

Biomedical Scientific Productivity of the Mostar University Faculty of Medicine and University Hospital Mostar in 1999–2008

Ljerka Ostojić¹, Vesna Damjanović¹, Ivan Vasilj¹, Ervin Jančić² and Boris Maslov¹

¹ Faculty of Medicine, University of Mostar, Mostar, Bosnia and Herzegovina

² General Hospital Karlovac, Karlovac, Croatia

ABSTRACT

The aim of this study was to investigate the scientific productivity of the Mostar University Faculty of Medicine and University Hospital Mostar. All articles that were indexed by PubMed with the keyword Mostar were included in the analysis. During 1999–2008, a total of 76 articles were published, with a total of 366 authorships contributed by a total of 228 unique authors, whereas a total of 161 of these authors (70.6%) coauthored a single article only. The average number of co-authors was 4.6 per article. There was a strong increasing linear trend in the total number of published articles. The most published articles were related to clinical research, whereas the least were recorded in the basic biomedical sciences, suggesting the need to increase the research capacity in basic biomedical sciences. The large percent of single-authorship authors that were recorded suggest almost a sporadic rather than systematic publication output. Likely improvements to this situation include the creation of the newly formed doctoral (PhD) course due to start next year and several other ways in which scientific research in biomedicine can be increased in basic, clinical and public health sciences.

Key words: scientific productivity, biomedicine, PubMed, Mostar, Bosnia and Herzegovina

Introduction

Scientometric analysis is one of the main elements of any scientific institution evaluation. This is usually performed on a regular basis, aiming to show the research output dynamics over investigated time. Such appraisals can equally be performed at both individual level, for each researcher, and at the institutional level^{1,2}.

The results obtained by such evaluations can be used for various purposes, mainly in attempt to increase the quality of scientific work in various institutions. Furthermore, such evaluations may serve as the integral element of external monitoring exercises, where scientific output presents an important part of the Medical Faculty performance. One of the main elements of such evaluations is definitely implementation of various surveys, which over time can provide important information regarding various aspects of students' and young researchers' work determinants, as well as the indices for decision making and planning among all groups of researchers^{3–7}. In view of previous evaluations of the existing medical

education facilities within Bosnia and Herzegovina, a previous study suggested that the evaluation efforts can be applied to these schools and that such exercises should be performed regularly⁸.

The aim of this study was to provide an initial overview of the scientific output by the Mostar University Faculty of Medicine and University Hospital Mostar in 1999–2008, aiming to understand the current dynamics, main fields of research and to provide information on local capacities and needs for scientific system development.

Materials and Methods

The main source of information for this study was PubMed (www.pubmed.com), which was used to search the published articles. The search was performed in the broadest possible way, selecting only the keyword »Mostar« and limiting the results to the period 1999–2008. All re-

sults were later analyzed based on the available fields from the MEDLINE output, aiming to show the main determinants of the published articles. All identified articles were later classified in three groups – basic, clinical and public health related subjects, similar to previously published study in Croatia⁹. Furthermore, all articles from clinical sciences were classified into four groups, aiming to show more precisely the main subject of an article – those related to cardiology, psychiatry, surgery, gynecology, pediatrics and other areas.

The data were presented as numbers and percentages, whereas the publication output trend was analyzed in the linear regression curve fit, with analysis of variance (ANOVA). The data was analyzed in SPSS version 15, with significance set at $p < 0.05$.

Results

A total of 76 articles were recorded in the investigated period, with most articles being published in 2004 and 2008 (Table 1). This suggested a strong increasing linear trend ($\hat{\alpha} = 0.85$, $F = 21.29$, $p = 0.002$), which was distorted in 2005, but nevertheless suggested that expected increase of the publication output was 1.5 articles *per* year.

A total of 366 authorships were recorded, leading to an average of 4.6 co-authors *per* article. Among these co-authors a total of 228 were unique, while a total of 161 of these authors (70.6%) coauthored a single article only. The most productive author in the author list co-authored a total of eight articles, while two more co-authored a total of seven articles. The majority of articles were written in English (76%), followed by Bosnian (13%) and Croatian (11%). The largest number of included articles was published in Croatia (50%), followed by Bosnia and Herzegovina (32%), while remaining articles were published elsewhere. The commonest journals were Medicinski Arhiv (24%), Croatian Medical Journal (20%), Collegium Antropologicum (13%), Psychiatria Danubina (12%) and Bosnian Journal of Basic Medical Sciences (9.2%). The remaining journals published one or two articles.

In terms of the article affiliation, a large amount of variation was recorded, with as much as 71 unique val-

ues in the affiliation field of PubMed, suggesting that only several affiliations were reported in the similar way. This was seen in both Faculty of Medicine and University Hospital Mostar, which were reported as »Medical School, University of Mostar«, or »Mostar University Medical School«, or »Mostar University School of Medicine«, or even »Medical Faculty and University Clinic Mostar«, which covered both institutions. University Clinical Hospital was reported by even wider set of records, with »KB Mostar«, »Interna klinika Mostar«, »University Clinic« and »University Hospital Center«.

