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EDITORIAL

The Ups and Downs of the Impact Factor: The Case of *Archives of Medical Research*

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Editor-in-Chief

The impact factor (IF) has become the subject of widespread controversy. Since its invention by Eugene Garfield and Irving Sher in 1960, this bibliometric indicator has moved steadily to become the chief measure of not only the visibility of a journal but also as the main quantitative indicator of its quality, of its research papers, and even to rank the researchers who author the papers (1). For grant allocation, academic tenure, promotions, and awards, the use of the IF is considered a "reliable indicator" of quality, mainly in developing countries. This indiscriminate use of the IF clearly indicates a misunderstanding of the meaning and limitations of this index (2).

Archives of Medical Research has not escaped this trend and is being monitored year by year by authors, indexers, and librarians. Although the *Archives* IF has been increasing since 1996, from 0.492 to 0.713 in 1999, in 2000 we experienced a decrease to 0.618 (Figure 1). This apparent setback has alarmed some of our collaborators and sponsors who continue to consider the IF an absolute index of quality. It is therefore appropriate at this time to review the many phenomena that influence citation rates and that impinge on IF variations throughout time.

The IF is a measure of the frequency with which the average article in a journal has been cited during a particular year period. Thus, the IF of a journal is calculated by dividing the number of current-year citations by the source items published in that journal during the previous 2 years. Informed and careful use of these data is essential. Users may be tempted to jump to ill-formed conclusions based on IF statistics unless several caveats are considered (3).

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Subject Area

There are numerous factors that affect the final IF of a given journal. The subject area covered by the journal is determinant of the mean impact factor (Figure 2): Highest rankings are for fundamental and basic research, particularly for molecular genetics. In contrast, in clinical medicine many contributions are widely read and used to improve diagnosis and treatment of patients but can rarely match the flood of citations that basic research papers receive. Paradoxically, basic molecular papers are not infrequently novelties that fade rapidly from the scientific literature because they are employed in a timely manner by colleagues in the same field for additional research and, therefore, are cited quite often over a short period of time (2). The number of authors on a paper also positively influences the IF. Multiple authorship is the rule in basic research publications and is less pronounced in clinical papers (Figure 3). This explains in part the higher citation rate of basic research papers and journals (4).

Journal and Article Type

Review articles and those journals specializing in review articles have the highest IFs because they often serve as surrogates of earlier literature. The best example is *Annu Rev Immunol* with an IF of 47.564 in 1999, far higher than *Nat Med* with 26.584 and *N Engl J Med* with 28.857 in the same year. Another article variation that is usually highly cited, albeit with a shorter half-life, is the rapid communication in specialty journals devoted to this type of publication. The full-paper journal or the ordinary research paper has a lower citation rate than the previously mentioned articles but has a longer half-life (Figure 4). *Archives of Medical Research* is usually composed of one review article and an average of 15 full articles with occasional rapid communications and case reports. This mix should in theory produce a better ci-

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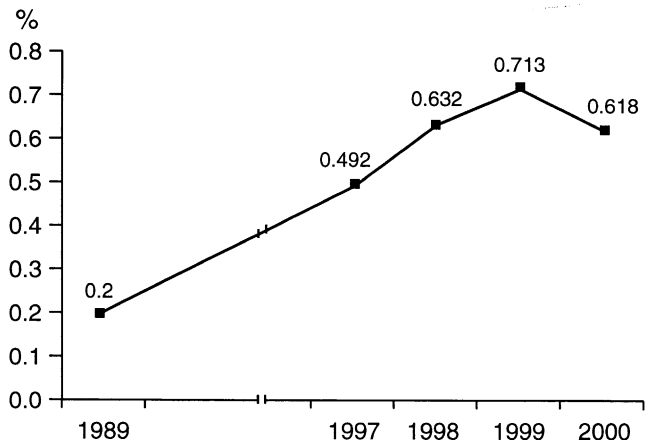

Figure 1. Impact factor, *Arch Med Res* (ISI, citation analysis 2000).

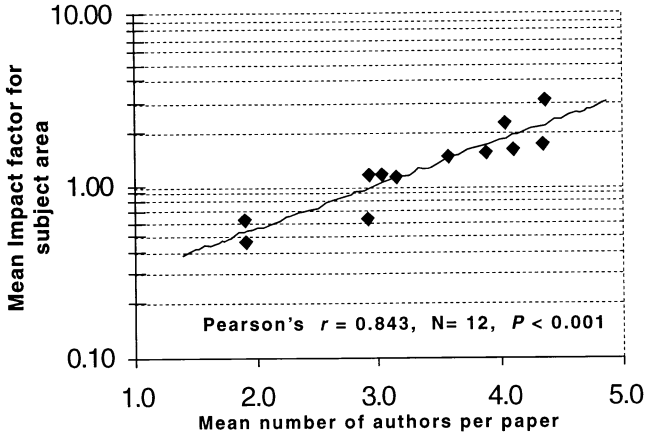

Figure 3. Impact factors and number of authors per paper (see Reference 4).

