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The Bibliometric Analysis of the Postgraduate Theses Written on Medical Parasitology in Türkiye

Türkiye'de Tıbbi Parazitoloji Alanında Hazırlanan Tezlerin Bibliyometrik Analizi

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ABSTRACT

Objective: The aim of this study was to analyze the theses prepared in the field of medical parasitology in Türkiye and to reveal the importance given to the science of parasitology in the groves of academe and to raise awareness in this field.
Methods: Council of Higher Education's National Thesis Center database has been analyzed postgraduate these documents conducted in the field of medical parasitology from January 1985 to September 2022.
Results: As a result of the examining, 393 theses made in the field of medical parasitology were detected. It was determined that 52.9% of the theses prepared were master, 28% of PhD and 19.1% were the thesis of medical specialty thesis and 61.3% of the theses prepared were related to protozoa, 16.5% of helminths, 8.6% arthropods and 12.2% of intestinal parasites (helminth and protozoa). The top five types of parasites in the theses were *Toxoplasma gondii, Leishmania* spp., *Echinococcus* spp., *Giardia intestinalis* and *Cryptosporidium* spp. respectively.
Conclusion: In conclusion, it was of the opinion that more importance should be given to the field of medical parasitology in Türkiye.
Keywords: Bibliometric analysis, postgraduate theses, medical parasitology, Türkiye

ÖZ

Amaç: Bu çalışmanın amacı, Türkiye'de tıbbi parazitoloji alanında hazırlanan tezlerin analizini yaparak, akademik camiada parazitoloji bilimine verilen önemi ortaya koymak ve bu alanda bir farkındalık oluşturmaktır.
Yöntemler: Çalışmaya, Yükseköğretim Kurulu Ulusal Tez Merkezi'nin online uygulamasından arama yapılarak, Ocak 1985-Eylül 2022 tarihleri arasında tıbbi parazitoloji alanında yapılmış tezler dahil edildi.
Bulgular: Arama sonucunda tıbbi parazitoloji alanında yapılmış 393 tez saptandı. Tezlerin %52,9'unun yüksek lisans, %28'inin doktora ve %19,1'inin tıpta uzmanlık tezi olduğu belirlendi. Tezlerin yapıldığı alanlarının dağılımı incelendiğinde, tezlerin %61,3'ünün protozoonlar, %16,5'inin helmintler, %8,6'sının artropodlar ve %12,2'sinin bağırsak parazitleri (helmint ve protozoonlar) ile ilgili olduğu saptandı. Tezlerde en çok çalışılan ilk beş parazit türünün sırasıyla *Toxoplasma gondii, Leishmania* spp., *Echinococcus* spp., *Giardia intestinalis* ve *Cryptosporidium* spp. olduğu belirlendi.
Sonuç: Sonuç olarak, Türkiye'de tıbbi parazitoloji alanına daha çok önem verilmesi gerektiği kanaatine varıldı.
Anahtar Kelimeler: Bibliometrik analiz, lisansüstü tezler, tıbbi parazitoloji, Türkiye

INTRODUCTION

Parasitic diseases are an important public health problem worldwide. These diseases are particularly a serious public health problem in developing countries, and it is estimated that there may be an increase in the prevalence of parasitic diseases in developed countries for many reasons such as climate change and mass migration (1). Thus, parasitosis outbreaks seen in countries that make up the European Union have once again emphasized the importance of struggle with the parasitic diseases (2). It should not be forgotten that

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Türkiye PARAZİTOLOJİ Dergisi

combating these diseases that threaten human health is possible with health workers specialized in field of parasitology (3).

Postgraduate education is a planned/programmed educational process aimed at educating qualified individuals who can contribute to knowledge through scientific research processes and meet the social needs (4). The theses prepared at the end of postgraduate education contribute to the scientific literature and give the researcher analytical thinking skills. The theses prepared at the end of the postgraduate programs are classified as "Master Thesis", "PhD Thesis" or "Specialization Thesis in Medicine" according to the stage in which it is written (5,6).

The aim of this study was to analyze the theses prepared in the field of medical parasitology in Türkiye and to reveal the importance given to the science of parasitology in the groves of academe and to raise awareness in this field.

METHODS

In this study, document analysis as a qualitative research method was used. Council of Higher Education's National Thesis Center database (https://tez.yok.gov.tr/UlusalTezMerkezi) has been analyzed postgraduate theses documents conducted in the field of medical parasitology from January 1985 to September 2022. In this database, which can be accessed online, the words of "parasitology'' and "microbiology'' were separately searched by entering the "division'' line of "detailed search" page. The theses prepared in the fields of veterinary parasitology and veterinary microbiology were not included in the study. The no, title, type and publication date of the theses included in the study were recorded. In the summary of the theses with open access, if the field work was stated, the province(s) and parasite(s) where the study carried out were recorded. The theses that were not open access were not taken into consideration.

