Challenges and opportunities for dental students as researchers

Desafíos y oportunidades para el desarrollo de la investigación por parte de estudiantes de Odontología

Desafios e oportunidades para o desenvolvimento de pesquisas por estudantes de Odontologia

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Abstract

Background: The challenges posed by research mean that very few students choose it as a career regardless of how many are involved in research during their university studies.
Objective: To analyze the challenges and opportunities that dental students perceive when conducting scientific research.
Methods: Observational and cross-sectional study including 112 dissertation students who completed their final degree project at the School of Dentistry (Universidad Nacional Mayor de San Marcos, Lima, Perú). The students' perception of the challenges and opportunities was measured at the end of the study with a scale that rated the following categories, among others: facilities and infrastructure as support, interpersonal support and institutional relations, writing a report, and publishing research results. The scores were analyzed through averages and comparison analysis.
Results: The general score was 2.45 ± 0.34. The dimensions "data analysis" (3.17 ± 0.41) and "general research experience" (3.26 ± 0.39) presented higher averages. Men showed higher overall scores (2.43 ± 0.31), with significant differences in the dimensions "research design and selection" (p= 0.001).
Conclusion: The challenges and opportunities for research are below average; the main challenges were institutional support, proper laboratories, and a curricular design that does not foster research. The main opportunities were found in data analysis and research experience in general.

Keywords: research, students, perception, dentistry, education.

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Resumen

Introducción: Independiente del número de estudiantes involucrados en la investigación, durante sus estudios universitarios, los desafíos para realizar investigación hacen que muy pocos escojan la carrera de investigador a futuro.

Objetivo: Analizar los desafíos y oportunidades que perciben los estudiantes de Odontología al momento de desarrollar una investigación científica.

Métodos: Estudio transversal que incluyó a 112 estudiantes tesistas que culminaron su trabajo de fin de grado en la Facultad de Odontología (Universidad Nacional Mayor de San Marcos. Lima-Perú). Se midió la percepción de los desafíos y oportunidad al culminar su estudio a través de una escala que valoró las categorías de: instalaciones e infraestructura como apoyo, apoyo interpersonal y relaciones de la institución, escribir un informe y publicar los resultados de investigación, entre otras. Se analizaron las puntuaciones a través de promedios y un análisis de comparación.

Resultados: La puntuación general fue de 2,45 ± 0,34, siendo las dimensiones "análisis de datos" (3,17 ± 0,41) y "experiencia de investigación general" (3,26 ± 0,39) las que presentaron un mayor promedio. Los varones presentaron mayores puntuaciones generales (2,43 ± 0,31), existiendo diferencias significativas en las dimensiones "diseño y selección de la investigación" (p = 0,001).

Conclusión: Los desafíos y oportunidades para la investigación se encuentran por debajo del promedio, los principales desafíos se encontraron relacionados al apoyo institucional, la presencia de laboratorios adecuados y un inadecuado diseño curricular para el fomento de la investigación; las principales oportunidades se encontraron en el análisis de datos y la experiencia investigativa en general.

Palabras clave: Investigación, Estudiantes, Percepción, Odontología, Educación.

Resumo

Introdução: Independentemente do número de alunos envolvidos na pesquisa, durante os estudos universitários, os desafios da realização de pesquisas fazem com que muito poucos escolham a carreira de pesquisador no futuro.

Objetivo: Analise os desafios e oportunidades que os estudantes de odontologia percebem no desenvolvimento de pesquisas científicas.

Métodos: Estudo transversal que incluiu 112 alunos de teses que concluíram seu trabalho de conclusão de curso na Faculdade de Odontologia (Universidad Nacional Mayor de San Marcos. Lima-Peru). A percepção de desafios e oportunidades foi medida ao final do estudo por meio de uma escala que avaliou as categorias de: instalações e infraestrutura como suporte, suporte interpessoal e relações institucionais, elaboração de relatório e publicação de resultados de pesquisas, entre outros. Os escores foram analisados por meio de médias e análise de comparação.

Resultados: O escore geral foi de 2,45 ± 0,34, sendo as dimensões "análise de dados" (3,17 ± 0,41) e "experiência geral de pesquisa" (3,26 ± 0,39) as que apresentaram maior média. Os homens apresentaram escores gerais mais elevados (2,43 ± 0,31), com diferenças significativas nas dimensões "desenho e seleção da pesquisa" (p = 0,001).

