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Correlation between journal citation indices for Biochemistry and Molecular Biology Journals

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Abstract:
This paper investigated the possibility of utilizing SCImago Journal Rank (SJR), Eigenfactor Score and Google H5 index indicator as an alternative to the Journal Impact Factor (JIF) for quality assessment in the field of biochemistry and molecular biology. Principal factors such as researchers and librarians concerns of methods of scientific journal ranking, publication of language, analysis time and self-citation impact are looked into across indicated options and alternatives. The SJR, ES, Google H5 and JIF scores and ranking order of biochemistry and molecular biology journals were downloaded from their relevant websites. Pearson's and Spearman's correlation coefficients were gauged to weigh relationship between these journal quality metrics. Nominated coefficients were embraced for evaluating direct and monotonic relationships of chosen variables and ranking measures. A constructive correlation was detected among the scores and ranking order based on SJR, ES, Google H5 and JIF of selected biochemistry and molecular biology journals. Consequently, scholars, academics and researchers in biochemistry and molecular biology can use the SJR, ES and Google H5 indicators as replacements to JIF for appraisal of scientific journals in the field.

Key words: Journal Ranking, Bibliometric Indicators, Impact Factor, SCImago Indicator, Eigenfactor Score, Google H5, Biochemistry and Molecular Biology journals.

Introduction

The mainstream scientific journals must meet quality criteria and are measured through scientometric tools. The quality of a scientific contribution is primarily estimated from the impact that it has in science, inferred from the citations in scientific articles that a contribution receives(Cantín, Muñoz, & Roa, 2015). This study of research is important for teachers, scientists and for librarians. This study will also help biochemistry and microbiology research centers and researcher to find suitable journals to submit their research papers.

The "Journal Impact Factor" (JIF) is the key pointer of scientific reputation of journals. JIF is calculated annually by Institute for Scientific Information (ISI) and by definition in any given year is the ratio of the number of articles cited all citable documents published in the two previous years to all citable documents in the same period of time(Ramin & Shirazi, 2012).

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The open access SJR database was launched in 2007, and has been regularly updated twice a year with new data and new features. It is likely to encourage the development of further metrics and the relationships among them as suggested and practiced by the most competent, highly active and innovative scientometricians(Jacsó, 2010).

The EigenfactorTM score is another variation on the same idea. The authors, however, use Clarivate Analytics' JCR data. Details of their method can be found at http://www.eigenfactor.org/projects/journalRank/journalsearch.php .The Eigenfactor® Project is an academic research project co-founded in January 2007 by Carl Bergstrom and Jevin West (pictured below), and sponsored by the West Lab at the Information School and the Bergstrom Lab in the Department of Biology at the University of Washington(Bergstrom, 2007).

Google Scholar (GS) is an open access scientific search engine that is getting gradually significance in the scientific community despite its limitations. 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(Kianifar, Sadeghi, & Zarifmahmoudi, 2014)

The main objective of this study focused on comparing and linking quality metrics and factors of biochemistry and molecular biology certain journals. The main objective of this research work is to recognize database coverage of biochemistry and molecular biology journals in Scopus, Web of Science and Google Scholar to determine correlation strength of bibliometric factors and its subsequent relevance in indicating influence and prestige of journals of biochemistry and molecular biology as per JIF, ES, SJR and Google H5-index indicators.

Review Literature

Ranked journal lists are of allow the reduction of uncertainty in the process of choosing publication targets and assessing research output (Pajić, 2015). The mainstream scientific journals must meet quality criteria and are measured through scientometric tools (Cantín et al., 2015). The Web of Science (WoS) and Scopus are the two foremost citation databases that are regularly employed to rank journals in a discipline in terms of their productivity as well as the total citations received so as to indicate the journals impact, influence or prestige. (Abrizah, Zainab, Kiran, & Raj, 2013). Journal popularity status counts citations, while the journal prestige recursively weights them with the prestige of the citing journals (Franceschet, 2010).

Journal impact factor is the major indicator of scientific importance of journals. JIF is calculated annually by Institute for Scientific Information (ISI)[5] and by definition in any given year is the ratio of the number of articles cited all citable documents published in the two previous years to all citable documents in the same period of time (JIF) achieved widespread acceptance in the scientific world(Ramin & Shirazi, 2012). Nonetheless, it has been criticized recently on many accounts: including lack of quality assessment of the citations, influence of self-citation, English language bias (Ramin & Shirazi, 2012) and effect of self-citation, review articles, total number of articles etc. (Kianifar et al., 2014).

Eigenfactor score (ES) journal scientific impact index uses an algorithm similar to Google's PageRank(Delgado-López-Cózar & Cabezas-Clavijo, 2013). For calculating ES an iterative method is used and journals are considered to be influential if they are cited more often by other prominent journals(Ascaso, 2011).

[5] A division of Clarivate Analytics (https://clarivate.com/specialty/research-assessment/).

SCImago Journal Rank Indicator (SJR) is a quality indicator that uses Scopus indexed journals for quality assessment. It is computed using similar method as the ES, but considers citations in Scopus database in a three years period(Kianifar et al., 2014). SJR drawbacks include: absence of construct definition, lack of data coherence, gaps in journals coverage and comparative purposes, issues related to comparability of citation networks, lack of ordinal position of ranking journals, use of retrospective data backups and stability, methodological issues in quartile construction, comparatively low discriminative indicator capacity, issues related to parameter fixing procedures, degree of transparency and results reproducibility, existence of errors in the assignment of documents in Scopus to countries, and omission of a large amount of information(Mañana-Rodríguez, 2014).

