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Research

A Study on Neurosurgery Specialty Theses and Their Publication Status in International Journals

Nöroşirürji Uzmanlık Tezleri ve Uluslararası Dergilerde Yayınlanma Durumları Hakkında Bir Çalışma

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ABSTRACT

Objective: Bibliometric analysis of theses can provide information on the trends and shortcomings in the related scientific field. Several studies have evaluated the specialty theses in different medical disciplines. In this study, we investigated the publication rates of neurosurgery specialty theses in international scientific journals and associated factors.

Methods: Neurosurgery specialty theses completed between 2015 and 2019 was searched in the National Thesis Center of Higher Education Council database. The author, mentor, institution, thesis title, study design, and study topic were extracted. Publications of authors were browsed in the Scopus database in terms of a paper derived from the thesis. Current publication parameters of the author and mentor were also recorded. The publication status of the theses was analyzed regarding author-related factors (publication count, h-index, first-author article), mentor-related factors (publication count, h-index), institution, study design, and study topic.

Results: Two hundred and sixty-one theses were included in this study. The publication rate in a Scopus-indexed journal was 26.8%. Publication counts of author and mentor ($p<0.001$ and $p=0.027$, respectively), h-index of the author ($p<0.001$), first-author article by the author ($p<0.001$), study design ($p=0.009$), and study topic ($p=0.013$) were associated with the publication status of the theses.

Conclusion: The publication rate of neurosurgical theses sits above average compared to other medical disciplines. The most important factor for the publication of a thesis appears to be the academic activity of the author. Regardless, still a high percentage of neurosurgery theses have not been published, and their contribution to cumulative scientific knowledge remains limited.

Keywords: Thesis, publication, neurosurgery, index

ÖZ

Amaç: Tezler üzerinde yapılan bibliyometrik analizler ilgili bilim dalındaki eğilimler ve kısıtlılıklar hakkında bilgi sağlayabilir. Birçok çalışma farklı tıp disiplinindeki uzmanlık tezlerini incelemiştir. Bu çalışmada, nöroşirürji uzmanlık tezlerinin bilimsel dergilerde yayınlanma oranlarını ve ilişkili faktörleri inceledik.

Gereç ve Yöntem: 2015 ile 2019 yılları arasında tamamlanmış nöroşirürji uzmanlık tezleri Yüksek Öğretim Kurumu Ulusal Tez Merkezi veritabanında arandı. Yazar, danışman, tez başlığı, çalışma tipi, çalışma konusu toplandı. Scopus veritabanında yazara ait yayınlar tezden türetilmiş yayın varlığı açısından tarandı. Ek olarak yazar ve danışmana ait güncel yayın parametreleri de kaydedildi. Tezlerin yayınlanma durumu yazarla ilişkili faktörler (yayın sayısı, h-indeks, ilk isim yayın), danışmanla ilişkili faktörler (yayın sayısı, h-indeks), kurum, çalışma tipi ve çalışma konusu açısından değerlendirildi.

Bulgular: İki yüz altmış bir tez bu çalışmaya dahil edildi. Scopus'ta indekslenen dergilerde yayınlanma oranı %26,8 idi. Yazar ve danışmanın yayın sayısı (sırasıyla $p<0,001$ ve $p=0,027$), yazarın h-indeksi ($p<0,001$), yazara ait ilk isim yayın ($p<0,001$), çalışma tipi ($p=0,009$), ve çalışma konusu ($p=0,013$) tezlerin yayınlanma durumu ile ilişkili bulundu.

Sonuç: Nöroşirürji tezlerinin yayınlanma oranı diğer tıp disiplinleri ile karşılaştırıldığında orta sıraların üstünde yer almaktadır. Bir tezin yayınlanmasındaki en önemli faktör yazarın akademik aktivitesi olarak gözükmektedir. Yine de tezlerin büyük bir oranı yayınlanmamakta ve bilimsel bilgi birikimine katkısı sınırlı kalmaktadır.

