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Comparison of Impact Factors of Journals and H Index of Faculty Members of Different Medical Specialties in Loghman Hakim General Hospital

Navid Ahmady Roozbahany[1], Omid Shafagh[1]
[1]-Hearing Disorders Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran

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Corresponding Author :
Navid Ahmady Roozbahany
Email:
ar.navid@sbmu.ac.ir

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Abstract

Background: With the advancement of knowledge, increasing science production and competition, evaluation of scientific products becomes one of the challenging and undeniable necessary subjects. In Iran, Deputy of Research for Ministry of Health uses H index as one of the scientometrics index for evaluation of research activities of the board members. In journals rating system Impact Factor index, is used.
Purpose: This study aims to compare H index of the board members and impact factor in top journals of each medical specialty.
Methods: In this descriptive study, data for H index of the board members gathered via Google Scholar citation database and impact factor of top journals, from SCImago database, supported by Scopus. 10 top journals with the highest impact factor in medical specialties, until the end of 2015, were studied. Study population of Loghman Hakim Medical Center was selected as a sample of Shahid Beheshti University of Medical Science. In the present study, 10 medical specialties were studied and information for each field including analyzed and compared.
Results: From 10 medical fields, infectious diseases had the highest and otolaryngology had the lowest mean of the impact factor. Toxicology had the highest and radiology had the lowest mean H index. Comparing means of H index and impact factor between the medical specialties, showed that the mentioned indexes in various fields have significant difference statistically.
Conclusion: Applying equal criteria for evaluation of medical specialties will lead to a bias. Comparing research activities of a researcher in otolaryngology field with other fields, relying on the current criteria, will leads to completely wrong interpretation.

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INTRODUCTION

With the advancement of knowledge, a scientific production, evaluation of scientific products in the universities, groups and research centers becomes one of the challenging and undeniable necessary subjects (1). On the other hand, creating a mechanism to evaluate the academic institutes and researchers' scientific quality is necessary (2). The most common way to evaluate the scientific productions is applying the scientometrics methods, including different indexes and parameters which are used for evaluating the researchers and research centers production (1).

In Iran, Deputy of Research for Ministry of Health uses H index as one of the scientometric index for evaluation of research activities of the board members.

H index (Hirsch) was suggested by Jorge Hirsch in 2005 to evaluate physics researchers' quality. it is now used by other science fields and is widely used to evaluate individual scientific impact of the researchers. Since the introduction, this index has great impact on bibliometrics (2-4). H index is a numerical index that is very simple for calculation. The researcher with H index, has H number of articles that are cited at least H times (5). According to this simple definition, H index, unlike other indexes of scientometrics, such as total number of the articles, total number of the citations and/or mean of citations in each article, could relate number of articles and number of citations of each researcher (4-6).

H index is a citation-based index and the nature of knowledge is based on communication and citations. Researchers

publish important results of new investigations in the international journals; every new finding will be valid by citation to previous findings (7).

In journals rating system, the citation-based indexes of scientometrics impact factor (IF) index. This index has been provided to Institute for Scientific Information (ISI) by Eugene Garfield in 1960s. The impact factor index is obtained by division of number of citations in the current year to the published articles in the recent two years (1).

There is fluctuation of these indexes in various scientific fields. So, particularly medical specialties are remarkable. This study aims to compare H index of the board members and impact factor in top journals of each medical specialty.

PATIENTS and METHODS

This is a descriptive study. H index of the board members obtained from Google Scholar citation database and impact factor of top journals, was obtained from SClmago database, supported by Scopus. 10 top journals with the highest impact factor in medical specialties, until the end of 2015, were studied. Study population of Loghman Hakim Medical Center was selected as a sample of Shahid Beheshti University of Medical Science. In the present study, 10 medical specialties were studied, including the following departments: Anesthesiology, Dermatology, Internal Medicine, Infectious Diseases, Neurology, Otolaryngology, Radiology, General Surgery, Toxicology and Pediatrics. Information for each medical specialty, including 10 top journals according to the impact factor and H index of the board members were studied and compared and statistical analysis was done by SPSS 18 Software.

RESULTS

The top journals of each medical specialty are listed in tables 1-10. From the 10 studied medical fields, Infectious Diseases has the highest (mean: 11.65 ±5.93), and Otolaryngology has the lowest (mean: 2.11±0.25) impact factor of top journals. Comparing H index of the board members in the mentioned fields showed that toxicology with mean had the highest (11.67 ± 6.86) and radiology with mean of 1.5± 0.7 had the lowest H index (Table 11).

