Analysis of citations and national and international impact factor of Farmacia Hospitalaria (2001-2005)


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Resumen

Objetivo: El objetivo de este trabajo es analizar los flujos de citas y los indicadores de impacto y de inmediatez de la revista Farmacia Hospitalaria durante el período 2001-2005.

Método: Aplicando una metodología similar a la que emplea ISI Thomson en Science Citation Index (SCI) y Journal Citation Reports (JCR), se realizó una análisis de citas de una selección de 101 revistas españolas en ciencias de la salud y se determinaron las revisiones citatoras y citadas y los indicadores de inmediatez e impacto nacionales e internacionales.

Resultados: Farmacia Hospitalaria realizó 1.370 citas a 316 revistas diferentes. El porcentaje de autocitas fue del 9%. El factor de impacto nacional pasó de 0,178 puntos en 2001 a 0,663 en 2005 y el factor de impacto internacional de 0,178 a 0,806 en el mismo período.

Conclusiones: El análisis de los flujos de citas pone de manifiesto el carácter multidisciplinar de Farmacia Hospitalaria y un crecimiento significativo de los indicadores de impacto en los últimos años. Estos indicadores son superiores a los de algunas revistas del área incluidas en Journal Citation Reports. La autocitación ha sido moderada y similar a la de otras revistas.

Palabras clave: Análisis de citas. Factor de impacto. Farmacia Hospitalaria.

Summary

Objective: The objective of this study is to analyse the citation patterns and impact and immediacy indicators of the Farmacia Hospitalaria journal during the period 2001-2005.

Method: An analysis of citations chosen from 101 Spanish health science journals was carried out in order to determine the citing and cited journals and the national and international impact and immediacy indicators. A similar methodology used by Thomson ISI in Science Citation Index (SCI) and Journal Citation Reports (JRC) was applied.

Results: Farmacia Hospitalaria made 1,370 citations to 316 different journals. The percentage of self-citations was 9%. The national impact factor increased from 0.178 points in 2001 to 0.663 points in 2005 while the international impact factor increased from 0.178 to 0.806 for the same period.

Conclusions: The analysis of citation patterns demonstrates the multidisciplinary nature of Farmacia Hospitalaria and a significant growth in the impact indicators over recent years. These indicators are higher than those of some other pharmacy journals included in Journal Citation Reports. Self-citation was not excessive and was similar to that of other journals.

Key words: Citation analysis. Impact factor. Farmacia Hospitalaria journal.

INTRODUCTION

The Farmacia Hospitalaria journal was established in 1977 by the Board of Directors of the Spanish Society of Hospital Pharmacists (SEFH). Since that time, it has constantly continued to publish quality works, and at present it is included in the main bibliographical information systems, which ensures the diffusion of its contents among health professionals all over the world (for example, the Spanish database IME –Spanish


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Medical Index– included 623 articles in 2007 and the American Journal Medline included 297 articles).

In order to measure the quality of scientific journals, parameters are often used which assess both the presentation and bibliometric indicators, including the circulation of the journal on national and international databases, its continuation, the number of times it is cited and the impact factor (IF)\(^1\). However, an assessment of the intrinsic quality of the studies published in this area can only be carried out by experts through peer review.

The use of the IF as a quality index for journals is based on the idea that a journal becomes more important for its final users depending on the number of times it is cited. In this way, citation is a form of giving quality votes to this journal\(^1\). The disadvantage is that the IF is calculated from the Science Citation Index (SCI) database, which favours the inclusion of journals published in English over journals from non-English speaking countries such as Spain\(^2\), and these are not included as often. Therefore, studies have been promoted which analyse citation features and the impact of Spanish journals not included in the SCI in order to obtain additional bibliometric indicators.

As a result, the factor de impacto potencial de las revistas médicas españolas (potential impact factor of Spanish medical journals) study was carried out by the López Piñero Institute of Science History and Documentation of Valencia (http://ime.uv.es/imecitas/impacto_ime.asp). This study analyses the citations from 103 journals which cover all health specialties and which determines four basic indicators: the national IF and immediacy index and the international IF and immediacy index\(^4,5\) of Spanish journals.

