



## Publication rates and characteristics of medical theses from a University Hospital in México City

Oscar C. Thompson-Chagoyán<sup>a1\*</sup>, Pablo Maravilla<sup>b2</sup>, Octavio Sierra-Martínez<sup>b3</sup>, Ingrid Jaqueline Pratt-Rosales<sup>a4</sup>, Rubén Alejandro León-Laredo<sup>a5</sup>

<sup>a</sup>Universidad Anáhuac México, Facultad de Ciencias de la Salud, Estado de México, México.

<sup>b</sup>Hospital General Dr. Manuel Gea González, Ciudad de México, México.

ID ORCID

<sup>1</sup><http://orcid.org/0000-0003-3471-8291>, <sup>2</sup><http://orcid.org/0000-0003-2534-9447>, <sup>3</sup><http://orcid.org/0009-0007-1178-3580>,

<sup>4</sup><http://orcid.org/0009-0007-9102-8971>, <sup>5</sup><http://orcid.org/0000-0003-3604-4569>

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### ABSTRACT

**Background:** In medicine, as in other disciplines, a significant amount of research is first captured in the thesis of university degree candidates. Nevertheless, on many occasions the scientific rates of thesis publication are meager. The Hospital General “Dr. Manuel Gea Gonzalez” (HGMGG) is a relevant public university hospital in Mexico City; however, the characteristics, fate, and publication rates of the dissertations produced by medical residents are unknown. The objective of the present study was to examine these essential aspects in our Hospital to identify areas of opportunity to increase publishing of these research dissertations. **Material and methods:** Data from the theses presented between 1980 and 2000 were obtained from the TESIUNAM repository. Publication of theses in indexed and non-indexed biomedical journals was assessed by a search strategy using Google Scholar, SciELO, Pubmed, Scopus, Science Direct, ProQuest, Ebsco, Ovid, Imbiomed, and Lilacs databases. **Results:** Sixty-eight of 360 (18.9%) medical theses written by residents were transformed into articles published in scientific journals. Residents were the first authors on 19% (13/68) of these articles. The factors associated with the publication of a particular thesis were a prospective and analytical design; human beings as the study subjects; presentation by the Department of Pediatrics; supervisor with PhD degree, and Mexican journal with impact factor in SJR and Scopus Impact Factor. **Discussion:** A low proportion of theses publication was found in our hospital. It is necessary to implement measures to improve the rate of publication by residents.

**Key words:** publication thesis; medicine residents; scientific papers; medicine specialty.

\* *Corresponding Autor:* Oscar C Thompson-Chagoyán. Universidad Anáhuac México, Campus Norte. Facultad de Ciencias de la salud. Address: Av. Universidad Anáhuac 46, Lomas Anáhuac, C.P. 52786, Huixquilucan, Estado de México. Tel: +52 55 5627 0210. E-mail [oscar.thompsonch@anahuac.mx](mailto:oscar.thompsonch@anahuac.mx)

## RESUMEN

**Antecedentes:** En medicina una cantidad significativa de investigación se refleja primero en las tesis de los residentes. Sin embargo, en muchas ocasiones la publicación de las tesis científicas es exigua. El Hospital General “Dr. Manuel Gea González” es un relevante hospital público universitario de la Ciudad de México; sin embargo, se desconocen las características y tasas de publicación de las tesis realizadas por los médicos residentes. El objetivo del presente estudio fue examinar estos aspectos en nuestro Hospital para identificar áreas de oportunidad para incrementar la publicación mediante tesis de investigación. **Material y métodos:** Los datos de las tesis presentadas entre 1980 y 2000 se obtuvieron del repositorio TESIUNAM. La publicación de tesis en revistas biomédicas indexadas y no indexadas se evaluó mediante una estrategia de búsqueda en las bases de datos Google Scholar, SciELO, Pubmed, Scopus, Science Direct, ProQuest, Ebsco, Ovid, Imbiomed y Lilacs. **Resultados:** Sesenta y ocho de 360 (18,9%) tesis médicas escritas por residentes fueron transformadas en artículos publicados en revistas científicas. Los residentes fueron los primeros autores en el 19% (13/68) de estos artículos. Los factores asociados a la publicación de la tesis fueron un diseño prospectivo y analítico, con el ser humano como sujeto de estudio, presentación por parte del departamento de pediatría, director con título de doctorado y revista mexicana con factor de impacto en SJR y Scopus Impact Factor. **Discusión:** En nuestro hospital se encontró una baja proporción de publicación de tesis. Es necesario implementar medidas para mejorar el ritmo de publicación por parte de los residentes.

