SCImago Journal Rank Indicator: A Viable Alternative to Journal Impact Factor for Dental Journals

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ABSTRACT

Objective. This paper investigated the possibility of SCImago Journal Rank (SJR) indicator as an alternative to the Journal Impact Factor (JIF) in the field of dentistry.

Method. The SJR and JIF scores and ranking order of 88 dental journals were downloaded from the relevant websites. Pearson and Spearman correlation coefficients were calculated to test hypotheses for association between the two journal quality metrics.

Result. A very strong positive correlation was found between the scores and ranking order based on the SJR and JIF of selected journals. Hence, academics and researchers in dentistry can use the SJR indicator as an alternative to JIF.

INTRODUCTION

Assessment of research quality is an important activity in all academic and professional fields. Citation-based evaluation metrics have been the most common method in the last few decades. As the only provider of citation data, the Institute for Scientific Information (now Thomson Reuters) has a long-established monopoly of the market. The Journal Impact Factor (JIF), first conceived in 1955 by Eugene Garfield, was the main quantitative measure of quality for scientific journals. The JIFs, published annually in the Journal Citation Reports (JCR), are widely used for quality ranking of journals and extensively used by leading journals in their advertising (Elsaie & Kammer, 2009). The JIFs are also used for a variety of other purposes. "For instance, it is used by librarians as a criterion for selecting library collections. JIF is also used by researchers to decide where they will submit their research manuscripts. JIF also serves as an evaluation tool by institutions for recruitment, promotion, research grant allocation, and project funding" (Law & Li, 2015, p. 19). "The JIF is generally defined as the recorded number of citations within a certain year (for example, 2015) to the items published in the journal during the two preceding years (2013 and 2014), divided by the number of such items (this would be the equivalent of the average citation rate of an item during the first and second calendar year after the year of publication). Only citations between journals indexed in the Thomson Reuter's Web of Science (WoS) are used (Cantin, Munoz & Roa, 2015, pp. 1183-1184).

The JCR Journal Impact Factor maintains its monopoly to date and is considered the best instrument for the ranking of journals. At the same time it has been a victim of severe criticism. Many authors have challenged the methodology of JIF calculation (Rieder, Bruse, Michalski, Kleeff, & Friess, 2010; Rossner, Van Epps & Hill, 2007; Seglen, 1997). “Whilst all citations for the given year are taken into account as the numerator, only manuscripts deemed to be original research or review papers, by employees of the company are included in the denominator. This in turn has resulted in poor reproducibility of the calculated impact factor which often serves as a source of conflict between publishers, editors and the ISI” (Oosthuizen & Fenton, 2014, p. 241). Other demerits of JIF include its bias towards English language publications, the disparity between different specialties and subspecialties, limited number of journals, and the inclusion of journal’s self-citations (Cantin, Munoz & Roa, 2015; Elliot, 2014; Falagas & Alexiou, 2008; Falagas, Kouranos, Arencibia-Jorge, & Karageorgopoulos, 2008; Oosthuizen & Fenton, 2014; San Francisco DORA, 2012). In the light of these criticisms, there is a need for an alternative to JIF.

SCImago Research Laboratory in 2007 developed the SCImago Journal Rank (SJR) indicator, a journal quality indicator that uses Scopus-indexed journals for quality assessment, applying the Google’s PageRank algorithm on the Scopus database. More complex than JIF, it considers citations in a three-year period (Cantin, Munoz & Roa, 2015). The SJR allows not only citation counts, but also works as an indicator of importance and influence of citing journals (Khurshid, 2014). The Scopus database contained over 21,500 journals and periodical publications in its directory (Scopus, 2016), which is substantially more comprehensive than the JCR (11,000+ indexed journals) (Journal Citation Reports, 2016). “The journal’s self-citation rate is limited to a maximum of 33%, a measure that effectively excludes manipulation through the use of self-citation” (Oosthuizen & Fenton, 2014, p. 242). A further advantage of the SJR is its free availability on the Internet while the JCR is a commercial product.

