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A Bibliometric Analysis of 25 Years and 1273 Dissertations in Thoracic and Cardiovascular Surgery

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Abstract

Objective: Dissertations play a crucial role in developing research skills and clinical practices and they are required to complete the training program. The transformation of these dissertations into scientific publications is essential for clinicians pursuing academic careers. This study aims to evaluate the dissertations in the field of Thoracic and Cardiovascular Surgery in terms of publication rates and bibliometric parameters, and to analyze these data by making comparisons within and between these fields in Türkiye.

Methods: The study included 1273 dissertations in thoracic and cardiovascular surgery registered in the National Thesis Center between 1995 and 2020. Data were obtained from search engines, and bibliometric parameters were collected, including publication status, publication time, research method, author's gender, affiliation, citation count, and journal index. Statistical analysis was performed using SPSS, and bibliometric networks were visualized using VOSviewer.

Results: The overall publication rate was 39.5%, with thoracic surgery at 37.4% and cardiovascular surgery at 40.4%. Dissertations from universities had higher experimental and prospective study rates (17.2%) compared to training and research hospitals (2.9%), showing a significant difference ($P < .001$). Male researchers had a higher conversion rate of dissertations into articles (40.9%) compared to female researchers (31.7%) ($P = .019$). Articles published in SCIE journals had a shorter time to publication (3.7 years) and received more citations compared to other indexes ($P < .001$).

Conclusions: The findings indicate that dissertations in thoracic and cardiovascular surgery in Türkiye have comparable publication rates to other medical specialties, with a significant preference for SCIE journals. The study highlights the need for improved research infrastructure in training hospitals. The higher publication rates and shorter publication periods of experimental studies underscore their scientific value and the motivation of researchers in these fields.

Keywords: Thoracic surgery, cardiovascular surgery, dissertations, bibliometric analysis, publication rates

Dissertations offer significant opportunities for the development of research and academic research skills as well as clinical practice. Scientific publications transformed from the dissertations of expertise in medicine are of great importance for clinicians in as a criterion for starting and working in an academic career.[1] Thoracic and Cardiovascular Surgery in Türkiye were separated into individual specialties as a result of efforts dating back to 1960.[2]

Every surgical trainee must finish a designated curriculum and present a dissertation in order to graduate from the program.[3] All dissertations are shared on the website of the National Thesis Center in Türkiye for validation.[4]

Research in thoracic and cardiovascular surgery fields, which require complex surgical interventions and high levels of technical knowledge and skills, makes significant contributions to developing surgical practices as well as literature. Therefore, transforming a dissertation into a publication states the surgeon's tendency for scientific research as well as surgical interventions.

There are several studies in various surgical and medical fields regarding publication rates and other bibliometric aspects.[5-11] Yet, there was no comparative study for thoracic and cardiovascular surgery, let alone any study specifically for cardiovascular surgery. Considering that the studies on bibliometric analysis in these fields are limited in the literature, there is an important gap and need to provide valuable information on surgical specialty education and research practice.

Our study aims to evaluate the dissertations in the field of Thoracic and Cardiovascular Surgery in terms of publications and other bibliometric parameters, and to analyze these data by making comparisons within and between fields.

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Methods

Research Population

This study includes a total of 1273 dissertations published in the fields of thoracic and cardiovascular surgery between 1995 and 2020 and registered to the National Thesis Center.[12] The rationale behind this period was to maximize accessibility and widen the time frame. Studies before 1995 were limited and harder to access. The research population consists of researchers who prepared their dissertations during that period and whose data were accessible. The majority of them were presented by male researchers (1084), and only 189 were from female researchers. Cardiovascular surgery had 907 dissertations, while Thoracic Surgery had 366.

Data Acquisition

We used the search engines of the National Dissertation Center,[12] Google Scholar,[13] Web of Science Basic Search,[14] and

Web of Science Master Journal List[15] to search for printed scientific papers and collected certain bibliometric parameters, including publication status, publication time, the research method, author's name, gender and affiliation, first authorship status, citation count, the publisher journals' index, and Journal Citation Reports (JCR). Journal indexes were classified as Science Citation Index Expanded (SCIE), Emerging Source Citation Index (ESCI), other international indexes, and national index (TR-Dizin). Publication status was verified by searching the title, author, and keywords on each of the previously mentioned scientific search engines. A paper with a publication date before the dissertation or without the main researcher as an author was disqualified. Published abstracts were not counted as papers. These parameters were analyzed to evaluate the rates of transformation of theses into scientific publications and other bibliometric aspects.

