

*From the Departments of Child Health and Parasitology, Medical School,  
University of Gadjah Mada, Yogyakarta.*

## The Use of Anthelmintics in the Treatment of Ascariasis

by

**DJAUHAR ISMAIL, UTOMO, SUGENG YUWONO and NOERHAYATI S.**

### Abstract

*Ninety-seven children with Ascariasis were treated at randomly with Piperazine, Tetramisole, and Pyrantel pamoate in a single dose with cure rates of 59%, 62%, and 88%, respectively. In the children who were not cured, a reduction in egg count of nearly 80% was found in all three treatment groups. The results of this study showed that Pyrantel pamoate is the most effective of the three drugs.*

Received 9th. January 1975.

### Introduction

Many anthelmintics have been advocated for the treatment of Ascariasis. Recently, several new drugs were introduced, among those were Tetramisole with the chemical formula 2, 3, 5, 6, tetrahydro 6-phenyl-imidazol (2,1-b) thiazole and Pyrantel pamoate with the chemical formula Trans-1, 4, 5, 6, tetrahydro 1-methyl-2 2-(2-thienyl) -vinyl pyrimidine hydrogen pamoate.

Piperazine has been considered for a long time as a standard remedy for Ascariasis in either individual or mass treatment (W.H.O., 1967). The purpose of this study is to compare the efficacy of these three drugs in the treatment of Ascariasis in children.

### Material and methods

In order to control the administration of the drugs and be able to make proper observations of the patient after treatment, children admitted to the Department of Child Health, University of Gadjah Mada Hospital, with *Ascaris lumbricoides* eggs in their feces were chosen for this study. Divided at randomly into 3 groups, they were treated with Piperazine, Tetramisole, and Pyrantel pamoate, all in a single dose. Piperazine was given in the form of syrup (5 ml. = 1 gm Piperazine citrate) with the dose arranged as follows :

- children under 1 year = 4 ml.
- 1 — 2 years = 5 ml.
- 3 — 5 years = 10 ml.
- over 6 years = 15 ml.

Tetramisole was given in the form of tablets with a dose of 2.5 mg/kg body weight and Pyrantel pamoate in the form of a syrup or tablet with a dose of 10 mg/kg body weight. All these drugs were administered in the evening after meal. Purgatives were not used.

Stool examination before and 7 — 10 days after treatment were done in the Department of Parasitology, University of Gadjah Mada, by direct fecal smear method, zinc sulfate centrifugal floatation method, and Stoll's dilution egg counting. The routine hematological and urine examinations were done before and after treatment. Close observation was done on each child for any possibility of side-effects. The efficacy of the drugs was assessed from the number of children positive for *Ascaris lumbricoides* egg before treatment and negative afterwards, and from the differences in egg counts before and after treatment.

### Results

In this study, there were 97 children varying in age between 8 months and 13 years. Thirty-four children were treated with Piperazine, 31 with Tetramisole, and 32 with Pyrantel pamoate. From the results of the stool examinations before treatment, beside *Ascaris lumbricoides* other parasites were also found as shown on Table 1.

TABLE 1: Incidence of other parasite infestation before treatment.

Parasite	No. children infested
Hookworm	32 (31.9%)
<i>Trichuris trichiura</i>	76 (78.3%)
<i>Entameba histolytica</i>	2 (2.1%)
<i>Giardia lamblia</i>	4 (4.2%)
<i>Enterobius vermicularis</i>	5 (5.1%)
Others	8 (8.4%)

TABLE 2: Number of parasites harbored.

No. parasites harbored	No. children
1	19 (19.6%)
2	35 (36.1%)
3	36 (37.1%)
4	5 (5.1%)
5	2 (2.1%)

Of the 34 children treated with Piperazine, there were 200 children (59%) judged as cured, and of the children not cured a mean egg reduction of 82% was achieved. Nineteen (62%) of 31 children treated with Tetramisole were cured, and the mean egg reduction in those not cured was 77%. Of the 32 children with Pyrantel pamoate there were 28 children (88%) who were cur-

ed, and the mean egg reduction in the other 4 was 78% (Table 3 & 4).

Side effects were noted in an 8 year-old girl who complained of headache after receiving Tetramisole. Two boys, 6 and 10 years old, complained of abdominal pain and headache after being treated with Piperazine. The results of hematological and urine examinations revealed no abnormalities in association with administration of the drug.



