ORIGINAL ARTICLE

Publication Productivity and Citation Analysis of the Medical Journal of Malaysia: 2004 – 2008

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SUMMARY

We analysed 580 articles (original articles only) published in Medical Journal of Malaysia between 2004 and 2008, the resources referenced by the articles and the citations and impact received. Our aim was to examine article and author productivity, the age of references used and impact of the journal. Publication data was obtained from MyAIS database and Google Scholar provided the citation data. From the 580 articles analyzed, contributors mainly come from the hospitals, universities and clinics. Contributions from foreign authors are low. The useful lives of references cited were between 3 to 11 years. ISI derived Impact factor for MJM ranged between 0.378 to 0.616. Journal self-citation is low. Out of the 580 sampled articles, 76.8% have been cited at least once over the 5 years and the ratio of total publications to citations is 1: 2.6.

KEY WORDS:
MJM, bibliometrics, Citation analysis, Impact factor, Productivity study, Literature half-life

INTRODUCTION

Very few Malaysian medical journals have gained indexation in citation databases such as Scopus and Science Citation Index; one of the Thomson Reuters Web of Science (WoS) databases. As of 2011, a total of 11 medical titles are indexed by Scopus. This constitutes 26% of the 42 Malaysian journal titles covered by Scopus. Only Tropical Biomedicine, published by the Malaysian Society of Parasitology and Tropical Medicine is currently being indexed by WoS. The Medical Journal of Malaysia (MJM) is the oldest medical journal in Malaysia and is amongst many currently being indexed by Scopus[1-3]. When a journal is not covered by any of these citation databases, it is difficult to ascertain its influence, even though the journal might be enjoying a healthy publication cycle. One way of determining influence is by using Google Scholar (GS), which provides citation information. GS is particularly useful for journals that are not covered by any of the citation databases and provides the opportunity for publishers to gauge their journal's influence on the web. The performance of WoS in capturing the total citations to a single author papers was tested and it was found that WoS captured only 28.8% of total citations[4]. Similarly, a comparison study of citations was conducted for 401 journal articles in education in WoS, Scopus and GS and it was revealed that GS provided results that are comparable to the other two databases[5]. This paper aims to show the versatility of GS as a service to ascertain the performance of a journal and will use MJM as a test case. The paper describes the bibliometric analysis of MJM, using data obtained from two databases, MyAIS (Malaysian Abstracting and Indexing system), which provides information on MJM's article productivity (original articles only) between the years 2004 and 2008 and Google Scholar, which provides the citation information. The study of citations helps to identify local publication activity and impact accrued by these contributes to the diversity and development of a discipline in a country[6-7]. Citations can be analysed from contributions to a group of journals or a single journal in a discipline. For the latter, it is usually carried out on a title which has longevity and is established as a channel of communication amongst professionals and practitioners. This is why we have chosen MJM, based on the standpoint of its well-grounded structure since it was first published in 1890, after which has undergone several changes in name, style and is still healthily focused on publishing four to five issues per year[8]. This paper aims to analyse the (i) publication productivity and citations referenced by the authors; (ii) age of references used by authors; (iii) core journals referenced; (iv) author productivity and affiliation; (v) citations received by articles published in MJM; and (vi) calculated ISI equivalent impact of MJM for articles published between 2004 and 2008. The year 2008 was taken as the cut-off year as it is assumed that citations to articles could be obtained after 2 years of publication (2009/2010).

MATERIALS AND METHODS

We use bibliometrics methods to gather and analyse data needed for this study. As a measurement and procedural technique, Bibliometrics basically uses bibliographic data in the form of citation of articles as the source data; citations referenced in the source (listed under list of references at the end of articles) and citations received by the source. To this task, the bibliographic data is then analysed for trends, frequencies and tested for conformity to bibliometrics law such as Lotka's law[9] to observe the spread of authorship and Bradford's law[10] to indentify core journals used by authors. The patterns and frequencies of citations, given as well as received by articles were analyzed to explain the relationship between cited and citing units (authors, affiliations, documents, countries, regions etc). Data about the citation referenced and received is usually only provided by citation databases such as WoS, Scopus and Google scholar (GS). As a beta service, GS is increasingly becoming useful and

