

Comparative efficacy of a single 400 mg dose of albendazole or mebendazole in the treatment of nematode infections in children

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The relative efficacy of a single 400 mg dose of albendazole or mebendazole in the treatment of nematode infections was assessed in 2- to 9-year-old children living in two different Bolivian rural communities. Both agents were equally very effective (100% cure rate) in treating ascariasis. Albendazole was clearly more active than mebendazole against hookworm infections, both in terms of egg reduction rate (92.8% vs. 62.4%) and cure rate (81.8% vs. 17.2%). As far as trichuriasis is concerned, albendazole produced a higher egg reduction rate than mebendazole (45.7% vs 15%), but a lower cure rate (33.3% vs 60%). Both drugs were well tolerated.

Key words: nematode infections, albendazole, mebendazole, Bolivia

Soil-transmitted helminthiasis due to hookworm, *Ascaris lumbricoides* and *Trichuris trichiura* are among the most common infections in the world.^{1,2} The morbidity of the infection and the dynamics of transmission are influenced by the intensity of the helminth parasite population. Improvement of sanitation and hygiene is probably the best approach to reduce the prevalence of helminthiasis in developing countries, but mass chemotherapy also plays an important role in disease control, as demonstrated by the satisfactory results obtained in several areas.³ The major goal of periodical mass treatment is reduction of worm load below pathogenic levels⁴; furthermore, a decrease of the worm burden in the treated population may bring a reduction in environmental contamination possibly affecting the transmission pattern.⁵

In Bolivia, over 65% of the population is infected with more than one parasite and it is estimated that some 2 million people have moderate to high parasite loads.⁶ The Ministry of Social Welfare and Public Health, through the National Department of Epidemiology, decided in 1985 to carry out a control program, covering the 2- to 9-year-old child population. A single 400 mg dose of mebendazole is administered approximately every 4 months. A coproparasitological survey carried out in three communities (Camiri, Boyuibe and Gutierrez) of Cordillera Province, Santa Cruz Department, in November 1987, five weeks after a deworming campaign,

showed⁷ the following helminth prevalences: hookworms (28.6%), *Trichuris trichiura* (19.7%), *Ascaris lumbricoides* (9.7%), *Hymenolepis nana* (8.7%), *Trichostrongylus* (5.5%) and *Strongyloides stercoralis* (1.8%). In a rural community close to Camiri the prevalence of hookworm and *T. trichiura* was 64.1% and 25.6%, respectively. The aim of the present study is to compare the efficacy of two anthelmintic drugs, mebendazole and albendazole, as a single 400 mg dose treatment in 2- to 9-year-old children living in two different rural communities. This research was conducted with the agreement of the Bolivian National Department of Epidemiology of the Ministry of Social Welfare and Public Health with the aim of evaluating the drug of choice for the deparasitization program.

POPULATION AND METHODS

The study was carried out during the dry season (July-August 1990) in two rural communities, Mora and Zanja Honda, situated in Cordillera Province, respectively about 100 and 85 km south of Santa Cruz de la Sierra. The two localities lie in the foothills of the Andes at an altitude of about 450 meters. Hygienic and sanitary conditions in both communities are very poor. The population lives in huts without any hygienic-sanitary equipment or services. Indiscriminate defaecation in the yard is usual, as is the habit of walking barefoot.

In Mora the number of inhabitants is 544, 154 of which are between 2 and 9 years of age. About 224 people live in Zanja Honda, and 78 are children of this age. A meeting was organized with the inhabitants of the two communities to explain the purpose of the study, and its procedures.

The study subjects consisted of all available 2- to 9-year-old children (117 and 62, respectively, at the baseline exam-

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ination). Children enrolled in the survey had not received any deparasitization treatment for at least 3 months prior to our study.

A single normally passed stool sample was collected from each child and examined using the Kato thick smear technique to study the prevalence and intensity of helminth parasites. Eggs were counted 30–60 min after a 50 mg smear preparation, and egg counts were expressed as eggs per gram of faeces.

At the time of stool collection, each child received anthelmintic treatment, in agreement with the mass chemotherapy control program. In view of a longitudinal evaluation of the effect of the treatment in the communities, the children living in Mora were randomly assigned to receive 400 mg albendazole (one tablet), while those of Zanja Honda were given 400 mg mebendazole (four 100 mg tablets). No fasting was required. All doses of albendazole and mebendazole were taken in the presence of project staff.

The children resulted positive at the baseline examination and were re-examined 21–28 days after treatment by the same team of workers, each following the same procedures. Evaluation of drug efficacy was based on two parameters: percentage of patients cured or cure rate, and percentage of egg reduction or egg reduction rate, as estimated by egg counts. Statistical tests used were the Chi-square test for prevalences, and a general linear model of analysis of variance (Package Statistical Analysis System) for intensities. Variance analysis (ANOVA) was performed once verified the homoskedastic hypothesis, transforming our data in logarithmic function.

RESULTS AND DISCUSSION

Patients treated with albendazole or mebendazole did not complain of any side-effects and the drugs were well tolerated. Figure 1 summarizes the findings concerning the baseline parasitological examination in the two communities. Children living in Zanja Honda showed a significantly higher initial prevalence for geohelminthic infections ($p < 0.004$), and this could be attributed mainly to the 2- to 5-year-old children ($p < 0.002$).

