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How Scientific Are We in the Field of Cardiology?

Kardiyoloji Alanında Ne Kadar Bilimseliz?

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ORIGINAL ARTICLE
KLİNİK ÇALIŞMA

ABSTRACT

Objective: The current study investigated the contribution of the dissertations produced in the field of cardiology to the scientific literature and the factors affecting the publication process.

Methods: The study included 1049 cardiology dissertations archived in the national thesis center database between January 2010 and December 2017. The titles (English and Turkish), abstracts, and author names of cardiology dissertations were searched in Google Academic, TR Directory, and PubMed Central databases. In addition to their publication rates, the subject of the cardiology dissertations, the type of research, the type of institution, the academic title of the cardiology dissertation advisors, the duration of publication, the index of the published journals, and the quartile ranking of the Science Citation Index and Science Citation Index Expanded journals were examined.

Results: Among the reviewed 1049 cardiology dissertations 42.7% (n=448) were published in a journal. The publication rate of cardiology dissertations among male authors was 43.5% and among female authors 40.1%. The cardiology dissertations were published at the highest rate after the 60th month. Among the published cardiology dissertations, 63.4% (n=284) appeared in journals indexed by the Science Citation Index and Science Citation Index Expanded. There was no statistically significant relationship between the academic titles of cardiology dissertation advisors and the quartile ranking of Science Citation Index and Science Citation Index Expanded journals (P=0.072).

Conclusions: There were difficulties in transforming into a publication of dissertations in the field of cardiology to gain an academic identity. Incentives should be created to increase the desire and motivation of the residents.

Keywords: Doctorate, epidemiology, cardiology, ORPHEUS, thesis

ÖZET

Amaç: Bu çalışmada kardiyoloji alanında üretilen tezlerinin bilimsel literatüre katkısı ve yayın sürecini etkileyen faktörler araştırıldı.

Yöntemler: Çalışmaya Ulusal Tez Merkezi veritabanına kaydedilmiş 1049 kardiyoloji tezi (KT) dahil edildi. Ocak 2010 ile Aralık 2017 arasında tez merkezinin veri tabanı kullanılarak KT'lerin başlıkları (İngilizce ve Türkçe), özetleri ve yazar isimleri Google Akademik, TR Dizin ve PubMED Central veri tabanlarında tarandı. Yayınlanma oranlarının yanı sıra KT'lerin konusu, araştırma türü, üretildiği kurum türü, yazarların isim sıralamaları, tez danışmanlarının akademik ünvanı, yayın süresi, yayınlandığı derginin indeksi ve Science Citation Index (SCI), Science Citation Index Expanded (SCI-E) dergilerde yayınlananların kategori sıralaması değerlendirildi.

Bulgular: İncelenen 1049 KT'nin %42,7'si (n=448) bir dergide yayınlanmıştır. Yayınlanan KT'lerin yayınlanma oranı erkek yazarlar arasında %43,5 ve kadın yazarlar arasında %40,1'idi. KT'ler en yüksek oranda 60. aydan sonra yayınlanmıştı. Yayınlanan tezlerin %63,4'ü (n=284), Science Citation Index ve Science Citation Index Expanded kapsamındaki dergilerde yer aldı. Tez danışmanlarının akademik unvanları ile Science Citation Index ve Science Citation Index Expanded dergilerin kategori sıralaması arasında istatistiksel olarak anlamlı farklılık bulunmadı (P=0.072).

Sonuç: Kardiyoloji alanındaki tezlerin akademik bir kimlik kazanması için yayına dönüştürülmesinde zorluklar yaşanmaktadır. Uzmanlık öğrencilerinin istek ve motivasyonlarını artıracak teşvikler oluşturulmalıdır.

