ORIGINAL ARTICLE

Efficacy of Albendazole in the Treatment of *Trichuris trichuira* and *Giardia intestinalis* Infection in Rural Malay Communities

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Summary

A community study was carried out to evaluate the efficacy of a 3-day course of 400 mg albendazole daily in the treatment of *Trichuris trichiura* and *Giardia intestinalis* infection. This treatment regimen was effective in the treatment of *Trichuris trichiura* and *Giardia intestinalis* infection with cure rates of 91.5% and 96.6% respectively. Uses of a 3-day course of 400 mg albendazole daily should be considered in mass or targeted soil-transmitted helminths chemotherapy particularly in areas where the prevalence of *Trichuris trichiura* is high and polyparasitism is common.

Key Words: Giardia intestinalis, Trichuris trichiura, Albendazole, Treatment

Introduction

Single-dose treatment of 400 mg albendazole is effective against *Ascaris lumbricoides* and hookworm infection [1-4]. In contrast, results of studies on the effect of single-dose 400 mg albendazole in the treatment of *Trichuris trichiura* infection are varied, with most studies reporting low curative effect [1-7]. A study in Malaysia reported a cure rate of only 30.0% and egg reduction of less than 40.0% [1], while a recent study reported a cure rate of only 5.5% and egg reduction rate of less than 50.0% [4]. High prevalence of moderate and heavy infection of *Trichuris trichiura* according to the WHO[8] criteria ≥ (2000 eggs/gram) may be the reason why the cure rate was low in this study [4]. This was verified by others studies [5,6]. Better cure rates of *Trichuris trichiura* infection were also not obtained by increasing the dosage of albendazole as shown in a few studies [6,7]. As the alternative multiple-doses of 400 mg albendazole have been used in the treatment of *Trichuris trichiura* infection. It is felt that by prolonging the contact of albendazole with the worms the cure rate can be improved; and this was shown in a study in Bangladesh where by a 3-day course of 400 mg albendazole daily has improved the cure rate to 80.0% [7].

Albendazole has also been proven as an effective treatment for *Giardia intestinalis* infection. A clinical trial of single-dose 400 mg albendazole in the treatment of *Giardia intestinalis* infection demonstrated a cure rate of 24.0% [9]. In a separate study, single and multiple doses of albendazole were investigated in children [10]. The study indicated that a single-dose of 600 mg and 800 mg gave cure rates of 62.1% and 74.6% respectively [10]. However a 3-day and 5-day course of 400 mg albendazole daily gave a better cure rates of 81.0% and 94.8% respectively.

The purpose of this study was to evaluate the efficacy of a 3-day course of 400 mg albendazole daily in the treatment of *Trichuris trichiura* and *Giardia intestinalis* infection in rural Malay communities.

Materials and Methods

This study was conducted in 5 Malay villages in sub-district of Tersat, Kuala Berang, Hulu Terengganu, about 450 km from Kuala Lumpur. All the villages were within the same ecological niche. Most of the occupational groups were labourers, drivers and farmers, whilst a few work in private and government agencies as office workers and some as teachers. Most of the villages were supplied with pipe water, proper sewage systems and electricity. The type of house ranged from wooden to permanent structures consisting of bricks and cement.

In all 917 subjects between 2-year-old to 70-year-old (431 males and 486 females) participated in this study. Faecal samples were collected in a faecal container. About 0.5 gm of faecal sample from each study subject was fixed with 10.0% formalin and polyvinyl alcohol. Faecal samples fixed with 10.0% formalin were examined for the presence of *Giardia intestinalis* antigen using the double antibody sandwich ELISA technique (LMD Lab, 1995). Faecal samples fixed with polyvinyl alcohol were stained with trichrome for microscopic detection of *Giardia intestinalis*. The faecal specimens were also examined by Kato-Katz method for the presence of soil-transmitted helminths (STH).

All subjects positive for *Giardia intestinalis* using both of the above methods were treated with a 3-day course of 400 mg albendazole daily. Ten days after the last day of treatment, faeces were collected and examined again for the presence of *Giardia intestinalis* and STH; to determine the efficacy of albendazole. The efficacy of albendazole in the treatment of *Giardia intestinalis* and STH were measured by cure rates. Cure rates were calculated as a ratio between cured cases at second faecal examination and all positive cases at first faecal examination. These cure rates were analysed using Chi Square test and test of Proportion.

Results

The demographic and socio-economic characteristics of the subjects are shown in Table I. The prevalence and distribution of *Giardia intestinalis* infection are shown in Table II. Of the 917 subjects studied 19.2% (176) were positive for *Giardia intestinalis*. The prevalence varied with age-groups with the highest prevalence in 7 to 12-year-old. The difference was statistically significant (X^2=13.88, p=0.0030). Out of the 176 subjects infected with *Giardia intestinalis* 60 (34.0%), 47 (26.7%) and 3 (1.7%) were infected with *Ascaris*, *Trichuris* and hook-worm infection respectively. The distribution of STH infection according to intensity of infection are shown in Table III.

