Journal of Animal and Veterinary Advances 8 (12): 2485-2488, 2009
ISSN: 1680-5593

How Effective Use Hirsch Index to Assess a Journal? A Study of Evaluation the Hirsch Index of Chinese Medical Journal

Qi Yu, Weidong Han, Yanli Wang, Kena Wei, Sihai Zhao, Penghui Yang and Liu Enqi
Laboratory of Animal Center, School of Medicine, Xi'an Jiaotong University, Xi'an, 710061, China

Abstract: The Hirsch index (h-index) originally suggested the h-index for application at the micro level. The h-index can be used not only for the lifetime achievements of a single researcher but can be applied to any (more extensive) publication set. For example, the h-index can be used for evaluating the scientific impact of journals as a robust alternative indicator that is an advantageous complement to journal impact factors. In current study, the h-index of Chinese Medical Journal and relative h-index from 1999-2008 was evaluated and compared with other two peer journals. We found that the validity of the h index should the new measure of journals be implemented.

Key words: Hirsch index, relative Hirsch index, evaluation, journal, impact factors, web of science

INTRODUCTION

Hirsch (2005) recently proposed a new research performance indicator that is designed for application at the micro level. According to Hirsch's definition, a scientist has index h if his/her N papers have at least h citations each and the other papers have fewer than h citation each. Hirsch's index (h-index) is an original and simple new measure incorporating both quantity and visibility of publications (Egghe and Rousseay, 2006). A further advantage seen for the h index is that the necessary data for calculation is easy to access in a database without the need for any off-line data processing (Batista *et al*., 2006). The proposed new measure of research performance has immediately provoked reaction in research community (Ball, 2005; Anonymous, 2005) and it is an advantageously supplement to assess the outcoming of scientists when associating with the number of citations and Impact Factor (IF).

After the short time, some researchers have adapted h-index into journals (Braun *et al*., 2005), which is an effective supplement to only use IF to assess journals. As well known, IF has many defects such as excessively high IF on review of the journals, a unfair assessment toward some journals of slowly developing fields, too sensitive few journals which have much accidental excess of uncited publications etc. (Kurmis, 2003; Garfield, 2006). For those reasons, Web of Science (Thomson Scientific) and Scopus (Elsevier) database offers a convenient way to get h-index and researchers can associate with IF, immediately index, citing half-life, cited half-life etc., to synthetically assess journal's academic level.

Chinese Medical Journal is well-known and Influential biomedical journal in China (Zhaori, 2007). In this study, the evolution of h-index of Chinese Medical Journal (Chin. Med. J.) from 1999-2008 was performed, the changing tendency of this period was also analyzed using a relative h-index and compared with other two peer-reviewed journals.

MATERIALS AND METHODS

The evaluation of Chinese Medical Journal h-index and relative h-index: Retrieving all source items of Chinese Medical Journal, sorting them by the number of Times Cited from Web of Science database, the highest rank number can be found which is still lower than the corresponding Times Cited value. This is exactly the h-index of the journal for the given year (Braun *et al*., 2005). We retrieved the h-index of Chinese Medical Journal for 10 years (1999-2008) on May 10, 2009, reviewed independently by two investigators.

The h-index of Chinese Medical Journal for 10 years is shown in Fig. 1. The early volumes of journal have high-cited and lead to high h-index. The SPSS13.0 software was used to analyze the linear relationship between the h-index and years. As shown in Fig. 1, the Pearson correlation coefficient of the regression line is 0.566, there is a statistical significance (5% level). It is period over which a volume can collects citations, also the number of publications at that volume influences the

Corresponding Author: Enqi Liu, Laboratory of Animal Center, School of Medicine, Xi'an Jiaotong University, West Road of Yanta, Xi'an, Shaanxi 710061, China

Fig. 1: The h-index of Chinese Medical Journal

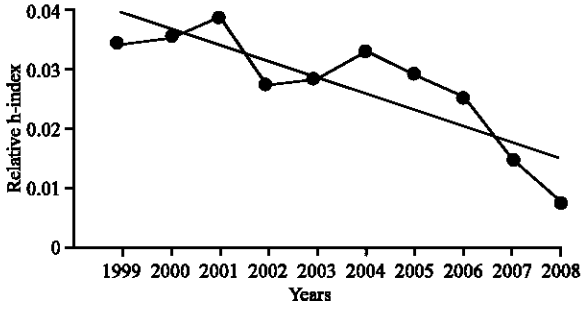

Fig. 2: The relative h-index of Chinese Medical Journal

h-index. For those reasons, the h-index must be divided by the numbers of publications, which can result in a relative h-index (Rousseau, 2006). The results of relative h-index of Chinese Medical Journal showed in Fig. 2. Obviously, using the relative h-index leads to an increased linear (Fig. 2), the Pearson correlation coefficients of the regression is 0.846, the value is higher than that in h-index, showed statistically significant (5% level).