tation rate than a straightforward journal, at least for review articles and rapid communications. It is our experience, however, that through citation analysis review articles published in *Arch Med Res* have a lower citation rate than full papers (review, 0.98 vs. full paper, 1.2, Bibliometric analysis for *Archives of Medical Research*, Institute for Scientific Information [ISI]). This apparent contradiction with the general trend reported for review articles by ISI's Journal of Citation Reports (JCR) shows that in small emerging journals, reviews are not sought as much as those written by international experts and published in prestigious specialty journals. Hence, including review articles in emerging journals does not necessarily increase citations. Given that the impact factor measures differing proportions of citations for diverse article types, care should be taken when comparing different journal types or journals with different mixes of article types (4).

The Effect of Size

The number of items in terms of articles published per annum has a great effect on the IF and its yearly variation. The denominator used by the JCR is the sum of articles published within the 2-year period previous to the cites counted in a particular year. So for large consolidated journals, more articles usually mean more citations and fewer IF fluctuations over time. It has been shown that impact factor variations directly correlate with the size of the journal (Figure 5). Small journals with fewer than 35 papers per annum show an average variation of IF of ±40% from one year to the next, while large journals are not immune and might show variations of ±15% (4). Our journal publishes approximately 100 papers per year; thus, under normal circumstances we should expect a fluctuation of ±25%. But the effect of publishing more articles does not necessarily improve our citation rate, particularly when the item type

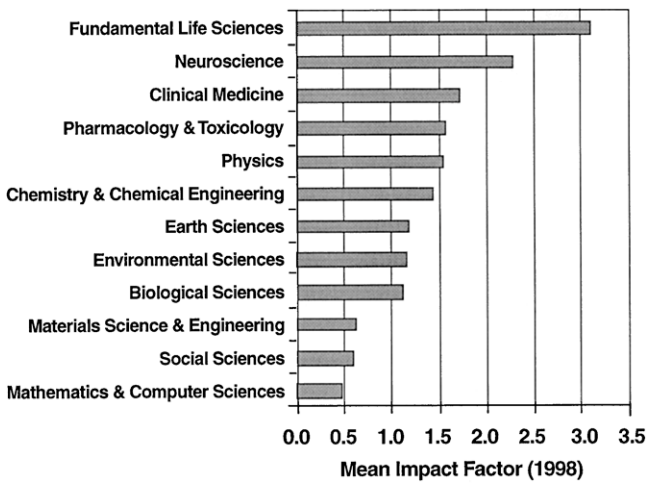

Figure 2. Subject variation in impact factors (see Reference 4).

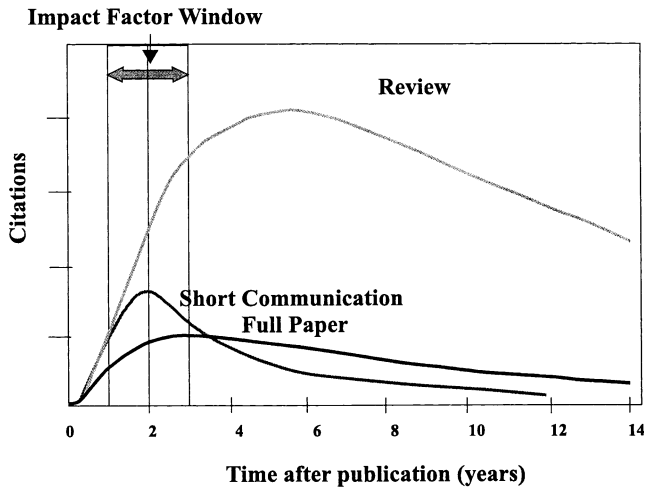

Figure 4. Impact factor and journal type (see Reference 4).

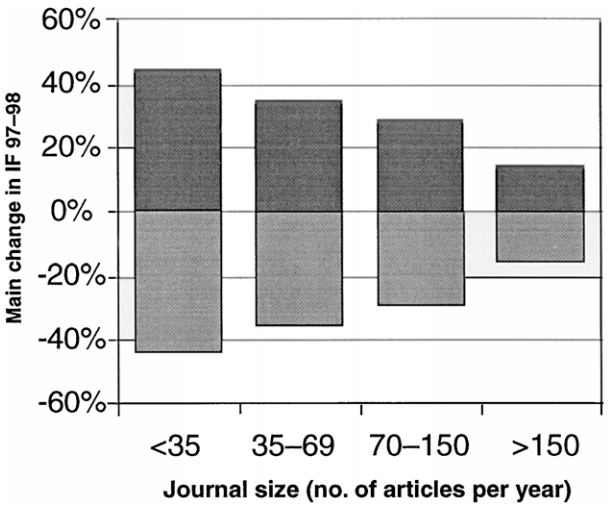

Figure 5. Impact factor fluctuations vs. journal size (based on sample of 4,000 journals) (see Reference 4).

