MINIMUM EFFECTIVE DOSES OF MEBENDAZOLE IN TREATMENT OF SOIL-TRANSMITTED HELMINTHS

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Abstract. Three hundred and fifteen primary school children infected with soil-transmitted helminths were divided into 5 groups. Three groups were treated with 25, 50 and 75 mg mebendazole (MBZ) single dose. One group was given MBZ conventional dose of 100 mg twice daily for 3 days and another group was given albendazole (ABZ) standard dose of 400 mg single dose. Every trial lower MBZ dose 75 mg, 50 mg and 25 mg regimen were highly effective against *Ascaris lumbricoides* but only moderately effective against *Trichuris trichiura* and *Necator americanus*.

INTRODUCTION

Mebendazole (MBZ), methyl-5(6)-benzoyl-benzimidazole 2-yl-carbamate, is orally active broadspectrum anthelmintic effective against numerous species of roundworms and flatworms especially the gastrointestinal nematodes of animals and man. The conventional dose of mebendazole 100 mg twice daily for three consecutive days, against soil-transmitted helminths (STH) were reported by a number of authors with variational efficacy (Chongsuphajaisiddhi *et al*, 1978; Nontasut *et al*, 1987; Anantaphruti *et al*, 1993; Setasuban *et al*, 1993).

A number of papers reported effective dose of MBZ as 300-600 mg single dose or 100 mg twice daily for three consecutive days against STH. The multiple dose regimen gave higher satisfactory result and being accepted as a standard dose of STH treatment.

Fan *et al* (1992) claimed that the minimum effective dose of MBZ against STH was only 1/10 to 1/20 of the standard regimen. MBZ minimum effective dose for ascariasis is 100 mg single dose or 25 mg for three consecutive days; for hookworm is 150 mg single dose and for *Trichuris* infection is 400 mg single dose or the 100 mg conventional dose.

This paper aimed to investigate the efficacy of MBZ at the dose lower than 100 mg either single or multiple dose regimens.

MATERIALS AND METHODS

The study was carried out mainly in Ban Chang primary school, Sichon District additional study was done in Ban Tha Rue primary school, Muang District, Nakhon Si Thammarat Province. Stool examination was performed by quantitative thick smear method (Kato-Katz). A total of 315 children were examined and the STH positive children were divided into 5 groups; two groups were given standard regimens, MBZ 100 mg twice daily for 3 consecutive days and ABZ 400 mg single dose; and three groups were given divided dose of MBZ, 25, 50 and 75 mg as single dose. Cure rates were obtained from Kato-Katz fecal examination on day 30th after treatment.

Statistical analysis

The statistical analysis were done by Fisher exact test.

RESULTS

Effectiveness of various regimens of MBZ, expressed as cure rates (CR) were summarized in Table 1. In *Ascaris lumbricoides* group, the children of the three single dose regimens gave highly satisfactory cure rates in the children of the standard dose of MBZ gave absolute cure (100%) but standard dose of ABZ cure rate was only 83.3%.

Table 1

Cure rate of soil-transmitted helminthiasis treated with albendazole (ABZ) and mebendazole (MBZ) in children.

	Drugs					Total
	ABZ 400 mg	MBZ 100 mg twice daily for 3 days	MBZ 75 mg	MBZ 50 g	MBZ 25 mg	
Ascariasis						
No. of not cure	3	0	1	2	2	8
(%)	(16.7)		(6.7)	(9.5)	(11.8)	
No. of cure	15	33	14	19	15	96
(%)	(83.3)	(100)	(93.3)	(90.5)	(88.2)	
Trichuriasis						
No. of not cure	18	2	13	17	21	71
(%)						
No. of cure	9	31	8	12	10	70
(%)	(33.3)	(93.9)	(38.1)	(41.4)	(32.3)	
Hookworm						
No. of not cure	2	6	9	19	11	47
(%)	(8.4)	(18.2)	(36.0)	(51.4)	(64.7)	
No. of cure	22	27	16	18	6	89
(%)	(91.6)	(81.8)	(64.0)	(48.6)	(35.3)	

In *Trichuris trichiura* and hookworm groups, the results showed moderate response or less to single dose regimens.