(Elkins, Maher, Herbert, Moseley, & Sherrington, 2010) claimed that there are strong correlations between four published indices that seek to represent the average number of citations received by the articles published in a given journal.

The h-index is originally intended to quantify an individual's scientific research output and impact in which 'a scientist has index h if h of his or her Np papers have at least h citations each and the other (Np – h) papers have(Yan & Ding, 2010) less than or equal to h citations each. Usage of h-index for journals is justifiable since it proved to be a robust alternative indicator advantageously supplementing JIFs. (Yin, 2011) summarizes that all four metrics are highly correlated with one another. Likewise, he also implied that journals that publish review articles and are of multidisciplinary nature may contribute to the skewness in statistical data of the four metrics.

Materials and methods

Particular biochemistry and molecular biology journals were chosen and employed for this research work. Pertinent information was obtained from their source databases as derived from the journal ranking section of SCImago journal and country ranking website[6] and from Web of Science[7] (WoS) Core Collection official website and citations. ISI indexed journals were used for computation of potential impact factor. The 2017 JIFs and ESs were acquired from Journal Citation Report® (JCR) through WoS. The 2017 SJR indicator is offered by the SCImago Journal and country rank provided by Scopus and Google Scholar Citations (GS) metrics under the category of "Biochemistry and Molecular Biology". Journals with JIFs and ESs were tabulated and data information regarding their ranking in the SJR indicator list was retrieved by matching their international standard serial number (ISSN). Likewise, journals with the SJR indicators also were listed and their ranking was detected in the inventory of journal JIFs.

The ranks of each journal according to each metric were also presented and compared statistically. The correlations between the extracted indices were evaluated using both Pearson's and Spearsman's correlation coefficients. All analyses were conducted using Statistical Package for the Social Sciences (SPSS) 21.0, version 2012.

Results and discussions

Ranking of the journals according to all four indices (IF, ES, SJR and Google H5) were matched and compared. Correlations between indices were evaluated using Pearson and Spearman correlation. In overall fifty (50) journals were itemized and recognized with biochemistry and molecular biology as the specific study domain and specialism. All nominated journals were indexed in ISI and Scopus together with rankings of the biochemistry and molecular biology journals according to SCImago, JIF, ES and Google H5 in 2017.

[6] At http://www.scimagojr.com/

[7] At http://www.accesowok.fecyt.es/

Detailed information for each journal is summarized in Table (1). This is together with comparative rankings of biochemistry and molecular Biology journals by 2015 JIF, ES, SJR and Google H5 Index. Likewise, table (1) reveals the ISI and Scopus indexed information in the 50-chosen biochemistry and molecular biology journals. Table (1) plainly displays that none of the selected biochemistry and molecular biology journals had the same ranking to compare different indicators in all four (4) taxonomies and metric indices under analysis. All inspected journals have the leading standard of quality since they are indexed in the two most high-status and reliable databases, WoS and Scopus.

Table (1): Comparative rankings of Biochemistry & Molecular Biology journals by 2015 JIF, ES, SJR and Google H5 Index

	Journal Impact Factor		Eigenfactor score		SCImagoJournal Rank		Google H5-Index	
Full Journal Title	Value	Rank	Value	Rank*	Value	Rank*	Value	Rank*
Nature Medicine	30.357	1	0.1625	5	13.959	4	160	3
Cell	28.71	2	0.55725	1	28.188	1	224	1
Annual Review of Biochemistry	21.407	3	0.03518	39	24.872	2	74	20
Molecular Cell	13.958	4	0.19327	4	13.658	5	118	4
Molecular Biology and Evolution	13.649	5	0.10367	10	8.168	10	64	32
Nature Structural & Molecular Biology	13.338	6	0.10434	9	12.548	6	95	10
Molecular Psychiatry	13.314	7	0.04455	30	6.79	13	91	12
Trends in Biochemical Sciences	12.81	8	0.03199	45	10.183	7	73	22
Nature Chemical Biology	12.709	9	0.06103	22	8.2	9	86	14
Genome Research	11.351	10	0.12414	7	14.352	3	108	6
Progress in Lipid Research	11.238	11	0.0085	131	5.108	21	48	77
Natural Product Reports	10.986	12	0.0183	78	3.636	35	58	46
Molecular Aspects of Medicine	10.86	13	0.01075	107	6.371	14	52	65
Molecular Systems Biology	10.581	14	0.03634	37	8.87	8	70	26
Embo Journal	9.643	15	0.10734	8	7.45	12	100	7
Trends in Microbiology	9.5	16	0.02032	71	5.285	20	63	34
Trends in Molecular Medicine	9.292	17	0.02056	70	5.368	18	66	29
Nucleic Acids Research	9.202	18	0.36513	3	7.458	11	184	2
Current Biology	8.983	19	0.14227	6	4.729	24	97	8
Critical Reviews in Biochemistry and Molecular Biology	8.867	20	0.00787	138	6.112	15	35	130
Plos Biology	8.668	21	0.07966	15	5.293	19	86	14
Plant Cell	8.538	22	0.07537	17	5.706	16	93	11
Cell Death and Differentiation	8.218	23	0.03574	38	4.219	30	74	20
Oncogene	7.932	24	0.09454	12	4.047	31	97	8
Biochimica Et Biophysica Actareviews on Cancer	7.841	25	0.01055	110	3.852	33	54	58
Embo Reports	7.739	26	0.0304	46	4.291	27	63	34

