

Profile and scientific output of researchers recipients of CNPq productivity grant in the field of medicine

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SUMMARY

BACKGROUND. This study aimed to evaluate the scientific production of researchers in the field of Medicine who receive a productivity grant from the CNPq.

METHODS: The curriculum Lattes of 542 researchers with active grants from 2012 to 2014 were included in the analysis. Grants categories/levels were stratified into three groups according to the CNPq database (1A-B, 1C-D, and 2).

RESULTS. There was a predominance of grants in category 2. During their academic career, Medicine researchers published 76512 articles, with a median of 119 articles per researcher (IQ, interquartile range, 77 to 174). Among the 76512 articles, 36584 (47.8%) were indexed in the Web of Science (WoS database). Researchers in Medicine were cited 643159 times in the WoS database, with a median of 754 citations (IQ, 356 to 1447). There were significant differences among the categories of grants concerning the number of citations in WoS ($P < 0.001$). There was a significant difference in the number of times researchers were cited according to the specialty included in Medicine area. ($P < 0.001$).

CONCLUSION. Strategies to improve the scientific output qualitatively possibly can be enhanced by the knowledge of the profile of researchers in the field of Medicine.

KEYWORDS: Research Personnel. Work Performance. Medicine.

INTRODUCTION

Many evaluations of tenure promotions and grants take into account appraising metrics in order to assess the performance of individual scientists and eventually rank those researchers². Thanks in part to the easier access to interdisciplinary publication and citation databases (such as Web of Science and

Scopus), quantitative measuring of the performance of researchers has become even more prevalent, controversial, and influential²⁻⁶.

Every organization that funds research wants to support science that makes a difference for the community. Therefore, quantifying the performance of

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individual scholars, departments, and institutions has become an essential part of decision-making in research policy, funding allocations, awarding of grants, faculty hiring, and claims for promotion^{7,8}. In this context, the rationale of performance evaluation is that scientific budget should flow to individuals and institutions with a qualitatively high scientific output. Nevertheless, there is a difficulty in using measurements to evaluate research since there is no simple formula for identifying truly important research. It is clear that a fair and reliable quantification of the 'level of excellence' of individual scientists is a challenging task⁹⁻¹¹. Thus, to measure the performance of a researcher using objective tools has become one of the major challenges in science. Evaluating individual research performance is a complex task that ideally examines productivity, scientific impact, and research quality¹². At present, the impact of scientific work is traditionally measured by the balance between the number of papers and the number of times that these publications are cited¹³⁻¹⁶. However, the evaluation system that has been built upon bibliometric indices is very complex and its results are often inconsistent¹⁷⁻¹⁹.

In Brazil, the National Council for Scientific and Technological Development (CNPq) was created in 1951 and, since then, it has been the most important Brazilian agency supporting science and technology²⁰. The scientific divisions of this entity are categorized into nine major areas subdivided into several subareas of knowledge. Medicine is one of these major areas and is subdivided into diverse subareas of specialization²¹. In the 1970s, the research productivity grant was implemented as a stimulus to researchers with notable scientific contributions in their respective areas²². The area of Medicine had 542 researchers (3.8%) among 14,077 productivity grants in 2014. In order to apply for a grant as a CNPq investigator in Medicine, researchers must fulfill some requirements, and they are ranked according to the criteria established by CNPq. According to the Advisory Committee of CNPq, the criteria for the selection and classification of researchers in Medicine include, among several indicators, scientific production, training of human resources, and contribution to innovation²³. Therefore, in order to be classified as a CNPq investigator in Medicine, the researcher must meet the following minimum requirements over the previous decade: a) to have published at least 20 papers in scientific journals with IF greater than

or equal to 1; b) to have completed the orientation of at least one Ph.D.; and c) to have a defined line of research and a present research project of scientific merit, covering the area of medicine. These researchers are currently classified into two main categories (1 and 2). Category 1 was subdivided into four levels: 1A, 1B, 1C, and 1D, and the first level of category 1 is attributed only to researchers with outstanding scientific productivity²⁴.

