Faculty of Medicine, University of Sarajevo, Sarajevo, Bosnia and Herzegovina

Corresponding author: Academician prof Izet Masic, MD, PhD, FACMI, FEFMI, MIAHSI. Faculty of Medicine, University of Sarajevo, Sarajevo, Bosnia and Herzegovina. ORCID ID: <http://www-orcid.org/0000-0002-9080-5456>. E-mail: imasic@lol.ba

Evaluation of the Medical Academic Community of Bosnia and Herzegovina Based on Scopus Parameters

Izet Masic

ABSTRACT

Introduction: The academic community of Bosnia and Herzegovina (B&H) is represented by four Academies, which include eminent personalities in the field of medical sciences (Academy of Sciences and Arts of Bosnia and Herzegovina, Department for Medical Sciences (ANU-BiH), Academy of Sciences and Arts of the Republika Srpska (ANURS), Croatian Academy of Sciences and Arts in BiH (HAZU B&H), and the Academy of Medical Sciences of Bosnia and Herzegovina (AMNuBiH)). **Aim:** To present scientometric analysis of members of the medical sphere of the ANUBiH, ANURS, HAZU B&H and AMNuBiH, to evaluate members and their scientific rating. **Material and methods:** The work has an analytical character and presents analysis of the data obtained from the Scopus database. Results are shown through number of cases, percentage, arithmetic mean, standard deviation, median and interquartile range, with Spearman's rank correlation coefficient. **Results:** The analysis showed a significant correlation between the Academy and the country of origin of the academician. In AMNuBiH and ANUBiH are mainly represented academics originating from Bosnia and Herzegovina, while ANURS, 71.4% of the members, are academics with background from Serbia. There is no significant correlation between the observed parameters (Scopus parameters—number of papers, H index, number of citations) according to membership in Academies. By analyzing the correlation between the country of residence, the number of papers, H index and the number of citations, it has been shown that the correlation is significant between the state and the number of papers, but not the other two observed parameters. **Conclusion:** Criteria for admission to main academic communities are highly questionable, as this analysis showed. Progress in the academic hierarchy must be more stringent, and the criteria must be set to the highest possible level, as this is the only path which leads to progress.

Keywords: scientometric analysis, evaluation, Scopus parameters.

1. INTRODUCTION

The academic community of Bosnia and Herzegovina (B&H) is represented by four Academies, which include eminent personalities in the field of medical sciences (Department for Medical Sciences of Academy of Sciences and Arts of Bosnia and Herzegovina (ANUBiH), Academy of Sciences and Arts of the Republika Srpska (ANURS), Croatian Academy of Sciences and Arts in BiH (HAZU B&H), and the Academy of Medical Sciences of Bosnia and Herzegovina (AMNuBiH)). The admission to these communities is also the most honourable act during the academic and professional career. On the ground of Bosnia and Herzegovina, there is often controversy surrounding the members of the Academy, and are they truly members of these communities and are they responsible for the development of science and medicine on the territory of B&H, or they perform

their activities for some other country. Although the title in the academic community does not bring financial gain, it is nevertheless a matter of prestige, to everyone who present something in the academic community of one country. Scientometric evaluation of one author (number of citations, H-index, number of papers in one base, e index, g index, ilo index) (1, 2), although often is not the most valid (3, 4, 5), it can be indicator of the scientific or academic work of one author.

2. AIM

Aim of this Editorial was to make scientometric analysis of members of the medical sphere of the ANUBiH, ANURS, HAZU B&H and AMNuBiH, and to evaluate members and their scientific rating.

3. MATERIAL AND METHODS

The work has an analytical character and presents analysis of the data

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obtained from the Scopus database (which is more selective than the information that can be obtained from the Google Scholar analysis). Results are shown through number of cases, percentage, arithmetic mean, standard deviation, median and interquartile range, with Spearman's rank correlation coefficient. The name of members were found on official webpages (on the 08 June 2017). Enver Zerem, MD, PhD and Asim Kurjak, MD, PhD are the members of both ANUBiH and AMNuBiH. Ljubo Simic, MD, PhD and Mirko Grujic, MD, PhD are members of both AMNuBiH and HAZU. In analysis wasn't include accademicians Zdenko Ostojic and Zijad Durakovic, members of HAZU, because their names are not deposited on official web site of HAZU.