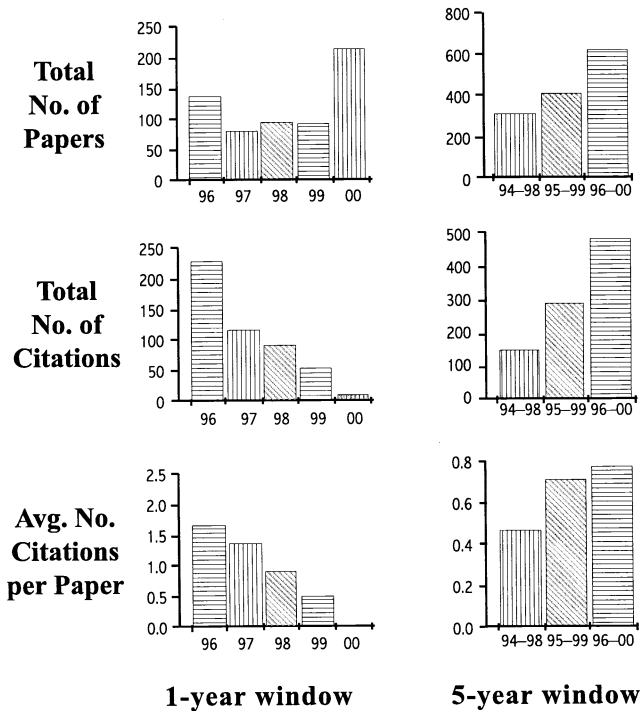

Figure 6. Citation analysis for *Archives of Medical Research*.

does not have a high citation impact. This happens with small articles such as proceedings papers, case reports, or short communications. Our journal publishes a limited but consistent number of small articles, but every 4 years the Seminar on Amebiasis publishes a supplement to the journal with an average of 120 extended abstracts. These items are considered by the JCR as full articles and are therefore pooled with regular papers in the denominator to calculate the IF for that year. Because many of these abstracts have a low citation rate, it should come as no surprise that whenever these seminars are published the IF is pulled down. We should expect such a phenomenon to occur in the next IF calculation, because we published 131 extended abstracts in the last supplement on Amebiasis (5). But there is another reason that accounts for the lowering of the IF and that is the standard window of 2 years of cited items that is used as the numerator. We have observed that our Amebiasis Seminar abstracts begin to be cited between 2 and 3 years after publication, so most cites fall after the 2-year window. This is why care should be exercised to avoid inferring too much from changes and differences in impact factors. A much more realistic figure emerges when the size of the measurement window is extended to 5 years. The ups and downs of the IF are ironed out in the 5-year window as compared to the standard yearly variations for *Archives of Medical Research*. The total number of citations and the average citations per paper show a completely different trend when viewed through a 1-year window or a 5-year period (Figure 6) (from ISI's Bibliometric analysis for *Arch Med Res*).

Given these considerations, the use of the absolute value of the IF should be strongly avoided, not only because of the variability induced by many independent factors, but also because many other variables impinge upon the quality of the journal.

Other Quality Indicators

It has been generally accepted, and even by the ISI, that the only difference among small journals in a group can be based on subjective judgments such as peer review (3). It can be said that the quality of a journal directly reflects the quality of its reviewers. Our journal has substantially improved its peer review process. We have an increasingly long list of reviewers from all over the world who are experts in their fields. Consequently, our manuscript rejection rate is now slightly above 50% and we are convinced that only the best manuscripts are being accepted for publication. Not surprisingly, the visibility and acceptance of our journal is increasing every year as judged by the growing number of subscribers, both institutional and individual, in the last 2 years as well as the number of contributions from throughout the world that is steadily increasing. Although 65% of papers published still originate from Mexican researchers, the remainder derive from many other countries, from the U.S to China. The publication of special monothematic issues garners more than one half of international contributions by world experts in their field.

We are convinced that despite IF fluctuations, *Archives of Medical Research* is keeping pace with and gaining prestige in the international biomedical community. It should be considered that the overall citation rate is 0.90 and that the average citation for regular papers is 1.3, as calculated by ISI (Bibliometric analysis for *Arch Med Res*, ISI). We there-

fore invite our collaborators and contributors to judge the quality of our publication as a whole and not only through a simple ratio of citations.

Acknowledgments

I want to thank Mayur Amin and Michael Mabe for granting permission to reproduce Figures 2–5 (See Reference 4).

References

1. Garfield E. Use of journal citation reports and journal performance indicators in measuring short and long term journal impact. Croatian Med J 2000;41:368–374.
2. Benitez-Bribiesca L. The impact factor of medical journals: its use and misuse. Arch Med Res 1999;30:161–162.
3. The impact factor. Current Contents 1994;June:20.
4. Amin M, Mabe M. Impact factors: use and abuse. Perspectives in Publishing (Elsevier Science). No. 1, October 2000.
5. XIV Seminar on Amebiasis. Arch Med Res 2000;31:S1.