The Use of Mebendazole as a Broad-Spectrum Anthelmintic in Rhodesia

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SUMMARY

In a trial on baboons and humans, mebendazole was found to be a very safe and highly effective anthelmintic for a range of intestinal helminths in Central Africa, including hookworm (*Ancylostoma duodenale* and *Necator americanus*), *Oesophagostomum bifurcum*, *Ternidens deminutus*, *Strongyloides stercoralis*, *Strongyloides fülleborni*, *Physaloptera* (= *Abbreviata*) sp., *Ascaris lumbricoides*, *Enterobius vermicularis*, *Trichuris trichiura*, *Taenia saginata* and *Moniliformis moniliformis*. It has also some activity against *Hymenolepis nana*.

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In recent years many new anthelmintics have been developed against intestinal helminths, including bephenium hydroxynaphthoate, tetramisole, levamisole, thiabendazole and pyrantel pamoate. The trend has been to develop drugs firstly to be effective and to have as broad an anthelmintic action as possible, and secondly, to have a minimum of side-effects. Thus bephenium hydroxynapthoate, although safe, had a relatively limited species-efficacy; tetramisole and levamisole were fairly broad-spectrum and relatively free from side-effects; pyrantel pamoate, too, was fairly broad-spectrum and caused very few and very mild side-effects. On the other hand, although thiabendazole was effective against a wide range of intestinal nematodes, its side-effects were relatively unpleasant and precluded its use as a widely used anthelmintic.[1-2]

Recently, a new anthelmintic was marketed and reported to be effective for the treatment of a variety of intestinal nematodes and some cestodes. Thus it was reported to be very effective against *Ascaris lumbricoides*, *Enterobius vermicularis*, and the hookworms, *Trichuris trichiura* and even *Taenia saginata*.[3-8]

A trial was designed to test the value of this new drug, mebendazole (methyl-5-benzoylbenzimidazole - 2 - carbamate, R17, 635; Vermox) as a broad-spectrum anthelmintic against a variety of intestinal helminth species in Rhodesia.

METHODS

After initial trials were carried out on baboons (*Papio ursinus*), subsequent studies were performed on humans varying in age from 1 to 40 years.

In all species of helminth a dose of 100 mg mebendazole *b.d.* for 3 days was used, except in the case of *Enterobius vermicularis*, where the dose was 100 mg once only.

After treatment, follow-up was carried out on all subjects for 7 - 10 days and, whenever possible, for longer periods. In the case of *E. vermicularis*, follow-up after treatment consisted of 1 - 6 anal tapes, while in all other species, follow-up consisted of stools examined by water centrifugation and NaCl flotation. In the case of a single *Taenia saginata* infection included in the study, species identification was based on the recovery of proglottids, and follow-up was continued for one year. Hookworm infections were separated from those of *Ternidens deminutus* on the basis of egg size as outlined by Goldsmid.[9-10]

Pretreatment egg counts and, where necessary, post-treatment egg counts were done, using the Stoll Dilution Egg Counting technique.

Note was kept of any side-effects which occurred.

RESULTS

The results of the study are given in Tables I and II. Cure was assessed as proved if no eggs were recovered 7 - 10 days after treatment.

TABLE I. RESULTS OF TREATMENT OF 25 BABOONS (*PAPIO URSINUS*) FOR INTESTINAL NEMATODES WITH MEBENDAZOLE

Species	Treated	Cured
*Strongyloides fülleborni**	11	11
*Oesophagostomum bifurcum**	10	10
Physaloptera (= Abbreviata) **sp.***	3	3
Streptophargus pigmentatus	1	1
Total	25	25 (100%)

* Also recorded from humans.

Those cases where longer follow-up proved 'cure' are summarised in Table III, which also shows that no relapses were recorded.

No side-effects were reported in any of the patients.

DISCUSSION

As seen from the results, mebendazole was found to be an extremely safe and highly effective anthelmintic against a wide range of intestinal helminths which infect man, confirming earlier studies.

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TABLE II. RESULTS OF TREATMENT OF 102 HUMANS FOR INTESTINAL HELMINTHS (NEMATODES, CESTODES AND ACANTHOCEPHALA WITH MEBENDAZOLE

Species	Cured	Treated
Hookworm	29 (97%)*	30
Ternidens deminutus	18 (100%)	18
Enterobius vermicularis	13 (100%)	13
Ascaris lumbricoides	10 (100%)	10
Strongyloides stercoralis	7 (88%)	8
Trichuris trichiura	6 (100%)	6
Hymenolepis nana	6 (40%)	15
Taenia saginata	1	1
Moniliformis moniliformis[11]	1	1
Total	91 (89%)	102

* In the one hookworm case not cured, a reduction in worm load of 50% was achieved.

TABLE III. LONG-TERM POST-TREATMENT FOLLOW-UP ON PATIENTS CURED OF VARIOUS INTESTINAL HELMINTHS

Species	Length of follow-up	No. negative
Hookworm	3 - 4 weeks	2
	6 weeks	2
	6 months	1
	9 months	1
T. deminutus	3 - 4 weeks	5
T. trichiura	3 - 4 weeks	2
A. lumbricoides	3 - 4 weeks	1
T. saginata	>1 year	1
M. moniliformis	>1 year	1

In fact, of all the species for which this drug was tested, in only one, *Hymenolepis nana,* was there not an almost 100% cure rate. In *H. nana,* at the dosage used, the drug only achieved a 40% cure rate.

If one includes *H. nana* in the series, a cure rate of 89% for helminths ranging from cestodes to acanthocephala, was achieved. Excluding *H. nana,* the cure rate was a remarkable 98% in the human trial and 100% in the baboon trial. With such a high rate of cure for over 13 species of intestinal helminths, including cestodes, nematodes and acanthocephala, and the complete absence of side-effects, this drug must certainly rank as the biggest breakthrough in anthelmintic drug development to date, a conclusion endorsed by Sargent *et al.*[12] who state that, for trichuriasis, mebendazole 'surpasses all currently available drug therapy in the USA'.

Advantages of Mebendazole

With its broad spectrum, high rate of cure and complete safety (especially if established for pregnant women), it permits mass outpatient treatment without the prior need for laboratory screening.

Because of its efficacy and safety, routine anthelmintic treatment of staff (e.g. on sugar estates) becomes possible.

It can also be used in small rural clinics without laboratory facilities.

It is not suggested that laboratory examinations of the stool should be dispensed with, or that the treatment of patients, without first establishing which species of intestinal helminth is involved, is desirable. It is suggested, however, that where laboratory facilities are non-existent, or where cost precludes a prior stool examination (or multiple stool examinations), this drug can be used to advantage — even with a view to treating entire, unscreened communities to break the cycle of transmission in endemic areas in association with the other usual prophylactic measures, e.g. education, hygiene, provision of toilets, wearing of shoes, etc.

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