**Palabras clave:** publicación de tesis; residentes de medicina; artículos científicos; especialidad médica.

## INTRODUCTION

In Mexico, as in many countries, medical specialization is completed when the specialist trainee doctors (residents) present their thesis. However, publication in a scientific journal is unnecessary to obtain the medical degree.

Consequently, the knowledge remains in the archives of a university library, where sometimes it is difficult to consult, and its diffusion is almost null.<sup>1</sup>

This inaccessible information may result in many unfavorable consequences, including waste of resources and medical knowledge, unnecessary duplication of studies, and loss of scientific integrity trust.<sup>2</sup>

Although students know, as with any research, that a thesis should not be complete before it is shared, that there are advantages of publishing the work carried out during their years of specialization. Getting residents to publish their results is a global problem since only on a few occasions does half of the theses appear in indexed journals.<sup>1-29</sup> (Table 1)

**TABLE 1.** Some representative thesis publication rates in the world

| Author (year)                                   | Country        | No. of theses | Published | %    |
|---|----------------|---------------|-----------|------|
| Hollmann <i>et al</i> (2015) <sup>3</sup>       | Spain          | 162           | 87        | 53.7 |
| Caan and Cole (2012) <sup>4</sup>               | United Kingdom | 82            | 43        | 52.4 |
| Brunod <i>et al</i> (2020) <sup>1</sup>         | France         | 148           | 76        | 51.3 |
| Pitche <i>et al</i> (2007) <sup>5</sup>         | Togo           | 240           | 99        | 41   |
| Al-Busaidi <i>et al</i> (2017) <sup>6</sup>     | New Zeland     | 89            | 36        | 40.4 |
| Chassagnon <i>et al</i> (2016) <sup>7</sup>     | France         | 224           | 79        | 35.3 |
| Roudbari <i>et al</i> (2012) <sup>8</sup>       | Iran           | 313           | 96        | 30.7 |
| Sipahi <i>et al</i> (2012) <sup>9</sup>         | Turkey         | 538           | 161       | 30   |
| Dhaliwal <i>et al</i> (2010) <sup>10</sup>      | India          | 160           | 48        | 30   |
| Varela-Pinedo <i>et al</i> (2015) <sup>11</sup> | Perú           | 399           | 114       | 28.6 |
| Baufreton <i>et al</i> (2012) <sup>12</sup>     | France         | 598           | 165       | 28   |
| Nieminen P. <i>et al</i> (2007) <sup>13</sup>   | Finland        | 256           | 61        | 23.8 |



|  |                |        |      |      |
|--|----------------|--------|------|------|
| Ticse <i>et al</i> (2014) <sup>14</sup>            | Perú           | 199    | 47   | 23.6 |
| Nour-Eldein <i>et al</i> (2015) <sup>15</sup>      | Egypt          | 208    | 45   | 21.6 |
| Arriola-Quiroz <i>et al</i> (2010) <sup>16</sup>   | Peru           | 482    | 85   | 17.6 |
| Salmi <i>et al</i> (2001) <sup>17</sup>            | France         | 300    | 51   | 17   |
| Munung <i>et al</i> (2014) <sup>18</sup>           | Cameroon       | 130    | 22   | 16.9 |
| Koca <i>et al</i> (2016) <sup>19</sup>             | Turkey         | 1,508  | 224  | 14.9 |
| Griffin and Hindocha (2011) <sup>20</sup>          | United Kingdom | 515    | 72   | 14   |
| Valle and Salvador (2009) <sup>21</sup>            | Perú           | 93     | 11   | 11.8 |
| Benotmane <i>et al</i> (2012) <sup>22</sup>        | France         | 2,150  | 243  | 11.3 |
| Rhyne (2000) <sup>23</sup>                         | USA            | 201    | 17   | 8.5  |
| Castro-Rodríguez <i>et al</i> (2020) <sup>24</sup> | Perú           | 1,954  | 134  | 6.9  |
| Özgen <i>et al</i> (2011) <sup>25</sup>            | Turkey         | 22,625 | 1386 | 6.1  |
| Figueredo <i>et al</i> (2002) <sup>26</sup>        | Spain          | 204    | 13   | 6.3  |
| Atamari-Anahui <i>et al</i> (2015) <sup>27</sup>   | Peru           | 398    | 20   | 5    |
| Taype-Rondán <i>et al</i> (2012) <sup>28</sup>     | Peru           | 74     | 2    | 2.7  |