Anahtar Kelimeler: Tez, yayın, nöroşirürji, indeks

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INTRODUCTION

A thesis is a document resulting from personal research on a topic of interest that has a varying degree of research quality (1). Two purposes of theses are to contribute to the scientific literature and to equip the researchers with skills essential for the profession that involves lifelong learning (2). Producing a thesis for specialization in medicine is a legal obligation for residents training in any field of medicine to complete their training in Turkey. The skills that a resident is expected to gain during this process are to develop a hypothesis by performing a literature search, plan and conduct research to test this hypothesis, interpret the results, and conclude by synthesizing the literature and their findings (3,4). Since this process can be overwhelming for an inexperienced individual, each thesis is conducted under the mentorship of a senior colleague, ideally an academic staff.

Although the publication of a thesis in a peer-reviewed journal is not mandatory to complete a specialty training program, doing so adds further value to the thesis. Recently, bibliometric studies were conducted to assess the publication status of theses in scientific journals, as well as associated factors (2,3,5-19). The institutional factors (affiliation, location), study-related factors (design, subject), author-related factors (gender, publication count, current academic title, and workplace), mentor-related factors (academic title), the interval from completion of the thesis to publication, and the journal index were among the factors that were investigated (5,6,8,10,13). However, most of them were descriptive and the remaining ones rarely went beyond univariate analysis. To the best of our knowledge, there were two bibliometric studies regarding specialty theses in neurosurgery in Turkey. Öğrenci et al. (15) performed a descriptive study regarding theses published in SCI/SCI-E indexed journals. The more recent study by Sarica et al. (7) has focused on the quality of the published journals and the academic activity of authors by looking into citations received, the impact factor of the journals, and the number of intraresidency publications. They didn't look into the differences between published and unpublished theses.

In this study, we performed a bibliometric analysis of recently completed neurosurgery specialty theses and assess the association of factors with the publication of theses in international peer-reviewed journals.

METHODS

Since no animal or humans were involved in the study, and a database search was conducted at publicly accessible websites, formal ethics approval was not required. The study was conducted in accordance with the Helsinki Declaration and the terms and conditions of the National Thesis Center of the Higher Education Council.

Between June 6-12, 2022, specialty theses for neurosurgery were searched in the online archive of the National Thesis Center of Higher Education Council (https://tez.yok.gov.tr/UlusalTezMerkezi). The search terms and fields that were used for this study are shown in Figure 1. Theses in the field of neurosurgery that were completed between 2015 and 2019 were included in this study. The theses carried out in disciplines other than neurosurgery were excluded from the study. The thesis title, study design, study subject, authors' name, institution's name, mentor's name, mentor's academic title, and publication year of the thesis were collected from the database. In theses with double mentors, the mentor that was listed first was taken into consideration.

A further search was conducted in the Scopus database (https://www.scopus.com; Elsevier, Amsterdam, Netherlands) to determine the total publication count and h-index of both the authors and mentors. Also, publications by authors in the Scopus database were browsed through individually to find a publication derived from the thesis. Finally, whether the authors have made any publications as the first author (excluding the ones derived from the thesis) was determined.

Institutions were categorized into university hospitals and training and research hospitals (UH and TRH, respectively). The academic title of the mentors was categorized into no title, assistant professor, associate professor, and professor.

Theses were categorized into two main groups based on study design, clinical studies, and experimental studies. For

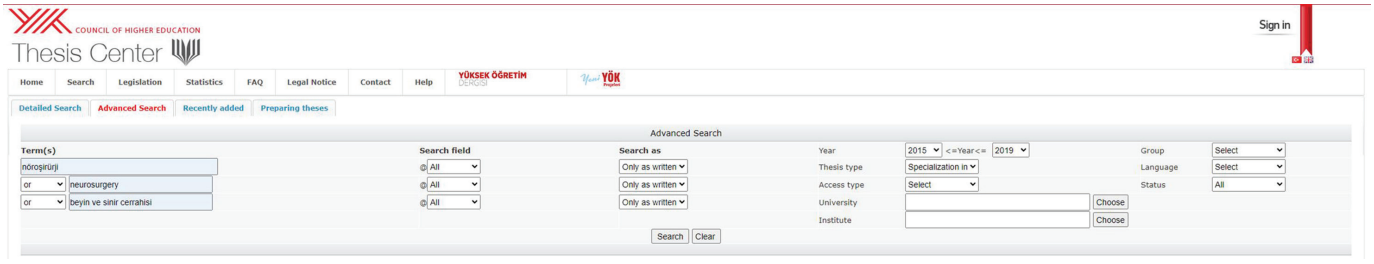

Figure 1. Search criteria used the online archive of the National Thesis Center of Higher Education Council

descriptive purposes, clinical studies were further divided into retrospective and prospective, whereas experimental studies were divided into the animal, cadaver, embryo, cell, and biomechanical studies.

