ALBENDAZOLE IN THE TREATMENT OF STRONGYOLIDIASIS

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INTRODUCTION

Strongyloides stercoralis infection is common among children and also adults in the tropics especially in warm, humid regions. Although infection rates are low in most areas, strongyloidiasis can be a serious and often fatal disease. Overwhelming and disseminating infections are becoming more common due to the use of immunosuppressive therapy for systemic diseases (Purtilo *et al.*, 1974; Powell *et al.*, 1980).

In general the host's immune processes limit the parasite numbers in the small intestine but allow the infection to persist indefinitely with minimal symptoms. Reinfection mainly autoinfection occurs due to lowering of immune status. Effective drugs are now available for the treatment of this parasitosis such as thiabendazole, but there have been reports of adverse effects. Albendazole has also been found to be effective against strongyloidiasis (Cruz, 1981; Pene, 1982; Misra, 1983; Rossignol, 1983) and preliminary studies conducted in Bangkok Hospital for Tropical Diseases showed promising results (Pungpak *et al.*, 1984). Further studies were carried out to determine the most effective dosage for use in strongyloidiasis in Thailand.

MATERIALS AND METHODS

The study was carried out at the Bangkok Hospital for Tropical Diseases, Faculty of Tropical Medicine, Mahidol University from January 1986 through February 1987. Thirty patients with *Strongyloides stercoralis* infection admitted to the hospital were selected for study. None had history of malaria or other liver diseases 60 days prior to admission. There were 21 males and 9 females, 13 to 68 years of age. Their weights ranged from 39 to 83 kg. Most had mild gastrointestinal symptoms including dyspepsia, abdominal discomfort, and occasional diarrhoea.

The patients were divided into two groups; 11 patients (Group I) 19 patients (Group II). Each patient was thoroughly examined and consent sought prior to treatment. Each was followed carefully throughout the course of treatment and evaluation period.

Laboratory tests included hematology (hemoglobin, packed cell volume, white blood count, differential count, platelet and sedimentation rate) and blood biochemistry (bilirubin, alkaline phosphatase, aspartate aminotransferase, alanine aminotransferase, cholesterol, albumin and globulin ratios, blood urea nitrogen, creatinine, and blood sugar). Laboratory values were monitored on days 0, 3, 7, 10 and then weekly through day 30. Urinalyses and radiological examinations were done before treatment.

Stools were examined prior to treatment and daily thereafter for 14 days in Group I and for 30 days in Group II. Each stool was examined in duplicate by the direct smear and the formalin-ether concentration method of Ritchie (1948). Worm counts were made on all stools with *S. stercoralis* larvae (Stoll 1923; Sasa, 1975).

Group I patients were given 400 mg albendazole orally in divided doses after morning and evening meals for 3 consecutive days. Group II received the same regimen but were retreated at the same dosage levels one week later.

Results were assessed by stool examinations 8, 9, 10 and 11 days after the last dose of albendazole in both groups.

RESULTS

All 11 patients in Group I and the 19 patients in Group II completed the study for 14 and 30 days, respectively. Basic information on age, weight, fecal larval counts, and treatment schedules are shown in Table 1.

Table 1

Data on two groups of patients with strongyloidiasis treated with albendazole.

	Group I	Group II
No. of patients	11	19
Age (years)	37.7 (13-68)	39.8 (22-59)
Weight (kg)	52.9 (39-65)	55.4 (42-83)
Larvae per gram of feces	418.1 (400-600)	747.4 (400-2800)
Albendazole (200mg/tab)	400 mg twice for 3 days	400 mg twice for 3 days × 2
Duration of treatment	$D_0 - D_2$	$D_0 - D_2$ $D_8 - D_{10}$
Follow-up	14 days	30 days

The results of the efficacy of albendazole in the treatment of strongyloidiasis is presented in Table 2. In both groups there was a reduction of *S. stercoralis* larvae in the feces 3 to 4 days after the first administration of the drug. In Group I, stool positive was obtained from two persons on day 12, and only one had positive larva on day 14; the rest of the group were negative. The parasitological cure rate was approximately 73%. In Group II, larvae could not be detected in the stools 10 to 20 days after treatment, but in four patients, stool were positive for larvae on days 21, 22, 23 and 24 respectively. Patients in this group were free of parasites after day 25. The cure rate in Group II was 100%.

Table 2

Efficacy of treatment with albendazole in the two groups of patients with strongyloidiasis.

Day of treatment	Number of patients with positive larvae	
	Group I	Group II*
0	11	19
1	10	16
2	4	14
3	2	6
4	2	4
5	2	4
6	0	3
7	1	4
8	0	3
9	0	1
10	2	2
11	0	0
12	2	0
13	0	0
14	1	0
21	-	1
22	-	1
23	-	1
24	-	1
30	-	0

* In group II all remained negative from day 11 to 20 and 25 to 30.

Side effects were recorded from three patients (27%) in Group I and eight (42%) in Group II. The side effects were epigastric pain, diarrhoea, and a hot sensation over the

abdomen. All symptoms were mild and transient and subsided in a few days.

Elevations in serum aminotransferase were observed in three patients in Group II on days 3, 10 and 28 respectively. In the first two patients, the enzymes rose to almost double the normal value, but returned to normal on subsequent testing. The third patient had a SGOT of 320 units/ml and SGPT of 405 units/ml. This patient had a history of rheumatoid arthritis. He was in remission when admitted to the study. There was no evidence of toxicity nor abnormal laboratory findings in any of the other patients.

