

Original article

CiteScores of cardiology and cardiovascular journals indexed in Scopus in 2019: A bibliometric analysis

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Competing interests

The authors declare no conflict of interest relevant to this article.

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Data sharing statement

The data that support the findings of this study are available within the article in the supplementary files (data).



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Abstract

Background: Citations are considered a measure of the scientific impact of research articles. CiteScore is a standard metric, based on the Scopus database, of the number of times articles in a given journal were cited during a given period relative to the number of articles published by that journal during that period.

Objectives: To investigate the factors associated with CiteScores of journals on cardiology and cardiovascular diseases and indexed in Scopus in 2019.

Methods: This cross-sectional, descriptive-analytical study examined 338 journals to analyse the correlation between CiteScore and such other variables and parameters as coverage by indexing services (databases), type of access, language, type of published articles, age of the journal (year of establishment), H-Index, Scimago Journal Rank, and the quartile of the journal.

Results: CiteScore of a journal was positively correlated to the following variables or parameters: coverage by PubMed, Web of Science, and EMBASE ($p < 0.001$), articles in English ($p < 0.001$), age of the journal ($p = 0.001$), publishing review articles ($p = 0.23$), H-Index ($p < 0.001$), and Scimago Journal Rank ($p < 0.001$).

Conclusion: Coverage of a journal in international databases, especially in PubMed, Web of Science, and EMBASE, is critical to increasing its visibility. Publishing review articles, which tend to be cited more often because they serve as comprehensive sources of information, can increase the CiteScore of a journal. Also, publishing more articles in English contributes to the number of times articles in a journal are cited.

Keywords:

Abstracting and indexing, cardiology journals, CiteScore, Journal Impact Factor, H-Index, PubMed, Scimago Journal Rank, Scopus

Introduction

A large number of medical scientific studies are conducted every year and their results are published in scientific journals as articles.¹ Published articles play a vital role in the treatment of patients and in decisions made by policymakers in the medical field.²

Consulting these articles and acknowledging such consultation by citing the articles serves to authenticate them in the scientific world. The frequency with which an article is thus cited is therefore used in the scientific community as one of the most important criteria for measuring the effectiveness or impact of research.^{3,4} At the same time, all journals are not equal: articles published in some journals may receive more attention and be cited more often than those published in other journals in a given field.⁵ Today, researchers are looking for techniques to promote their studies in an attempt to garner more citations for the papers they have published.

The factors that influence how often a given article is cited can be categorized under three aspects: 1) characteristics of the article itself, including the quality of writing, contents (for example, reporting a new idea or methodology), and a suitable abstract; 2) profile of the authors of the article including the number of authors, their academic degrees, H-index, and self-citation; and 3) characteristics of the journal in which the article is published, including the language of the journal, its age (years since its first publication), and such measures of its effectiveness as its impact factor or CiteScore.⁶

Oh et al.⁷ analysed the citations received by articles published in biomedical and health sciences journals based on their coverage

by such major citation databases as Medline and Web of Science to identify the factors contributing to the citation metrics: the most important factor turned to be coverage by international databases, especially Web of Science (WoS) and Medline. In another study of disease-specific research publications, Breugelmans et al.⁸ surveyed the scientific impact of open-access journals; their results indicated that there was a real and measurable advantage, in terms of more citations, to publishing research on poverty-related diseases in open-access journals and enlisting international collaboration. In another study, Di Bitetti et al.⁹ analysed the effect of language (English versus languages other than English), article length, and publication year on the number of citations in six scientific journals from five countries. They found that so long as the effects of the journal, year of publication, and paper length were statistically controlled, articles published in English were cited more frequently than those published in other languages.⁹

CiteScore is a bibliometric measure that gives a more comprehensive and transparent view of the impact of a journal.¹⁰ Launched by Elsevier in 2016, CiteScore, essentially, shows the average number of citations per document for a given type document in a given journal in a three-year period. The CiteScore of a journal in a given year is essentially the number of times articles published in that journal were cited in the preceding three years divided by the total number of articles published in that journal in those three years.¹¹ CiteScore provides the current view of a journal, which makes the score a suitable guide for authors and researchers in choosing an appropriate journal for their manuscripts. Although CiteScore is calculated annually, showing the average citations for a full calendar

year, CiteScore Tracker is updated monthly, giving a current measure of a journal's performance.¹²

