

EPIDEMIOLOGICAL TRENDS OF PARASITIC INFECTIONS IN THE HOSPITAL FOR TROPICAL DISEASES, BANGKOK DURING 2013-2018

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ABSTRACT

Parasitic infections remain significant public health challenges, particularly in tropical regions. While most epidemiological studies focus on intestinal parasites in community settings, data from hospital setting are limited. The Hospital for Tropical Diseases, Bangkok, a referral center known for parasitology's expertise, offers an opportunity to examine the clinical spectrum and epidemiological trends of parasitic diseases in a hospital setting. Such data are essential for improving diagnostic awareness and guiding appropriate management strategies. This cross-sectional retrospective study analyzed medical records of patients attending the Parasite Clinic at the Hospital for Tropical Diseases, Bangkok, between January 2013 and December 2018. Patient demographics, clinical diagnoses, and infection trends were assessed using descriptive statistical methods. Among 2,695 patients during the six-year, 1,065 (45.3%) were diagnosed with parasitic infections. Infections were more prevalent in males (45.8%) and individuals aged 31–45 years (47.2%). The majority of parasite infected patients were Thai (94.2%). The annual prevalence of parasitic infections ranged from 35.9% to 52.3%. Gnathostomiasis was the most common parasite (34.7%), followed by *Blastocystis hominis* infections (25.9%) and Taeniasis (17.5%). Delusional parasitosis was identified in 6.6% of patients, predominantly among Western travelers (13.8%). The high proportion of parasitic infections, especially tissue parasites, highlights the need for heightened clinical awareness in endemic areas. Enhancing physician knowledge and public education on safe food practices may help reduce infection rates. Furthermore, integrating tissue parasite screening into community surveys for symptomatic individuals could improve disease surveillance and inform targeted public health interventions.

Keywords: Parasitic infections, prevalence

INTRODUCTION

Parasitic infections represent a significant public health threat in developing countries. The World Health

Organization estimates approximately three billion reported cases of parasitic diseases worldwide, resulting in millions of fatalities each year (Hamarsheh and Amro, 2020). These infections are a major component of

Neglected Tropical Diseases or NTDs (Ghorai, 2023). Many cases present as asymptomatic or with mild symptoms, which can lead to misdiagnosis. If left untreated, these infections may result in severe complications (Krolewiecki and Nutman, 2019).

Determining the global incidence of all parasitic infections is challenging. Nevertheless, the World Health Organization (WHO) estimates that 11 food- and waterborne parasitic diseases have infected approximately 407 million people worldwide, resulting in 94,000 deaths and 11 million disability-adjusted life years (DALYs) (Almeria et al, 2021). In Thailand, during the fiscal year 2019, the overall prevalence of helminthic infections was reported at 9.79%, with hookworms and *Opisthorchis viverrini* showing the highest prevalence rates (Wattanawong et al, 2019).

Epidemiological studies in Thailand primarily focus on endemic areas and intestinal parasites, with few conducted in clinical settings where patients seek care (Jiraanankul et al, 2011, Yanola et al, 2018, Martviset et al, 2023). One study from the parasitology unit of King Chulalongkorn Memorial Hospital, conducted from June to December 1997, assessed 6,231 patients and found a parasitic infection prevalence of 8.94%. The Northeast region exhibited the highest prevalence at 17.03%, with *Strongyloides stercoralis* as the most commonly identified parasite, followed by *Opisthorchis viverrini* (Nuchprayoon et al, 2002). Given the scarcity of data on prevalence and epidemiological trends in hospital settings, this current study aims to assess the prevalence of parasitic infections at the Hospital for Tropical Diseases in Bangkok, a referral center known for its expertise in parasitology. It is hypothesized that the prevalence may be higher, allowing for a broader understanding of parasitic infections.

OBJECTIVE

This study aims to evaluate the overall prevalence of parasitic infections and demonstrate the epidemiological trends and diagnosis for parasites among patients attending the clinic, which can inform public health strategies and interventions.

MATERIALS AND METHODS

This cross-sectional study utilizes medical records from the Parasite Clinic at the Hospital for Tropical Diseases in Bangkok, Thailand. Data were collected from patients who visited the clinic between January 2013 and December 2018, totaling 2,695 visits. This comprehensive dataset will allow for an in-depth analysis of parasitic infections and their prevalence over the specified period.

