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Impact factor trends for general medical journals: non-English-language journals are lagging behind

Siri Vinther[b], *Jacob Rosenberg*[a,b]

[a] Ugeskrift for Læger (Journal of the Danish Medical Association), Copenhagen, Denmark
[b] Department of Surgery, Herlev Hospital, University of Copenhagen, Herlev, Denmark

Summary

BACKGROUND: The impact factor (IF) is a common citation metric used for evaluating and comparing scientific journals within a certain field. Previous studies have shown that IFs are increasing. However, rates may depend on journal publication language.

The aim of this study was to determine IF values and trends for general medical journals, comparing non-English-language with English-language journals.

METHODS: For all journals categorised as "medicine, general and internal" (n = 150) in the Journal Citation Reports (JCR), publication language, country of origin and IFs for the last 10 years were recorded (2001–2010).

Data were classified, analysed descriptively and compared using non-parametric tests.

RESULTS: From 2001 to 2010, IFs increased for English-language and non-English-language journals ($p < 0.001$). During the 10-year study period, IFs were higher for English-language than for non-English-language journals ($p < 0.001$).

The proportion of non-English-language journals included in the JCR was 12.2% in 2001 and 18.0% in 2010 ($p = 0.28$).

INTERPRETATION: From 2001 to 2010, IFs increased significantly for English-language and non-English-language journals. When comparing IF values year-by-year (2001–2010), IFs were significantly higher for English-language than for non-English-language journals.

In an international scientific community with English as the universal language of science, non-English-language journals should consider changing publication language, and adopt either a bi- or a monolingual approach. Publishing in English will increase citation counts and thus IFs, but, more importantly, scientific findings will be accessible to a much wider audience.

Key words: *journals; publications; impact factor; language*

Introduction

Every year, Thomson Reuters publishes impact factors (IF) for more than 7,350 science journals in the Journal Citation Reports® (JCR) [1]. The IF is used as a proxy measure for the relative importance of scientific journals, reflecting the relationship between citing and cited articles. More specifically, IF is the number of citations appearing in publications in a given year to articles published in a given journal in the previous two years, divided by the number of citable articles published in those two years [2]. Previous studies have demonstrated that IFs are increasing [3–5], but rates may depend on publication language. Relatively few non-English-language journals are included in the JCR, but the non-English-language journals which are included seem to have lower IFs compared with English-language journals [6–16]. Despite being one of the largest subject categories in the JCR, IF values and trends for the JCR subject category "medicine, general and internal" – to which general medical journals belong – have not been studied thoroughly.

The aim of this study was to determine IF values and trends for general medical journals, comparing non-English-language with English-language journals as well as journals published in different continents.

Methods

All journals classified as "medicine, general & internal" in the JCR were analysed (150 journals in September 2011). For each journal, IFs for the last 10 years were recorded (2001–2010). Publication language and country of origin were also recorded.

Data were grouped into separate categories: language (English-language, non-English-language or multi-language) and continent of origin (North America, Europe, Australia, Africa, Asia and South America)).

Each category was analysed descriptively (number of journals, median IFs and IF inter-quartile range (IQR)).

For English-language, non-English-language and multi-language journals, Friedman's test (the non-parametric equivalent to the one-way ANOVA with repeated measures) was used to test for IF trends. This was done for the time periods 2001–2010, 2001–2005, and 2006–2010.

For English-language, non-English-language and multi-language journals, Wilcoxon's signed-ranks test (the non-

parametric equivalent to the dependent t-test) was used to compare 2001-IFs with 2010-IFs.

For English-language *versus* non-English-language journals, Mann-Whitney U test (the non-parametric equivalent to the independent t-test) was used to compare IFs for all registered values during the study period 2001–2010 (year-by-year comparison).

The proportions of English-language versus non-English-language journals included in the JCR in 2001 and 2010 were compared using Fisher's exact test.

For statistical analysis, we used IBM SPSS Statistics 19®.

