

Bibliometric Characterization Of The Scientific Community Specialized In The Study Of

Alopecia Areata

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ABSTRACT

Knowledge domains are closely related to the communities that are integrated for their configuration and development. Bibliometrics constitutes one of the most objective ways to analyze and characterize these communities. The present study characterized, through a bibliometric perspective, the behavior of the scientific community specialized in alopecia areata during the period 2001-2014. The Web of Science was used as a source of information. A battery of bibliometric indicators was used to determine the productivity, influence and performance of the authors, as well as to characterize their most relevant research. The annual productivity was determined, which showed during the period an exponential growth of scientific production on Alopecia Areata. The 15 most productive journals were identified, which generated around 50% of the total volume of articles. The core of the most visible authors of the domain was identified. The usefulness of the H index was demonstrated not only as an indicator to determine scientific performance, but also as a measure to identify leadership in domains of scientific knowledge, especially in the field of Medical Sciences Keywords **INTRODUCTION**

The various domains or fields of knowledge are directly related to the set of social actors that are integrated for their configuration and development, which make up communities of thought or discursive communities based on the social division of



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labor in society. The members of these communities share common interests and cognitive styles, and present certain patterns of behavior that are manifested in the content of educational programs, the priorities of research programs, forms of communication, the selection of vehicles for disseminating information. knowledge and editorial objectives of scientific journals; all of which makes them responsible in the constructive, reconstructive and identity process of their domain.1-3 One of the most objective ways to analyze these communities is through Bibliometrics, which is defined as an informational subdiscipline, of a marked instrumental and methodological nature, that quantitatively studies the models of science communication, and the processes of production, storage, dissemination. recovery and use of registered scientific information.^{4,5} Consequently, bibliometric studies are capable of showing and describing trends in different areas of knowledge, although their limitation lies in interpretation, which can be minimized when there is in-depth knowledge of the domain.¹ Hence the importance of multidisciplinary participation in these studies. In the particular case of Dermatology as a medical specialty, this has been addressed with some regularity from a bibliometric perspective in the last decade, fundamentally limited to certain geographical areas and specific serial publications.⁶⁻¹⁵ However, the analysis of one of its specific entities, such as alopecia areata, has not been identified in the scientific production published in the preceding five years.

Alopecia areata is a common, non-scarring dermatological disease, usually distinguished by plaques with no hair and well-defined borders on the scalp, or any hairy area of the body. It manifests itself in severe forms that include alopecia totalis (loss of hair on the scalp) and alopecia universalis (total loss of hair on the



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scalp and the rest of the hairy areas of the body). ¹⁶ It affects almost 0.1% of the general population. ¹⁷ Its etiology is still unknown. ^{16,18} However, genetic factors, ¹⁹ autoimmune conditions ²⁰ and environmental factors ²¹ are hypothesized to play an important role. In fact, alopecia areata could be a psychosomatic illness precipitated by stressful events. ²²

From a therapeutic point of view, multiple variants have been developed throughout history to treat alopecia areata. The use of corticosteroids has been effective in mild cases; However, the clinical management of more severe forms is very complex and difficult. Recent studies suggest that intervention (*of the JAK pathway*) can potentially be an effective treatment. ¹⁶ The truth is that the uncertainties associated with its study have turned it into a biologically and clinically fascinating disease, around which multiple controversies have been generated among dermatologists, biologists and immunologists around the world. ²³

Precisely, a group of researchers has gathered around this dermatological entity during the 21st century who generate, validate, update and disseminate knowledge through publications and scientific events. However, there are no previous descriptive studies that analyze the most influential scientific production that they have been able to generate, nor have the actors who exercise the greatest leadership over this particular community been identified, aspects that can be successfully addressed from a bibliometric approach. Therefore, the general objective of this article is to characterize, through the bibliometric perspective, the behavior of the scientific community specialized in research on Alopecia Areata during the period 2001-2014, and to identify the most relevant authors of the domain from of bibliometric indicators of productivity, influence and performance.