Anahtar Kelimeler: Doktora, epidemiyoloji, kardiyoloji, ORPHEUS, tez

A dissertation is a hypothesis-based, original, and scientific study. In educational terminology, this is scientific work prepared by students on a specific subject at the end of doctoral education. The dissertations have features named differently from works, such as assignments and projects.[1] Thesis studies, which started in the 1930s in

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our country, are now classified as master's, doctorate, proficiency in art, and dissertation in medicine. Dissertation studies provide individuals with experience in literature review, data collection, analysis, and interpretation.[2]

In our country, to become a cardiology specialist, it is necessary to complete 6 years of medical school (undergraduate and graduate) education followed by 4-5 years of cardiology residency training. Although a cardiology residency does not fully meet the definition of a universal doctorate program, it may be used as the equivalent of a doctorate in our country.[3] The physicians are expected to improve their clinical skills and gain the ability to make scientific publications during the cardiology residency. The medical dissertation has become one of the most valuable scientific studies, as it enables the development of scientific skills and is formed as a result of the final decision after a long preparatory phase. Therefore, medical dissertation creation is mandatory for completing a medical residency program.[4] After the medical dissertations are prepared with devotion, they can be published to enable physicians to advance academically and enter the world of science. The publication process is a difficult part, although not mandatory. Dissertations in developing countries have strikingly low publication rates, ranging from 1.2% to 52.3%.[5] However, no similar study has been carried out specifically for the field of cardiology. Therefore, this study aims to investigate the publication rates of cardiology dissertations (CDs) produced in our country and to show their place in national and international literature.

Materials and Methods

Study Design

Medical dissertations produced in the cardiology department and then uploaded to the database of the Turkish National Thesis Center (NTC) (https://tez.yok.gov.tr/UlusalTezMerkezi/) between January 2010 and December 2017 were retrospectively scanned in this study. The records related to the dissertations produced in the cardiology department were accessed using the NTC database's detailed search tab. Studies that were entered into more than one NTC database were separated. A total of 1049 CDs were reached between the specified dates. The date that CDs were uploaded to the database of the NTC, the research topic, the type of research, the type of institution, the academic title of the CD advisors, the index of the published journals, the quartile ranking of the Science Citation Index (SCI) and Science Citation Index Expanded (SCI-E) journals, and the relationship with other departments that contributed to their production were recorded. The department where CDs were mainly carried out was considered the jointly conducted department, except for the cardiology department. The study did not include CDs in 2017 and later years, considering that the publication process may be longer. Ethical committee approval was received from the Ethics Committee of Kahramanmaraş Sütçü İmam University University (Approval no: 01, Date: 22.06.2022).

Titles (English and Turkish), abstracts, and author names of the CDs were searched in Google academic, TR Directory, and PubMed Central databases. The absence of articles related to CDs in these databases was considered unpublished. Whether a CD turned into a publication was evaluated by comparing the summary of the CD with the abstract or the full text of the article in detail. The number of subjects in the CDs and the article was compared. Database incompatibility between the CD and the article was considered unpublished. The acceptance dates of the CDs published, the time duration between uploading to the NTC database and publication, and the research method were recorded. The order of the CD owner's name in the published article was searched. The name order of CD authors in the article was categorized as first, second, third, and others. In addition, journal indexes of published CDs were searched. Index types were categorized as SCI and SCI-E, Emerging Sources Citation Index, and Ulakbim TR Index. The Web of Science Database was used to find the quartile ranking and impact factor. Articles were placed in the appropriate index. Journal Indexes published outside these databases were defined as "other indexes."

Statistical Analysis

All statistical analyses were performed using the Statistical Package for Social Sciences 22 (SPSS Inc., Chicago, Ill, USA) for Windows. While numerical data were presented as averages, categorical variables were expressed as percentages. The Kolmogorov–Smirnov test, skewness, and kurtosis were used to assess normal distribution. The chi-square test was used to compare multiple categorical variables. A comparison of 3 and more than 3 independent groups was obtained with the one-way ANOVA test. A *P*-value less than .05 is statistically significant.

