

# Journal impact factor: is it only used in China and South Asia?

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*Impact factor, as an important indicator for the evaluation of research performance, has always been the concern of scientists and scientometricians. For a long time, many Chinese researchers have believed that impact factor is used as an indicator to evaluate research performance only in South Asian countries and regions, especially in China. In this article, we study how impact factor is presented on the websites of medical journals indexed in Web of Science (WoS) in 2009, and examine the number of articles about impact factor published between 2001 and 2010 in the WoS and Scopus databases. Finally, we summarize the attitude of researchers in various countries towards impact factor. We conclude that impact factor is not only a concern in South Asia but also has a profound influence in Europe and other regions. It is widely used for academic evaluation in various fields. Therefore, infatuation with impact factor is a global phenomenon that has gradually spread to other regions, thus gaining more importance.*

**Keywords:** China, global infatuation, impact factor, medical journals, research performance evaluation, South Asia.

THE concept of impact factor (IF) was first introduced by Eugene Garfield<sup>1</sup> in 1955. It is undoubtedly one of the best-known scientometrics indicators<sup>2</sup>. In the late 1980s, the *Science Citation Index (SCI)*, together with the concept of IF, was introduced to China. Since then, much attention has been paid to using related indicators to evaluate research performance in the country. Lu Yong-xiang<sup>3</sup> pointed out that the journals were proud of being indexed in *SCI*. Also, the individual researchers regarded publishing articles in highly impacted *SCI* journals as their ultimate goal, and even one *SCI* article may determine their professional reputation. Li Guo-jie<sup>4</sup>, made a joke about *SCI*, suggesting that it stands for 'Stupid Chinese Idea', pointing out that it is wrong to evaluate research performance only by *SCI*. However, the role of IF in research evaluation has been recognized by the majority of research institutions and researchers in China. *SCI* and IF have played an important role in job promotion, achievement awards, funding applications, applications for academic degree authorization, and the ranking of universities or research institutions. Thus some researchers regard them as the '*SCI* phenomenon of

China'<sup>5</sup>. Meanwhile, some scholars believe that the use of IF for evaluating academic journals and research performance is popular mainly in Southeast Asia, especially in China<sup>6</sup>. However, on 20 April 2008, EASE<sup>7</sup> published a statement on inappropriate application of IFs. From this statement and its interpretation<sup>8</sup>, we can see that many countries (including Western developed countries) consider IF to be an important indicator for research evaluation.

In this article, we study how IF is presented on the websites of medical journals indexed in *Web of Science (WoS)* in 2009, and examine the increase in papers on topics related to IF published between 2001 and 2010 and listed in the *WoS* and *Scopus* databases. Finally, the attitude of researchers in various countries on IF has been summarized. The study shows that the use of IF for evaluating research performance is not restricted to China and South Asia.

## Impact factor in the websites of medical journals indexed in the *SCI* database

We statistically analysed 1259 *SCI* medical journals in andrology, anatomy, anesthesiology, clinical neurology, dermatology, emergency medicine, gastrointestinal medicine and hepatology, genetics, hematology, health-care science, immunology, infectious diseases, internal medicine, obstetrics and gynecology, oncology, ophthalmology, otolaryngology, pathology, pediatrics, pharmacology, physiology, psychiatry, psychology and gerontology (journal assignments were based on the 2009 edition of

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**Table 1.** Regional distribution of medical journals indexed in *Journal Citation Report* – 2009 displaying impact factors on their websites

Country (region)	Journal number	Journal (with impact factor) number	Percentage	Country (region)	Journal number	Journal (with impact factor) number	Percentage
New Zealand	3	3	100.0	Australia	28	19	67.9
Pakistan	2	2	100.0	Greece	3	2	66.7
Bosnia	1	1	100.0	USA	493	315	63.9
Poland	9	9	100.0	Japan	22	14	63.6
China*	6	6	100.0	Spain	12	7	58.3
Hungary	1	1	100.0	Sweden	4	2	50.0
United Arab Emirates	1	1	100.0	Romania	2	1	50.0
Finland	1	1	100.0	Singapore	2	1	50.0
Norway	13	12	92.3	Slovakia	2	1	50.0
Denmark	26	23	88.5	Germany	78	38	48.7
The Netherlands	51	42	82.4	Canada	16	7	43.8
Austria	5	4	80.0	Iran	6	2	33.3
Scotland	8	6	75.0	Saudi Arabia	3	1	33.3
Ireland	4	3	75.0	Turkey	11	2	18.2
UK	251	185	73.7	French	36	6	16.7
Italy	26	19	73.1	Korea	7	1	14.3
Switzerland	43	31	72.1	Brazil	9	1	11.1

\*Including one journal from Taiwan.

