Google Scholar journal metrics: Comparison with impact factor and SCImago journal rank indicator for nuclear medicine journals

Original Article

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ABSTRACT

Introduction: In the current study, we compared h5-index provided by Google Scholar (GS), impact factor (IF) provided by web of sciences (WOS), and SCImago journal rank indicator (SJR) provided by SCOPUS for quality assessment of nuclear medicine journals.

Methods: 2013 h5-index, 2012 IF, and 2011 SJR of nuclear medicine journals were extracted from their publishers namely GS, WOS, and SCOPUS. Rank of each journal according to each index was provided. Spearman correlation was used for evaluation of the correlation between metrics.

Results: Overall 22 journals were identified. Spearman correlation coefficients between h5-index and other journal metrics were 0.907 for 2012 IF, 0.979 for 2011 JCR, and 0.978 for 2011 SCOPUS h-index (all p-values<0.00001). Wilcoxon signed ranks test showed no statistically meaningful difference between rankings according to h5-index and other journal metrics (p values of 0.589, 0.565, and 0.542 for 2012 IF, 2011 SJR, and 2011 SCOPUS h-index respectively).

Conclusion: The new GS journal metrics are reliable tools for quality assessment of the nuclear medicine journals. In our opinion, h5-index, IF, and SJR should be used in a combination as their combination would give a more holistic view of journal quality. Development of new journal metrics in addition to SJR and IF by GS should be welcomed by the scientific community.

Key words: Impact factor; Google scholar; h5-index; h5-median; SCImago journal rank indicator

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INTRODUCTION

Google Scholar (GS) is an open access scientific search engine which is getting increasingly important in the scientific community despite its shortcomings [1, 2].

In the recent years, Google Scholar expanded its utilities to research evaluation mainly by introducing h-indices for researchers and journals [3-6]. H-index is an extremely popular metrics for scientific evaluation of the researchers and is currently provided by SCOPUS, Web of Science (WOS), and Google Scholar Citations [7, 8]. By introducing its user profiles, Google Scholar developers have tried to improve the accuracy of h-index calculation and the prospect of this metrics seems to be very promising.

In April 2012, Google Scholar Metrics has been launched and aimed to provide a tool for journal ranking and evaluation. By providing journal ranking indices (h5-index and h5-median thus far), Google Scholar actually introduce itself as an important competitor in the field of scientometrics alongside WOS and SCOPUS [9]. Traditionally, impact factor (provided by WOS) and SCimago journal rank indicator (provided by SCimago based on SCOPUS) have been used for journal citation evaluation and ranking. Google Scholar provided two indices for journal metrics. h5-index is the h-index for articles published in the last 5 complete years and h5-median of a journal is the median number of citations for the articles that make up its h5-index. The definitions of h-index, h-median, and h-core according to Google Scholar are:

"The h-index of a publication is the largest number h such that at least h articles in that publication were cited at least h times each. The h-core of a publication is a set of top cited h articles from the publication. The h-median of a publication is the median of the citation counts in its h-core. The h-median is a measure of the distribution of citations to the articles in the h-core"[10].

Since the launch of Google Scholar Metrics, it has attracted interest in the scientific community [11-18]. In the current study, we compared the quality metrics of nuclear medicine specific journals. The metrics included impact factor (IF) (provided by WOS), SCimago journal rank indicator (SJR) and h-index (provided by SCOPUS), and h5-index and h5-median (provided by GS).

We aimed to define if the GS metrics can be used as an alternative to IF and SJR or not.

METHODS

In order to identify all journals under the category of nuclear medicine, three different sources were searched: Science Citation Index Expanded provided by WOS under the category of "Radiology, Nuclear Medicine & Medical Imaging" [19], SCImago Journal Ranking provided by SCOPUS under the subject category of "Radiology, Nuclear Medicine and Imaging" [20], and GS metrics under the category of "Health & Medical Sciences" and subcategory of "Nuclear Medicine, Radiotherapy & Molecular Imaging" [21].

