Impact factor – the misnamed, misleading and misused measure of scientific literature

The issues raised and addressed by Balaram[1] are quite appropriate and applicable to the present day scenario of medical research – the way it is assessed. According to the new eligibility criteria of the Medical Council of India, for appointments and hierarchical promotions of teachers in medical colleges, the teaching faculty mandatorily need to publish 2–4 research/scientific articles. Academic performance of the teaching faculty is assessed by the number of research publications in reputed journals and impact factor (IF) is being used to provide a gross approximation of the prestige of journals in which individuals have to publish.

IF was originally described as a useful tool for planning library choices, programming personal journal buying and reading, and directing scientific journal editors in their editorial strategies. Now, IF is considered as the most common bibliometric quantitative parameter or criterion in use today and has mostly replaced subjective criteria used in the past to define journal quality and prestige. It is thus a dynamic parameter and an indicator of the editorial quality of a journal[2]. Further, it is being considered more as a reputed index of the scientific production of a single author.

On the other hand, we have been hearing several voices against the credibility of IF, branding it as – the misnamed, misleading and misused measure of scientific literature[3]. Seglen has even gone to the extent of making a bold statement that the IF should never be used to evaluate research, as it takes into account only the papers published in the last 2 years and in fact many papers are appreciated after several years of their publication and then referred, while many others continue influencing others' research for much longer period[4]. In addition, items such as new articles and powerful editorials (like the one being referred to), which are regular feature of some journals are not counted in the denominator of the IF, but citations to those may be included in the numerator, inflating the IF of journals that publish such articles. Further, this does not work well since a small number of publications on the so-called 'hot topics' are cited much more than the majority, contributing significantly to the IF of the journal[5]. There are numerous rather misleading variables, such as the average number of bibliographical references in a single article, self-citations, 'salami publications', which may influence the IF, and so IF, though adequate to judge entities such as journals, institutes and whole scientific communities, appears to be inadequate to evaluate accurately the quality of the single investigator, paper and research group[6].

Many other parameters, viz. the visibility and quantum of the circulation of the journal including availability of electronic formats and options for on-line search and retrieval, editorial standards, especially rapid and effective peer-reviewing and a short-time lag between acceptance and publication and number of self-citations and citation density (the ratio of references to articles) and also the inclusion of many review articles containing hundreds of references to recently published articles, influence the citation rate of a particular journal's articles and, therefore, its IF[7]. It has also been suggested that half the literature published is redundant as it is never cited clearly suggesting that the assumption that all articles published in a journal are of similar quality is nonsensical[8]. Even Garfield, the originator of the IF, states that it is incorrect to judge an article by the IF of the journal[9].

Hansson[10], in criticizing the suggestion: '… the merit of a report is based on publication in journals with an IF greater than two', noted that many medical specialties have no journal with an IF greater than 2. He also noted that it can be difficult to publish clinical studies that cite work published in the previous 2 years fast enough to impact the IF[10]. Thus, the IF tends to treat clinical journals as less important. He and others have proposed that it should be rejected as a guide to the quality of research[2].

Majority of the Indian biomedical journals are neither indexed with *Medline*/*Science Direct* nor full texts of the same are available freely online to facilitate citation by any author. In India, there are very few journals which have IF greater than one. Hence, there always exists a gap or deficit in citing any work by the next researcher.

Another big problem is in assessing the quality and quantity of publications of an institute for its accreditation purpose. How does one compile the IFs of the journals of a large number of total articles of various disciplines published by the teachers of an institute, in the absence of citation indexes in the Indian environment[11]?

However, for the last 10–12 years, ever since the establishment of Indian Electronic Biomedical Database (*IndMED* and *MEDind*), the scenario has changed. Free full texts of almost 100 Indian biomedical journals from year 2000 onwards are available online. Even the *Indian Citation Index* has been published, but will take time to be an effective tool. Now, the issues already raised about IF, and its use to assess the quality of an article and a journal will start appearing in our Indian scenario. Having been aware of all the pros and cons of these controversial issues, we are always at an advantage of overcoming these problems before they are born. It is left to our wisdom to make the optimal use of the IF.

