Impact factors: Misuse and initiatives

Pharmacy academics, researchers and practitioners around the world have been affected by "journal impact factors" to some extent. It is crucial for everyone to fully understand what it is, how it is used or misused and some initiatives to supplement or substitute this conventional approach.

BACKGROUND

The impact factor (IF) of a refereed journal, or widely known as "Journal Citation Reports (JCR) IF", was created by the Institute for Scientific Information in 1975. The company name was later changed to "Thomson Reuters"[1] that has published JCR with two editions: JCR science and social sciences. JCR is claimed to provide a systematic, objective means to assess the world's leading research journals and enable readers to compare journals and find the most significant ones for their research or practice.[2] From the JCR homepage, users can select a JCR edition, year or search option, i.e., a subject category, publisher, country or specific journal. As for pharmacy practice and clinical pharmacy, the subject category is "Pharmacology and Pharmacy" in the Science Edition or "Social Sciences, Biomedical" in the Social Sciences Edition. After a search, the full record of journals will pop up to detail all evaluated journals, some of which retrieved from the 2012 JCR[3] are demonstrated in the Table 1.

As can be seen in the table above, the JCR record covers eight indicators or metrics ranging from the 2012 total cited (the total number of times that the journal is cited by all indexed journals in the database within the JCR year) to the article influence scores.[4] However, IFs and 5 year IF are mostly utilized to indicate how important a journal is in the discipline; journals with higher IF are regarded as more essential with higher ranking than those with lower ones. An IF refers to "a measure that reflects the average number of times that articles from a journal is cited by articles in indexed journals within a particular year".[4] IF is usually considered after 2 years of journal publication or at least within a 3 year period. For instance, IF for 2013, which will be analyzed and published in 2014, can be calculated using the equation below.

$$IF = \frac{\text{Number of times that articles published in a journal in 2011-2012 were cited in indexed journals during 2013}}{\text{Total number of "citable items" published by that journal in 2011-2012}}$$

where "citable items" = Original articles, reviews, proceedings or notes (excl. editorials or letters to the editor).

LIMITATIONS

Like most generic measures, the validity and reliability of IFs remain controversial. IF varies with academic disciplines or the number of citations in the field, such as IF for pharmacy practice journals being in the range of 0.001-2.000 or for medical sciences 0.001-30.000.[3] Thus, different disciplines have different IF values and they cannot be compared between disciplines. Regarding journals indexed in the JCR database, most need to submit their applications for further selection and some are invited by the JCR expert panel. A new journal with either new or existing volumes will receive an IF only after being indexed for 3 years as demonstrated in the equation above. Moreover, journals with only online or open access versions, like Archives of pharmacy practice, seem to be overlooked. Peter Butler of Springer SBM Publisher discussed the IF issues at the joint meeting between the International Advisory Board and the Reviewers of IJCP in Prague, Czech Republic on October 17, 2013. He pointed out that.

"The Journal IF was initially only designed to reflect the impact of a journal, but that it usually reflects the impact of a number of papers in that journal. One highly cited article can stand next to many not-cited articles, yet the journal will have a reasonable IF, whereas the real scientific impact of the whole journal in fact is not high. It is quite an unbalanced measure."

According to Thomson Reuters, the 2013 JCR released in 2014 will cover 10,853 influential journals of 232

Access this article online	
Quick Response Code:	Website: www.archivepp.com
	DOI: 10.4103/2045-080X.128368

Table 1: The 2012 JCR record of some pharmacy practice and clinical pharmacy journals

Abbreviated journal title	ISSN	JCR data						Eigen factor metrics	
		2012 total cited	Impact factor	5-year impact factor	Immediacy index	2012 items	Cited half-life	Eigen factor score	Article influence score
Am J Health-Syst Ph	1079-2082	3749	1.984	2.051	0.552	154	5.8	0.00876	0.548
Drug Inf J	0092-8615	510	0.401	0.418	0.184	76	>10.0	0.00145	0.228
Eur J Hosp Pharm S P	2047-9956	12			0.235	51		0.00000	
Int J Clin Pharm-Net	2210-7703	99	0.859	0.859	0.139	101		0.00033	0.192

