

The Prevalence of Intestinal Parasitic Infections among School Children in the Central Region of Thailand

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Objective: Survey the prevalence of intestinal parasitic infections in 14 primary schools of Central Thailand

Material and Method: A cross sectional survey of the prevalence of intestinal parasitic infections in 14 primary schools of Central Thailand that included Ang Thong, Ayudthaya, and Suphanburi provinces was conducted. One thousand and thirty seven children with age ranging from 3-12 years (540 males and 497 females) were examined for intestinal parasites by the formalin-ether concentration technique.

Result: The overall prevalence was 4.24%. The pathogenic parasites found were *Giardia lamblia* (1.25%), *Enterobius vermicularis* (0.19%), *Trichuris trichiura* and Hookworm (0.19% each), respectively. The common non-pathogenic protozoa found were *Entamoeba coli* (1.64%) and *Endolimax nana* (0.48%). The infection rate of *Blastocystis hominis* was 0.19%.

Conclusion: Interestingly, the area studied which is low and flat and contains rice and water chestnut fields and small rivers, did not demonstrate *Fasciolopsis buski* as highly found in the past five decades. However, Parasitic infections are still public health problems in Thailand. Close monitoring and control of parasitic infections is needed.

Keywords: Prevalence, Intestinal parasite, School children, Central region, Thailand

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Intestinal parasitic infections are commonly found in tropical countries, including Thailand⁽¹⁾. Malabsorption, diarrhea, blood loss, impaired work capacity, and retarded growth can be found, causing important health and social problems⁽²⁾. Some infections occur focally in school-age children⁽³⁾. The type of infection is much different depending on the behavioral factors and the geographical regions. For example, a high prevalence of hookworm infection, the soil-transmitted nematodes, the liver fluke and the giant intestinal fluke infections are highly demonstrated in the South, the North, the Northeast and the Central regions, respectively⁽¹⁾. During the past five decades, many surveys have been made in various areas of the country including the central region^(4,5). The ecologi-

cal system in this area is suitable for the parasite life cycles of soil-transmitted nematodes and food-borne trematodes⁽⁴⁾. However, many areas in this region are now being invaded by urban culture due to their location close to Bangkok. At present, there is limited information available for the parasitic infections of the Central region. The authors therefore performed a survey of the intestinal parasitic infections in this region of Thailand.

Material and Method

A cross-sectional survey was conducted in 14 primary schools of Angthong (9 schools in Amphoe Samko), Suphanburi (3 schools in Amphoe Si Prachan) and Ayudthaya (2 schools in Amphoe Phak Hai and Bang Pahan) provinces that are located in the Central region of Thailand. The majority of the people earn their living by agriculture (rice, lotus, chestnuts, cal-

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trops, lily, and other water vegetables). One thousand and thirty seven school children (540 males and 497 females) ranging from 3 to 12 years old were recruited for the present study. This survey was performed between July and November 2004. The present study was approved by the Ethics Committee of the Faculty of Medicine at Chulalongkorn University.

An oral description and specific instructions for handling and contamination avoidance of the stool specimen were given to all the children. All stool specimens were preserved in 10% formalin before examination at the department of Parasitology, Faculty of Medicine, Chulalongkorn University. The specimens were examined by the formalin-ether concentration technique as described⁽⁶⁾. The presence of intestinal parasites was determined microscopically by two independent medical technologists.

Data analysis

Data were recorded and analyzed by using Microsoft Excel 6.0 program. Statistical differences of the data were analyzed by Chi-square tests or Fisher's Exact test where appropriated. P values < 0.05 was considered statistically significant.

Results

One thousand and thirty seven individuals (540, 52.07% males and 497, 47.93% females) from 14 primary schools in three provinces provided an average rate of 4.24% for the intestinal parasitic infections

according to the formalin ether stool concentration technique. When classified by age, the children of 10-12 years old in Ayudthaya province demonstrated the highest prevalence (9.23%) (Fig. 2), while those of 7-9 years old had the second highest prevalence (4.50%), with a significant difference from those of other provinces (Angthong and Suphanburi). Parasites could not be found in 3- year- old children of Ayudthaya and Suphanburi provinces.

