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Prevalence of intestinal parasitic infections among schoolchildren in Phitsanulok Province, Northern Thailand

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ABSTRACT

Objective: To determine the prevalence of intestinal parasites in children from six schools located in Bang Rakam and Mueang Districts, Phitsanulok Province, Northern Thailand.
Methods: The study sites were the following six schools: Wat Krab Phuang, Wat Wang Ped, Wat Tha Ko, Wat Sao Hin, Wat Kung Waree and Wat Sakat Namman. Fecal samples were collected from 352 students in the age range 7-15 years old, and examined for intestinal parasites by formalin-ethyl acetate concentration method. Additionally, Scotch tape technique was used to recover *Enterobius vermicularis* eggs from 576 children.
Result: It was found that the overall prevalence of intestinal parasites among 352 examined students was 5.4%: *Strongyloides stercoralis* (2.5%), *Entamoeba coli* (*E. coli*) (0.6%), *Giardia lamblia* (0.6%), Enterobius vermicularis (0.6%), hookworm (0.3%), hookworm and *E. coli* (0.3%), hookworm and *Trichuris trichiura* (0.3%) and *Strongyloides stercoralis* and *E. coli* (0.3%). The overall prevalence of enterobiasis among 576 schoolchildren by Scotch tape technique was 14.1%. The highest infection rate (19.3%) was observed at Wat Sao Hin School. The selective anthelminthic drugs were administered to all positive cases.
Conclusions: In this study, low prevalence of parasitic infections was demonstrated among schoolchildren in Phitsanulok Province. However, the control and prevention including the transmission of parasites detected should be explained for more concern and attention and the proper hygienic health education should be implemented.

1. Introduction

Intestinal parasitosis is a major public health problem worldwide, especially among children of developing countries. World Health Organization estimated that in the year 2000 approximately 3.5 billion people all over the world were infected with intestinal parasites and around 450 million children were ill because of these infections. In 1997, it was reported that there were estimated 280 million of hookworm infections worldwide, 478 million of ascariasis and 347 million of trichuriasis cases. *Ascaris lumbricoides* (giant intestinal roundworm), and *Enterobius vermicularis* (*E. vermicularis*) (pinworm) were the two common intestinal parasites found in schoolchildren[1,2]. Approximately 320 million schoolchildren worldwide were infected with *Ascaris lumbricoides* and more than 614 million schoolchildren were needed treatment[2,3]. *Enterobius* infection is widespread among children because they are frequently exposed to crowded and inadequate sanitary conditions. Children are particularly vulnerable to infections, causing many nutritional problems, and consequently, resulting in physical and intellectual growth retardation. It is known that intestinal parasitosis can lead to various types of morbidity with the symptoms of bloody stool, chronic diarrhea and abdominal pain. The public health problem of helminthiasis has been neglected in rural areas where there remains a low level of hygiene and poor quality of water supply[4]. Generally, undernourished and weak schoolchildren are also infected with some protozoa with several species inhabited in intestine. Most of them are non-pathogenic

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protozoa such as *Entamoeba coli* (*E. coli*) and *Endolimax nana*, whilst some can cause human symptoms including *Giardia lamblia* (*G. lamblia*) and *Entamoeba histolytica*[5,6].

In Thailand, intestinal parasitosis is the most common infection of people living in rural areas[7,8]. Children are more often infected than adults because they take less care of personal hygiene. Several studies on detection of parasites among schoolchildren in Thailand reported the range of prevalence varied from 4.24% to 75.1%[9-16]. Although the treatments of parasitosis in schoolchildren have been implemented for reducing the parasitic infections, the high prevalence of intestinal parasites in schoolchildren has been widely documented in many areas[9,14-16]. In Phitsanulok Province, few data of parasitic infections among children have been reported[17]. The appropriate control program is necessary to estimate the current status of intestinal parasitic infections. Thus, the objective of this research was to study the prevalence of intestinal parasites among schoolchildren in Phitsanulok Province, Northern Thailand. In addition, Scotch-tape technique was used for detecting *Enterobius* eggs. The results of this study might be useful for the researchers and health authorities for planning and implementing control programs in the studied areas.

2. Materials and methods

The study was performed at six primary schools close to Naresuan University in Phitsanulok Province, Northern Thailand: three schools of Bang Rakam District (Wat Krab Phuang, Wat Wang Ped and Wat Tha Ko) and three schools of Mueang District (Wat Sao Hin, Wat Kung Waree and Wat Sakat Namman) during February 2009 to January 2010. The province is situated in the lower Northern Thailand (Figure 1) and is located 370 km to the north of Bangkok. The majority of people earned their daily lives by agriculture.