Conclusão: Os desafios e oportunidades de pesquisa estão abaixo da média, os principais desafios estavam relacionados ao apoio institucional, a presença de laboratórios adequados e um desenho curricular inadequado para fomentar a pesquisa; as principais oportunidades foram encontradas na análise de dados e na experiência em pesquisa em geral.

Palavras-chave: Metástase oral, carcinoma de células renais, mucosa oral.

Introduction

Research is the basis for sustainable development and helps countries consolidate their position and build their independence.[1] Encouraging research among health sciences students allows us to train professionals with better skills for patient care by exposing them to more robust scientific evidence. These practices have demonstrated more significant benefits and are

constantly updated. Exposure to research during undergraduate studies provides research experiences that will impact graduate training,[2] either because students will decide to specialize or pursue a PhD. However, these experiences are not satisfactory in most cases and cause several students to perceive research negatively. In this process, some students will perceive challenges while others will see opportunities for improvement.[3] All this results in a poor research culture within an institution.

There are strategies and undertakings to improve the research culture and some students are motivated to do research. However, many are frustrated in their motivation due to personal factors, lack of tutors/mentors, clinical research teachers, institutional support, time availability, etc. These factors affect their intentions to conduct undergraduate research. Regardless of the number of students involved in research during their undergraduate studies, the challenges of conducting research mean that very few choose research as a career.

Dental research should focus on preventing and managing oral diseases and promoting oral health through primary health care.[4] The challenges and opportunities for research are no different from those in other fields of study. Various strategies have been outlined to encourage student participation in research activities: research incubators, scientific societies, problem-based learning, book clubs, and mentoring.[5-7] Nevertheless, it is necessary to identify the factors that facilitate or hinder student participation in research. It is also essential to analyze the environment in which research experiences occur so that dental research is more contemporary, aligned with biomedical science in general, and more collaborative.[8]

The School of Dentistry of Universidad Nacional Mayor de San Marcos is the oldest school in the Peruvian dental field. It is part of a state/public university governed by regulations and guidelines issued by the Vice-Chancellor's Office for Research and the Academic Vice-Chancellor's Office. The research policies imply that courses related to research methodology, statistics, dissertations, writing, and seminars are included in the curriculum. Some policies allow students to engage in research groups, internships, and fellowships. However, this is optional, and few students participate. The main research work conducted by students is their undergraduate thesis, which allows them to graduate as Dental Surgeons. The thesis is perhaps the work that better enables them to improve their research skills and prepares them for a postgraduate degree.

The final research project (university thesis) is the last step before students graduate as professionals. This work requires planning, developing, writing, and supervising an investigation, including challenges and opportunities that must be analyzed. This study aimed to describe the perceptions of dental school on the challenges and opportunities when conducting research. The study is justified because a better understanding of these strengths, weaknesses, and possibilities allows school members to improve their processes and research projects.

Method

Observational and cross-sectional study. The population was the students of the School of Dentistry of the Universidad Nacional Mayor de San Marcos who had completed their final degree project (university thesis) between 2016 and 2020.

No sample calculation was performed because the number of thesis students was collected intentionally to achieve the largest number of subjects. The students who had completed their university thesis (undergraduate/bachelor's degree) and whose data were registered in the Cybertesis portal (https://cybertesis.unmsm.edu.pe/handle/20.500.12672/13) were included. Theses were searched by publication date and authors' names. A total of 146 students were identified based on this registry and the period

selected (last five years).

The students were invited to participate in the study by e-mail and on Facebook and Instagram. Those who accepted were sent a survey and instructions on how to complete it. The survey used was a scale created by Shirahatti et al.[9] with 25 questions structured in 8 dimensions: research design and selection (Q1–3), facilities and infrastructure as support (Q4–7), interpersonal support and institutional relations (Q11–13), writing a report and publishing research results (Q14–16), general research experience (Q17–19), curricular design for research (Q20–22) and research opportunities (Q23–25). The questions present a 6-score Likert-type response (5= strongly agree, 4= agree, 3= disagree, 2= strongly disagree, 1= don't know, and 0= don't understand). The survey was translated into Spanish by three linguists-translators and three bilingual dental surgeons, which validates the content of the translated version. Subsequently, a pilot test was conducted with 30 students to assess the test's reliability, obtaining an alpha value of 0.92. The survey was self-administered through Google forms between October and November 2020 (social distancing prevented in-person interviews). The survey took 5 to 10 minutes to complete.

