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Short Communication

H-index and promotion decisions

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Two disciplines, medicine and health management & information sciences which offer graduate programs were studied. From well known citation databases, it was found that significantly higher number and impact factors of journals of high consensus disciplines indicate a higher chance of publication for the faculty members of these disciplines compared with low consensus disciplines. Due to the shortcomings of current scientometric indexes and movement towards new generation universities, it seems imperative for evaluation and promotion committees to reconsider the criteria which are largely publication-based. It is suggested that potential differences across disciplines as well as individual competencies and differences within disciplines be taken into consideration in decision making about promotion of faculty members.

Keywords: Promotion; Evaluation; H-index; G-index; High consensus disciplines; Low consensus disciplines

Introduction

Evaluation of faculty members for promotion decisions is a complicated procedure which has often been disputed worldwide. In an attempt to move towards social accountability, universities have developed criteria for evaluating faculty members' academic performances and activities. To this end, academic activities are often redirected towards universities' strategic goals, part of which is university rankings, pushing universities to keep up with their competitors[1,2]. The criteria for promotion are expected to be sufficiently reasonable to reflect the values of universities, and integrate data from teaching, research and administrative records of faculty members as well as their accomplishments such as awards and creative works)[4 3](. However, the criteria are often questioned for undervaluing teaching and emphasizing on publications as the main performance criteria for promotion and hence, multi-criteria scales based on individual differences have been suggested by faculty members[5-7]. Highlighting publications may result in underestimating teaching which leads to serious consequences such as artificial self-citations and unethical behavior in research; for example,a very recent survey in China shows that 93 percent of Chinese researchers write papers only for promotion purposes[8].

Studies in medical universities in Iran show the inappropriate use of existing evaluation information for promotion decision making which overshadows the faculty members' main role, i.e. teaching[9 10]. Similarly, in more recent studies, it has been argued that evaluation for promotion is mainly based on faculty members' publications and less attention is given to educational activities or other academic performances, thereby making the promotion process questionable[11 12].

Recently, a list of criteria for evaluation of faculty members working in medical universities affiliated to Iran's Ministry of Health and Medical Education has been developed. Although there has been an attempt to provide a multi-criteria scale, the focus is mainly on publications and the difference between high consensus disciplines (natural sciences) and low consensus disciplines (social and human sciences) in regard to publications has been unnoticed. According to these criteria, H-index is one of the key scientometric indexes of faculty members' academic performances even though several studies have argued that H-index is not an appropriate index for assessing research achievements of faculty members and their overall scientific impact[8 13-15].

A major problem with H-index is that comparing researchers at different stages of their academic performance even within the same discipline is unlikely. There is a correlation between age and h-index; therefore, some of the articles will receive more citations only because they are published earlier. This has led to the development of M-parameter that is dividing h by the scientific age of the researcher. Moreover, H-index may appear to be misleading when a group of researchers work together and accumulate H-index regardless of the amount of contribution he or she makes, i.e. the first person in the list of authors accumulates the same H-index as the last person in the list. It has also been argued that H-index should not be used equally to compare researchers of different fields due to differences among fields regarding productivity level of disciplines[16-18]. Another disadvantage of H-index is that after a paper becomes a top H-paper, this paper will not be used for determining the value H of the H-index in subsequent years. In other words, H-index calculated in the next years is not influenced by subsequent citations the paper may receive[19].

To improve the shortcomings of H-index, a new index called G-index has been suggested[19-21]. G-index is defined as "A set of papers has a G-index g if G is the highest rank such that the top g papers have, together, at least G2 citations. This also means that the top g+1 papers have less than (g+1) 2 papers."(19) It has been argued that the drawbacks of H-index can be improved by G-index, which represents the largest number of citations at which G of the most cited papers gets a total value of not less than G2 of citations in a descending list of publications[19-21]. The present study was conducted to compare the publication chances of two types of disciplines and argue that the criteria for promotion decision might not be appropriate.

Methodology

For the purpose of this study, a list of post graduate disciplines from School of Medicine (SM) and School of Health Management and Information Sciences (SHMIS) was obtained from the official website of Iran University of Medical Sciences. It was decided to choose postgraduate disciplines of SM and SHMIS because the former offers programs of disciplines mainly related to high consensus disciplines and the latter offers programs of disciplines mainly related to low consensus sciences. Data was obtained from Web of Science and Scopus databases. We searched all first quartile (Q1) journals relevant or representative of postgraduate disciplines of SM and SHMIS in 2017.

Almost all disciplines were available by the name of their subject matters in these two databases. However, a few disciplines such as applied linguistics were not available by the subject matter in these databases and we had to proceed the search on the basis of standard keywords of Medical Subject Headings (MESH). For the search in Scopus database, we used Scimago journal list because it provided the access to data on the basis of Q1 and Scientific Journal Ranking (SJR) measures.