This article was accepted: 30 November 2011
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trustworthy. For this paper we use MyAIS (MyAis http://Myais.fsktm.um.edu.my), to observe the productivity trends of and citations referenced by MJM articles published between 2004 and 2008. We noted that MJM published far more than 580 papers between 2004 and 2008. The 580 articles which are candidates for analysis are original articles, while papers in the group of: Commentaries, Continue Medical Education (CMA), Case Reports, Short Communications, and Letters have been omitted. The omission rests on the basis that bibliometric studies are more concern about sources employed in research. We are interested in the reference cited, and citations received by authors. In respect to this, papers in the categories of: Commentaries, Continue Medical Education (CMA), Case Reports, Short Communications, and Letters most times do not come with references and are not often cited either. Including them might dilute the analysis. Analysis of these forms of papers might be a focus of future studies. We have used GS to obtain the citation information utilizing Harzing's Publish and perish tools (http://www.harzing.com/pop.htm?source=pop_3.3.4291). The citations retrieved were cleaned up through the diligent act of weeding duplicate data and removing citation errors resulting from misspellings and incompleteness, in order to achieve an error-free analysis.

RESULTS

Publication productivity and citations referenced

As observed, for MJM, stability is the core priority. MJM is an active publisher, strongly sustaining its production strength periodically. This study has observed over 100 articles each year between 2004 and 2008, with an average of 116 articles per year. Medical researchers give credit to works of other researchers through references, as the norm is in all scientific discipline. All the 580 sampled articles appended a total of 6958 references (see Figure 1). The average number of references per year is 1391 citations, while the average number of references per article is approximately 12. Very few articles referred to more than 40 references. About 87.67% (6100) of total references are to journal articles. Others are to books, book chapters (4.79%), Conference proceedings (0.85%), web resources (0.75%), government publications (2.77%), theses and newspaper articles. Journals therefore form the core resources used by medical authors and by this result, it is imperative for medical librarians to consider this information when making decisions on new subscriptions or de-selections.

Age of references used by authors

The reference used by authors is a significant factor in decision making process. This is because it reflects the age and useful life of references, and also informs medical librarians about the type and age of resources that they must still keep on shelves or make accessible to medical professionals and practitioners. When the references are sorted by age the results show that articles in the field of medicine and related literature have a long useful life. Even though "younger" articles are cited more, those older continued to be cited. This typifies an established discipline where older articles (over 30 years) are still found to be useful (see Table I).

In order to determine the highest 50% of useful life of references, we applied the formula for calculating half-life[10] as follows:

$$T = Y + y \quad (1)$$

Where Y is the number of whole years, and y is the fraction of the year.

$$y = a - b/c - b \quad (2)$$

Where a is 50% of the citations, b is the cumulative total of citations of the subcritical year, and c is the cumulative total of citations of the critical year. Critical year is the year in which 50% of the active literature is reached when counted from the base year, while the subcritical year is the year previous to the critical year.

Hence, Half –Life 'T' is then given as:

$$T = Y + (a - b/c - b) \quad (3)$$

Applying equation (3) above, the study found half – life of cited references to be 8.46 years. However, most materials referenced by medical researchers are between 3 - 11 years. For clarity, this is represented on a linear graph (see figure 2) which shows citations in years plotted against the cumulative number of references. The half-life represents the number of years of publication (back from the current) which accounts for 50% of references to each title. Citation half life shows the long term value of referenced items used by authors.

Useful life of references used by authors seems to be discipline dependent. In the field of computer science for example, articles more than 6 years old are less referenced11. It has also been suggested that obsolescence of references in the social science journals, by contrast are slower than for the medical and chemistry journals [12]. Similarly, In a study of veterinary journals, it was observed that more than one-half (65%) of the cited journal titles were published within the previous ten years [13], inferring that in the medical field currency of items is less important as older articles and books continue to be cited, even when they are more than 100 years old, suggesting the longevity of works published in this field.

The core journals referenced

Bradford[14] studied the frequency distribution of papers over journals and found that "if scientific journals are arranged in order of decreasing productivity on a given subject, they may be divided into a nucleus of journals particularly devoted to the subject and several groups or zones containing the same number of articles and the succeeding zones will be as 1: b: b^2 …" 15. Therefore, in order to identify core scholarly journals very relevant to the field, Bradford's Law of Scattering was applied to the resulting list of journal title frequently referenced in MJM between the years 2004 to 2008. Three zones of relevance were created, each producing approximately one third of the cited references. A total of 43 journals provided 1990 citations) form the nucleus (zone 1), 210 (1996 citations) are in the marginal zone (zone 2), while 1270 journals (1941 citations) are in the peripheral zone (zone 3). The core journal titles are those referenced 22 or more times. The result indicates that the core journals used are small (2.82%) but accounted for one-thirds of all the

