

ORIGINAL PAPER

Scientific Production of Medical Universities in the West of Iran: a Scientometric Analysis

Masoud Rasolabadi¹, Shahnaz Khaledi², Fariba Khayati³, Marya Maryam Kalhor², Susan Penjvini², Alireza Gharib¹

¹Kurdistan University of Medical Sciences, Sanandaj, Iran

²School of Nursing & Midwifery, Kurdistan University of Medical Sciences, Sanandaj, Iran

Corresponding author: Alireza Gharib, Kurdistan University of Medical Sciences, Sanandaj, Iran. Phone: Tel /Fax: +98-8731827286. E-mail: gharibalireza@yahoo.com.

ABSTRACT

Introduction: This study aimed to compare scientific production by providing quantitative evaluation of science output in five Western Iranian Medical Universities including Hamedan, Ilam, Kermanshah, Kurdistan and Lorestan University of Medical Sciences using scientometrics indicators based on data indexed in Scopus for period between the years 2010 to 2014. **Methods:** In this scientometric study data were collected using Scopus database. Both searching and analyzing features of Scopus were used to data retrieval and analysis. We used Scientometrics indicators including number of publications, number of citations, nationalization index (NI), Internationalization Index (INI), H-index, average number of citations per paper, and growth index. **Results:** Five Western Iranian Universities produced over 3011 articles from 2010 to 2014. These articles were cited 7158 times with an average rate of 4.2 citations per article. H- Index of under study universities are varying from 14 to 30. Ilam University of Medical Sciences had the highest international collaboration with an INI of 0.33 compared to Hamedan and Kermanshah universities with INI of 0.20 and 0.16 respectively. The lowest international collaboration belonged to Lorestan University of Medical Sciences (0.07). The highest Growth Index belonged to Kurdistan University of Medical Sciences (69.7). **Conclusion:** Although scientific production of five Western Iranian Medical Universities was increasing, but this trend was not stable. To achieve better performance it is recommended that five Western Iranian Universities stabilize their budgeting and investment policies in research.

Key words: Bibliometrics, Scientometrics, Databases- Bibliographic, H- Index, Scopus, Iran.

1. INTRODUCTION

Many countries work on evaluation systems to identify universities and researchers that achieve excellence as a final destination of science policy (1-2). Citation databases store references (citations) that authors include in the reference list of their publication and so can be used to search for publications that cite a known author or work. The three most widely used multidisciplinary citation databases are Web of Science, Scopus and Google Scholar (3).

Scopus provided by Elsevier is based on abstract and citation of peer reviewed literature. It can be used for evaluation of research output and university ranking (4). As the largest database of peer reviewed articles it includes 53 million records, 20,500 peer-reviewed journals from 5,000 publishers mostly with English abstracts (5). Advanced sorting and refining tools of Scopus help researcher's access more than 27 million citations. Boyle and Sherman believe that "choosing Scopus is due to its quality of outcomes, time savings, ease of use and possible effect on research findings" (6).

Scientometrics evaluate quality of scientific productions using the following indicators: 1-Productivity measurement using the number of cited articles, number of articles per year, and number of articles for a particular author 2- Measures of effectiveness using total number of citations, number of citations per year, and number of citations by a particular author, 3- Combined measures such as average number of citations per paper, and highly cited papers, and 4- H-index which is a citation index that attempts to measure both productivity and

impact of the published work. In addition, Growth Index (GI) can evaluate percentage of increase of publications between two definite periods (7, 8).

Universities can evaluate their performance using standard evaluation tools. This way they can improve on their weak points and obtain higher rankings (9). In a study conducted by Sohrabi et al, they found that policy change in Shahid Beheshti University of Medical Sciences followed a 46% to 56% increase in its scientific production from 2009 to 2010 and 2010 to 2011 respectively (10). Zorzetto et al showed that stability of the investment in research and development activities made a fourfold increase in the scientific output of Brazilian universities in the last two decades (11).

In this study we aimed to compare scientific production by providing quantitative evaluation of science output in 5 western Iranian universities including Hamedan, Ilam, Kermanshah, Kurdistan and Lorestan University of Medical Sciences using scientometrics indicators based on data indexed in Scopus data base.

2. AIM OF THE STUDY

In this study we aimed to compare scientific production by providing quantitative evaluation of science output in 5 western Iranian universities including Hamedan, Ilam, Kermanshah, Kurdistan and Lorestan University of Medical Sciences, using scientometric indicators based on data indexed in Scopus data base.