Several studies have examined the profile and the scientific production of CNPq researchers in various areas of knowledge, including pharmacy²⁰, chemistry²², computer science²⁴, neurosciences^{25,26}, cardiology²⁷, nephrology^{28,29} and clinical medicine^{30,31}. However, there is a deficiency of studies concerning the entire area of Medicine with its diverse subareas and specialties. In this regard, the present study aims to describe the profile and the scientific production of recipients of CNPq research productivity grants in Medicine. In addition, we evaluated the ability of the Assessor Committee in Medicine to rank researchers that stand out among their peers as a result of the scientific-technical production developed.

METHODS

Participants

This was a cross-sectional study conducted on 542 investigators registered as recipients of CNPq research productivity grants in Medicine according to a list provided by the agency in February 2013.

Data collection

For this investigation, we used the list of researchers in Medicine from CNPq, with active research productivity grants during the triennium 2012-2014. Using the openly available Lattes curriculum in the CNPq Lattes Platform (<http://lattes.cnpq.br/>) we elaborated a database with information on each researcher in terms of geographic distribution, institution, time since obtaining the Ph.D., scientific production (published papers), and training of human resources (supervision of undergraduate, master and Ph.D. students). For this data collection, we considered all papers and all student tutoring during the scientific career span of the researcher. We also analyzed the same content for the last five years, considering the period 2008-2012.

Additionally, we searched the database of Web of Science, Thomson Reuters (WoS) at <http://apps>.

isiknowledge.com/. The database was consulted through the CAPES website (<http://novo.periodicos.capes.gov.br/>). This database was surveyed with the aim to get the number of times the researchers were cited. The main problem in processing our data was to properly identify authors since the same author can provide his/her name or can be registered in diverse ways⁹⁻¹⁰. Therefore, the scientific name of the researcher primarily used in this investigation was that provided in the Lattes curriculum. Furthermore, there was an intense search for possible variations of researchers' names. Additionally, data were checked with the following filters available on the WoS database: (i) institution; (ii) subject area; (iii) year of publication, and (iv) source titles. We also used the filter called "Document type" and we excluded from the analysis abstracts presented at meetings.

Area of knowledge and medical specialties

For this variable, we considered the expertise area specifically assigned by the investigator in the Lattes curriculum. When this information was missing, we analyzed the researchers' scientific production over the past five years and allocated them to the area of knowledge in which there was a predominance of issues published.

Variables of interest

The following variables, divided into three categories, were analyzed: (1) Demographic variables, including gender and regional distribution; (2) Background information, including affiliation, post-graduate features, and time since obtaining the Ph.D., and (3) Scientific productivity, including mentoring undergraduate, master's, and Ph.D. students, number of articles, and number of papers indexed in the WoS databases. Concerning publications and student supervision, we analyzed all production during the entire scientific career as well as in the last five-year period. Regarding both student supervision and scientific publications, all data were adjusted per time after the researcher's Ph.D., i.e., the average of production and citation per year. Research performance indicators were also included in the analysis: adjusted number of citations, and the number of citations *per paper*^{15,32-34}. Research productivity grants categories/levels were classified in the CNPq database as two main categories (1 and 2), with four levels in category 1 (1A, 1B, 1C and 1D).

These categories/levels were taken into account for analysis purposes.

Statistical analysis

The SPSS (*Statistical Package for Social Science for Windows, Inc., USA*) version 18.0 for Windows was used to create the database and to perform the statistical analysis. Continuous data were reported as medians and interquartile range (IQ) or means and standard deviation (SD), when appropriate. The non-parametric Mann-Whitney and Kruskal-Wallis (KW) tests were used for comparison of medians and ANOVA was used for comparison of means among groups. Dichotomous or nominal variables were compared using the chi-square test.

RESULTS

The demographic characteristics and the area of knowledge of the researchers are summarized in Table 1. There was an overall predominance of males (63.5%) and grants in category 2 (54.1%). There was a significant difference in the distribution of categories between genders. Among males, 52% had grants in categories 1 (1A-1D), while only 36% of females were included in these categories ($P < 0.001$). Five states of the Federation were responsible for approximately 90% of the researchers, and the State of São Paulo accounted for about 60% of them. Six institutions were responsible for approximately 70% of researchers, with a prominence of USP with about a third of them. Regarding Ph.D., most of the researchers ($n=504$, 93%) obtained the degree in Brazil and 38 (7%) in institutions abroad. The main institution from which the researchers obtained their Ph.D. was USP (35%). Indeed, six universities accounted for about 80% of the Ph.D. (USP, UNIFESP, UFRGS, UNICAMP, UFRJ, and UFMG).