Results

A total of 1049 CDs recorded in the NTC system were included in the study between 2010 and 2017. The year in which the most CDs were produced was 2010 (17.3%, n=181). As high as 73.3% (n=769) of CDs were created at state universities. Of the CDs, 42.7% (n=448) were published in a journal. A total of 844 (80.5%) CDs were designed retrospectively, and 40.8% were published in a journal. The publication rate of prospective CDs was higher than retrospective CDs ($P=0.010$). There were significant differences between publication rates and years ($P=0.031$). When the 2010 and 2017 years were compared in the post-hoc analysis for the chi-square test, the publication rate of the CDs from the year 2010 was statistically higher than the 2017 year ($P=0.002$). No significant difference was found between the publication of CDs and the educational institutions where CDs were produced ($P=0.745$) (Table 1).

As high as 26.1% (n=117) of CDs were published after 60 months. The subject of 44.1% (n=225) of the CDs published was cardiovascular disease. Biochemistry was the department that produced the most common CDs, with the cardiology department (15.1%, n=158). This was followed by internal medicine at 10.1% (n=106) and cardiovascular surgery at 5.1% (n=53) (Table 2). Graph 1 compared the types of journal indexes according to cardiology topics.

ABBREVIATIONS

CDs	Cardiology dissertations
NTC	National Thesis Center
ORPHEUS	Organization of PhD Education in Biomedicine and Health Sciences in the European System
SCI	Science Citation Index
SCI-E	Science Citation Index Expanded

Table 1. Distribution of Cardiology Dissertations by Years, Type of Educational Institution, and Type of Research

	Published Dissertations		Unpublished Dissertations		Total Dissertations		
Years	**n**	**%**	**n**	**%**	**n**	**%**	***P***
2010	84	46.4	97	53.6	181	17.3	**0.031**
2011	46	36.8	79	63.2	125	11.9	
2012	55	40.4	81	59.6	136	13	
2013	79	51.3	75	48.7	154	14.7	
2014	52	41.3	74	58.7	126	12	
2015	55	46.6	63	53.4	118	11.2	
2016	45	43.7	58	56.3	103	9.8	
2017	32	30.2	74	69.8	106	10.1	
Total	448	42.7	601	57.3	1049	100	
Educational institution							
State university	323	42	446	58	769	73.3	0.745
Private university	94	44.8	116	55.2	210	20	
Training and research hospital	31	44.3	39	55.7	70	6.7	
Total	448	42.7	601	57.3	1049	100	
Type of research							
Retrospective	344	40.8	500	59.2	844	80.5	**0.010**
Prospective	104	50.7	101	49.3	205	19.5	
Total	448	42.7	601	57.3	1049	100	

Significant results ($P < 0.05$) were shown in bold type.

Of the published CDs, 63.4% (n=284) were indexed in SCI or SCI-E journals. Of these, 85.3% (n=382) were listed as the first name in the articles. Female authors constituted 22.1% of all CDs. The published CDs' ratios according to male and female authors were 43.5% and 40.1%, respectively (Table 3).

In Table 4, CDs published in SCI-SCI-E journals and their quartile ranking in the web of science were shown according to the academic titles of CD advisors. In addition, no difference was found between the impact factors of these CDs in terms of academic titles ($P=0.072$).

Discussion

The thesis's contribution to the scientific community can be evaluated by converting the thesis into a journal article. The value of scientific publications is determined by the number of citations they receive and taking place in internationally respected journals. Studies produced during the doctoral period will reference individuals throughout their academic and business life and qualify them as an academic identity.[6] In this study, we examined dissertations made in the field of cardiology among medical dissertations (doctoral thesis). The fact that cardiology is a branch of science including both invasive and non-invasive activities and is in constant communication with other medical departments has led to the need to scientifically evaluate the

Table 2. Distribution of Cardiology Dissertations According to the Research Topic, Relationship with Medical Departments, and Publication Time Interval