Results

Characteristics of the 150 journals classified as "medicine, general and internal" in the JCR are shown in tables 1a and 1b. IF trends for both categories (language and continent of origin) are shown in figures 1a and 1b.

From 2001 to 2010 (and especially from 2008 onwards), the total number of journals included in the JCR increased (from 90 to 150). Increases were relatively higher for European, Asian and South-American journals as well as for non-English-language journals.

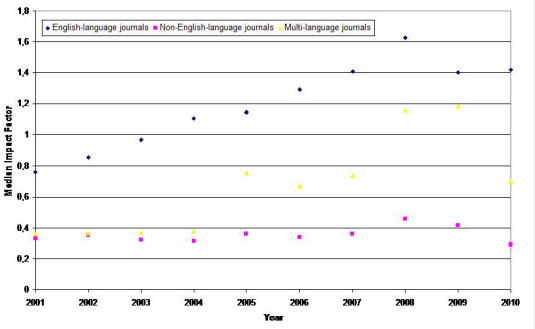

Figure 1a

The proportion of non-English-language journals increased from 2001 to 2010 (from 12.2% [11/90] to 18.0% [27/150]) (p = 0.28). The four major non-English languages in 2010 were Spanish (21.4%), German (14.3%), Serbian (14.3%) and French (10.7%).

From 2001 to 2010, IFs varied significantly for English-language journals (p <0.001), non-English-language journals (p <0.001) and multi-language journals (p <0.001). From 2001–2005, IFs varied significantly for English-language journals (p <0.001) and for multi-language journals (p = 0.034) but not for non-English-language journals (p = 0.290). From 2006–2010, IFs varied significantly for all three language groups (p <0.001 for English-language and non-English-language journals; p = 0.005 for multi-language journals).

For all three language groups (English-language, non-English-language and multi-language journals), there was a significant difference between IFs in 2001 and IFs in 2010 (p <0.001 for English-language and non-English-language journals; p = 0.008 for multi-language journals).

When comparing all IF values year-by-year (English-language *versus* non-English-language journals), IFs were significantly higher for English-language journals (p <0.001).

Interpretation

The main finding of this study was that non-English-language journals had significantly lower IFs than English-language journals. Although not significant, it is clear from the graphic presentation (fig. 1a) that IFs of English-language journals have increased at a higher rate than those of non-English-language journals during the last decade. This could suggest that scientific findings published in non-English languages do not have the same international impact as those published in English.

From 2008, median IFs decreased for both categories (language and continent of origin). This could be due to the large increase in the number of journals with relatively

Table 1a: Characteristics of journals (classification: language).

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
English-language journals										
No of journals	71	75	76	76	78	78	79	84	102	114
English:all journals	79.8%	80.6%	80.9%	80.9%	80.4%	80.4%	80.6%	80.0%	78.5%	76.0%
Median IF	0.78	0.92	1.02	1.22	1.25	1.34	1.55	1.72	1.49	1.45
25% quartile IF	0.46	0.57	0.58	0.65	0.66	0.75	0.86	1.00	0.83	0.73
75% quartile IF	2.07	1.98	1.95	2.18	2.49	2.55	2.72	2.76	2.44	2.53
Non-English-language journals										
No of journals	11	10	10	11	11	11	11	12	19	27
Non-English:all journals	12.4%	10.8%	10.6%	11.7%	11.3%	11.3%	11.2%	11.4%	14.6%	18.0%
Median IF	0.33	0.35	0.32	0.31	0.36	0.34	0.36	0.46	0.42	0.29
25% quartile IF	0.22	0.30	0.26	0.25	0.26	0.28	0.28	0.32	0.16	0.13
75% quartile IF	0.40	0.40	0.44	0.47	0.41	0.45	0.48	0.60	0.51	0.47
Multi-language journals										
No of journals	8	8	8	8	8	8	8	9	9	9
Multi:all journals	9.0%	8.6%	8.5%	8.5%	8.2%	8.2%	8.2%	8.6%	6.9%	6.0%
Median IF	0.36	0.36	0.37	0.38	0.76	0.67	0.74	1.16	1.19	0.70
25% quartile IF	0.31	0.28	0.34	0.31	0.34	0.34	0.33	0.56	0.51	0.52
75% quartile IF	0.60	0.58	0.55	0.78	1.08	1.09	1.18	1.28	1.23	1.40
Total no of journals	90	93	94	95	97	97	98	105	130	150

lower IFs (i.e., non-English-language journals and/or journals from "non-English-speaking" continents).