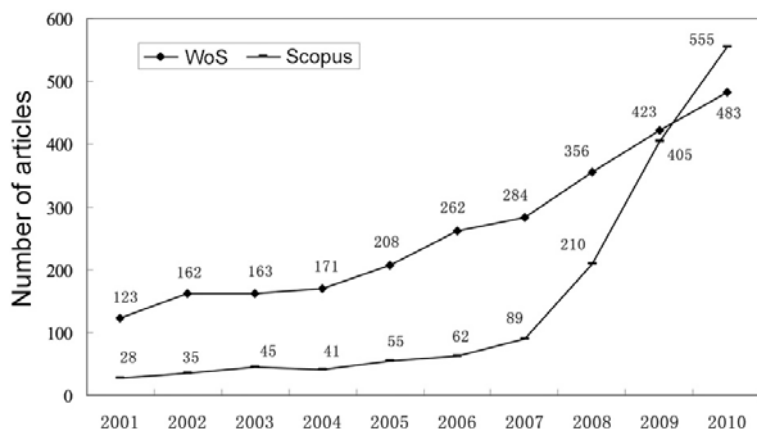
the *Journal Citation Report (JCR-2009)* in the *Web of Knowledge*). We conducted searches with the aim of understanding how IF was presented on each journal's website. Among the 1259 journals, 36 journal websites could not be traced, and 7 of the journals were not in English. The websites of 1216 journals were successfully accessed and of these 770 journals (63.3%) show IF on their websites (their distribution by country and region can be seen in Table 1). On 389 websites, the journals' IF is displayed prominently (e.g. IF was indicated by striking icons on the home page of the websites, at the top or on the side bars on the journal pages, as obvious icons at the introductory pages of the journals, or featured in a full column on the home pages); 187 journals show the ranking of their IF within their particular discipline; 513 journals introduce their indexing databases and 108 journals list their 5-year IF. On the website of the journal *Nature*, 'Citation and Impact Factor' appears in the section labelled 'About the journal' and makes the remarkable statement that its IF is 34.480 (ref. 9). Similarly, the journal *Science* states that 'the 2009 ISI Impact Factor for *Science* is 29.747!<sup>10</sup>. Among the top 10 *SCI* medical journals with the highest IFs in 2009, 7 displayed them on their websites, with 5 of these showing their IFs in prominent positions.

In Table 1, *SCI* journals displaying their IF on their websites were mainly located in Western developed countries and regions. Our study indicated that journals with high or improved IF typically display the same in a prominent position on their websites, in order to attract more interesting submissions. It was also noted that researchers pay more attention to a journal's IF if that journal is indexed in the *SCI* database.

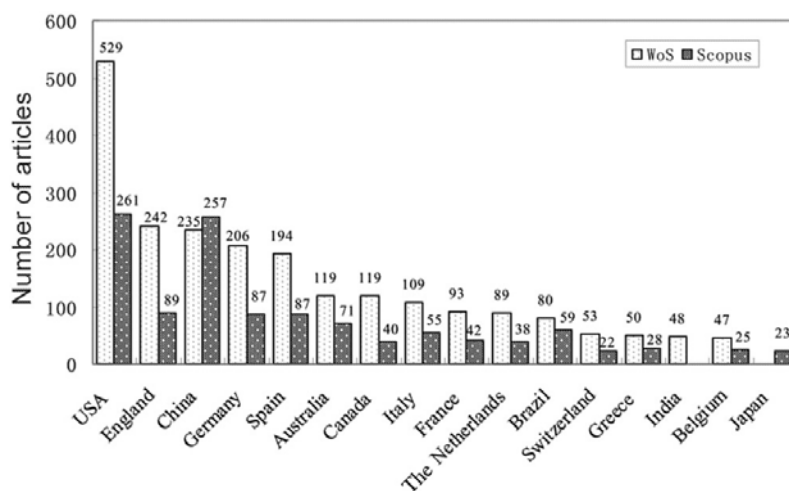
### The trend and distribution of articles focusing on impact factor, 2001–2010