DISCUSSION

Albendazole has been shown to be an efficient anthelminthic and has shown efficacy in the treatment of a number of intestinal helminthiases (Pene *et al.*, 1982; Viravan *et al.*, 1982; Rossignol and Maissonneuve, 1983); In our initial studies (Pungpak *et al.*, 1984)we found the drug to be effective in the treatment of *S. stercoralis* and the present study confirms the previous results. We have shown that albendazole given at dosages of 400 mg/day in divided doses for 3 days and repeated 7 days later, completely cured 19 patients with minimal side effects.

Side effects attributed to thiabendazole often result in cessation of treatment. With albendazole few side effects were seen in our patients. In other studies adverse effects were often due to co-existing problems. Viravan *et al.*, (1982) reported rise in alkaline phosphatase in three patients treated for hookworm; the patients also had malaria. In long term trials for hydatid disease, Morris *et al.*, (1985) reported abnormal liver functions in six patients treated for 4 to 5 days. The liver function tests returned to normal within a week of discontinuing the drug. In our study, two patients experienced hepatotoxic effects of the drug, and the third who had elevated SGPT/SGOT values was probably due to other factors since the elevations occurred near the end of the study period.

SUMMARY

Albendazole was used to treat 30 patients with *Strongyloides stercoralis* infections. There were 21 males and 9 females, 13 to 68 years of age, who were divided into two groups of 11 and 19, respectively. Repeated pre-and post-treatment stool examinations were done by simple direct smear and formalin-ether concentration, and larval quantitations were done by the Stoll and Sasa's technique. Group I patients were given albendazole in dosages of 400 mg/day in divided doses for 3 days. Group II patients were given similar dosages, but were treated again 7 days later on the same schedule. Patients in Group I were followed for 14 days and those in Group II for 30 days. The cure rates were 73% for Group I and 100% for Group II. Side effects were minimal and transient. Albendazole is recommended for the treatment of strongyloidiasis in dosages of 400 mg/day in divided doses for 3 days with treatment repeated one week later.

ACKNOWLEDGEMENTS

The authors wish to express thanks to Professor Khunying Tranakchit Harinasuta, Dr. Santasiri Sornmani, Dean, Faculty of Tropical Medicine for encouragement and support, to Professor John H. Cross for his advice, and to nursing and technical staff of the Bangkok Hospital for Tropical Diseases for their help. The study was partly supported by Smith Kline & French Overseas Company.

REFERENCES

CRUZ, H.L., TELLO, R., DE MAYOLO, A.A., CAMPOS, M., GUERRA, H. and SOTO, J.,

(1981). Com. de Investiga. *Clin. Latinoamericanas. 1* : 104.

MISRA, R.C., DEWAN, R., SACHDEV, S., SACHDEV, K., AGARWAL, S.K. and GUPTA P.S., (1983). Albendazole. A new drug in the treatment of intestinal helminthiasis (nematodes and cestodes). *Current Ther. Res., 31* : 753.

MORRIS, D.L., DYKES, P.W. MARRINER, S., BOGAN, J., BURROWS, F., SKEENE SMITH, H. and CLARKSON, M.J., (1985). Albendazole objective evidences of response in human hydatid disease. *JAMA, 253* : 2053.

PENE, P., MOJON, M., GARIN, J.P., COULAUD, J.P., and ROSSIGNOL, J.F. (1982). Albendazole : a new broad spectrum anthelmintic. Double blind multicentre clinical trial. *Am. J. Trop. Med. Hyg., 31* : 263.

POWELL, R.W., MOSS, J.P., NAGER, D., MELO, J.C., BORAM, L.H., ANDERSON, W.H. and CHENG, S.H., (1980). Strongyloidiasis in immunocompromised hosts : presentation as massive lower gastrointestinal bleeding. *Arch. Intern. Med., 140* : 1061.

PUNGPAK, S., BUNNAG, D. and HARINASUTA, T., (1984). Albendazole in the treatment of opisthorchiasis and concomitant intestinal helminthic infections. *Southeast Asian J. Trop. Med. Pub. Hlth., 15* : 44.

PURTILO, D.T. MAYERS, W.M. and CONNER, D.H., (1974). Fatal strongyloidiasis in immunosuppressed patients: *Amer. J. Med. 56* : 488.

RITCHIE, L.S., (1948). An ether sedimentation technique for routine stool examination. *Bull. U.S. Army Med. Dept., 8* : 326.

ROSSIGNOL, J.F. and MAISSONNEUVE, H., (1983). Albendazole : placebo-controlled study in 870 patients with intestinal helminthiasis. *Tran. Roy. Soc. Trop. Med. Hyg., 77* : 707.

SASA, M., (1975). Diagnosis of hookworm and Strongyloides infections by faecal culture method. *In:* Diagnostic methods for important helminthiasis and amoebiasis in Southeast Asia and the Far East. Harinasuta, C. and Reynolds, D.C. (eds.) SEAMEO-TROPMED. Bangkok. p. 70.

STOLL, N.R., (1923). An effective method of counting hookworm eggs in faeces. *Amer. J. Hyg., 3* : 59.

VIRAVAN, C., MIGASENA, S., BUNNAG, D. and HARINASUTA, T., (1982). Clinical trial of albendazole in hookworm infection. *Southeast Asian J. Trop. Med. Pub. Hlth. 13* : 654.