A total of 35 areas of research were identified with a large dispersion of investigators among the several areas of interest. As shown in Table 1, the five areas of research more frequently assigned as the main area of interest of the researchers include about 45% of the total of the investigators.

The overall median time since receiving the doctoral degree was of 18 years (Interquartile range, 13 – 24 years). Female researchers had a median of 17 years of Ph.D. time (13 – 21), while males had a median of 18.5 (13 – 25) ($P=0.013$). The majority of the researchers (56.3%) had post-doctoral training, predominantly at USA institutions

TABLE 1. DEMOGRAPHIC, BACKGROUND, AND POST-GRADUATE FEATURES OF CNPQ RESEARCHERS IN CLINICAL MEDICINE (N = 542)

Gender	n (%)	Area of knowledge (cont.)	n (%)
Male	344 (63.5)	Ophthalmology	15 (2.8)
Female	198 (36.5)	Immunology	15 (2.8)
Scholarship categories		Gastroenterology/Hepatology	14 (2.6)
1A	60 (11.1)	Rheumatology	13 (2.4)
1B	52 (9.6)	Genetics/Molecular Biology	13 (2.4)
1C	50 (9.2)	Others	69 (12.7)
1D	87 (16.1)	Doctorate country*	
2	293 (54.1)	Brazil	502 (92.3)
Federation State		United Kingdom	12 (2.2)
SP	318 (58.7)	Germany	10 (1.8)
RS	62 (11.4)	Canada	6 (0.9)
RJ	55 (10.1)	Japan	3 (0.6)
MG	36 (6.6)	Netherlands	3 (0.6)
BA	19 (3.5)	Others	4 (0.8)
Others	52 (9.6)	Doctorate Institution*	
Researcher Institution		USP	191 (35.2)
USP	164 (30.3)	UNIFESP	103 (19.0)
UNIFESP	72 (13.3)	UFRGS	49 (9.0)
UFRGS	44 (8.1)	UNICAMP	37 (6.8)
UNICAMP	41 (7.6)	UFRJ	35 (6.5)
UFMG	32 (5.9)	UFMG	27 (5.0)
UFRJ	30 (5.5)	Others	100 (18.1)
Others	159 (29.3)	Time since Doctorate (years)	
Area of knowledge		Median (IQ range)	18 (13 – 24)
Psychiatry/Neurosciences	73 (13.5)	Post Doctorate	
Cardiology	47 (8.7)	Yes	305 (56.3)
Gynecology/Obstetrics	44 (8.1)	No	237 (43.7)
Endocrinology	39 (7.2)	Post Doctorate country	
Pathology	37 (6.8)	USA	144 (47.2)
Pediatrics	33 (6.1)	Brazil	55 (18.0)
Nephrology/Urology	33 (6.1)	United Kingdom	34 (11.1)
Infectious Diseases	27 (5.0)	Canada	19 (6.2)
Hematology/Oncology	26 (4.8)	France	16 (5.2)
Medicine/Intensive Medicine	24 (4.4)	Others	37 (12.1)
Pneumology	20 (3.7)	*Two researchers without a doctorate	

Scientific productivity: human resource training

During their scientific career, CNPq researchers in Medicine have trained 7336 undergraduate research fellows (a program known as scientific initiation at Brazilian universities), with a median of 8 (IQ, 3 – 18) per investigator, 6962 master's students (median of 10, IQ = 5 - 18), and 4962 Ph.D. students (median of 7, IQ = 3 - 13). Table 2 shows the absolute and adjusted (per year of Ph.D.) values considering the mentorship stratified by the grant categories. Concerning the absolute and adjusted values, there was a significant difference among grant categories

regarding the number of masters and Ph.D. students, but not regarding undergraduate students (Table 2).

Scientific output: publications

During the entire period of their academic career, CNPq medicine researchers published 76512 articles, with a median of 119 articles *per* researcher (IQ, 77 to 174), ranging from 8 to 992 articles.