The subject of the studies was assessed for univariate analysis only. Since there is not a universally accepted formal categorization for subspecialties of neurosurgery, the subjects were grouped based on education and training groups of the Turkish Neurosurgical Society (20). The subject topics were pediatric neurosurgery, spine and peripheral nerves, neurooncology, stereotactic functional pain and epilepsy (SFP&E), neurovascular surgery, surgical neuroanatomy, and miscellaneous.

Statistical Analysis

Statistical analyses were performed using SPSS 25.0 (IBM Corp, Chicago, USA) software. Descriptive statistics were expressed as median (minimum-maximum) for continuous variables, and observation number (%) for nominal variables. Normality analysis of continuous variables was assessed by the Kolmogorov-Smirnov test. Mann-Whitney U test was used to evaluate the statistically significant difference between groups in terms of continuous variables. The difference between nominal variables was analyzed by chi-square and Fisher-Freeman Halton Exact test. Logistic regression analysis was performed to identify factors that were associated with publication in the Scopus indexed journals. Odds ratio OR, 95% confidence interval and P values were determined for each variable. $P<0.05$ is regarded as statistically significant.

RESULTS

Two hundred and sixty-one theses were included in this study. Seventy theses were published in Scopus indexed journals. The mean interval from completion of a thesis to publication was 2.83±1.38 years.

One hundred and eighty-three theses were completed by residents in UHs compared to 78 from TRHs. The rate of published theses didn't show a significant difference between the two types of institutions.

The overall number of clinical and experimental studies were 128 and 133, respectively. The rate of publications derived from experimental studies was significantly higher in univariate analysis ($p=0.009$).

Animal experiments were the most frequent type of experimental studies in both published and unpublished theses. They were also the most frequently conducted study type in all published theses. In clinical studies, retrospective studies constituted a major portion of unpublished theses. On the other hand, they were only slightly more than prospective studies among published theses (18.6% vs 17.1%, respectively).

The most frequent topic both in the published and unpublished theses were spinal and peripheral nerves. This was followed by neurovascular surgery, neurooncology, and surgical neuroanatomy in unpublished theses and by neurooncology, neurovascular surgery, and SFP&E in published theses. Although the published and unpublished theses showed different trends in terms of study topics, this was not significant ($p=0.063$). The highest published/unpublished theses ratio belonged to the SFP&E (8/6) category, while the lowest ratio was observed in pediatric neurosurgery (3/13). Despite a high number of studies, the spine and peripheral nerve category also had one of the lowest published/unpublished ratios (17/69).

The author-related factors showed a significant difference between published and unpublished theses. The publication count of authors was significantly higher in published theses compared with unpublished ones. Similarly, the h-index of authors with published theses was significantly higher than those without. Finally, a significantly higher portion of the authors with a published thesis had at least one other article where they were the first author (60.0% and 15.7%, respectively).

Similar to authors, mentors of authors with published theses had a significantly higher number of published articles in Scopus indexed journals. On the other hand, the h-index and academic title of the mentors didn't show any significant difference between published and unpublished theses.

The demographic data regarding published and unpublished theses are summarized in Table 1 alongside the results of the univariate analysis.

The parameters that differed significantly between published and unpublished articles (publication count of the author, h-index of the author, publication count of the mentor, presence of first author publication, study design) were included in the logistic regression analysis. The publication count of the author and the presence of first-author articles were independently associated with the publication of theses (Table 2).

DISCUSSION

As every research, the thesis research generates knowledge and is expected to contribute to the literature. Although theses are considered scientific documents, they lack the potential to spread the knowledge they generated since they are usually limited to the university libraries

Table 1. Descriptive statistics and univariate analysis for evaluated factors in terms of publication status