The causes reported in the scientific literature related to this problem are multiple,<sup>29-31</sup> and the actions implemented to improve the publication rate have not proven to reverse them (stimulation training and promotional activities of investigation, the obligation to present a thesis to obtain the academic degree, research methodology courses during residency, training advisors who actively publish, help to adapt the format of the thesis to that of a scientific article).

Furthermore, the low rate of thesis publication has worsened because universities allow students to obtain degrees through options other than preparing and presenting a thesis.<sup>29</sup>

The Hospital General “Dr. Manuel Gea Gonzalez” (HGMGG) is a public general hospital in the south of Mexico City; it is surrounded by the most important hospitals that belong to the National Health Institutes of our country, offering several medical specialties for the thousands of patients seeking medical care. HGMGG is also an important university hospital in the country, because it hosts up of 17 medical and nursing subjects to university students, from different careers such as Medicine, Dentistry, Nursing, and Nutrition. Approximately 335 residents of Mexico and other countries in Central and South America receive training annually at the hospital.<sup>32</sup>

Given that the rate of thesis publications in the HGMGG is still being determined, the present study’s objective was to analyze how frequently research carried out by residents appears in scientific journals and the characteristics mentioned in the material and methods section.

## MATERIAL AND METHODS

### Timeframe and case selection

We conducted a single-center retrospective cohort study over 20 years (1980 and 2000). The search for theses and articles consisted of three stages.

#### First stage:

The theses were retrieved from the open access repository of the Universidad Nacional Autónoma de Mexico, known as TESIUNAM ([https://tesionam.dgb.unam.mx/F/XSGYNI5G2AMXX9EYVBKBHAYKXXLEE1C771TQN65JTXX-S4MYJ9P-04173?func=file&file\\_name=find-b](https://tesionam.dgb.unam.mx/F/XSGYNI5G2AMXX9EYVBKBHAYKXXLEE1C771TQN65JTXX-S4MYJ9P-04173?func=file&file_name=find-b)), which is the web site where these documents are stored for public consultation. We obtain the title of the thesis and the year of publication, the name and sex of the resident, the supervisor or supervisors, and the corresponding medical specialty, the type of study carried out, and the material and methods used. In addition, the degree of the supervisor(s) was obtained from the publicly available National Registry of Professionals database (<https://cedulaprofesional.sep.gob.mx/cedula/presidencia/indexAvanzada.action>)

#### Second stage:

We check if a thesis resulted in a corresponding scientific publication in the indexed and non-indexed journals. An



exhaustive search was carried out, without time limit, in Scholar Google, SciELO, Pubmed, Scopus, Science Direct, ProQuest, Ebsco, Ovid, Imbiomed, and Lilacs, using the names and surnames of the thesis supervisor (s) and the resident. Whenever possible, one of the researchers contacted the thesis directors via email to confirm whether all the theses they had supervised were those that were in the repository or if they had any more, and whether they published other articles from the theses found and those not found.

### Third stage:

We analyzed published articles from the thesis to gather the following information: the year of publication of the article. Also, we confirmed that the title, the name of the Hospital, and the material and methods coincided with those described in the thesis.