The data was processed using the Spps v 21.0 statistical package. Student's t-test for independent groups was used to compare the scores with the sex of the students (male/female), type of research (observational/experimental), and timeframe of research development (≤1 year/>1 year). Scores were categorized as: above 3.5= excellent research opportunities, above 3 to 3.5= good research opportunities, above 2.5 to 3= average research opportunities, above 2 to 2.5= below average research opportunities, above 1.5 to 2.0= few research opportunities, and 1.5 or less= very poor research opportunities. We accepted a significance level of 0.05 to refute a null hypothesis. Respondents were told that the information obtained would be kept anonymous and used only for scientific and academic purposes and not for studies other than this research.

Results

A total of 112 students were surveyed (76.7% response rate). Fifty-eight percent were female; the average age was 27.2 ± 5.3 years. 72% (n= 81) of the theses were observational, and 34% (n=38) of students indicated that they conducted their research in one year or less.

The overall score was 2.45 ± 0.34. The dimensions "data analysis" (3.17 ± 0.41) and "overall research experience" (3.26 ± 0.39) had the highest average (Table 1).

Table 1: Scale scores according to dimensions, sex of students, and research characteristics.

Dimensions	Sex		Type of thesis		Timeframe		
	V	M	Obs	Exp	≤1	>1	Total
Research design and selection	2,15 ± 0,25	2,75 ± 0,12*	2,88 ± 0,65*	2,25 ± 0,45	2,88 ± 0,44*	2,05 ± 0,55	2,49 ± 0,41
Facilities and infrastructure as support	2,25 ± 0,12	1,88 ± 0,1	2,45 ± 0,22*	1,95 ± 0,3	2,55 ± 0,31*	1,55 ± 0,21	2,11 ± 0,21
Data analysis	3,25 ± 0,22	3,05 ± 0,34	3,45 ± 0,15*	3,15 ± 0,45	3,12 ± 0,65*	2,98 ± 0,65	3,17 ± 0,41
Interpersonal support and institutional relations	2,05 ± 0,15	1,88 ± 0,25	2,25 ± 0,14	1,96 ± 0,12	2,12 ± 0,6	2,02 ± 0,55	2,05 ± 0,30
Write a report and publish the research results	2,88 ± 0,45*	2,65 ± 0,66	2,55 ± 0,28	2,78 ± 0,32*	2,88 ± 0,26*	2,45 ± 0,22	2,70 ± 0,37
General research experience	3,15 ± 0,45	3,45 ± 0,28*	3,25 ± 0,44	3,14 ± 0,51	3,44 ± 0,23*	3,10 ± 0,42	3,26 ± 0,39

Curriculum design for research	1,45 ± 0,36	1,25 ± 0,32	1,55 ± 0,28	1,68 ± 0,15	1,55 ± 0,45	1,40 ± 0,14	1,48 ± 0,28
Research opportunities	2,25 ± 0,44	2,18 ± 0,28	2,65 ± 0,32*	2,22 ± 0,22	2,34 ± 0,4	2,45 ± 0,55	2,35 ± 0,37
Total	2,43 ± 0,31	2,39 ± 0,29	2,63 ± 0,31	2,39 ± 0,32	2,61 ± 0,42*	2,25 ± 0,41	2,45 ± 0,34

V= M= Males. M= Female. Obs= Observational. Exp= Experimental. *= p<0.05 Student's t-test.

Discussion

Research allows students to develop critical thinking and evaluation skills, decide on a future career in basic sciences or clinical research[10] and become scientific researchers.[11,12] Traditionally, student research activity has been assessed through their scientific output, opinions on research interest, and the quality of their work. The challenges they face when conducting research have been understudied. This study assessed the opportunities and challenges that the thesis students faced when conducting their research.