	Published CDs		Unpublished CDs		Total CDs	
Research Topic	**n**	**%**	**n**	**%**	**n**	**%**
HF/LVSD and LVDD	69	43.4	90	56.6	159	15.2
Cardiovascular disease	225	44.1	285	55.9	510	48.6
Hypertension	28	33.3	56	66.7	84	8
Heart valve diseases	36	43.9	46	56.1	82	7.8
Carditis	3	37.5	5	62.5	8	0.8
Arrhythmia	63	42.9	84	57.1	147	14
Lipid disorders	7	50	7	50	14	1.3
PH/RVSD and RVDD	17	37.8	28	62.2	45	4.3
Total	448	42.7	601	57.3	1049	100
Cardiology dissertations conducted jointly with any medical department						
Cardiology	237	40.2	352	59.8	589	56.1
Internal medicine	48	45.3	58	54.7	106	10.1
Chest diseases	14	35.9	25	64.1	39	3.7
Neurology	10	41.7	14	58.3	24	2.3
Dermatology	3	27.3	8	72.7	11	1
Radiology	8	29.6	19	70.4	27	2.6
Cardiovascular surgery	27	50.9	26	49.1	53	5.1
Biochemistry	82	51.9	76	48.1	158	15.1
Pharmacology	14	41.2	20	58.8	34	3.2
The others	5	62.5	3	37.5	8	0.8
Total	448	42.7	601	57.3	1049	100
The time interval between the uploading of cardiology dissertations to the national thesis center and their publication in journals						
Time interval	**Published CDs (n)**			**Published CDs (%)**		
6-12 months	49			10.9		
13-24 months	76			17		
25-36 months	82			18.3		
37-48 months	68			15.2		
49-60 months	56			12.5		
>60 months	117			26.1		
Total	448			100		

CD, cardiology dissertation; HF, heart failure; LVDD, left ventricular diastolic dysfunction; LVSD, left ventricular systolic dysfunction; PH, pulmonary hypertension; RVDD, right ventricular diastolic dysfunction; RVSD, right ventricular systolic dysfunction.

Table 3. The Index of the Journal, Name Order, and Gender in Published Cardiology Dissertations

	Journal Index	
	Published CDs	Published CDs
	n	%
SCI or SCI-E	284	63.4
ESCI or PubMed/ MEDLINE	93	20.8
ULAKBİM TR directory	56	12.5
Others	15	3.3
Total	448	100
Name order		
First	382	85.3
Second	49	10.9
Third	4	0.9
The others	13	2.9
Total	448	100

Gender						
	Published CDs		Unpublished CDs		Total CDs	
	n	%	n	%	n	%
Male CDs	355	43.5	462	56.5	817	77.9
Female CDs	93	40.1	139	59.9	232	22.1
Total	448	42.7	601	57.3	1049	100

CD, cardiology dissertations; ESCI, Emerging Sources Citation Index; SCI, Science Citation Index; SCI-E, Science Citation Index-Expanded.

dissertations produced in the field of cardiology in our country. This is the first descriptive study in the field of cardiology.

Our country has 3 types of institutions (state university, training and research hospital, and private university hospital) that provide specialized medical training and education. In our study, 73.3% of the CDs were made in state university hospitals. State universities have undertaken almost the entire burden of specialized medical training and education. Universities have emerged as the key institutions that promote Türkiye abroad and contribute to the scientific community by conducting scientific studies and producing new technology.[7] However, in our study, the publication rate of CDs showed no difference between types of institutions. This may reflect that the academic aspirations of lecturers are independent of the institution type.

