

Factors associated with the scientific production of academics in the Faculty of Dentistry of the National University of San Marcos. Lima Peru.

Factores asociados a la producción científica de académicos en la Facultad de Odontología de la Universidad Nacional de San Marcos. Lima, Perú.

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Abstract: Publishing scientific articles allows for disseminating the results of a study and concludes the research process; such publication allows the academic to develop more research skills. Objective: To analyze the factors associated with the production of scientific articles in university professors. Material and Methods: Analytical cross-sectional study that collected the amount of articles published in the Scopus and SciELO databases by ordinary professors of the Faculty of Dentistry of the National University of San Marcos (Lima, Peru). Associated factors included: sex, teaching category, dedication time, academic degree, positions at other universities, professional experience and teaching courses related to scientific research. Results: 20.8% of academics presented at least one article published. Male sex (OR = 1.12, 95% CI: 1.04-2.49), working at one university only (OR = 1.39, 95% CI: 1.12-2.71), teaching courses related to research methodology (OR = 1.35, 95% CI: 1.05-4.27) and having more than 10 years' experience in university teaching (OR = 2.95, 95% CI: 2.1-8.97) were factors associated with greater scientific production. Conclusions: One fifth of ordinary professors presented scientific production in the databases Scopus and SciELO, with the main factors associated with a greater production of scientific articles being sex, course teaching, number of years in teaching and number of work-institutions.

Keywords: Dentistry; faculty, dental; publications for science; diffusion; scientific publication indicators; universities; Peru.

Resumen: Publicar artículos científicos permite difundir los resultados de un estudio y culminar el proceso investigativo. Para un docente tal publicación le permite desarrollar más competencias investigativas. Objetivo: Analizar los factores asociados a la producción de artículos científicos en los docentes universitarios. Material y Métodos: Estudio analítico transversal que recolectó la cantidad de artículos publicados en las bases de datos Scopus y SciELO por parte de 101 docentes ordinarios de la Facultad de Odontología de la Universidad Nacional Mayor de San Marcos (Lima, Perú). Los factores asociados incluyeron: sexo, categoría docente, tiempo de dedicación, grado académico, desempeño en otras universidades, experiencia profesional y dictado de cursos relacionados a investigación científica. Resultados: El 20,8% de los docentes presentó al menos un artículo publicado. El sexo masculino (OR= 1,12; IC 95%: 1,04-2,49), laborar sólo en una universidad (OR= 1,39; IC 95%: 1,12-2,71), dictar cursos relacionados a metodología de la investigación (OR=1,35; IC 95%: 1,05-4,27) y tener más de 10 años en la docencia (OR= 2,95; IC 95%: 2,1-8,97) fueron factores asociados a una mayor producción científica. Conclusiones: La quinta parte de los docentes ordinarios presentó producción científica en las bases de datos Scopus y SciELO, siendo los principales factores asociados a una mayor producción de artículos científicos: el sexo, dictado de cursos, cantidad de años en la docencia y cantidad de universidades donde se labora.

Palabras Clave: Odontología; profesores de odontología; indicadores de producción científica; publicaciones de divulgación científica; universidades; Perú.

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INTRODUCTION.

Scientific research is an essential activity for university professors. It is also essential for the academic and professional training of students.

According to Sogui *et al.*,¹ 41% of medical research academics began this activity during their undergraduate training, following the example of their own professors, due to attending extension courses, obtaining scholarships and writing a thesis. As such, a professor or professor who disseminates and promotes scientific research among their students serves as an example, helps to develop critical thinking and leads to an increase in the number of scientists in the long term.²

At university level in our reality, only a few academics are dedicated to scientific production (SP), the majority are mostly committed to teaching. According to Sogui *et al.*,³ 15% of academics at Universidad Nacional Mayor de San Marcos submitted manuscripts for publication to scientific journals. Of these, 66% corresponded to professors of the School of Human Medicine. It has also been reported that academics with doctorate degree, who belong to a research institute and who work as full-time professors, show greater scientific production.⁴ Many professors who produce scientific knowledge report having had a professor as a mentor, and having started doing research early in their academic lives, during their undergraduate training as motivating factors. On the contrary, an excessive teaching load is highlighted as having a negative impact on research.⁵⁻⁷