Despite the importance of such metrics, we were surprised to find no published study of journals related to cardiology and cardiovascular diseases, given that cardiovascular diseases are the main cause of global morbidity and mortality.^{13,14} We searched PubMed, Google Scholar, Scopus, and Magiran looking for articles in English and in Persian, from 2010 up to 30 April 2020, on the citation performance of journals on cardiology and cardiovascular diseases. Having drawn a blank, we sought to explore the factors associated with the CiteScore of those journals indexed in Scopus in 2019.

Methods

We searched the Scimago Journal and Country Rank database (<https://www.scimagojr.com/>) using 'journal ranking' as the search term, limiting the results to the subject area of medicine, and narrowed the results further by choosing the terms 'cardiology' and 'cardiovascular journals' and limiting the search to journals indexed in 2019. The study was approved by the ethics committee of the Shiraz University of Medical Sciences (ethics code: IR.SUMS.REC.1400.348).

The search fetched 361 journals, which were then reviewed for extracting the following parameters: CiteScore, types of published articles, year of establishment, journal H-index, Scimago Journal Rank (SJR), quartile, indexing services (databases) covering the journal, the language of the journal, and access to the journal (open, subscription-based or behind a paywall, or hybrid). If information on access and language was not available, it was obtained

from the Scopus database. Information on the type of published articles was obtained from Scopus and from another database, namely 'In Cite Journal Citation Report' (<https://jcr.clarivate.com>).

Variables

We categorized the articles as either original articles, consisting of all research studies, clinical trials, and case studies, or as review articles, consisting of narrative reviews, systematic reviews, and meta analyses. We also ascertained, from Scopus, the total number of articles published in the chosen journals from 2016 to 2018.

The year of establishment was determined by counting backwards from 2019 up to the first issue of the journal (the information was extracted from the Scimago database). Data on the H-Index, SJR, and quartile were collected from both Scopus and Scimago databases.

Information on indexing services other than Scopus covering the selected journals was collected from the websites of the respective journals, which also served as the source of information on the language of the journal and whether it published articles in English.

As mentioned earlier, the journals were categorized into three types based on access, namely open access, non-open-access (subscription required to access the full text of articles), and hybrid (both open access and subscription-based, depending on the authors' choice and paying the required charges).

Statistical analysis

Descriptive statistics were calculated for each variable using mean \pm SD for quantitative variables and frequencies for qualitative (categorical) variables. The Kolmogorov–

Smirnov test was performed to analyse the distribution function of the samples. Citation rates between groups were compared by Spearman, Mann–Whitney U, and Kruskal–Wallis tests, depending on the sample size of the subgroup.

Results

Descriptive characteristics of journals

Of the 361 journals indexed in Scopus, 23 were excluded because they were no longer covered by Scopus. The median CiteScore (\pm SD) of the remaining 338 journals in 2019 was 2.6 (0.8–4.5) and ranged between 1 and 29

(Table 1). The median year of establishment was 15 (5–21) years, the oldest journal being the International Journal of Cardiology, first published in 1880. Among indexing databases other than Scopus, EMBASE was the most comprehensive, covering 288 of the 338 journals, and the Directory of Open Access Journals (DOAJ) was the least comprehensive, covering only 45 journals. The means, standard deviations, and frequency of the variables are given in Table 1. The Kolmogorov–Smirnov test showed that the data did not conform to normal distribution.

Table 1. Descriptive statistics of variables related to journals in cardiology and cardiovascular diseases indexed in Scopus in 2019 (n = 338)