We only included journals with the scope of nuclear medicine in the current study.

The following data was extracted for each identified journal: 2012 IF from Journal Citation Report of WOS, 2011 SJR and h-index from SCOPUS, h5-index and h5-median from GS.

The correlations between the extracted indices were evaluated using Spearman correlation coefficient. The ranks of each journal according to each metrics were also provided (for journals with equal h5-index, h5-median was used [16]) and compared statistically using the Wilcoxon signed ranks test.

P-values less than 0.05 were considered statistically significant. All analyses were done using SPSS version 11.5.

RESULTS

Overall 22 journals were identified (Table 1). Thirteen journals were indexed in all three databases, 6 journal in SCOPUS and GS, 2 journals only in SCOPUS, and one journal only in GS. Spearman correlation coefficients between h5-index and other journal metrics were 0.907 for 2012 IF, 0.979 for 2011 JCR, and 0.978 for 2011 SCOPUS h-index (all p-values<0.00001). Figure 1 shows the scatter plots of the different journal metrics against h5-index with their fit lines.

Table 2 shows the journal quality metrics and their corresponding ranks for each identified journal. Wilcoxon signed ranks test showed no statistically meaningful difference between rankings according to h5-index and other journal metrics (p values of 0.589, 0.565, and 0.542 for 2012 IF, 2011 SJR, and 2011 SCOPUS h-index respectively).

DISCUSSION

In the current study, we compared the newly developed journal quality metrics provided by GS with the traditional IF and SJR for evaluation of nuclear medicine journals. Our results showed very high correlation between h5-index and other metrics (all above 0.9). This strong correlation is quite remarkable if we take into account the source of the metrics and the way they are calculated.

Table 1: Nuclear medicine specific journals identified in the current study and the covering sources.

Journal	Covering sources
Journal of Nuclear Medicine (JNM)	WOS,SCOPUS,GS
European Journal of Nuclear Medicine and Molecular Imaging (EJNMMI)	WOS,SCOPUS,GS
Seminars in Nuclear Medicine (SNM)	WOS,SCOPUS,GS
Journal of Nuclear Cardiology (JNC)	WOS,SCOPUS,GS
Nuclear Medicine and Biology (NMB)	WOS,SCOPUS,GS
The quarterly journal of nuclear medicine and molecular imaging (QJNMMI)	WOS,SCOPUS,GS
Nuclear Medicine Communications (NMC)	WOS,SCOPUS,GS
Nuklearmedizin. Nuclear medicine (NM)	WOS,SCOPUS,GS
Annals of Nuclear Medicine (ANM)	WOS,SCOPUS,GS
Journal of Nuclear Medicine Technology (JNMT)	SCOPUS,GS
Clinical Nuclear Medicine (CNM)	WOS,SCOPUS,GS
Revista Espanola de Medicina Nuclear e Imagen Molecular (REMNIM)	WOS,SCOPUS,GS
Hellenic Journal of Nuclear Medicine ((HJNM)	WOS,SCOPUS,GS
Iranian Journal of Nuclear Medicine (IJNM)	SCOPUS,GS
Nuclear Medicine and Molecular Imaging (NMMI)	SCOPUS,GS
Nuclear medicine review. Central & Eastern Europe (NMR)	SCOPUS,GS
Médecine Nucléaire (MN)	WOS,SCOPUS,GS
Kaku igaku. The Japanese journal of nuclear medicine (JJNM)	SCOPUS
Indian Journal of Nuclear Medicine (InJNM)	SCOPUS,GS
ANZ Nuclear Medicine (ANZNM)	SCOPUS
The Egyptian Journal of Radiology and Nuclear Medicine (EJNM)	SCOPUS,GS
Alasbimn journal. Revista de medicina nuclear (Alasbimn)	GS

IF (provided by JCR) is a mean citation per paper over two years, SJR (provided by SCOPUS) is calculated based on a Google Page Rank algorithm over three years and h5-index (provided by GS) is a combined quality/quantity measure over 5 years [6].