Statistical Analysis

The continuous variables were analyzed using an independent t-test or Mann–Whitney U-test, and the categorical variables were analyzed using the chi-square test. The Pearson correlation test was applied to investigate the relationship between independent variables. We used the Statistical Package for Social Sciences version 25.0 software (IBM Corp.; Armonk, NY, USA) for statistical analysis. The statistical significance level was accepted as $P < .05$.

Data Visualization

VOSviewer version 1.6.18 (Center for Science and Technology Studies, Leiden University, The Netherlands) was the software used for visualizing the bibliometric network through keyword co-occurrence in the dissertations in order to better understand the trend of research in the field of thoracic and cardiovascular surgery. Other graphics were prepared on common using line tools for data visualization with the data set of this study.

Results

In both fields, 503 (39.5%) of the dissertations transformed into publications. The highest number of dissertations in a year was 114, in 2014, within the period of our research. The publishing rate as original articles was the highest in 2012 at 53.1% and the lowest in 1996 at 21.1% (Figure 1).

Of the dissertations examined in the field of thoracic surgery, most (n = 307; 83.9%) were from universities and 59 (16.1%) were from training and research hospitals (TRH). 50 (13.7%) of these theses consist of experimental or prospective studies. The ratio of women researchers was found to be 17.8% (n = 65) in the population.

When the publishing rates were examined, 37.4% (137) of the dissertations in the thoracic surgery field were published in scientific journals. A total of 70 articles were published in journals indexed in the Science Citation Index Expanded (SCIE). Nine of them were in Q1, four in Q2, 14 in Q3, and 43 in Q4 journals. Eight articles were published in Emerging Source Citation Index journals, three in other international indexes, and 56 theses were found in the nationally indexed (TR-Dizin) journals. The average publication time of the dissertations in thoracic surgery was 4.4 years with a 95% Confidence Interval (CI) of 3.9-5.

In the field of cardiovascular surgery, 760 (83.8%) of 907 dissertations examined were produced by universities and 147 (16.2%) by TRH. The proportion of experimental and prospective clinical studies was determined to be 15.4% (n = 14). The ratio of female researchers was found to be 13.7% (n = 124) among cardiovascular surgery graduates.

Publication rate was 40.4% (n = 366) in cardiovascular surgery. SCIE journals accepted 167 dissertations (12 of them in Q1, 10 in Q2, 41 in Q3, and 104 in Q4 journals). Twenty articles transformed from dissertations were published in ESCI journals, and 12 in other international indexes. The remaining 167 theses were published in national indexed journals. The average publication time of cardiovascular surgery theses was 4.5 years (95% CI: 4.2-4.9).

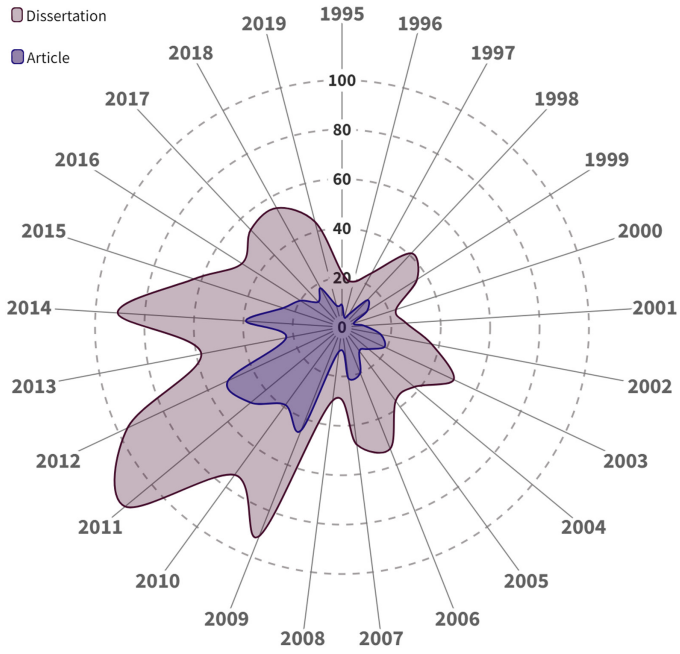

Figure 1. The number of thoracic and cardiovascular surgery dissertations presented by graduates and ones transformed into articles over the years.