Current Opinion in Chemical Biology	7.643	27	0.02313	63	3.614	36	57	48
Science Signaling	7.359	28	0.04408	31	4.85	22	63	34
Molecular Plant	7.142	29	0.01801	81	3.14	42	56	53
Antioxidants & Redox Signaling	7.093	30	0.04558	29	3.134	43	87	13
Current Opinion in Structural Biology	6.713	31	0.02644	51	5.517	17	62	38
Cytokine & Growth Factor Reviews	6.571	32	0.00851	130	3.018	46	39	111
Redox Biology	6.235	33	0.00539	166	2.382	60	34	137
Human Molecular Genetics	5.985	34	0.09561	11	4.288	28	85	16
Molecular Ecology	5.947	35	0.06441	20	3.925	32	78	17
Molecular Cancer	5.888	36	0.02205	66	2.337	63	52	65
Free Radical Biology and Medicine	5.784	37	0.04786	28	2.468	58	78	17
Chemistry & Biology	5.774	38	0.02822	47	3.282	40	57	48
Expert Reviews in Molecular Medicine	5.71	39	0.00368	205	1.776	93	32	144
Cellular and Molecular Life Sciences	5.694	40	0.04403	32	3.388	39	72	24
Biomacromolecules	5.583	41	0.05257	26	2.209	69	73	22
Biochimica ET Biophysica Acta Gene Regulatory Mechanisms	5.373	42	0.02006	72	4.46	26	52	65
Current Opinion in Lipidology	5.336	43	0.00817	133	2.515	57	41	102
Reviews of Physiology Biochemistry and Pharmacology	5.333	44	0.00055	275	1.862	90	0	278
Faseb Journal	5.299	45	0.06404	21	2.775	51	77	19
Molecular Ecology Resources	5.298	46	0.02458	58	2.331	64	51	69
Structure	5.237	47	0.04312	33	4.77	23	54	58
Experimental and Molecular Medicine	5.164	48	0.00556	164	1.922	85	32	144
Biochimica Et Biophysica Actamolecular Basis of Disease	5.158	49	0.02539	57	2.718	52	64	32
Biochimica Et Biophysica Actamolecular Cell Research	5.128	50	0.03376	41	3.043	45	72	24

** Note: The shown rank is the correspondent rank for the specified journal name within the header index*

Figure (1) shows categorization of tested journals with regards to Imam Abdulrahman Bin Faisal University's (IAU) incentive scheme; which have four categories of different incentive values (all above JIF = 2).

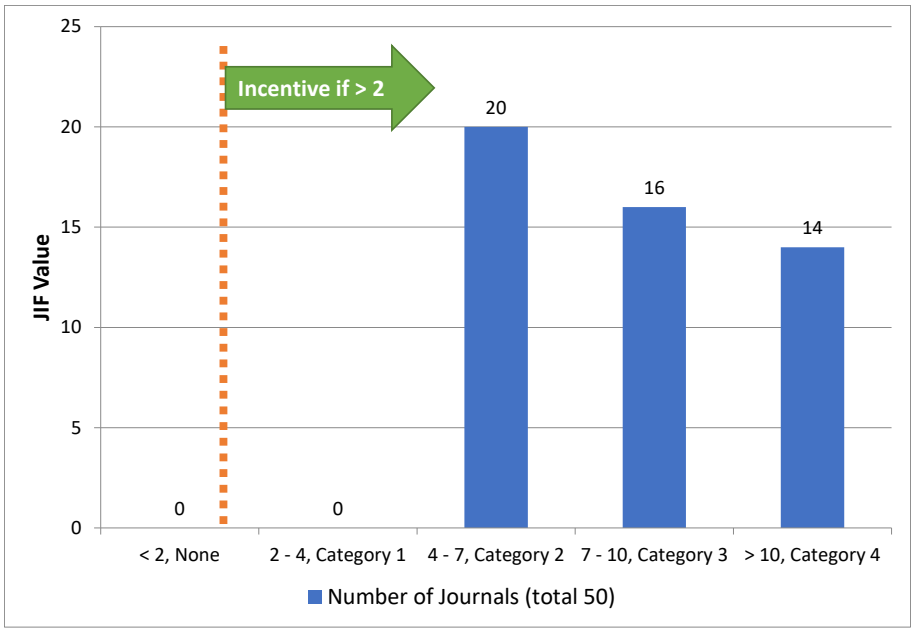


Fig. (1): Categorization of tested journals with regards to IAU's incentive scheme.

The 50 selected journals were categorized with biochemistry and molecular biology specialization. All journals were indexed in WoS and Scopus databases. In form of JIF the most cited top three (3) journals were Nature Medicine (JIF 30.357), Cell (JIF 28.71) and Annual Review of Biochemistry (JIF 21.07). In contrast, the lowest citations were scored by Biochimica Et Biophysica Actamolecular Basis of Disease (JIF 5.158) and Biochimica Et Biophysica Actamolecular Cell Research (JIF5.128).

For Eigenfactor Score the journals that ranked top three (3) ones were Cell (ES 0.55725), Nucleic Acids Research (ES 0.36513n) and Molecular Cell (ES0.19327). Extremity of ES is documented for Reviews of Physiology Biochemistry and Pharmacology (ES 0.00055).