In recent years, research focusing on IF has gradually increased. For instance, the study on the relationship between IF and other bibliometrics indexes<sup>11,12</sup>, on the use and misuse of IF<sup>13–15</sup>, on the tiering of IF<sup>16</sup>, and journal IF change or mutation<sup>17,18</sup>. We searched articles related to IF in both the *WoS* and the *Scopus* databases. *WoS* is one of the world's most influential multidisciplinary citation databases and *Scopus* is the world's largest abstract and citation database. We used 'impact factor\*' as our search term, and limited the search range to 'topic' (for the *WoS* database) and 'key words' (for the *Scopus* database). The time-period was set as 2001–2010. The results show that *WoS* and *Scopus* contain 2691 and 1996 records respectively. Excluding articles that bear no relation to the term 'impact factor' in scientometrics, there are 2635 documents in *WoS* (including 1746 articles, 607 editorials, 155 letters and 127 reviews), and 1525 documents in *Scopus* (including 935 articles, 360 editorials, 170 reviews and 60 letters). The trend in articles focusing on IF between 2001 and 2010 is shown in Figure 1. The top 15 countries with the highest number of articles related to IF in the same time-period are shown in Figure 2.

It can be seen from Figure 1 that the number of articles concerning IF increased continuously between 2001 and 2010, especially after 2007 and most noticeably in the *Scopus* database. This growth suggests that researchers and scientometricians are increasingly likely to pay attention to IF and use it while evaluating journals and research performance.



**Figure 1.** Number of articles on impact factor indexed in the *Web of Science* (WoS) and *Scopus* databases, 2001–2010.



**Figure 2.** Top 15 countries with the highest number of articles on impact factor indexed in the *WoS* and *Scopus* databases, 2001–2010.

Figure 2 shows that the top 15 countries with the highest output of articles on IF are distributed throughout North America, Europe, Asia, Oceania and South America. Most of them are developed countries. This result shows that IF is considered important not only in South Asian countries and China, but also has a profound influence in Europe and other regions. The continuous increase in the number of papers examining IF indicates that its applications already receive careful attention. IF is widely used in various fields for the evaluation of journals, scientists, universities and institutes, and countries and regions.

### Viewpoints of scholars on *SCI* and impact factor

We have mentioned earlier that the journals *Nature* and *Science* release their most recent IFs on their websites, which partly reflects the infatuation with *SCI* and IF in the international scientific community. In 2008, the American journal *Plasmonics* declared: the journal was being indexed in the ISI database and its IF had reached a

new high. The editor published a letter in the journal aimed at attracting more contributors and looking forward to suggestions that would contribute to the growth of *Plasmonics*<sup>19</sup>. In 2008, the *British Medical Journal* published an article which informed its readers that the journal's IF had greatly increased that year. It showed graphics depicting *BMJ's* increasing IF in recent years, and issued a call for more submissions<sup>20</sup>. *Briefings in Bioinformatics* excitedly reported that its IF had reached 24.37, and also expressed its thanks to the authors whose articles had received the highest number of citations, noting that this had helped to boost its IF<sup>21</sup>. Its British editor Karram<sup>22</sup> thanked contributors and editorial committees for their suggestions on how best to improve the journal's quality as its IF dramatically increased. *CMAJ* proposed that its reported IF did not represent the journal's actual value and expressed hope that authors would continue to focus on the journal and submit more articles for publication<sup>23</sup>. Abbasi<sup>24</sup> put forward the idea that the main motivation for authors submitting their papers to the *Lancet* was its high IF in the field of general medical and internal

medicine, and suggested that the journal's reputation could improve the academic standing of its articles. Kirchof<sup>25</sup> pointed out that the IF has drifted significantly from its original purpose. In addition, Western countries tend to share the view that higher IFs confer greater prestige upon journals. Governments tend to award funds to research institutions based on the number of their papers published in journals with high IF. Furthermore, IF determines promotions and bonuses in many research institutions and universities. Thus, it is widely used in research and performance evaluation in European countries and in the United States, and the so called 'SCI phenomenon' is gradually becoming a global academic phenomenon.