Medical University	2010	2011	2012	2013	2014	Total	%
Hamedan	115	169	219	239	216	958	31.8
Ilam	40	61	75	112	81	369	12.2
Kermanshah	104	140	233	260	218	955	31.7
Kurdistan	49	58	66	112	113	398	13.2
Lorestan	39	52	65	71	104	331	11.1
Total	347	480	658	794	732	3011	100

Table 1. Frequency Distribution of Articles per year of the five Western Iranian Universities

Medical University	2010	2011	2012	2013	2014	Total	Citation/Article	H-index	H-index Without self-citation
Hamedan	307	480	686	853	839	3165	3.3	27	23
Ilam	112	153	216	368	308	1157	3.1	16	12
Kermanshah	536	765	1027	1296	1183	4807	5	30	27
Kurdistan	80	150	254	313	397	1194	3	16	13
Lorestan	39	77	108	195	211	630	1.9	14	10
Total	728	1068	1497	1977	1888	7158	4.2		

Table 2. Frequency Distribution of Citation per year and H-index of the five Western Iranian Universities

3. METHODS

This scientometric study evaluated scientific productions of five Western Iranian Universities including Hamedan, Ilam, Kermanshah, Kurdistan and Lorestan University of Medical Sciences. Data were collected using Scopus database in November 2014. We used searching and analyzing features of Scopus. First the affiliations of the above mentioned universities were searched then data were analyzed using Scopus analyzing system in the period between the years 2010 to 2014. Number of articles was checked for duplication. All data including; number of published articles, number of citations and h-index were obtained from Scopus.

We used Scientometrics indicators including number of publications, number of citations, nationalization index (NI), Internationalization Index (INI), H-index, average number of citations per paper, and growth index.

4. RESULTS

In this study we found that five Western Iranian Universities produced over 3011 articles from 2010 to 2014. These articles were cited 7158 times with an average rate of 4.2 citations per article (Table 1). Although Hamedan University of Medical Sciences produced the highest number of articles (958) received only 3165 citations. Kermanshah University of Medical Sciences with 955 articles received 4807 citations. The lowest number of articles belongs to Ilam University of Medical Sciences (Table 2). H- Index of under study univer-

Medical University	Total Articles	National Coauthored Articles	International Coauthored Articles	NI	INI
Hamedan	958	927	153	0.96	0.16
Ilam	369	362	123	0.98	0.33
Kermanshah	955	931	193	0.97	0.20
Kurdistan	398	383	76	0.96	0.20
Lorestan	331	319	24	0.96	0.07
Total	3011	2922	569	0.97	0.19

Table 3. Number of National and International Coauthored Articles, Nationalization Index and Internationalization Index

Medical University	Hamedan	Ilam	Kermanshah	Kurdistan	Lorestan
2010-2011	46.9	52.5	34.6	18.3	33.3
2011-2012	29.5	22.9	66.4	13.8	25
2012-2013	9.1	48	11.5	69.7	9.2
2013-2014	-9.6	-27.6	-16.1	0.9	46.5

Table 4. Annual Growth of the five Western Iranian Universities

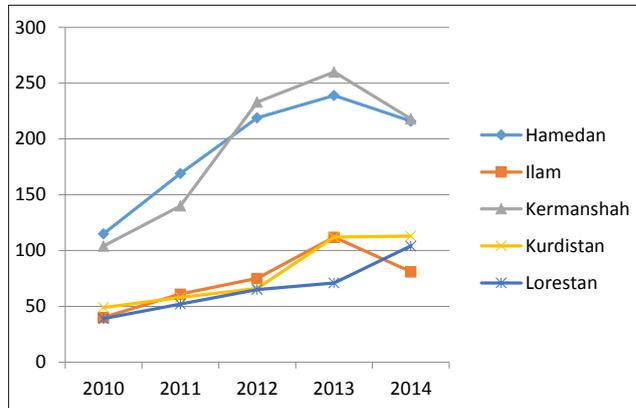


Figure 1. Comparison of the publication trends in the five Western Iranian Universities

sities are varying from 14 to 30. As table 2 shows H-index without self-citation in all universities decreased, but for Ilam University of Medical Sciences this decrease is significant (from 14 to 10).