The Hospital for Tropical Diseases, Faculty of Tropical Medicine, Mahidol University, Bangkok, Thailand, is a referral center for the diagnosis and treatment of tropical diseases, including parasitic infections. The hospital offers several specialized outpatient services, such as the Parasite Clinic, Fever Clinic, and Travel Clinic. Established in 2012, the Parasite Clinic is dedicated to evaluating and managing patients suspected of having parasitic infections.

Referrals to the clinic may come from screening nurses, self-referred patients, or physicians from other departments. All patients attending the clinic undergo routine stool examinations, which include both direct smear and concentration techniques. Additional investigations, such as complete blood counts and serological tests for parasitic infections, are conducted based on clinical judgment. It is important to note that malaria cases are managed through a separate service and are not seen at the Parasite Clinic.

Inclusion Criteria

- All patients who attended the Parasite Clinic at the Hospital for Tropical Diseases, Faculty of Tropical Medicine, Mahidol University, Bangkok, Thailand, between January 2013 and December 2018, were included in the study. This included patients with both positive and negative results for parasitic infections.
- Patients with multiple visits were assessed individually. A revisit was considered a new case if:
 1. The patient presented with the same chief complaint after having been symptom-free for at least 3 months following completion of the initial treatment, or
 2. In cases where the symptom-free interval was not documented, if clinical improvement or cure had been noted by the attending physician during the last visit, a subsequent visit after 3 months was considered a new case.
 3. Visits with different chief complaints, associated with different diagnoses and treatment plans, regardless of timing, were also classified as separate cases.

Exclusion Criteria:

none

Diagnosis of parasitic infections

Parasitic infections were identified based on physician summary notes supported by appropriate diagnostic evidence, such as positive stool examination or serological tests. In some cases, diagnosis was made clinically—for example, cutaneous larva migrans. Patients who were suspected of harboring parasitic infections but lacked direct or indirect diagnostic evidence were not classified as having a parasitic infection, even if empirical treatment led to clinical improvement.

For intestinal parasitic infections, diagnosis required detection of protozoan

cysts, trophozoites, helminth eggs, or cestode proglottids in stool samples.

For tissue parasitic infections, diagnosis was based on:

1. Confirmed cases: Direct identification of parasites (e.g., worms).
2. Presumptive cases: Positive serological results combined with compatible clinical features, exposure history, and/or eosinophilia, as judged by the physician.

Delusional parasitosis was defined as a fixed belief of being infested with parasites without any diagnostic evidence. This study followed this definition for diagnosing delusional parasitosis.

Data analysis

Statistical analysis was conducted using SPSS software version 25. Categorical data, including gender, ethnicity, and place of birth will be presented as counts and percentages. Continuous data, such as age, will be presented as mean or median (depending on the normality of distribution) in the descriptive analysis.

Ethics

This proposal was approved by the Ethics Committee of the Faculty of Tropical Medicine, Mahidol University [MUTM 2024-028-01].

RESULTS

Demographic characteristic

Of the total 2,695 patients who visited the Parasite Clinic at the Hospital for Tropical Diseases in Bangkok, Thailand, between January 2013 and December 2018, 2,351 cases were documented for diagnosis. Among these patients, 51.1% were female. The age of the patients ranged from 1 to 101 years, with a mean age of 41.82 years (SD \pm 15.76). The majority of patients were Thai (95.0%). The percentage of patients visited parasite clinic was shown in Table 1.

International travelers included individuals from Europe, North America, and Africa (1 case from Nigeria), the Middle East (3 cases from Israel, 2 from Pakistan, 1 from Yemen, and 1 from Kuwait), East Asia (1 case each from China and Korea), and South Asia (2 cases from India and 1 from Sri Lanka).

Patients residing in the central region of Thailand constituted the largest group of visitors to the clinic (75.0%), with 55.5% originally from the central region and 26.5% from the northeastern region of Thailand.

Parasitic infections were found to be more prevalent among males (45.8%) compared to females (33.6%), with the highest prevalence observed in individuals aged more than 15 to 30 years. Patients from Myanmar exhibited a higher prevalence of parasitic infections than individuals from other ethnic groups. Notably, individuals from the northeastern region of Thailand had the highest rates of infection, followed by those from the northern region. Regarding occupational distribution, farmers represented the highest prevalence of parasitic infections, followed by daily laborers.