Among the MeSH terms, after the exclusion of the basic terms (Humans, Male, Female, Adult, Middle Aged, Bosnia-Herzegovina, Aged, and Adolescent), the commonest ones were Bosnia-Herzegovina/Epidemiology (3.6%) and War (2.9%; Table 2). The division into three groups based on the main article subject revealed that the most articles were published related to clinical research or an intersection of clinical research (47; 62%), public health (21; 28%), while the remaining 8 articles could be classified as originating or covering the subjects related to the basic biomedical sciences (11%). Among the clinical science articles the most numerous were ones related to cardiology (12; 26%), followed by psychiatry (8; 17%).

Discussion

The results of this study show rather low publication output of the Mostar University Faculty of Medicine and University Hospital Mostar in 1999–2008. This could be regarded as the result of rather newly founded Medical School and the beginning of the systematic scientific efforts. The recorded output could be almost considered as sporadic scientific output, as over 70% of authors published at most a single Faculty of Medicine announced and started preparing the PhD course, which aims to introduce higher scientific standards. Such a course could indeed improve the current situation and provide a common hub for younger researchers, as well as facilitate their scientific efforts.

TABLE 1
THE PUBLICATION OUTPUT DURING THE INVESTIGATED PERIOD

Year	Number of articles
1999	1
2000	1
2001	3
2002	4
2003	10
2004	14
2005	5
2006	11
2007	13
2008	14

TABLE 2
THE COMMONEST MeSH TERMS IDENTIFIED IN THE INCLUDED ARTICLES (THOSE WITH OVER 1% OF PREVALENCE WERE PRESENTED IN THE TABLE AFTER REMOVAL OF THE BASIC MeSH TERMS SUCH AS MALE, FEMALE AND VARIOUS AGE GROUP TERMS)

Rank	MeSH term	N	%
1	Bosnia-Herzegovina/epidemiology	19	3.6
2	War	11	2.1
3	Risk Factors	9	1.7
4	Questionnaires	8	1.5
5	Case-Control Studies	7	1.3
6	Prevalence	7	1.3
7	Pregnancy	5	1.0
8	Retrospective Studies	5	1.0

The publication output shows a strong orientation towards epidemiology and war, as these subjects were relatively easy to write on (as neither requires more substantial finances) and the wider international audience was interested in seeing the impact of war on the population and understanding the complex situation which lead to the war¹⁰. This is also seen in rather large number of articles which are related to psychiatric disorders (the article classification into more precise groups was not performed, as for most a clear separation between public health and clinical medicine was difficult, if not impossible). Hence, we could also state that the current situation is largely a consequence of the 1992–1995 war, and that researchers accepted that situation and focused on the investigation of subjects related to warfare and the outcomes that have emerged after it had ceased. However, it should still be noted that there are some articles dealing with basic sciences, but the possibility to publish in basic sciences is largely dependant on the funds available, as most of the basic research requires a large funds in order to finance laboratory materials and animals. Similar result was seen in research fellows in Croatia, where those employed in public health had the greatest scientific output, which was explained by the authors as the result of a mixture or large workplace obligation in those employed in clinical sciences, large research requirements of those employed in basic sciences, whereas for those employed in public health rather low amount of workplace obligations coupled with the easily available research material was likely to have caused such a result⁹.

Many medical communities report a profound lack of interest in the physician-scientists, medical doctors who are involved in scientific research^{11–14}. Detailed investigation should also be performed in Mostar, as the results of this study indeed show rather low interest in research. A detailed analysis of the articles subjects suggests, however, that there are some research areas which had greater publication output than other, namely cardiology. However, it should also be noted that in order to really show the current situation, international comparisons should be made in order to better understand the patterns of scientific research in Mostar.

The current situation requires certain actions to be taken. One of the main recommendations could be to create a core of researchers, which would be able to create

the research policy in the region, taking into account the local specificities, funding opportunities as well as human resources and their capacity to perform research tasks. The beneficial effects of such strategies were also reported previously in case of the journal *Collegium Antropologicum*, where local researchers proved to be much more interesting group in terms of scientific productivity¹⁵. Secondly, the Faculty of Medicine aims to create a critical number of PhDs in recent future, which would be an integral part of this core researcher group¹⁶. This could also be extended to founding of a specific department within the Faculty of Medicine, which could be responsible for supporting the scientists, in terms of advice, funding opportunities monitoring as well as for providing useful information on various other aspects of scientific work. Furthermore, such a strategy requires careful human resources planning scheme and high interest in young researchers. This is especially important if we take into account some unexpected results from the neighboring Croatia, where e.g. younger researchers who were better as undergraduate students in terms of grade point average experienced worse scientific productivity indices later in career, supporting the idea of local specificities which must be taken into account in scientific strategies creation. One of the suggestions that arose as the results of this study is that the Faculty of Medicine needs to adopt a unique way of writing affiliation and suggest all the researchers to start using common affiliation in all future articles, all ensuring that the scientometric evaluation may be performed in a better methodological way.