Quantitative variable		Mean \pm SD	Min–Max	Median	Percentile (25–75)	Mode
CiteScore		3.53 \pm 3.99	1–29	2.6	0.8–4.5	0.1
Type of article	Original	112.18 \pm 113.87	0–733	113.30	48–140	17
	Review	17.64 \pm 20.68	0–153	11.50	5–21	7
Year of establishment (age in years as in 2019)		21.21 \pm 17.88	0–139	15	1991–2010 10–30	10
H-Index		50.27 \pm 62.67	1–593	47.38	10–59	8
Scimago Journal Rank		1.56 (12.45)	0.10–229	0.55	0.23–1.02	0.11
Q1		8.36 (4.92)	2.8–29	7.1	5.35–9.55	5.2
Q2		3.27 (0.87)	1.2–5.3	3.2	2.7–3.9	2.9
Q3		1.63 (0.80)	0.0–4.4	1.5	0.95–2.1	0.8
Q4		0.29 (0.29)	0.0–2.1	0.1	0.4	0.1
Qualitative variables		Frequency (%)	–	–	Percentile Range	–
Indexing database	PubMed	234 (69.20)	–	–	2.13–5.98	
	EMBASE	288 (85.20)	–	–	0.80–4.59	
	DOAJ	45 (13.30)	–	–	0.50–3.70	
	WoS	264 (78.10)	–	–	1.90–5.30	
Language	English	291 (86.10)	–	–	1.48–4.93	
	Other than English	47 (13.90)	–	0.20	0.10–0.60	
Access	Open access	104 (30.80)	–	2.65	0.50–4.74	
	Subscription-based	230 (68)	–	2.40	0.70–4.40	
	Hybrid	4 (1.20)	–	4.05	0.65–7.35	

Review articles were positively correlated to CiteScore ($r_s = 0.124$ and $p = 0.023$) whereas original articles showed no such correlation ($r_s = 0.002$, $p = 0.976$). Three other factors

also showed a significant relationship with CiteScore, namely age of the journal, H-index, and SJR ($p < 0.001$; Table 2).

Table 2. Correlation between CiteScores of cardiology journals indexed in Scopus and type of articles, age of the journal, H-Index, Scimago Journal Rank, or quartile

Variable correlated to CiteScore	Correlation coefficient (r_s)		Pvalue*
Type of article	Original	0.002	0.976
	Review	0.124	0.023
Age of the journal		0.255	<0.001
H-index		0.808	<0.001
Scimago Journal Rank		0.810	<0.001
Quartile		0.821	<0.001

The qualitative factors are compared in Table 3. The median and interquartile range (IQR) of the journals indexed in different databases were as follows: EMBASE, 2.8 (1.30–4.80); WoS, 3.1 (1.90–5.30); PubMed, 3.5 (2.20–0.60); and DOAJ, 2.6 (0.8–40.59). The corresponding values for English-language journals were 2.90 (1.57–5.20) and those for open-access journals were 2.0 (0.52–3.65).

The journals covered by EMBASE, WoS, and PubMed databases showed a significant

relationship with the CiteScore of the journals ($p < 0.001$), but those covered by the DOAJ did not ($p = 0.662$; Figure 1). Journals that published articles in English also showed a significant relationship with their CiteScore ($p < 0.001$). CiteScores of open-access journals differed significantly from those of non-open-access journals ($p < 0.001$), but no relationship was found between open-access or hybrid journals and the CiteScore (Table 3).

Table 3. Effects of qualitative factors on CiteScore of cardiology journals indexed in Scopus

Indexing database	CiteScore median and IQR		Pvalue
	Indexed in	Non-indexed in	
EMBASE	2.8 (1.30–4.80)	0.45 (0.20–2.90)	<0.001
ISI	3.1 (1.90–5.30)	0.32 (0.10–0.82)	<0.001
PubMed	3.5 (2.20–0.60)	0.40 (0.20–0.80)	<0.001
DOAJ	2.6 (0.8–40.59)	2.50 (1.30–30.75)	0.662
Language of journal	English	Non-English	
	2.90 (1.57–5.20)	0.30 (0.10–0.60)	<0.001
Access to journal	Open	Subscription-based	Hybrid
	2.0 (0.52–3.65)	2.80 (1.25–4.85)	4.05 (0.57–7.37)

Discussion

The present study was designed to determine the factors associated with the CiteScore of cardiology journals indexed in Scopus in 2019. We found that the most common factors associated with the CiteScore of cardiology and cardiovascular journals indexed in Scopus were H-Index, publishing in English, and age

of the journal (years since the first issue of the journal). Other factors such as coverage in medical databases other than Scopus, such as EMBASE, WoS, and PubMed, were also effective in raising the journal's CiteScore. However, CiteScores of open-access journals did not differ significantly from those of non-open access journals.