citations. The three zonal distributions calculated using Bradford's formula is 43: 210: 1270, which is approximately in the ratio 1: 5: 25. It follows that, our b ≈ 5 in the general proportion 1: b: b^2. The list of core journals comprising Zones 1 (see Table II) is shown along with the total number of times each was referenced. Identifying the core journals used by medical researchers and practitioners help medical librarians make justifiable decisions regarding serials collection policy, when making decisions to subscribe, deselect or renew. Medical librarians need to ensure that at least the core titles are available for access within their own premises or in other Malaysian institutional collections.

Identifying the core journals relevant to medical authors is useful for medical librarians when initiating collection development and subscription policies as journal subscriptions forms two third of total library's acquisition budget. A study on collections needed by users was carried out on core journals in embryology, anatomy and morphology[16]. The core list observed and marginal zones can be used as a checklist to assess their relevancy in local library holdings. For the current study, the results also show that out of the 6958 references, journal self-citations is only 2.49% (173), which is very low.

Authors' productivity pattern

Two thousand one hundred and seventy seven (2177) names were observed to have authored the 580 articles sampled. The number and percentage of contributing authors is given in Table III.

By applying Lokta's law, we calculated the authorship productivity pattern in MJM. Lotka contended that "the number (of authors) making n contributions is about $1 / n^c$ of those making one contribution, where c nearly always equals two ($c \approx 2$) ; and the proportion of all contributors, that makes a single contribution, is about 60 per cent." This law has been applied by bibbliometric scholars to several fields of research. For example, it was found that this law applies relatively to authors publishing in finance literatures[17] and we hereby test it with a medical literature (MJM); that the number of authors making n contributions is about $1/n^2$ of those making one; and of all contributors, the proportion that make a single contribution, is about 60 percent.

Lotka's empirical finding can be summarized by the equation:

$a_n = a_1/n^2$, n= 1, 2, 3,.,

Where

a_n= the number of authors publishing n papers and

a_1 = the number of authors publishing one paper

We compare our own observation as regards to author's productivity with that of Lokta's by assuming that (c = 2) as shown in Table IV.

The result from Table IV indicate that when (c=2) the proportion of all contributors, that makes a single contribution, is (63.40%), and few authors contributed more than one paper. We apply Lotka's law to productivity of authors in MJM, by testing with the same equation:

$a_n = a_1/n^c$, n= 1, 2, 3,.., (1)

a1 = an . nc n= 1, 2, 3,.., (2)

Where

n = the number of publications,

a_n= the relative frequency of authors with n publications

a_1 = the number of authors publishing one paper,

c = a constant.

First we find our c value by applying equation (2)

$a_1 = a_n . n^c$ n= 1, 2, 3,..,

From Table IV

Let n = 1, and a_n = 1084

$a_1 = 1084. 1^c$

a_1 = 1084

Let n = 2, and a_n = 204, and a_1 = 1084

$1084 = 2^c . 204$

$2^c = 1084 / 204$

$2^c = 5.31$

clog2 = log 5.31

c (0.301) = 0.725

c = 0.725 / 0.301

c = 2.4

We calculated our value c = 2.4, and by imputing this value in equation (2)

$a_1 = a_n . n^c$ n= 1, 2, 3,.., the result generated is presented in Table V.

We find that the frequency of authors publications observed and the frequency of authors expected when c = 2.4 is very close. This implies that the authors' productivity pattern in MJM from year 2004 - 2008 conforms slightly well to Lokta's law with little marginal c value.

Active authors and their affiliations

Table VI lists the names and affiliations of the active authors observed, out of the 1435 unique authors publishing in MJM in the 5-year period. Practitioners and professionals affiliated to hospitals (35.26%) and universities (34.10%) are the most active authors publishing in MJM. This is followed by those affiliated to government agencies (14.45%), medical centres (6.94%), clinics (4.62%), private and international organizations (4.63%). The variety of affiliations not confined to contributions from a single institution clearly established MJM as an important channel to disseminate and share research findings and practices.