Table 1 Demographic characteristic of patients visiting parasite clinic

Demographic data	Total N=2695 (%)	Parasite infected cases (1065)	Prevalence (%)
Sex			
Male	1318 (48.9)	603	45.8
Female	1377 (51.1)	462	33.6
Age (years)			
Mean \pm SD	41.82 \pm 15.76	39.75 \pm 14.88	
0-15	54 (2.0)	15	27.8
>15-30	672 (24.9)	317	47.2
>30-45	920 (34.1)	397	41.2
>45-60	665 (24.7)	220	33.1
>60-75	333 (12.4)	98	29.4
>75	51 (1.9)	18	35.2
Ethnicity			
Thai	2559 (95.0)	1003	39.2
Myanmar	28 (1.0)	19	67.9
Westerners	65 (2.4)	24	36.9
Others	43 (1.6)	19	44.2
Birth regions			
N= 2689 N= 1064			
Thai region			
Central	1139 (42.3)	346	30.4
Northeast	865 (32.1)	452	52.3
North	145 (5.4)	69	47.6
South	116 (4.3)	37	31.9
East	212 (7.9)	71	33.5
West	79 (2.9)	29	36.7
Europe	42 (1.6)	17	40.5
North America	20 (0.7)	5	25.0
Others	71 (2.6)	38	53.5

Occupation	N=1965	N=793	
Daily laborer	769 (28.5)	368	47.9
Office worker	364 (13.5)	124	34.1
Merchant	281 (10.4)	91	32.4
Housemate	155 (5.8)	56	36.1
Student	177 (6.6)	56	31.6
Farmer	105 (3.9)	59	56.2
Monk	31 (1.2)	13	41.9

Prevalence of parasitic infections

The overall prevalence of parasitic infections at the Parasite Clinic of the Hospital for Tropical Diseases in Bangkok, Thailand, from January 2013 to December 2018 was 45.3% (1065/2351). The annual

prevalence of parasitic infections during this period was as follows: 35.9% (74/206) in 2013, 49.3% (189/383) in 2014, 52.3% (265/507) in 2015, 46.6% (203/436) in 2016, 44.5% (195/438) in 2017, and 36.5% (139/381) in 2018 (Figure 1).

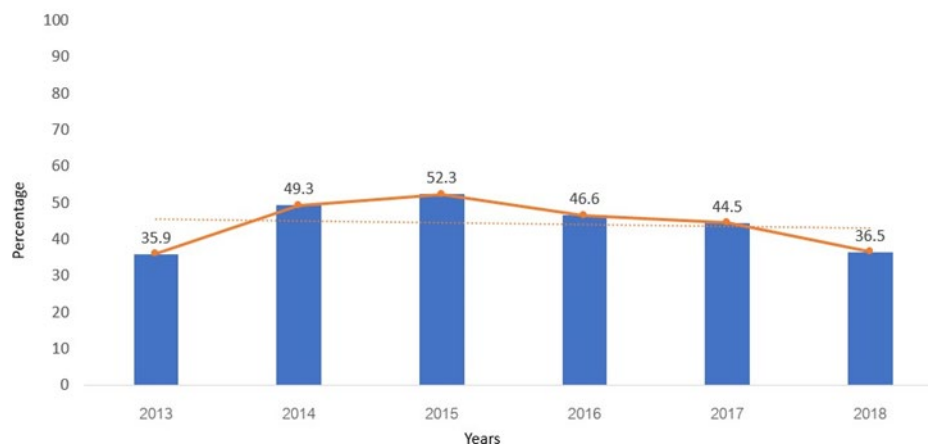


Figure 1 Prevalence of parasitic infections at Hospital for Tropical Diseases 2013-2018 (n=2695).