Statistical Analysis

Descriptive statistics for categorical variables in our study are expressed as number (n) and percentage (%). Microsoft Excel 2016 program was used for calculations and graphs. The map of distribution by provinces of the theses in the group of intestinal parasites was drawn on the PaintMaps.com website.

RESULTS

A total of 393 theses, 150 (3.6%) of 4119 theses prepared in microbiology departments, were found to be related to field of medical parasitology. Two hundred fourty-three (61.8%) of these theses were prepared in "Parasitology'' and "Medical parasitology'' departments and 150 (38.2%) were prepared in six different departments of microbiology (Table 1). In addition, 208 (52.9%) of 393 theses were a master thesis, 110 (28%) PhD thesis and 75 (19.1%) were specialization thesis in medicine (Table 2).

Two hundred forty-one (61.3%) of the theses prepared were related to protozoa, 65 (16.5%) helminths, 34 (8.6%) arthropods and 48 (12.2%) intestinal parasites (helminths and protozoa) (Table 3). The distribution of prepared theses subject (protozoa, helminths and arthropods) is as shown in Figure 1. Even though the number of theses prepared in the field of medical parasitology between 2000 and 2022 were small fluctuations between these years, it was found that there was no gradual increase in the number of theses to the until today.

The top 10 parasites in the prepared theses were found to be *Toxoplasma gondii* (68), *Leishmania* spp. (50), *Echinococcus* spp. (37), *Giardia intestinalis* (27), *Cryptosporidium* spp. (21), *Trichomonas vaginalis* (16), *Entamoeba histolytica* (16), *Plasmodium* spp. (15), *Blastocystis hominis* (15) and *Naegleria fowleri* + *Acanthamoeba* spp. (9), respectively (Figure 2).

Forty-four (11.2%) theses were prepared for intestinal parasites. Fifteen (34.1%) of the theses were prepared in Van, Türkiye and six (13.6%) were prepared in different patient groups in Ankara, Türkiye. The distribution of the theses prepared in the field of medical parasitology according to the provinces is as shown in Figure 3. In the theses, the parasites of the investigated frequency and patient groups where the research performed are shown in Table 4.

In the distribution by universities of the theses prepared in the field of medical parasitology, the universities, which took place in the top three, were Ege University, Van Yüzüncü Yıl University and Erciyes University, respectively. In addition, the list of the first ten universities was shown in Table 5.

DISCUSSION

Bibliometric analysis of theses is an important way to determine scientific field trends (7). The upload of the theses prepared in

Table 1. Distributions of theses by departments

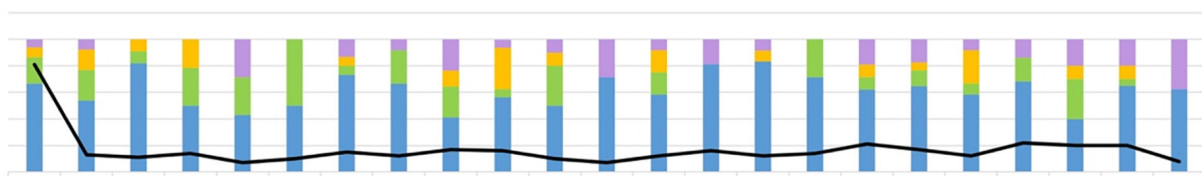
Departments	Number and rate (%) of the theses
Parasitology	209 (53.2)
Medical parasitology	34 (8.6)
Microbiology	40 (10.2)
Medical microbiology	54 (13.7)
Microbiology and clinical microbiology	49 (12.5)
Infectious diseases and clinical microbiology	4 (1.0)
Pharmaceutics microbiology	2 (0.5)
Clinical microbiology and infectious diseases	1 (0.2)

Table 2. Distributions of theses by program degrees

Program degree	Number and rate (%) of the theses
Master	208 (52.9)
PhD	110 (28.0)
Specialization in medicine	75 (19.1)
Total	393

Table 3. The distribution of prepared theses subject

Prepared theses subject	Number and rate (%) of the theses
Protozoan	241 (61.3)
Helminths	65 (16.5)
Arthropod	34 (8.6)
Intestinal parasites	48 (12.2)
Others	5 (1.3)



