ARCHIVOS DE BRONCONEUMOLOGÍA: Among the 3 Spanish Medical Journals With the Highest National Impact Factors


Instituto de Historia de la Ciencia y Documentación López Piñero, Consejo Superior de Investigaciones Científicas, Universidad de Valencia, Valencia, Spain.

OBJECTIVE: Citation analysis elucidates patterns of information consumption within professional communities. The aim of this study was to analyze the citations of 87 Spanish medical journals by calculating their impact factors and immediacy indices for 2001, and to estimate the importance of ARCHIVOS DE BRONCONEUMOLOGÍA within the framework of Spanish medicine.

MATERIAL AND METHOD: Eighty-seven Spanish medical journals were included. All were listed in the Spanish Medical Index (Índice Médico Español) and in at least one of the following databases: MEDLINE, BIOSIS, EMBASE, or Science Citation Index. References to articles from 1999 through 2001 in citable articles from 2001 were analyzed. Using the method of the Institute for Scientific Information, we calculated the national impact factor and immediacy index for each journal.

RESULTS: The journals with the highest national impact factors were Revista Española de Quimioterapia (0.894), Medicina Clínica (0.89), and ARCHIVOS DE BRONCONEUMOLOGÍA (0.732). The self-citation percentage of ARCHIVOS DE BRONCONEUMOLOGÍA was 18.3% and the immediacy index was 0.033.

CONCLUSIONS: The impact factor obtained by ARCHIVOS DE BRONCONEUMOLOGÍA confirms its importance in Spanish medicine and validates its inclusion as a source journal in Science Citation Index and Journal Citation Report.

Key words: Scientific journals. Bibliometrics. Impact factor. Immediacy index.

This study was undertaken with a grant from the Program for Studies and Analyses (Programa de Estudios y Análisis, 2003) awarded by the Spanish Ministry of Education, Culture, and Sports, division for universities.

Correspondence: Prof. R. Aleixandre Benavent. Instituto de Historia de la Ciencia y Documentación López Piñero. Facultad de Medicina de Valencia. Avda. Blasco Ibíñez, 15. 46010 Valencia. España. E-mail: aleixand@uv.es

Manuscript received February 17, 2004. Accepted for publication March 30, 2004.

**Introduction**

Scientific activity culminates when researchers provide access to their findings, usually through the publication of journal articles, books, or congress presentations. In addition, the currently established practice that requires scientists to cite the publications serving as the basis for their work lets us form an impression of the influence a cited publication has on...
later research. Bibliometric analysis based on counting the number of times a publication is cited is used to identify key studies read by investigators and provides an indication of the repercussion or impact those studies have had.2,4

The Science Citation Index (SCI), calculated by the Institute for Scientific Information (ISI), quantifies impact by analyzing citations appearing in over 3000 journals covering the main fields of knowledge.7 The impact factor has been used as a measure of a study’s repercussion, and by extension, of its quality.6,7 Widespread application of the impact factor has come to modify the publication and citation behaviors of many researchers, who want to see themselves reflected in the SCI as a way of receiving credit for their efforts.8,9 Numerous experts have called attention to this situation and have warned of the peculiarities and limitations of SCI indicators and of the distortions arising from indiscriminate use of the impact factor as a measure of quality.10-14

One of the most striking characteristics of the SCI is its bias in favor of journals published in countries where English is the medium of communication. For example, the 2001 issue of Journal Citation Reports (JCR) included 2220 journals from the United States of America, 1171 from Great Britain, and 59 from Australia. In contrast, those from France and Italy—examples of countries of undoubted scientific importance whose language is not English—numbered 148 and 69, respectively. Of the 26 Spanish journals included, only 13 were biomedical publications. Such biased coverage places limitations on the use of SCI analysis as a tool for studying the real impact of research performed outside English-speaking contexts and has led to the use of complementary analyses targeting specific journals or knowledge areas.15-31

The present study had 2 objectives. One was to present the results of analyzing citation in 87 Spanish scientific medical journals, whose impact factors and immediacy indices were calculated for 2001. The second was to assess the importance of ARCHIVOS DE BRONCOMEUMOLOGÍA within Spanish medicine.