The male and female gender ratios may differ between medical departments. In a study conducted with the otorhinolaryngology branch, the percentage of female authors in the dissertations was 20.9%.[8] Similar to this study, 22.1% was found in our study. However, in a study in which family medicine specialty dissertations were evaluated between 2005 and 2015, this rate was 50.8%.[9] In our study, although the rate of female CDs was lower than that of males, the publication rates were similar. In Sweden, last-year medical students were surveyed on their specialization preferences. Its findings showed that female and male students wanted medical specialties at a similar rate. However, this study drew attention to the fact that the branch of surgical medicine was still male-dominated in western countries. Among the reasons for this, family responsibilities, lack of social support, and role models may have affected the medical specialty choice.[10]

The most challenging stage in the thesis process is deciding on the topic. Study subjects should be designed by considering the abilities and interests of research assistants. In addition, the subject of study should be up-to-date and have features that can solve problems.[1,11] Our study showed that CDs were the most commonly co-produced with the biochemistry department. The idea that the markers and parameters measured in the blood can provide information about diseases led to joint studies with biochemistry. Collaborative studies with internal medicine took second place. The existence of common issues, such as autoimmune and inflammatory diseases, allowed for joint studies between the two departments. Cardiology has an important place in terms of its contribution to the literature, as it can collaborate with almost all other departments. Among the cardiology subjects, it was found that the most common studies were related to coronary artery disease. It can be said that the researcher tended toward this subject because this is common and easy to reach. On the contrary, carditis was the least studied subject. Difficulties in finding a topic due to the relatively low incidence of disease and the lack of sufficient time for data collection may be effective in this situation.

The cardiology branch is intertwined with all medical branches, and the integration of technological developments increases its contribution to the international literature. In addition, the fact that most deaths worldwide are due to cardiac causes, researches in this field also attract the attention of journals.[12] In this study, of the 1049 CDs examined, 42.7% were published in one of the journals. As high as 63.4% of the CDs published were in journals indexed in SCI and SCI-E. The medical specialties of otolaryngology and cardiology are comparable since they both contain internal and surgical facets. In a study that examined dissertations between 2007 and 2017 in otolaryngology, the publication

Table 4. Comparison of Cardiology Dissertation Advisors According to the Quartile Rank and Impact Factor of the Journals

	Q1 Journal		Q2 Journal		Q3 Journal		Q4 Journal		Total Journal		Impact Factor	
Academic Title	n	%	n	%	n	%	n	%	n	%	Median (IQR)	*P*
Assistant professor	1	3.6	4	14.3	9	32.1	14	50	28	9.9	2.11 (1.66)	0.072
Associate professor	2	1.9	14	13.5	48	46.2	40	38.5	103	36.6	2.97 (1.40)	
Professor	10	6.6	26	17.1	64	42.1	52	34.2	152	53.5	3.10 (1.59)	
Total journal	13	4.6	44	15.5	121	42.6	106	37.3	284	100		

rate of related dissertations was 35.6%. The rate of publication in SCI and SCI-E journals was 20.4%.[8] The results differ from our study due to the sampling year range and size. In a study in which 834 dissertations in infectious diseases were examined, the rate of dissertations turned into publications was 11.2%.[13] In a similar study conducted in neurosurgery, the publication rate of dissertations was 18%.[14] In another study conducted in the public health field, published dissertations rates were reported as 11.9% and 18% in international and national journals, respectively.[6] Besen et al[15] evaluated nursing graduate theses and showed that 15.8% of theses produced were indexed in journals within the scope of SCI and SCI-E. Considering these studies, we can say that CDs have been published highly. This may be due to the long period between the production year of the CDs and the beginning year of this study. In France, only 17% of 300 theses between 1993 and 1998, 1.6% of 482 theses between 2000 and 2003 in Peru, and 23.8% of 256 theses between 2001 and 2003 in Finland have been published.[5,16] It was considered that erroneous and incomplete data might have been entered because the theses were produced in the past years. In addition, the theses in the medical field were only not included. Publishing a thesis may pose a crucial academic problem in developing and developed countries.