Some teachers highlight that the lack of access to databases, work overload, and lack of economic incentives prevents them from devoting themselves to scientific research and production.⁸ Pasache *et al.*,⁹ when studying the cases of 34 professors, found that 66,7% did not publish in journals or participate in congresses. They also found an association between having a master's degree and the number of papers presented in scientific conferences.

A university professor is the main role model for a student to develop interest in scientific research. However, in some contexts this role is weakened by the lack of incentives, motivation and greater dedication to teaching activities. In general, many of them only aspire to be thesis or research advisors, but not to produce knowledge.¹⁰

Dentistry as an area of the Health Sciences also requires

an analysis of the scientific production of its academics, as well as identifying the factors associated with a higher or lower scientific production. Universities expect their professors to become involved in research activities, as this increases the visibility of the authors and the institution, creating academic impact and greater recognition for both researchers and universities.¹¹ In the present study, scientific production disseminated in indexed journals by ordinary professors of a School of Dentistry was evaluated, as well as the characteristics that could be associated with a higher or lower scientific production. It is hypothesized a low scientific production is more prevalent, and that an excessive academic burden is one of the main factors associated with it.

MATERIALS AND METHODS.

An analytical, cross-sectional and observational study was designed that included 107 ordinary professors (regular professors) from the School of Dentistry at Universidad Nacional Mayor de San Marcos, in Lima, Peru. The STROBE guidelines were followed in the preparation of the study and writing of the manuscript.¹²

The population consisted of all regular professors of the School and who were in the registry of the School. (Available at: <https://odontologia.unmsm.edu.pe/departamentos-academicos/>), which was consulted in July 2018.

Part-time adjunct lecturers, recently hired academics (as of July 2018) and professors who were not registered or found on the official list at the School website were excluded. A sample size calculation or sample selection was not performed because the aim of the study was to cover the entire teacher population. Study variables were: type of professor (full professor, associate, or assistant), contract terms (complete dedication [having an exclusive contract with the university], full time and part time), academic department (Surgical Medical Stomatology, Pediatric Stomatology, Rehabilitative Stomatology, Basic Sciences, and Preventive and Social Stomatology), academic degree (doctorate degree, master's degree, bachelor), and gender. All this information was collected by means of the documentation technique. Data were obtained from the School website.

The variables, which were collected through an interview, included aspects such as: teaching research courses (Yes/

No), number of universities where they teach, and teaching experience (<5 years, 5-10 years, 11-15 years and >15 years). Each academic was interviewed for 3 minutes, during which the objective of the study was explained and data regarding their professional experience was collected. It is important to note that this technique may possibly present memory bias: according to which, data could be made up and not verifiable by researchers.

The variable scientific production was analyzed according to the documentation technique. For this, the names and surnames of each author were searched in the Scopus and SciELO databases, and the number of scientific articles published by each academic was recorded. First and last names were verified in each database, as well as the affiliation to the University to avoid confusion with other authors. The articles published by the academics were registered regardless of the year of publication or the type of publication.

Data were transferred to the software SPSS version 23.0. Descriptive statistics were performed for categorical variables through frequencies and their comparisons. The variable scientific production was dichotomized (have/does not have) as a supervised variable to carry out the associations; while the associated variables were academic degree, teaching experience (in years), research courses, professor rank and contract type. The association was obtained through a logistic regression analysis. A level of

significance of 0.05 was accepted to refute null hypotheses during statistical analysis.