In the present study, we calculated the correlation between JIFs and SJRs of dental journals and journal rankings based on these two quality metrics. The objective was to see whether SJR scores and rankings based on them were comparable with the gold standard of JIF, and whether SJR could be an alternative to JIF for deciding publication, scientific reading and other uses of journal ranking in the field of dentistry.

METHODS

We identified journals in the JCR category *Dentistry, Oral Surgery & Medicine* and downloaded the latest available Journal Impact Factors (JIF-2015) as well as the ranking data. Similarly, we downloaded SJR scores (latest for 2015) for journals in the subject category *Dentistry* from the website SCImago.com.

JIF scores were found for 89 dental journals included in the JCR. In the SCImago, there were 170 journals in this category. We selected 88 JCR based journals for comparison and further analysis. Note that five JCR journals were not included in the dentistry list by SCImago. One JCR journal was not found in SCImago. The other four were found in the category *Medicine*.

We set the following null hypotheses to test in this study:

- H_01 : There is no correlation between the SCImago Journal Rank indicator and the Journal Impact Factor of dental journals.
- H_02 : There is no correlation between journal rankings based on the SJR and the JIF of dental journals.

We compared JIF and SJR scores as well as ranking based on them for selected journals with the help of Microsoft Excel (version 2010). The correlation coefficients for two sets of paired data were calculated using IBM SPSS software (version 21).

RESULTS

The JIF of 88 selected journals in the discipline of dentistry ranged between 0.248 and 4.949. The SJR values for corresponding journals ranged between 0.204 and 2.020. Slight differences in ranking positions of journals in the two impact metrics can be seen in Appendix 1. In the cases of three journals, there was no difference in ranking positions. The largest differences in the positions were found for the *Journal of Implantology* and the *Journal of Orofacial Pain* as 34 and 33 respectively. A bump chart for the top 10 JCR dental journals (Figure 1) shows that eight journals were also ranked in the top 10 in the SJR list.

Results of Pearson correlation between JIF and SJR scores of selected journals and Spearman correlation coefficient between their ranking positions are given in Table 1. The values are 0.851 and 0.865 respectively. The most well-known “rule of thumb” to interpret the strength of correlation coefficient was suggested by Cohen (1988). He proposed the values of 0.10, 0.30, and 0.50 as having small, medium and large correlation strength. Many other statisticians disagreed with Cohen and accepted a larger value as a strong effect, starting from 0.60 and sometimes from 0.80. In the case of dental journals, both null hypotheses were rejected as very high positive correlation was found between the variables. Figure 2 shows scatter plots of the relationship between JIF versus SJR scores and ranks.

DISCUSSION AND CONCLUSION

A small amount of literature has been produced on the quality of dental journals. The current study is the first of its kind in this discipline that compared and correlated two citation-based journal quality metrics, JIF and SJR. In general, researchers have made two main criticisms of the popular approach for journal ranking. The first criticism is the use of citation-based quantitative measures as a proxy for research quality. To address this, they recommended qualitative methods for this purpose such as perception-based surveys of experts or key informants in specific disciplines. The second criticism is related to the question of the best citation-based metric for the assessment of journal quality. As aforementioned, the scientific community has raised many objections on the use of the oldest and most popular measure, the Thomson Reuters’ Journal Impact Factor (JIF).

Later, researchers made efforts to eliminate deficiencies and improve the existing citation-based measures. The creation of SCImago Journal Rank indicator was the outcome of such efforts. Like JIF, it does not use raw citations. However, it uses a complex algorithm to take into account the prestige and quality of the citing sources. The SJR also overcomes many other biases which include geography, language, the journal collection size, self-citations and time window.

