

Citation analysis of otorhinolaryngology journals

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Abstract

Bibliometric analysis is used to assess the 'impact' of scientific journals. The commonest method of evaluation is impact factor. The aim of this study was to analyse the citation data for otorhinolaryngology journals of the years 1994 to 1998. Data on the total number of citations and impact factor of journals was obtained from the CD-ROM editions 1994–98 of the *Journal Citation Reports* and 'Web of Science' database. The adjusted impact factor and five-year impact factor has been calculated. Fifteen otorhinolaryngology journals have been identified and ranked according to the impact factor. *Head and Neck* has the highest adjusted impact factor. *Archives of Otolaryngology – Head and Neck Surgery* has the highest five-year impact factor. There is considerable variation in the ranking of journals calculated by the five-year impact factor. Impact factors of otolaryngology journals can help to direct readers to those journals that have a track record of publishing data that are frequently cited. Although there are several limitations to the use of citation data to rank journals, the authors recommend the use of the five-year period for calculation of the impact factor for ranking of otolaryngology journals.

Key words: Citation; Publishing; Otorhinolaryngology

Introduction

Bibliometric analysis is used to assess the 'impact' of scientific journals and can provide quantitative estimates of a journal's usefulness to the scientific community.¹ *Journal Citation Reports* publishes a number of measures of citations annually for all journals indexed by the *Science Citation Index* (SCI).² Several methods of evaluation have been proposed, but the impact factor has been suggested to be a measurable indicator of quality in scientific research.³ The journal impact factor is calculated as the number of all current citations of source items published in the last two years divided by the number of all articles (excluding editorials, letters, news items and meeting abstracts) published by that journal in those two years. However, ranking of journals by impact factors has limitations. Some of these limitations can be addressed by calculating the adjusted impact factor and the five-year impact factor. There has not been any reported study on citation analysis of otolaryngology journals. The aim of this study was to establish the impact factor, adjusted impact factor and five-year impact factor of otorhinolaryngology journals for articles published in 1998 and present a review of citation analysis.

Material and methods

The 'Web of Science' database at <http://wos.mimas.ac.uk> and the database from the 1994–98 editions of the CD-ROM version of *Journal Citation Reports* was obtained from Liverpool University library. A total of 29 otolaryngology journals with impact factors were identified in the 1998 *Journal Citation Reports* CD-ROM. There were eight audiology journals, which were excluded. *Dysphagia*, which is a multidisciplinary journal, was also excluded from the study. Out of the remaining 20 otolaryngology journals the top 15 journals were analysed.

The *Journal Citation Reports* counts citations of all published items, including articles, reviews, notes and proceedings as well as letters and editorials in the numerator of its impact factor calculations, while restricting the denominator to include only articles, reviews, notes and proceedings. The 1998 impact factors have been calculated by dividing 1998 citations to the 1996 and 1997 published items of a particular journal by the total number of published items in that journal from 1996 and 1997. The following is an example of how the impact for Journal X for the year 1998 is calculated.

In 1998 Journal X was cited, 80 times for articles published in 1997 and 70 times for articles published

TABLE I
OTOLARYNGOLOGY JOURNALS RANKED BY ADJUSTED IMPACT FACTOR FOR 1998

Rank	Journals	1998 Citations Source 1996–97	Total number of articles in 1996–97	Actual impact factor	Adjusted impact factor 1998
1	<i>Head and Neck – Journal for the Sciences and Specialties of Head and Neck</i>	225	169	1.331	1.325
2	<i>Laryngoscope</i>	640	556	1.151	1.147
3	<i>Archives of Otolaryngology – Head and Neck Surgery</i>	469	413	1.136	1.036
4	<i>Annals of Otolaryngology, Rhinology and Laryngology</i>	377	375	1.005	0.995
5	<i>Otolaryngologic Clinics of North America</i>	117	150	0.780	0.780
6	<i>HNO</i>	99	266	0.675	0.639
7	<i>American Journal of Otolaryngology</i>	228	343	0.612	0.574
8	<i>Otolaryngology – Head and Neck Surgery</i>	186	580	0.576	0.553
9	<i>Clinical Otolaryngology</i>	126	220	0.532	0.455
10	<i>American Journal of Rhinology</i>	62	137	0.453	0.453
11	<i>Acta Oto-Laryngologica</i>	292	663	0.440	0.439
12	<i>ORL – Journal for Otorhinolaryngology and its related specialities</i>	57	131	0.435	0.435
13	<i>European Archives of Oto-Rhino-Laryngology</i>	110	228	0.482	0.434
14	<i>Journal of Voice</i>	59	106	0.557	0.406
15	<i>Journal of Laryngology and Otolaryngology</i>	217	544	0.400	0.373

in 1996, for a total of 150 citations. In 1997, 160 articles were published in Journal X, and 140 articles were published in 1996, for a total of 300 articles.