Regarding H index and impact factor means in different medical specialties, it is specified that the mentioned indexes in various fields have statistically significant difference. (table 12) (diagram 1)

Table 1: List of Anesthesiology Top Journals based on Impact Factor Index

Anesthesiology Journals	IF
Pain	5.64
Anesthesiology	5.52
British Journal of Anaesthesia	5.2
Regional Anesthesia And Pain Medicine	4.23
Pain Physician	4.21
Journal of Pain	4.13
Anesthesia And Analgesia	3.43
Journal of Neurosurgical Anesthesiology	3.41
Anaesthesia	3.18
Neuromodulation	2.91
Mean (SD)	4.18 (0.98)

Table 2: List of Dermatology Top Journals based on Impact Factor Index

Dermatology Journals	IF
Clinics in Dermatology	5.78
Journal of Investigative Dermatology	5.31
Fibrogenesis and Tissue Repair	4.8
Experimental Dermatology	4.71
British Journal of Dermatology	4.48
Journal of the American Academy of Dermatology	4.44
Pigment Cell and Melanoma Research	4.17
Journal of Dermatological Science	3.51
American Journal of Clinical Dermatology	3.32
Acta Dermato-Venereologica	2.87
Mean (SD)	4.33 (0.90)

Table 3: List of Internal Medicine Top Journals based on Impact Factor Index

Internal Medicine Journals	IF
JAMA Internal Medicine	10.03
Diabetes Care	9.19
Annals of Internal Medicine	8.66
The Lancet Diabetes and Endocrinology	8.03
Diabetes	7.74
Diabetes, Obesity and Metabolism	7.11
Diabetologia	6.56
Hypertension	6.43
Journal of Internal Medicine	6.31
Journal of Hypertension	4.92
Mean (SD)	7.49 (1.53)

Table 4: List of Infectious Diseases Top Journals based on Impact Factor Index

Infectious Diseases Journals	IF
Lancet Infectious Diseases, The	23.32
Clinical Microbiology Reviews	18.2
Immunity	16.39
FEMS Microbiology Reviews	13.26
Drug Resistance Updates	9.7
Clinical Infectious Diseases	8.7
Trends in Microbiology	8.52
Emerging Infectious Diseases	6.32
Reviews in Medical Virology	6.31
Clinical Microbiology and Infection	5.86
Mean (SD)	11.65 (5.93)

Table 5: List of Neurology Top Journals based on Impact Factor Index

Neurology Journals	IF
Lancet Neurology, The	22.31
Acta Neuropathologica	10.33
Annals of Neurology	9.28
Brain; a journal of neurology	9.12
Alzheimer's and Dementia	8.81
Sleep Medicine Reviews	8.32
Nature Reviews Neurology	7.94
Neurology	6.94
Neuro-Oncology	6.45
JAMA Neurology	6.26
Mean (SD)	9.57 (4.66)

Table 6: List of Otolaryngology Top Journals based on Impact Factor Index

Otolaryngology Journals	IF
Ear and Hearing	2.59
JARO - Journal of the Association for Research in Otolaryngology	2.43
Head and Neck	2.34
International Forum of Allergy and Rhinology	2.1
Laryngoscope	2.03
Acta Otorhinolaryngologica Italica	1.98
Otolaryngology - Head and Neck Surgery	1.96
Rhinology	1.9
American Journal of Rhinology and Allergy	1.89
Current Opinion in Otolaryngology and Head and Neck Surgery	1.88
Mean (SD)	2.11 (0.25)

Table 7: List of Radiology Top Journals based on Impact Factor Index

Radiology Journals	IF
JACC: Cardiovascular Imaging	7
Radiology	6.62
Photoacoustics	5.5
Human Brain Mapping	5.18
Journal of Cardiovascular Magnetic Resonance	4.67
Investigative Radiology	4.55
International Journal of Radiation Oncology Biology Physics	4.24
European Radiology	4.17
Journal of the American Society of Echocardiography	3.91
Ultrasound in Obstetrics and Gynecology	3.91
Mean (SD)	4.97 (1.09)

Table 8: List of Surgery Top Journals based on Impact Factor Index

Surgery Journals	IF
Annals of Surgery	8.2
British Journal of Surgery	5.43
Journal of the American College of Surgeons	4.8
Liver Transplantation	4.11
Annals of Surgical Oncology	3.94
Obesity Surgery	3.74
JAMA Surgery	3.71
Journal of Refractive Surgery	3.5
Surgical Oncology	3.49
Journal of Surgical Oncology	3.31
Mean (SD)	4.42 (1.47)

Table 9: List of Toxicology Top Journals based on Impact Factor Index

Toxicology Journals	IF
Annual Review of Pharmacology and Toxicology	18.69
Trends in Pharmacological Sciences	10.83
Particle and Fibre Toxicology	6.48
Archives of Toxicology	5.66
Forensic Toxicology	5.29
Journal of Toxicology and Environmental Health - Part B: Critical Reviews	5.18
Critical Reviews in Toxicology	5.1
Nanotoxicology	4.93
Environmental Pollution	4.22
Toxicology Research	3.86
Mean (SD)	7.02 (4.53)

