

Impact Factor: Is That All for Deciding a Journal?



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Introduction

The impact factor (IF) of an academic journal is a measure reflecting the average number of citations to recent articles published in that journal. The calculation of IF is based on a two-year period (in majority of journals) and involves dividing the number of times articles were cited by the number of articles that are citable.

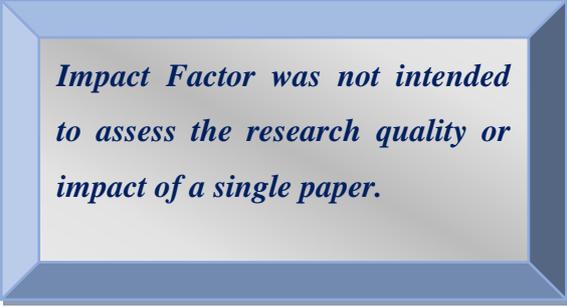
For example: Calculation of IF for 2015 of a journal is done as:

$$\text{IF of a journal} = A/B$$

where: A= the number of times articles published in 2013 and 2014 were cited by indexed journals during 2015.

B= the total number of "citable items" published in 2013 and 2014.

IF was introduced in the early 1960s to aid librarians in stocking their shelves with the journals that were most important to their constituents. It was not intended to assess the research quality or impact of a single paper, let alone an individual scientist's performance.



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Flaws of Impact Factor

Numerous flaws in the IF have been pointed out over the years. Some of the more troublesome shortcomings are:

- A journal's IF can be driven by a few, extremely highly cited articles, yet all articles published in a given journal, even those that are never cited, are presumed to have the same IF. Journal IF are not representative of individual journal articles, yet conclusions about a particular paper are often drawn (2).
- The IF can be manipulated by journals in many ways, for example by publishing more review articles which are generally more highly cited, the perceived impact of the journal's primary research articles is distorted (3).
- The IF is sensitive to the nature of the scientific content and the size of a given field, with smaller and specialized communities naturally generating fewer citations. It implies that speciality and super speciality journals might have a lower IF.

- The IF depends on the research field. High IFs are likely in journals reporting basic research with a rapidly expanding literature that use many references per article. In particular, clinical medicine draws heavily on basic science (but not *vice versa*), basic medicine is generally cited three to five times more than clinical medicine (4).

Thus, IF is a function of the number of references per article in the research field. It depends on dynamics (expansion or contraction) of the research field.

Are additional parameters needed to better judge a journal?

Just as visual acuity is known to be a very insufficient assessment of visual function, so IF seems to be an insufficient overall assessment of the journal quality. What then, what extra is needed to provide a better overall assessment of the quality/usefulness journal of the journal?

First, it may be an improvement to have a second IF figure and particularly one that includes citations to textbooks as it seems important to recognise the importance of the references used in evidence-based medical literature. Perhaps, this might also help to readdress some of the imbalance between basic and clinical research papers.

- ✓ *IF are not statistically representative of individual journal articles.*
- ✓ *IF correlate poorly with actual citations of individual articles.*
- ✓ *Review articles are heavily cited and inflate the IF.*
- ✓ *Long articles collect many citations and give high IF.*

Second, for journal quality assessment, the number of downloads that papers within the journal receive should be considered. This has become a standard metrics available for open access journals in particular and is a very useful indicator of which topics have become of wide interest (5).

Another metrics which may also highlight the overall quality of a journal is the acceptance (or rejection) rate. Some of the top journals have very low acceptance rates of around 7–8% (Science and Nature and similar journals); while some open access journals have very high acceptance rates (6). That does not mean that studies published in the latter journals are not of high impact. Nonetheless, all the good studies cannot be published in journals like Science, Nature, Cell and the likes.

Individual papers must not be assessed based on the IF of the journal they are published in.

Is the impact of an article increased by publication in a high impact journal?

It is widely assumed that publication in a high impact journal will enhance the impact of an article. In a comparison of two groups of scientific authors with similar journal preference, who differed 2-fold in mean citation rate for articles, however, the relative difference was the same (2-fold) throughout a range of journals with IFs of 0.5 to 8.0 (2). If the high impact journals had contributed “free” citations, independently of the article contents, the relative difference would have been expected to diminish as a function of increasing journal impact (8). These data suggest that the journals do not offer any free ride.

The citation rates of the articles determine the journal IF, but not vice versa.

So, if the scientific authors are not detectably rewarded with a higher impact by publishing in high impact journals, why are we

so adamant on doing it? The answer, of course, is that as long as there are people out there who judge our science by its wrapping rather than by its contents, we cannot afford to take any chances.

Although JIFs are rarely used explicitly, their implicit counterpart, journal prestige, is widely held to be a valid evaluation criterion (9) and is probably the most used indicator besides a straight forward count of publications. As we have seen, however, the journal cannot in any way be taken as representative of the article. Even if it could, the JIF would still be far from being a quality indicator. Another factor that is often considered¹ is the citation impact. However, it is primarily a measure of scientific utility rather than of scientific quality, and authors' selection of references is subject to strong biases unrelated to quality (10, 11).

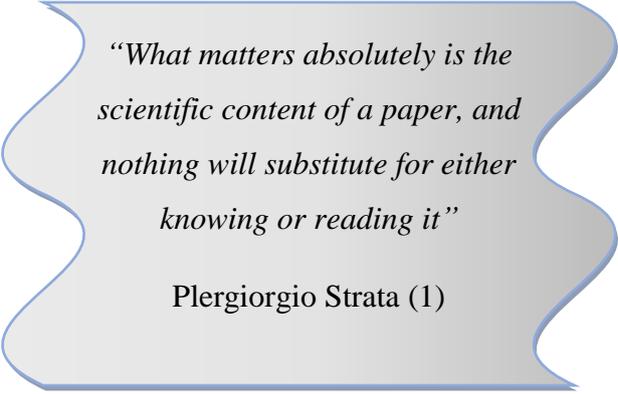
Another parameter that is generally used to measure both the scientific productivity and the apparent scientific impact of a scientist is the H-index. The H-index is based on the set of the researcher's most cited papers and the number of citations that they have received in other people's publications. Similarly, the Eigen factor (EF) score, is a rating of the total importance of a scientific journal (12). As a measure of importance, the EF score scales with the total impact of a journal. Journals are rated according to the

number of incoming citations, with citations from highly ranked journals weighted to make a larger contribution to the EF than those from poorly ranked journals (13).

But, in general, there is no alternative for readers for evaluation of scientific quality. There is still a scope for improvement and standardization of the principles, procedures, and criteria used in evaluation of scientific research. However, just developing sophisticated versions of otherwise useless indicators will not serve the purpose.

Recommendations

IF alone should not be used to judge the quality or impact of individual papers published in a journal as this can vary widely. While selecting a journal for publication, one should consider factors like target audience, acceptance and rejection rate, publication lag time *etc.* For pharmaceutical companies, the timing at which their article is published is also crucial like simultaneous with the launch of their drug or just post-launch. In other words, strategic publication



“What matters absolutely is the scientific content of a paper, and nothing will substitute for either knowing or reading it”

Plergiorgio Strata (1)

is important to reap the benefits of your article.

In conclusion, IF of a journal appears to provide a reasonable ball-park figure for the journal’s quality and/or impact and/or usefulness to the research community. Journal features such as editorials, meeting reports and a lively communications page that seem indicative of a vibrant journal that has excellent connections with its readership appear to be positive biases in the IF calculation rather than flaws. Finally, it may be better to have a small array of parameters to judge overall journal impact and additional assessments could be included to analyse the quality of paper.

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