There was a significant difference of the median number of publications among the grant categories considering both the absolute and the adjusted number of articles (total of articles, in the last 5 years,

TABLE 2. MENTORING AND SCIENTIFIC PUBLICATION BY CNPQ RESEARCHERS IN MEDICINE ACCORDING TO THE SCHOLARSHIP CATEGORIES (N = 542)

Variables	1A – 1B n = 114	1C-1D n = 136	Level 2 n = 292	p-value*
Undergraduates				
Median (IQ range)	12.5 (3.0 – 26.0)	9.0 (3.0 – 17.0)	7.0 (2.0 – 17.0)	0.03
Undergraduates/year				
Median (IQ range)	0.54 (0.15 – 1.2)	0.48 (0.16 – 1.0)	0.5 (0.16 – 1.0)	0.63
Master degree				
Median (IQ range)	16.5 (9.2 – 17.7)	10.0 (7.0 – 17.7)	3.2 (8.0 – 14.8)	<0.001
Master degree/year				
Median (IQ range)	0.73 (0.42 – 1.2)	0.61 (0.3 – 0.91)	0.57 (0.3 – 0.8)	0.01
Doctorate				
Median (IQ range)	17.0 (10.0 – 23.8)	9.0 (5.0 – 12.0)	4.0 (1.0 – 8.0)	<0.001
Doctorate/year				
Median (IQ range)	0.73 (0.54 – 0.94)	0.43 (0.3 – 0.63)	0.26 (0.12 – 0.4)	<0.001
Mentorship total				
Median (IQ range)	53.5 (36.0 – 75.0)	30.5 (21.0 – 44.8)	21.5 (11.0 – 39.0)	<0.001
Mentorship total/year				
Median (IQ range)	2.3 (1.5 – 3.4)	1.6 (1.2 – 2.4)	1.5 (0.83 – 2.3)	<0.001
Total articles				
Median (IQ range)	193 (155 – 282)	129 (101 – 176)	88 (60 – 126)	<0.001
Total articles/year				
Median (IQ range)	9.4 (6.5 – 12.2)	6.9 (5.3 – 9.4)	5.8 (4.0 – 7.9)	<0.001
Total articles WoS				
Median (IQ range)	108 (87 – 148)	66 (51 – 86)	33 (25 – 49)	<0.001
Total articles WoS/year				
Median (IQ range)	4.7 (3.5 – 7.0)	3.6 (2.4 – 5.2)	2.2 (1.5 – 3.3)	<0.001
Articles last 5 years				
Median (IQ range)	70 (49 - 105)	50 (34 – 66)	36 (26 – 50)	<0.001
Articles last 5 years WoS				
Median (IQ range)	36.5 (26 - 55)	26 (18 – 32)	14 (10 – 21)	<0.001
Increment of Scientific Output (%)				
Median (IQ range)	63.7 (28 – 108)	41.0 (12 – 64)	25.4 (3 – 63)	<0.001

and articles indexed on WoS). There was also a significant difference among grant categories in relation to the increase of scientific publication (Table 2).

During the last five years, the total of articles was 29618 with a median of 44 *per* researcher (IQ, 29 – 63), ranging from 7 to 546. Among the 76512 articles, 36584 (47.8%) were indexed in the WoS database (median *per* researcher of 53, IQ, 32 - 85). Considering the average number of articles published annually, the majority of researchers (438, 81%) increased their scientific output over the past five years. This increase ranged from 2% to 326% with a median increment of 49.8% in overall scientific production (IQ, 23 to 79).

Regarding the areas of knowledge, there was a significant difference in the increment of the scientific output in the last 5 years ($F = 2.6$, $P < 0.001$). The area of knowledge with the greatest mean percentage

of increment was Immunology ($64.9\% \pm 42$), followed by Endocrinology ($57.5\% \pm 42.0$), Hematology/Oncology ($54.7\% \pm 52$), Neurosciences/Psychiatry ($50.3\% \pm 51$), Pneumology ($46.8\% \pm 51$), Surgery ($43.8\% \pm 61$), Pediatrics ($43.3\% \pm 51$), and Nephrology/Urology ($42.5\% \pm 51$). Figure 1 illustrates the increment of scientific output by comparing the mean number of papers/years in the last five years and in the whole scientific career among the researchers in the diverse areas of knowledge.