SJR indicator incidentally overlapped with JIF for ranking top three (3) Cell (SJR 28.188), Annual Review of Biochemistry (SJR 24.872) and Genome Research (SJR 14.352). These journals were closely followed by Nature Medicine (SJR 13.959) and Molecular Cell (SJR 13.658). Reviews of Physiology Biochemistry and Pharmacology stalked at the end of assessed journals (SJR 1.862) and Expert Reviews in Molecular Medicine (SJR 1.776).

Ranking top three (3) journals for Google H5 index labeled Cell to lead with a Google H5 of 224, yet to be trailed by Nucleic Acids Research with a Google H5 of 184 and Nature Medicine with a Google H5 of 160. Reviews of Physiology Biochemistry and Pharmacology tailed the list of assessed journals.

Table (2) demonstrates a bivariate correlation between the four (4) indicators (JIF, ES, SJR and Google H5) for ranking of biochemistry and molecular biology journals. As shown in table (2) there is a high Pearson's (r) statistical correlation between JIF and SJR indicators for journals in this category (r = 0.912) and between JIF and Google H5 indices (r = 0.796), while it is rather moderate between JIF and ES values (r = 0.591). With respect to Spearsman's rho statistical correlation an acceptable high correlation existed between JIF and SJR indicators, JIF and Google H5 and JIF and ES rankings and between for journals in biochemistry and molecular biology (coefficient value = 0.916, 0.818 and 0.754, respectively).

Gathered research statistics and information revealed that employment of the SJR index does not suggestively adjust the technique of sorting of biochemistry and molecular biology journals as compared to JIF or its method of calculation. Since SCImago Journal and Country Rank is a free access one, this promotes that SJR may be deemed as an alternative to the JIF for biochemistry and molecular biology journals. This finding is in agreement with (Jacsó, 2010; Waris, Ahmad, Isam, Abdel-Magid, & Hussain, 2017).

Table (2): Bivariate correlation between three indicators for ranking of Biochemistry & Molecular Biology journals

Correlation statistic	Coefficient value	Sig.
Pearson's r between JIF and ES values	0.591	.000
Pearson's r between JIF and SJR values	0.912	.000
Pearson's r between JIF and Google H5 values	0.796	.000
Spearman's rho between JIF and ES rankings	0.754	.000
Spearman's rho between JIF and SJR rankings	0.916	.000
Spearman's rho between JIF and Google H5 rankings	0.818	.000

Figure (2) indicates a bump chart for top ten JIF ranked Biochemistry & Molecular Biology journals in comparison and as judged with ES ranking.

