

Characteristics and publication patterns of theses from a Peruvian medical school

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Abstract

Background: Many medical schools require a student thesis before graduation. Publishing results in a peer-reviewed journal could be an indicator of scientific value and acceptability by the scientific community. The publication pattern of theses published by medical students in Peru is unknown. The aim of this study was to assess the characteristics and publication pattern of theses in biomedical-indexed journals conducted by medical students in a university with the highest research output in Peru.

Methods: Data from registered theses between 2000 and 2003 were obtained from the university library. Publication of theses in biomedical journals was assessed in 2008 by a search strategy using PubMed, Google Scholar, LILACS, LIPECS and SciELO.

Results: Four hundred and eighty-two medical theses were registered between 2000 and 2003; 85 (17.6%) were published in biomedical-indexed journals. Of the published theses, 28 (5.8%) were published in MEDLINE-indexed journals, 55 (11.4%) in SciELO-indexed journals, 61 (12.6%) in LILACS-indexed journals and 68 (14.1%) in LIPECS-indexed journals. Most of the published theses (80%) were in Spanish and published in Peruvian journals; and 17 theses (20%) were published in foreign journals (all of them indexed in MEDLINE). In addition, 37 (43.5%) belong primarily to internal medicine, and 24 (28.2%) belong primarily to infectious diseases. Medical students were first authors in 71 (83.5%) of the articles.

Conclusion: In this study, most of the published theses were in Spanish, published in local journals and indexed in LIPECS. The percentage of published theses in biomedical journals at this university is comparable with others coming from developed countries.

Keywords: bibliographic, databases, education, medical, medline, students

Key Messages

Implications for Practice

- More courses and workshops on scientific publishing should be organised periodically that include ethical and scientific misconduct issues in publication.
- More awareness of the available journals to publish both in Spanish and English are needed.
- More indexed journals in Spanish are needed to disseminate findings from Latin America.
- Students should be supported if they want to publish in non-Spanish-indexed journals.

Implications for Policy

- Courses on scientific publishing should be integrated into the medical curricula.
- Electronic repositories could be implemented to achieve full access to medical theses.
- Universities should encourage medical students to publish their medical theses not only in local journals but also in others with a high impact factor.

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Background

A university is an institution of higher education and research. A thesis is a document that presents the author's research based on the findings collected during the years of training at a university. A thesis is required for a professional qualification as a doctor in many medical schools around the world,¹ including Peru.

Every year students invest money, time and human resources to prepare and conduct their theses. The publication of a thesis in a peer-reviewed journal could be an indicator of its scientific value and acceptability in the international scientific community.²

Nevertheless, few universities have assessed the impact of theses on future publications. Salmi *et al.* performed a stratified sampling of theses from 36 medical schools in French universities between January 1993 and December 1997. The proportion of published theses in the MEDLINE database was 17% (51) out of 300.³ Nieminen *et al.* studied 256 consecutive theses presented between 2001 and 2003 at Oulu University in Finland. Sixty-one (23.8%) were published in indexed journals from several databases such as MEDLINE and Scopus.⁴ Pitche *et al.* studied 240 theses on medicine at the University of Lome in Togo from 1993 to 2002. Fifty-four theses (22.5%) were published in indexed journals from several databases such as MEDLINE and Pascal.⁵

It is well recognised that publication of a scientific article is the final and essential step of the scientific process.⁶ The most used bibliometric indicator to measure the scientific activity of an institution is the amount of publications, the amount of citations and the impact factor of the journal where the publication is published.⁷ There are many venues where medical students can publish their theses or research projects. In Peru, there are 17 medical-related journals indexed in different databases⁸ (compared with approximately 760 medical-related journals in Latin America and the Caribbean).⁹ Most of the research that has been done in Peru is published mainly in four resources: MEDLINE (the premier database of health care research and practice), LILACS (Latin American and Caribbean Health Science Literature Database), LIPECS (Peruvian Health Science

Literature Database) and SciELO (Scientific Electronic Library Online).¹⁰ The impact of theses published by medical students in Peru is unknown.