The most prevalent intestinal parasitic infections observed were *Giardia lamblia* (1.25%). *Blastocystis hominis* was found in 0.19%. The parasitic helminth found were hookworm (0.19%), *Trichuris trichiura* (0.19%) and *Enterobius vermicularis* (0.29%) Table 1. From the Venn diagram (Fig. 3), there were 36 children who carried one parasite and 3 children who had mixed infection. Among the mixed infected individuals, one child had two parasitic infections and two children had three parasitic infections. At the end of the study, the standard treatment was given to all infected students.

Discussion

The stool concentration technique was used in the present study because of its higher diagnostic sensitivity of intestinal parasites than the direct smear technique⁽⁶⁾. The prevalence rate of intestinal parasitic infections can vary from one area to another depending on the degree of personal and community hygiene, sanitation and geographic factors^(7,8). The Central region is low and flat. It contains rice, water chestnut,



Fig. 1 A map of Thailand, central region and the survey areas (Angthong, Ayudthaya and Suphanburi provinces)

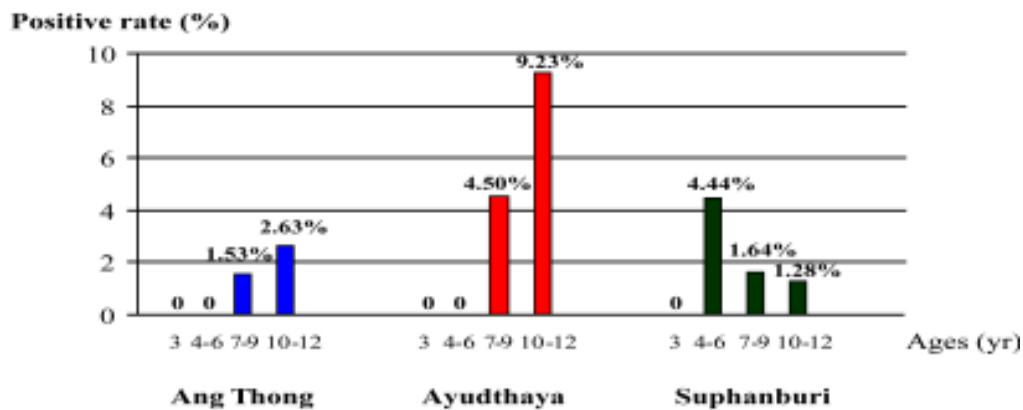


Fig. 2 Prevalence of intestinal parasitic infections classified by provinces and age

