Naunyn-Schmiedeberg's Archives of Pharmacology (2018) 391:1033–1035
https://doi.org/10.1007/s00210-018-1529-x

BRIEF COMMUNICATION

Do review articles boost journal impact factors? A longitudinal analysis for five pharmacology journals

Marjan Amiri[1] · Martin C. Michel[2]

Received: 14 June 2018 / Accepted: 15 June 2018 / Published online: 21 June 2018

Abstract

The impact factor is a frequently applied tool in research output analytics. Based on five consecutive publication years each of five pharmacology journals, we have analyzed to which extent review articles yield more impact factor-relevant citations than original articles. Our analysis shows that review articles are quoted about twice as often as original articles published in the same year in the same journal. We conclude that inclusion of review articles does not substantially affect the impact factor of a journal unless they account for considerably more than 10% of all published articles.

Keywords Impact factor · Review articles · Pharmacology

Introduction

The impact factor (IF) was introduced more than 50 years ago by Eugene Garfield to assist librarians in selecting source journals (Garfield 2006). Meanwhile, it is frequently used to evaluate departments, researchers, or even individual publications. For instance, some search or tenure committees look at the sum of IF points accumulated by a candidate and some universities allocate departmental budgets based upon the accumulated IF points. However, the IF has never been intended or validated for such purposes and is unfit for it (Garfield 2006). For instance, the IF of a given journal can change considerably over time (Ioannidis et al. 2010) and journals in some medical disciplines have a much higher median IF than those of other fields (Baethge 2012) despite lacking evidence that research in one field is inherently of greater quality than the other. Despite these limitations, many scientists select journals for submission of their manuscripts at least partly based on IF. Realizing such practice, journals in turn are interested in boosting their IF to attract the best possible manuscripts in their fields.

There is a general assumption among journal editors that review papers by average attract more citations and that inclusion of many review papers may be helpful to increase the IF of a journal. Only little data is available whether this assumption is true and how effective inclusion of review articles is to boost the IF of a journal. Against this background, we have empirically explored for five international pharmacology journals over a 5-year period whether review articles indeed accumulate more citations and how this affects the overall IF of a journal.

The IF is calculated based on their proprietary Web of Science® database (www.webofknowledge.com) using the equation

$$\mathrm{IF} = \frac{(\text{citations in year x to source items published in years } x{-}1 \text{ and } x{-}2)}{(\text{number of source items in years } x{-}1 \text{ and } x{-}2)}$$

The Web of Science® website lists the number of total source items and classifies them, e.g., as "original articles" or "reviews." Number of citations can be viewed separately for each category of source item and year of citation. This enables calculation of a pseudo-IF, i.e., the IF that would have

Electronic supplementary material The online version of this article (https://doi.org/10.1007/s00210-018-1529-x) contains supplementary material, which is available to authorized users.

✉ Martin C. Michel
marmiche@uni-mainz.de

[1] Institute of Medical Informatics, Biometry and Epidemiology, University Hospital Essen, Essen, Germany

[2] Department of Pharmacology, Johannes Gutenberg University, Obere Zahlbacher Str. 67, 51131 Mainz, Germany

Table 1 Pseudo-impact factors for original and review papers as well as official impact factor of five major pharmacology journals. See main text for calculation methods

		2009	2010	2011	2012	2013	Average
BJP	Original	4.119	3.720	3.119	4.003	3.706	3.733
	Review	10.529	10.867	11.262	7.556	7.985	9.640
	Official	5.204	4.925	4.409	5.067	4.990	4.919
EJP	Original	2.403	2.428	2.276	2.459	2.523	2.418
	Review	6.716	7.237	7.364	4.534	5.540	6.278
	Official	2.585	2.737	2.516	2.592	2.684	2.623
Life Sci	Original	2.401	2.330	2.198	2.130	2.030	2.216
	Review	7.231	5.000	5.171	5.186	4.510	5.419
	Official	2.560	2.451	2.527	2.555	2.296	2.478
MP	Original	4.476	4.735	4.665	4.328	4.053	4.451
	Review	14.556	7.211	11.138	9.800	7.500	10.041
	Official	4.531	4.725	4.883	4.411	4.120	4.534
Naunyn	Original	2.302	2.287	2.390	1.932	2.134	2.209
	Review	5.500	4.063	4.600	2.600	2.762	3.905
	Official	2.631	2.500	2.647	2.147	2.630	2.457

resulted had the journal only published original articles or only reviews.