Scientific production: citations

During their academic career, CNPq researchers in Medicine received 643159 citations in the WoS database, with a median of 754 citations *per* researcher (IQ, 356 to 1447, ranging from 29 to 12741). The median number of citations *per* article was 13.9 (IQ, 9.5 – 17.5). There were significant differences among the

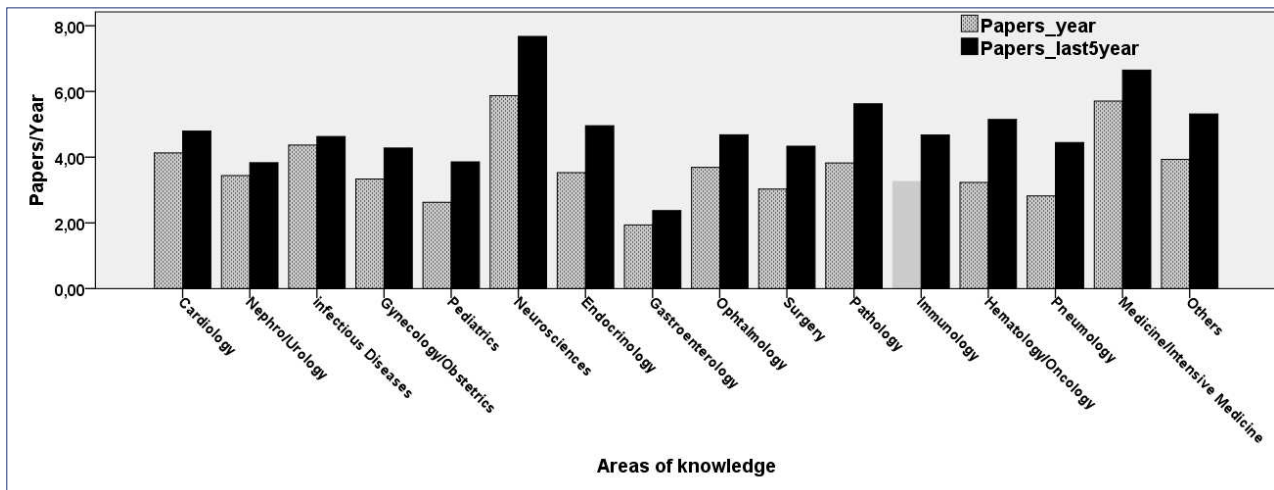


FIGURE 1

grant categories considering the number of citations in WoS (KW = 218.5, $P < 0.001$). CNPq researchers of level 1A-B had a median of 1664 citations (IQ, 1129 – 2292); level 1C-D, 992 citations (IQ, 730 – 1645); and level 2, 425 citations (232 – 752). The difference remained significant even after the adjustment for the time of obtaining the Ph.D. The mean number of citations per year was 105 (SD, 89), 78.4 (SD, 60), and 47 (SD, 83) for levels 1A-B, 1C-D, and 2, respectively ($P < 0.001$). The mean of citations per article was 18 (SD, 9.8) for level 1A-B, 19.6 (SD, 13.4) for level 1C-D, and 15.7 (SD, 14.5) for level 2. There was also a significant difference among grant levels regarding the mean citation per article ($P = 0.016$). Interestingly, there was a moderate positive correlation between the number of papers published in journals indexed on WoS and the number of citations received by the researchers ($r = 0.66$, $P < 0.001$).

Considering the several areas of knowledge, there was a significant difference in the mean of citations per paper received by the CNPq researchers ($F = 5.4$, $P < 0.001$). The area of knowledge with the greatest mean of citations per paper was Cardiology (29.5 ± 29.1), followed by Immunology (22.7 ± 16.9), Pneumology (21.7 ± 13.0), Infectious Diseases (20.3 ± 11.2), Neurosciences/Psychiatry (19.7 ± 12.5), Nephrology/Urology (18.6 ± 13.2), Medicine/Intensive Medicine (16.6 ± 6.5), Hematology/Oncology (16.2 ± 8.8), and Endocrinology (15.9 ± 8.0).