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METHODS

The primary source of information used in this bibliometric research is the Web of Science (WoS), an Internet portal that integrates the databases developed by the Thomson Reuters consortium. In particular, its citation indexes were used to recover the records, which constitute the world's leading sources of academic information since their creation by Eugene Garfield in the 1960s. These indices, which comprise more than 10,000 serial publications of maximum international visibility and concentrate the most influential scientific production on the world scientific community, allow the bibliometric characterization of scientific and academic literature using techniques and indicators based on citation analysis, which justified its choice over Medline, the main source of information for the international biomedical community. The search strategy was used to identify the entity "alopecia areata" in the title, abstract and keywords of all records included in the WoS citation indexes. The search was carried out at the end of October 2015, and limited the period between 2001 2014. was to and

The articles recovered from WoS were exported to the bibliographic reference manager EndNote, also developed by the Thomson Reuters consortium, where they were the normalization of the "Author" and "Author Address" fields. The normalization process allowed the identification of the affiliation of the leading authors in research on alopecia areata, and facilitated the calculation of the bibliometric indicators used, as well as corroborating the thematic areas where the leading authors are most active and influential. Likewise, it offered the possibility of determining the levels of annual productivity and its evolution during the period,



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and identifying the journals that publish the largest volumes of articles related to this disease.

Citation analysis was applied as a bibliometric technique, based on the premise that the citation count can be considered an impact indicator, since articles that attract a large number of citations suggest a particular influence on the development of science. ²⁴ To identify and characterize the most relevant authors in the domain, a battery of bibliometric indicators was used, presented and defined in the <u>table</u>, which cover three categories of analysis: productivity, influence and performance.



Cuadro. Batería de indicadores para la caracterización de los autores más relevantes de la investigación científica mundial sobre alopecia areata 2001-2014

Categoría	Indicador	Definición
Productividad	Artículos publicados durante el período (A)	Cantidad de artículos publicados por un autor durante el período 2001-2014
	Media de artículos publicados por año (A/año)	Promedio anual de artículos publicados por un autor durante el período 2001-2014
Influencia	Citas recibidas durante el período (C)	Cantidad de veces que han sido citados los artículos publicados por un autor durante el período 2001-2014
	Media de citas recibidas por año (C/año)	Promedio anual de citas recibidas por un autor durante el período 2001-2014
Rendimiento	Índice H (i-H)	Medida de rendimiento que expresa la capacidad de un autor para generar artículos de alta visibilidad o impacto. En el presente estudio, consiste para cada autor en el resultado del cálculo de la cantidad H de artículos que durante el período 2001-2014 han recibido una cantidad igual o superior (nunca inferior) a H citas. Básicamente, H es el número aplicado a un autor que tiene H trabajos citados al menos H veces ²⁵
	Índice R (i-R)	Medida de rendimiento que expresa el nivel de visibilidad que tienen los artículos más influyentes de un autor. En el presente estudio, consiste para cada autor en el cálculo de la Raíz Cuadrada del total de citas recibidas por los artículos que constituyen el núcleo o base de cálculo del índice H de dicho autor. Es empleado generalmente para comparar el nivel de influencia en autores con igual índice H ²⁶



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The incorporation of the "performance" category was based on the novel characteristics of the Hirsch index or H index, which is capable of combining in a single indicator the productivity of the researcher with his influence, measured from the citations he has received. ²⁵ Performance implies the researcher's ability to systematically generate scientific production with contributions substantial enough to influence the scientific community to which it is directed.

Even if we are very productive, if there are no significant contributions in the work, or if the influence is due to only one of the articles published by the researcher, the H index will not grow. On the other hand, if the new knowledge that is revealed in each published report manages to influence the rest of your colleagues, then you will experience progress. Hence its frequent use in research evaluation exercises and its use in the present study. The R index, derived from the calculation of the H index, was included in the "performance" category based on its use as a complementary indicator, for the comparative analysis of authors with the same H index. ²⁶

RESULTS

During the period analyzed, a total of 1,747 research articles related to the study of alopecia areata were retrieved in the WoS. The period showed exponential growth in annual productivity (R 2 > 0.8), with production peaks in the years 2003, 2006, 2010 and 2013 (Fig.).