In addition, we found two different tendencies between 1999-2004 and 2004-2008. In period of 1999-2004, the Pearson correlation coefficient is 0.499, which is low, even without statistically significant (5% level). However, in last period of 2004-2008, the Pearson correlation coefficient is 0.980, which is remarkable high and statistically significant (1% level). The numbers of publication of Chinese Medical Journal increased recently suggested that variation of h-index of Chinese Medical Journal has been influenced by cited numbers of every year. The h-index and relative h-index tends to be a linear increase over time, illustrates that new publications need time to be extensively known and accepted.

The comparison Chinese Medical Journal and other two Chinese journals: We compared Chinese Medical Journal with another two biomedical journals, Acta Pharmacologica Sinica (Acta Pharmacol. Sin.) and Science in China Series C: Life sciences (Sci. China C). We can found clearly from Fig. 3, the h-index of Chinese Medical Journal is higher than Science China C, but lower than Acta Pharmacologica Sinica in the past 10 years. The h-index can be easily influenced by number of publications (Rousseau, 2007). The h-index of Science China C is the lowest, because the journal numbers of publications is also the lowest. Compared with Acta Pharmacologica Sinica and Science China C, the relative h-index of Chinese Medical Journal is the lowest (Fig. 4).

The IF of the three journals from 2001-2008 is also retrieved using Web of Science database. The IF of Chinese Medical Journal is higher than that of Science China C, but lower than Acta Pharmacologica Sinica

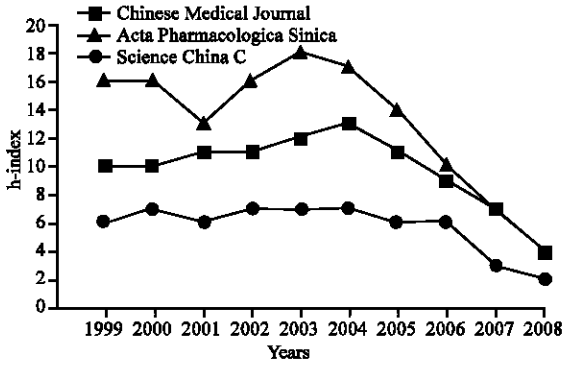

Fig. 3: Comparison of h-index of Chinese Medical Journal and other two journals

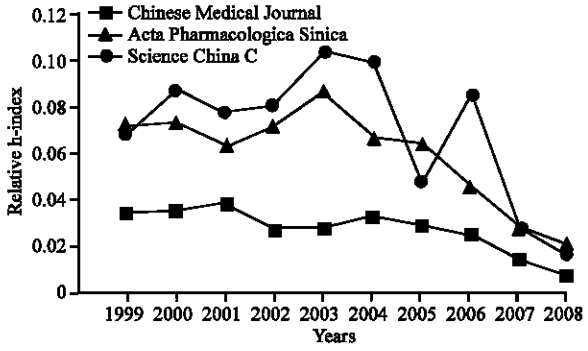

Fig. 4: Comparison of relative h-index of Chinese Medical Journal and other two journals

(Fig. 5). The Subject Category of Chinese Medical Journal is Medicine, General and Internal in Web of Science database, the most famous journal in this field of subject is The New England Journal of Medicine (N. Engl. J. Med.), ISI Journal Citation Reports® Ranking is 1/107, Chinese Medical Journal is 76/107. Undoubtedly, it is an extremely difference between two journals in any aspect. However, we found that the IF of Chinese Medical Journal was 4.77 times increased from 2001-2008, which was growing faster than New England Journal of Medicine, the latter only increased 1.58 times.

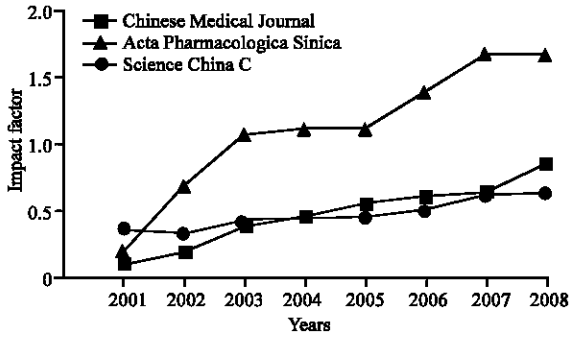

Fig. 5: Comparison of impact factor of Chinese Medical Journal and other two journals

RESULTS AND DISCUSSION

Because of many advantages over other bibliometric measures that the h-index offers as an evaluative measure for assessing the research output of scientists (Hirsch, 2005), research groups (van Raan, 2006) and journals (Braun *et al*., 2005) and due to a simple calculation based on Web of Science or other database.