Within clinical medicine, several studies have examined different subject categories and possible associations between IF and language and/or continent of origin [6, 7, 9, 10, 13, 14]. In brief, findings suggest that IFs are increasing with rates depending on publication language and/or country of origin.

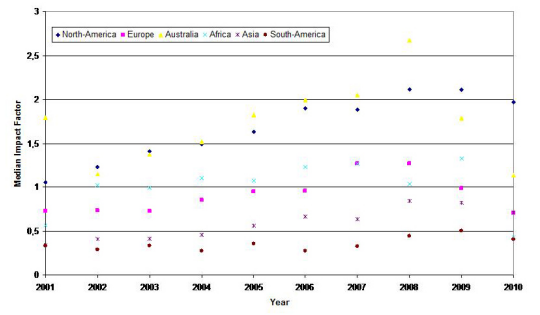

Figure 1b

Trends for journals classified as "medicine, general and internal" have not been studied thoroughly, despite the fact that it is one of the largest subject categories in the JCR. One study demonstrated increasing IF trends for seven high-impact general medical journals [7]. Another study analysed possible associations between 2003 IFs and publication language [15]. This study concluded that IFs of English-language general medical journals were significantly higher than those of non-English-language journals.

In this study of general medical journals, IF values and trends over a ten-year period were analysed for different categories (language and continent of origin). Despite being more comprehensive than some previous studies, this one has some limitations, one of which may be that only general medical journals were included. Yet, IFs should not be used for comparison across different subject categories [5, 17, 18]. For instance, high IFs can be much more difficult to achieve in "small" specialities with few researchers, since the number of citations will be lower and there may be different citation traditions in different clinical fields.

Table 1b: Characteristics of journals (classification: continent of origin).