In both fields, dissertations were mainly published from universities. There was no significant difference between thoracic and cardiovascular surgeries in terms of experimental and prospective research percentages ($P = .436$). The success and duration of the transformation to printed paper were similar ($P = .343$ and $P = .844$ respectively).

There was a clear dominance in the number of male trainees, as only 14.8% of the researchers were women. The gender gap fluctuated throughout the years, showing increases and decreases. In 2012, more female trainees presented theses and became surgeons than in any year, and they had their largest share at 31.8% in the year 2019 (Figure 2).

Although the proportion of women researchers among thoracic surgery graduates is higher compared to cardiovascular surgery, this difference is at the limit of significance ($P = .068$). The rate of transformation of dissertations by male researchers was 40.9%, while this rate was determined to be 31.7% for women ($P = .019$). There was no significant difference in terms of publication time ($P = .809$).

It was observed that the dissertations which were carried out in universities were published faster by 4.4 years (95% CI: 4-4.7). For the researchers who completed their education in TRHs, this period was 5.1 years (95% CI: 4.3-5.8). Although, the difference could not represent sufficient statistical significance ($P = .067$).

The rate of experimental and prospective studies conducted in universities is 17.2%, and this rate is 2.9% in TRHs. There was a statistically significant difference ($P < .001$). Graduates who finished their training in TRHs seem to have succeeded in converting their theses at a higher rate of 48.5%. For universities, this rate was 37.8%, which states a statistical significance ($P = .005$).

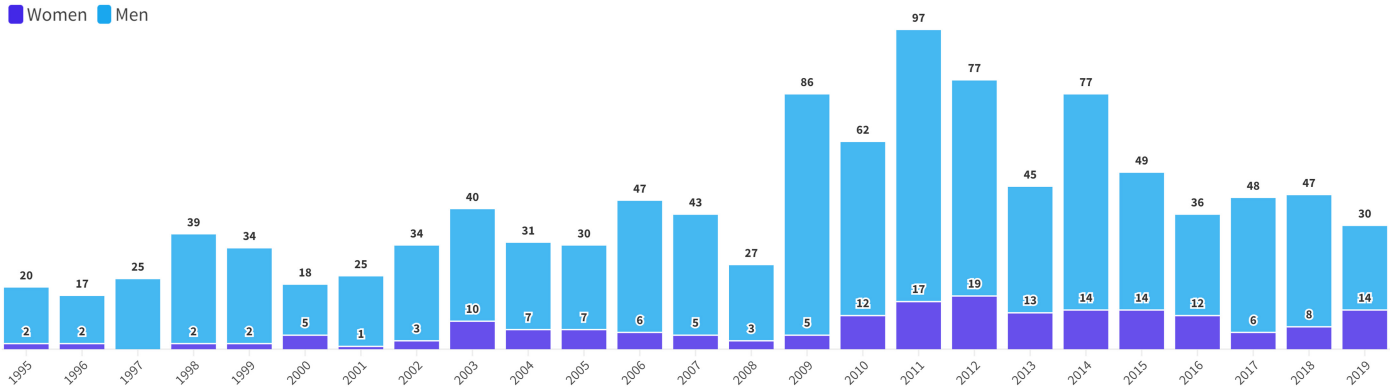

Figure 2. Gender distribution by year of the thoracic and cardiovascular surgery trainees who presented their dissertations and graduated from their training programs between 1995 and 2020.

According to our study, experimental and prospective clinical studies have a significantly higher publishing rate (46.8%) than other studies (38.2%) (P = .03). Furthermore, such studies have had the chance to get published in SCIE journals at a higher rate (56.2% versus 45.2%; P = .062) and have a higher average number of citations (6 against 4; P = .079). Publishing periods do not vary among the designs of the studies (P = .822).