A total of 383 serial publications were responsible for disseminating research results related to alopecia areata, of which only 15 (4% of the total) showed a productivity of more than 20 articles during the period (<u>table 1</u>). These 15 most productive journals published 51.8% of the global research on the disease; They



are included in the thematic category of the WoS that covers the domain of Dermatology, and were published by publishers from the United Kingdom, the United States, Switzerland, France, Sweden and India.

The 1,747 articles were generated by 4,839 authors, which showed an associativity index close to five authors per article (4.7). Of them, a total of 44 (0.72%) achieved a productivity of more than one article per year during the period analyzed, 8 received more than 500 citations (more than 35 citations received per year on average) and 4 authors showed a H greater than the number of years included in the study (<u>table 2</u>). A total of 8 authors (<u>table 2</u>) coincide among the top 12 according to each of the calculated productivity, influence and performance indicators. This is given by the high degree of relationship observed between the indicators used in the present study to characterize the most productive authors (<u>annex</u>). In this way, the majority of the most productive authors are not only those who receive the most citations, but also reach their high citation levels from the knowledge they disclose in 10 or more articles. Therefore, the correspondence between the indicators facilitates the identification of these 8 authors as the most relevant in the domain.

Leading this list is Canadian researcher *Kevin J. McElwee*, from the Department of Dermatology and Skin Sciences at the University of British Columbia, with 68 articles published, 835 citations received and 17 articles with 17 or more citations during the period; and the German researcher *Ralf Paus*, who carried out his research at the Department of Dermatology of the Eppendorf Hospital of the University of Hamburg, the Medical University of Lubeck and more recently, at the University of Manchester, and who is the most cited author of the period (1,367 citations received, 19 articles with 19 or more citations).



Just over 67% of the retrieved articles (1,175 articles) received at least one citation during the period, and compiled a total of 15,640 citations, for an average of 8.95 citations received per article. These citation levels justify the presence of few authors with high scientific performance (H> 14) according to the H index (table 2). The Americans John P. Sundberg, Madeleine Duvic and Vera Price; the Germans Pia Freyschmidt-Paul, Rolf Hoffmann and Margot Zoeller; The Israeli Amos Gilhar, the Canadian Jerry Shapiro and the Italian Antonella Tosti make up, along with Paus and McElwee, the core of authors with the greatest leadership in the domain.

DISCUSSION

Alopecia areata is the most prevalent autoimmune disorder worldwide, and the second most prevalent hair loss disease after androgenic alopecia.²⁷ Depending on its extent, it can significantly affect patients' quality of life, and can be psychologically devastating. To analyze for the first time, from a bibliometric perspective, the most influential scientific production worldwide generated by the scientific community specialized in the study of this complex disease, and to identify the authors who have set the course of the main research during the present 21st century. , constitute without a doubt the main contributions of this research.

The application of bibliometric indicators has allowed the identification of a group of researchers essential in the study of the disease. *Kevin J. McElwee*, *John P. Sundberg*, *Rolf Hoffmann*, *Pia Freyschmidt-Paul* and *Margot Zoeller* led a group of highly cited experimental research during the first five years of the 21st century with the aim of explaining the mechanisms of disease development. These



multinational works allowed us to suggest the role of CD8(+) cells as primaryinstigatorsofthehairlossphenotype.

For their part, *Ralf Paus* and *Amos Gilhar* have developed important bibliographic reviews during the last years of the period, and have led, together with German and Japanese authors, crucial research aimed at describing new hypotheses about how the immune privilege of the hair follicle can collapse when exposed to to psychosocial stress, which has allowed them to build hypothetical scenarios of initiation, progression and culmination of alopecia areata lesions.