Of the 117 subjects screened in Mora, 48 (41.0%) had one or more geohelminths. Hookworm was the most common parasite (29.1%) followed by *T. trichiura* (14.5%), and *A. lumbricoides*

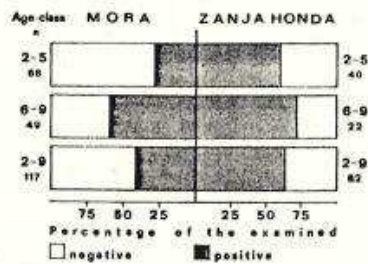


Figure 1 Age-specific prevalence of geohelminthic infections in two rural communities of Cordillera Province (Bolivia)

(7.7%). The mean (\pm SD) egg counts were 770.0 ± 1534.3 for hookworm, 204.7 ± 274.7 for *T. trichiura* and 4744.0 ± 5402.0 for *A. lumbricoides*. No differences in intensity relative to age were noticed, but on account of the higher hookworm prevalence in 6- to 9-year-old children ($p = 0.01$), the infection rate observed in the two age groups studied was significantly different ($p = 0.001$).

In Zanja Honda, geohelminth prevalence was 64.5%. Hookworm was the most prevalent species (50.0%), followed by *A. lumbricoides* and *T. trichiura* (19.3%). The mean (\pm SD) egg counts were 1299.3 ± 1710.1 for hookworm, 300.0 ± 390.3 for *T. trichiura* and 5438.3 ± 9956.2 for *A. lumbricoides*. Infection rate and intensity did not differ between the groups studied. Multiple infections (figure 2) were observed in 22.9% of the parasitized children living in Mora: 10 (20.8%) harboured two species and 1 (2.1%) had three species. In Zanja Honda only 65.0% of infections were single. The number of species varied from one to three, with 32.5% double, and 2.5% triple infections. Polyparasitism rate and parasite load in Mora and Zanja Honda resulted comparable ($p = 0.31$, and $p = 0.05$, respectively).

The outcome of both albendazole and mebendazole treatments is reported in the table. Five children of Mora and three of Zanja Honda positive at the baseline examination did not return for follow up examination. Albendazole and mebendazole were equally very effective (100% cure rate) in treating ascariasis. As expected, albendazole resulted clearly more active than mebendazole against hookworm infections both

Table Efficacy of albendazole and mebendazole treatment

Parasite	Mora (Albendazole)				Zanja Honda (Mebendazole)					
	Cases* N	Patients cured N	%	Pretreatment mean eggs/g \pm SD (range)	Mean egg reduction %	Cases* N	Patients cured N	%	Pretreatment mean eggs/g \pm SD (range)	Mean egg reduction %
Hookworm	33	27	(81.8)	790.9 ± 1553.1 (20-8120)	92.8	29	5	(17.2)	1291 ± 1730.9 (40-8226)	62.4
<i>T. trichiura</i>	15	5	(33.3)	148 ± 181.5 (20-680)	45.7	10	6	(60.0)	348 ± 418 (20-1440)	15.0
<i>A. lumbricoides</i>	6	6	(100)	1900 ± 656.3 (1340-2800)	100	11	11	(100)	5661.8 ± 10410.5 (20-28120)	100

* Multiple infections included. Due to small numbers, the infections were not splitted up in light ($\leq 2,000$ eggs/g faeces), moderate (2,000-10,000 eggs/g faeces), and heavy ($\geq 10,000$ eggs/g faeces).

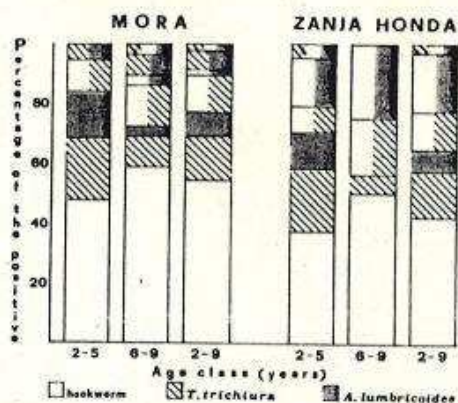


Figure 2 Frequency and distribution, by age, of hookworm, *T. trichiura*, and *A. lumbricoidee* in single white, hatched or grey and mixed infections in children living in Mora and Zanja Honda

in terms of cure rate ($p < 0.000001$) and egg reduction rate (82.6% vs. 29%, and 99.8% vs. 75.9%, respectively in light and moderate infections). In *T. trichiura* infections, albendazole produced a higher egg reduction rate than mebendazole (45.7% vs. 15%), but a lower cure rate (33.3% vs. 60%).

Our results confirm the broad spectrum action of the two benzimidazole derivatives against intestinal helminths⁸, and show the higher activity of albendazole as a single dose treatment against hookworm (probably *Necator*, as indicated by fecal culture of 43 positive specimens which produced 754 larvae of *Necator*).

Considering that in both rural communities hookworm resulted the most prevalent geohelminth, in single as well as in

mixed infections, albendazole should be considered the drug of choice for mass deworming campaigns in this area.

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