Finally, the order of authorship by the tutor and the resident in the publication and the type of journal (indexed or not, national or international. language and impact factor) where the article was published were registered.

### Statistical analysis

A database was created in Excel and analyses were performed with the Statistical Package for the social sciences (SPSS) software (version 22.0). Descriptive statistics were used to analyze the data (means, medians, standard deviation, and percentages as appropriate), and comparisons were conducted using the Chi-square test, odds ratio, and confidence intervals.

In all cases, a value of  $p < 0.05$  was considered significant. The analyses were performed with the Statistical Package for the social sciences (SPSS) software (version 22.0).

## RESULTS

### Theses

We found three hundred and sixty-seven theses in TESIUNAM; the contacted supervisors added none. Seven were not included, three due to a lack of the supervisor's name (s), and four due to the absence of the theses' full text in the catalog. A total of three hundred and sixty theses were included in the study, with an average of  $17 \pm 15$  per year (range 0 to 59).

In the years 1981 and 1985 no theses were found in the repository and in the year 2000 the greatest number was found. Each of the theses was written by a resident, and 315 (87.5%) had one supervisor. A total of 102 supervisors participated, who directed from one (mean 4, median 2).

Almost a quarter of the theses found in the repository belongs to the Department of Pediatrics [74/360 (21%)], and one hundred ninety-seven theses (55%) were presented by residents of the four specialties considered basic in our country (Pediatrics, General Surgery, Gynecology, and Internal Medicine)

According to what was mentioned in the materials and methods section of the theses, it was found that 208 theses (58%) were descriptive and 152 (42%) analytical. Likewise, 251 (70%) were prospective, 104 (29%) retrospective, and five (1%) ambispective, of which 65% (234) were performed with human subjects.

### Articles and Journals

Sixty-eight out of 360 (18.9%) medical theses written by residents were transformed into articles published in indexed and non-indexed journals (average of 3.2 articles per year; range, 0-15), sixty-five were found in the bases consulted and three added by the contacted supervisors.

Fifty-seven (84%) of the theses were published in Mexican journals and eleven (16%) in international journals, 40 of 68 (59%) papers were published in indexed journals, and the median impact factor was 0.158 (range 0.056-15.487). Ninety percent of articles (61/68) were published in Spanish (57 in México and 4 in Spain). The four journals in which most articles in Spanish were La Revista Mexicana de Pediatría with ten papers (16%), seven in the Boletín Médico del Hospital Infantil de México (12%), five in Dermatología Revista Mexicana, and five in Gynecology and Obstetrics of Mexico (8.2% each respectively in these papers). Only 19% of the residents were first authors (13/68), 56% (38/68) were second authors, and 7% (5/68) of them did not appear in the published documents. On the other hand, the supervisors were the first author in 78% (53/68) of the published articles.

The median delay between thesis presentation and paper publication was 12 months (range 6-120 months). In the comparative analysis, significant differences were found for the publication of the theses. When they were carried out in the Department of Pediatrics, the study was analytical and prospective, when it was carried out on human beings, the director had a doctorate, when the publication was carried out in national journals, in Spanish, were indexed and had some impact factor (Table 2).