$$\begin{aligned}
 & \text{1998 Impact factor of Journal X =} \\
 & \left\{ \begin{array}{l} \text{Citations in 1998 to} \\ \text{articles published in} \\ \text{'96 and '97} \end{array} \right\} \div \left\{ \begin{array}{l} \text{Number of} \\ \text{articles published in} \\ \text{'96 and '97} \end{array} \right\} \\
 & = \frac{150}{300} = 0.5
 \end{aligned}$$

The *Web of Science* database was used to identify the citations to letters and editorials published in 1996 and 1997 for each journal. The adjusted impact factor for 1998 has been calculated by deleting the citations to letters and editorials. The five-year impact factor has been derived by dividing the total

number of citations in 1998 to the published items from 1993–97 by the total number of items published in 1993–97. The total number of articles published in 1993 was derived from the calculation of the impact factor for 1995.

Results

A total of 15 otolaryngology journals and their impact factors were derived from *Journal Citation Reports* (Table I). *Head and Neck* has the highest impact factor. The total number of citations in 1998 for articles published in 1996 and 1997 was highest for *Laryngoscope* (n = 640). The total number of articles published in 1996 and 1997 was highest for *Acta Otolaryngologica*.

Head and Neck has the highest adjusted impacted factor. Calculating the adjusted impact factor has shown that some journals such as the *Journal of*

TABLE II
OTOLARYNGOLOGY JOURNALS RANKED BY FIVE-YEAR IMPACT FACTOR FOR 1998

Rank	Journals	1998 citations to source articles 1993–97	Source articles 1993–97	Impact factor 1998
1	<i>Archives of Otolaryngology – Head and Neck Surgery</i>	1526	938	1.627
2	<i>Head and Neck – Journal for the Sciences and Specialties of Head and Neck</i>	631	416	1.517
3	<i>Annals of Otolaryngology, Rhinology and Laryngology</i>	1285	855	1.503
4	<i>Laryngoscope</i>	1948	1309	1.488
5	<i>Otolaryngologic Clinics of North America</i>	425	374	1.136
6	<i>American Journal of Otolaryngology</i>	688	625	1.101
7	<i>Otolaryngology – Head and Neck Surgery</i>	1436	1314	1.093
8	<i>Clinical Otolaryngology</i>	420	547	0.768
9	<i>Journal of Voice</i>	188	245	0.767
10	<i>HNO</i>	393	596	0.659
11	<i>Journal of Laryngology and Otolaryngology</i>	877	1407	0.623
12	<i>European Archives of Oto-Rhinology-Laryngology</i>	401	686	0.585
13	<i>Acta Oto-Laryngologica</i>	911	1566	0.582
14	<i>ORL – Journal for Otorhinolaryngology and its related specialities</i>	198	344	0.576
15	<i>American Journal of Rhinology</i>	144	282	0.511

Voice has its impact factor inflated by 27 per cent, followed by *Clinical Otolaryngology* (14.52 per cent) and *European Archives of Otorhinolaryngology* (10 per cent). The ranking of journals is altered in the lower half of the table (Table I). The five-year impact factor for 1998 was highest for *Archives of Otolaryngology – Head and Neck Surgery*. The rankings of the journals by the five-year impact factor has been altered (Table II).

Discussion

Counting references to rank the use of scientific journals was reported as early as 1927.⁴ The term 'impact' to measure the counting of references was suggested in 1955 and the term 'impact factor' was used in the publication of the Science Citation Index (SCI) in 1963.⁵ The Institute of Scientific Information has edited the SCI to evaluate diffusion of scientific articles. The *Journal Citation Reports* is derived from SCI, and annually calculates and publishes impact factors for all the journals that are indexed by it.