While the articles accepted in SCIE journals with high impact factors were published in 3.7 years (95% CI: 3.3-4), the average was 5.2 years (95% CI: 4.7-5.7) in other indexes (P < .001). Additionally, the number of citations received by articles published in SCIE-indexed journals was significantly higher compared to those in other indexes (P < .001).

First authorship rate of the main researchers was 84%. Only 3% had another researcher as first author, while the rest of the articles had the supervisor of the study as first author. This rate was similar in both Thoracic and Cardiovascular fields (P = .299). Women researchers had a slightly higher first authorship rate with no significant difference compared to their male colleagues (P = .338). Surprisingly, this rate was 79% in experimental studies, though it did not represent any statistical significance (P = .122).

Network analysis of dissertation keywords run via VOSviewer software revealed and visualized the trend of the research field and gave an idea about research methods. Surgery, lung, cancer, bypass, artery, ischemia-reperfusion, injury, heart, valve, and graft were the most common keywords used in the dissertations. Comparison, morbidity, and mortality studies were dominant in the cluster. Rat and rabbit studies were less commonly found among the dissertations within the previously mentioned period. Iloprost was the only medication used in enough of the studies to make it in the keyword cluster (Figure 3).

Discussion

The results of our study provide important data on the bibliometric characteristics of theses in the field of Thoracic and Cardiovascular Surgery in Türkiye. There are limited studies on the bibliometric analysis of medical specialties in Türkiye. In a study conducted by Koca et al, the publication rate of orthopedic theses prepared between 1974-2012 was reported as 14.9%,[4] According to Baysan et al, 81.3% of theses in the field of orthopedics were conducted in university hospitals.[5] In the field of anesthesiology, 39.1% of theses produced between 2000 and 2018 turned into scientific articles.[6]

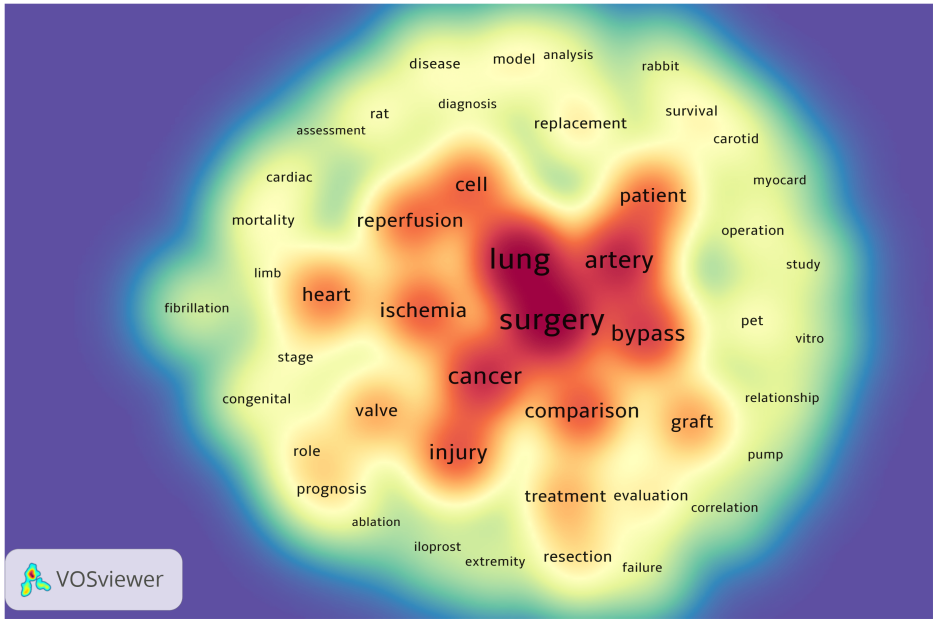

Figure 3. Network analysis of dissertation keywords obtained via VOSviewer software revealed and visualized the trend of the research topics as well as methods.