The study of familial alopecia areata and its association with genetic factors has been the most influential topic developed in North American research, by authors such as *Madeleine Duvic*, *Vera Price* and *María K. Hordinsky*. The most cited work of this group of authors, published in 2010 by the journal Nature and which constitutes the most influential research on alopecia areata of the period (more than 150 citations in just five years), established the genetic bases of the disease based on the identification of eight regions and 18 genes significantly associated with its development. ²⁸ *Duvic* has also participated in multiple clinical trials aimed at evaluating the therapeutic effects of Bexarotene 1% topical gel on alopecia areata lesions.

Jerry Shapiro and a group of Canadian researchers have been leaders in the development of literature reviews and therapeutic guidelines for the management of the disease. *Shapiro* has also collaborated with the *National Alopecia Areata Foundation* (NAAF) of the United States in preparing clinical practice guidelines for the development of controlled clinical trials. For its part, the role of early diagnosis and the therapeutic effects of biological agents or steroids, such as



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clobetazole in the treatment of alopecia areata, have been the aspects addressed by the most cited articles by a group of Italian researchers headed by *Antonella Tosti*. As stated in the literature and observed in the present study, the H indices of the authors in the sample are affected by the number of articles published, and by the accumulation of a large number of citations. ^{25,29,30} In fact, its behavior could be associated with the size of the community specialized in Dermatology, whose number of articles increased year by year in general, ^{8,14} which is confirmed particularly in the case of alopecia. areata. It is also related to the number of journals that the field generates and that more articles publish on the disease, which have maintained a similar behavior compared to previous years within the speciality, ⁷ to which we would add the size of the audiences of these specialized publications. ³¹

The results of the study also respond to the selection of the analysis period and the data source, since as has been stated in previous research, the use of various databases can yield different numbers of citations and, therefore, differ the calculation of the H and R indices for each of the individuals to be analyzed. ^{32,33} In this sense, the greater the coverage of source journals by the database, the greater the coverage of citations must be and, therefore, the greater the value of the indicators derived from them.

Therefore, the authors identified in this study as the core of the most visible authors in the domain could potentially exhibit higher rates of productivity, influence and performance if the Scopus or Google Scholar databases, with greater reach, are used as a source of information. documentary and even with greater coverage of biomedical literature, which currently constitutes a line of research derived from the present study. However, the fact of being the most visible in the



journals that have formed the so-called "mainstream" *of* science, makes these authors the most relevant researchers in the study of alopecia areata worldwide.

Undoubtedly, in the specific case of the H-Index we are dealing with an objective and easy-to-calculate indicator, which is being increasingly used in research evaluation processes in the Medical Sciences environment, ²⁸ and which allows clarity evaluate the relevance and significance of an individual author's scientific contributions to his or her community. ^{31,34} If we add to this its applicability at various levels of aggregation, it becomes evident that its use as a performance measure allows for the simple comparison and measurement of scientific progress in any domain of knowledge.

CONCLUSIONS

Scientific production specialized in alopecia areata experienced, during the first 14 years of the 21st century, sustained growth in annual productivity levels. This behavior allowed us to consider the scientific community dedicated to the study of this disease as a community in full development, which generates, validates, updates and disseminates knowledge in a broad set of journals specialized in biomedicine, although it concentrates the main research in the most important journals. of the area of Dermatology.

The use of bibliometric indicators, especially the use of measures to determine the productivity, influence and performance of authors specialized in the study of the disease, allows the identification and thematic characterization of the most relevant authors in the domain. In this sense, the usefulness of the H index is demonstrated not only as an indicator to determine scientific performance, but also as a measure to identify leadership in domains of scientific knowledge, which justifies its



increasingly frequent use in evaluation exercises. research in the field of Medical Sciences.

Authors' contribution

All authors contributed to the conception and design of the study, data analysis, and final writing.

Conflict of interests

The autors declare that does not exist an interest conflict.

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