DISCUSSION

A relevant finding that emerges from our cross-sectional study on CNPq researchers in the

field of Medicine is the concentration of scientific output in a few Brazilian states. Five of them account for approximately 90% of the researchers, and a single state (São Paulo) for remarkably 60% of the CNPq researchers in Medicine. Notably, this figure is even disproportionately higher than the participation of the State of São Paulo in the Brazilian Gross Domestic Product (GDP), which is about 32%³⁵. The findings of this study also show that two institutions in the state of São Paulo (USP and UNIFESP) were responsible for the Ph.D. of about 54% of the researchers. This fact can contribute partly to the concentration of the CNPq researchers in the Southeast region of Brazil³⁶. It is important to highlight that only six researchers with a grant in Medicine (1.1%) were from the North and Midwest regions of Brazil, which reinforces the heterogeneous spatial distribution in the country. This finding should subsidize specific government actions to address such regional differences³⁷.

Our analysis showed that CNPq male researchers have proportionally more grants in category 1 than female researchers. We believe that even though males had a longer Ph.D. time than females, the relatively small difference of 1.5 years cannot explain the imbalance in the grant categories. Concerning the gender disparities in science, Larivière et al.³⁸ have recently presented a bibliometric analysis confirming that gender inequalities persist in research output worldwide. Moreover, although there are more female than male undergraduate and graduate students in many countries, there are relatively few female full professors, and gender inequalities in hiring, earnings, funding, satisfaction, and patenting persist. As expected, in Brazil the state of affairs is

quite similar, and women are in lower proportion in the higher positions of the academic career, that is, those positions associated with higher income and higher academic prestige³⁹.

Another point to be emphasized in our study is the assessment of the scientific output by CNPq researchers in Medicine in quantitative and qualitative terms through the analysis of bibliometric indicators. From the quantitative point of the view, our study showed an important scientific output with an expressive number of publications of scientific articles in periodicals indexed at the WoS database. Among the 76512 articles published by the Medicine CNPq researchers, 36584 (47.8%) were indexed in the WoS database. Another point to be emphasized is the increment of the scientific output over the last 5 years, a fact that has also been observed in other areas of knowledge^{29-31,40}. CNPq researchers in Medicine had an increase of about 50% in the number of published articles, in comparison to the annual output across the career over the last 5 years. This quantitative increment in scientific production correlates with the general increase in scientific production in Brazil, and possibly reflects the various fostering mechanisms implemented by the various national research support agencies^{27,28,41-45}. Unfortunately, the current economic crisis has already resulted in cuts to federal and state science funding. This will probably impair Brazilian research and possibly hamper the scientific output increment over the next years⁴⁶.

Another point assessed in our study was the impact of scientific publications by CNPq researchers in Medicine through the analysis of the number of citations. The most widespread method for judging the impact of biomedical articles is citation count, which is the number of citations received⁴⁷. This metric was first introduced by Gross and Gross⁴⁸. It is generally assumed that articles with higher impact receive more citations. Although quantifying the quality of individual scientists is difficult, the general view is that the citation count of a paper (relative to citation habits in its field) has been considered a useful measure of its quality¹⁰. In our analysis, the median number of citations per researcher and number of citations per article was 754 and 13.9, respectively. There were significant differences among the grant categories regarding the number of citations received in WoS. Nevertheless, it is important to recognize that it takes time for a paper to accumulate its full complement of citations¹⁰. This fact represents a serious

limitation on the value of citation analyses for younger authors, who presumably are the researchers of CNPq grant in category 2.

Another relevant topic that should be pointed out in this study is the remarkable difference in the citation counts among researchers from the diverse subareas of Medicine. In this regard, the areas of Cardiology and Neurosciences stand out with a median of about 12000 citations per researcher. These data emphasize the quality of the scientific output of this group of researchers. In a previous analysis, we have shown that of the 587 journals identified as being used by the CNPq researchers in Cardiology, 340 (58%) are indexed in the Web of Science database, with a median impact factor (IF) of 2.65²⁷. It is notable that approximately 16% of these journals have IF > 5. In the database of the Web of Science, there are 97 indexed journals in the area of Cardiology, and only 10 (10.5%) have IF > 5. We have described a similar pattern for the Brazilian researchers in Neuroscience²⁶. Among the journals used by the CNPq Neurosciences researcher, 61% were indexed at WoS with a median IF of 2.58. It is noteworthy that approximately 14% of the journals used by researchers in neurosciences have an IF > 5. The same database shows that among 128 journals indexed in the field of Psychiatry and 239 in the field of Neurosciences, only 14 (11%) and 39 (16.3%) had an IF greater than 5, respectively. Therefore, researchers in these areas published papers in indexed journals above the median of the remaining specialties. Interestingly, our data also have shown that there was a positive correlation between the number of papers published in journals indexed on WoS and the number of citations received by the researchers.