An oral description and instruction for handling and collection of fecal samples were given to all children and teachers. The clean containers were distributed to each student on the day before specimen collection. All fecal specimens were transported to the laboratory of Department of Microbiology and Parasitology, Faculty of Medical Science, Naresuan University, and fixed in 10% formalin before further processing. The formalin-ethyl acetate concentration method was used to detect any parasites presented in fecal samples as described by Garcia[18]. The presence of intestinal parasites was microscopically determined by two parasitologists. In addition, the Scotch tape technique was used for detecting *Enterobius* eggs. The children were explained how to use the Scotch tape slides as described by Beaver *et al.*[19]. All infected children with parasites were treated with anthelminthic drugs and were explained about the transmission of parasites and how to prevent the parasitic diseases.

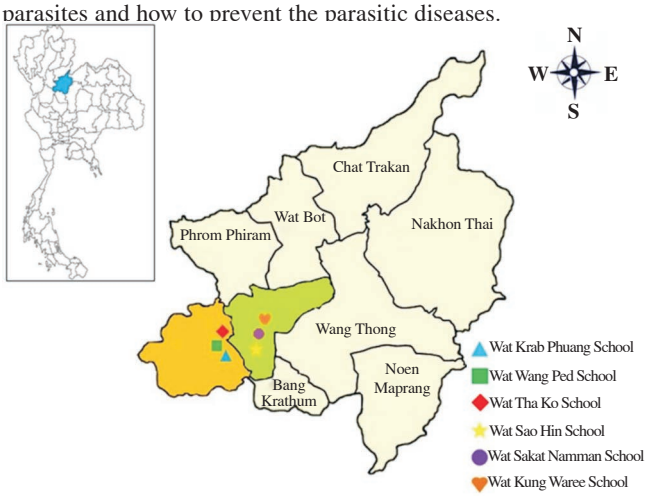

Figure 1. Map of 6 studied schools in Phitsanulok Province.

3. Results

A total of 352 fecal samples were collected from schoolchildren, 183 boys and 169 girls in the age range from 7-15 years old to check for their intestinal parasites. It was found that the overall prevalence of parasitic infection among schoolchildren was 5.4% (19/352). Among six species of intestinal parasites detected, two species belonged to protozoa (*E. coli* and *G. lamblia*) and other four species were nematodes [*E. vermicularis*, *Trichuris trichiura* (*T. trichiura*), *Strongyloides stercoralis* (*S. stercoralis*), and hookworm]. There were no cestodes and trematodes presented in this study. The infection rate ranged from 0% to 18.7% in different schools, and the highest rate was observed in Wat Wang Ped School. The positive infection rates for boys and girls were 5.5% and 5.3%, respectively. *Strongyloides* infection (2.5%) was the most common (Table 1) whilst *E. coli* and *G. lamblia* were found in 0.6% each. Mixed infections were found between hookworm and *E. coli*, hookworm and *T. trichiura* and *S. stercoralis* and *E. coli* in 0.3%. Hookworm infection and

Table 1

Prevalence of intestinal parasites in schoolchildren of Phitsanulok Province examined by formalin-ethyl acetate concentration technique.

Schools	No. of positive/No. of examined (%)		No. of positive (%)								Total
	Boys	Girls	Ec	Gl	Ev	Hw	Ss	Hw+Ec	Hw+Tt	Ss+Ec	
Wat Krab Phuang	3/45 (6.7)	1/46 (2.2)	2 (2.2)	0	2 (2.2)	0	0	0	0	0	4/91 (4.4)
Wat Kung Waree	0/29 (0.0)	1/23 (4.3)	0	0	0	1 (1.9)	0	0	0	0	1/52 (1.9)
Wat Sakat Namman	1/39 (2.6)	0/37 (0.0)	0	0	0	0	1 (1.3)	0	0	0	1/76 (1.3)
Wat Sao Hin	0/22 (0.0)	0/17 (0.0)	0	0	0	0	0	0	0	0	0/39 (0.0)
Wat Wang Ped	6/34 (17.6)	6/30 (20.0)	0	2 (3.1)	0	0	7 (10.9)	1 (1.6)	1 (1.6)	1 (1.6)	12/64 (18.7)
Wat Tha Ko	0/14 (0.0)	1/16 (6.2)	0	0	0	0	1 (3.3)	0	0	0	1/30 (3.3)
Total	10/183 (5.5)	9/169 (5.3)	2 (0.6)	2 (0.6)	2 (0.6)	1 (0.3)	9 (2.5)	1 (0.3)	1 (0.3)	1 (0.3)	19/ 352 (5.4)

Ec: *E. coli*; Gl: *G. lamblia*; Ev: *E. vermicularis*; Hw: Hookworm; Ss: *S. stercoralis*; Tt: *T. trichiura*.