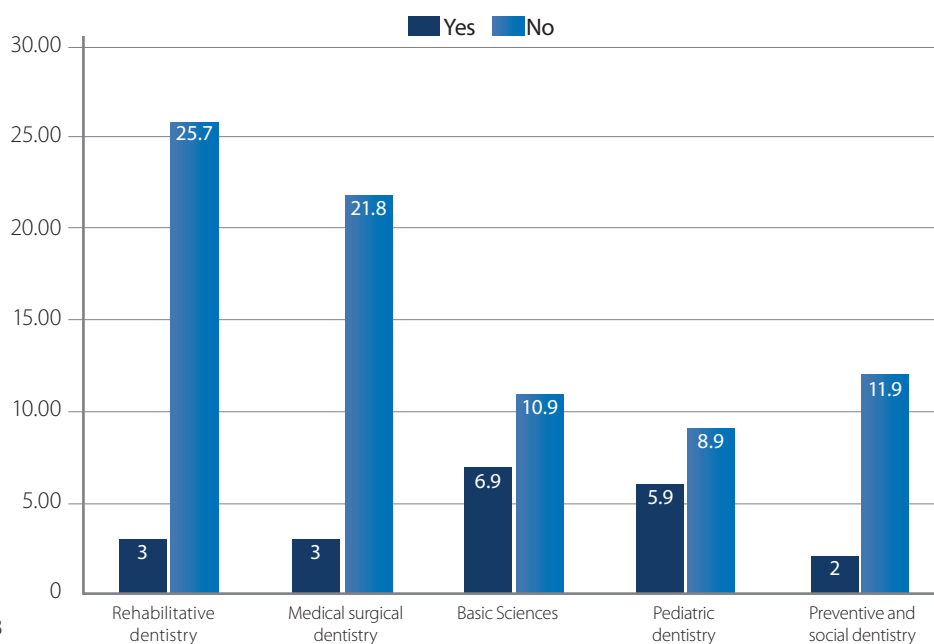
RESULTS.

Of the 101 academics analyzed, 63.4% (n=64) were male; 20.8% (n=21) submitted at least one published article; 55.4% (n=56) worked in two or more universities, and 19.8% (n=20) taught courses related to research methodology. There were no losses or professors who did not wish to participate, thus no data deletion. Fourteen articles were found in the Scopus database and 48 in SciELO. Of the academics who had at least one scientific publication (n=21), 47.62% (n=10) were associate professors, and 71.43% (n=15) were part-time teachers (Table 1). A greater scientific production was found among academics who belonged to the Department of Basic Sciences (n=7 $p<0.03$). (Figure 1)

Eight academics who published scientific articles had a master's degree (38.01%), and six had a doctorate's degree (n=6; 28.6%). (Figure 2).

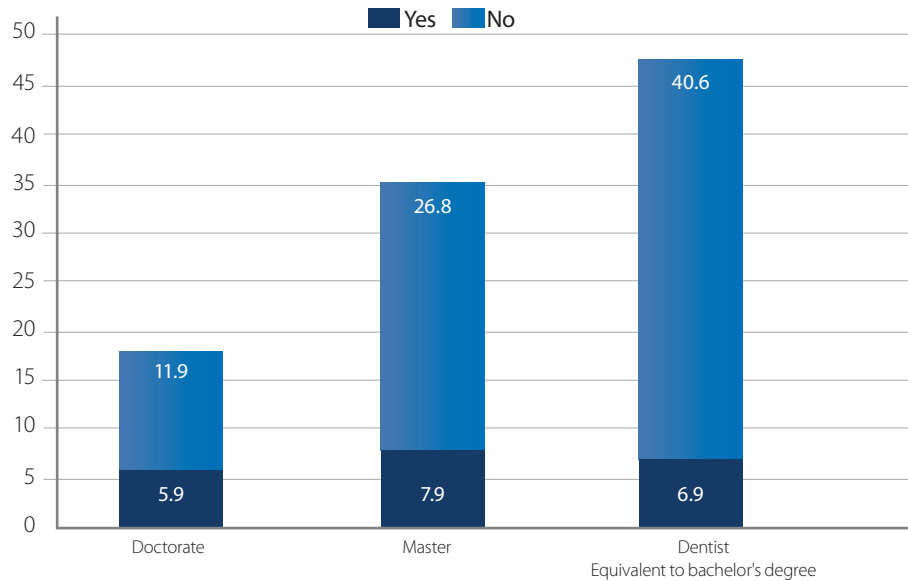
When assessing the associated characteristics, an association was found between gender ($p=0.04$), the number of universities where professors work ($p=0.01$), teaching methodology courses ($p=0.04$), and the number of years of teaching experience ($p=0.01$). Therefore, factors that are associated with greater scientific production are: being male, teaching in one university, teaching courses on methodology, and having more than 10 years of teaching experience (Table 2).