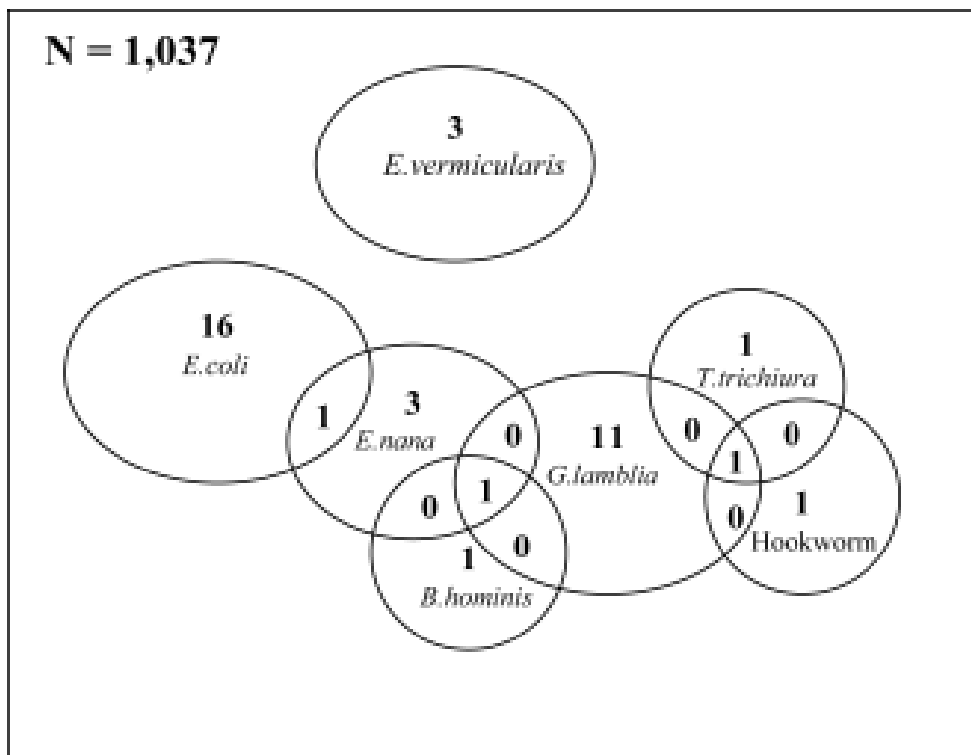


Fig. 3 Venn Diagram of parasites detected. Numbers in circles indicated the number of positive cases
N = Total number of the children examined

water caltrop fields, and small rivers. It is situated within a radius of 96 kilometers from Bangkok (Fig. 1). The climate is tropical and humid with a slight range of extremes. The minimum mean temperature was 13.4°C

in January, and the maximum was 38.0°C in April⁽⁹⁾.

The first survey of parasitic infections in Central Thailand was studied by Sudan and Maiphoom in 1953⁽⁴⁾. In that study, the parasites found were *F.*

Table 1. Distribution of the intestinal parasites classified by province

Organism	Angthong		Ayudthaya		Suphanburi			Total (%)
	7-9	10-12	7-9	10-12	4-6	7-9	10-12	
Parasite								
Helminth								
Hookworm		1		1				2 (0.19%)
<i>T. trichiura</i>		1		1				2 (0.19%)
<i>E. vermicularis</i>	1		1	1				3 (0.29%)
Protozoa								
<i>G. lamblia</i>			5	8				13 (1.25%)
<i>B. hominis</i>				2				2 (0.19%)
Non-pathogenic protozoa								
<i>E. coli</i>	1	3	4	6	1	1	1	17 (1.64%)
<i>E. nana</i>				4	1			5 (0.48%)
Total	2	5	10	23	2	1	1	44 (4.24%)

buski and roundworms with the prevalence of 10% to 25% and 0%-9% in Ayudthaya, Dhonburi and Nakhon Phatom⁽⁴⁾.

During the past five decades, houses in this region were grouped and built on still in low land along the rivers. Natural shallow water ponds with aquatic plants such as water caltrop, water chestnut, lotus and etc., remain throughout the year. The major occupation of the villages was farming. The people eat raw aquatic vegetables as a common food item. In addition, the water in this area could be contaminated by animal excreta. Furthermore, due to limited latrines people usually defecated near the water ponds and along the rice fields where snails and aquatic plants (the intermediate hosts of flukes) were found in abundance^(4,5,10). At present, the invasion with urban culture, the health education and the other conditions could make the prophylaxis of the intestinal parasitic infections quite different from what it was in the past.

In the present survey, the parasites were found in only 39 children (Fig. 2). The most frequent intestinal parasites found were protozoa. The highest protozoan found was *G. lamblia* (1.25%), followed by *B. hominis* (0.19%). In general, *G. lamblia* and *B. hominis* infection were commonly found in children^(3,7). The giardiasis prevalence could be high among children living in an orphanage and those attending day care centers⁽⁷⁾. However, the prevalence reported in the developing countries varies from 1% in 0-3 months old to 51.0% in elder children and fell to about 17% in adults^(11,12) depending on personal and community hygiene^(11,13). The sources of infections could be from

natural reservoirs (domestic animals or contaminated food or water), since it has been shown that domestic animals (cattle, sheep, dogs, cats) might also serve as cross-transmission between humans and animals⁽¹⁴⁾. Dogs and cats were commonly found in the presented study area. In further study, analysis of *Giardia* genotype not only determined sources of infection but also provided direct evidence of zoonotic transmission.