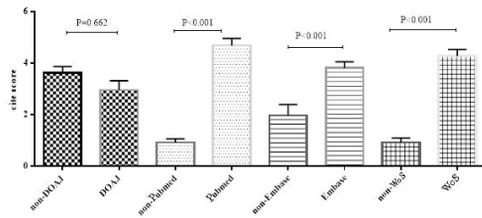


Figure 1. Effect of being covered by indexing services other than Scopus on CiteScores in 2019 of cardiology journals indexed in Scopus

The H-Index of a journal was strongly and positively correlated to its CiteScore, a relationship also noted earlier in a bibliometric study of journals related to family studies using the Journal Impact Factor, CiteScore, and H-Index by Liu.¹⁵ A possible explanation for this result can be the formula used for calculating the metrics, considering that both Journal Impact Factor and CiteScore are based on the number of citations to the articles published in a given journal.

Another finding of this study was the significant correlation between publishing articles in English and CiteScore, a correlation absent in the case of journals published in languages other than English. This difference shows that articles published in English-language journals are cited more often than are those published in journals in other languages. This observation too is consistent with other studies that had made similar comparisons.^{7,9,16,17} This result may be explained by the fact that English is an international language and most researchers have a good understanding of it and therefore prioritize papers published in English over other papers—which is true also of papers in journals related to cardiology and cardiovascular diseases.

The age of the journal was also significantly correlated to its CiteScore. However, Oh et

al.⁷ found no such correlation. It is possible that the difference was due to the differences in the samples: whereas Oh et al.⁷ analysed academic journals limited to Korean journals in the field of disease control and prevention, the present study encompassed journals in cardiology and cardiovascular diseases published from all over the world that had been indexed in Scopus in 2019. It is likely that older journals carry higher credibility and are therefore cited more often.

Yet another finding of the present study, namely that review articles received more citations than articles reporting original research did, was also consistent with the findings of Walters¹⁸ and Annalingam et al.¹⁹ On the other hand, Yaminfirooz and Ardali²⁰ reported that the type of an article does not affect the number of times it is cited. However, because review articles discuss the results of many studies on a given topic, citing review articles amounts to, albeit indirectly, citing all those studies too—which is why comprehensive reviews probably attract many more readers and citations than single articles reporting original research do. Therefore, we recommend that special issues of journals be published focusing on reviews and prominent scientists be invited to help in this matter.

With regard to coverage by indexing databases other than Scopus, we found that being indexed in EMBASE, WoS, and PubMed databases was significantly correlated to a high CiteScore but being indexed in DOAJ was not—yet another finding that matches the study by Oh et al.⁷ but contradicts, as before, that by Yaminfirooz and Ardali,²⁰ who failed to find any relationship between being indexed in PubMed and WoS and the number of citations to the medical journals so indexed. Based on the current study, we can conclude that being indexed in EMBASE,

WoS, and PubMed databases and in Scopus is advantageous in boosting a journal's visibility.

We found no relation between CiteScore and the type of access to the contents of a journal, whether open, behind a paywall, or a mix of both (hybrid type), nor did Davis,²¹ who showed that being open-access had little to do with being cited more often. However, two studies have reported such a connection.^{8,22} One possible explanation is that although easy access to a study seems likely to lead to the study being cited more often, journals behind paywalls are often regarded as more prestigious, and papers published in such journals reap the benefit of that impression in the form of gathering more citations.

The present study suffers from at least three limitations. First, it was confined to journals in one, and rather narrow, speciality, namely cardiology and cardiovascular diseases. Secondly, it was limited to journals indexed in Scopus; in fact, we explicitly discarded journals that were no longer indexed in Scopus. Lastly, it was also limited to only a few of the many possible factors that can affect the CiteScore of a journal—it is hoped that future studies will investigate many more.

Conclusion

The CiteScore of journals in the field of cardiology and cardiovascular diseases and indexed in Scopus was influenced by the following factors: H-Index of the journal, its Scimago Journal Rank, its age (years since first publication), language (English or other than English), whether it published review articles, and whether it indexed also by other databases, especially EMBASE, WoS, and PubMed.

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