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The use of mebendazole in the treatment of *Taenia saginata* taeniasis in an endemic area in the Philippines*

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Summary

The successful treatment of *Taenia saginata* taeniasis with mebendazole is herein reported. 41 subjects ascertained to have taeniasis based on the history of passage of gravid segments and positivity for Taenia egg were treated with 300 mg mebendazole b.i.d. for 3 days without need for fasting. No side-effects were observed. The drug acts as a taeniacide. The worms were expelled either as degenerated boluses or fragmented segments on the 2nd to the 4th day (Mean: 2.4 days) after the initial dose. 33 (84.6%) of the 41 subjects expelled the worm. A follow-up of all the subjects 2–3 months after treatment revealed that all those who expelled the worm following treatment and 6 of those who did not were negative for both Taenia egg and gravid segment, or a cure rate of 95%.

Key words: Taeniasis; mebendazole; Philippines.

Introduction

There are a limited number of anti-cestodal drugs for human use in the current therapeutic armamentarium. Keeling (1968) listed the drugs indicated for the treatment of *T. saginata* taeniasis, which included niclosamide (Yomesan), diclorphen, aspidium oleoresin, and mepacrine hydrochloride (Atabrine). To the latter list, Pawloski and Schultz (1972) added paromomycin, bithionol, pumpkin seed extract, and tin compounds. The presently available human

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taeniacide and taeniafuge leave much to be desired. They have a variable efficacy and many of them cause undesirable side-effects (Dufek and Kalivoda, 1969; Pawlowski, 1970). This evident paucity of drugs for the treatment of *T. saginata* taeniasis dictates the continuous search for ideal compounds.

Mebendazole (methyl 5 (6)-benzoyl-2 bensimidazolecarbamate) (Antiox, Vermox) is a broad-spectrum anthelmintic against the more common intestinal nematodes of man. Its use for the treatment of human taeniasis has been recently reported by Pena-Chavarria (1974) in Costa Rica, and by Oliveira-Gomes (1975) in Brazil.

T. saginata taeniasis occurs in isolated endemic foci in the Philippines. In these areas, the prevalence ranges from 11–15% (Arambulo et al., 1976). The drugs that have been widely used locally for the treatment of human taeniasis are atabrine and bithionol. Atabrine was reported to be 93.7% effective in expelling *T. solium* and *T. saginata* (Cabrera and Yogore, 1961; Chanco, 1960; 1970), while bithionol was 85–100% effective (Cabrera, 1973; Arambulo et al., 1976). Atabrine, however, was observed to have undesirable side-effects which included nausea, vomiting, hunger pains, and slight general body weakness. Bithionol caused temporary, but negligible, side-effects such as slight body weakness, nausea and hunger pains, probably being secondary to fasting prior to treatment.

This paper reports the therapeutic regimen for the successful treatment of *T. saginata* taeniasis cases with mebendazole.

Materials and methods

This study involved 41 subjects, the majority of whom came from the known *T. saginata* taeniasis endemic area of Pastrana, Leyte. This area has been described previously (Arambulo et al., 1976; Cabrera, 1973). All subjects were ascertained to have taeniasis by two criteria: history of passage of gravid segments, and positivity for Taenia egg. The methods used for detecting Taenia egg were the standard anal swab using "Scotch" brand cellophange tape and the formalin-ether concentration technique of stool examination (fecalysis) as described by Faust et al. (1970).

The therapeutic regimen we followed consisted of the administration of 3 mebendazole tablets (100 mg/tablet)** b.i.d. for 3 consecutive days, or a total of 18 tablets preferably taken after meals. Two days after the drug treatment, a saline purge of magnesium sulfate (30 g) was given followed by copious quantities of water.

The subjects were given half-pint plastic containers with saline. They were instructed to defecate directly into a bed pan during the duration of the treatment, to collect the worms that they would void, to place these in the plastic containers provided, and to submit these to us. Following purgation, stools from all subjects were collected and examined for any Taenia segments.

The criteria for the cure used in this study were as follows: 1. expulsion of the worm during drug treatment, 2. absence of segments following purgation, 3. failure to pass segments and Taenia egg negativity (by anal swab and fecalysis) 2–3 months after drug treatment.