The aim of this study was to assess the characteristics and publication pattern of theses in biomedical-indexed journals conducted by medical students at Universidad Peruana Cayetano Heredia (UPCH), a premier medical school in Latin America with the highest scientific research production in Peru.¹¹

Methods

This is a retrospective cohort study. Theses were obtained from the authorised university's direction for scientific information management (Dirección Universitaria de Gestión de la Información Científica or DUGIC) at UPCH. We included all the registered theses from 2000-2003 for our study. All the registered theses had author's name, title, date of publication, summary and key words. We had no exclusion criteria. The completion of a thesis was a significant requirement for a medical degree at UPCH as it is in other countries.¹² Since 2004, medical students are no longer required to present a thesis. Rather, students must conduct a research project that may have up to three authors, though this is no longer called a thesis.

Search strategy

During June 2008, searches using PubMed (<http://www.pubmed.gov>) and Google Scholar (<http://scholar.google.com>) were conducted using key words with the names of the author and the advisor's thesis (Table 1). To find articles not indexed in PubMed, we searched on LILACS (<http://bases.bireme.br/cgi-bin/wxislind.exe/iah/online/?IsisScript=iah/iah.xis&base=LILACS&lang=e&form=F>), LIPECS (<http://www.bvs.org.pe/cgi-bin/wxis.exe/iah/?IsisScript=iah/iah.xic&lang=E&base=LIPECS>) and SciELO using a search criteria similar to that developed by Curioso *et al.*¹³ We limited our searching to those databases because those indexed most of the research carried out in Peru.¹⁰

Searching was made by three authors trained in searching biomedical bibliographical databases (IAQ, WHC and MJCE), who also selected

Table 1 Search strategy using PubMed, Google Scholar, LILACS and LIPECS

Database or Search engine	Search criteria
PubMed	'last name of author'[au] 'last name of advisor'[au]
Google Scholar	author: 'last name of author' author: 'last name of advisor'
LILACS	'last name of author' [Autor] and 'last name of advisor' [Autor]
LIPECS	'last name of author' [Autor] and 'last name of advisor' [Autor]

suspected dual publication in the most sensitive mode. Dual publication of the information was graded as suggested by the International Committee of Medical Journal Editors¹⁴ and the editors of cardiothoracic journals.¹⁵

The resulting search items were compared with the title of each thesis. If there was a complete or partial match, it was further corroborated by comparing the abstracts of the theses and the articles. A thesis was considered published in a biomedical journal if the authors, title and abstract matched between the thesis and the article found. We then tracked the name of the journal where the matching article was published.

The primary research area of a particular thesis was based on its listed key words. If no key words were registered, the primary research area was defined by consensus between two of the authors (I.A-Q. and W.H.C.). For comparison purposes, we consider SciELO as a database, though it is an electronic library.¹³

Statistical analysis

Descriptive statistics were used to summarise the data which were entered into computer files using the social science statistical software (SPSS version 13). Data are presented as percentages.

Results

Four hundred and eight-two medical theses were registered between 2000 and 2003 and 85 (17.6%) were published in biomedical-indexed journals.

Most of the theses (27 or 31.7%) were registered in 2002.

In general, the frequency of published theses in each database during 2000–2003 is as follows: 28 theses (5.8%) were published in MEDLINE-indexed journals, 55 (11.4%) in SciELO-indexed journals, 61 (12.6%) in LILACS-indexed journals and 68 (14.1%) in LIPECS-indexed journals.

In addition, 37 (43.5%) belong primarily to internal medicine and 24 (28.2%) belong primarily to infectious diseases (Table 2).

Sixty-eight theses (80%) were published in Peruvian journals and 17 theses (20%) were published in foreign journals (all of them indexed in MEDLINE). Most articles coming from medical theses were published in *Revista Medica Herediana* (indexed in SciELO, LILACS and LIPECS) and *Revista de Gastroenterologia del Peru* (indexed in MEDLINE, SciELO, LILACS and LIPECS). In addition, medical students were first authors in 71 (83.5%) of the articles.

Eighty-five theses produced 87 articles (Table 3), two of which were duplicates, meaning that the same data from one thesis were published twice. In the first case, the same data were published initially in *Parasitologia Latinoamericana* (not indexed in MEDLINE) and later in the *Revista de Gastroenterologia del Peru* (a MEDLINE-indexed journal).

In the second case, the same data were published initially in *Folia Dermatologica Peruana* (a journal in Spanish) and later in the *Revista de Medicina Tropical de Sao Paulo*, a journal in English and indexed in MEDLINE.