According to Glanzel (2006), any Web of Science document type can be considered when determining the h-index, because the h-index is not changed by adding typical lowly cited papers (such as meeting abstracts) or typical highly cited papers (such as reviews). Therefore, the h-index has been well received in the scientific community.

This is exactly the h-index of the journal for the given year (Braun *et al*., 2005). Since, the h-index can not be larger than the number of papers it is based on, Braun *et al*. (2005) did not include in their exemplary calculations of the h index of various journals with a high visibility in science.

To avoid excluding certain journals for comparative purposes and to calculate a journal h-index whose value is largely independent of the number of papers published in a journal, Rousseau (2006) proposed journal relative h-index. We found the Pearson correlation coefficient of the regression of relative h-index is higher than that in h-index.

However, there are some evidences to show that h-index had its disadvantages. For example, the h-index can combines with the effect of quantity (numbers of publication) and quality (citation rate) when it is used to evaluate output of scientists. Nevertheless, it seems lacks the necessary accuracy to evaluate the journals, because of h-index is largely independent of the number of paper published in a journal (Bornmann and Daniel, 2008). Obviously, there will be thorough validation of the h-index.

CONCLUSION

We think that the h-index is certainly useful to supplement IF, it should be applied as an addition and not as a substitutefor other indicators that have become established standards in recent years (Bornmann and Daniel, 2008).

REFERENCES

Anonymous, 2005. Data point-impact factor. Science, 309: 1181. http://www.sciencemag.org/cgi/reprint/309/5738/1181a.pdf.

Ball, P., 2005. Index aims for ranking of scientists. Nature, 436: 900. PMID: 16107806. http://www.nature.com/nature/journal/v436/n7053/pdf/436900a.pdf.

Batista, P.D., M.G. Campiteli and O. Kinouchi, 2006. Is it possible to compare researchers with different scientific interests? Scientometrics, 68: 179-189. DOI: 10.1007/s11192-006-0090-4. http://www.citebase.org/fulltext?format=application/pdf&identifier=oai:arXiv.org:physics/0509048.

Bornmann, L. and H.D. Daniel, 2008. What do citation counts measure? A review of studies on citing behavior. J. Doc., 64: 45-80. DOI: 10.1108/00220410810844150. http://www.lutz-bornmann.de/icons/BornmannLutzCitingBehavior.pdf.

Braun, T., W. Glanzel and A. Schubert, 2005. A Hirsch-type index for journals. Scientist, 19: 8. http://www.steunpuntoos.be/WG_Papers/Scientist_19_22_8.pdf.

Egghe, L. and R. Rousseay, 2006. An informetric model for the Hirsch-index. Scientometrics, 69: 121-129. http://www.springerlink.com/content/u104552167x14603/fulltext.pdf.

Garfield, E., 2006. Identifying Nobel class scientists and the uncertainties thereof. http://www.garfield.library.upenn.edu/papers/lund2006.pdf.

Glanzel, W., 2006. On the h-index: A mathematical approach to a new measure of publication activity and citation impact. Scientometrics, 67: 315-321. DOI: 10.1556/Scient.67.2006.2.12. http://www.springerlink.com/content/j8q11n8576125317/fulltext.pdf.

Hirsch, J.E., 2005. An index to quantify an individual's scientific research output. Proc. Natl. Acad. Sci. USA., 102: 16569-16572. DOI: 10.1073/pnas.0507655102. PMID: 16275915. http://www.pnas.org/content/102/46/16569.full.pdf+html.

Kurmis, A.P., 2003. Understanding the limitations of the journal impact factor. J. Bone Joint Surg. Am., 85: 2449-2454. PMID: 14668520. http://www.ejbjs.org/cgi/reprint/85/12/2449.

Rousseau, R., 2006. New developments related to the Hirsch index. Sci. Focus, 1: 23-25 (in Chinese). http://eprints.rclis.org/archive/00006376.

Rousseau, R., 2007. A case study: Evolution of JASIS? Hirsch index. Sci. Focus, 1: 16-17 (in Chinese). http://www.citebase.org/fulltext?format=application%2Fpdf&identifier=oai%3Aeprints.rclis.org%3A5430.

van Raan, A.F.J., 2006. Comparison of the Hirsch-index with standard bibliometric indicators and with peer judgment for 147 chemistry research groups. Scientometrics, 67 (3): 491-502. DOI: 10.1556/Scient.67.2006.3.10. http://www.springerlink.com/content/jx04n72413rk03u5/fulltext.pdf.

Zhaori, G., 2007. Looking back at the past and seeking for greater development: In commemoration of the 120th anniversary of the Chinese Medical Journal. Chin. Med. J., 120: 443-446. http://www.cmj.org/periodical/PDF/200731952023160.pdf.