Figure 1. Scientific production (%) according to professors' academic department.



χ^2 : 10.39. p -value: 0.03

Figure 2. Percentage of scientific production according to teachers' academic grade.



U: 656.6. *p*-value: 0.095

Table 1. Scientific production according to professors' characteristics.

		Scientific Production		Total	<i>p</i> -value
		Yes	No		
Professor rank	Principal	6 (5.9%)	22 (21.8%)	28 (27.7%)	U Mann Whitney=758.8 <i>p</i> =0.468
	Associate	10 (9.9%)	29 (28.7%)	39 (38.6%)	
	Assistant	5 (5%)	29 (28.7%)	34 (33.7%)	
Contract type	Complete dedication	0	3 (3%)	3 (3%)	X ² =0.93 <i>p</i> =0.62
	Full time	6 (5.9%)	25 (24.8%)	31 (30.7%)	
	Part time	15 (14.9%)	52 (51.5%)	67 (66.3%)	
Teaching experience	5-10 years	1 (1%)	4 (4%)	5 (5%)	U Mann Whitney=746 <i>p</i> =0.319
	11-15 years	7 (6.9%)	17 (16.8%)	24 (23.8%)	
	>15 years	13 (12.9%)	59 (58.4%)	48 (71.3%)	
Total		21 (20.8%)	80 (79.2%)	101 (100%)	

Table 2. Logistic regression of associated factors and scientific production (≤ 1 and > 1 published article).

Categories		OR	CI 95%
Gender	Male	1.12	1.04-2.49
	Female	Ref	
Number of universities where staff work	1	1.39	1.12-2.71
	2 or more	Ref	
Teaching methodology courses	Yes	1.35	1.05-4.27
	No	Ref	
Teaching experience	≤ 10 years	Ref	
	> 10 years	2.95	2.1-8.97

DISCUSSION.

The research activities of academics should be supported by professional associations, scientific societies and organizations to which they belong. Thus, incorporation into a society should allow for the dissemination and participation

in scientific activities such as: publication of articles in specialized journals, organizing and participating in scientific conferences, disseminating the results of studies in congresses and seminars, etc. These societies should also boost support for more professors to acquire scientific

skills. Such support could include free access to databases, offer training in research methodology, biostatistics and scientific writing.¹³ In the health sector, hospitals and clinics should provide facilities for health professionals to carry out research, be flexible with the hours allocated to scientific activity, and create research units dedicated to epidemiological study and dissemination of results.¹⁴

Producing scientific knowledge through articles is an objective way to measure the quantity and quality of research conducted by academics and/or students within a university.¹⁵⁻¹⁷ As of 2018, in Peru, the National Superintendence of Education demands that universities have teaching staff qualified in research, and that knowledge be produced, whether in the form of scientific articles, books, or theses, among other activities. This is one of the basic quality requirements, so that a university can be licensed/accredited and can continue offering its services in higher education.¹⁸ In the present study a low scientific production was found. Of a total of 101 ordinary teaching academic staff of the School of Dentistry, only 20.8% submitted at least one scientific article; this corresponded to only a fifth of the faculty studied.