In addition to high correlation between different metrics, the ranks of journals according to each source were quite similar again and no statistically meaningful difference was noticed between rankings. Overall it seems that the new GS journal metrics (h5-index, and h5-median) are reliable and can be used as an alternative to IF or SJR (or at least as an adjunct).

Despite the overall results above, several important discrepancies were identified between journal quality metrics we evaluated. In the rest of this manuscript we would address these discrepancies.

Journal coverage

Overall, the journal coverage differs among the three evaluated sources. Notably, ALASBINM was only identified by GS and JJNM and ANZNM were only identified by SCOPUS (for journal abbreviations please refer to Table 1). We should be aware of this coverage difference as not all journals are covered by WOS and some very prestigious journals such as NMR, JNMT, and IJNM could be missed if one considers JCR for journal quality assessment [9].

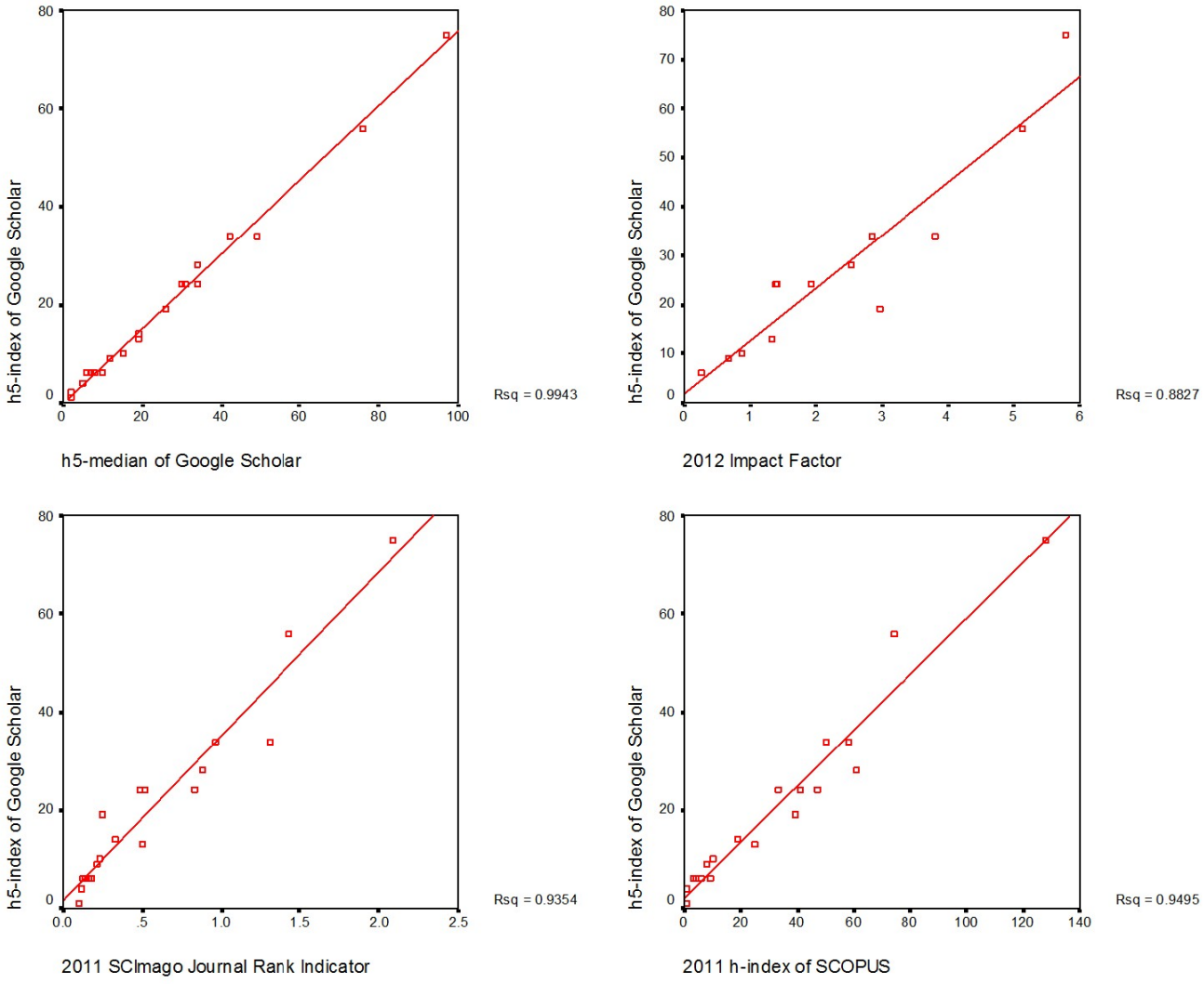

Figure 1: Scatter plots of h5-index against the other journal metrics.

These three journals have not been included in the JCR yet, however they rank higher than MN which is a WOS indexed journal using both SCOPUS and GS rankings. In our opinion, this is an important finding and is an important reason that GS and SCOPUS metrics should be used at least as an adjunct to IF. Actually, many authors have expressed their concern regarding monopoly of IF for journal quality assessment [22-25]. Quality assessment by GS is a great opportunity to end the monopoly of JCR in this regard.

Some of the newly launched journals such as "Asia Oceania Journal of Nuclear Medicine and Molecular Imaging", "Molecular Imaging and Radionuclide Therapy", "American Journal of Nuclear Medicine and Molecular Imaging", "World Journal of Nuclear Medicine", "The Open Nuclear Medicine Journal" were