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PRACA ORYGINALNA
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Scientific output of professors and doctors habilitatus from Medical University of Silesia in Katowice – School of Medicine with Division of Dentistry in Zabrze

Dorobek naukowy profesorów i doktorów habilitowanych Wydziału Lekarskiego z Oddziałem Lekarsko-Dentystycznym w Zabrzu Śląskiego Uniwersytetu Medycznego w Katowicach

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ABSTRACT

AIM: The purpose of the study was to present the scientific output of professors and doctors habilitatus and to assess the factors influencing scientific output.

MATERIAL AND METHODS: The data of scientific output (full text papers from the Web of Science and Scopus) of scientists were presented.

RESULTS: The mean scientist's age was 55.7 ± 7.2 yrs, the mean age of receiving PhD 32.7 ± 3.2 yrs, the age of obtaining habilitation degree 45.8 ± 5.6 yrs, the age of attaining professorship 51.2 ± 5.9 yrs, the interval from PhD to habilitation 13.1 ± 4.9 yrs, the interval from habilitation to professorship 7.7 ± 2.7 yrs, the total number of publications 144.6 ± 124.2, the number of publications with an Impact Factor 33.8 ± 31.3, the total value of Impact Factor 61.7 ± 73.2, the citation index 387 ± 531 and index h 8.6 ± 5.3 according to the Web of Science, the citation index 513 ± 756 and index h 9.6 ± 6.0, according to Scopus, the citation index 411 ± 601 and index h 8.6 ± 5.2, according to Scopus without citations of all co-authors.

In a correlation analysis, a lower age of habilitation (r ranged -0.29 to -0.36, $p < 0.01$) and of professorship (r ranged -0.31 to -0.42, $p < 0.05$) improved the scientific output. Shorter intervals from PhD to habilitation and from habilitation to professorship improved the scientific output as well (r ranged -0.25 to -0.34, $p < 0.01$, r ranged -0.41 to -0.53, $p < 0.01$, respectively).

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CONCLUSION: Scientific output increases with a lower age of habilitation and shorter intervals between PhD and habilitation and habilitation and professorship. The current results should help modify scientific politics supporting the total research impact of the whole division.

KEY WORDS
citation index, index h, scientific output, Scopus, Web of Science

STRESZCZENIE

CEL PRACY: Celem pracy było przedstawienie dorobku naukowego profesorów i doktorów habilitowanych oraz czynników wpływajacych na wielkość Wydziału Lekarskiego z Oddziałem Lekarsko-Dentystycznym w Zabrzu Śląskiego Uniwersytetu Medycznego w Katowicach.
MATERIAŁ I METODY: Dane dotyczące dorobku naukowego dla publikacji pełnotekstowych zostały zebrane z baz Web of Science i Scopus.
WYNIKI: Uzyskano następujące średnie wartości: wiek badanych naukowców 55,7 ± 7,2 lat, wiek uzyskania stopnia doktora 32,7 ± 3,2 lat, wiek uzyskania stopnia doktora habilitowanego 45,8 ± 5,6 lat, wiek uzyskania tytułu profesora 51,2 ± 5,9 lat, czas od doktoratu do habilitacji 13,1 ± 4,9 lat, czas od habilitacji do profesury 7,7 ± 2,7 lat, całkowita liczba publikacji 144,6 ± 124,2, liczba publikacji z Impact Factor 33,8 ± 31,3, całkowita wartość Impact Factor 61,7 ± 73,2, indeks cytacji 387 ± 531 i indeks h 8,6 ± 5,3 wg bazy Web of Science, indeks cytacji 513 ± 756 i indeks h 9,6 ± 6,0 wg bazy Scopus oraz indeks cytacji 411 ± 601 i indeks h 8,6 ± 5,2 wg bazy Scopus po wykluczeniu autocytacji i cytacji współautorów.
Analiza korelacji wykazała, że niższy wiek uzyskania habilitacji (r od -0,29 do -0,36; $p < 0,01$) i profesury (r od -0,31 do -0,42, $p < 0,05$) pozytywnie wpływał na wielkość dorobku naukowego. Krótszy czas od doktoratu do habilitacji (r od -0,25 to -0,34, $p < 0,01$) oraz od habilitacji do profesury (r od -0,41 to -0,53, $p < 0,01$) również pozytywnie wpływał na wybrane parametry oceniające dorobek naukowy.
WNIOSKI: Na dorobek naukowy pozytywnie wpływa niższy wiek uzyskania habilitacji i profesury, a także krótszy czas od doktoratu do habilitacji oraz czas od habilitacji do profesury. Uzyskane wyniki mogą być przydatne w celu modyfikacji polityki rozwoju naukowego kadry, zwiększając dorobek naukowy jednostek naukowych.