Citations received by MJM

The citation analysis is the frequency with which papers published in a journal are cited in other papers[18]. Traditionally, the most commonly used source for citation counts are WoS and Scopus. However, Google scholar has been utilized in recent times to estimate a journal's influence, which stem from the fact that GS appears to be strongest in the sciences, particularly medicine, and secondarily in the social sciences[19]. As regards to this, a study was conducted to analyze the 2007 citation count of articles published by the Croatian Medical Journal in 2005-2006 based on data from the WoS, Scopus, and GS and it was reported that the coverage of citations by Scopus and especially GS was broader and included additional local sources[20]. To harvest citation data from GS the bibliometric tool Harzing Publish and Perish (http://www.harzing.com/), was used. Figure 3 shows the total number of citations received by MJM articles published between years 2004 and 2008 (as at July 31, 2010).

Table I: Age of References Cited by Articles Published in MJM

Age of Citation in years	No of Citations	Percentage (%)
Up to 1	73	1.05
2	230	3.31
3	448	6.44
4	502	7.21
5	535	7.69
6	557	8.01
7	463	6.65
8	468	6.73
9	433	6.22
10	365	5.25
11	370	5.32
12	257	3.69
13	249	3.58
14	215	3.09
15	201	2.89
16	177	2.54
17	141	2.03
18	105	1.51
19	117	1.68
20	96	1.38
21	93	1.34
22	91	1.31
23	73	1.05
24	64	0.92
25	65	0.93
26	57	0.82
27	53	0.76
28	55	0.79
29	31	0.45
30	33	0.47
31 - 40	188	2.70
41 - 50	55	0.79
51 and above	45	0.65
Undated	53	0.76
Total	6958	100.00

Table II: The Most Frequently Referenced Journals

	Journals (Zone 1)	No of citation
1	The Journal of Bone and Joint Surgery. BR/AM	144
2	The New England Journal of Medicine	142
3	Lancet	139
4	Clinical Orthopaedics and Related Research	112
5	BMJ : British Medical Journal	107
6	Diabetes Medicine	104
7	The Laryogoscope	79
8	JAMA : the journal of the American Medical Association	77
9	Chest	65
10	Plastic and reconstructive surgery	58
11	Spine	53
12	The Journal of laryngology and otology	44
13	The British journal of surgery	41
14	Archives of internal medicine	40
15	Pediatrics	40
16	Singapore Medical Journal	38
17	Circulation	37
18	Clinical Infectious Diseases	37
19	Otolaryngology--head and neck surgery	33
20	Hypertension	32
21	Archives of otolaryngology--head & neck surgery	29
22	American journal of obstetrics and gynecology	28
23	Annals of internal medicine	28
24	The Southeast Asian journal of tropical medicine public health	28
25	Transplantation proceedings	28
26	Radiology	26
27	Cancer	26
28	Journal of hypertension	25
29	The Journal of Infectious Diseases	25
30	Stroke	25
31	The American journal of medicine	24
32	American Journal of Respiratory and Critical Care Medicine	24
33	The American journal of surgical pathology	24
34	Journal Neurosurgery	24
35	American Journal of Epidemiology	23
36	Cancer research	23
37	Journal of Clinical Microbiology	23
38	Obstetrics and gynecology	23
39	Ophthalmology	23
40	Transactions of the Royal Society of Tropical Medicine and Hygiene	23
41	American journal of surgery	22
42	Archives of dermatology	22
43	Gastroenterology	22

Table III: Number, Percentage of Authors and Country Affiliations

Year	Number of Articles	Number of Authors	Malaysian (unique)	Foreign (unique)	Percentage (%)
2004	139	478	438	40	21.96
2005	102	367	334	33	16.86
2006	104	412	394	18	18.93
2007	100	352	324	28	16.17
2008	135	568	492	76	26.09
Total	580	2177	1982	195	100.00

Table IV: Author's Productivity Pattern Observed Compared with Expected (c=2)

No of Publication (n)	frequency of authors with n publications observed (an)	Observed Percentage (%)	frequency of authors with n publications expected when c=2	Expected Percentage (%) when c=2
1	1084	75.54	1084	63.40
2	204	14.22	271	15.85
3	65	4.53	120	7.04
4	34	2.37	68	3.96
5	19	1.32	43	2.54
6	8	0.56	30	1.76
7	7	0.49	22	1.29
8	4	0.28	17	0.99
9	1	0.07	13	0.78
10	1	0.07	11	0.63
11	1	0.07	9	0.52
12	3	0.21	8	0.44
14	1	0.07	6	0.32
15	2	0.14	5	0.28
19	1	0.07	3	0.18