4. RESULTS

The analysis showed a significant correlation between the Academy and the country of origin of the academician. In AMNuBiH and ANUBiH are mainly represented academics originating from Bosnia and Herzegovina, while ANURS, 71.4% of the members, are academics with background from Serbia (Table 1, Table 2). There is no significant correlation between the observed parameters (Scopus parameters - number of papers, H index, number of citations) according to membership in Academies (Table 3). By analyzing the correlation between the country of residence, the number of papers, H index and the number of citations, it has been shown that the correlation is significant between the state and the number of papers, but not the other two observed parameters (Table 4, Table 5). There is no significant correlation between the number of papers and the H index, and between the number of papers and number of citations (Figure 1, Figure 2). Table 6. shows Scopus analysis of all academicians in all four Academies. Scopus covers a much smaller database, so there is a clear difference in the analysis of the parameters (the requirement to analyze the work of one academic worker on Google Scholar is the existence of a registered Google Scholar account). On Figure 3. there is a discrepancy between the number

Place of residence * Academy Crosstabulation						
		Academy				Total
		AMNuBiH	ANUBiH	ANURS	HAZU B&H	
Bosnia and Herzegovina	Count	17	8	0	1	26
	%	70,8	88,9	0,0	100,0	54,2
Bosnia and Herzegovina, Republic of Srpska	Count	0	0	3	0	3
	%	0,0	0,0	21,4	0,0	6,3
Croatia	Count	3	1	0	0	4
	%	12,5	11,1	0,0	0,0	8,3
Germany	Count	1	0	0	0	1
	%	4,2	0,0	0,0	0,0	2,1
Serbia	Count	1	0	10	0	11
	%	4,2	0,0	71,4	0,0	22,9
USA	Count	2	0	1	0	3
	%	8,3	0,0	7,1	0,0	6,3
Total	Count	24	9	14	1	48
	%	100,0	100,0	100,0	100,0	100,0

Table 1. Relation of membership in the Academy and the country in which the academics operate (retrieved 08.06.2017)

Correlations			
Academy		Academy	Place of residence
	Pearson Correlation	1	,450**
	Sig. (2-tailed)		,001
	N	48	48

Table 2. Significant correlation between academies and countries from which they originate (retrieved June 8, 2017)

Descriptives							
		N	Mean	Std. Deviation	Std. Error	Minimum	Maximum
Scopus Number of articles	AMNuBiH	24	93,750	111,3749	22,7343	11,0	432,0
	ANUBiH	9	65,778	65,1935	21,7312	12,0	221,0
	ANURS	14	77,143	62,3907	16,6746	5,0	216,0
	HAZU B&H	1	40,000	.	.	40,0	40,0
	Total	48	82,542	89,6409	12,9385	5,0	432,0
Scopus h index	AMNuBiH	24	11,542	14,0897	2,8761	2,0	49,0
	ANUBiH	9	19,222	19,0773	6,3591	3,0	63,0
	ANURS	14	11,714	7,3738	1,9707	2,0	27,0
	HAZU B&H	1	5,000	.	.	5,0	5,0
	Total	48	12,896	13,5823	1,9604	2,0	63,0
Scopus Number of Citations	AMNuBiH	24	2494,042	7003,6495	1429,6140	12,0	31113,0
	ANUBiH	9	624,444	1220,8673	406,9558	3,0	3825,0
	ANURS	14	1124,786	2136,6964	571,0561	26,0	8261,0
	HAZU B&H	1	77,000	.	.	77,0	77,0
	Total	48	1693,771	5120,3778	739,0629	3,0	31113,0

Table 3. Analysis of academies based on observed parameters (retrieved 08.06.2017)

Correlations					
Place of residence		Place of residence	Scopus Number of articles	Scopus h index	Scopus Number of Citations
	Pearson Correlation	1	,309*	,277	,231
	Sig. (2-tailed)		,033	,056	,113
	N	48	48	48	48

** . Correlation is significant at the 0.01 level (2-tailed).

Table 4. Correlation analysis between the state of residence, number of papers, H index and the number of citations (retrieved 08.06.2017)

of citations on Scopus and Google Scholar (a condition for a public Google Scholar profile).

