

The Impact of Impact Factor

Syed Muhammad Tahir

Even today whenever asked by any clinicians, each will name different medical journals that they think are most influential, the reason (s) may be lacking, and when given may be debatable. To resolve this subjectivity Eugene Garfield in 1955 brought an idea of science citation index¹. The concept behind citation indexing is very simple. It recognized that the value of information is best determined by those who use it, will be a better way to measure quality, rather than the overall impact it makes on the community at large. However we should not forget that citation indexing is simply a fairly recent form of information management and retrieval. The term, impact factor (IF), was first coined in 1961, after publication in the Science Citation Index (SCI), Presently, referred to as Journal Citation Reports(JCR) in 1963². A journal's impact factor, being one part of JCR is based on 2 elements: the numerator, which is the number of citations in the current year to any items published in a journal in the previous 2 years, and the denominator, which is the number of articles (source items) published in the same 2 years. The JCR is intended simply to provide quantitative tools for ranking, evaluating, categorizing, and comparing journals. The impact factor is useful in clarifying the significance of 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. On the other hand evaluation of scientific work is a notoriously difficult problem. System presently used is peer review. The reviewer however may also take into considerations the journal prestige, the reputation of authors and institutions, and estimated importance and relevance of the research field³. This made peer review, much of a lottery rather than a rational process^{4, 5}. The purported bias and subjectivity for appointments to higher post had been and still being reported in most part of the world. With this background and availability of journal impact factors, it has been tempting to use them for evaluating individual scientists or research groups including appointments to higher academic positions⁵. Even more so, in Nordic countries, the journal impact factor is used not only for the evaluation of individuals but also for allocation of universities resources^{7, 8}. Resource allocation based on Journal impact factors has also been reported from Canada⁹

and Hungary¹⁰. The science ministries in South Korea, China and Pakistan now offer cash rewards to their scientists if they are able to publish papers in journals with high IFs such as Nature, Science and Cell. The remuneration amount can be quite impressive, as much as US\$ 50,000 in China. Therefore, researchers may aim to publish in journals whose quality is based on their IF¹¹. The recognition and acceptance of IF is increasing throughout the world, however like any other system, IF also has various limitation and bias. Coverage of the database to calculate IF is not complete. The different publication through out world is estimated to be 126 000¹², while Science Citation Index database covers only 3200 journals¹³ and this is dominated by American publications¹⁴. The way, IF is calculated also introduces bias. The Science Citation Index database includes only original articles, notes, and reviews in the denominator as citable items, but records citations to all types of documents (editorials, letters, meeting abstracts, etc) in the numerator¹⁵⁻¹⁷. Because of this flawed computation, a journal that includes meeting reports, interesting editorials, and a lively correspondence section can have its impact factor greatly inflated relative to journals that lack such items. Editors who want to raise the impact of their journals may make frequent reference to their previous editorials, since the database makes no correction for self citations. The inclusion of review articles, which generally receive many more citations than ordinary articles¹⁸, is also preferred. Furthermore, because citation rate is roughly proportional to the length of the article, journals might wish to publish long, rather than short articles¹⁹. If correction were made for article length, "communications" journals like Biochemical and Biophysical Research Communications and FEBS Letters would get impact factors as high as, or higher than, the high impact journals within the field, like Journal of Biological Chemistry^{20 21}. The use of an extremely short term index also introduces bias. The journals with more frequent issue generally contain many up to date citations and thus contribute heavily to the impact factors of all cited journals. Dynamic research fields with high activity and more frequent publication will have a correspondingly high proportion of citations to recent publications and hence higher journal impact factors. The preference of the

Science Citation Index data-base for English language journals²², contribute to a low impact factor for the few Non-English journals that are included²³. As an example The Institute for Scientific Information's database for the social sciences contained only two German social science journals, whereas a German database contained 542²⁴. Last but not the least, American scientists, who seem particularly prone to citing each other^{25, 26}, dominate these databases to such an extent (over half of the citations) as to raise both the citation rate and the mean journal impact of American science 30% above the world average²⁷. Keeping in views these limitation of IF, some new methods have recently been developed that may help in updating or modifying the methods of evaluation of the IF in the future. For example, Hirsch has developed a new method called the h-index, which aims to evaluate the impact of individual scientists²⁸. It has also been realized by Bollen et al²⁹ that the IF, which clearly measures popularity, is not without its value, because it is scientists' peers who are citing their papers, however to add prestige to the scientists, they have invented a new parameter called the Y-factor in which multiplication of the page rank is done using the IF. The above discussion is our contribution to the discussion of IF, with a hope that this will enlightened both sides of the coin. This will also raise different questions and, finally the complex process of evaluating scientific work in biomedical research will be rationalized.

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AUTHOR AFFILIATION:

Dr. Syed Muhammad Tahir

Assistant Professor, Department of Plastic Surgery
Liaquat University of Medical and Health Sciences
Jamshoro, Sindh-Pakistan.

Email: syedsahib1@yahoo.com