JCR=Journal citation reports, ISSN=International standard serial number

disciplines in 83 countries.[5] Despite the large number of indexed journals, numerous periodicals are not interested in it or not chosen by the JCR panel. In pharmacy practice and clinical pharmacy, fewer than 30 journals have been included and given IF; some have no IF on account of irregular publications or other reasons.[3] In addition, reviewed journals are usually cited more than research ones, thereby resulting in higher IF.[4] A possible explanation is they are comparatively easy to read and utilized. This is also true for reviewed articles compared with original reports. In order to increase journal's IFs, some editorial policies have been put in place, based on the IF equation, to maximize the numerator and minimize the denominator. Few intriguing strategies[6] are to increase reviewed articles, reduce other uncitable items (e.g., case reports, editorials and letters to the editor), publish potentially cited papers at the beginning of the year to give more time for citation, or force authors to cite at least one paper from the journal (or so-called "coercive citation"[7]).

Misuse

As suggested by JCR, IFs along with other metrics provided are of help to five groups of people:[8]

- Librarians can support, evaluate and document the value of their library research investments
- Publishers can determine journal's influence in the marketplace, review editorial policies and strategic direction monitor competitors and identify new opportunities
- Authors and editors can identify the most appropriate, influential journals in which to publish
- Researchers can discover where to find the current reading list in their respective fields
- Information analysts and bibliometricians can track bibliometric and citation trends and patterns.

In theory, IF and other metrics may be used with the aforementioned limitations. Nevertheless, in practice IF is prone to misuse either directly or indirectly. IF should not be applied to the assessments of individual researchers or institutions, but many universities tend to make use of it so as to evaluate the performance of researchers for recruitment, promotion, or funding decisions.[9] In the UK, to partake in the 2014 Research Excellent Framework (REF 2014),[10] which is a new system used to assess UK universities' research in order to allocate research funding, each academic member needs to submit four quality research outputs (or papers) published during 2008-2013. Although REF does not specify the exact criteria for the quality of research outputs, most universities prefer to include research articles published in journals with IF at least 3.0 (British academics; personal communication). If this is the case, pharmacy practice papers are likely to be excluded as most are printed in low-impact journals. Aside from that, it seems to create a misperception, or a sense of superiority, among researchers: Those who are able to publish their papers in a journal with high IF are perceived as more knowledgeable or skillful in research. With respect to a critical evaluation of a research article, we sometimes need to ask, "Is it published in a reputable peer reviewed journal?" Again, IF is primarily employed to clarify the journal's reputation, which is deemed inappropriate.

Initiatives

In response to the misuse of IF, some initiatives for assessing research publications have been introduced. One of commonly used indicators is H-index, which measures the impact of an individual's article rather than the whole journal.[11] It can control the effect of a small number of highly cited papers and reward consistent outputs.[12] This index, apart from IF, has been accepted by several research funding bodies, such as German Research Foundation (Deutsche Forschungsgemeinschaft).[13] Other interesting publication metrics are PageRank algorithm,[14] Twimpact factor and Twindex[15] and article-level metrics.[16] In December 2012, the American Society for Cell biology with the assistance of editors and publishers of scholarly journals announced the San Francisco Declaration on Research Assessment (DORA),[17] which is a global initiative

to improve the evaluation of research outputs. Many large research organizations have already signed the declaration to:

- Eliminate the use of journal-based metrics, such as Journal IFs, in funding, appointment and promotion considerations
- Assess research on its own merits rather than on the basis of the journal in which the research is published; and
- Capitalize on the opportunities provided by online publication, such as relaxing unnecessary limits on the number of words, figures and references in articles and exploring new indicators of significance and impact.

