

THE PRESENT SITUATION OF PARAGONIMIASIS IN ENDEMIC AREA IN PHITSANULOK PROVINCE

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Abstract. A cross-sectional survey and evaluation of paragonimiasis situation from endemic area in Phitsanulok Province was studied. Studies on the species and prevalence of parasites which infected people in Noen Maprang, Phitsanulok Province were also conducted during October 1999-March 2000. The sputum specimens were collected and examined to identify *Paragonimus heterotremus* eggs. In addition fecal samples were collected and examined for parasites by the formalin-ethyl acetate concentration technique. *P. heterotremus* eggs were detected in 2 out of 391 sputum specimens; a prevalence of 0.51%. A total of 584 stool specimens were obtained and examined. It was found that the prevalence of parasitic infection was 36.30%. *Opisthorchis viverrini* infection was the most prevalent (10.78%), followed by *Strongyloides stercoralis* (9.59%), hookworm (8.22%), *Echinostoma* spp (2.23%), minute intestinal flukes (1.54%), *Taenia* species (1.37%), *Enterobius vermicularis* (0.68%), *Entamoeba coli* (1.03%) and *Giardia lamblia* (0.86%). The prevalent rate of paragonimiasis in this endemic area in Phitsanulok Province has decreased during the past decade. However, there were other important parasite infections, especially opisthorchiasis and strongyloidiasis and these should be studied further.

INTRODUCTION

Paragonimiasis is an endemic disease in many Asian countries (Thailand, Korea, China, Philippines, Lao PDR and India) as well as in Africa and Latin America (Vien *et al.*, 1997). There have been at least 40 species reported in the world (Bunnag and Harinasuta, 1984). Fourteen species of *Paragonimus* are known to infect humans. *Paragonimus westermani* infection is the most common elsewhere while *Paragonimus heterotremus* is the etiologic agent of human paragonimiasis in Thailand (Miyazaki and Harinasuta, 1974; Vanijanonta *et al.*, 1981). The first case of human paragonimiasis in Thailand was reported in Petchabun Province (Prommas, 1928). After that many cases were reported in Saraburi, Nakhon Nayok, Chiang Rai, Nan and Phitsanulok Provinces, respectively (Daengsvang *et al.*, 1964; Khamboonruang *et al.*, 1977; Sutthipunthu *et al.*, 1978; Vanijanonta *et al.*, 1981; Pannarunothai *et al.*, 1988). The aims of this study were to evaluate paragonimiasis situation and to determine the prevalence of other parasitic infections in an endemic area in Phitsanulok Province.

MATERIALS AND METHODS

Study site

The study was carried out from October to March 2000 in Sai Dong Young village, Wang Yang subdistrict and Huay Bo Tong village, Ban Mung subdistrict, Noen

Maprang district, Phitsanulok Province, in northern Thailand, 490 km from Bangkok. Both villages consisted of simple wooden houses which were scattered along the hills and streams. The 1,275 residents (of two villages) were Buddhist and worked in farming.

Sputum examination

A total of 391 individuals (30.67% of the total villagers) gave sputums for examination during October 1999 to March 2000. During the surveyed period, our field workers collected seven morning sputum samples on seven successive days, from each of the villagers, and all samples were brought to a laboratory in Naresuan University, Phitsanulok Province. Each sample was mixed with equal amount of 3% sodium hydroxide in a centrifuge tube and centrifuged at 1,500 rpm for 10 minutes. The supernatant was decanted and the sediment was examined for the eggs of *P. heterotremus*.

Stool examination

A total of 584 individuals (45.80% of the total villagers) provided stools for examination during October 1999 to March 2000. Stool samples were also collected for seven days. All samples were collected in night pots from the villagers, and all the pots were brought to the laboratory in Naresuan University for processing. Each stool sample was examined for *P. heterotremus* eggs and others parasites using the formalin-ethyl acetate concentration technique.

RESULTS

P. heterotremus eggs were detected in 2 individuals from 391 people examined, a prevalence of 0.51% (Tables 1 and 2).

A total of 584 stool specimens were examined. The prevalence of parasite infection was 36.30%. *O. viverrini* infection was the most common, 10.78%, followed by *S. stercoralis* 9.59%, hookworm 8.22%, *Echinostoma* spp 2.23%, small intestinal flukes 1.54%, *Taenia* species 1.37%, *E. vermicularis* 0.68%, *E. coli* 1.03% and *G. lamblia* 0.86% respectively (Tables 3 and 4). Some individuals had more than one parasitic infections.

Treatment

The two villagers who were positive for *P. heterotremus* received health education and praziquantel at a dose of 75 mg/kg, three times daily for three days. Other villagers with parasitic infections were given health education and treatments accordingly.