Table V: Author's Productivity Pattern Observed Compared with Expected (c=2.4)

No of Publication (n)	frequency of authors with n publications observed (an)	Observed Percentage (%)	frequency of authors with n publications expected when c=2.4	Expected Percentage (%) when c=2.4
1	1084	75.54	1084	73.17
2	204	14.22	205	13.86
3	65	4.53	78	5.24
4	34	2.37	39	2.63
5	19	1.32	23	1.54
6	8	0.56	15	0.99
7	7	0.49	10	0.69
8	4	0.28	7	0.50
9	1	0.07	6	0.38
10	1	0.07	4	0.29
11	1	0.07	3	0.23
12	3	0.21	3	0.19
14	1	0.07	2	0.13
15	2	0.14	2	0.11
19	1	0.07	1	0.06
	1435	100.00	1481	100.00

Out of the 580 sampled articles published by MJM between 2004 and 2008, 76.8% (446) have been cited one time or the other. This implies that MJM articles are cited in journal articles (1082 out of 1164) and the rest were cited in theses and dissertations, books and book chapters, conference proceedings and government reports. The ratio of total publications to citation for the 5 year period was 1: 2.6 and yearly ratio was 1:3.5 in 2004, 1.02 for 2005, 1.26 for 2006, 1.80 for 2007 and 1.12 for 2008. The indication is that it takes at least 3-5 years for articles published in MJM to receive its maximum number of citations.

The study also observed that MJM articles obtained citations from top international medical and health science journals Journal of Bone and Joint Surgery AM (11 citations), BMC Med (10), Journal of Biomedical Materials Research (10). The journals with the highest frequency of MJM citations are: Malaysian Family Physicians (17), Chinese Journal of Clinical Rehabilitation (14) and Singapore Medical Journal (13). The result implies that medical researchers in Malaysia are making contributions to the field and would continue to improve due to the stability and consistency observed in the publication productivity of MJM.

Authors from seventy six different countries have cited MJM articles (2004 – 2008) at one time or more. Most of the citing authors were from China (227), followed by Malaysia (171), United States (123), India (43), United Kingdom (40), Germany (35), Australia (35), Brazil (31), Spain (27), and Turkey (20). In general, MJM articles received more citations from authors from East Asia (258 citations), Europe (212), and Southeast Asia (187). By these results, it is believed that research articles published in the Medical Journal of Malaysia (MJM) can attract citations from both national and international authors.

ISI equivalent journal impact factor

A journal's JIF for year n is defined as the ratio between the number of citations during year n of the journal's articles

Table VI: List of Active Authors

Group	Cohort	Authors	No of Articles	Affiliations
1	Cohort: 1	Ruszymah B.H.I.	19	University Kebangsaan Malaysia
2	Cohort: 2	Aminuddin B.S.	15	University Kebangsaan Malaysia
		Gendeh, B.S.	15	University Kerbangsan Malaysia
3	Cohort: 1	Chua, K.H.	14	Universiti Kebangsaan Malaysia
4	Cohort: 3	Chua, K.B.	12	Ministry of Health, Malaysia
		Philip, R	12	Hospital Ipoh
		Prepageran, N.	12	University of Malaya
5	Cohort: 1	Halim A.S.	11	Universiti Sains Malaysia
6	Cohort: 1	Kwan, M.K.	10	University of Malaya
7	Cohort: 1	Sukumar, N.	9	University Kebangsaan Malaysia
8	Cohort: 4	Abdullah J.M	8	Universiti Sains Malaysia
		Sherina M.S	8	Universiti Putra Malaysia
		Sopyan I.	8	International Islamic University Malaysia
		Zulmi W.	8	Universiti Sains Malaysia.
9	Cohort: 7	Gurdeep, S.	7	Hospital Ipoh
		Kumarasamy,V	7	Ministry of Health, Malaysia
		Loh, K.Y.,	7	International Medical University
		Rampal, L.	7	Universiti Putra Malaysia
		Raymond, A.A.	7	University Kebangsaan Malaysia
		Tan, G.C.	7	Universiti Kebangsaan Malaysia
		Teng, C.L.	7	International Medical University
10	Cohort: 8	Chan, K.Y.	6	Universiti Kebangsaan Malaysia
		Gopala, K.G.	6	University of Malaya
		Hamidon B.B.	6	Universiti Kebangsaan Malaysia
		Harvinder, S.	6	Hospital Ipoh
		Saim L	6	Universiti Kebangsaan Malaysia
		Shashinder, S	6	University Malaya
		Sivalingam, N	6	International Medical University
		Zulfiqar M.A	6	Universiti Kebangsaan Malaysia
11	Cohort: 19	Biswal, B.M.	5	Universiti Sains Malaysia
		Chan, S.C	5	Royal College of Medicine Perak
		Choon, S.K.	5	University of Malaya
		Faisham W.I	5	Universiti Sains Malaysia.
		Hamzaini A.H.	5	Universiti Kebangsaan Malaysia.
		Khalid B.A.K	5	Universiti Kebangsaan Malaysia
		Kuljit, S	5	University Malaya
		Leong, C.F.	5	Universiti Kebangsaan Malaysia
		Loh, L.C.	5	International Medical University
		Mafauzy M	5	Universiti Sains Malaysia
		Mallina, S	5	Hospital Ipoh
		Naing L	5	Universiti Sains Malaysia
		Norizah I	5	Kementerian Kesihatan
		Reddy, S.C	5	Universiti Putra Malaysia
		Rosalind, S	5	Hospital Ipoh
		Saw, A	5	University of Malaya
		Subha, S.T.	5	Universiti Putra Malaysia
		Teoh, C.M	5	University Kebangsaan Malaysia
		Yeap, J.S	5	International Medical University
12	Cohort: 34		4	
13	Cohort: 65		3	
14	Cohort: 204		2	
15	Cohort: 1084		1	