Discussion

To our knowledge, this is the first study that reports the publication pattern of medical theses at a Peruvian university in indexed journals. Most theses were published in LIPECS, the Peruvian database for health sciences journals. This might be explained by the fact that LIPECS is a database that stores journals, theses and technical reports in Spanish, the main language spoken in Peru. This study also reveals a domestic pattern of theses publication. In fact, almost one-third of the theses were published at the university's medical journal (*Revista Medica Herediana*). This may be due to

Table 2 Publication patterns of undergraduate medical theses at Universidad Peruana Cayetano Heredia

	Published	Articles in Spanish	MEDLINE	SciELO	LILACS	LIPECS
Primary research area*						
Medicine	37	35	11	25	27	34
Infectious diseases	24	18	13	18	17	15
Paediatrics	10	10	0	4	7	9
Psychiatry	7	7	3	2	4	4
Surgery	4	4	1	4	4	4
Gynaecology	3	3	0	2	2	2
Total	85	77 (90.5%)	28 (32.9%)	55 (64.7%)	61 (71.7%)	68 (80.0%)

*Infectious diseases: medical topics primarily related to infectious diseases.

Medicine: medical topics not primarily related to infectious diseases, surgery, pediatrics or gynecology and obstetrics.

Includes topics such as education and history.

Surgery: topics primarily related to surgery.

Paediatrics: topics primarily related to paediatrics.

Gynaecology and obstetrics: topics primarily related to gynaecology and obstetrics.

Psychiatry: topics primarily related to psychiatry.

Table 3 Journals where medical students published their theses*

	First author (71)	Second author (16)	Total (87)
Peruvian journals (12)			
<i>Revista Medica Herediana</i>	20	6	26
<i>Revista de Gastroenterologia del Peru</i>	12	2	14
<i>Revista de la Sociedad Peruana de Medicina Interna</i>	7	2	9
<i>Folia Dermatologica Peruana</i>	4	0	4
<i>Enfermedades del Torax</i>	4	0	4
<i>Diagnostico (Peru)</i>	3	0	3
<i>Revista Peruana de Medicina Experimental y Salud Publica</i>	1	1	2
<i>Revista Peruana de Reumatologia</i>	2	0	2
<i>Acta Cancerológica</i>	1	0	1
<i>Revista Estomatológica Herediana</i>	1	0	1
<i>Revista Peruana de Oftalmología</i>	1	0	1
<i>Ginecologia y Obstetricia</i>	1	0	1
Foreign journals (14)			
<i>Revista de Neuro-psiquiatria</i>	3	0	3
<i>Infection Control and Hospital Epidemiology</i>	2	0	2
<i>Actas Españolas de Psiquiatria</i>	1	1	2
<i>International Conference on Aids</i>	1	1	2
<i>Cuadernos de Saude Publica</i>	1	0	1
<i>Revista Chilena de Pediatria</i>	1	0	1
<i>Revista de Medicina Tropical de Sao Paulo</i>	1	0	1
<i>Sexually Transmitted Diseases</i>	1	0	1
<i>The American Journal of Tropical Medicine and Hygiene</i>	1	0	1
<i>Parasitología Latinoamericana</i>	1	0	1
<i>Transactions of the Royal Society of Tropical Medicine and Hygiene</i>	1	0	1
<i>Revista Española de Salud Publica</i>	0	1	1
<i>Emerging Infectious Disease</i>	0	1	1
<i>International Congress Series</i>	0	1	1

*Two cases of duplication were found.

the journal being well known at the university and possibly because the medical students are not aware of the diverse journal venue for publishing articles. The second most favorite journal is *Revista de Gastroenterología del Peru*, one of the most important Peruvian journals, and the only MEDLINE-indexed journal in Peru.¹⁰

Almost 18% of the theses were published in indexed journals, which is comparable to some universities from developed countries such as Finland and France.^{3,4} Only 5.8% of all published theses, however, were published in MEDLINE-indexed journals, which is fairly low compared to a study from France that found that 17% of medical theses were published in MEDLINE-indexed journals.³ The low number of publications in MEDLINE found in this study might reflect the situation and challenges of other researchers in Latin America.¹⁶ This difference could be explained by the many challenges that undergraduate students face when it comes to publishing.¹⁷ A barrier for students may be writing in English, which is considered a time-consuming and difficult enterprise for some.¹⁸ Another factor is the lack of incentives for publishing. In Peru, students and faculty do not usually receive funds for publishing,¹⁹ and many times theses at UPCH are produced from existing projects, i.e. grants funded by national or international institutions to advisors, although many others are self-funded out-of-pocket by the students themselves.¹⁸ Gutierrez and Mayta found that undergraduate Peruvian medical students' main perceived limitations for scientific publishing were: a lack of value of the work done, an absence of a culture of publication, a lack of knowledge regarding the venues for publication, the quality of research done, a lack of support from mentors, a lack of training in medical publishing and a lack of incentives to publish.² Many times, the first good research work done by a medical student is his or her thesis.²