The journal impact factor is a measure of the frequency with which the average article in a journal has been cited in a particular year. It is based on the fact that the more an article is cited as a reference in other articles, the more important it is considered to be and the higher the coefficient attributed to the journal in which it was originally published. In *Journal Citation Reports*, the citations to all published items, including articles, reviews, notes and proceedings as well as letters and editorials are counted in the numerator of its impact factor calculation, while restricting the denominator to include only articles, reviews, notes and proceedings. Thus, the impact factors are relatively inflated and favour journals that include meeting reports, interesting or controversial editorials and lively correspondence that are highly cited relative to journals that lack such items. The adjusted impact factor eliminates this bias by deleting the citations to letters and editorials. The range in reduction of the adjusted impact factor varied from 0–27 per cent. The adjusted impact factor altered the journal rankings at the lower half of the Table I. The following journals – *Journal of Voice*, *Clinical Otolaryngology* and *European Archives of Oto-Rhino-Laryngology* achieved lower rankings after the calculation of the adjusted impact factor. Elimination of citations to editorials and letters did not affect the ranking of the majority of the journals calculated by the adjusted impact factor since most of the otolaryngology journals have few letters published.

The *Journal Citation Reports* impact factors are based on citations of articles published in the previous two years, but the average citation rate can be calculated by using longer time periods. A base of five years is more appropriate for otolaryngology journals because the body of citations in the speciality is not large enough to make reasonable comparisons. There is a possible delay in publication or it takes more time to disseminate or to respond to

published works than the overall average of two years. Calculation of the five-year impact factor gives the articles sufficient time to be cited. The five-year impact factor reflects the relative citation longevity of published items in a particular journal. Journals responsible for publishing articles of enduring value would tend to post a higher five-year impact factor. *Archives of Otolaryngology* has the highest five-year impact factor. The ranking of some journals are markedly changed when short-term indicators such as adjusted impact factors are compared with long-term indicators such as five-year impact factors. For example, the *Journal of Laryngology and Otology* (JLO) is ranked 15th in Table I but ranked 11th in Table II.

The impact factor of otolaryngology journals can be increased by publishing more review articles, methodological articles, basic research articles and reducing the number of articles with low citation rates such as case reports and short communications. The author should cite all of the relevant literature and editors should avoid artificial limits on the bibliography. Decreasing the time lag to publications would also result in a higher impact factor.

Citation analysis helps authors to identify journals relevant to their research and in which to publish. It helps editors of journals to assess the effectiveness of editorial policies and objectives and to track the standing of their journals. Information analysts are able to study bibliometric trends and study the citation patterns within and across the discipline. It helps librarians to budget the subscription to journals. In Italy, journal impact factors are used in appointments to higher academic positions.⁶ In Nordic countries, impact factors are used to assess individuals and institutions and for allocation of resources.⁷ Resource allocation based on impact factors has also been reported from Canada⁸ and Hungary.⁹ The increasing awareness of journal impact factors and their use in evaluation is increasing author's publication behaviour towards publishing in journals with maximum impact, often at the expense of specialist journals.⁹

However, citation analysis has its limitations and should not be used as the sole source of information when comparing and evaluating publications.⁵ Impact factors are not statistically representative of individual journal articles and poorly correlate with actual citation of individual articles. Review and long articles receive more citations whereas short communications such as case reports are often less cited.^{10,11} The *Journal Citation Reports* database has a preference for English language journals, that have a higher impact factor than other language journals.¹² It has been reported that American publications are biased by parochial self-citation.^{13,15} The impact factor of medical journals such as the *British Medical Journal* (1988 impact factor 5.385) and the *Lancet* (1998 impact factor 11.793), which have a wider audience and larger circulation, acquire a higher impact factor than smaller specialist journals so it is difficult to make individual comparisons.¹⁴ In addition, there are high citation errors of up to 37

per cent in otolaryngology journals.¹⁵ Despite the limitations, citation analysis and impact factor are used widely to rank and evaluate journals. However, it should be complemented by other methods of assessment of journals such as peer survey and specialist opinion.¹⁶

Conclusions

Journal impact factors can help direct readers to those journals that have a track record for publishing data that are frequently cited and, thus, considered to be useful and of high information value. The calculation of the adjusted impact factor has little effect on the rankings of the journals since not all otolaryngology journals include features that increase impact factor such as letters, editorials on controversial topics or invited discussions. However, there is considerable variation in the ranking of the journals calculated by the impact factor using a five-year period as compared to two-year period used in the *Journal Citation Reports*. The authors therefore, recommend that in a speciality such as otolaryngology a five-year period should be used to calculate the impact factor since it takes into account the time lag in publication, delay in response to articles, dissemination of information and gives sufficient time for the articles to be cited.

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