published during years n–1 and n–2, and the total number of articles published during these two years[19]. The result of our calculation is based on the ISI equivalent journal impact factor, for each year and overall 5 years (see Table VII). The result has shown that MJM has a relatively good IF.

CONCLUSION AND RECOMMENDATIONS

Analysing the publication productivity of MJM, the references cited by authors and the citations received shows that MJM remains strong as a channel used by medical professionals and practitioners to communicate their research and practices. MJM has consistently published over a 100 articles each year between 2004 and 2008, which are authored by professionals, and practitioners affiliated to universities, hospitals, clinics and medical centres. However, MJM remains very much a national journal, publishing mainly Malaysian papers and receive less foreign contributions. Perhaps the situation can be improved by inviting foreign professionals to the editorial and reviewing board. Such strategy would encourage more foreign contributions, as it has been noted that the number of foreign

Table VII: Yearly and Five-Yearly Impact Factor of MJM Based on Google Scholar

Publication Year	A Current year cites to articles published in year -1 to year -2	B Number of articles published in year -1 and year -2	Current year Impact Factor &5yr Column A / Column B
2006	110	241	0.456
2007	127	206	0.616
2008	75	204	0.367
2009	89	235	0.378
2004-2008	335	580	0.577

Table VIII: Malaysian Medical Journals in SCOPUS (2010)

No.	Title	Scopus Journal Rank	H index	Total articles 3 years	Total cites 3 years	Total cites/ Total docs 3 years	Subject category & quartile score
1	Malaysian Journal of Pathology	0.065	7	64	37	0.42	Q2=Medicine (miscellaneous)
2	Tropical Biomedicine	0.048	9	118	87	0.5	Q3 = infectious diseases, parasitology
3	Biomedical imaging and Intervention Journal	0.048	6	108	39	0.14	Q3=Biomedical engineering, etc
4	Neurology Asia	0.045	3	65	23	0.37	Q3 = Neurology
5	Medical Journal of Malaysia	0.039	13	432	123	0.25	Q2=Medicine (miscellaneous)
6	Medical Physiology Online	0.03	0	1	0	0	Q4= Physiology (medical)
7	Malaysian Journal of Medical Sciences	0.029	4	101	7	0.12	Q3=Medicine (miscellaneous)
8	Malaysian Family Physician	0.028	3	72	11	0.1	Q3= Community, homecare; Family practice
9	Malaysian Journal of Medicine & Health Sciences	0.025	1	45	1	0.03	Q4=Medicine (miscellaneous)
10	Malaysian Journal of Microscopy	0.025	0	26	0	0	Q4 = Histology, Instrumentation, Pathology and forensic medicine
11	Journal of the University of Malaya Medical Centre	0.025	2	52	0	0	Q4 = Medicine (miscellaneous)

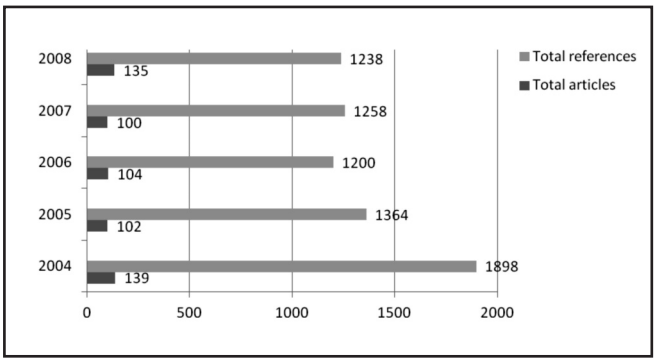

Fig. 1: Total articles Published and Total References.