The perception of "opportunities for research" was below average, reflecting the fact that students perceive multiple obstacles and challenges when completing their university thesis. These challenges were most prominent in the dimensions of institutional relations/laboratory support to conduct research and those related to curricular design for research. This indicates that there is no real institutional support, a lack of proper laboratories, and the inflexibility of the curriculum discourages students' interest in research. One of the problems is the time devoted to research since the study plan is not flexible,[13] which makes the students use the limited time they have left to write their thesis.

A favorable perception (good research opportunity) was found in the dimension "general research experience," as students considered that the thesis was satisfactory and useful for their training. This is favorable as it will impact future graduate studies and their decision to become researchers. Recent decades have seen a reduction in the number of graduates who choose to pursue a career in scientific research. This impacts the profile of graduates since medical education depends on understanding scientific evidence training.[14,15] A formula that seems to contribute to solving this problem is including these future professionals in the world of scientific research during their academic training.[16-18] The thesis is a type of research experience that favors this, as do research groups and research incubators.

The challenges for research were more widely perceived by women and those undertaking experimental theses, perhaps due to the complexity of the resources required. Various factors account for these challenges: deadlines are usually set by the advisor or the program, the processes governing the program are unknown, these processes change depending on the management, the process is inadequate or too bureaucratic, it is difficult to find suitable advisors/supervisors, lack of adequate skills for some research processes (data analysis is expected to be complex) and lack of knowledge of the sources of funding. All this affects people's interest in research and reduces student motivation.

Therefore, it is recommended that the teacher/advisor or supervisor involve students in their research, thus stimulating their interest in research. Teachers should trust students' creativity and inspiration since their ideas can contribute to the research project. It is also essential to be realistic; the student should be told about the real obstacles they will face, such as searching for funds, finding study objects that meet the eligibility criteria, data analysis, etc. Whether or not the ideas or the project will be feasible should be stated from the beginning.

This study has its limitations, and only the thesis students could be analyzed since they had completed at least one study during their undergraduate education. This study could apply to other students. Another limitation was the difficulty in gathering the opinion of all students since the virtual survey's response rate was not always adequate. Nonetheless, the data allowed us to explore which elements should be improved in a study program and reflect on the role of teaching in research.

Conclusion

The perception of dental students on the challenges and opportunities for research are below average. The main challenges were related to institutional support, the presence of proper laboratories, and an inadequate curricular design for the promotion of research. The main opportunities were found in data analysis and research experience in general. Research experiences such as research incubators, summer courses, research internships, competitions, fellowships, and research workshops should be implemented in undergraduate programs to familiarize students with the research processes and give them their first tools in the field.

References

1. Rahmatulla M. Vision and challenges for dental research worker. Indian J Dent Res [Internet]. 2009 [Cited: 2020 Nov 12]; 20(2):125. Available from: https://pubmed.ncbi.nlm.nih.gov/19553710/

2. Rosenstiel SF, Johnston WM. Goals, costs, and outcomes of a predoctoral student research program. J Dent Educ [Internet]. 2002 [Cited: 2020 Nov 12]; 66(12):1368-73. Available from: https://pubmed.ncbi.nlm.nih.gov/12521063/

3. Mansori M, Mohseni-Rad L, Haghani J, Hashemipour MA. Dental students' opinions on the challenges and research opportunities: A qualitative research. J Oral Health Oral Epidemiol [Internet]. 2018 [Cited: 2020 Nov 12] 7(12):8-15. Available from: http://johoe.kmu.ac.ir/article_84906.html

4. Albino J, Teles F, Cohen LK. Commentary: Challenges and Opportunities for Women in Dental Research. Adv Dental Res [Internet]. 2019 [Cited: 2020 Dec 10]; 30(3);119-123. Available from: https://pubmed.ncbi.nlm.nih.gov/31746649/

5. Edmunds RK. Strategies for making research more accessible to dental students. J Dent Educ [Internet]. 2005 [Cited: 2020 Dec 10]; 69(8):861–3. Available from: https://pubmed.ncbi.nlm.nih.gov/16081567/