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
North-America										
Number of journals	36	37	37	36	38	39	39	42	42	44
North-American:all	40.0%	39.8%	39.4%	37.9%	39.2%	40.2%	39.8%	40.0%	32.3%	29.3%
Median IF	1.05	1.23	1.40	1.49	1.63	1.90	1.88	2.11	2.11	1.97
25% quartile IF	0.67	0.72	0.86	0.86	1.04	1.12	1.09	1.37	1.35	1.40
75% quartile IF	2.56	2.75	2.90	3.32	3.74	3.91	4.45	3.71	4.21	4.15
Europe										
Number of journals	35	38	38	38	38	38	40	42	58	64
European:all	38.9%	40.9%	40.4%	40.0%	39.2%	39.2%	40.8%	40.0%	44.6%	42.7%
Median IF	0.73	0.73	0.73	0.85	0.94	0.96	1.26	1.27	0.98	0.70
25% quartile IF	0.36	0.37	0.37	0.47	0.46	0.41	0.50	0.57	0.41	0.34
75% quartile IF	1.37	1.40	1.25	1.56	1.70	1.83	1.83	2.21	1.70	1.87
Australia										
Number of journals	1	2	2	2	2	2	2	2	3	4
Australian:all	1.1%	2.2%	2.1%	2.1%	2.1%	2.1%	2.0%	1.9%	2.3%	2.7%
Median IF	1.79	1.15	1.37	1.52	1.82	1.99	2.05	2.67	1.79	1.14
25% quartile IF	1.79	0.88	1.19	1.28	1.67	1.70	1.81	2.35	1.18	0.58
75% quartile IF	1.79	1.41	1.56	1.76	1.97	2.29	2.30	3.00	2.34	1.89
Africa										
Number of journals	2	1	1	2	2	1	1	1	1	3
African:all	2.2%	2.2%	2.1%	2.1%	2.1%	2.1%	2.0%	1.9%	1.5%	1.3%
Median IF	0.57	1.02	0.99	1.11	1.07	1.23	1.27	1.04	1.33	0.52
25% quartile IF	0.57	1.02	0.99	1.11	1.07	1.23	1.27	1.04	1.33	0.34
75% quartile IF	0.57	1.02	0.99	1.11	1.07	1.23	1.27	1.04	1.33	1.10
Asia										
Number of journals	13	12	13	14	14	14	13	15	19	26
Asian:all	14.4%	12.9%	13.8%	14.7%	14.4%	14.4%	13.3%	14.3%	14.6%	17.3%
Median IF	0.34	0.41	0.42	0.46	0.56	0.67	0.64	0.84	0.82	0.71
25% quartile IF	0.11	0.27	0.37	0.33	0.43	0.46	0.50	0.61	0.53	0.27
75% quartile IF	0.42	0.51	0.55	0.59	0.64	0.84	0.82	1.00	0.98	1.06
South America										
Number of journals	3	3	3	3	3	3	3	3	7	9
South-American:all	3.3%	3.2%	3.2%	3.2%	3.1%	3.1%	3.1%	2.9%	5.4%	6.0%
Median IF	0.34	0.29	0.33	0.28	0.35	0.27	0.32	0.44	0.51	0.41
25% quartile IF	0.32	0.27	0.30	0.28	0.31	0.26	0.26	0.33	0.41	0.20
75% quartile IF	0.35	0.31	0.34	0.30	0.36	0.34	0.33	0.44	0.58	0.55
Total number of journals	90	93	94	95	97	97	98	105	130	150

The IF has been the subject of major debate ever since this citation metric was devised. Most people agree that the IF reflects journal popularity and prestige, but the use of the IF to evaluate journal quality has been heavily criticised. The criticism mainly concerns "citation inflation" and the fact that IFs can be editorially manipulated [2, 19, 20]. In brief, IF increases when the number of "cited" articles increases – and/or the number of "citable" articles decreases. As regards the former, some aspects are difficult to control: the amount of scientific literature is getting larger, reflecting the fact that the number of scientists as well as the number of scientific journals are increasing. Accessing scientific literature is getting easier because of "open access" and the fact that the quantity and quality of indexing and search engines are growing. Moreover, reference lists are getting longer: authors cite more articles and proportionately more of these citations are of recent articles (cf. the IF equation). In addition, trans-disciplinary citations and self-citations (authors citing their own previous work) are getting more common [18, 20–24].

Editorial policies that may affect IFs include recruitment or selection of popular/controversial researchers whose articles will receive special attention and thus more citations. Favouring large and scientifically active research groups, thus increasing the potential for author self-citation, will also increase IF. Moreover, selecting specific article types or articles with specific outcomes are other options: review articles generally receive more citations compared with original articles and especially case reports, and articles with favourable outcomes receive more citations than negative or confirmatory studies. Reducing publication volume and/or publishing fewer "citable" articles will also increase the IF (it is not known how "citable" articles are defined by Thomson Reuters; however, publications without an abstract and/or with a limited number of references are generally not regarded as citable [e.g. editorials, letters to editors and errata]). Finally, changing publication language into English will expand a journal's readership and thus the potential for receiving more citations [5, 25–28].

The importance of publication language for journal visibility is interesting. Relatively few non-English-language journals are included in the JCR. The inclusion criteria of the JCR are not official, but publication language and thus international orientation are important parameters. Thomson Reuters states that the JCR is not and should not be "all-inclusive", albeit "comprehensive": "English is the universal language of science at this time in history. It is for this reason that Thomson Reuters focuses on journals that publish full text in English or at the very least the bibliographical information in English. […] However, going forward, it is clear that the journals most important to the international research community will publish full text in English" [29].