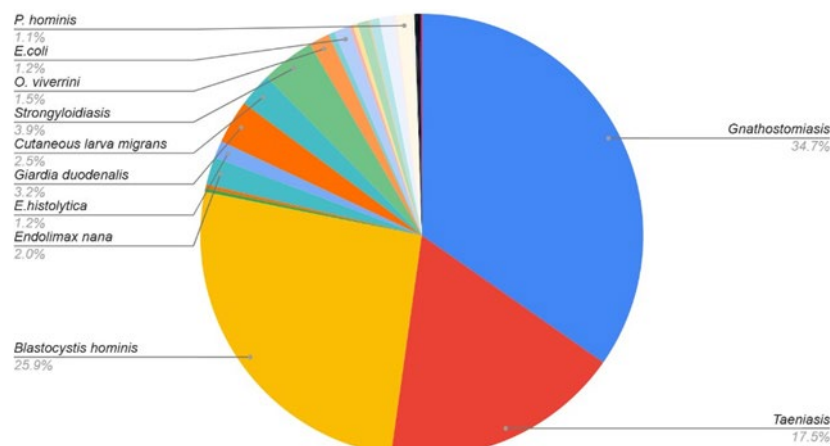


Figure 2 Constituent ratio of parasitic infection by diagnosis

Among the 29 different types of parasitic infections identified, the most common was gnathostomiasis (34.7%), followed by *Blastocystis hominis* infection (25.9%) and Taeniasis (17.5%). The data was presented in Figure 2.

When stratified by region, gnathostomiasis was found to be the most prevalent in the central region (40.2%), followed by the northeastern region

(32.5%). Although *Blastocystis hominis* is generally considered a non-pathogenic parasite, it was most commonly found in the northeastern population, with a prevalence of 62.0%. Additionally, *Opisthorchis viverrini* infections was the most prevalent parasitic infection among individuals from the northeastern region (35.3%), followed by those from other regions, particularly individuals from Myanmar (29.4%).

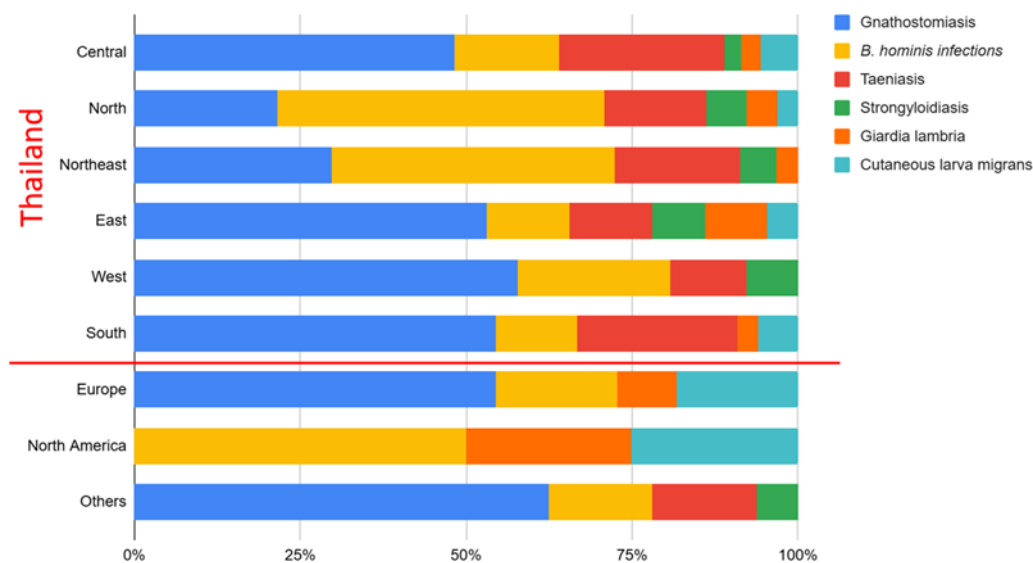


Figure 3 The prevalence of six most common parasitic infections by region of origin.

DISCUSSION

Parasitic infections continue to pose a significant threat, particularly in developing countries and in sub-tropical to tropical regions (Hamarsheh and Amro, 2020). The study of the incidence of parasitic infections remains a challenge (Almeria et al, 2021). While most epidemiological studies focus on intestinal parasites in community settings, data from hospital settings are limited. This present study aims to demonstrate the epidemiological trends of parasitic infections in parasite clinic at Hospital of Tropical Diseases, Bangkok, Thailand since 1st January 2013 to 31st December 2018.

The overall prevalence of parasitic infections observed in the current study was 45.3%. In comparison, a study conducted in a hospital setting at the Parasite Unit of King Chulalongkorn Memorial Hospital in Bangkok, which collected data from June to December 1997, reported a prevalence of 8.94% (Nuchprayoon et al, 2002). The higher prevalence in this current study could be attributed to specific characteristics of the patient population at the Hospital for Tropical Diseases. This clinic included those asymptomatic patients who seek screening for parasitic infections before working in regulated countries, particularly Taiwan and Japan.