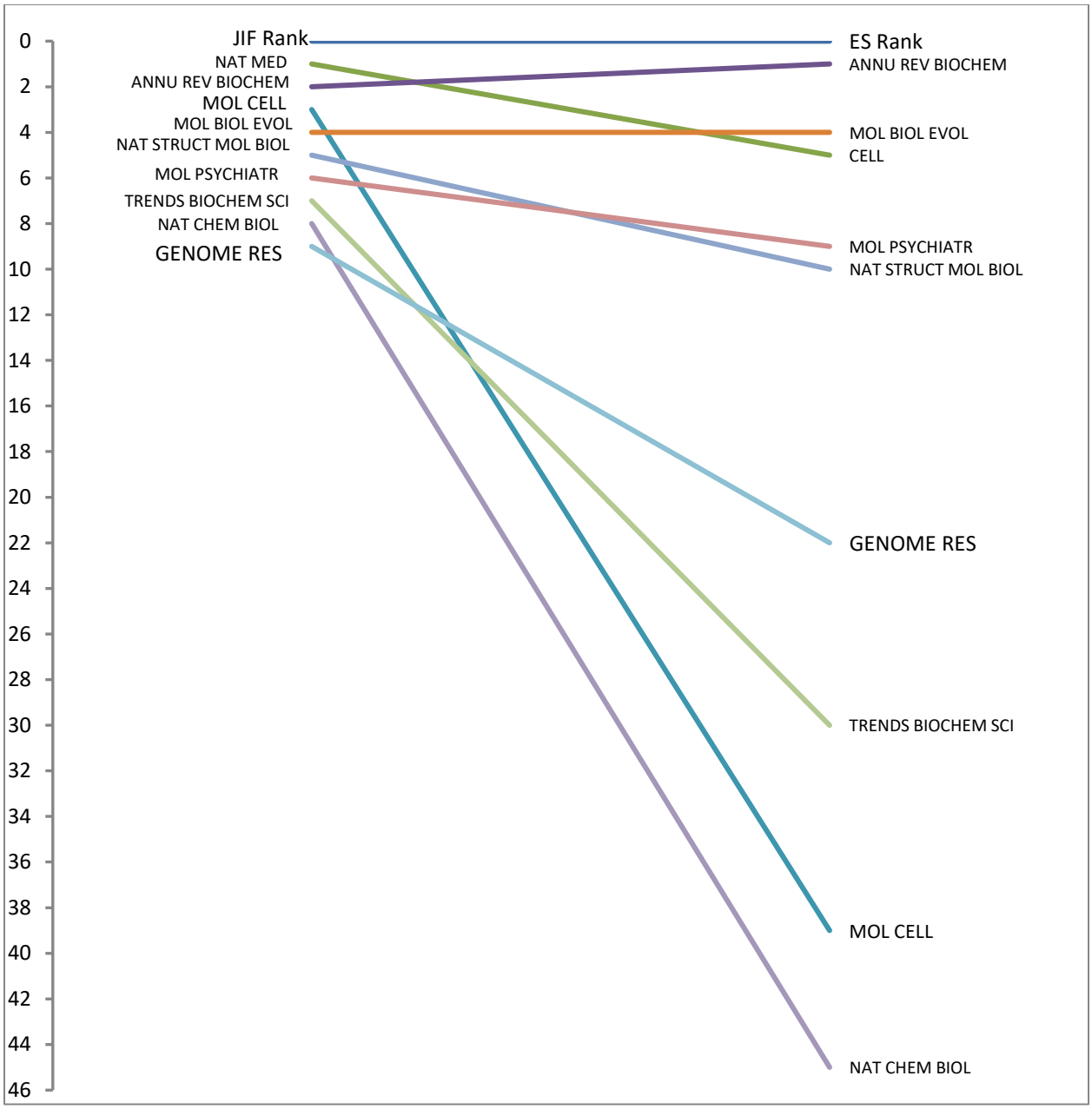


Fig. (2): Bump chart for top 10 JIF ranked Biochemistry & Molecular Biology journals in comparison with ES ranking.

Figure (3) illustrates a bump chart for top ten JIF ranked Biochemistry & Molecular Biology journals in analogy to SJR ranking.

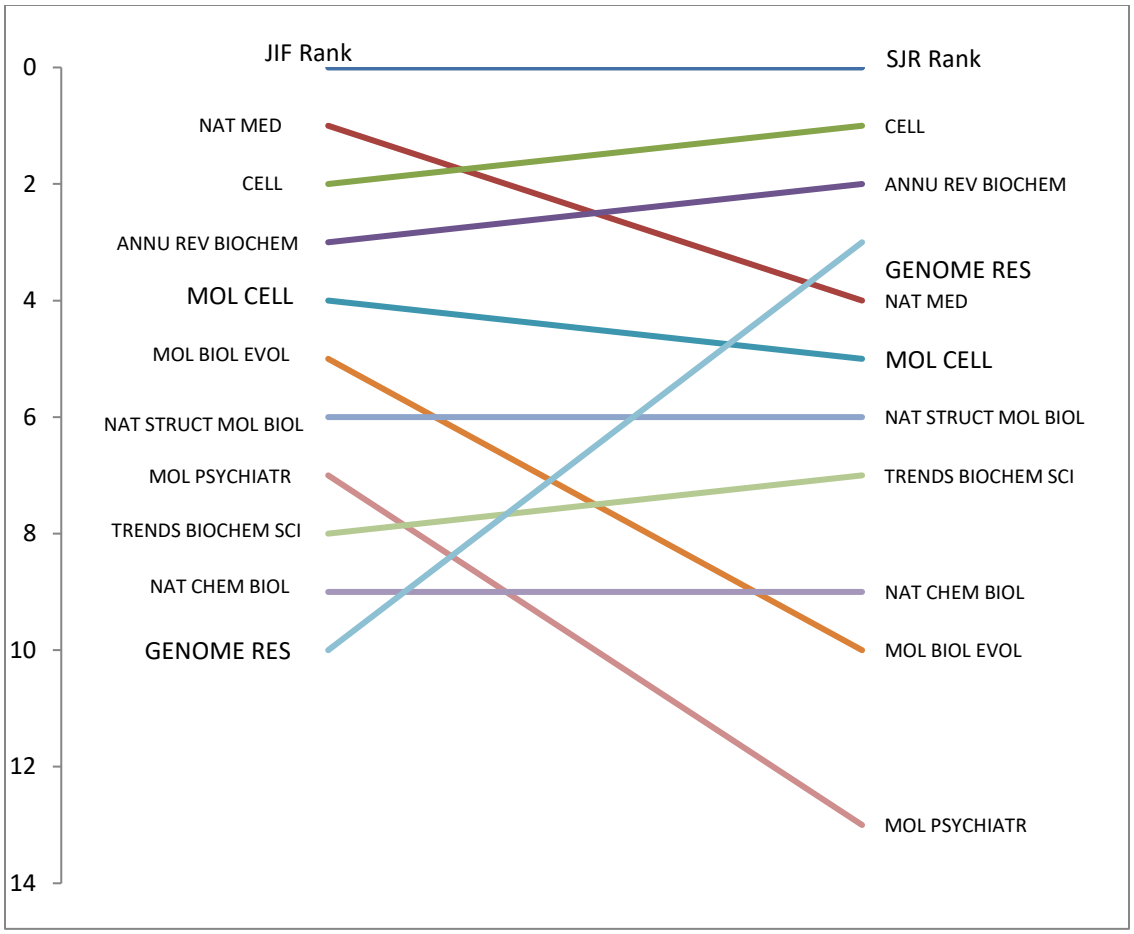


Fig. (3): Bump chart for top 10 JIF ranked Biochemistry & Molecular Biology journals in comparison with SJR ranking.

Figure (4) exhibits a bump chart for top ten JIF ranked Biochemistry & Molecular Biology journals in comparison with Google H5 ranking.

Figures (2 - 4) noticeably illustrate the varying array of ranking of selected indicators for the designated biochemistry and molecular biology journals.