Hypotheses tested in the present study reveal that in the case of top dental journals, SJR indicator is highly correlated with JIF. These results are consistent with those of similar studies in general and specific subject areas. Elkins, Maher, Herbert, Moseley, and Sherrington (2010) matched JIF and SJR based rankings of 5503 journals in all subject areas. They found a very strong positive correlation between two metrics (Spearman’s rho was 0.89). Other studies on the correlation between these two metrics include: an analysis of 99

Table 1. Bivariate correlation between two indicators for ranking of dentistry journals

Correlation statistic	Coefficient value	Sig.
Pearson r between JIF and SJR values	0.851	.000
Spearman rho between JIF and SJR rankings	0.865	.000

Figure 1. Bump chart for top 10 JIF ranked dentistry journals in comparison with the SJR ranking

Figure 2. Scatter plots showing the relationship between JIF versus SJR values and rankings, as well as the best-fit lines for 88 dentistry journals

randomly selected Brazilian journals (Pearson $r=0.884$) (Rocha-e-Silva, 2010), 13 journals of nuclear medicine (Pearson $r=0.919$) (Ramin & Shirazi, 2012), 11 pediatric neurology journals (Spearman $\rho=0.736$) (Kianifar, Sadeghi, & Zarifmahmoudi, 2014), 50 journals of information and library science (Spearman $\rho=0.88$) (Jacso, 2010), and 259 computer science journals (Spearman $\rho=0.93$) (Sicilia, Sanchez-Alonso & Garcia-Barriocanal, 2011). We could find only one study in which the correlation between JIF and SJR was negligible (20 journals of anatomy and morphology, Spearman $\rho=-0.037$) (Cantin, Munoz & Roa, 2015).

We support the recommendation of many authors (for example Leydesdorff, 2009) that the scientific community in the field of dentistry can safely use the freely available SJR indicator as a viable alternative to JIF. Further studies should focus on the validity of SJR as a proxy for research quality.

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APPENDIX 1. COMPARATIVE RANKINGS OF DENTISTRY JOURNALS BY 2015 JOURNAL IMPACT FACTOR AND SCIMAGO JOURNAL RANK INDICATOR

Journal	Journal Impact Factor		SCImago Journal Rank indicator	
	Value	Rank	Value	Rank
Periodontology 2000	4.949	1	1.836	3
Journal of Dental Research	4.602	2	1.714	5
Oral Oncology	4.286	3	1.764	4
Clinical Implant Dentistry and Related Research	4.152	4	1.165	12
Dental Materials	3.931	5	1.339	9
Journal of Clinical Periodontology	3.915	6	1.848	2
Clinical Oral Implants Research	3.464	7	1.427	8
Journal of Dentistry	3.109	8	1.029	16
Molecular Oral Microbiology	3.061	9	1.517	7
Journal of Endodontics	2.904	10	1.681	6
Journal of Periodontology	2.844	11	1.070	15
International Endodontic Journal	2.842	12	2.020	1
Journal of Orofacial Pain	2.824	13	0.599	46
Operative Dentistry	2.819	14	0.641	42
International Journal of Oral Science	2.595	15	0.942	20
Journal of Periodontal Research	2.474	16	0.932	21
Journal of Oral & Facial Pain and Headache	2.444	17	0.592	47
European Journal of Oral Implantology	2.328	18	0.888	24
Caries Research	2.278	19	1.014	17
Community Dentistry and Oral Epidemiology	2.233	20	1.111	13
Clinical Oral Investigations	2.207	21	0.752	31
Oral Diseases	2.000	22	0.828	28
Journal of Oral Rehabilitation	1.926	23	0.757	30
Dentomaxillofacial Radiology	1.919	24	0.897	23
Journal of Oral Pathology and Medicine	1.859	25	0.731	33
International Journal of Oral & Maxillofacial Implants	1.859	25	0.671	38
Journal of the American Dental Association	1.767	27	0.661	40
Archives of Oral Biology	1.733	28	0.713	35
Journal of Prosthodontic Research	1.693	29	0.738	32
American Journal of Orthodontics and Dentofacial Orthopedics	1.690	30	1.249	11
Orthodontics and Craniofacial Research	1.640	31	0.881	26
Journal of Oral and Maxillofacial Surgery	1.631	32	0.824	29
European Journal of Oral Sciences	1.607	33	0.681	37
Journal of Adhesive Dentistry	1.594	34	0.486	58
Journal of Cranio-Maxillofacial Surgery	1.592	35	1.010	18
Angle Orthodontist	1.579	36	1.254	10
International Journal of Oral and Maxillofacial Surgery	1.563	37	0.854	27
Odontology	1.538	38	0.493	57
International Journal of Prosthodontics	1.487	39	0.539	53
Journal of Evidence-Based Dental Practice	1.474	40	0.563	50
European Journal of Orthodontics	1.440	41	1.090	14
Journal of Oral Implantology	1.432	42	0.369	76
Gerodontology	1.396	43	0.643	41
Dental Traumatology	1.327	44	0.955	19
International Journal of Paediatric Dentistry	1.303	45	0.721	34
Australian Dental Journal	1.272	46	0.482	59
Oral Surgery, Oral Medicine, Oral Pathology and Oral Radiology	1.262	47	0.666	39
British Journal of Oral and Maxillofacial Surgery	1.237	48	0.887	25
Journal of Esthetic and Restorative Dentistry	1.231	49	0.430	67