This declaration is somewhat in contrast to the fact that the number of non-English-language journals included increased by 145% from 2007 to 2010 (after having been stagnating during the previous six years, cf. table 1). Also, the proportion of non-English-language journals to English-language journals increased, though not significantly. It seems that Thomson Reuters has found it necessary to moderate their inclusion criteria, given the scale of criticism of the (previous) "exclusive" focus. There may also be a financial incentive to include journals, regardless of international orientation. It should however be mentioned that the increase in the number of non-English-language journals included may also reflect the fact that non-English-language journals do play an important role in the scientific community – and that scientific work published in non-English languages does have an impact.

Of course, non-English-language journals with high local circulations and established readerships are of great utility in disseminating knowledge of national/local importance. But publishing in a non-English language simply does not make sense if the ambition is to reach an international readership. Non-English-language journals are underrepresented in bibliographical indexing databases (such as MEDLINE, Embase etc.) and this means that articles published in these non-indexed journals are not accessible to (or citable for) a wider audience [16, 23].

Apart from the fact that scientific work published in English is cited more often, authors prefer to submit to high-impact and thus English-language journals [30]. Whether or not IF is accepted as a valid measure of a journal's scientific quality, one must assume that articles published in these high-impact journals are generally associated with higher quality.

For the reasons given above, non-English-language journals desirous of contributing to the *international* pool of knowledge should consider changing publication language, adopting either a bi- or a monolingual approach. Publishing in English (possibly in addition to the national language) will increase journal visibility, expand readership and thus increase the potential number of citations.

The potential increase in IFs (or potential inclusion in the JCR) might have been a contributing factor for national journals that have already changed publication language into English [15, 31–33]. However, increasing IFs should not be the sole argument for changing publication language. From an ethical perspective, it could be argued that original research findings should not be published in small, local/national languages and thus "hidden" from the international scientific community [33]. Instead, authors and editors should seek to communicate original research findings to as many readers as possible.

In conclusion, this study demonstrated that non-English-language general medical journals had significantly lower IFs than English-language general medical journals. In an international scientific community with English as the universal language of science, non-English-language journals should consider changing publication language, adopting either a bi- or a monolingual approach. Publishing in English will increase citation counts and thus IFs, but, more importantly, scientific findings will be rendered accessible to a much wider audience.

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Correspondence: *Siri Vinther, MS, Department of Surgery, Herlev Hospital, University of Copenhagen, DK-2730 Herlev, Denmark, sirivinther[at]hotmail.com*

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Figures (large format)