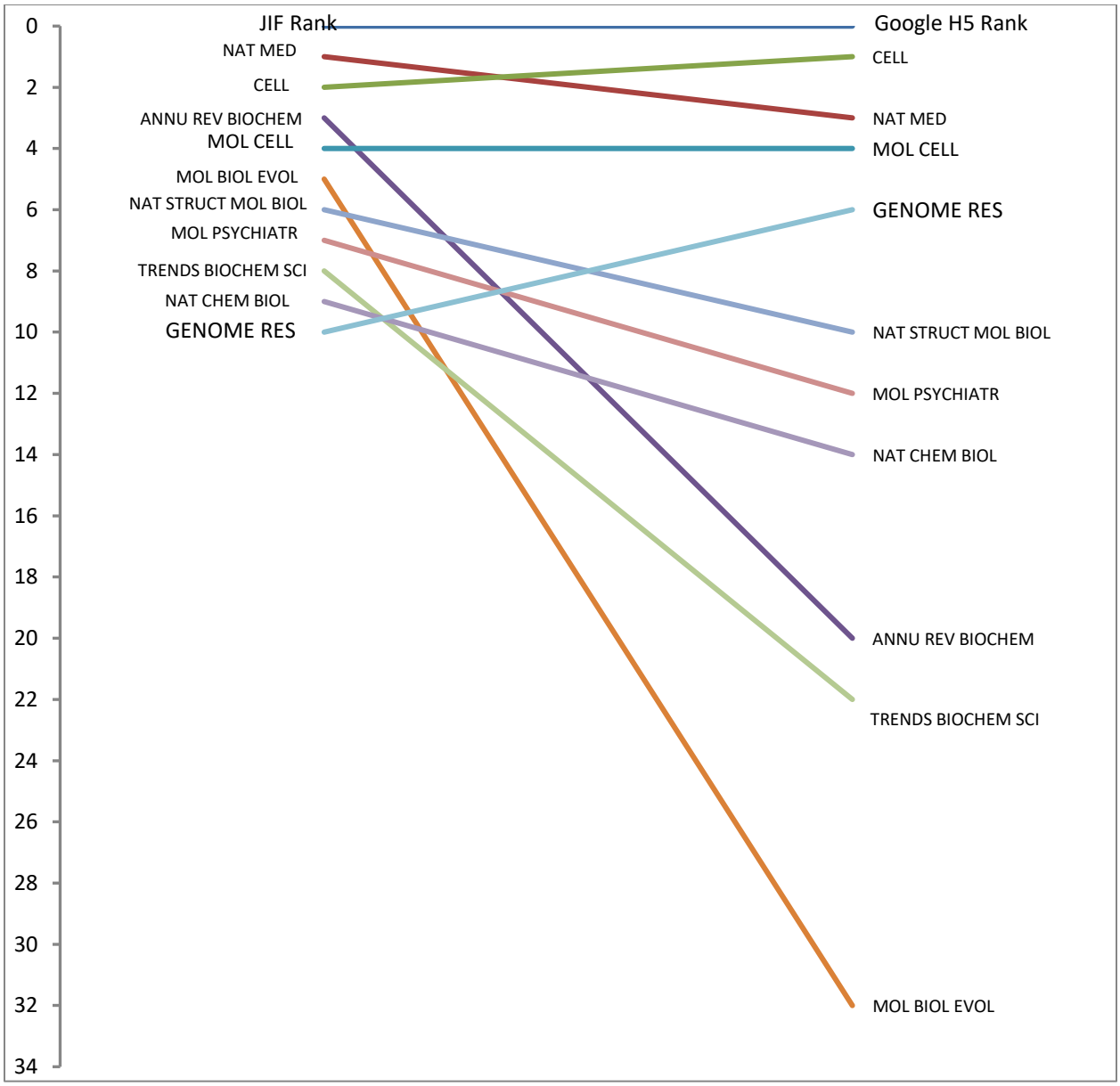
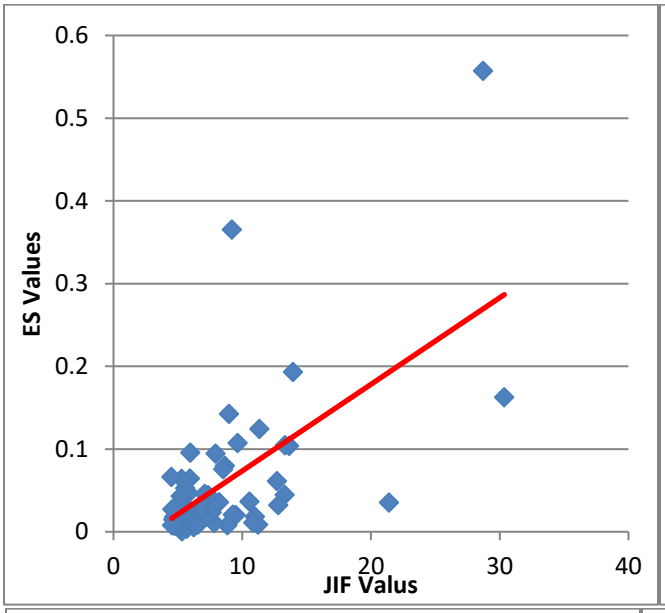


Fig. (4): Bump chart for top 10 JIF ranked Biochemistry & Molecular Biology journals in comparison with Google H5 ranking.