Table I

Demographic and socio-economic characteristics of subjects in five rural Malay communities

Variable	Subjects (%)
Gender	
Male	486 (53.0%)
Female	431 (47.0%)
Age (years)	
2-6	210 (22.4%)
7-12	316 (34.5%)
13-20	96 (10.4%)
≥ 21	295 (32.2%)
Occupational Groups	
Professional (teachers, clerks, technicians)	78 (12.5%)
Non-professional (farmers, labourers, drivers)	544 (87.5%)
Mean family income	
≤ RM200.00	326 (35.6%)
≥ RM201.00	591 (64.4%)
Water supply	
Pipe	609 (66.4%)
Others (river, well, rain water)	308 (33.6%)
Usage of toilets	
Yes	851 (92.8%)
No	66 (7.2%)

Table IV shows the efficacy of albendazole in the treatment of *Giardia intestinalis* and STH infection. A 3-day course of 400 mg albendazole daily was effective against all STH including *Trichuris trichiura* infection, with cure rates of 96.7%, 91.5% and 100.0% for *Ascaris lumbricoides*, *Trichuris trichiura* and hookworm infection respectively. Albendazole was also found to be very effective in the treatment of *Giardia intestinalis* infection with a cure rate of 96.6%. There was a significant reduction in the prevalence of *Giardia intestinalis* and STH infection after treatment.

Table II

Prevalence of *Giardia* intestinalis according to age and gender in five rural Malay communities

Variables	Number examined	Number infected	Prevalence (%)
Age (years)			
2-6	211	46	21.8
7-12	316	74	23.4
13-20	96	20	20.8
≥ 21	294	36	12.2
Gender			
Male	431	73	16.9
Female	486	103	21.2
Total	**917**	**176**	**19.2**

Discussion

Single-dose of 400 mg albendazole was found to be very effective against *Ascaris lumbricoides* and hookworm infections, with cure rates ranging between 90.0% to 100.0% [1,2]. Findings in this study showed that administration of a 3-day course of 400 mg albendazole daily did not increase the cure rates of *Ascaris lumbricoides* and hookworm infections. A previous study has also shown that, the cure rate of *Ascaris lumbricoides* was almost the same either by increasing the single-dosage of albendazole or by administering it in a course of a few days [7].

This study showed that a 3-day course of 400 mg albendazole daily was effective against *Trichuris trichiura* infection giving a cure rate of 91.5%; whereas cure rates of 40.0% and 80.0% were reported using a course of 3 days and 5 days of 400 mg albendazole daily repectively [7]. Previous studies have also shown that single-dose of 400 mg albendazole only gave cure rate of less than 40.0% [2,3,7]; increasing the single-dose to 600 mg and 800 mg did not improve the cure rate [5,7]. It can be concluded that prolonging the contact of albendazole with the worms is the important factor in determining the cure rate of *Trichuris trichiura* infection.

Table III

Intensity infection of soil-transmitted helminths infection (n=176) in five rural Malay communities

Intensity of infection	*Ascaris lumbricoides* n (%)	*Trichuris trichiura* n (%)	Hookworm Infection n (%)
Mild	19 (10.8)	12 (6.8)	3 (1.7)
Moderate	30 (17.0)	18 (10.2)	0 (0.0)
Severe	11 (6.3)	17 (19.7)	0 (0.0)

Table IV

The efficacy of a 3-day course of 400 mg albendazole daily in the treatment of *Giardia intestinalis* and soil-transmitted helminths (n=176) in five rural Malay communities

Infections	Number of cases	Number cured	Cure rate (%)
Ascaris	60	58	96.7
Trichuris	47	43	91.5
Hookworm	3	3	100.0
Giardia intestinalis	176	170	96.6

This study indicated that a 3-day course of 400 mg albendazole daily was very effective against *Giardia intestinalis* infection. The potential of benzinidazole (albendazole and mebendazole) as an effective antigiardial has been reported in a number of clinical cases [12-14]. A clinical trial using single-dose of albendazole for the treatment of *Giardia intestinalis* gave cure rates between 24.0% to 74.6% [10]; whereas a course of 3 days and 5 days of 400 mg albendazole gave cure rates of 81.0% and 94.8% respectively and that 5 days course of 400 mg albendazole daily was as effective as a course of metronidazole [10]. A recent clinical study also reported that a 7-day course of albendazole is effective against *Giardia intestinalis* infection [15].

Albendazole is a broad spectrum anthelminthic and has been widely used as a single-dose of 400 mg in the treatment of *Enterobius vermicularis*, *Ascaris lumbricoides* and hookworm infection. It is poorly absorbed by the intestine and is well tolerated with minimal side effects. On the other hand metronidazole which has been widely used in the treatment of giardiasis and amoebiasis give rise to frequent side effects and is incompatible with alcohol. Beside that, their use in children has been limited by poor compliance [16] and potential carcinogenic effects [17].

High efficacy of a 3-day course of 400 mg albendazole daily in the treatment of *Trichuris trichiura* and *Giardia intestinalis* infection as shown in this study and other studies [7,10,15] is an important factor to be considered in the mass intestinal parasite control program, particularly in areas where polyparasitism is common. A 3-day course of 400 mg albendazole daily can also be used as an alternative treatment for giardiasis.

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