	2000 and before	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Intestinal parasites (%)	6,1	7,7	0	0	28,5	0	13,3	8,3	23,5	6,2	10	28,6	8,3	18,8	8,3	0	19	17,6	8,3	13,7	20	20	37,5
Arthropod (%)	7,4	15,3	9	21,4	0	0	6,7	0	11,8	31,2	10	0	16,7	0	8,3	0	9,5	5,8	25	0	10	10	0
Helminth (%)	19,8	23	9	28,5	28,5	50	6,7	25	23,5	6,2	30	0	16,7	0	0	28,6	9,5	11,8	8,3	18,1	30	5	0
Protozoan (%)	66,6	53,9	82	50	43	50	73,3	66,7	41,1	56,2	50	71,4	58,3	81,2	83,3	71,4	62	64,8	58,4	68,1	40	65	62,5
Total number of theses	81	13	11	14	7	10	15	12	17	16	10	7	12	16	12	14	21	17	12	22	20	20	8

Figure 1. Distribution of total number of theses and theses subjects by years

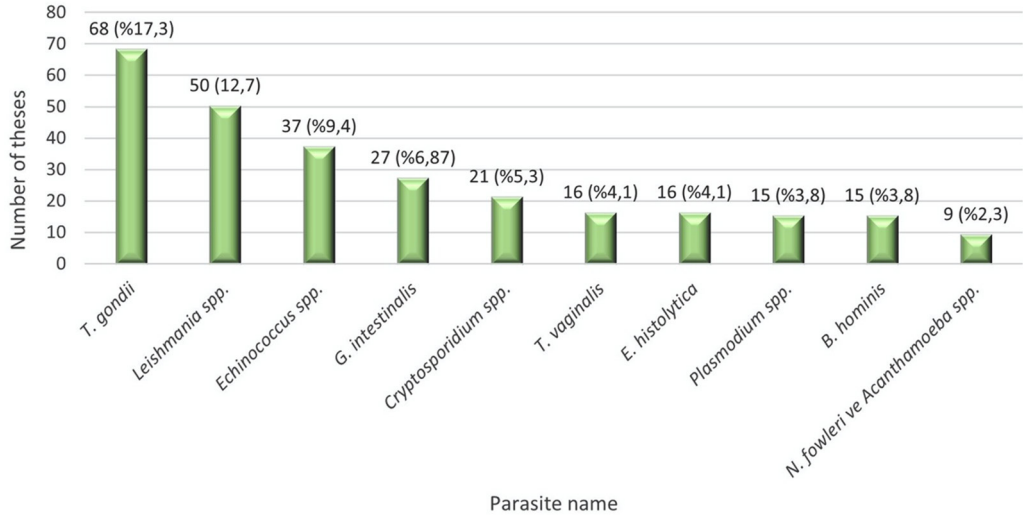


Figure 2. The top 10 parasite species

Türkiye to the Council of Higher Education's National Thesis Center database enables that bibliometric analyzes are made easily according to the thesis subjects.

According to World Malaria Report 2017, it is estimated that there are about 216 million malaria cases annually and approximately 445,000 of these cases result in death. It has been reported that more than 12 million people were influenced by leishmaniasis and about 2 million new leishmaniasis cases. In the world, especially in Central and South America, approximately 6-8 million people were affected by Chagas disease and about 12,000 of these patients died. It has been reported that amebiasis caused the most deaths in children after pneumonia (8). A study conducted by worldwide, it has been reported that 819 million people are estimated to be infected with *Ascaris lumbricoides*, 464.6 million people *Trichuris trichiura* and 438.9 million people with hookworms (9). It has been stated that approximately 187 million people were influenced by schistosomiasis in sub-Saharan Africa, India, China, East Asia and America. In 83 countries of the Africa, Asia, Southern and Central America, approximately 120 million lymphatic filariasis cases have been seen and approximately 90% of these cases were reported to be caused by *Wuchereria bancrofti* (10).

In the data of the T.C. Ministry of Health 2022, the rate of deaths due to some infectious and parasitic diseases among total deaths was reported as 3.66%. In the same data, the sales value of Antiparasitic Products, Insecticides and Repellents in 2018 was 26.6 million TL (5.1 million boxes), while this value was reported as 174.8 million TL (7.5 million boxes) in 2022 (11). In summary, parasitic diseases continue to be important public health problems in Türkiye and worldwide (12). For this reason, it is important to increase the number of scientists specialized in the field of medical parasitology. The number of PhD and specialization theses is an indicator of the number of scientists specialized in their field. It was determined that of the 393 theses written in the field of parasitology in Türkiye, 208 (52.9%) were master's theses, 110 (52.9%) were PhD theses and 75 (19.1%) were medical specialization thesis. We believe that the number of medical speciality theses written in the field of parasitology is insufficient and there should be more specialisation in the field of parasitology due to reasons such as the fact that parasitology laboratories are within the microbiology laboratories in hospitals and parasitology specialists who are not medical doctors are not authorised to evaluate patient results and consult medical specialization students in Türkiye.