Additionally, the clinic was recognized as a center of excellence for parasitic testing,

attracting individuals with clinical concerns related to parasitic infections, either seeking care directly or being referred from other hospitals (data not shown here).

The prevalence of parasitic infections was found to be higher among males, which is consistent with findings from other studies (Boonjaraspinyo et al, 2013, Nuchprayoon et al, 2002). In this study, males were more likely to consume raw meat compared to females (89.9% vs. 86.8%). Additionally, occupations such as daily laborers, farmers, and monks, which exhibited high prevalence rates, were predominantly in male.

The northeastern region of Thailand exhibited the highest prevalence of parasitic infections, which aligns with findings from several studies and most epidemiological surveys (Boonjaraspinyo et al, 2013 and 2022, Suwansaksri et al, 2003). During the 2019 fiscal year, a cross-sectional nationwide survey conducted by the Thailand Ministry of Public Health reported an overall prevalence of helminthic infections at 9.79%. The northeastern region continues to pose a high risk for parasitic infections, with the highest rates of *Opisthorchis viverrini*, followed by hookworm infections and minute intestinal flukes (Wattanawong et al, 2021). This study also demonstrated that *Opisthorchis viverrini* remains highly prevalent in the northeastern region, together with gnathostomiasis identified as the most common parasitic infection. Both infections reflect dietary behaviors associated with the consumption of raw freshwater fish.

International travelers or migrants also sought care for parasitic testing. Patients from the Southeast Asia region, particularly from Myanmar, represented the second highest prevalence of *Opisthorchis viverrini* infections. A study on intestinal parasites among Myanmar migrant workers conducted in northeastern Thailand found that 78.67% of cases reported a history of consuming raw cyprinoid fish, which was

associated with *Opisthorchis viverrini* infections (AOR=2.82, 95% CI: 1.22-6.49) (Sangwalee et al, 2021). This finding suggests a similarity in food culture that may contribute to the prevalence of these infections. 16.6% of Western travelers diagnosed with parasitic infections were found to have cutaneous larva migrans, while others were affected by food and waterborne parasites. A study involving 3,528 Canadian travelers and immigrants at the Tropical Disease Unit of Toronto reported that the most common parasites identified included non-histolytica amebiasis (20.7%), malaria (14.2%), cutaneous larva migrans (10.4%), dientamebiasis (8.3%), giardiasis (7.3%), and schistosomiasis (4.8%) (Boggild et al, 2006). These variations could be attributed to differing clinical settings; for instance, the Hospital for Tropical Diseases in Bangkok designates cases with fever as the primary symptom to the Fever Clinic. Thus, malarial can't be observe in parasite clinic. Cutaneous larva migrans was particularly prevalent among travelers who visited tropical countries and had a history of walking barefoot or trekking in forested areas (data not shown).

Interestingly, one of the unique aspects of patients visiting the Parasite Clinic is their concern about having parasitic infections. Delusional parasitosis was diagnosed in 6.6% of patients (155 out of 2,351), with females being more likely to be affected, accounting for 52.3% of the cases. Westerners represented the most prevalent group among those diagnosed, accounted for 13.8%. These individuals often sought care specifically for parasitic testing and frequently visited multiple hospitals in their pursuit of diagnosis and treatment.

In conclusion, the prevalence of parasitic infections in the clinical setting was notably higher than anticipated. Tissue parasites emerged as the most common due to the clinic's comprehensive diagnostic capabilities and specialized testing.

Screening symptomatic patients in community setting could improve disease surveillance. Additionally, asymptomatic patients were found to carry non-pathogenic parasites, reflecting the impact of food and waterborne transmission. Emphasizing the importance of consuming thoroughly cooked food, ensuring access to clean water, and maintaining rigorous hygiene practices are crucial steps in preventing such infections.

Further studies on the clinical characteristics of patients who visited parasite clinic would be beneficial in guiding accurate diagnoses and facilitating appropriate investigations. Such research has the potential to enhance the capacity for detecting a greater number of cases and to understand prevalence and impact of parasitic diseases within the community.

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