** Antiox (Janssen Pharmaceutica, Beerse, Belgium), distributed by Johnson & Johnson (Phil.) Inc., Mandaluyang, Rizal, Philippines

Table 1. Age and sex distribution of the *Taenia saginata* taeniasis cases treated with mebendazole

Age (years)	No.	Males	Females
19 and below	4 (9.8%)	3 (9.4%)	1 (11.1%)
20–39	16 (39.0%)	10 (31.3%)	6 (66.7%)
40–49	17 (41.5%)	16 (50.0%)	1 (11.1)
50 and above	4 (9.8%)	3 (9.4%)	1 (11.1)
Total	41	32 (78.0)	9 (22.0)

Table 2. Duration of history of passage of gravid segments of the *Taenia saginata* taeniasis cases treated with mebendazole

Duration (years)	No.
1	4 (9.8%
1–9	19 (46.3%)
10–19	15 (36.6)
20–29	1 (2.4%)
30–39	2 (4.9%)
Total	41

Results

Of the 41 *T. saginata* taeniasis cases included in this study, 32 (78%) were male and 9 (22%) were female. Their ages ranged from 6 to 77 years (Median: 40 years, Mean: 40.8 years) (Table 1). All had a history of passage of gravid segments ranging in duration from 4 months to 35 years (Median: 5 years, Mean: 6.8 years) (Table 2).

The anal swab technique was found to be highly efficient in picking up taeniasis cases. Where anal swab was performed, 38 of 39 cases or 97.4% were found positive for Taenia eggs by this method. With fecalysis, 24 of 29 cases or 82.8% were found positive for Taenia egg. The difference between the two techniques was statistically significant (χ^2 1df, with Yate's correction = 5.855). In cases where anal swab and fecalysis were performed, the two techniques had a percentage of agreement of 77.8% (Table 3). In this study, the anal swab was observed to be a superior technique for detecting taeniasis cases than fecalysis.

Of the 41 *T. saginata* taeniasis cases treated with mebendazole, 33 or 80.5% expelled the worm while 8 or 19.5% did not (Table 4). The expelled worms were morphologically confirmed as *T. saginata* on the basis of the intact material and gravid segments.

The expelled worms appeared either coiled like a bolus or in fragmented segments. The scolex of the worms was no longer intact and recognizable. Expulsion was observed between the 2nd and the 4th day after the administration

Table 3. Results of examination of *Taenia saginata* teaniasis cases using anal swab and fecalysis techniques

	Technique	
	Anal swab No.	Fecalysis No.
+ for Taenia egg	38 (97.4%)	24 (82.8%)*
− for Taenia egg	1 (2.6%)	5 (17.2%)
Not performed	2	12
Total	41	41
+ by both techniques	21 (77.8%)**	
− by both techniques	0 (0%)	
+ by anal swab − by fecalysis	5 (18.5%)	
− by anal swab + by fecalysis	1 (3.7%)	
Total	27	

* χ^2 1df = 5.885, significant

** Percentage of agreement of anal swab and fecalysis techniques: 77.8%

Table 4. Results of treatment of *Taenia saginata* taeniasis cases with mebandazole and follow-up of treated cases 2–3 months post-treatment

Result of treatment		Result of follow-up (2–3 months post-treatment)	
No.		No.	
Worm expelled after treatment	33 (80.5%)	Negative for Taenia egg or segment	39 (95.0%)
Worm not expelled	8 (19.5%)	Positive for Taenia egg	2 (5.0%)
Total	41	Total	41

of the initial dose (Mean: 2.4 days) (Table 5). No further segments were expelled after the patients were purged with magnesium sulfate 2 days after the last dose of mebendazole.

Mebendazole was observed to be a convenient drug to administer, as compared to the previous drugs we used for treating taeniasis, i.e., atabrine and bithionol. No fasting was necessary and the patients did not complain of undesirable side-effects. The only drawback was that the latter drug acts as a taenicide so that the worms were not expelled intact. This made the identification of the scolex impossible. Atabrine and bithionol are both taeniafuge. With these

Table 5. Day of expulsion of worm following treatment with mebendazole

Day expelled	No.
2nd day	10 (24.4%)
3rd day	12 (29.3%)
4th day	11 (26.8%)
Not followed-up	8
Total	41

Note: Start of treatment is considered as the 1st day.

drugs, the worms were expelled on the same day of treatment and intact making identification of the scolex relatively easy (Arambulo et al., 1976; Cabrera, 1973; Cabrera and Yogore, 1961).

Pena-Chavarria (1974) reported a cure rate of only 25% using a therapeutic regimen of 100 mg b.i.d. for 3 days and 200 mg b.i.d. for 4 days. Oliveira-Gomes (1975) reported varying cure percentages using different therapeutic regimens: 100 mg b.i.d. for 4 days – 75%, 100 mg b.i.d. for 3 days – 75%, 200 mg b.i.d. for 3 days – 80%, and 200 mg b.i.d. for 3 days – 60%.

The mode of action of mebendazole on tapeworm (adult *Hymenolepis nana* and *Taenia taeniaformis* strobilocerous) has been described by Verheyen et al. (1976) based on ultrastructure changes. Mebendazole caused autolysis of the cestode tegument leading to final degeneration of the worm. This is perhaps the reason why expulsion of the worm was not observed in some of the treated subjects.

Follow-up of all subjects 2–3 months after treatment revealed that all those who expelled the worm following treatment and 6 of those who did not were negative for both Taenia egg and gravid segments, or a cure rate of 95%.

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