From the other side, Ilam University of Medical Sciences had the highest international collaboration with an INI of 0.33 compared to Hamedan and Kermanshah universities with INI of 0.20 and 0.16 respectively. The lowest international collaboration belongs to Lorestan University of Medical Sciences (0.07) (Table 3).

Table 4 shows that the highest Growth Index belongs to Kurdistan University of Medical Sciences (69.7) and the lowest to Ilam University of Medical Sciences (-27.6).

Scientific production of five Western Iranian Medical Universities is increasing as shown in Fig.1.

5. DISCUSSION

Most of the international databases that evaluate scientific production accept only English articles (12). However, Scopus covers English articles, and Non English articles that their abstracts are in English language (4). In our study most indexed articles were published in the form of English and Persian Original articles. It is mandatory that universities consider policies to boost the researcher’s English knowledge especially in the field of writing so that they would be able to present their production and increase visibility of their work and their universities as a whole.

Our study showed that growth in rise of scientific production and publication may increase the number of citation and h-index of researchers which is congruent with the studies conducted by Bornmann et al (13) and also Kelly and Jennions (14). In our study h-index of all 5 western Iranian universities increases; however, Kermanshah and Lorestan had the highest and lowest h-index during the 5 years period. A closer look at these two universities reveal that Kermanshah uni-

versity had better research laboratories and more financial allocation for research. These factors and other factors such as making an allowance for factors that facilitate research projects and better access to internet and other sources of information including scientific data bases, as well as considering credits for prominent researchers have a great influence on the scientific production and ranking of universities. In Iran, universities have been ranked into three types according to various factors such as facilities, number of faculty members, educational equipment etc. Type one universities are raking the highest and others types rank lower. In our study Kermanshah, Hamedan, and Lorestan are type 2 whereas Kurdistan and Ilam Universities are type 3.

Results showed that number of citations of all five universities increased exponentially from 728 citations to 7158 citation whereas h-index lowered by excluding self-citations. Self-citation can clearly enlarge authors and universities' h-index; however, it has a minor effect on h-index than on the total citation (15). In a study conducted by Jalili-Baleh and Mirhosseini they found that there was a significant relationship between h-index and number of articles as well as h-index and number of citations (16). Another study by Cronin and Meho reported that there was a strong positive correlation between h-index and citation counts, and therefore suggested that total number of citations (with or without self-citations) was, indeed, a reliable indicator of scholarly impact and influence (17).

Kulkarni conducted a study on the author self-citation in the field of general medicine in three medical journals. He reported that self-citation is higher in articles that include more numbers of authors(18). In another study Garfield showed that articles with more authors enjoy more citation (19). However, Ahmadi et al reported that international research must be distinguished in terms of sequence of authors(20). In recent years collaboration network analysis is becoming one of the scientometric indicators showing association between coauthorship networks of organizations. Hence, universities should encourage more collaboration among researchers to increase their number of citations and consequently increase their h-index.

International collaboration index (INI) or share of international publications among all publications is an index for measuring the efficiency of articles with international collaboration (21). Table 3 shows that Kermanshah University has the highest number of internationally indexed articles (193 articles), and therefore enjoys the highest h-index in both with and without self citation, as shown in table 2; however, its INI is lower than Ilam University of Medical Sciences with 153 internationally coauthored papers (INI of 0.33). This difference in the INI of above mentioned universities is due to ratio of total number of papers to international papers. Despite increasing trend of publication production in the 5 Western Iranian Universities, they have shown a lower relative growth rate in the five years of study (Table 4).

As shown in table 4, Lorestan University of medical sciences had the highest Growth Index (46.5) in the period from 2013 to 2014, while other type 2 universities (Hamedan and Kermanshah) had negative Growth Index. This index showed that Kurdistan University of Medical Sciences was better in comparison with Ilam University of Medical Sciences (with

the same type). Consequently, except for Lorestan university of Medical Sciences, growth index of other universities reduced in the four time periods from 2010 to 2014. The highest Growth Index belonged to Kurdistan University of Medical Sciences (69.7) and the lowest to Ilam (-27.6).

From 2012–2013 the annual growth of the 3 type 2 Universities (Hamedan, Krmanshah, Lorestan) decreased whereas for type 3 universities (Kurdistan and Ilam) it was increased. It seems that type 3 universities had changed their research policies. As Sohrabi et al, reported that policy change in Shahid Beheshti University of Medical Sciences led to 46% to 56% increase in its scientific production from 2009 to 2010 and 2010 to 2011 respectively (10).