The objective of this study is to analyse the citation patterns and impact and immediacy indicators of the Farmacia Hospitalaria journal during the period 2001-2005, using the data from the abovementioned study.

**METHOD**

**Selection of source journals**

87 journals were initially selected for the study. These fulfilled the criteria to be included in the IME database and also fulfilled the criteria for some of the following international databases: Medline, EMBASE, SCI or BIOSIS. These criteria were used since inclusion in international databases is considered a reliable quality indicator due to the fact that all of these journals establish strict qualitative standards which journals must fulfil for their inclusion. Medline, EMBASE, SCI and BIOSIS are considered the most important databases in health and life sciences\(^6,7\), while the IME has broad coverage, currently including more than 200 Spanish journals\(^8\). The initial number of 87 journals increased to 103 in subsequent editions of the study, since additional journals with 10 or more citations were included.

**Citation analysis**

From the journals not included in the JCR, the citable articles published in the year of analysis (originals, revisions and clinical notes) were selected, identifying the bibliographical references for this year and the two previous years (for example, references from 2003, 2004 and 2005 were included in the citable articles of 2005). Using the journals included in the JCR, a search was made of SCI for citations taken from Spanish journals. The search option Cited Ref Search was entered in the Institute for Scientific Information (ISI-Thomson) Web of Science platform, using the fields cited work and cited year. The abbreviations of the Spanish journals were included in the cited work field, and the current year and two previous years were entered in the cited year field (for example, for 2005, the search was as follows: 2005 OR 2004 OR 2003). All of the references, together with the data about the number of citations received and articles published, were entered in a database using the Microsoft Access 2000 programme.

**Calculation of indicators**

The national impact factor (NIF) was measured by means of the ratio between citations taken from Farmacia Hospitalaria in the two years prior to the year of analysis of the reference Spanish journals, and the citable articles in Farmacia Hospitalaria for the same two years. The national immediacy index (NII) was measured by means of the ratio between the citations taken from Farmacia Hospitalaria in the year of analysis and the articles published during the same year. The international impact factor (IIF) was obtained as follows: the numerator was made up of the citations taken from Farmacia Hospitalaria over the two years prior to the year of analysis of the source Spanish and foreign journals of the SCI. The denominator was made up of the citable articles in Farmacia Hospitalaria over these two years. The international immediacy index (III) was calculated as follows: the numerator was made up of the citations taken from Farmacia Hospitalaria in the year of analysis of the source Spanish and foreign journals of the SCI. The denominator was made up of the citable articles in Farmacia Hospitalaria in the year of calculation.

**RESULTS**

Farmacia Hospitalaria made 1,343 citations to 316 different journals during the five-year period (2001-2005).
Table I shows their distribution according to the number of citations. The 25 journals which received 10 or more citations represent half of the overall citations (46.8%), while the other 291 journals represented 53.2% of the citations. The source journal received the most citations (n = 121), followed by the American Journal of Health-System Pharmacy (n = 47), AIDS and Clinical Infectious Diseases, both with 42 citations. There was wide distribution in the journals cited, with 198 journals receiving one or two citations which only made up 22.2% of all of the citations. 9% of Farmacia Hospitalaria citations were self-citations.

Table II shows the 33 journals which have cited Farmacia Hospitalaria on two or more occasions. These include both Spanish (n = 17) and international journals (n = 16) in the SCI. If we exclude the actual journal itself, Farmacia Hospitalaria received the most citations from Atención Farmacéutica (51 citations), a significantly higher number of citations than from other citing journals. Other journals which included 5 or more citations were Medicina Clínica (n = 35), Medicina Clínica, Enfermedades Infecciosas y Microbiología Clínica (n = 22), Nephrologie (n = 3), and the American Journal of Health-System Pharmacy (n = 10)

Table I. Journals cited in Farmacia Hospitalaria (2001-2005)

<table>
<thead>
<tr>
<th>Journals cited</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>Total</th>
</tr>
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<td>108</td>
<td>106</td>
<td>103</td>
<td>102</td>
<td>755</td>
</tr>
<tr>
<td>American Journal of Health-System Pharmacy</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
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<td>1</td>
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<td>1</td>
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<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>4</td>
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<tr>
<td>Medicina Clínica</td>
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<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Annals of Pharmacotherapy</td>
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<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>4</td>
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<tr>
<td>Journal of Clinical Oncology</td>
<td>1</td>
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<td>1</td>
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<td>1</td>
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<tr>
<td>Lancet</td>
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<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>20</td>
</tr>
</tbody>
</table>