In spite of all these, valid arguments and aforesaid understandings, it is indeed a pity that the policymakers (Ministry of Human Resource and Development) in the government in our country have erred in classifying Indian universities based on the research output, as assessed using the misleading tool, viz. IF!

Bibliometricians and scientists have been devising different indexes to assess the research impact in science domain especially since the last decade. Bibliometric indexes mainly based on citation and publication analysis, are the emerging and the most used tools to perform research evaluation of people and their contributions making citation the cornerstone of scientific impact. There is increasing interest in understanding how to assess objectively the research performance of research teams and individual scientists in the recent past. Today, many indexes such as *h*-index, *g*-index, *hg*-index, *m*-index, *Tol*-index, etc. are being used for assessing the scientists and their research, but the question again

is that – which indexes should be used for assessment?[5]

IF has one specific meaning: it is a clear measure of the extent to which a given journal functions as a connector of researchers in a specific field. This is one (but only one) critical function of medical journals[8]. Authors should submit their research results and manuscripts to journals that are easily available and are read by their peers (the most interested audience) and pay less attention to journal impact factors[7].

A more informed and balanced judgement on the part of the expert committees for selection, appointment and promotion of individuals or for assessment and accreditation of institutes, is required until a more concrete index or formula is devised.

This being the status, it is quite but natural for many across the country to express their concern and doubts as to whether the medical research in the country is properly evaluated or not and thereby the institutes are justly graded/accreditated or not. I must congratulate Balaram[1] for disseminating such thought provoking and wisdomful editorial which certainly does its share of contribution in sensitizing the minds of our researchers and policymakers.

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P. F. KOTUR

Sri Devraj Urs University,
Kolar 563 101, India
e-mail: profkotur@gmail.com

Double-blind review process

Nature Geoscience and *Nature Climate Change* have recently announced that they will adapt a double-blind review process, which means, that authors of a study will be kept anonymous, just like how reviewers names are not revealed to the authors[1]. They will adapt this process initially on a trial basis, which is currently effective. This initiative was taken after a survey was conducted in June 2012, where 27,137 people were invited for a feedback; however, they received 1002 responses between 6 and 22 June 2012 (ref. 2). It was astonishing to know that a majority of people have shown a common interest a peer review under double-blind conditions, where both referees and authors are kept anonymous. The survey results show that three-quarters of respondents agreed that double-blind peer review is a worthy exercise, where only 16% disagreed[1]. They further specified that generally female authors are subjected to a harder peer review than their male colleagues[1,3]; thus, if the first author is unknown, this bias will be largely removed.

The double-blind review system is said to increase the accountability and remove any bias, which is generally hard to achieve through a traditional review process where the reviewers can have several conflicts of interest that could easily sway their decision. This is because, generally, reviewers are chosen from a similar area of research as the submitted manuscript. Thus, if working on a similar research problem, they might reject the paper or delay its publication[4]. Similarly, junior researchers may also be reluctant to criticize the work of their senior peers. Thus with anonymity, such bias may not be apparent[5].

A double-blind peer review could also help remove the bias in getting funds for a project. The different projects are also peer-reviewed by experts, however, as with the research publications; the chances to get biased responses are multiple. Therefore, it would be a great idea if a double-blind-peer review is also adapted here. It is true, that unlike papers, the projects are generally assessed based on the qualification of an applicant, which has to be mentioned, however, if just the name of the applicant is kept anonymous, it will serve the purpose. Therefore, the review process will be fruitful and it will help the right applicant to get funds.

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A. A. SHAH

Applied Geology,
Curtin University,
Sarawak, Malaysia 98009
e-mail: afroz.shah@curtin.edu.my

Cherish investigation or perish: role of law in earthquake forecasting

The verdict of an Italian court read that a group of seismologists was guilty for wrong prediction of the impending L'aquilla earthquake which killed 309 people on 6 April 2009 and sentenced them to prison. A question was asked to them whether an earthquake will occur due to the many foreshocks that were observed in the previous months. Their investigations showed that there will not be a big earthquake, which was later found wrong and hence a punishment was announced. This is being debated among seismologists and other scientists globally.