Medical parasitology has included the study of parasitic protozoa, parasitic helminths and arthropods that directly cause disease or act as vectors of various pathogens (13). Parasitic diseases cause low productivity, morbidity and mortality in animals, and life-threatening morbidity and mortality in humans by affecting both humans and animals worldwide. Despite recent advances in epidemiology, molecular biology, and treatment of protozoan

Table 4. Species of parasites and patient groups studied in the theses

Species of parasites	Studied patient groups
Intestinal parasites	Applying to the hospital, primary school student, 0-6 years old children, immigrant children, diarrheic, diarrheic children, gastrointestinal complaints, dialysis patients, skin disease, chronic urticaria, allergy complaint, oncologic/cancer patients, stomach cancer, pediatric intensive care unit, substance addicted patients, cardiac disease, schizophrenic patients, HIV-positive
T. gondii	Healthy woman, miscarriage and death–birth, suspected pregnant, 8-25 age group women who have never given birth, women of reproductive age group, hospital staff members, hospital staff members, diabetic, cancerous, dialysis, multiple sclerosis, preeclampsia, ocular toxoplasmosis pre-diagnosis, blood donors, applying to neurology polyclinic, newborns
E. histolytica	Applying to hospital, gastrointestinal complaints, diarrheic, endoscopy/colonoscopy, ulcerative colitis, primary school student, mental retardation
G. intestinalis	Applying to hospital, school-age children, diarrheic, endoscopy/colonoscopy, immunosuppressed, abdominal pain, gastrointestinal complaints
B. hominis	Applying to hospital, gastrointestinal complaints, diarrheic, immunosuppressed, using proton pump inhibitors, ulcerative colitis and Crohn's disease, diabetic, urticaria, coeliac disease
Cryptosporidium spp.	Applying to hospital, gastrointestinal complaints, diarrheic, immunosuppressed, dialysis, endoscopy/colonoscopy, HIV-positive, children in the child welfare agency
C. cayetanensis	Diarrheic, HIV-positive
Microsporidia	Cancer patients, diarrheic, children with gastrointestinal complaints, receive a diagnosis of cancer, bone marrow transplantation, retarded development, itching, dermatitis, urticaria and ulcerative colitis complaint
Dientamoeba fragilis	Gastrointestinal complaints, coeliac disease, irritable bowel syndrome, ulcerative colitis complaint
C. belli	HIV-positive
T. vaginalis	Women admitted to hospital, woman with vaginal discharge, vaginitis pre-diagnosis, female patients with vaginal complaints and male patients with urinary system complaints, male patients with urinary tract infection
Acanthamoeba spp. and *Naegleria* spp.	Applied to the ophthalmology
Pneumocystis jirovecii	Lung disease
Plasmodium spp.	Malaria-like symptoms, blood donors, Malaria suspected individuals working as farm workers
Babesia spp.	A history of tick bites
Leishmania spp.	Individuals over 2 years of age living in Mersin/Türkiye, applying to dermatology outpatient clinic
Echinococcus spp.	Diagnosed intrathoracic or intracardiac hydatid cyst, healthy individuals, pre-diagnosed hydatidosis, eosinophilic, applying to hospital, studies involving sheep, dogs and cattle as well as humans
Toxocara spp.	Toxocariasis suspected, primary school students, healthy individuals of different ages and occupations, eosinophilic, veterions
Fasciola hepatica	Applying to hospital, healthy individuals, eosinophilic
Enterobius vermicularis	Requested cellophane band, primary school students
Trichinella spiralis	Healthy individuals, suspected trichinellosis
Demodex spp.	Applying to dermatology outpatient clinic, applied to the ophthalmology, diabetic, acne complaints, healthy individuals
Pediculus humanus capitis	Primary school students, seven occupational groups (preschoolers primary school students, college students, healthcare personnel, officeholder, workers and peasantry)
Tick species	A history of tick bites

HIV: Human immunodeficiency virus

diseases, research on protozoa is not sufficient. In addition, an increase in protozoan infections is expected due to displacement of human and animal populations, increases in atmospheric temperature, flooding and the need for alternative water sources (14). In this study, it was determined that 61.3% of the theses prepared in our country in the field of medical parasitology were related to protozoa.