Material and Method

The criteria for selecting journals whose references would be analyzed were that they be included in the Spanish Medical Index (Índice Médico Español) and additionally in one of the following international databases: MEDLINE, Excerpta Medica, SCI, or BIOSIS. The Spanish Medical Index can be considered the main Spanish bibliographic database. Since 1970 it has been gathering, analyzing, and disseminating information about most Spanish scientific medical journals in all knowledge areas, whether related to basic, experimental, or clinical research.32 In turn, the aforementioned international databases are considered those of greatest importance in the life sciences and health care.33-35 These criteria have been adopted because the inclusion of a journal in international databases is considered one of the most valid and reliable bibliometric indicators,36 given that they require the journals they follow to meet certain formal and quality-control criteria.37-40

Eighty-seven journals met these criteria and were analyzed as source or citing journals. Citable articles published in 2001 selected from each journal, in accordance with ISI methods, were original research articles, review articles, and case reports. Excluded, therefore, were editorials, letters to the editor, and reports of conference and other presentations. In those articles, references to publications from 1999 and 2000 were identified to calculate the impact factor. References to publications from 2001 were identified to calculate the immediacy index. The information was managed by creating a database of references in Microsoft Access. Information about the number of citations received and articles published in the 13 Spanish medical journals included in the 2001 JCR were extracted directly from the ISI Web of Knowledge, the gateway to ISI information, which encompasses the SCI and JCR databases, among others. This was not possible for ARCHIVOS DE BRONCOMEUMOLOGÍA, which although included as a source journal for SCI analysis in 2001, would not have an impact factor published in the JCR until the second semester of 2004, for 2003.

The national impact factor for each journal in 2001 was calculated by establishing the ratio of citations received by the journal in 1999 and 2000 and the citable articles published in those years. The national immediacy index, which measures the promptness with which a journal’s articles are cited, was calculated by establishing the ratio of citations received in 2001 to articles published in the same year. The information for journals included in the JCR was taken directly from that database.

Results

Of the 20 193 citations in the 74 source or citing journals not included in the JCR, 86.71% were references to journal articles and 7.06% were references to books and book chapters (Table 1).

Table 2 shows the impact factors and immediacy indices of the journals identified, along with the data needed to calculate those indices (citations received and articles published). The journals that were most often cited in the 3 years covered by the study for calculating impact factor were Medicina Clínica (627), Revista de Neurología (319), and Revista Española de Cardiología (306). Only 7 journals received more than 100 citations each, and at the opposite end of the spectrum, 34 journals were cited fewer than 10 times and 4 journals were never cited.

<table>
<thead>
<tr>
<th>Document Type</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>Total</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Articles</td>
<td>9526</td>
<td>6671</td>
<td>1313</td>
<td>17510</td>
<td>86.71</td>
</tr>
<tr>
<td>Books</td>
<td>398</td>
<td>256</td>
<td>49</td>
<td>703</td>
<td>3.48</td>
</tr>
<tr>
<td>Book chapters</td>
<td>397</td>
<td>273</td>
<td>52</td>
<td>722</td>
<td>3.58</td>
</tr>
<tr>
<td>Conference papers</td>
<td>226</td>
<td>229</td>
<td>35</td>
<td>490</td>
<td>2.43</td>
</tr>
<tr>
<td>Doctoral dissertations/theses</td>
<td>24</td>
<td>19</td>
<td>8</td>
<td>51</td>
<td>0.25</td>
</tr>
<tr>
<td>Other*</td>
<td>258</td>
<td>12</td>
<td>717</td>
<td>717</td>
<td>3.55</td>
</tr>
<tr>
<td>Total</td>
<td>10829</td>
<td>7760</td>
<td>1604</td>
<td>20193</td>
<td>100</td>
</tr>
</tbody>
</table>

*Including newspapers, courses, speeches, seminars, official publications, web pages, handbooks, and reports.
The journals that obtained the highest national impact factors were *Revista Española de Quimioterapia* (0.894), *Medicina Clínica* (0.89), and *Archivos de Bronconeumología* (0.732). Only 9 journals had impact factors over 0.5. Evidently, 4 journals had impact factors of 0, as they had not been cited.

The journals with the highest immediacy indices were *Medicina Clínica* (0.481), *Revista Española de Anestesiología y Reanimación* (0.379), and *Ciencia y Tecnología Farmacéutica* (0.379). For 35 journals the immediacy index was 0, as they received no citations in 2001.

Table 3 displays the journals from the sample that cited articles published in *Archivos de Bronconeumología*. Citations came from 13 different publications, and *Archivos de Bronconeumología* was the main provider of citations (87), followed by *Atención Primaria* (12) and *Revista Clínica Española* (11).

The journals cited in *Archivos de Bronconeumología* are displayed in Table 4. Apart from the 87 self-citations to the journal identified, the 63 citations in *American Journal of Respiratory and Critical Care Medicine* stand out. Other journals providing substantial numbers of citations were *Chest* (39) and *European..."
Respiratory Journal (35). Most of the journals cited in Archivos de Bronconeumología are related to the respiratory system, although some are general medicine publications (such as New England Journal of Medicine, Lancet, Medicina Clínica, Nature, Atención Primaria, and British Medical Journal), allergy and immunology (such as Journal of Allergy and Clinical Immunology and Clinical and Experimental Allergy), and oncology (Seminars in Radiation Oncology).