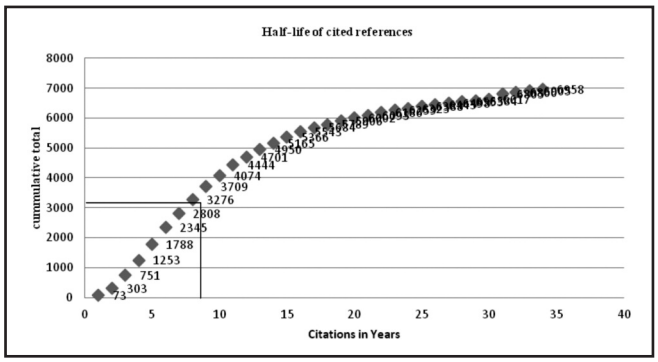

Fig. 2: Half – Life of Cited References.

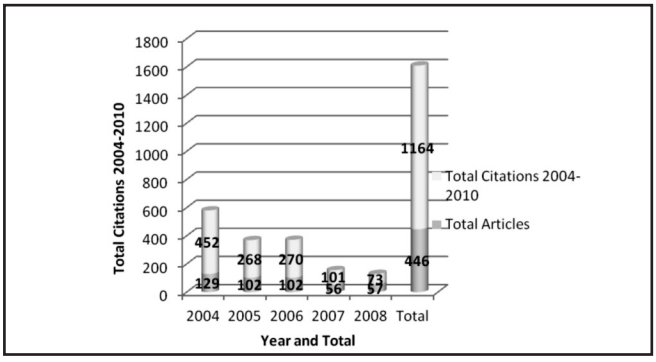

Fig. 3: Total Articles Produced and Total Citations Received.

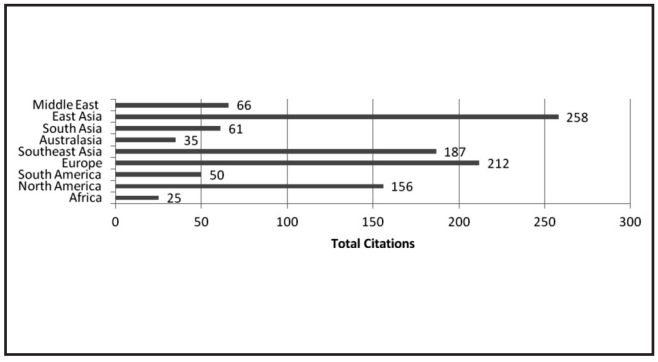

Fig. 4: Citations Distribution by Authors' Country.

contributions is related to higher percentage of foreign editorial[21]. In this respect MJM need to meet the requirements of an "international" journal, which should be reflected in the composition of contributing authors and editorial membership. This is an important criterion if indexation by WoS is aimed at in future.

The healthy state of contributions can be utilized by MJM to its advantage. To accommodate as many papers as possible, on one hand might create a harmonious atmosphere in the author's camp, while on the other hand may hamper journals impact. The ISI Impact factor or Scopus Journal rank (SJR) calculates impact based on articles published within 2 or 3-year windows and by observing the yearly citations received, it is possible to estimate roughly on average how many citations MJM could accumulate. To improve impact score the number of articles published could be reduced as the number of citations received may be beyond the control of editors.

Journals are important to Malaysian medical authors as reflected by the high rate citing of journals in articles published. However, very few authors cite articles in MJM itself or other articles published in Malaysian medical journals. Out of 580 articles sampled, only 90 (15.5%) cite articles in MJM itself. The rate of journal self citation is very low at 2.49%. This is surprising as more self citation was expected bearing in mind that MJM is the oldest medical journal and would have published a larger pool of citable articles over the years. This lack of "use" of articles published in MJM may be partly due to lack of accessibility before year 2011. As observed that MJM has just recently opened up access to its current and archived issues (http://www.e-mjm.org/about_MJM.html). This move is expected to improve articles visibility and should increase use and citations and ultimately improves its impact and influence.