*Only the “useful” citations were included in order to determine the immediacy and impact indicators; i.e.: those corresponding to the current year and the two previous years (for example, 2003, 2004 and 2005 were included in the 2005 analysis).
**Table II. Journals which cited Farmacia Hospitalaria (2001-2005)**

<table>
<thead>
<tr>
<th>Journals cited</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>Total</th>
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<td>5</td>
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<td>20</td>
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<td>12</td>
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<td>3</td>
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<td>0</td>
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<td>0</td>
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<tr>
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<td>0</td>
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<tr>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
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<tr>
<td>Enfermedades Infecciosas y Microbiología Clínica</td>
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<td>0</td>
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<td>0</td>
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<tr>
<td>Annals of Pharmacotherapy (EU)</td>
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<td>0</td>
</tr>
<tr>
<td>Archivos de la Sociedad Española de Oftalmología</td>
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<td>0</td>
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<td>0</td>
</tr>
<tr>
<td>Ciencia y Tecnología Farmacéutica</td>
<td>0</td>
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<td>0</td>
<td>0</td>
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<td>0</td>
</tr>
<tr>
<td>Revista de Neurología</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>18 journals with 1 citation</td>
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<td>1</td>
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<td>0</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
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<td>12</td>
<td>1</td>
<td>26</td>
<td>18</td>
<td>2</td>
<td>12</td>
<td>11</td>
</tr>
</tbody>
</table>

*Only the “useful” citations were included in order to determine the immediacy and impact indicators; i.e.: those corresponding to the current year and the two previous years (for example, 2003, 2004 and 2005 were included in the 2005 analysis).

Farmacia Hospitalaria obtained a NIF which displayed the highest values in 2001 with 0.178 points and 2005 with 0.663 (Fig. 1). This indicator has shown a progressive trend, with a slight decrease in 2003. The total NIF for the five-year period was 2.117 with an average of 0.423, and only the Revista Española de Quimioterapia had a higher index factor (average NIF = 0.433). The NIF of Farmacia Hospitalaria has exceeded that of the Revista Española de Quimioterapia, Atención Farmacéutica, Ciencia y Tecnología Farmacéutica and Revista de Toxicología over the last 4 years. The average NII was 0.060 (Table III).

The evolution of the IIF of Farmacia Hospitalaria can be seen in figure 2, which shows that the value of this indicator exceeds that of other reference journals over recent years. The accumulated IIF was 2.411, which implies an average value of 0.482, exceeding the IIF value in other reference journals with the exception of the Revista Española de Quimioterapia. The average III was 0.065 (Table III).

**DISCUSSION**

The analysis of the distribution of citations between the citing and cited journals allows us to obtain an overview of
the citation patterns and the links between the journals. These patterns display the multidisciplinary nature of Farmacia Hospitalaria, since it cites pharmacy journals (Farmacia Hospitalaria, American Journal of Health-System Pharmacy, Annals of Pharmacotherapy, Drugs and Atención Farmacéutica), and also cites a large number of journals which cover other areas of medicine, including infectious diseases (AIDS, Clinical Infectious Diseases, Enfermedades Infecciosas y Microbiología Clínica, Journal of Acquired Immune Deficiency Syndromes and Human Retrovirology), general and internal medicine (Medicina Clínica, Lancet, New England Journal of Medicine, British Medical Journal, Archives of Internal Medicine and Annals of Internal Medicine) and oncology (Journal of Clinical Oncology, Proceedings of the American Society for Clinical Oncology).

Although half of the citing journals of Farmacia Hospitalaria are foreign (16 of 33), it is mainly the Spanish journals which cite it the most often. This is in accordance with the national character of the journal and its greater distribution in Spain. A large part of these journals (n = 19) have an impact factor in JCR, which indicates that the journal has a certain visibility and significance among foreign researchers, even though it is not included in the SCI.