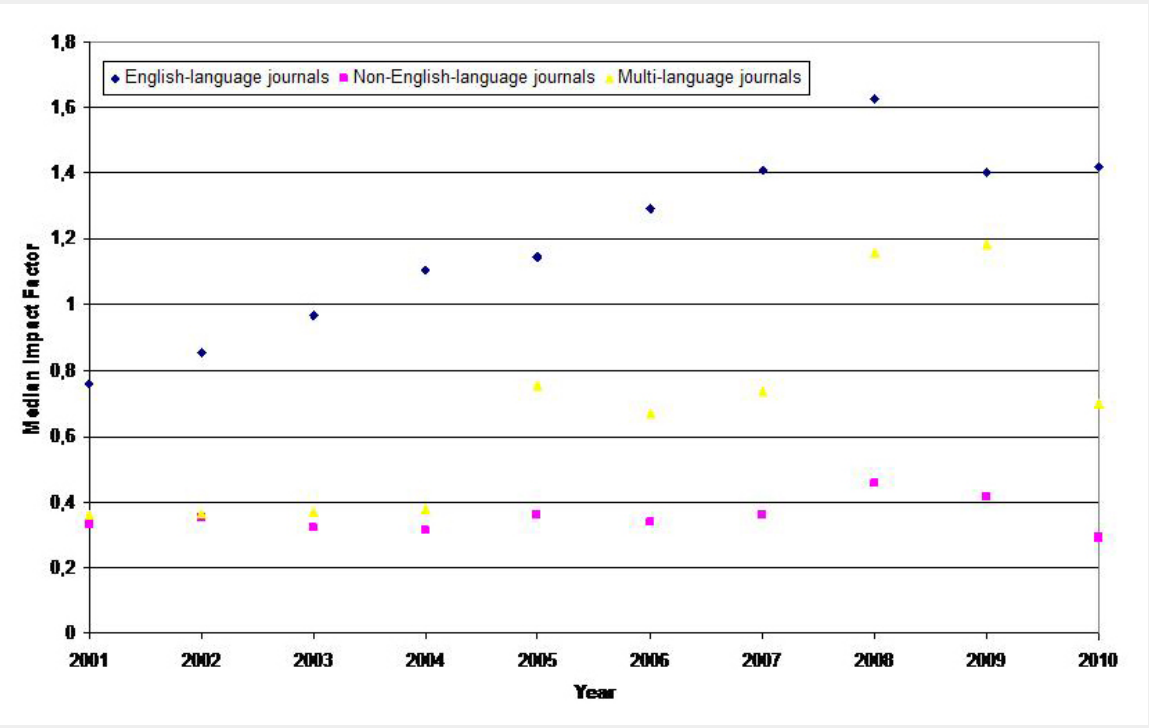

Figure 1a

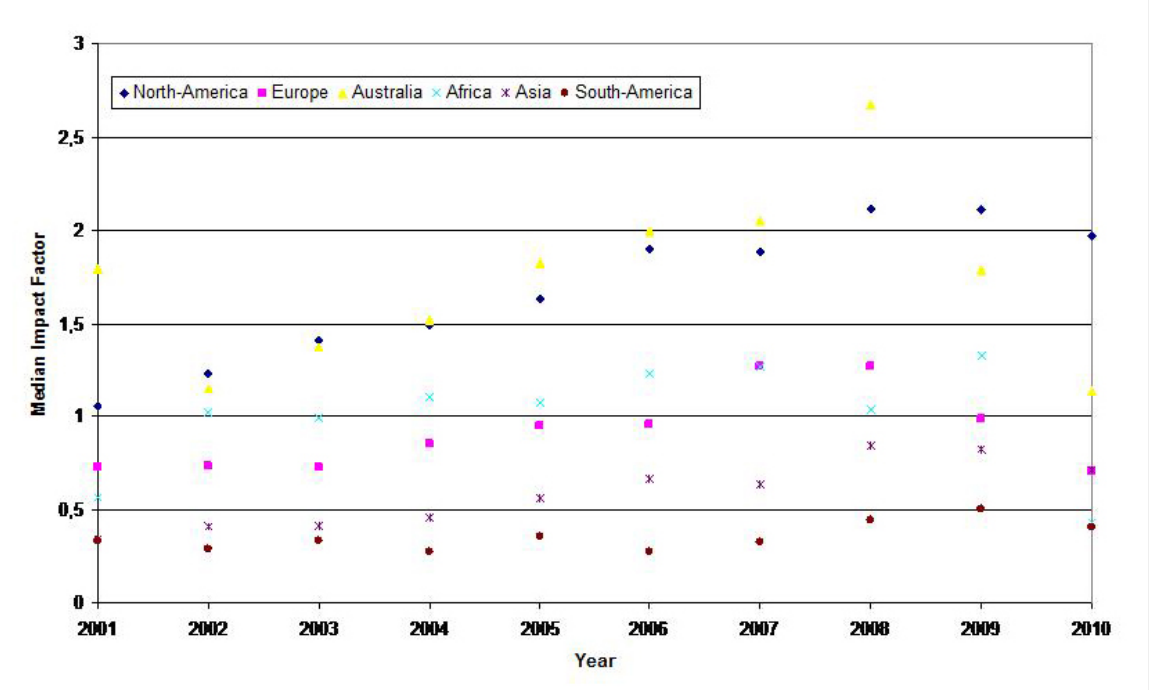

Figure 1b