Journal	Journal Impact Factor		SCImago Journal Rank indicator	
	Value	Rank	Value	Rank
BMC Oral Health	1.210	50	0.616	44
American Journal of Dentistry	1.194	51	0.443	65
Journal of Public Health Dentistry	1.182	52	0.603	45
Acta Odontologica Scandinavica	1.171	53	0.455	63
Korean Journal of Orthodontics	1.162	54	0.914	22
Journal of Prosthodontics	1.133	55	0.421	68
Journal of Applied Oral Science	1.117	56	0.591	48
Journal of Periodontal and Implant Science	1.108	57	0.412	70
Medicina Oral, Patologia Oral y Cirugia Bucal	1.087	58	0.542	51
Dental Materials Journal	1.087	58	0.474	60
Cleft Palate-Craniofacial Journal	1.050	60	0.685	36
International Journal of Periodontics and Restorative Dentistry	1.039	61	0.631	43
Implant Dentistry	1.023	62	0.445	64
British Dental Journal	0.997	63	0.461	61
International Dental Journal	0.967	64	0.512	56
Head and Face Medicine	0.916	65	0.416	69
Australian Endodontic Journal	0.885	66	0.513	55
Pediatric Dentistry	0.872	67	0.458	62
Brazilian Oral Research	0.859	68	0.540	52
Journal of Advanced Prosthodontics	0.844	69	0.330	80
Journal of Dental Education	0.830	70	0.442	66
Quintessence International	0.821	71	0.396	73
Journal of Oral Science	0.804	72	0.387	75
Journal of Dental Sciences	0.795	73	0.242	86
International Journal of Dental Hygiene	0.791	74	0.400	72
Journal of Orofacial Orthopedics	0.789	75	0.574	49
European Journal of Dental Education	0.784	76	0.524	54
Community Dental Health	0.767	77	0.395	74
Cranio - Journal of Craniomandibular Practice	0.738	78	0.351	78
Oral Health & Preventive Dentistry	0.690	79	0.325	81
Oral and Maxillofacial Surgery Clinics of North America	0.670	80	0.369	76
Journal of Clinical Pediatric Dentistry	0.562	81	0.250	85
Australian Orthodontic Journal	0.451	82	0.317	82
Oral Radiology	0.449	83	0.302	83
European Journal of Paediatric Dentistry	0.421	84	0.402	71
Swedish Dental Journal	0.381	85	0.340	79
Seminars in Orthodontics	0.346	86	0.252	84
Journal of the Canadian Dental Association	0.280	87	0.204	88
Revue de Stomatologie, de Chirurgie Maxillo-faciale et de Chirurgie Orale	0.248	88	0.208	87