5. DISCUSSION

Four academies have been processed, of which the main is ANUBiH. ANURS and the HAZU B&H, although they are registered on the territory of B&H, by analyzing its members, we can notice that their activities, as well as their scientific work are not related to B&H. Their activities for the promotion of the science of B&H, and for the promotion of B&H itself, it is quite questionable. It should be noted that these three academic communities, gather not only members from the medical field, but from science in general. AMNuBiH includes only members from the medical field, covering mainly the largest names of the older generation, primarily acting in B&H,

Descriptives		N	Mean	Std. Deviation	Std. Error	Minimum	Maximum
Scopus Number of articles	Bosnia and Herzegovina	26	54,846	53,8343	10,5578	11,0	258,0
	Bosnia and Herzegovina, Republic of Srpska	3	20,667	8,6217	4,9777	13,0	30,0
	Croatia	4	231,000	158,2424	79,1212	45,0	432,0
	Germany	1	87,000	.	.	87,0	87,0
	Serbia	11	90,727	62,3395	18,7961	5,0	216,0
	USA	3	155,000	165,8101	95,7305	34,0	344,0
	Total	48	82,542	89,6409	12,9385	5,0	432,0
Scopus h index	Bosnia and Herzegovina	26	9,385	12,6018	2,4714	2,0	63,0
	Bosnia and Herzegovina, Republic of Srpska	3	3,667	1,5275	,8819	2,0	5,0
	Croatia	4	32,250	16,6808	8,3404	9,0	47,0
	Germany	1	9,000	.	.	9,0	9,0
	Serbia	11	13,636	6,7568	2,0373	5,0	27,0
	USA	3	25,333	20,5508	11,8650	12,0	49,0
	Total	48	12,896	13,5823	1,9604	2,0	63,0
Scopus Number of Citations	Bosnia and Herzegovina	26	287,846	525,0741	102,9755	3,0	2250,0
	Bosnia and Herzegovina, Republic of Srpska	3	66,667	63,6344	36,7393	26,0	140,0
	Croatia	4	10305,500	14062,0864	7031,0432	345,0	31113,0
	Germany	1	244,000	.	.	244,0	244,0
	Serbia	11	1380,091	2361,6896	712,0762	98,0	8261,0
	USA	3	5656,667	9221,5884	5324,0865	57,0	16300,0
	Total	48	1693,771	5120,3778	739,0629	3,0	31113,0

Table 5. Analysis by academics based on the country of residence, number of papers, H index and the number of citations (retrieved 08.06.2017)

Figure 1. Comparison of Scopus and Google Scholar H-index

Figure 2. Comparison of Scopus and Google Scholar number of citations

	Name	Scopus number of articles	Scopus H index	Scopus number of citations	Google Scholar number of articles	Google Scholar H index	Google Scholar number of citations
ANUBiH	Asim Kurjak	432	41	5939	-	-	-
	Berislav Topić	24	5	63	-	-	-
	Enver Zerem	100	13	566	132	16	1069
	Husref Tahirović	81	10	351	-	-	-
	Lidija Lincender Cvijetić	25	3	27	-	-	-
	Ljerka Ostojić	43	10	242	62	11	418
	Miro Jakovljević	221	32	3825	-	-	-
	Mirsada Hukić	61	11	545	95	13	875
	Muhidin Hamamdžić	19	2	19	-	-	-
	Senka Mesihović Dinarević	12	3	30	-	-	-
	Slobodan Loga	25	4	53	-	-	-
ANURS	Drenka Šečerov Zečević	30	2	26	-	-	-
	Dragan Mičić	173	22	2260	-	-	-
	Duško Vulić	13	5	140	-	-	-
	Gordana Stevanović	5	5	98	-	-	-
	Ljubiša Rakić	135	13	660	-	-	-
	Milan Jokanović	58	17	979	94	19	1658
	Miodrag Ostojić	216	27	8261	-	-	-
	Predrag Đorđević	75	12	825	-	-	-
	Predrag Peško	93	12	492	-	-	-
	Rajko Igić	87	15	613	141	19	1029
	Slavica Jandrić	19	4	34	-	-	-
	Srboljub Živanović	25	7	193	-	-	-
	Vladimir Kanjuh	90	17	951	242	21	1822
	Vojko Đukić	61	6	215	-	-	-
	Ljubo Šimić	40	5	77	-	-	-
HAZU B&H	Zdenko Ostojić	26	9	161	-	-	-
	Zijad Duraković	200	13	507	595	16	1092
	Mirko Grujić	51	2	14	-	-	-
	Abdulah Kučukalić	60	8	314	130	13	567
AMNUBiH	Asim Kurjak	432	41	5939	-	-	-
	Benjamin Đulbegović	344	49	16300	-	-	-
	Dželaludin Junuzović	21	3	33	46	8	148
	Emir Mujanović	31	3	71	29	5	112
	Enver Zerem	100	13	566	132	16	1069
	Halima Resić	12	2	12	149	12	419
	Izet Hozo	45	9	345	-	-	-
	Izet Mašić	258	10	469	437	19	1675
	Jacob Bergsland	165	24	2250	212	32	3679
	Jasenka Karamehić	39	5	78	240	8	262
	Ljubo Šimić	40	5	77	-	-	-
	Kenan Arnautović	34	12	57	-	-	-
	Marko Bukša	32	4	30	-	-	-
	Mehmed Gribajčević	30	3	26	-	-	-
	Mirko Grujić	51	2	14	-	-	-
	Muharem Zildžić	45	4	51	-	-	-
	Osman Sinanović	109	10	413	161	13	766
	Pavle Milenković	67	12	247	-	-	-
	Snježana Miličević	11	3	15	45	3	24
	Šukrija Zvizdić	45	4	51	24	2	16
	Vjekoslav Gerc	37	5	1627	-	-	-
	Željko Reiner	226	47	31113	428	37	47413
	Zlata Kundurović	25	6	139	-	-	-
	Zlatko Hrgović	87	9	244	-	-	-
	Zoran Hadžiahmetović	44	2	19	-	-	-