**TABLE 2.** Characteristics of the theses in relation to their subsequent publication

|                              |                               | Total (%)        | Published (%)    | Not published (%) | $\chi^2$     | OR (CI)                 | p-value           |
|------------------------------|-------------------------------|------------------|------------------|-------------------|--------------|-------------------------|-------------------|
| <b>Number of theses</b>      |                               | <b>360</b>       | <b>68 (18.9)</b> | <b>292 (81.1)</b> |              |                         |                   |
| Sex of resident              | Male                          | 212 (59)         | 35 (17)          | 177 (83)          | 1.91         | 0.69 (0.405-1.17)       | NS                |
|                              | Female                        | 148 (41)         | 33 (22)          | 115 (78)          |              |                         |                   |
| Sex of supervisor            | Male                          | 295 (82)         | 53 (18)          | 242 (82)          | 0.91         | 0.73 (0.381-1.40)       | NS                |
|                              | Female                        | 65 (18)          | 15 (23)          | 50 (77)           |              |                         |                   |
| Medical specialty            | <b>Pediatrics</b>             | <b>74 (20.5)</b> | <b>31 (42)</b>   | <b>43 (58)</b>    | <b>32.2</b>  | <b>4.85 (2.73-8.64)</b> | <b>&lt; 0.001</b> |
|                              | Gynecology and Obstetrics     | 45 (12.5)        | 6 (13)           | 39 (87)           | 1.04         | 0.63 (0.25-1.55)        | NS                |
|                              | Surgery                       | 49 (14)          | 4 (8)            | 45 (92)           | 4.26         | 0.34 (0.12-1.0)         | NS                |
|                              | Plastic surgery               | 39 (11)          | 6 (15)           | 33 (85)           | 0.27         | 0.79 (0.32-1.96)        | NS                |
|                              | Internal Medicine Dermatology | 30 (8)           | 1 (3)            | 29 (97)           | 5.20         | 0.14 (0.02-1.01)        | NS                |
|                              | Other                         | 26 (7)           | 9 (35)           | 17 (65)           | 4.52         | 2.47 (1.05-5.81)        | NS                |
| Number of supervisors        | One                           | 315 (87.5)       | 60 (19)          | 255 (81)          | 0.041        | 1.09 (0.48-2.46)        | NS                |
|                              | More than one                 | 45 (12.5)        | 8 (18)           | 37 (82)           |              |                         |                   |
| Academic level of supervisor | Specialist                    | 283              | 43               | 240               | 11.79        | 0.37 (0.21-0.66)        | NS                |
|                              | Subspecialist                 | 21               | 7                | 14                | 3.04         | 2.28 (0.88-5.88)        | NS                |
|                              | Master's degree               | 32               | 10               | 22                | 3.50         | 2.12 (0.95-4.71)        | NS                |
|                              | <b>PhD</b>                    | <b>22</b>        | <b>8</b>         | <b>14</b>         | <b>4.670</b> | <b>2.65 (1.06-6.59)</b> | <b>0.03</b>       |
| Study design                 | Descriptive                   | 208 (58)         | 31 (15)          | 177 (85)          | 5.11         | 0.54 (0.32-0.93)        | NS                |
|                              | <b>Analytic</b>               | <b>152 (42)</b>  | <b>37 (24)</b>   | <b>115 (76)</b>   | <b>5.11</b>  | <b>1.84 (1.08-3.13)</b> | <b>0.024</b>      |
| Data collection              | <b>Prospective</b>            | <b>251 (70)</b>  | <b>57 (23)</b>   | <b>194 (77)</b>   | <b>7.90</b>  | <b>2.62 (1.31-5.22)</b> | <b>0.005</b>      |
|                              | Retrospective                 | 104 (29)         | 11 (11)          | 93 (89)           | 6.60         | 0.41 (0.21-0.82)        | NS                |
|                              | Ambispective                  | 5 (1)            | 0 (0)            | 5 (100)           | 1.18         | 0.81 (0.77-0.85)        | NS                |
| Material                     | <b>Human beings</b>           | <b>234 (65)</b>  | <b>55 (23.5)</b> | <b>179 (76.5)</b> | <b>16.78</b> | <b>2.67 (1.40-5.11)</b> | <b>0.002</b>      |
|                              | Histopathological samples     | 24 (6.7)         | 7 (29.2)         | 17 (70.8)         |              |                         |                   |
|                              | Clinical records              | 76 (21.1)        | 4 (5.3)          | 72 (94.7)         |              |                         |                   |
|                              | Animal model                  | 17 (4.7)         | 2 (11.8)         | 15 (88.2)         |              |                         |                   |
|                              | Documentary review            | 9 (2.5)          | 0 (0)            | 9 (100)           |              |                         |                   |
| Journal's characteristics    | <b>Mexican</b>                | ----             | <b>61 (90)</b>   | ----              | <b>360</b>   | ----                    | <b>&lt; 0.001</b> |
|                              | Foreign                       | ----             | 7 (10)           | ----              |              | ----                    |                   |
|                              | <b>Spanish</b>                | ----             | <b>58 (85)</b>   | ----              | <b>360</b>   | ----                    | <b>&lt; 0.001</b> |
|                              | English                       | ----             | 10 (15)          | ----              |              | ----                    |                   |
|                              | <b>With impact factor</b>     | ----             | <b>40 (59)</b>   | ----              | <b>360</b>   | ----                    | <b>&lt; 0.001</b> |
| Without impact factor        | ----                          | 28 (41)          | ----             |                   | ----         |                         |                   |

