressive increase in the number of articles published. The main categories of publication have been case presentation, original articles and topic reviews. The topics in body image, neuroradiology and chest radiology stand out, with largest number of publications from Bogota and Medellin. This bibliometric analysis may serve as an input for decision making regarding the future of the Revista Colombiana de Radiologia.

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