We have chosen to look at five general pharmacology journals for our analysis. These included journals owned by two commercial publishes (Elsevier for European Journal of Pharmacology (EJP) and Life Sciences (Life Sci) and Springer-Nature for Naunyn-Schmiedeberg's Archives of Pharmacology (Naunyn)) and by academic societies (British Pharmacological Society for British Journal of Pharmacology (BJP) and American Society of Pharmacology and Experimental Therapeutics for Molecular Pharmacology (MP)). The five selected journals cover a range from those with high and with medium IFs, relative to all journals publishing original research within the field of pharmacology. Originally, we had planned to include the Journal of Pharmacology and Experimental Therapeutics, but it had published so few review articles during our analysis period that we did not consider the total number to be meaningful for the purpose of our analysis; therefore, we replaced it by MP, which is more specialized than the others but remains reasonably broad. To improve the robustness of our analysis, we performed all calculations and analyses for 5 consecutive years of IF assignment. Differences between total number of source items for a given journal and sum of original and review articles are caused by inclusion of some source items in the calculation of the official IF that are classified in other ways, e.g., as editorial material. All data underlying our calculations are shown in the Online Supplement.

As shown in Table 1, the five journals included in the analysis had mean official IFs in the 2009–2013 period ranging from 2.457 to 4.919. Within each journal and each year of analysis, the pseudo-IF based on reviews was about twice as high as that for original articles. However, the official IF was not much higher than the pseudo-IF calculated for original articles only, except for BJP (+ 32, 8, 12, 2 and 11% for BJP, EJP, Life Sci, MP, and Naunyn, respectively). To better understand this, we calculated percentage of source items classified as reviews on the Web of Science® website, which was 17.5, 4.8, 7.0, 3.1, and 8.3%, respectively for the five journals.

These data confirm the widely held belief that review articles are cited more often than original articles, but the difference may be smaller than expected, i.e., represents factor of about 2. Interestingly, reviews published in a journal with a relatively high IF (BJP or MP) had a greater pseudo-IF than those published in journals with medium IF. On the other hand, pseudo-IFs from BJP and MP (9.640 and 10.041) were lower than those of top journals only publishing review articles within the same field such as Annual Reviews of Pharmacology (20.862) or Pharmacological Reviews (19.396) in the same period. We propose that this may at least in part be related to the fact that articles published in leading review journals typically are much longer than those published in journals primarily reporting original research and, accordingly, can be quoted to support a broader range of claims.

Our analysis also shows that the effect of including review articles on the official IF was only moderate for most journals. The exception is BJP, in which 17.5% of all articles published were reviews. Mathematically, this is not surprising if the pseudo-IF for reviews within a journal is only twice as high as that for original articles. We conclude that inclusion of review articles can increase the IF of a journal; however, this only has a moderate effect on the IF unless review articles constitute a relatively large fraction of articles within a journal.

Author contribution MA and MCM jointly defined the research question and analyzed the data. MA drafted the manuscript, and MCM revised the manuscript for critical intellectual content.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

References

Baethge C (2012) Impact factor. Dtsch Arztebl International 109:267–269

Garfield E (2006) The history and meaning of the journal impact factor. J Am Med Assoc 295:90–93

Ioannidis JPA, Belbasis L, Evangelou E (2010) Fifty-year fate and impact of general medical journals. PLoS One 5:e12531