	Not published in Scopus indexed journals (n=191)	Published in Scopus indexed journals (n=70)	p-value
Publication count [author] (median; range)	1 (0-49)	6 (1-46)	<0.001*
h-index [author] (median; range)	1 (0-11)	2 (0-9)	<0.001*
First-author article (n, %)	30 (15.7%)	42 (60.0%)	<0.001*
Year of the thesis			
2015	26 (13.6%)	14 (20.0%)	0.356
2016	31 (16.2%)	16 (22.9%)	
2017	52 (27.2%)	13 (18.6%)	
2018	43 (22.5%)	14 (20.0%)	
2019	39 (20.4%)	13 (18.6%)	
Publication count [mentor] (median; range)	40 (6-195)	51.5 (8-140)	0.027*
h-index [mentor] (median; range)	11 (3-28)	12.5 (3-25)	0.182
Institution (UH:TRH) (n)	132:59	51:19	0.665
Academic title			
No title (n, %)	10 (5.2%)	3 (4.3%)	0.630
Assistant professor (n, %)	30 (15.7%)	8 (11.4%)	
Associate professor (n, %)	69 (36.1%)	31 (44.3%)	
Professor (n, %)	82 (42.9%)	28 (40.0%)	
Study design			
Clinical	103 (53.9%)	25 (35.7%)	0.009*
Retrospective	79 (41.4%)	13 (18.6%)	
Prospective	24 (12.6%)	12 (17.1%)	
Experimental	88 (46.1%)	45 (64.3%)	
Animal	56 (29.3%)	36 (51.4%)	
Cadaver	25 (13.1%)	6 (8.6%)	
Biomechanical	4 (2.1%)	0 (0.0%)	
Embryo	2 (1.0%)	0 (0.0%)	
Cell	1 (0.5%)	3 (4.3%)	
Topic			
Spine and peripheral nerve	69 (36.1%)	17 (24.3%)	0.063
Neurooncology	25 (13.1%)	12 (17.1%)	
Neurovascular surgery	30 (15.7%)	10 (14.3%)	
SFP&E	6 (3.1%)	8 (11.4%)	
Surgical neuroanatomy	24 (12.6%)	6 (8.6%)	
Pediatric neurosurgery	13 (6.8%)	3 (4.3%)	
Miscellaneous	24 (12.6%)	14 (20.0%)	
Publishing time (years) (mean ± SD)	-	2.83+1.38	

*Statistically significant. SD: Standard deviation, SFP&E: Stereotactic functional pain and epilepsy, TRH: Training and research hospital, UH: University hospital

Table 2. Logistic regression analysis of factors associated with theses' publication status in Scopus indexed journals

Model	Odds ratio (OR)	95% Confidence interval for OR		p-value
		Minimum	Maximum	
Publication count [author]	1.127	1.013	1.253	0.027*
h-index [author]	0.981	0.691	1.393	0.914
Publication count [mentor]	0.999	0.988	1.010	0.800
First-author article	3.045	1.389	6.675	0.005*
Study design	0.618	0.320	1.192	0.113
Constant	0.180	-	-	0.000

*Statistically significant

(3). The preferred mode of spreading this knowledge and contributing to literature is through publication in a scientific journal (4). So, since one of the purposes of a thesis is contribution to the literature, an unpublished thesis can not be considered as fulfilled its purposes completely. Also, publishing a thesis -that is not mandatory in Turkey- has advantages for those who pursuit an academic career.

The publication rates of specialty theses were investigated in several medical fields in Turkey. This rate ranged from 10.2% to 49.7% (2,3,5-18). This might be due to the index used for database search, criteria used for search, or study period. Interestingly, Özgen et al. (19) found a much lower overall publication rate (6.2%, range: 0.9-13.04%) for specialty theses completed between 1980-2005. However, they reported an increased publication rate toward the end of the evaluated period (19). The higher rates reported in the recent studies might have resulted from an ongoing increase in people publishing their theses.

In this study, we found that 26.8% of neurosurgery theses carried out between 2015 and 2019 were published in scientific journals. This is lower than what Sarica and Sayman (7) found (37.9%) in their study that covered 2000-2017 era. Interestingly, Öğrenci et al. (15) found a much lower rate (18%) between 2004 and 2013. Although they searched for publications in SCI/SCI-E-indexed journals, they used Pubmed/Medline, Google Scholar, and unspecified search engines. Also, they used the title of the theses in their search. In this regard, it is possible some publications could have been missed by Öğrenci et al. (15) Another reason might be the ongoing increase in the publication rate of specialty theses, as discussed above. However, because Sarica and Sayman's (7) study also searched Scopus indexed journals but covered a much longer timespan (17 years compared to 5 years of current study) and found a higher overall rate, we can assume that publication rates of neurosurgery fluctuated during these years.