not included in the Google Scholar Metrics. The reason is most likely the limitation imposed by GS as publications with fewer than 100 articles between 2008 and 2012 were excluded [26]. We could expect that in the upcoming versions of Google Scholar Metrics, these journals be included. However this cannot explain omission of two notable journals namely JJNM and ANZNM. Actually Google Scholar Metrics help manual mentioned that *"If you can't find the journal you're looking for, try searching by its abbreviated title or alternate title. There're sometimes several ways to refer to the same publication. (Fun fact: we've seen 959 ways to refer to PNAS)"* [27].

We searched Google Scholar Metrics with various versions of the JJNM and ANZNM titles with no yield.

Table 2: Journal quality metrics and their corresponding ranks for the identified journals.

Journal*	H5-index/Rank	H5-median	2012 IF/Rank	2011 SJR/Rank	2011 SCOPUS h-index/Rank
JNM	75/1	97	5.774/1	2.086/1	128/1
EJNMMI	56/2	76	5.140/2	1.428/2	74/2
SNM	34/3	49	3.818/3	1.306/3	58/4
JNC	34/4	42	2.847/5	0.966/4	50/5
NMB	28/5	34	2.517/6	0.876/5	61/3
QJNMMI	24/6	34	1.918/7	0.833/6	41/7
NMC	24/8	30	1.379/9	0.522/7	47/6
NM	13/11	19	1.322/10	0.502/8	25/10
ANM	24/7	31	1.410/8	0.485/9	33/9
JNMT	14/10	19	N/A	0.326/10	19/11
CNM	19/9	26	2.955/4	0.250/11	39/8
REMNIM	10/12	15	0.863/11	0.227/12	10/12
HJNM	9/13	12	0.679/12	0.211/13	8/14
IJNM	6/15	8	N/A	0.183/14	4/17
NMMI	6/14	10	N/A	0.166/15	3/18
NMR	6/16	7	N/A	0.136/16	9/13
MN	6/17	6	0.253/13	0.124/17	6/16
JJNM	N/A	N/A	N/A	0.118/18	8/15
InJNM	4/18	5	N/A	0.114/19	1/20
ANZNM	N/A	N/A	N/A	0.110/20	3/18
EJNM	1/20	2	N/A	0.102/21	1/20
ALASBIMN	2/19	2	N/A	N/A	N/A

*For full journal titles please refer to Table 1.

We used "Publish or Perish" software [28] to explore this finding in depth and surprisingly got h5-index of 2 for both journals. This shows that, omission of these two journals is due to inaccuracy of GS not lack of citation.

