PREVALENCE OF STRONGYLOIDES IN NORTHERN THAILAND AND TREATMENT WITH IVERMECTIN *VS* ALBENDAZOLE

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Abstract. The stools of 697 cases were examined by agar plate technique at Tambon Makam Luang, Sun Pa Tong district, Chiang Mai; there were *Strongyloides stercoralis* 15.9%,*Opisthorchis viverrini* 5.1%, intestinal fluke 0.1%. Treatment with ivermectin 78 cases and albendazole 33 cases of strongyloidiasis gave cure rates at 98.7% and 78.7%, respectively. Alkaline phosphatase in some patients were increased at mild level after treatment. Side effects in ivermectin group were anorexia,nausia,diarrhea,diffuse itching and drowsiness; and in albendazole group were nausia and diarrhea. The efficacy of single dose and mild side effects suggest ivermectin as drug of choice for strongyloidiasis treatment.

INTRODUCTION

Strongyloidiasis has a worldwide distribution; it is founded in Europe, Asia, Africa and America. In northeast Thailand, in 19 provinces, the prevalence of *Strongyloides stercoralis* has been measured at 23.5%, with the highest infection rate being in the Kalasin Province, at 61% (Jongsuksuntigul *et al*, 2003). In the Chiang Mai Province in the northern part of Thailand, the infection rate in San Pa Tong was 38.8% (Phongsri, 1997). *Strongyloides stercoralis* has been found in prisoners of the Second World War, forty years later (Grove, 1980). In immunocompromized hosts, the parasites can autoinfect in host, multiplying to larger numbers, causing the patients to die of malnutrition (Leelarasamee *et al*, 1978; Purtito *et al*, 1994). Treatment of *Strongyloides stercoralris* with albendazole 400 mg twice daily for five days gives a cure rate of 95% (Pitisuttithum, 1995). Comparative treatment with albendazole 400 mg daily for five days or ivermectin 0.2 mg/kg single dose gives cure rates of 45% and 82.9%, respectively (Marti, 1996).

The objective of this study was to determine the prevalence of *Strongyloides stercoralis* in northern Thailand and the effectiveness of albendazole 400 mg twice daily for five days vs. ivermectin 0.2 mg/kg single dose.

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MATERIALS AND METHODS

The study was conducted from April to September 2004 in San Pa Tong district, Chiang Mai Province, Thailand. In the study population, 697 cases had a stool examination by the Kato technique and the agar plate culture technique. Patients were excluded if they were pregnant or lactating, or had severe heart disease. Informed consent was obtained after the study was explained to them. They were told that they could discontinue participation at any time. The subjects were randomly divided into 2 groups. The subjects in group one were given albendazole 400 mg twice daily for 5 days. The subjects in group two were given ivermectin 0.2 mg/kg as a single dose. The liver function tests and complete blood counts were done on days 1 and 30. Thirty days after treatment, a repeat stool examination was performed and those with negative stools were assumed to be cured.

RESULTS

The stool examinations were done in San Pa Tong, Chiang Mai Province on 697 people using the Kato technique and the agar plate cul-

Table 1
The prevalence of parasites among villagers in San Pa Tong, Chiang Mai.

No. examined	*S. stercoralis*	*O. viverrini*	Intestinal fluke	Hookworm
697	114 (15.9%)	31(5.1%)	1 (0.1%)	3 (0.4%)

Table 2
Treatment of strongyloidiasis with albendazole and ivermectin.

Treatment	No. patients	Cured	Not cured
Albendazole 400 mg for 5 days	33	26 (78.8%)	7 (21.2%)
Ivermectin 0.2 mg/kg	78	77 (98.7%)	1 (1.3%)
Total	111	103	8

Chi-square test=10.95 (Yates corrected), p=0.0009
Ivermectin treated strongyloidiasis significantly better than albendazole.

ture technique. The results revealed 114 cases with *Strongyloides stercoralis* (15.9%), 31 with *Opisthorchis viverrini* (5.1%), 1 case with an intestinal fluke (0.1%) and 3 cases with hookworm (0.4%) (Table 1). All the Strongyloidiasis cases were treated with albendazole or ivermectin according to group.

There were 33 cases in group 1 and 78 cases in group 2. The subjects in group 1 were treated with albendazole 400 mg twice daily for 5 days. The subjects in group 2 were treated with ivermectin 0.2 mg single dose. Thirty days after treatment, the stool was recollected and cultured on agar plate. There were 7 cases (21.2%) in group 1 positive for *Strongyloides stercoralis* and one case (1.3%) in group 2 positive (Table 2).

The liver function tests and completed blood counts were done on 41 cases, on days 1 and 30. There were abnormal liver function tests in 16 of the cases (43.2%). The alkaline phosphatase was increased in both groups. In the albendazole group, the alkaline phosphatase levels ranged from 143 to 224 U/l and in the ivermectin group the alkaline phosphatase levels ranged from 131 to 230 U/l (normal alkaline phosphatase range is 53-128 U/l). Eosinophilia on the complete blood count was found in 77.4% of the subjects, in both groups. The average WBC counts ranged from 5.1 to 21.5 cells. All patients were mildly anemic with hemoglobin levels of 7-11 g/dl in the females and 10-12 g/dl in the males.

Table 3
The side effects of ivermectin and albendazole in the treatment of strongyloidiasis.

	Ivermectin (79 cases)	Albendazole (35 cases)
Loss of appetite	2	0
Dizziness	1	1
Diarrhea	2	1
Diffuse itching	2	0
Drowsiness	3	0
Total	10	2

Prior to treatment, none of the patients had symptoms, but within 30 days of initial treatment, patients had a number of symptoms, including loss of appetite, dizziness, dirrhea, diffuse itching and drowsiness (Table 3). The side effects of albendazole were milder than ivermectin. There was nausea in one case and diarrhea in one case. Alkaline phosphatase in both groups was increased, occurring in 4 of 9 cases (44.4%) with albendazole and 12 of 32 cases (37.5%) with ivermectin.

DISCUSSION

The prevalence of strongyloidiasis among the villagers in San Pa Tong, Chiang Mai (15.1%) was lower than previously reported (38.8%) (Phongsri, 1997). Strongyloidiasis in males was more common than in females, with a ratio of 3:1; most likely because most of the males are farmers and work in the soil without shoes, while the females usually work as housewives and wear shoes when walking on the ground. Prevention is by wearing shoes while working in the field. The effectiveness of ivermectin and albendazole against *S. stercoralis* was reported to be 82.9% and 45%, respectively, by Marti *et al* in 1996. In our study, the effectiveness of ivermectin against *S. stercoralis* was 98.7% and albendazole was 78.8%. Ivermectin at a dose of 0.2 mg/kg/day was highly effective against strongyloidiasis in both mild and heavy infections. No severe adverse effects were recorded among the patients in either treatment group. Diarrhea, diffuse itching and drowsiness were recorded more often after ivermectin than after albendazole treatment. Alkaline phosphatase levels were increased in patients among both groups. The efficacy of single dose treatment with ivermectin makes it the drug of choice for the treatment of strongyloidiasis in uncomplicated and complicated cases, especially given the mild side effect profile.

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