Table 10: List of Pediatrics Top Journals based on Impact Factor Index

Pediatrics Journals	IF
Journal of Child Psychology and Psychiatry and Allied Disciplines	5.83
Pediatrics	5.53
JAMA Pediatrics	4.62
Developmental Review	4.07
Journal of Neurodevelopmental Disorders	3.97
Pediatric obesity	3.96
Child Development	3.91
Journal of Pediatrics	3.63
Pediatric Allergy and Immunology	3.56
Developmental Medicine and Child Neurology	3.52
Mean (SD)	4.26 (0.81)

Table 11: Mean and Standard Deviation of H index in ten different Medical Specialties

Groups	Mean	Std. Deviation
Anesthesiology	2.67	2.066
Dermatology	5.00	3.916
Internal Medicine	2.00	2.098
Infectious Disease	7.50	7.583
Neurology	2.25	2.217
Otolaryngology	3.86	3.078
Radiology	1.50	0.707
Surgery	3.25	1.282
Toxicology	11.67	6.861
Pediatrics	3.00	1.528

Table 12: Impact Factor and H Index of different medical specialties.

	F	Sig.
IF	9.825	0.001
H Index	3.529	0.002

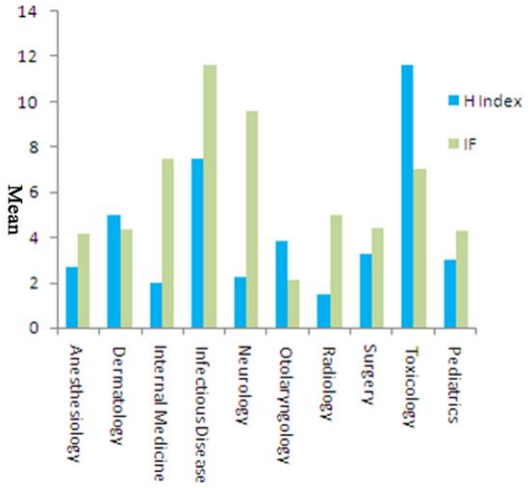

Diagram 1: Comparing different medical specialties based on Impact Factor and H Index

DISCUSSION

H index of the researchers and the impact factor of journals are included in citation-based indexes of scientometrics. The basis for calculation of the indexes is the citations of the researchers or journals (2, 8, 9).

Our results indicated that different medical specialties, in both H index of the researchers and the impact factor of top journals, have significant difference.

Different studies have shown that citation patterns of different scientific fields are different. This difference is also observed in various scientific subfields (10-12). For example, Chemistry is a field with large number of citation and from its subfields, Analytical Chemistry has a tangible difference comparing other Chemistry subfields. In another study regarding Dentistry, Orthodontic subfield has the highest referencing (13).

We believe that each scientific field has a unique research characteristic. For example, updating intervals of scientific content and number of scientific publications concerning a specific subject or method significantly varies

in different scientific fields. Consequently, H index of the researches and the impact factor of journals in various fields are different and in some cases, the difference is significant (2).

Although H index can be used for comparing the research activity of researchers within a specific field, using H index for comparing the researchers of different fields seems meaningless. In fact, this evaluation indexes should be corrected keeping in mind that different scientific fields have different citation methods (6, 14, 15). Furthermore, because the applied mechanism in H index is collection of all the scientific publications and citations into a single number it would be not only relates to the scientific field, but also to the researcher's age. H index does not decrease over time. It provides no information about the current or recent scientific activities of a researcher. Higher research age of a researcher, leads to receiving more citations and references H index will grow in time, even if the researcher has ceased research activity. This is why we believe that H index cannot compare young and experienced researchers.

Our study showed that on average, the lowest impact factor belongs to otolaryngology journals. We believe that otolaryngology research area has several different research lines. This fact, leads to production of a huge number of novel but unrelated scientific product. As the result, citation and referencing is lower in this field, which consequently, lowers impact factor of its journals. This theory also explains relative low H index of otolaryngologists.

Also, scientific articles publication in the journals with higher impact factor is considered as a criterion to evaluate research activity quality, our results indicate that applying equal criteria to evaluate different specialties lead to a bias. For instance, comparing research activity of a researcher in otolaryngology field with another researcher in infectious diseases field, relying on the current criteria results to a completely wrong interpretation (2, 3, 6, 8, 9, 16).

Our recommendation is to modify the current comparing system. One solution is considering several groups, each containing research field's with comparable indices. Another option is to provide a corrected Index which is calculated using the conventional Indices multiplied to a factor that is unique for each scientific field.

CONCLUSION

According to the aforementioned disadvantages and criticisms about H index, applying this index as a criterion for evaluation of research activities and research rating of the board members by Ministry of Health and Medical Education, will not be resulted in exact conclusions. Considering impact factor of the journals for evaluation of research activities will have unreal results. Only medical specialties that have similar research criteria shall be evaluated and compared to each other.

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CONFLICT of INTEREST

The authors declare no conflict of interest.

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