It seems that GS has inherent problem in identifying non-English journals [13]. Searching Google Scholar Metrics yielded 2 journals under the title of "Nuclear Medicine and Molecular Imaging" with 2 different h-indices. This is most likely due to dual language (Korean and English) of this journal. "Publish and Perish" software yielded h5-index of 4 which is different from the one given by GS.

Another shortcoming of GS is in identifying journals with title change. Google Scholar Metrics yielded 3 journals under the title of "Revista Espanola de Medicina Nuclear" with 3 different h-indices. In addition to the dual language of this journal (English and Spanish), another reason is most likely the title change of this journal to "Revista Espanola de Medicina Nuclear e Imagen Molecular". "Publish and Perish" software yielded the h5-index of 7 which was different from the one provided by GS.

This lack of standardization of journal title is a major shortcoming of GS and hopefully would be addressed in the future versions of Google Scholar Metrics [16].

Inherent differences between h-index, SJR, and IF

Some of the differences in rankings in Table 2 is due to inherent difference between h-index, SJR, and IF. H-index is a cumulative index which means that journals with higher number of articles would have more probability of getting higher h-index. On the other hand SJR and IF are not affected by the number of articles. This is the most likely reason of ranking differences of NM by SJR, IF, and h5-index as the number of article published by NM is small each year.

Another important ranking difference in Table 2 is CNM. Despite 4th position by IF ranking, its rankings by h5-index, and SJR were 9th and 11th. The reason is again lies in the inherent difference of these journal quality metrics. CNM is a special journal which publishes numerous case reports under the section of "interesting image". These items are not considered citable by JCR, although cited very frequently and contribution of these articles to CNM IF is very high. Actually, most of the "interesting images" published by CNM in the period of 2008-3012 were cited only once or twice and numbers of articles with higher citations are limited. This is the reason of low h5-index for this journal despite very high IF [9].

In addition to GS, SCOPUS also releases h-index for journals as a quality metrics. However, the h-index provided by SCOPUS is not limited to a period of time and corresponds to the whole period of time the journal is indexed in SCOPUS. This makes the SCOPUS h-index less reliable than h5-index. Journals with a long history of publication would have a higher chance of getting higher h-index. Actually, SCOPUS h-index does not reflect the quality of a journal in the recent period of time which is the most important piece of information researchers are seeking for.

To cut the story short, h-index, SJR, and IF are calculated with their unique methods and have different theoretical backgrounds. Each of these quality metrics is sensitive to different aspects of scientometrics and using a combination of all of them seems to be a rational method for journal quality assessment.

Other shortcoming of Google Scholar Metrics

A major shortcoming of Google Scholar Metrics is the limited search ability. GS has provided two tools for acquiring journal rankings. A first tool is search by journal language which does not seem to be of practical value. Another arrangement is the categories and sub-categories which allows the users to search in a specific discipline. This is a very useful tool and is a step forward compared to the 2012 version of Google Scholar Metrics. However the arrangement of sub-categories is sometimes unusual. For example the nuclear medicine was combined with radiotherapy which is to some extent inappropriate.

The major problem with the above-mentioned tools is limited number of journals provided by each search. Each language section would yield the first 100 journals and each sub-category search the first 20. This limitation is a major shortcoming and actually the journals should be searched one by one in order to find their h5-indices.

GS also provides the articles contributed to the h5-index by a link for each journal. This is an important option, however the rest of the articles with lower citations are not provided which limits the usefulness of this option to some extent [13].

Limitations of our study

We only included specific nuclear medicine journals in our analysis which can limit the generalizability of our results. Further studies with larger sample of randomly selected journals are needed in this regard.

CONCLUSION

The new GS journal metrics are reliable tools for quality assessment of the nuclear medicine journals. In our opinion, h5-index, IF, and SJR should be used in a combination as their combination would give a more holistic view of journal quality. Development of new journal metrics in addition to SJR and IF by GS should be welcomed.

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