MJM''s impact in Scopus in 2010 is 0.039 and its h index is the highest (13) when compared with other Malaysian medical journals (see Table VIII), eleven in number at present. Accordingly, a good h index is achieved due to the larger issues coverage in Scopus. Indeed, being an older journal is an advantage, however, age have little influence on citedness. It must be pointed out that, Scopus's SJR uses a slightly different impact measure as it not only considers total citations over a 3-year window frame (WoS uses 2 years) but weighted the citations according to the prestige of the citing journal. Hence, if articles in a journal are cited by articles in high impact journals the SJR score is expected to be higher. Also, MJM's quartile score is good as it ranked among the 50 percent (Q2) of the titles listed under category Medicine (Miscellenous).

ACKNOWLEDGEMENT

We acknowledge funding received from the Ministry of Higher Education Malaysia and the University of Malaya FP0561/2006A and F250/2008B which made it possible to develop MyAIS, the system that provided part of the data for this study.

REFERENCES

1. Chen PCY. The Medical Journal of Malaysia: past and future. Med J Malaysia 1982; 37: 1 [editorial].
2. Chia J, Yeong J. Straits Medical Association, National Library Board Board Singapore. (online) http://infopedia.nl.sg/articles/SIP_1173_2006-08-30.html (13 September 2011).
3. Lim VK. A short history of the Medical Journal of Malaysia. Med J Malaysia 1995 50: Suppl A: S11-3.
4. Nisonger TE. Citation autobiography: an investigation of ISI database coverage in determining author citedness. College and Research Libraries 2004; 65: 152-63.
5. Aalst VJ. Using Google Scholar to estimate the impact of journal articles in education. Education 2010; 39: 387-400.
6. Al-Qallaf C. Citation patterns in the Kuwaiti journal Medical Principles and Practice: The first 12 years, 1989-2000. Scientometrics, 2003; 56(3): 369-382.
7. Archambault E, Gagne, EV. The Use of Bibliometrics in the Social Sciences and Humanities, Final Report, Quebec, Canada: Science-Metrix, 2004.
8. Sanni SA, Zainab AN. Google Scholar as a source for citation and impact analysis for a non-ISI indexed medical journal. Malaysian Journal of Library & Information Science. 2010; 15(3): 35-51.
9. Lotka AJ. The frequency distribution of scientific productivity. Journal of the Washington Academy of Sciences 1926; 16 (12): 317-24.
10. Sen B. Symbols and formulas for a few bibliometric concepts. Journal of Documentation1999; 55(3): 325-34.
11. Zainab AN, Anyi KWU, Anuar NB. A single Journal Study: Malaysian Journal of Computer Science, Malaysian Journal of Computer Science 2009; 22 (1): 1-18.
12. Glanzel W, Schoepflin U. A bibliometric study on ageing and reception processes of scientific literature, Journal of Information Science 1995; 21: 37-53.
13. Crawley-Low, J. Bibliometric analysis of the American Journal of Veterinary Research to produce a list of core veterinary medicine journals. Journal of the Medical Library Association 2006; 94(4): 430.
14. Bradford S. Documentation. London, Crosby, Lockwood, 1948.
15. Glanzel W. Bibliometrics as a research field: A course on theory and application of bibliometric indicators. Nordic Research School of Library and Information Science, 2003.
16. Dombrowski, T. Journal evaluation using Journal Citation Report as a collection tool. Collection Management 1988, 10(3/4), 175-80.
17. Chung KH, Cox RAK. Patterns of Productivity in the Finance Literature: A Study of the Bibliometric Distributions. Journal of Finance 1990; 45 (1): 301-9.
18. Chiu W, Ho Y. Bibliometric analysis of homeopathy research during the period of 1991 to 2003. Scientometrics 2005; 63(1): 3-23.
19. Vine, R. (2006). Google Scholar. Journal of the Medical Library Association, 94(1), 97.
20. Šember M, Utrobi i, A, Petrak J. Croatian Medical Journal Citation Score in Web of Science, Scopus, and Google Scholar. Croatian Medical Journal, 2010; 51, 99-103.
21. Uzun A. Library and information science research in developing countries and Eastern European countries: a brief bibliometric perspective. International Information and Library Review 2002; 34: 21-33.