Pereyra-Elías *et al.*,¹⁹ found that half of the academics involved in research had at least one publication in the Scopus database. Unlike this study, in which only one fifth of teachers had scientific articles published in two of the most relevant databases considered for the elaboration of university rankings. Here it becomes relevant to indicate that it is necessary for a university professor to be trained in the competencies of research, writing and scientific production. However, many of them argue that the lack of support and experience in publishing articles limits this activity.^{20,21}

Teachers who publish articles tend to have better research skills. However, these competences do not guarantee the skills necessary for teaching successfully. Failure to publish research prevents the completion of the research process and reveals that the professor is not fully trained in this respect; consequently, they will offer their students only a partial view of the research-scientific publication process.²² It is objectionable that someone who does not know how to do research be responsible for teaching it to others. It would also be unacceptable that a professor who is unable to complete the research process be allowed to teach

research methodology (research culminates in the act of publishing and disseminating the results). In our study, teaching courses on research methodology was associated with greater scientific production; perhaps because it is closely related to writing skills and knowledge production.

Publishing articles gives teaching staff better job opportunities, especially in those universities where degrees are awarded after completing thesis work and/or submitting scientific publications. In Peru, the new University Law has made thesis work a compulsory requirement to obtain a degree in all universities (state and private). Consequently, teachers need to be trained in planning, implementing and disseminating research results. Those academics with more teaching experience tend to publish more scientific articles; this study found such an association. However, it was also found that those with a doctorate were the ones who published the least, not because they lack the skills, but because the number of professors with a doctorate working as ordinary professors at the School of Dentistry is lower than those with a master's or bachelor's degree.

Academics who publish scientific studies contribute to a more favorable environment for research, giving their students a wider array of opportunities, as these teachers become tutors, mentors and theses' advisors, or supervise other types of projects.^{3,23}

According to the study conducted by Pereyra-Elías *et al.*,¹⁹ professors with fewer years of teaching experience presented the best scientific production, similar to that reported by Sogui *et al.*,³ This is explained by their closest proximity to scientific information technologies, having been trained in a different context that favors publication, having greater access to databases, and more enthusiasm for professional development. These characteristics should be valued by universities when hiring new teaching staff. However, the opposite was found in this study, and academics with more teaching experience were associated with greater scientific production. In the case of the School of Dentistry, this may be due to many associate teachers (those with more experience in teaching) having had more opportunities to participate in projects and as co-authors of scientific articles written by younger and newly hired professors or assistant professors with whom they collaborated.

Pereyra-Elías *et al.*,¹⁹ found no association regarding the

gender of the professor and scientific production; unlike McCarren *et al.*,²⁴ and Christianson *et al.*,²⁵ who report that women show a lower SP. This study corroborates this finding, since it was found that male professors were associated with a higher production of scientific articles.

It should be noted that the present study assessed SP through the output of scientific articles, however, it could be expanded to include patents, and research funds attained, impact of publications, and be contrasted with other professional academic institutions or universities. It is also important to consider that some teaching staff only occasionally publishes an article and others publish several papers per year. The dichotomization of SP can affect the accuracy of the analysis.

Scopus and SciELO databases were chosen, as they are the most popular in the biomedical field. However, it would be also recommended to conduct studies including more databases, in addition to complementing the analysis with an evaluation of the pedagogical and didactic skills of the teaching staff. Likewise, as a faculty policy, it would be recommended to give more credit to articles published in indexed journals, as it would be more beneficial for professors in the area of research methodology and for those working in the clinical field.

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This would ensure better quality teaching, since academics that publish and disseminate their knowledge have more teaching skills, as well as serving as an example for their students. In the same way, such requirement would improve the SP indicators of an institution with the resulting national and international recognition for the university.

CONCLUSION.

One fifth of ordinary professors published at least one scientific article indexed in the Scopus or SciELO databases. Factors associated with a higher scientific production were: being male, teaching research methodology courses, having more than 10 years of teaching experience, and working only at a single university.

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