TABLE 3: Results of treatment.

Treatment	No. children	Cured	Not cured
Piperazine	34	20 (59%)	14 (41%)
Tetramisole	31	19 (62%)	12 (38%)
Pyrantel pamoate	32	28 (88%)	4 (12%)

TABLE 4: *Ascaris* eggs in children who were not cured.

Treatment	Mean egg counts per gram feces		Reduction of egg count (%)
	before treatment	after treatment	
Piperazine	17,302	3,190	82
Tetramisole	13,309	3,008	77
Pyrantel pamoate	14,588	3,162	78

### Discussion

From the results of stool examination before treatment it appeared that almost 80% of the children harbored more than 1 intestinal parasite (Table 2). These children generally come from families where the social economic and sanitary conditions are poor.

In this study it was shown that treatment with Pyrantel pamoate was the most effective. There was no significant difference ( $P < 0.05$ ) between the results of Piperazine and Tetramisole treatment. Seftel and Heinz (1968) performed a study to compare the efficacy of Piperazine with Tetramisole and found that the latter gave better results. A comparison study between Piperazine and Pyrantel pamoate treatment (Bell

and Nassif, 1971) showed a better result using Pyrantel pamoate. Chanco et al. (1971) reported that Pyrantel pamoate was the most effective drug for the treatment of Ascariasis as compared with Piperazine and Tetramisole.

The evaluation of the efficacy of Pyrantel pamoate in this study was mainly for *Ascaris lumbricoides*, but some investigators reported that Pyrantel pamoate was also very useful in the treatment of Hookworm (Hsieh and Chen, 1970; Kosin, 1973) and *Enterobius vermicularis* (Rim and Lim, 1971). According to the results shown above, Pyrantel pamoate could be considered as a drug of choice for the treatment of helminthes, especially for Ascariasis. But for a drug to be used for mass

treatment beside its effectiveness, several other points should be fulfilled such as its minimal toxicity, chemical stability, acceptability to the patients and that it should be as inexpensive as possible (W.H.O., 1967). For the last condition mentioned above, the cost of Pyrantel pamoate is still high. Piperazine, the current drug of choice, has shown to be quite adequate for Ascariasis. Unfortunately, Piperazine is of no use for hookworm infection. Most of the population usually harbored not

only *Ascaris lumbricoides*, as shown in this study, but also hookworm infection where it is also found in 31.9% of the children.

### Acknowledgement

The authors are indebted to Drs. Siti Moesfiroh, Moestrarsi Sri Kanapsijah, C.A. Baedhowi, and the other staff members of the Department of Parasitology, University of Gadjah Mada, for their invaluable assistance in accomplishing this study.

### REFERENCES

- BELL, W.J. and NASSIF, S.: Comparison of Pyrantel pamoate and Piperazine phosphate in the treatment of Ascariasis. *J. trop. Med. Hyg.* 20 : 584 (1971).
- CHANCO, P.P.; CABE, E. and VIDAD, Ma., J.J.Y.: The efficacy of Pyrantel pamoate in the treatment of Ascariasis (a comparative study with Piperazine and Tetramisole). *Proceeding on the 10th Southeast Asian Regional Seminar on Tropical Medicine, Bangkok, October 26-30, 1971.*
- HSIEH, M.C. and CHEN, E.R.: Evaluation of Anthelmintic activity of Pyrantel pamoate (Combantrin) against *Ascaris* and Hookworm. *Chin. J. Microbiol.* 3 : 126 (1970).
- KOSIN, E.: Some aspects on the treatment of Ascariasis and Hookworm infection in North Sumatra. *Abstract. Seminar on Public Health Research. Jakarta, July 31-August 3, 1973.*
- RIM, H.J. and LIM, J.K.: Treatment of Enterobiasis and Ascariasis with Combantrin. *Proceeding on the 10th Southeast Asian Regional Seminar on Tropical Medicine, Bangkok, October 26-30, 1971.*
- SEFTEL, H.C. and HEINZ, H.J.: Comparison on Piperazine and Tetramisole in treatment of Ascariasis. *Br. Med. J.* 4 : 93 (1968).
- W.H.O. Expert Committee: Control of Ascariasis. *W.H.O. Tech. Rep. Ser.* 379 (1967).