Discussion

Although much has been written about citation analysis and the calculation of impact factors for Spanish medical journals, authors have always limited themselves to particular journals or to particular subspecialties. Until the present study, no large sample of Spanish medical journals had been treated as a whole. Thus, the present analysis of indicators of scientific activity—citations

<table>
<thead>
<tr>
<th>Journals</th>
<th>Citations</th>
<th>Articles</th>
<th>IF</th>
<th>II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medicina Intensiva</td>
<td>26 32 3</td>
<td>53 57 42</td>
<td>0.527 0.071</td>
<td></td>
</tr>
<tr>
<td>Medicina Oral</td>
<td>1 2 0</td>
<td>27 43 40</td>
<td>0.042 0</td>
<td></td>
</tr>
<tr>
<td>Medifam. Revista de Medicina Familiar y Comunitaria</td>
<td>6 3 1</td>
<td>43 63 77</td>
<td>0.084 0.012</td>
<td></td>
</tr>
</tbody>
</table>

TABLE 2
Impact Factors and Immediacy Indices of the Journals Analyzed (continued)*

*IF indicates impact factor; II, immediacy index; SCI, Science Citation Index, journals included in the 2001 issue of Journal Citation Reports.
received, impact factors, and immediacy indices—has confirmed the leadership of certain journals and justified their positioning in international databases, particularly in the JCR. This is the case of ARCHIVOS DE BRONCONEUMOLOGÍA, which became a source journal for the SCI in 2001 and whose JCR-calculated impact factor will become available for 2003.41

The high percentage of citations received by journal articles confirms the important role of medical journals as the means by which Spanish medical research is communicated23 and situates them well above other types of cited documents, such as books, doctoral dissertations, conference presentations, and other even less used sources of information. The percentages we calculated are similar to those reported by other authors who analyzed indices for Spanish medical journals.10,20,22,25,31 The low rate of citation of dissertations might be related to difficulty of access to such sources of information—referred to as "gray literature" by documentalists because of their scarce visibility and distribution. Such difficulty of access may also be the reason why conference papers are seldom cited, as only a limited number of conference proceedings volumes are usually distributed to those who attend and there is no system for systematically indexing and distributing information about them.

The impact factors of Spanish journals can generally be considered moderate, given that none exceeded 1. The value we calculated for ARCHIVOS DE BRONCONEUMOLOGÍA is much higher than those estimated previously23,27,42: 0.069 in 1996 but closer to 0.1 between 1997 and 2000. Those were international impact factors, however, calculated by using a specified range of journals or those considered source journals by the SCI.

It is striking that the Spanish journals covered by the SCI that are published in English (Histology and Histopathology, The International Journal of Developmental Biology, Journal of Physiology and Biochemistry, and Methods and Findings in Experimental and Clinical Pharmacology) are little-cited by Spanish journals and have low citation indices in spite of their relation to basic sciences, a category in which journals usually receive a large number of citations. Their scarce distribution in Spain and the difficulty many professionals have in reading literature in English might be the reasons for the low impact factors and immediacy indices.

The rate of self-citation in ARCHIVOS DE BRONCONEUMOLOGÍA is 18.3%. Self-citation occurs when authors, groups, or journals cite their own publications. Such citation is currently considered normal in science, given that authors who publish in a journal will cite it, because it publishes on topics related to the same area of knowledge. Self-citation of a journal can also be interpreted as a demonstration of an author’s confidence in a journal. The reason for calculating the self-citation rate lies in what it reveals about the validity of the absolute count of all citations as an indicator of impact; moreover, abusing self-citation is an indicator of the isolation of a group or community of scientists.5,14,36 The percentage of self-citation in ARCHIVOS DE BRONCONEUMOLOGÍA is similar to that of Atención Primaria (17.3%),45 but greater than

### Table 3

<table>
<thead>
<tr>
<th>Journals</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anales de Medicina Interna</td>
<td>8</td>
<td>0</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>Anales del Sistema Sanitario de Navarra</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Anales Españoles de Pediatría</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>ARCHIVOS DE BRONCONEUMOLOGÍA</td>
<td>50</td>
<td>37</td>
<td>0</td>
<td>87</td>
</tr>
<tr>
<td>Atención Farmacéutica</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Atención Primaria</td>
<td>9</td>
<td>2</td>
<td>1</td>
<td>12</td>
</tr>
<tr>
<td>Investigación Clínica</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Medicina Clínica</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Medicina Intensiva</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Medifam, Revista de Medicina</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Familiar y Comunitaria</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Pediatrika</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Revista Clínica Española</td>
<td>9</td>
<td>2</td>
<td>0</td>
<td>11</td>
</tr>
<tr>
<td>Revista de Oncología</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>89</td>
<td>50</td>
<td>3</td>
<td>142</td>
</tr>
</tbody>
</table>

