

Editorial:

Journal Impact Factor

Dr. Chinmay Shah

Assistant Professor, Department of Physiology
Government Medical College, Bhavnagar

Like nuclear energy, the impact factor has become a mixed blessing. I expected that it would be used constructively while recognizing that in the wrong hands it might be abused. In the early 1960s Irving H. Sher and Eugene Garfield created the journal impact factor to help select journals for the Science Citation Index (SCI)¹

The use of the term “impact factor” has gradually evolved, especially in Europe, to include both journal and author impact. This ambiguity often causes problems. It is one thing to use impact factors to compare journals and quite another to use them to compare authors. The impact factor of a journal reflects the frequency with which the journal's articles are cited in the scientific literature. It is derived by dividing the number of citations in year 3 to any items published in the journal in years 1 and 2 by the number of substantive articles published in that journal in years 1 and 2². For example, for 1997 impact factors the following formula was used:

Impact Factor =

$$\frac{\text{citation of article published in 1995-96}}{\text{article published in 1995-96}}$$

The impact factor will help you evaluate a journal's relative importance, especially when you compare it to others in the same field. Journal Impact factors can be accessed and compared through the Journal Citation Reports database (JCR).

The impact factor is useful in clarifying the significance of absolute (or total) citation frequencies. It eliminates some of the bias of such counts which favor large journals over small ones, or frequently issued journals over less frequently issued ones, and of older journals over newer ones. Particularly in the latter case such journals have a larger citable

body of literature than smaller or younger journals. All things being equal, the larger the number of previously published articles, the more often a journal will be cited^{3,4}.

The following points should be borne in mind when consulting impact factors⁵:

- Citation does not automatically imply that a work is of high quality: a work may be heavily cited because lots of other authors are refuting the research findings it contains.
- Beware of citation bias: people may cite their own work, or work from the journals in which they publish.
- An impact factor is a measure of average citation impact, not individual citation impact, so an impact factor cannot be used to measure the performance of an individual.
- Time needs to elapse before a meaningful citation analysis can be made, so new journals tend to fare badly.
- Not all research work is published and cited in the citation indices: conference proceedings, for example are often poorly covered.
- There is a bias in favour of English language material on citation indices.

Different fields of research publish at different rates: there is generally a much stronger culture of publishing in journals and citing the worth of peers in the biomedicine than in engineering.

Conceptually developed in the 1960s, impact factor has gained acceptance as a quantitative measure of journal quality⁶. Impact factor is used by librarians in selecting journals for library collections, and, in some countries, it is used to evaluate individual scientists and institutions for the purposes of academic

promotion and funding allocation^{7, 8}. Not surprisingly, many have criticized the methods used to calculate impact factor^{9, 10}. However, empiric evaluations of whether or not impact factor accurately measures journal quality have been scarce¹¹.

The use of impact factor as an index of journal quality relies on the theory that citation frequency accurately measures a journal's importance to its end users. This theory is plausible for journals whose audiences are primarily researchers, most of whom write manuscripts for publication. By citing articles from a given journal in their own manuscripts, researchers are in essence casting votes for that journal. Impact factor serves as a tally of those votes.

A journal's impact within clinical medicine, however, depends largely on its importance to practitioners, most of who never write manuscripts for publication and thus never have a chance to "vote." Citation frequency may therefore better reflect the importance of clinical journals to researchers than practitioners. Because the opinions of both practitioners and researchers are relevant in judging the importance of clinical journals, the validity of impact factor as a measure of journal quality in clinical medicine is uncertain. The authors therefore sought to examine whether impact factor is a valid measure of journal quality as rated by clinical practitioners and researchers¹².

Citation density and half-life are also important variables. The citation density (mean number of references cited per article) would be significantly lower for a mathematics article than for a life sciences article. The half-life (number of years, going back from the current year, that cover 50% of the citations in the current year to the journal) of a physiology journal would be longer than that of a journal of molecular biology or astronomy.

The impact factors currently reported by the Institute for Scientific Information in Journal Citation Reports (JCR) may not provide a complete enough picture for slower changing

fields with longer half-lives. Nevertheless, when journals are studied within disciplinary categories, the rankings based on 1-, 7- or 15-year impact factors do not differ significantly, as was recently reported in *The Scientist*.^{13, 14}

There are many artifacts that can influence a journal's impact and its ranking in journal lists, not the least of which is the inclusion of review articles or letters. This is illustrated in a study of the leading medical journals published in the *Annals of Internal Medicine*¹⁵.

Impact factor is commonly used as a tool for managing scientific library collections. Librarians faced with finite budgets must make rational choices when selecting journals for their departments and institutions. Impact factor helps guide those choices by determining which journals are most frequently cited. Journals that are cited frequently generally contain articles describing the most notable scientific advances (i.e., those with the greatest "impact") in a given field and are therefore of greatest interest to researchers, teachers, and students in most scientific disciplines.

In medical libraries, however, the interests of clinicians must also be considered. Journals publishing "cutting-edge" medical discoveries may be cited frequently and highly valued by researchers but may be of less value to clinicians than journals providing, for instance, concise overviews of common clinical problems. Impact factor may therefore be less valid as a guide to selecting high-quality journals in clinical medicine than in other scientific disciplines.

Journal impact factor has its limitations, and we believe that further evaluation of whether and how impact factor measures journal quality is warranted before it is widely adopted as a quantitative marker of journal quality.

REFERENCE:

1. Eugene Garfield, Journal impact factor: a brief review, *CMAJ* • OCT. 19, 1999; 161 (8) 979

2. Garfield E. Journal impact factor: a brief review. Can Med Assoc J 1999 Oct 19; 161:(8):979-80
3. Garfield E. Citation analysis as a tool in journal evaluation. Science 178:471-9, 1972.
4. Garfield E Citation indexing for studying science. Nature 227:669-71, 1970.
5. E Garfield. The impact factor. Current Contents 1994, 20: 3-7.
6. Garfield E. The impact factor. [Internet]. Curr Contents 1994 Jun 20; 25:3-7 [cited 16 Aug 2002].
7. Seglen PO. Why the impact factor of journals should not be used for evaluating research. BMJ 1997 Feb 15; 314:(7079):498-502
8. Lowy C. Impact factor limits funding. Lancet 1997 Oct 4; 50:(9083):1035
9. Seglen PO. Why the impact factor of journals should not be used for evaluating research. BMJ 1997 Feb 15; 314 :(7079):498-502.
10. Hansson S. Impact factor as a misleading tool in evaluation of medical journals. Lancet 1995 Sep 30; 346:(8979):906
11. Foster WR. Impact factor as the best operational measure of medical journals. Lancet 1995 Nov 11; 346:(8985):1301
12. S Saha et al. Impact factor: a valid measure of journal quality? Journal of Medical Librarians Association 2003 91: 42-46.
13. Garfield E. Long-term vs. short-term journal impact: Does it matter? Scientist 1998; 12(3):10-2.
14. Garfield E. Long-term vs. short-term journal impact (part II). Scientist 1998; 12(14):12-3.
15. Garfield E , Which medical journals have the greatest impact? Ann. Intern. Med. 105:313-20, 1986

Corresponding Author:

Dr. Chinmay Shah, Assistant Professor, Department of Physiology , Govt. Medical College, Bhavnagar (Gujarat),
cjshah79@yahoo.co.in