On the whole, the JCR IF influences the research work of researchers and research-related organizations world-wide. It renders some benefits and drawbacks. Owing to the IF misuse and limitations, several initiatives have now been exploited. It is envisaged that the DORA initiative that gains wide acceptance might replace IF for the evaluation of research publications in the near future.

Win Winit-Watjana

College of Clinical Pharmacy, University of Dammam, Dammam, Kingdom of Saudi Arabia

Address for correspondence:
Dr. Win Winit-Watjana,
College of Clinical Pharmacy, University of Dammam, King Faisal Road, P.O. Box 1982, Dammam 31441, Kingdom of Saudi Arabia.
E-mail: wwinit@gmail.com

REFERENCES

1. Company history: Historical highlights from across Thomson Reuters. New York: Thomson Reuters; 2013. Available from: http://www.thomsonreuters.com/about-us/company-history/. [Last cited on 2013 Dec 10].
2. Journal citation reports: The recognized authority for evaluating journals. New York: Thomson Reuters; 2013. Available from: http://www.thomsonreuters. com/journal-citation-reports/. [Last cited on 2013 Dec 10].
3. Thomson Reuters. 2012 JCR Science Edition: Pharmacology and pharmacy. New York: Thomson Reuters; 2013. Available from: http://www.ezp.ud.edu.sa. [Last cited on 2013 Dec 10].
4. Journal citation reports: Quick reference card. New York: Thomson Reuters; 2013. Available from: http://www.wokinfo.com/media/mtrp/jcr_qrc_en.pdf. [Last cited on 2013 Dec 10].
5. Introducing the 2013 release of the journal citation reports. New York: Thomson Reuters; 2013. Available from: http://www.thomsonreuters.com/articles/2013/introducing-the- 2013-edition-journal-citation-reports. [Last cited on 2013 Dec 10].
6. van Leeuwen T. Discussing some basic critique on Journal Impact Factors: Revision of earlier comments. Scientometrics 2012;92:443-55.
7. Wilhite AW, Fong EA. Scientific publications. Coercive citation in academic publishing. Science 2012;335:542-3.
8. Journal citation reports: 2013 release. New York: Thomson Reuters; 2013. Available from: http://www.wokinfo.com/products_tools/analytical/jcr/. [Last cited on 2013 Dec 15].
9. Patel VM, Ashrafian H, Ahmed K, Arora S, Jiwan S, Nicholson JK, *et al*. How has healthcare research performance been assessed? A systematic review. J R Soc Med 2011;104:251-61.
10. Research excellent framework. London: REF; 2012. Available from: http://www.ref.ac.uk/. [Last cited on 2013 Dec 20].
11. Hirsch JE. An index to quantify an individual's scientific research output. Proc Natl Acad Sci U S A 2005;102:16569-72.
12. El Emam K, Arbuckle L, Jonker E, Anderson K. Two h-index benchmarks for evaluating the publication performance of medical informatics researchers. J Med Internet Res 2012;14:e144.
13. Deutsche Forschungsgemeinschaft (DRG). Quality not quantity: DFG adopts rules to counter the flood of publications in research-Press release no. 7. Bonn: DRG; 2010. Available from: http://www.dfg.de/en/service/press/press_ releases/2010/pressemitteilung_nr_07/index.html. [Last cited on 2013 Dec 20].
14. Bollen J, Van de Sompel H, Hagberg A, Chute R. A principal component analysis of 39 scientific impact measures. PLoS One 2009;4:e6022.
15. Eysenbach G. Can tweets predict citations? Metrics of social impact based on Twitter and correlation with traditional metrics of scientific impact. J Med Internet Res 2011;13:e123.
16. Fenner M. What can article-level metrics do for you? PLoS Biol 2013;11:e1001687.
17. San Francisco Declaration on Research Assessment (DORA). Bethesda, MD: The American Society for Cell Biology; 2013. Available from: http://www.am.ascb.org/dora/. [Last cited on 2013 Dec 20].

How to cite this article: Winit-Watjana W. Impact factors: Misuse and initiatives. Arch Pharma Pract 2014;5:3-5.