The mean publishing time in our study was similar to other studies conducted in Turkey that ranged between 2.72±1.51 and 3.83±2.98 years (2,5,7,8,10-14). It was found that the publishing time in journals indexed in SCI/SCI-E was similar to those that didn't (10,14).

In Turkey, residency training has been given both in UHs and TRHs. Most of the specialty theses in Turkey were conducted in UHs (2,6,8,12,17,21). UHs are autonomous, focus on education and research, whereas TRH serve under government and prioritize health services. In this context, it can be expected that theses completed in university hospitals would be published more frequently. However, two individual studies found that the type of institution has no association with the publication of thesis (6,8). Our data support these findings.

The study topic and design are the most crucial element for a thesis. It must be chosen according to the area of interest of the resident, as well as the capabilities of the person and institution, novelty of the subject, and time required to complete the study. Despite clinical studies made up most of the theses, Söğütdelen et al. (6) reported an OR of 4.68 for publication in favor of animal experiments. This trend exists in other fields of medicine as well (5,10). However, there are also reports that found no association with study designs and publication status (8,14). Although we found an association between study design and publication status, it didn't emerge as an independent factor in multivariate analysis. This may have resulted from residents that pursuit of an academic career purposefully chose to do animal experiments for the thesis. Animal studies have more potential to be published owing to the original information they provide (10,14).

Duracinsky et al. (22) reported several author-related features as a barrier to publications, such as workload, inproficiency in English, and low budget, which can both limit the study itself and open access publishing. However, there are also motivating factors. Publishing a thesis contributes to cumulative knowledge of science, which is a main motivating factor for a true scientific spirit. Second, the publication of a thesis is a step toward an academic career. Similarly, Sayek and Yorgancı (23) reported that people with academic career expectations have published more. The association of publication status of the theses with active academic career or pursuit was confirmed by other studies (6,8,10). Although studies used different criteria to assess authors' post gradual academic activity, the findings show

that it was associated with the publication of the theses. Our results also showed that the authors with a first-author article and a higher number of published articles more likely to publish their theses.

Most thesis were mentored by a professor in our study. This is in concordance with similar studies in Turkey (8,9,21,24,25). However, the relationship with the title of the mentor and publication of a thesis was rarely investigated. Erim and Petekkaya (8) found that theses mentored by assistant professors were published more frequently. This might be related to the academic expectancy of assistant professors being higher than associate professors and professors. Although we found a similar association with the total publication count of mentors, this was not confirmed by multivariate analysis.

Regardless, the majority of these thesis were not published. The suggested reasons for not publishing a thesis were proposed to be related to heavy work load, motivation, mentoring and support, institutional research tradition, out-of-date thesis subject, low scientific quality, foreign language insufficiency, high submission/publication fees, and publication bias for negative results (4,5,7,10,22,26,27). An unpublished thesis does not reach the scientific community and can be regarded as financial loss, waste of time, and human resources. Moreover, since the majority of these studies are performed on either humans or animals and these studies are supposed to contribute to literature, non-publishing of these studies brings up the purpose of the study for debate ethically.

This study carries a few potential limitations. There may be theses that were not uploaded to the database. We didn't included theses of the last 2 years as similar studies, but this might still not be sufficient to reach a definitive status for the publication of the evaluated theses (28). And the unpublished status for a thesis doesn't mean they were never submitted to a journal.

CONCLUSION

The publication rates of recent neurosurgical specialty theses are similar to other disciplines, but still low. The publication of theses in indexed journals is a sign of academic success -first- of the institution -and second- the country where the study was conducted. The most significant factor that is associated with the publication of a thesis is the author himself. A person who is in pursuit of an academic career tends to publish their work. With that said, there are still a significant number of theses that were not published. The reasons behind this situation should be examined and people should be encouraged to contribute to the scientific community by publishing their theses.

ETHICS

Ethics Committee Approval: The study involved no animal or human and conducted on open access databases. So, a formal ethics committee approval is not relevant.

Informed Consent: The study does not require patient consent.

Authorship Contributions

Concept: S.B., Design: S.B., İ.B., Data Collection or Processing: S.B., İ.B., Analysis or Interpretation: S.B., Literature Search: S.B., İ.B., Writing: S.B.

Conflict of Interest: No conflict of interest was declared by the authors.

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