Results

Table 1 shows the number of journals, highest IF and highest Eigenfactor metrics of journals in Q1 ranking of JCR. As the results show, the highest number of the journals appear in high consensus disciplines including biochemistry and molecular biology (n=73), pharmacology and pharmacy (n=65), genetics and heredity (n=44), immunology (n=38) and microbiology (N=31). On the other hand, low consensus disciplines including medical informatics (n=6), applied linguistics (n=4), and health economics (n=3) have significantly lower number of journals. The table also illustrates that health technology assessment and medical education have the lowest number of journals (N=1). Moreover, the table shows that the highest IFs of the journals appear to be in the fields of pharmacology and pharmacy and genetic and heredity which are above 40, whereas the highest IFs in medical education and library and information sciences are below 6.

Table 2 shows the number of journals, the highest Scimago Journal Rank (SJR) and H-index of the journals based on field/category names in Scopus. This table shows that the number of journals in some fields such as biochemistry and molecular biology, pharmacology and pharmacy, immunology, and microbiology are several times more than other fields such as medical education, healthcare sciences and services, medical informatics, and health information management. The table also shows that the highest h-indexes in the high consensus disciplines such as biochemistry and molecular biology, pharmacology and pharmacy, immunology, and microbiology are

Table 1—The number of journals, highest impact factors and highest Eigenfactor metrics of Q1 journals based on JCR

Filed / Category name	# journal in JCR	Highest Impact factor	Highest Eigenfactor
Biochemistry &Molecular Biology	73	32.621	0.583260
Pharmacology & Pharmacy	65	50.167	0.054410
Genetics & Heredity	44	41.465	0.234110
Immunology	38	41.982	0.136360
Microbiology	31	31.851	0.12238
Physiology	20	24.014	0.045010
Biochemical Research Methods	19	26.919	0.243170
Biophysics	18	13.783	0.081820
Parasitology	9	17.872	0.122380
Virology	8	17.872	0.122380
Anatomy & Morphology	5	4.231	0.016860
Medical Education	1	4.405	0.011900
Health Care Sciences & Services	24	7.226	0.055270
Information Science & Library Science	22	5.43	0.017580
Health Policy & Services	19	7.226	0.055270
Medical Informatics	6	4.671	0.027410
Applied Linguistics	4	4.88	0.002850
Health Economics	3	3.25	0.013920
Health Technology Assessment	1	4.513	0.011340

Table 2—The numbers of journal, highest SJR and highest H-index of the journal based on field/category name in Scopus

Field / Category name	Journals in Scopus	Highest SJR	Highest H-index
Biochemistry and Molecular Biology	103	19.939	514
Pharmacology and Pharmacy	78	10.106	277
Pharmacology (Medical)	65	4.072	226
Immunology	49	28.786	410
Microbiology	35	9.146	268
Microbiology (Medical)	30	11.301	288
Physiology	26	16.184	557
Biophysics	34	8.790	318
Parasitology	17	9.146	197
Virology	17	9.146	268
Anatomy and Morphology	11	2.664	185
Medical Education	3	2.04	114
Health Care Sciences and Services	5	1.24	55
Information Science and Library Science	54	3.160	241
Health Policy & Services	58	4.660	147
Medical Informatics	16	5.022	127
Applied Linguistics	7	3.22	76
Health Economics	6	3.68	103
Health Technology Assessment	1	2.26	107
Genetics	81	34.896	511
Health Information Management	5	34.638	176

more than 220 whereas these figures are below 100 among low consensus disciplines such as applied linguistics, health care sciences and services, health economics and health technology assessment.

Discussion

The higher number of journals in high consensus disciplines suggests that the members of these academic communities have a significantly higher chance for publication and accumulating citations. This finding supports Hirsch (2005) and Jackson, et al. (2017) arguing that high consensus disciplines provide higher chances of publications for their members; therefore, they cannot be equally compared with the members of low consensus disciplines in promotion and evaluation procedures[17 22]. Accordingly, deployment of the same evaluation, and promotion criteria equally for faculty members of all disciplines (high consensus and low consensus) remains questionable unless the members of the promotion and evaluation committees apply different criteria for the faculty members of high and low consensus disciplines. This is in line with the arguments provided by Ahmady, et al (2009), Tootoonchi, et al.(2014), Kamali, et al(2018) and Gilavand, et al(2016)[9-12].

Given that impact factors of some journals in particular high consensus disciplines are several times higher than that of low consensus disciplines (Tables 1 and 2), the number of citations is accordingly higher. There is no shadow of doubt that members of the communities of high consensus disciplines will receive higher number of citations due to the higher impact factors leading to higher scientometric indexes.

Conclusion

Considering the limitations of H-index discussed earlier in this paper, it seems that promotion decisions based on these criteria do not appear to be reasonable and they should be reconsidered by including other measures. For example, G-index which modifies H-index while keeping its advantages might present a more supportable view of faculty members' outcome and be a more justifiable criteria for publications. Having criteria on the basis of the nature of disciplines is also an option which could be taken into consideration.

However, as medical universities are moving towards Third Generation Universities, academic products, team works and interdisciplinary collaborations should be given more importance than faculty members' "H-index" which is merely publication-based. Moreover, the faculty members of high and low consensus disciplines should develop projects which could be conducted by team-work so the chance of publication for low consensus disciplines will increase as well. Finally, as members of academia have different potentials, skills, and talents for scientific productivity, other forms of academic products such as textbook writing, innovative teaching methods etc., should also be considered as alternatives to paper publication.

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