Interestingly, the prevalence of helminth infections was not highly detected. The infection rates of hookworm, *T. trichiura*, and *E. vermicularis* were 0.19%, 0.19%, and 0.29% respectively. The infection rate of *E. vermicularis* found in the present study was certainly lower than the actual rate. Since the sensitivity of this infection detected by stool examination is lower than clear tape technique⁽⁶⁾. The food-borne trematodes could not be observed in the present study. A study in Suphanburi in 1979 demonstrated *F. buski* (2.06%), *O. viverrini* (0.61%) and hookworm (7.5%) in school children (age 5-14 years old)⁽¹⁵⁾. In 1980, another study in three districts of Ayudthaya demonstrated *F. buski* infection with prevalence of 2.97%-23.93% in school children⁽¹⁶⁾. To gather evidence on the low prevalence of parasitic infections in the present study, the authors observed 100% school and house latrines and rarely observed pigs reservoir host for *F. buski* living under houses. Furthermore, the authors observed the foot-wear of the children. In addition, the water chestnut field is now an economic plantation. It is cultured in blockages on private land, is well organized and cared for. There was nearly no more natural or spontaneous growth of these aquatic

plants.

The data obtained from the present study suggested that some pathogenic parasites remained observed in children of the Central region of Thailand. However, *F. buski* infection was not detected although it was prevalent during the past decades. Health education and sanitation is important for control of parasitic infections⁽¹⁾. Parasitic infections are still public health problems in Thailand⁽¹⁷⁾. Close monitoring and control of parasitic infections is needed, especially in children who are prone to have severe consequences, such as impaired cognitive function, malnutrition, and anemia⁽¹⁸⁾.

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ความชุกของโรคติดเชื้อปรสิตในลำไส้เด็กนักเรียน ในภาคกลางของประเทศไทย

วิไล ศักดิ์ศิริสัมพันธ์, จารุรัตน์ เกานิบล, เมธิ กุลมภ์ภรณ์, สุทิน เย็นท่าข้าม, สุรศักดิ์ จันทพลา, สุรางค์ นุชประยูร

ความชุกของโรคติดเชื้อปรสิตในลำไส้จากการสำรวจโรงเรียนประถม 14 แห่ง ในภาคกลางของประเทศไทย ซึ่งได้แก่จังหวัด อ่างทอง อยุธยา และ สุพรรณบุรี พบว่า จากนักเรียนจำนวน 1,037 คน อายุระหว่าง 3-12 ปี (ชาย 540 คน, หญิง 497 คน) มีความชุกเฉลี่ย 44 (4.24%) จากการตรวจจุลจากรด้วยวิธีเข้มข้นแบบฟอร์มาลิน-อีเทอร์ มีลำดับของเชื้อปรสิตที่ก่อโรค คือ *Giardia lamblia* (1.25%), *Enterobius vermicularis* (0.29%), *Trichuris trichiura* (0.19%) และ Hookworm (0.19%) เชื้อโปรโตซัวที่ไม่ก่อโรคคือ *Entamoeba coli* (1.64%) และ *Endolimax nana* (0.48%) อัตราการติดเชื้อ *Blastocystis hominis* คือ 0.19% ในพื้นที่ที่ศึกษานี้เป็นพื้นที่ราบลุ่ม ประกอบด้วยนาข้าว ไร่ และ แม่น้ำสายเล็ก ๆ แต่ไม่พบเชื้อ *Fasciolopsis buski* ซึ่งเคยมีระบาดมากใน 50 ปีที่ผ่านมา