The standard dose of MBZ was highly effective against STH, cure rate for *A. lumbricoides* was 100%, for trichuriasis was 93.9% and 81.8% for hookworm infection. The standard dose ABZ induced highly response for *A. lumbricoides* and hookworm infection with cure rates of 83.3% and 91.6%, respectively, but low response obtained from the children infected with *T. trichiura* with only 33.3% cure rate.

The comparative study between the regimens of treatment against hookworm infection in Table 2 showed no significant difference ($p > 0.005$) except 25 mg MBZ. In hookworm infection the standard dose of albendazole and mebendazole gave higher cure rates than the other regimens. Likewise in

Table 2

Result of hookworm treatment in children with albendazole (ABZ) and mebendazole (MBZ).

Drugs	No. of cure (%)	No. of not cure (%)	Total
ABZ 400 mg	22 (91.6)	2 (8.4)	24
MBZ 100 mg b.i.d. for 3 days	27 (81.8)	6 (18.2)	33
MBZ 75 mg	16 (64.0)	9 (36.0)	25
MBZ 50 mg	18 (48.6)	19 (51.4)	37
MBZ 25 mg	6 (35.3)	11 (64.7)	17
Total	89	47	136

whipworm infection the mebendazole conventional dose was significantly higher than other regimens ($p < 0.005$).

DISCUSSION

Soil-transmitted helminthiasis is the world most abundant parasitic infection, estimated over million people were infected with *Ascaris lumbricoides*, about 900 million people with hookworm and about 700 million people with whipworm (WHO, 1990). The cost of using chemotherapy for controling these infections is enormous. If the lowest dose of MBZ is effective the cost of treatment will be minimized and the same allocated budgets for National Control can increase the time of drug giving. Compared with a normal single dose of MBZ 300 mg or 500 mg, if the drug was given twice a year, 600 mg or 1,000 mg would be used for one children, but for 25 mg dose it can be given 6 times a year or every two months and only 150 mg of MBZ used, the cost will be 1/4 to 1/6 times lower and expected outcome should be better as from our result. 400 mg ABZ was equally effective to ascariasis when compare to 25 mg MBZ; and MBZ gave higher efficacy in trichuriasis; only in hookworm infection that ABZ was better than MBZ.

REFERENCES

Anantaphruti M, Achawanitkun W, Sanguankiat S, *et al.* Intensity of infection, worms expulsion and efficiency of multiple doses of albendazole and mebendazole against trichuriasis. Collected papers on the Control of Soil-transmitted Helminthiasis by the APCO Research Group 1993, 5 : 179-83.

Chongsuphajaisiddhi T, Sabcharoen A, Attanath P, *et al.* Treatment of soil-transmitted nematode infection in children with mebendazole. *Ann Trop Med Parasitol* 1978; 72 : 59-63.

Fan PC, King ML, Chan CH, *et al.* Determination of minimun effective dose of Mebendazole in treatment of common nematode parasite infections. *Yonsei Rep Trop Med* 1992; 23 : 43-9.

Nontasut P, Singhasivanon V, Maipanich V, *et al.* Comparative study of different doses of mebendazole in hookworm infection. *Southeast Asian J Trop Med Public Health* 1987; 18 : 211-4.

Setasuban P, Dekumyoy D, Komalamisra C, Muennoo C. Albendazole (Zeben) in the treatment of trichuriasis in school children at Choom Chon Wat Sumrong Primary School, Nakhon Si Thammarat. Collected Papers on the Control of Soil-transmitted Helminthiasis by the APCO Research Group. 1993; 5 : 165-7.

WHO. Informal consultation on intestinal infection. Geneva, 9-12 July 1990. WHO/CDS/IPI/90.1. 1990.