## DISCUSSION

In the present study, the articles that appeared in both indexed and non-indexed journals, showed a thesis publication rate of 18.9%, but if only the indexed journals are taken into account, the publication rate drops to 11.1%. This low publication rate is consistent with studies carried out in Peru,<sup>16,21,24,27,28</sup> France,<sup>17,22</sup> Cameroon,<sup>18</sup> Turkey,<sup>19,25</sup> the United Kingdom,<sup>20</sup> the USA,<sup>23</sup> and Spain,<sup>26</sup> but it is much below the value of 30% considered very satisfactory by some authors.<sup>32</sup>

This low rate of scientific article production is also consistent with the report by Oboku *et al.*<sup>33</sup> who found that the

average publication in low and middle-income countries is only 7%, which translates into Latin American participation of less than 1% of world scientific production.<sup>34</sup> One of the possible causes of this low production at the international level is that even though most scientific journals in Latin America and the Caribbean are open access, few of them are found in recognized databases,<sup>35</sup> which would explain why despite ten databases were used to search for the publications of the residents' theses, three articles were not found in them and were provided by the supervisors; this fact has already been highlighted by several authors, although none used the number of databases data used in this study. Despite this, Brazil and Mexico lead scientific production in the region.<sup>36</sup>



On the other hand, our study revealed that the probability of a thesis being published is more significant if the study is prospective, analytical, and the study subject are human beings, which is in opposition to the findings of Taype-Rondán *et al.* in Peru,<sup>28</sup> who found that most of the theses published as original articles were descriptive and cross-sectional, despite the fact that, in the present study, the cross-sectional design was used in 58% of all theses.

Interestingly, it was identified that the resident as a first author was considerate in only 19% of those published, which contrasts with the general premise by which the name of the principal investigator, in this case, the resident, is almost always mentioned first. This outcome may be due to the fact that this aspect is not a rule and is poorly standardized,<sup>37</sup> even though there are recommendations on the order of appearance of the authors in publications with more than one author.<sup>38</sup> Another possibility that can explain this phenomenon is the little interest of the residents in the publication of their thesis, and when all the work is done, the supervisor is noted as the first author.

## CONCLUSIONS

In HGMG, it is necessary to increase the level of evidence of the studies carried out by residents, as well as to promote their publication in high-impact English-language journals in order to substantially improve their dissemination and the rate of publication of articles. Additionally, it is necessary to carry out actions aimed at improve the interest of the residents interested in publishing their own thesis before his/her presentation and obtaining the university degree, such as trying to adapt as much as possible the requirements of the documents demanded by the Universities with those of the journals. Alternatively, to encourage thesis publication, residents and their supervisors could be included in incentive programs or assisting with the publication of their work, even when they are no longer within the Hospital. Finally, training potential supervisors in the preparation of works and lines of research with greater impact, as well as in the way of obtaining financing, both for the development of the project and for the publication of its results, would undoubtedly promote an increase in the publication of research theses.

As a limitation of the present study, there is a high probability that some theses were not found in the repository because either the residents did not submit their thesis to the University or because we did not include all the names of the residents who completed their studies in

this period and only appeared the theses in which the name of the Hospital was included. Furthermore, not contacting all the thesis directors could modify the actual rate of publications coming from residents' theses. However, even with these limitations inherent in the experimental design approach used, valuable information was obtained.

Currently, data collection is being carried out between the years 2000 and 2020, as well as a multicenter study in several universities and hospitals in the country.

## CONFLICT OF INTEREST

The authors declare that they are free of any conflict of interest.

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