The NIF of Farmacia Hospitalaria has experienced significant growth over recent years, increasing 0.485 points from 2001 to 2005. Furthermore, it has exceeded the NIF of other pharmacy journals or related journals analysed. It has displayed a practically equal NIF to the Revista Española de Quimioterapia, but has experienced a much more evolutionary trend. However, there is only a small difference between the NIF and IIF which is marked by the level of citation of the foreign journals of the SCI-JCR. This implies low citation values by foreign journals included in SCI-JCR.

Self-citation is one important indicator in the analysis of citations, corresponding to the number of times that a journal cites bibliographical references from its own articles. The percentage of self-citations in Farmacia Hospitalaria (9%) is very similar to that of other journals such as Revista Iberoamericana de Micología (10.1%), Medicina Clínica (11.9%) and Adicciones (8.5%)4, although it exceeds the percentages of self-citations in Anales Españoles de Pediatría (6.9%)13 and Gastroenterología y Hepatología (6%)2, and is lower than those of Atención Primaria (17.3%)11 and Archivos de Bronconeumología (18.3%)4. In accordance with Hyland4, Bonzi and Snyder16, self-citation is considered a normal aspect in current science, and it is logical that researchers cite their own previous studies linked to their current studies and frequently published in the journal. This is an indicator of the confidence which authors have in their own studies and in the journal in which these have been published. Nevertheless, self-citation should be moderate and the efforts made by some editors to force authors to increase the number of self-citations in their articles are frowned upon14,15. In addition, overuse of self-citations is considered an indicator that the journal is somewhat isolated from the rest of the scientific community, since it is focused on consulting its own publications and does not cite foreign publications4.

One interesting though limited aspect which should be interpreted with care is that Farmacia Hospitalaria obtained a higher IIF than the IF in other journals in the pharmaceutical area included in JCR. For example, the IIF of Farmacia Hospitalaria in 2005 was 0.806, a value which would place it higher than 16 journals in the 193 that make up the Pharmacology & Pharmacy group in the 2005 edition of the JCR14,15. There were a significantly low number of citations taken from Spanish pharmacy journals included in the SCI (Drug of the Future, Drug News & Perspectives, Drugs of Today and Methods and Findings in Experimental and Clinical Pharmacology). This was perhaps due to the poor diffusion of articles between specialists and Spanish libraries, their exclusive publication in English and their contents on basic research.

The wish to obtain good impact indicators is having a positive effect on some Spanish journals, since their editors are making increased efforts to improve quality. These measures are usually aimed at improving the revision process of the manuscripts, incorporating prestigious foreign researchers, and shortening the time between the reception of the manuscript and its publication. They also aim to increase the journal’s distribution using measures such as providing a version in English or a bilingual version, allowing electronic access (free if possible), and ensuring strict compliance with international standards20-22.

One of the limits of this study is that impact indicators cannot be used to compare journals from different disciplines, since each of these have their own citation patterns and there may be significant variations in the impact (the possibility of being cited in the journals depends on the number of researchers in the area and the subsidy amounts allocated for research in this field; the greater these factors, the greater the possibility of being cited)23,24. Furthermore, the analysis of citations has only focused on citations that can be included for calculating the immediacy and impact indicators. It

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**Table III. Average values of the indicators (2001-2005)**

<table>
<thead>
<tr>
<th>Journals</th>
<th>NIF</th>
<th>IIF</th>
<th>NII</th>
<th>III</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farmacia Hospitalaria</td>
<td>0.423</td>
<td>0.482</td>
<td>0.060</td>
<td>0.065</td>
</tr>
<tr>
<td>Ciencia y Tecnología</td>
<td>0.285</td>
<td>0.299</td>
<td>0.082</td>
<td>0.082</td>
</tr>
<tr>
<td>Farmacéutica</td>
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<td>0.111</td>
<td>0.027</td>
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</tr>
<tr>
<td>Atención Farmacéutica</td>
<td>0.113</td>
<td>0.261</td>
<td>0.143</td>
<td>0.152</td>
</tr>
</tbody>
</table>

NIF: national impact factor; IIF: international impact factor; NII: national immediacy index; III: international immediacy index.

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would therefore be useful to continue the analysis over coming years in order to observe the evolution of the journal indicators and take corrective measures in order to improve these.

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References