In this study, most published theses were related to internal medicine and to infectious diseases. This is not surprising as UPCH is globally characterised by high-quality tropical and infectious diseases research and training programmes.^{20,21}

We also found two cases of duplication. Some authors consider some situations of duplicate publication justified (e.g. publication in different

languages and with clear cross references).^{22,23}

This might be the case found in the second instance (the article was initially published in a journal in Spanish and later the article was published in English), but the authors failed to declare the cross reference. It is possible that in the first case the authors wanted to increase visibility (the article was initially published in a SciELO-indexed journal and later it was published in a MEDLINE-indexed journal). In both cases, the pattern of duplication was an identical sample and outcomes.²⁴ In any case, authors should carefully read the proscription against duplicate publication that appears in the 'Instruction to Authors' before submitting to a particular journal, and in other communications. Sometimes publishing one article in two or more languages could be acceptable but cross references should be clearly stated. As Bailey mentioned: 'The act of submission infers that the manuscript should be published because the information is not available elsewhere and because it is significant'.²² Many institutions are storing theses and dissertations in university repositories, which might be considered 'published' in one sense.²⁵ We might have a duplicate publication problem if journals take a very strict approach to duplicate publication. This issue needs to be further explored.

In Chile, Reyes *et al.* documented some cases of duplication in *Revista Medica de Chile* from well-recognised researchers.²⁶ In Peru, Salinas and Mayta-Tristan reported a case of duplication in a Peruvian journal;²⁷ and Rojas-Revoredo *et al.* have detected a case of plagiarism.²⁸ Significant efforts should be made to educate authors, particularly young academicians, to avoid the practice of duplicate publication.^{22,27}

One limitation of the study is that we studied only the theses at one private university in Peru. Therefore, our results can not be generalised to all medical schools in Peru. In addition, we are unable to determine if there is at least one article currently under peer-reviewed process or in press. Another limitation is that we focused our work on published articles and we did not consider scientific communication in congresses or medical conferences, in part, because it is very difficult to access those types of publications. Although most of the research carried out in Peru is not indexed in

EMBASE,¹⁰ this could be a limitation as we did not include that database in our search strategy, and we could have missed a reference of a published thesis. We did not evaluate the amount of manuscripts submitted which might be a more accurate measure of the research activity than accepted publications.²⁹ In general, there is under-representation of developing countries in the research literature, especially in high-impact general medical journals.³⁰ Far more manuscripts submitted from low and middle-income countries are rejected when compared with high-income countries.²⁹ Some of the challenges described include different socio-cultural, and economic contexts, low technical preparation, low quality of articles and even the presence of a 'developing country bias' which influences the likelihood of publication.³¹ A topic for future research is to determine the interests of students in conducting a thesis (e.g. purely academic or scientific) and the quality of the published articles coming from theses.

Undergraduate scientific production is increasing in Peru.³² Most of this, however, is available as abstracts or proceedings from presentations at congresses and conferences.³³ There are many challenges and limitations for publication in undergraduate schools in Peru.^{2,34} One strategy to tackle this issue could be organising courses and workshops on scientific publishing periodically that include ethical issues in publication. Ideally, those courses should be integrated into the medical curricula. This strategy has been shown to be effective elsewhere.¹ We hope that our results help researchers, other health professionals and students to better promote research and improve the quality of publications, not only in Peru but also in other developing countries. Finally, more studies should be performed to understand the lack of publication in undergraduates.

Conclusion

In this study, most of the published theses were in Spanish, published in local journals and indexed in LIPECS. The percentage of published theses in biomedical journals at this university is comparable with those from developed countries (e.g. Finland and France).

Competing interests

The author(s) declare that they have no competing interests.

Author contribution

W.H.C. participated in the design of the study, collected the data, and led the analysis, interpretation and manuscript drafting. I.A.Q. conceived the study, collected the data, participated in the design of the study, data analysis and helped draft the manuscript. M.C.E. collected the data, participated in the data analysis and helped draft the manuscript. O.G. reviewed the manuscript and made significant comments. All authors read and approved the final manuscript.

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