The journals indexed by SCI and SCI-E are categorized according to their quartiles rank (Q1, Q2, Q3, and Q4). Q1 journals have the highest citation rates, impact factors, and scientific value.[17] The academic title of the thesis advisors may affect the publication of theses in journals with a high quartile rank. In our study, no relationship was found between the title of CD advisors and the impact factor of the journals. Çalışkan et al[18] showed that in emergency medicine, associate professors were more efficient in producing and publishing articles before receiving this title. This may indicate that the dissertation advisors with the lowest academic titles are willing to make academic progress and make an effort to produce high quality publications.

Another problem from the creation of the dissertation to the publication stage is that the authors do not turn the dissertation into an article and do not send it to a journal. After a dissertation is written, a certain amount of time is needed for it to be turned into an article and uploaded to journals. In the studies conducted, the period from the creation of the dissertation to its publication was at least 6 months.[19] In this study, most CDs were published after the 60th month. This can be because the dissertation is sufficient to obtain the doctorate, there is no requirement for publication, and the researchers are reluctant to turn the dissertation into an article. In addition, the rejection of dissertations converted into articles and the extended publication process cause a loss of motivation. Weber et al[20] revealed that only 20% of the authors sent their studies as presentations and posters to the journal. This may reflect the academic desires of the research assistants. The delay in the publication time of studies produced with great effort and making an impact in the literature is a process that slows down international academic development.

Quality assurance is becoming increasingly important in research and higher education internationalization. The need for internationally accepted standards to use as a guide in studies to improve quality is now recognized by everyone.[21] The requirement is also valid for doctorate programs. Medicine residency is considered similar to a doctorate program in our country. Although writing a dissertation for the doctoral program in Türkiye is regulated by in-house and inter-institutional, the necessity of additional criteria to increase quality and efficiency cannot be denied. The standards prepared by the Organization of PhD Education in Biomedicine and Health Sciences in the European System (ORPHEUS) can increase the applicability and quality of doctoral programs on the international platform.[22] The first steps were taken in Zagreb in April 2004 with the participation of delegates from 25 universities from 16 European countries, and so far, 119 university members from 42 countries have memberships. Many universities from Türkiye are also members of this organization. Its primary mission is to contribute to the development of biomedicine and health sciences by maintaining and promoting the PhD degree as a research degree. Thus, the career opportunities of young scientists will be strengthened. Aiming to develop and disseminate basic standards and best practices, this organization cooperates with all organizations with similar goals, not only in Europe but worldwide. The booklet published in 2012 contains a set of standards that outline the essential and quality development standards for PhD degrees and PhD programs.[23] The most significant difference between the ORPHEUS program (research environment, outcomes, admission policy and criteria, PhD training program, supervision, PhD thesis, assessment, and infrastructure), which consists of 8 parts, from the medical dissertation writing process in our country is that it includes the publication condition of the dissertations.[17] In addition, another difference is that the thesis advisor is not on the jury for objective evaluation. The "education-by-research" model adopted in Europe can be ignored due to the high density of courses for doctoral education in institutions of our country. It would be better if the ORPHEUS program could be integrated into medical specialization programs in our country. In this way, the doctoral diplomas of institutions in Türkiye can be recognized by many institutions in North America and Australia, especially in Europe. It can also provide the opportunity to show the scientific value of the articles to the international community.

The present study has some limitations. First, the CDs were searched in English and Turkish. No search was performed in other languages. Second, there may have been a problem with uploading CDs to the NTC platform. This problem may have caused the number of CDs produced and those scanned in the NTC registry system not to match. Third, most of the publications produced from CDs did not have the expression produced from CDs. Therefore, the CD's subject and author were considered if they matched the article.

It is necessary to develop the skills of writing and publishing articles for dissertations produced in the field of cardiology to gain an academic identity. The dissertations created with intense effort should be made mandatory for publication without losing time.

Ethics Committee Approval: Ethical committee approval was received from the Ethics Committee of Kahramanmaraş Sütçü İmam University University (Approval No: 01, Date: 22.06.2022).

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