Table 6. Analysis of the members of all four academies (retrieved 08.06.2017)

Figure 3. Comparison between Scopus parameters (number of articles, H index)

and promoting the medicine of Bosnia and Herzegovina. Scientometric indicators through which the authors are processed provide numerous information, and indicate that scientific criteria are often neglected in the selection of members in these academic communities, and that members are selected on the basis of some other, probably political criteria. When compared with academies from the region and then from European countries, we come to the conclusion that it is incredible that members of the ANUBiH, in their lifetime who exceeded their peak, have 12 papers in the Scopus database and thirty citations, and they are a regular member of this Academy. Although, it is not necessary to look at the quantity, but the quality, again the number of quotations is miserable (compared to the coeval in Republic of Croatia, which has 37180 citations on the Scopus in the same status in the Academy, and 1082 in the Republic of Serbia). By analyzing the correlation between the country of residence, the number of papers, H index and the number of citations, it has been proven that the correlation is significant between the state and the number of papers, where B&H is lagging far behind the Republic of Croatia and the Republic of Serbia. Realizing that some members of these academic communities have a single number in some scientometric parameters, the problems of the criteria themselves, which are set in the reception in these bases, is even more pronounced. It's even more challenging, that all members are essentially full professors, some teachers and some mentors. Such a real picture of the academic community of the medical field of Bosnia and Herzegovina is certainly a reminder of the future. What to do to correct this picture is a good question, in a country with a bad economic situation, in a country with poor infrastructure, in a country with a lack of support for any scientific activity, in a country where the number of faculties is growing, in a country where the number of doctors are growing, in countries where there are more doctors of science than master of medical sciences, and in a country where belonging to the ruling structure, political or idyllic is more important than the quality itself. The heads of educational institutions are not the most heterogeneous, the most reputable, which represents another one in the complex mosaic. The situation is complex, but surely the imposition of certain norms that already existing professors must carry out within a certain time

Figure 4. Comparison between Google Scholar parameters (H index, i10 index)

period is considered imperative. Progress in academic hierarchy must be more stringent, and the criteria must be set to the highest possible level (6-8). Doctoral studies must produce scientists, real academic staff, and not people who are just pro forma, who are just for the paper. The education of both the existing staff and students about the importance of academic scholarly activity must be embedded in each assistant, assistant professor or professor. Although academic work, scientific work, scientific publications are very "expensive sports" in a country that cannot endure it, this is the only normal, natural and logical way to the progress of B&H science, and so on the state itself.

6. CONCLUSION

Criteria for admission to main academic communities are highly questionable, as this analysis showed. Progress in the academic hierarchy must be more stringent, and the criteria must be set to the highest possible level, as this is the only path which leads to progress. Unfortunately, accepting new academicians as member of academies in Bosnia and Herzegovina are more political nor scientific matter.

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