6. CONCLUSION

To sum up, provision of workshops and other sources of information for university researchers have a great influence on the scientometric performance of universities. Moreover, importance of correct spelling in the names and affiliation of the scientific production is a subject that should be emphasized constantly. Scientific production of the five Western Iranian Medical Universities was increasing, but this trend was not stable. To achieve better performance it is recommended that five Western Iranian Universities stabilize their budgeting and investment policies in research.

Limitation of the study

This paper examines exclusively papers of five Western Iranian University that have been indexed in Scopus database ranging from the year 2010 to 2014. Thus, the papers published in other different channels and sources which have not been indexed in Scopus are excluded from our research. So the data presented here are not complete scientific performance of five Western Iranian University.

Acknowledgements

The authors are thankful to Vice Chancellor for Research, Kurdistan University of Medical Sciences to provide access to Scopus database and support the study financially.

Authors' Contributions

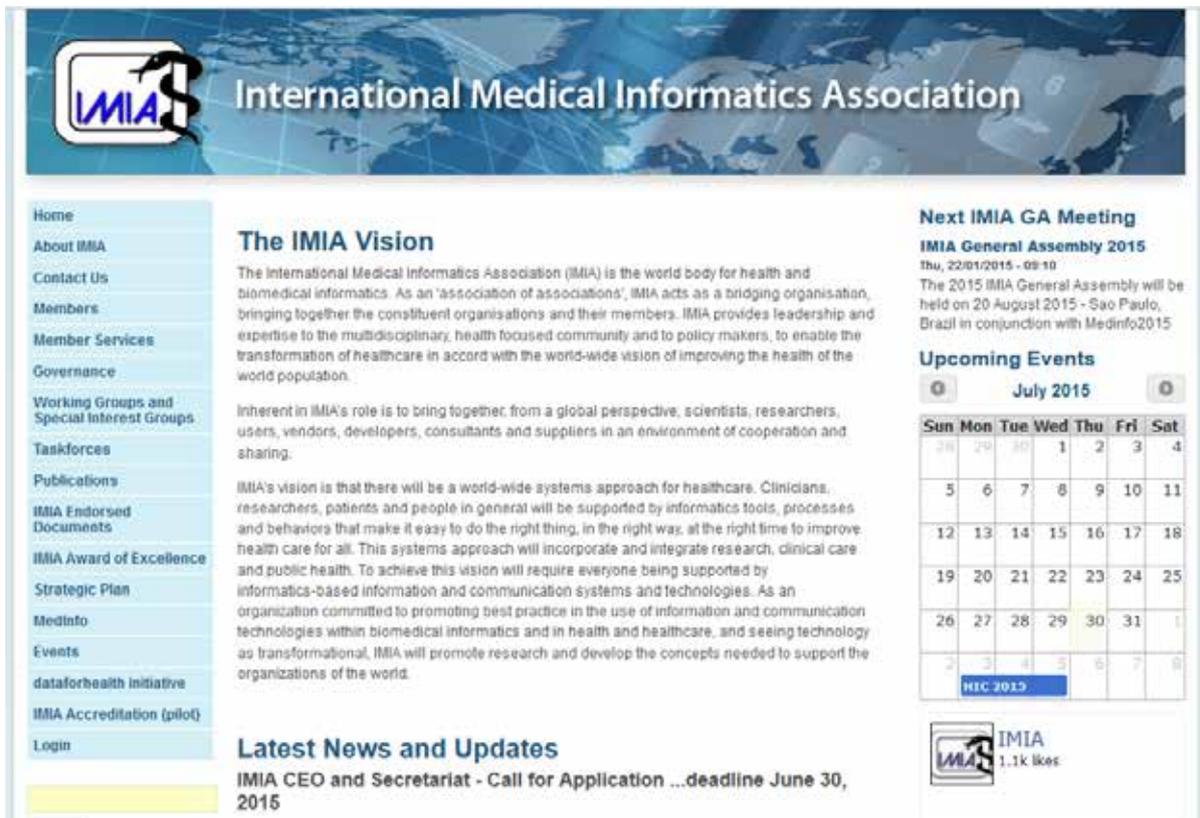
All authors had equal role in design, work, statistical analysis and manuscript writing.

CONFLICT OF INTEREST: NONE DECLARED.

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