As early as 2002, Bachhawat<sup>26</sup> proposed the concept of 'impact factor syndrome', regarded as 'impact factor myth syndrome' by Elsaie and Kammer<sup>27</sup>. Recently, Lakhota<sup>28</sup> has once again proposed the existence of IF syndrome. Additionally, IF has been referred to as 'angel or devil'<sup>29</sup>, 'vitamin or poison'<sup>30</sup>, and 'Scylla and Charybdis'<sup>31</sup>. Journals have entered into 'races and games'<sup>32-34</sup> or even 'wars'<sup>35</sup> over IF, with some apparently even attempting to manipulate their scores<sup>36-38</sup>. Falagas and Alexiou<sup>39</sup> listed the top 10 most common 'tricks' about IF manipulation. Some journals even offer additional rewards to the authors of outstanding articles or highly cited papers<sup>40,41</sup>. 'Impact factor worship' is joining the SCI phenomenon as global academia's latest infatuation.

On 4 July 2011, the Ministry of Science and Technology of the People's Republic of China clearly outlined the overall science and technology development aims in its national '12th Five-year Science and Technology Development Plan', bringing SCI citation frequency into the national strategy for technological development for the first time. The specific requirement was that the cited frequency ranking of Chinese SCI papers would increase from eighth to fifth by 2015. This is likely to give rise to a new 'SCI craze' in China. IF is receiving such close attention that its increasing influence on journals and scientists may result in under-hand activities. Some scholars have pointed out that journal editors have deliberately induced their authors to cite articles recently published in their journals, in order to increase their citation scores. Moreover, journals tend to publish articles citing papers already published in their pages over the past two years, with the intention of improving their journal IF by increasing self-citation<sup>42,43</sup>. In addition, some editors tend to publish more commentary, expert discussions, outlook, or letters, as some scholars have indicated that this could increase IF by 30-40% (refs 44-46).

Despite the continued spread of the 'SCI phenomenon' and 'impact factor worship', scholars should pay special attention to the limitations of the SCI database and IF. First, the SCI database uses a 'cover to cover' indexing strategy, which means that when a journal is indexed, all articles in that journal are included, suggesting that not all the articles in the SCI database are of high quality.

Secondly, IF can be influenced by other non-academic factors, such as the journal publishing cycle<sup>47,48</sup>, excessive self-citation<sup>49</sup>, critical reference<sup>50</sup> and so on. IF therefore does not fully reflect the academic influence of journals. Thirdly, journal IFs may vary among different disciplines. Therefore, IF cannot be used for cross comparison between disciplines. Fourthly, IF can be applied as one of the indicators to evaluate journals but cannot be used to measure the impact of individual papers<sup>51</sup>. Journal IF is generally determined by only a few high-quality papers; thus, it is unreasonable to use journal IF to evaluate all papers published in any journal<sup>52</sup>. Only when the limitations of the SCI database and IF are noted, can their application in scientific evaluation be conducted in a more rational way.

## Conclusion

1. Most medical journals state their IF on their websites, including *Nature* and *Science*. The number of medical journals indexed in the SCI database gradually increased from 2001 to 2010, with marked increases in 2009. Moreover, journals originating in the US, UK and Germany ranked top three by numbers indexed in this time-period. In the past 10 years, the number of papers examining IF has gradually increased, with most output occurring in European countries and US. It has been indicated that interest in SCI and IF has gradually increased in international academic fields, and that this trend became more prominent between 2001 and 2010.

2. It is noteworthy that there are some limitations on using SCI and IF as tools for scientific research performance evaluation. However, both have played an important role in worldwide academic evaluation in the past 10 years, a phenomenon that could intensify.

3. Chinese researchers first proposed the concept of 'SCI phenomenon', followed by Indian researchers who proposed the concept of 'impact factor syndrome', and American researchers who proposed the notion of the 'impact factor myth'. Journal IFs in the SCI database are widely used in various fields of scientific evaluation in China, India, the US, UK, Germany, Finland and other countries. The 'SCI phenomenon' and 'impact factor syndrome' exist not only in developing countries, but are also widespread in Western developed countries, and have gradually become a global 'SCI phenomenon' and 'impact factor worship'.

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