Figure (5) displays a scatter plots presenting correlation of ranking rates between JIF, ES, SJR and Google H5 as well as their fit lines for fifty (50) biochemistry and molecular biology journals combined in this study. Figures (5-a) and (5-b) show a linear correlation between the values and ranks of JIF and ES indices. Figures (5-c) and (5-d) show a stronger relationship between the values and ranks of JIF and SJR indices. Figures (5-e) and (5-f) show the same for the correlation between the values and ranks of JIF and Google H5. A linear correlation between various values of indices (ES versus JIF and SJR set against JIF) is clearly showed in the figure. Similarly, linearity of relationship is apparent between both ranks of ES versus JIF and of SJR against JIF.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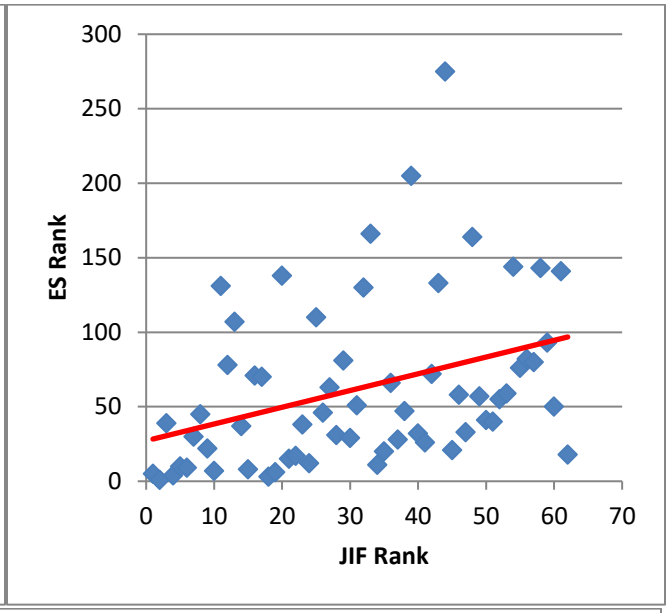
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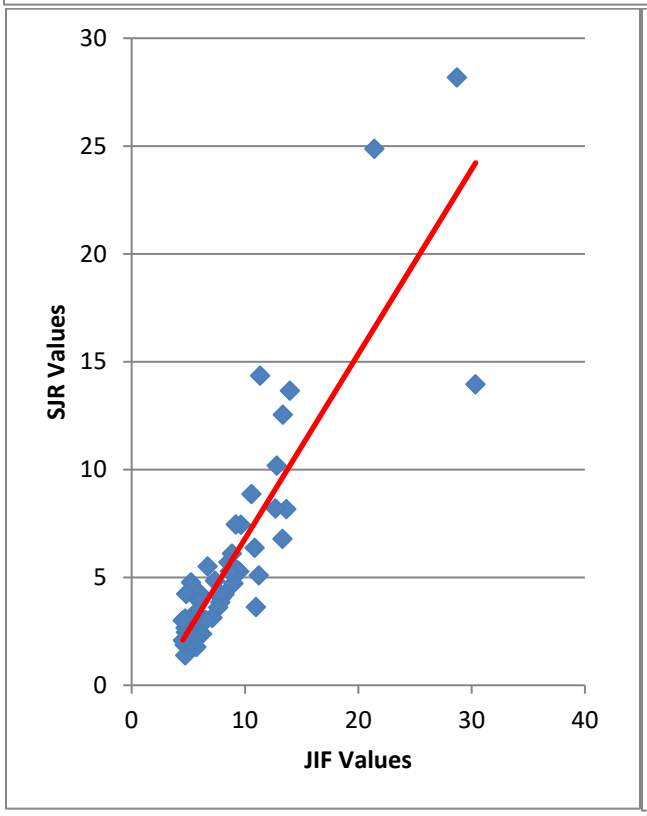
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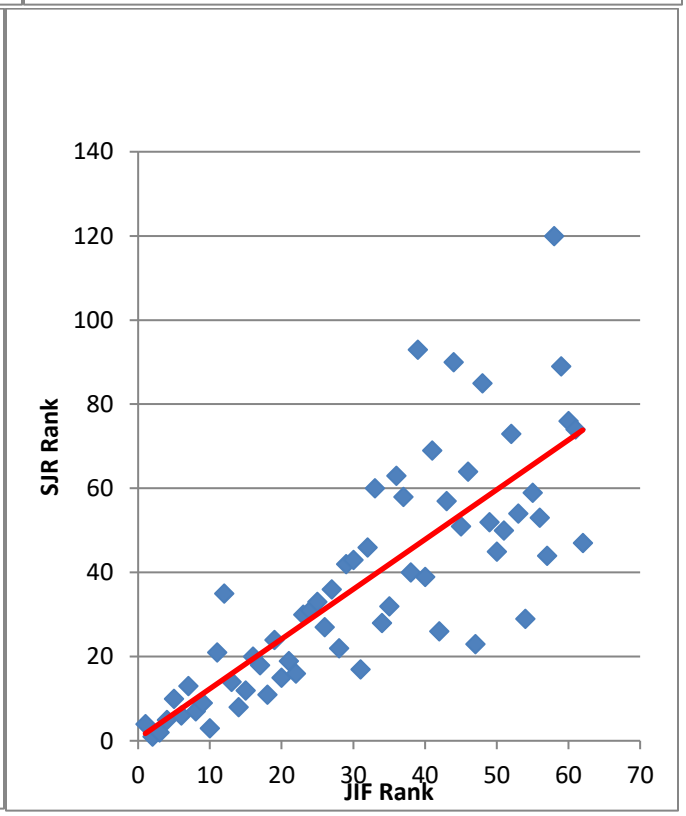
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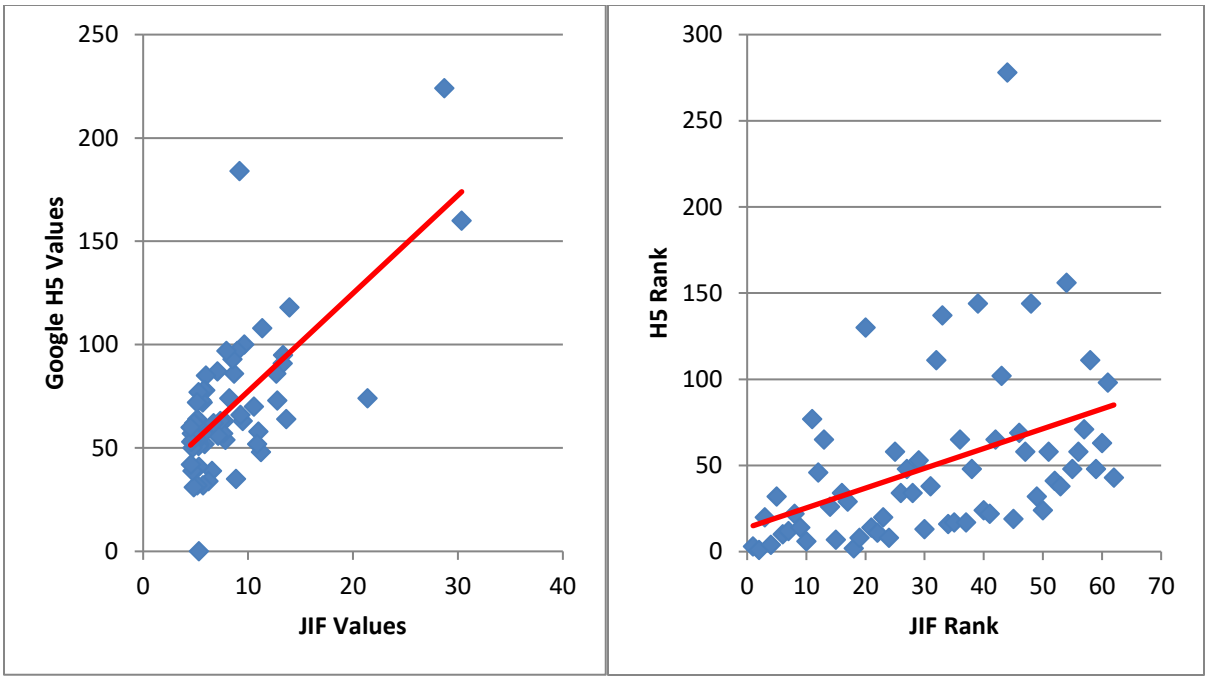