In a recent study in the field of Emergency Medicine, the publication rate of theses between 1998 and 2021 was reported as 35.5%.[7] A study examining general surgery theses produced between 1998 and 2018 revealed that 20.5% were published, with 14.4% appearing in SCIE-indexed journals. The study also highlighted that 49.3% of the theses were experimental in nature.[8] Another article states that the conversion rate to publication in neurosurgery dissertations between 2000 and 2017 was 37.9% and the average publication time was 3.8 ± 2.7 years. According to the study, 18% of articles were published in SCIE journals.[9]

Erim et al. showed that 37.9% of psychiatry theses between 2001-2018 were published as articles and stated that they had a publication rate of 28.5% in SCI/SCI-E journals. It was revealed that 82% of the theses were conducted at universities, and 2.7% of the studies were prospective and experimental.[10] According to another study by Sipahi et al, the publication rate of public health dissertations is 30%, and 11.9% of them were published in international journals.[11]

In our study, the overall rate of transformation into publication was 37.4% for Thoracic Surgery and 41.8% for Cardiovascular Surgery. These rates were close to those of other medical specialties previously reported in the literature from Türkiye. The publication rate in SCIE journals was 51.1% in the field of Thoracic Surgery and 45.6% in Cardiovascular Surgery. This result was above the rates reported in other studies. However, the rate of experimental and prospective clinical studies is seen to be behind many branches. These results revealed the academic tendency of the field and the interest of surgical residents.

It has been determined that male researchers have a higher chance of transforming their dissertations into articles. Apart from this, no parameter showing a significant difference in the two branches was found when gender was taken into account. However, it has been shown that female researchers publish their studies in a shorter time on average in the case of Thoracic Surgery. Furthermore, it is noteworthy that the rate of female specialist students in both the Thoracic and Cardiovascular Surgery fields is low. Our results are consistent with previous related studies highlighting the issue of the gender gap in medicine and academia. Encouraging and increasing the participation of women within surgical fields as trainees and researchers may help establish equity.[16-18] Overall, this issue cannot be handled without improving training programs, supporting facilities, supervising the approaches in individual centers, and developing social policies.[17]

In both specialties, the fact that articles published in SCIE journals have a shorter time for conversion into publication and receive more citations indicates the quality of the studies conducted and the prestige of these journals. This finding emphasizes that publishing in SCIE journals is important for academic careers and that such publications provide researchers with more visibility. In addition, experimental and prospective studies have a higher publication rate and a not significantly shorter publication period. This reveals that such studies are more valuable and noteworthy for scientific literature. This finding is consistent with the fact that experimental studies are more widely accepted and receive more citations in the literature.

First authorship of the main researcher wasn't observed in 16% of our study group. Even though there was no statistical significance in terms of various parameters, the low rate among experimental studies may raise a question regarding the contribution of the trainee and supervisors.

In our study, it was determined that the proportion of experimental and prospective studies among dissertations conducted at universities was significantly higher compared to those carried out in TRHs. This finding suggests that there is a need to support the academic environment and development in the research infrastructure of these institutions as well as improve the surgical curriculum to avoid disparity between training centers.[19]

Limitations

Since the study is confined to Türkiye, it may not fully represent the regional variations within these scientific disciplines. Furthermore, the study's scope might be limited by the exclusion of unpublished research, non-indexed publications, or those inaccessible through keyword searches. These limitations could potentially compromise the study's capacity to accurately reflect the complete landscape of research in this field. However, the authors do not think that it will make a significant difference in the results within the 25-year data set. Nevertheless, similar studies conducted in the future should aim to reach more comprehensive data sets by taking these limitations into consideration.

Conclusion

The findings of this study provide important data on the training of specialists in Thoracic and Cardiovascular Surgery in Türkiye, access to clinical and experimental research methods, and the ability to convert them into scientific articles. In both branches, the rate of conversion from thesis to publication and the rate of publication in high-impact journals appear to be ahead of other specializations in the literature. However, it was determined that they lag behind many branches in terms of the rate of experimental studies.

The higher publication rate and shorter publication period of experimental and prospective studies indicate that such studies are more valuable from a scientific perspective and that these researchers are more motivated in their academic careers. The fact that the rate of experimental studies in university institutions is much higher than in the TRH emphasizes that educational programs and research support should be organized in a way that encourages such studies in order to ensure equal opportunities among institutions. Similar studies to be conducted in the future can support and develop these findings with larger data sets and long-term analyses.

Availability of Data and Materials: The data that support the findings of this study are available on request from the corresponding author.

Peer-review: Externally peer-reviewed.

Declaration of Interests: The author has no conflict of interest to declare.

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