SŁOWA KLUCZOWE
dorobek naukowy, indeks cytacji, indeks h, Scopus, Web of Science

INTRODUCTION

The mission of all universities comprises research and teaching of students. Possibly the highest levels in both areas are crucial criteria for the external assessment of ranking of any university. The achieved success in research may easily be established, using commonly available databases, the Web of Science and Scopus being most often used. These databases enable finding complex information, regarding individual scientific outputs, including: the total number of publications, the number of publications with an Impact Factor, the total value of Impact Factor, the citation index and index h. Index h has become one the most important methods for evaluating individual scientific quantitative/qualitative outputs in the last decade (1–10), being compared with other bibliometric tools, used to assess research performance.
The aim of the study was to present the scientific output of professors and doctors habilitatus from the School of Medicine with the Division of Dentistry in Zabrze, Medical University of Silesia, Katowice, Poland. We also tried to identify certain factors which influence the scientific output. Such data may help improve general and detailed planning of the scientific development of individual researchers, as well as of the whole University.

METHODS

The scientific output of individual scientists was derived from open databases: the Web of Sciences and Scopus in October 2015. Only full text papers were included. Other personal data, concerning the age, the age at achieving PhD, habilitation and professorship were found in the database of the Medical University of Silesia, Katowice (www.sum.edu.pl). The significance of the following factors were analysed: calendar (current) age, the age of obtaining PhD, the age of attaining habilitation ("doctor habilitatus"), the age of achieving professorship, the period from PhD to habilitation and from habilitation to pro-

fessorship. The term "doctor habilitatus" was used because in Poland and some other European countries this definition is present in daily university practice.

STATISTICS

All the calculations were done by means of the Statistica program (StatSoft, Tulsa, OK, USA). Descriptive statistics are presented as mean values, standard deviations and value ranges. A correlation analysis was done by Spearman's correlation test. Significance was assumed at $p < 0.05$.

RESULTS

Data were collected for 110 university scholars and scientists, including 55 professors and 55 doctors habilitatus. The mean scientist's age was 55.7 ± 7.2 yrs, the mean age of receiving PhD: 32.7 ± 3.2 yrs, the age of obtaining habilitation: 45.8 ± 5.6 yrs, the age of attaining professorship: 51.2 ± 5.9 yrs, the interval from PhD to habilitation: 13.1 ± 4.9 yrs, the interval from habilitation to professorship: 7.7 ± 2.7 yrs.

The scientific output data are presented in Table 1 (mean, SD, minimum and maximum). For important variables, e.g., the citation index and index h, we collected the number of researchers with a citation index of at least 500 and 1000 citations, as well as with an index h of 10 and 20, according to the Web of Science. Twenty-six subjects had at least 500 (23.6%), and 10 exceeded 1000 (9.1%) citations. Regarding index h, 38 subjects had 10 or more (34.5%), and only four exceeded 20 (3.6%). However, a relatively big part of our group had weaker achievements; 31 (28.2%) had less than 100 citations and 17 subjects (15.4%) had an index h lower than five.

Table 2 shows the results of the correlation analysis. The current age and the age of achieving PhD did not influence the above-mentioned parameters (data not shown), while the younger age of receiving habilitation and the younger age of obtaining professorship, as well as shorter intervals from PhD to habilitation and from habilitation to professorship were associated with significantly better scientific outputs.

All the performed correlation analyses showed a negative (i.e. profitable) relationship with the scientific output parameters, while comparisons among them did not reveal any differences in statistical power. The citation index according to the Web of Science was significantly correlated with the number of publications ($r = 0.48$, $p < 0.0001$), total number of papers with IF ($r = 0.72$, $p < 0.0001$) and total IF ($r = 0.73$, $p < 0.0001$).

We have also calculated the scientific output of the 10-percent group of leaders (11 researchers) and of the 10-percent group of subjects with the least research activity (11 researchers), expressing it as the percent of the total (i.e., obtained by the whole Faculty) bibliometric parameters: the number of publications, the number of publications with IF, the citation index according to the Web of Science and the citation index without autocitation according to Scopus. These data are presented in Table 3. The top 10% of the University scientists have published approximately 30% of all the papers, published by the Faculty members, and their citation index numbers have achieved almost a half of the total citation index value for the whole Faculty.

DISCUSSION

In the current study, we present the data of the scientific output of one whole division at the Medical University. It is difficult to assess the size of the output for the whole population of researchers, representing all medical schools in Poland. For logistic reasons, it was possible only for our Faculty because adequate data for other medical universities in Poland were not available to the authors. However, some comments should be made regarding the issue.

