
Scientometrics in medical journals: Indices, their pros and cons

Sir,

Scientometrics is the science that deals with the evaluation of the success of a scientific article and the quantitative indicators that describe it. There are several indices that are available and used to describe the impact of an author according to the citations that the published work received, number of publications of a particular author, or the journal in which the article has been published. All indicators have certain pros and cons [Table 1]. Of all, a H-index is the most popularly used indicator.

The H-index was described by Jorge Hirsch in 2005, which was introduced as a bibliometric tool describing the impact of scientific contribution made

by a researcher.^[1] The H-index describes the impact of a researcher according to the number of citations and the number of papers that have been cited by other researchers. There are several types of H-index. H5-index is the average H-index for last 5 years. An h5-median is a median number of citations for a particular number of citations. There are certain issues with H-index. H-index depends on author's age (more the age, actively involved in research-higher the H-index) and the area of research. H-index can be low for a researcher if the number of publications is high but the citations for each paper are few. There are 2 types of citations: self-citation and independent citation. An independent citation is when an unrelated author cites the work, and a self-citation means when the author has cited his or her own work. Self-citation can add bias to the overall H-index.

Google Scholar describes an index called i10 index. i10 is the index the number of publications with at least 10 citations. It is a very simple way of describing a researcher's impact by considering a minimum of

Table 1: The commonly used scientometric indices with pros and cons with its use when used to describe the impact of a researcher who published in peer-reviewed journals

Scientometric index	Principle	Pros	Cons
H-index	Considers number of papers with number of citations for each paper	Most popular index. Uses a simple formula to calculate	Impact of a researcher depends on a particular number of citations.
i10-index	Considers paper with at least 10 citations	Easy to calculate.	Does not consider papers with <10 citations for calculating impact.
PageRank index	Uses PageRank algorithm. Expressed in percentile	Considered fair and robust than all other indices.	Difficult to calculate.
g-index	Considers citations in descending order. Index is according to paper with maximum citations.	Easy to calculate.	Takes into consideration the highest number of citations for a paper.

10 citations for a particular paper.^[2] Senanayake *et al.* introduced the PageRank index, which uses PageRank algorithm to analyze the impact of papers and the impact of the citations.^[3] The algorithm assigns a PageRank value for each publication. Unlike other indices, PageRank-index is expressed as percentile. g-index is another scientometric index introduced in 2006 by Leo Egghe. g-index considers the citations of a researcher's work in descending order. Unlike h-index for at least a certain number of citations are required for a paper, the g-index will be at least according to the paper with maximum citations.^[4]

A publication usually has several authors out of which the lead author i.e., the first author and the corresponding author are considered important in the list. When an article is cited by another article, the names of either the first 3 authors or the first 6 authors usually feature in the bibliography according to the journal guidelines.

Inappropriate authorship also known as honorary, and ghost authorship leads to crediting authors who have hardly contributed in the process of developing a manuscript.^[5] It has been shown that the prevalence of honorary authors is up to 40% and ghost authors is around 11%. International Committee of Medical Journal Editors (ICJME) has clearly defined authors as who contribute substantially to the conception or design of the work; is involved in data acquisition, analysis, or interpretation and drafted the work or revised it critically.^[6] As authors do not follow the ICJME definitions and recommendations, ghost and honorary authors get the credit by having a

better scientometric index than that of the lead or corresponding authors who give them authorship. They also enjoy other perks in the organization, in the university, and in the speciality. None of the indexes have a solution to identify and credit the authors who have made genuinely made a significant contribution to a peer-reviewed manuscript.

To conclude, every scientometric index has its own advantages and limitations. An ideal index should analyze the contributions made by an author/authors according to authentic declaration made by the corresponding author. This way, the authors will get due credit for the efforts taken in manuscript preparation.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

Abhijit S Nair

Department of Anaesthesiology, Basavatarakam Indo-American Cancer Hospital and Research Institute, Hyderabad, Telangana, India

Address for correspondence:

Dr. Abhijit S Nair,
Department of Anaesthesiology, Basavatarakam Indo-American Cancer Hospital and Research Institute, Hyderabad - 500 034, Telangana, India.
E-mail: abhijitnair@rediffmail.com

Received: 27th May, 2019

Revision: 12th July, 2019

Accepted: 04th August, 2019

Publication: 08th November, 2019

REFERENCES

1. Hirsch JE. An index to quantify an individual's scientific research output. *Proc Natl Acad Sci U S A* 2005;102:16569-72.
2. Mingers J, O'Hanley JR, Okunola M. Using Google Scholar institutional level data to evaluate the quality of university research. *Scientometrics* 2017;113:1627-43.
3. Senanayake U, Piraveenan M, Zomaya A. The pagerank-index: Going beyond citation counts in quantifying scientific impact of researchers. *PLoS One* 2015;10:e0134794.
4. Gasparyan AY, Yessirkepov M, Duisenova A, Trukhachev VI, Kostyukova EI, Kitas GD. Researcher and author impact metrics: Variety, value, and context. *J Korean Med Sci* 2018;33:e139.
5. Wislar JS, Flanagan A, Fontanarosa PB, Deangelis CD. Honorary and ghost authorship in high impact biomedical journals: A cross sectional survey. *BMJ* 2011;343:d6128.
6. International Committee of Medical Journal Editors (ICMJE). Uniform requirements for manuscripts submitted to biomedical journals: Writing and editing for biomedical publication. *Haematologica* 2004;89:264.

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

Access this article online	
Quick response code	Website: www.ijaweb.org
	DOI: 10.4103/ija.IJA_435_19

How to cite this article: Nair AS. Scientometrics in medical journals: Indices, their pros and cons. *Indian J Anaesth* 2019;63:955-7.

© 2019 Indian Journal of Anaesthesia | Published by Wolters Kluwer - Medknow