6. Castro-Rodríguez Y. Desarrollo de competencias investigativas en estudiantes de las Ciencias de la Salud. Sistematización de experiencias. Duazary [Internet]. 2020 [Cited: 2020 Dec 10]; 17(4):65-80. Available from: https://revistas.unimagdalena.edu.co/index.php/duazary/article/view/3602

7. Krueger P, White D, Meaney C, Kwong J, Antao V, Kim F. Predictors of job satisfaction among academic family medicine faculty: findings from a faculty work-life and leadership survey. Can Fam Physician [Internet]. 2017 [Cited: 2020 Dec 10]; 63(3):e177–e185. Available from: https://pubmed.ncbi.nlm.nih.gov/28292815/

8. McCauley LK. The Future of Dental Schools in Research Universities and Academic Health Centers.J Dent Educ [Internet]. 2017 [Cited: 2020 Dec 10]; 81(9):eS91-eS95. Available from: https://pubmed.ncbi.nlm.nih.gov/28864809/

9. Shirahatti RV, Sura S, Sumanthprasad GR, Khurana L. Dental Students Research Inventory: A Questionnaire to Assess Research Challenges and Opportunities. J Dent Educ [Internet]. 2010 [Cited: 2020 Dec 10]; 74(12):1308-1318. Available from: https://pubmed.ncbi.nlm.nih.gov/21123498/

10. Ghali WA, Saitz R, Eskew AH, Gupta M, Quan H, Hershman WY. Successful teaching in evidence-based medicine. Med Educ [Internet]. 2000 [Cited: 2020 Dec 10]; 34:18–22. Available from: https://pubmed.ncbi.nlm.nih.gov/10607274/

11. Chang Y, Ramnanan CJ. A review of literature on medical students and scholarly research: experiences, attitudes, and outcomes. Acad Med [Internet]. 2015 [Cited: 2020 Dec 10]; 90:1162- 73. Available from: https://pubmed.ncbi.nlm.nih.gov/25853690/

12. Klowak J, Elsharawi R, Whyte R, Costa A, Riva J. Predictors of medical student interest and confidence in research during medical school. Can Med Educ J [Internet]. 2018 [Cited: 2020 Dec 10]; 9:e4-13. Available from: https://pubmed.ncbi.nlm.nih.gov/30140343/

13. Riva JJ, Elshawari R, Daza J, Toma A, Whyte R, Agarwal G, Busse JW. Medical students' challenges and suggestions regarding research training: a synthesis of comments from a cross-sectional survey. Can Med Educ J [Internet]. 2019 [Cited: 2020 Dec 10]; 10(3):e91-e100. Available from: https://pubmed.ncbi.nlm.nih.gov/31388382/

14. Moraes DW; Jotz M, Menegazzo WR, Menegazzo MS, Veloso S, Machry MC, Costanzi M, Pellanda LC. Interest in research among medical students: Challenges for the undergraduate education. Rev Assoc Med Bras [Internet]. 2016 [Cited: 2020 Dec 10]; 62(7):652-658. Available from: https://pubmed.ncbi.nlm.nih.gov/27925045/

15. Solomon SS, Tom SC, Pichert J, Wasserman D, Powers AC. Impact of medical student research in the development of physician-scientists. J Investig Med [Internet]. 2003 [Cited: 2020 Dec 10]; 51(3):149-56. https://pubmed.ncbi.nlm.nih.gov/12769197/

16. Sambunjak D, Straus S, Marusic A. Mentoring in academic medicine: a systematic review. JAMA [Internet]. 2006 [Cited: 2020 Dec 10]; 296:1103- 15. Available from: https://pubmed.ncbi.nlm.nih.gov/16954490/

17. Kashiwagi DT, Varkey P, Cook DA. Mentoring programs for physicians in academic medicine: a systematic review. Acad Med [Internet]. 2013 [Cited: 2020 Dec 10]; 88(7):1029-37. Available from: https://pubmed.ncbi.nlm.nih.gov/23702518/

18. Ergun S, Busse JW, Wong A. Mentorship in anesthesia: a survey of perspectives among Canadian anesthesia residents. Can J Anaesth [Internet]. 2017 [Cited: 2020 Dec 10]; 64(4):402-10. Available from: https://pubmed.ncbi.nlm.nih.gov/28092066/

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2. Acquisition of data
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