Since helminths tend to cause chronic infections, their impact on people's quality of life is enormous. Helminths reduce the quality of life in people with low socio-economic levels and weak immune system. These diseases affect the lives of future generations negatively by preserving their ability to infection in various environments without disappearing for many years (10,15). In this study, it was determined that 16.5% of the theses prepared in the field of medical parasitology were related to helminths. Considering the high prevalence of helminths in the community and their negative widespread effects on human health, it is seen that number of studies in this area is insufficient.

In addition to causing allergic reactions as a result of sucking blood from people, the importance of arthropods in the field of medical parasitology is increasing because they transmit some fatal cause of disease to people. Many pathogenic agents such as viruses, bacteria, rickettsia, spirochaete, protozoa and helminths are transmitted to humans by arthropods feeding on blood. In

Figure 3. Distribution by provinces of the number of theses investigating the incidence of intestinal parasites (https://paintmaps.com/ was used to create the map)

Table 5. Distribution of theses by universities

Name of university	The number of theses				
	Protozoans	Helminths	Arthropoda	Intestinal parasites	Total
Ege University	32	13	4	5	54
Van Yüzüncü Yıl University	14	4	8	19	45
Erciyes University	29	5	5	0	39
Sivas Cumhuriyet University	24	6	1	1	32
İstanbul University	18	6	3	1	28
Çukurova University	22	2	0	0	24
Manisa Celal Bayar University	14	0	0	1	15
Fırat University	7	3	0	4	14
Ankara University	7	2	3	1	13
Harran University	8	2	0	3	13

order to understand the epidemiology of vector-borne diseases, it should be informed about the diseases carried by arthropods and their complex life cycles. This information is necessary for the prevention, recognition, treatment and control of vector-borne diseases with epidemic potential. The adaptability of arthropods to various environments (such as pesticide resistance) more difficult to control the diseases they transmitted (16). For this reason, scientific studies on arthropods will help us in the fighting against arthropods and the disease agents transported by arthropods. In this study, only 8.6% of the theses examined in the field of medical parasitology are related to arthropods, and this result shows that scientific studies related to arthropods in Türkiye are insufficient.

Intestinal parasitosis is among the most common infections in people living in countries with low and middle-income levels. Soil-transmitted helminths such as A. *lumbricoides* and hookworm, nematodes such as *Strongyloides stercoralis* and *T. trichiura* affect more than 2 billion people all around the world (17). While helminth infections can be asymptomatic in humans, it causes a wide variety of symptoms such as fatigue, ailment, arm and leg pain, insomnia, headache, chest pain, cough, eosinophilia, skin rashes, itchy rashes, stomach ache, nausea and vomiting, diarrhea, ileus and volvulus-invagination due to ileus, fever, itchy nose, drooling, lingual papillitis, asthma exacerbations, tetany, epileptic spasm, myoclonus, ageusia, appetite disorders, vision disorders, mental retardation, nyctophobia, anemia and weakening (18).

Parasitizing on human's intestines pathogenic intestinal protozoans like *E. histolytica, G. intestinalis*, *Cryptosporidium* spp., *Cyclospora cayetanensis* and *Cystoisospora belli* have an important place in the world and in our country. *Cryptosporidium* species are an important parasite that causes high rates of death in children under five years of age and immunocompromised patients (17). Intestinal parasitosis continues to be one of the important health

problems in Türkiye (19). Epidemiological studies have shown that there is an increase in the incidence of intestinal parasites moving from east to west in Türkiye. Studies to determine the prevalence of intestinal parasites in Türkiye are very important in the development of effective protection and control strategies to be created against parasites (12). In this study, it was determined that only 12.2% of the theses prepared in the field of medical parasitology performed to determine the prevalence of intestinal parasites. The theses were prepared in 18 provinces, especially Van (34.1%) and Ankara (13.6%). Similarly, in the remaining 63 provinces, we believe that comprehensive thesis studies on the prevalence of intestinal parasitosis should be done.

CONCLUSION

In conclusion, we believe that more importance should be given to the field of medical parasitology in Türkiye and that parasitology departments should be established in all medical faculties.

* Ethics

Ethics Committee Approval: Ethics committee approval is not required for this study.

Informed Consent: No patients were included in the study.

* Authorship Contributions

Concept: S.A., F.B., A.E., Design: S.A., F.B., A.E., Data Collection or Processing: S.A., F.B., K.K., Analysis or Interpretation: H.Y., S.A., F.B., A.E., Literature Search: F.B., S.A., K.K., Writing: H.Y., S.A., F.B., K.K.

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