DISCUSSION

The diagnosis of paragonimiasis is based on the demonstration of *Paragonimus* eggs in the feces and/or sputa by microscopic examination (Yokogawa *et al*, 1960). It was found that sputum examination was more sensitive in detecting *P. heterotremus* eggs than fecal examination, confirming previous reports of Cabrera and Fevidal (1974); Upatham *et al* (1995). This follow-up study showed that the prevalence rate of paragonimiasis in this endemic area in Phitsanulok Province has decreased during the past decade (Pannarunothai *et al*, 1988). Decreasing prevalence of paragonimiasis in this area may be due to the control programs of the Ministry of Public Health for paragonimiasis and health education on not consuming raw crabs. Other important parasite infections, especially opisthorchiasis and strongyloidiasis still exist and should be studied further. Jongsuksantigul *et al* (1992) reported that the prevalence rate of *O. viverrini* in the north and northeast were 22.88% and 22.0% respectively. The habit of eating raw fish is the

Table 1
The prevalence according to sex of *P. heterotremus* from the population of Huay Bo Tong village and Sai Dong Young village.

Sex	No. of examined samples (No. positive)			Total prevalence
	Huay Bo Tong village	Sai Dong Young village	Total	
Male	71	130 (2)	201 (2)	0.99
Female	71	119	190	0.00
Total	142	249 (2)	391 (2)	0.51

Table 2
The prevalence according to age group of *P. heterotremus* from the population of Huay Bortong village and Sai Dong Young village.

Age (years)	No. of examined samples (No. positive)			Total prevalence
	Huay Bo Tong village	Sai Dong Young village	Total	
< 10	7	9	16	0.00
10-19	22	8	30	0.00
20-29	21	37	58	0.00
30-39	29	77 (1)	106 (1)	0.94
40-49	23	59	82	0.00
50-59	22	41	63	0.00
> 60	18	18 (1)	36 (1)	2.78
Total	142	249 (2)	391 (2)	0.51

Table 3
Prevalence of parasite infections in Huay Bo Tong and Sai Dong Young villages examined by formalin-ethyl acetate concentration technique.

Villages	No. examined	No. positive	Helminths							Protozoa	
			<i>Ov</i>	MIF	<i>Echi</i>	<i>Hw</i>	<i>Ss</i>	<i>Ev</i>	<i>Ta</i>	<i>Gl</i>	<i>Ec</i>
Huay Bo Tong	192	62	13	0	8	16	17	1	4	1	2
Sai Dong Young	392	150	50	9	5	32	39	3	4	4	4
Total	584	212	63	9	13	48	56	4	8	5	6
(%)		(36.30)	(10.78)	(1.54)	(2.23)	(8.22)	(9.59)	(0.68)	(1.37)	(0.86)	(1.03)

Ov = *Opisthorchis viverrini*; MIF = Minute intestinal flukes, *Echi*=*Echinostoma* spp; *Hw* = Hookworm; *Ss* = *Strongyloides stercoralis*; *Ta* = *Taenia* spp; *Ev* = *Enterobius vermicularis*; *Gl* = *Giardia lamblia*; *Ec* = *Entamoeba coli*

Table 4
Prevalence according to age group of parasitic infections in Huay Bo Tong and Sai Dong Young villages examined by formalin-ethyl acetate concentration technique.

Age (years)	No. examined	No. positive	Helminths							Protozoa	
			<i>Ov</i>	MIF	<i>Echi</i>	<i>Hw</i>	<i>Ss</i>	<i>Ev</i>	<i>Ta</i>	<i>Gl</i>	<i>Ec</i>
<10	61	12	0	0	0	4	4	1	0	1	2
10-19	48	7	2	0	1	1	2	0	0	0	1
20-29	76	20	3	0	6	8	1	0	1	0	1
30-39	158	59	18	5	4	15	12	2	0	3	2
40-49	124	49	16	0	2	11	15	0	2	1	0
50-59	75	44	18	3	0	5	14	1	3	0	0
>60	42	21	6	1	0	4	8	0	2	0	0
Total	584	212	63	9	13	48	56	4	8	5	6
(%)		(36.30)	(10.78)	(1.54)	(2.23)	(8.22)	(9.59)	(0.68)	(1.37)	(0.86)	(1.03)

Ov = *Opisthorchis viverrini*; MIF = Minute intestinal flukes, *Echi* = *Echinostoma* spp; *Hw* = Hookworm; *Ss* = *Strongyloides stercoralis*; *Ta* = *Taenia* spp; *Ev* = *Enterobius vermicularis*; *Gl* = *Giardia lamblia*; *Ec* = *Entamoeba coli*.

cause of infection. The infection is found in young people and increases with age (Table 4). The extensive continuation of mass treatment, sanitation improvement and health education are suggested.

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