We noted a fairly broad range between the smallest and highest counts for several data. For example, the lowest number of publications was 19 and the highest 941 or the citation index values varied from 3 to 3281. However, the mean results seems to be more promising. Another valuable observation was provided by comparisons of the scientific outputs between the 10-percent group of leaders and the 10-percent group of scientists with the lowest publication activity (see Table 3). A significant part, i.e., almost half of the total output in regard to the citation index, was achieved by the scientific leaders. Such an observation may suggest that the research units with these scientists deserve better support, being clearly important for the university's total output. From another point of view, such a division of total scientific output indicates that without the leaders' scientific output, the mean individual contribution is much smaller than the simple mean value.

We consider that the most important results were provided by correlation analyses. One might suspect that scientific output should increase with age but our results do not confirm such a thesis. Crucial factors, significantly and positively influencing the scientific output, included a younger age of achieving habilita-

tion, a younger age of attaining professorship, as well as shorter intervals from PhD to habilitation and from habilitation to professorship. Such observations prompt the necessity of active scientific work by young individuals and may easily be considered in the politics of universities. It seems obvious that the young age is the most efficient period in many fields but the current data support this thesis for science as well.

Concluding, scientific output increases with a lower age of habilitation, as well with shorter intervals from PhD to habilitation and from habilitation to professorship.

Table I. Scientific output, n = 110 (mean, SD, minimum, maximum)
Tabela I. Dorobek naukowy, średnia, oddychanie standardowe, minimum, maksimum

Variable	Mean, SD	Minimum	Maximum
Total number of papers	144.6 ± 124.2	19	941
Number of papers with IF	33.8 ± 31.3	2	228
Total IF	61.7 ± 73.2	2.5	454.89
Citation index according to Web of Science	387 ± 531	3	3282
Index h according to Web of Science	8.6 ± 5.3	1	30
Citation index according to Scopus	514 ± 736	6	5182
Index h according to Scopus	9.6 ± 6.0	1	33
Citation index according to Scopus without citations of all co-authors	411 ± 601	6	4309
Index h according to Scopus without citations of all co-authors	8.6 ± 5.2	1	26

Table II. Results of correlation analysis (coefficient of correlation, p)
Tabela II. Wyniki analizy korelacji (współczynnik korelacji, p)

Parameter	Age of habilitation n = 110	Age of professorship n = 55	Interval from PhD to habilitation n = 110	Interval from habilitation to professorship n = 55
Total number of papers	-0.31, < 0.001	-0.31, < 0.05	-0.33, < 0.001	-0.41, < 0.01
Number of papers with IF	-0.32, < 0.001	-0.42, < 0.01	-0.34, < 0.001	-0.53, < 0.0001
Total IF	-0.29, < 0.01	-0.33, < 0.05	-0.32, < 0.001	-0.52, < 0.0001
Citation index according to Web of Science	-0.31, < 0.001	-0.33, < 0.05	-0.25, < 0.01	-0.47, < 0.001
Index h according to Web of Science	-0.34, < 0.001	-0.37, < 0.01	-0.28, < 0.01	-0.47, < 0.001
Citation index according to Scopus	-0.32, < 0.001	-0.34, < 0.05	-0.28, < 0.01	-0.48, < 0.001
Index h according to Scopus	-0.36, < 0.001	-0.38, < 0.01	-0.33, < 0.001	-0.48, < 0.001
Citation index according to Scopus without citations of all co-authors	-0.3, < 0.01	-0.31, < 0.05	-0.26, < 0.01	-0.46, < 0.001
Index h according to Scopus without citations of all co-authors	-0.33, < 0.001	-0.35, < 0.01	-0.3, < 0.01	-0.45, < 0.001

Table III. Output for top 10% (11 scientists) and 10% (11 scientists) with lowest output expressed as percentage of Faculty total yield
Tabela III. Dorobek naukowy 10% najlepszych i 10% najsłabszych osób wyrażony w procentach w odniesieniu do dorobku całego wydziału

Parameter	10% of top scientists (n = 11), percent	10% scientists with lowest output (n = 11), percent
Total number of papers	28.43	2.85
Number of papers with IF	30.82	1.67
Citation index according to Web of Science	43.86	0.63
Citation index according to Scopus	46.47	0.62
Citation index according to Scopus without citations of all co-authors	45.85	0.54

Author's contribution

Study designe – W. Pluskiewicz, B. Drozdzowska
Data collection – R. Kuźniewicz
Data interpretation – W. Pluskiewicz, P. Adamczyk
Statistical analysis – P. Adamczyk
Manuscript preparation – W. Pluskiewicz, B. Drozdzowska, P. Adamczyk
Literature research – W. Pluskiewicz

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