Our results should be considered in light of some methodological limitations. In this respect, the possible major weakness was the difficulty to get, in a reliable way, important research metrics, including h-index and m-index. We have tried to recover this information from the Lattes curriculum of each researcher. CNPq has developed the Lattes curriculum system in order to record the scientific output of Brazilian researchers²⁴. The current version of the system allows researchers to update their Lattes curriculum vitae (CV) and others to consult the English version of the CVs using a Web system (<http://lattes.cnpq.br/english>). According to a recent comment in Nature, the Brazilian experience with the Lattes database is

a powerful example of good practice. This provides high-quality data on about 1.6 million researchers and about 4,000 institutions⁹. However, we have found that the information regarding h-index was lacking in about 30% of the CVs in the Lattes platform and, moreover, many researchers have not updated this information in an appropriate way. For this reason, we had to obtain the h-index from WoS by using scientific names informed by each researcher in their Lattes curriculum. Consequently, partially due to these difficulties, we were not able to address some relevant issues regarding the impact of the scientific output of this group of researchers. However, some characteristics of the study may increase the strength of our results, including the strategies mentioned above and the systematic search of the Lattes and WoS databases, according to a well-established protocol.

CONCLUSION

This study of the profile of CNPq researchers in the area of Medicine has shown that the majority of them are males, concentrated in the southeast region of Brazil, particularly in the state of São Paulo. We have shown that CNPq researchers in the field of Medicine have a relevant quantitative and qualitative scientific output, although with a significant

discrepancy among the diverse subareas included in this field of knowledge. In this regard, Cardiology and Neurosciences stand out among the several specialties. This overall scientific production has increased significantly in recent years, but again with a relevant asymmetry among the diverse areas.

Finally, our findings suggest that the Assessor Committee in Medicine follows the criteria that were set for awarding productivity grants. According to the objective criteria, including scientific production and human resources training, there is consistency in ranking the grant holders among the diverse grant categories. Nevertheless, it is possible that fine adjustments might still be needed, especially in indices harder to measure, such as leadership and innovation. Further studies addressing some critical issues like research groups' productivity, collaborative efforts, and the impact of the scientific output might contribute to our better understanding of this dynamic area of research.

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Conflicts of interest: none.

RESUMO

OBJETIVO: O objetivo deste estudo foi avaliar a produção científica de pesquisadores da área de Medicina que recebem bolsa de produtividade do CNPq.

MÉTODOS: Os currículos Lattes de 542 pesquisadores com bolsas ativas de 2012 a 2014 foram incluídos na análise. As categorias/níveis das bolsas de produtividade foram estratificadas em três grupos de acordo com a classificação do CNPq (1A-B, 1C-D e 2).

RESULTADOS: Houve predomínio de bolsas na categoria 2. Durante a carreira acadêmica, pesquisadores da Medicina publicaram 76.512 artigos, com mediana de 119 artigos por pesquisador (Intervalo Interquartil, IQ, 77 a 174). Entre os 76.512 artigos, 36.584 (47,8%) foram indexados no banco de dados da Web of Science (WoS). Pesquisadores em Medicina receberam 643.159 citações no banco de dados de WoS, com uma mediana de 754 citações (IQ, 356 a 1.447). Houve diferenças significativas entre as categorias de bolsas em relação ao número de citações em WoS ($P < 0,001$). Houve uma diferença significativa no número de citações recebidas pelos pesquisadores de acordo com a especialidade incluída na área de Medicina ($P < 0,001$).

CONCLUSÃO: Estratégias para melhorar qualitativamente a produção científica possivelmente podem ser aprimoradas pelo conhecimento do perfil dos pesquisadores no campo da Medicina.

PALAVRAS-CHAVE: Pesquisadores. Desempenho profissional. Medicina.

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