Fig. (5): A scatter plots correlating of ranking rates between JIF, ES, SJR and Google H5 as well for biochemistry & molecular biology journals.

Conclusions

This this research work focused on testing four bibliometric research Journal quality indices (JIF, SJR, ES and Google H5) for biochemistry and molecular biology journals. Work done revealed that Journal Impact Factor (JIF) is the principal index used by researchers and academicians for ranking biochemistry and molecular biology journals and periodicals. While a number of shortcomings appear in only using JIF indicator, SJR, ES and Google H5 indicators could be more meticulous quality indices for biochemistry and molecular biology journals. Thus, it would be advantageous to recommend working with the four (4) indices when assessing quality of biochemistry and molecular biology journals. This would enable indictors to complement and balance one another. This work showed that all the aforementioned metrics are highly correlated with one another (Spearman's rho > 0.8 and Pearson's r > 0.6).

JIF, ES, SJR and Google H5 indicators of biochemistry and molecular biology journals would be of overriding importance for librarians, researchers, academicians, authors, writers, inventors and biochemistry and molecular biology personnel alike when rating distinguished journals for publishing their work and scientific findings. All examined biochemistry and molecular biology journals possess the leading standard of quality as being indexed in marked and esteemed databases such as: World of Science (WoS) and Scopus. JIF ranged between 30.357 and 5.128; ES varied between 0.55725 to as low as 0.00386, SJR fluctuated over 28.188 and 1.776 and Google H5 ranged between 224 and 32. A high Pearson's (r) statistical correlation occurred between JIF and SJR indicators for journals in this category (r = 0.912) and between JIF and Google H5 indices (r = 0.796), while it is rather moderate between JIF and ES values (r = 0.591). Spearman's rho statistical correlation showed an acceptable and identical correlation appeared between JIF and SJR indicators, JIF and ES rankings and between JIF and Google H5 for journals in biochemistry and molecular biology (coefficient value = 0.916, 0.818 and 0.754, respectively). From an institutional point of view, considering Imam Abdulrahman Bin Faisal University case; the displayed top 50 journals falls within the university's incentive scheme for reputable publication. Inspected bibliometric may confidently be established to complement each other when used as supportive indicators to assess the impact on biochemistry and molecular biology journals.

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