The limitations of the current study include a possibility for errors in PubMed search (incomplete cover), possible problems related to reporting affiliations, the possibility to search articles by the first author only and lack of the clear article classification which could provide additional information. Furthermore, the classification of articles into any group is likely to be another source of bias, as sometimes it is not clear whether an article should be treated as clinical or public health, thus making this part of the analysis somewhat less precise. Nevertheless, the current study provides a starting point for further research of the scientific productivity, which is needed for any further evaluation as a starting point. Efforts should be made in order to increase the scientific output of the Mostar biomedical institutions.

REFERENCES

- PETROVEČKI M, PAAR V, PRIMORAC D, *Croat Med J*, 47 (2006) 809. — 2. POLAŠEK O, PETROVEČKI M, PRIMORAC D, PETROVEČKI M, *Društvena Istraživanja*, 16 (2007) 1127. — 3. PETRAK J, BOZIKOV J, *Croat Med J*, 44 (2003) 681. — 4. PULJAK L, VUKOJEVIĆ K, LOVRIĆ KOJUNDŽIĆ S, SAPUNAR D, *Croat Med J*, 49 (2008) 164. — 5. KOLČIĆ I, POLAŠEK O, MIHALJ H, GOMBAC E, KRALJEVIĆ V, KRALJEVIĆ I, KRAKAR G, *Croat Med J*, 46 (2005) 88. — 6. POLAŠEK O, KOLČIĆ I, *BMJ*, 331 (2005) 1204. — 7. PETROVEČKI M, SMILJANIĆ L, TROŠELJ M, POLAŠEK O, *Croat Med J*, 49 (2008) 91. — 8. SIMUNOVIĆ VJ, SONNTAG HG, HREN D, DØRUP J, KRIVOKUČA Z, BOKONJIĆ D, VERHAAREN H, HORSCH A, MIMICA M, VOJNIKOVIĆ B, SELESKOVIĆ H, MARZ R, MARUŠIĆ A, MARUŠIĆ M, *Med Educ*, 40 (2006) 1162. — 9. POLAŠEK O, KOLČIĆ I, BUNETA Z, CIKES N, PEĆINA M, *Croat Med J*, 47 (2006) 776. — 10. POLAŠEK O, *Eur J Epidemiol*, 21 (2006) 61. — 11. LANE R, *J Pediatr*, 152 (2008) 296. — 12. HASPEL RL, ORLINICK JR, *JAMA*, 295 (2006) 623. — 13. HOLCOMBE RF, *Acad Med*, 80 (2005) 905. — 14. BYRNE E, *Intern Med J*, 34 (2004) 75. — 15. RUDAN P, SUJOLDŽIĆ A, ŠKARIĆ-JURIĆ T, KOLČIĆ I, POLAŠEK O, RUDAN I, *Coll Antropol*, 29 (2005) 1. — 16. MEDICAL SCHOOL UNIVERSITY OF MOSTAR, Postgraduate PhD course offered. Available from: URL: <http://www.mefmo.ba/images/dokumenti/doktorski/natjecaj.pdf>, accessed 20.05.2009.

Lj. Ostojić

*Faculty of Medicine, University of Mostar, Bijeli brijeg bb, 88 000 Mostar, Bosnia and Herzegovina
e-mail: ljerka.ostojic@sve-mo.ba*

ZNANSTVENA PRODUKTIVNOST IZ PODRUČJA BIOMEDICINE NA MEDICINSKOM FAKULTETU SVEUČILIŠTA U MOSTARU I KLINIČKOJ BOLNICI U MOSTARU TIJEKOM 1999–2008. GODINE

S A Ž E T A K

Cilj ovog rada bio je istražiti znanstvenu produktivnost na Medicinskom fakultetu Sveučilišta u Mostaru i kliničkoj bolnici u Mostaru tijekom 1999–2008. godine. Korišteni su članci koji su bili indeksirani u PubMed-u, koji su pretraživani korištenjem ključne riječi Mostar. Tijekom 1999.–2008. godine zabilježeno je ukupno 76 članaka, s ukupno 366 ko-autorstava. Među svim koautorima bilo je 228 autora, od kojih je 161 (70,6%) objavio samo jedan članak. Prosječan broj koautora bio je 4,6 po članku. Zabilježen je i snažan linearni trend porasta broja objavljenih članaka. Najveći broj objavljenih članaka bio je iz područja kliničke medicine, a najmanji iz temeljnih medicinskih znanosti, što je ukazivalo na potrebu povećanja znanstvene produktivnosti u temeljnim medicinskim znanostima. Veliki postotak autora koji su objavili samo jedan članak ukazivao je na nesustavnu i gotovo sporadičnu prirodu objavljivanja znanstvenih članaka. Moguća poboljšanja ovog stanja uključuju pokretanje doktorskog poslijediplomskog studija kao i nekoliko drugih načina koji bi se mogli primijeniti s ciljem povećanja znanstvene produktivnosti u temeljnim, kliničkim i javnozdravstvenim strukama unutar medicine.