### Table 4

<table>
<thead>
<tr>
<th>Journals</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anales de Medicina Interna</td>
<td>8</td>
<td>0</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>American Journal of Respiratory and Critical Care Medicine</td>
<td>38</td>
<td>25</td>
<td>0</td>
<td>63</td>
</tr>
<tr>
<td>ARCHIVOS DE BRONCONEUMOLOGÍA</td>
<td>50</td>
<td>37</td>
<td>0</td>
<td>87</td>
</tr>
<tr>
<td>Chest</td>
<td>13</td>
<td>26</td>
<td>0</td>
<td>39</td>
</tr>
<tr>
<td>European Respiratory Journal</td>
<td>17</td>
<td>16</td>
<td>2</td>
<td>35</td>
</tr>
<tr>
<td>New England Journal of Medicine</td>
<td>4</td>
<td>1</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Thorax</td>
<td>9</td>
<td>7</td>
<td>0</td>
<td>16</td>
</tr>
<tr>
<td>Journal of Thoracic and Cardiovascular Surgery</td>
<td>12</td>
<td>2</td>
<td>0</td>
<td>14</td>
</tr>
<tr>
<td>Annals of Thoracic Surgery</td>
<td>5</td>
<td>5</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>Lancet</td>
<td>6</td>
<td>4</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>Journal of Allergy and Clinical Immunology</td>
<td>5</td>
<td>4</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>Medicina Clínica</td>
<td>7</td>
<td>2</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>Seminars in Radiation Oncology</td>
<td>8</td>
<td>0</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>Respiratory Medicine</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>The International Journal of Tuberculosis and Lung Disease</td>
<td>2</td>
<td>4</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>Nature</td>
<td>1</td>
<td>4</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Prevención del Tabaquismo</td>
<td>0</td>
<td>3</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Clinical and Experimental Allergy</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>American Journal of Medicine</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Atención Primaria</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>British Medical Journal</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Clinics in Chest Medicine</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Critical Care Medicine</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Drugs</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>European Journal of Cardio-Thoracic Surgery</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Journal of Antimicrobial Chemotherapy</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>The American Journal of Clinical Nutrition</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>21 journals with 2 citations</td>
<td>27</td>
<td>14</td>
<td>1</td>
<td>42</td>
</tr>
<tr>
<td>63 journals with 1 cite</td>
<td>31</td>
<td>32</td>
<td>0</td>
<td>63</td>
</tr>
<tr>
<td>Total</td>
<td>263</td>
<td>207</td>
<td>5</td>
<td>475</td>
</tr>
</tbody>
</table>
that of *Medicina Clínica* (11.9%), Adicciones (8.5%)14, *Anales Españoles de Pediatría* (6.9%),15 and *Gastroenterología y Hepatología* (6%).20 Hyland25 and Bonzi and Snyder16 note that authors’ reasons for citing the journal in which they publish articles are extremely complex.

The immediacy index of ARCHIVOS DE BRONCONEUMOLOGÍA places it in an intermediate position in comparison with other source journals. Immediacy, or promptness of citation, depends on a variety of factors, among them periodicity (weekly or biweekly journals are more likely to generate citations within the year than are journals issued monthly or quarterly), the number of articles published per issue, the slowness or speed of peer review and the editorial process, and above all the rapidity with which issues are distributed in the international scientific community.7,28 The availability of electronic editions can help to improve a journal’s immediacy index, given that distribution is not subject to the delays involved in publishing and distributing paper editions.

A limitation of this study is that the period analyzed was only a single year and the results are likely to change over time as a result of possible shifts in patterns of scientific activity in Spain. Another is that it considered only citations made in Spanish journals (to obtain national impact factors). The findings of this study should be interpreted very cautiously, given that although there is a widespread notion that frequently cited journals and articles are better than those that are cited less often, that impression is only justified in certain cases.49,50 Citation counts provide mainly a measure of the utilization of publications rather than their quality, given that authors do not cite only high quality articles but rather those they find useful to their own ends.28 Citation behavior is influenced by many factors, some of which are scientific while others are formal or societal. An example is the phenomenon of obliterating by which a scientific work will no longer be explicitly cited once it becomes so widely known within a field of study that it comes to form an integral part of its body of knowledge—a fate shared by many works of great quality.3,5,12 Citation is also affected by language barriers and by availability and accessibility to researchers. Additionally, basic science journals tend to be cited more often than journals of applied research.5,12,18 Papers that establish a technique in a discipline or subspecialty or that propose experimental methods and applications will be more often cited than those that present theory, even if the latter are of higher quality.19 An author’s citing of a previously published article, therefore, is only a measure of the cited paper’s visibility and its impact, not necessarily of its quality, importance, or usefulness.5,14,51

The present study has contributed to a clearer understanding of how Spanish medical researchers use sources of information and it will serve as a basis for improving the way our scientific and medical publications are evaluated.

REFERENCES