

## SOIL-TRANSMITTED HELMINTHIC INFECTION AMONG PEOPLE OF DIFFERENT SOCIO-ECONOMIC LEVELS IN WEST JAVA (THE EFFECT OF TREATMENT WITH PYRANTEL PAMOATE)\*

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*Pengobatan infeksi Ascaris lumbricoides dengan pyrantel pamoate (combantrin) memberikan hasil yang memuaskan. Penyembuhan didapatkan 81,8 persen, 87,9 persen dan 88,1 persen pada tiga golongan penduduk, sedangkan jumlah penurunan telur adalah 94,6 persen, 95,8 persen dan 96,4 persen.*

*Untuk cacing tambang derajat penyembuhan cukup variasi antara 22,5 - 70,0 persen ditemukan tergantung bila dua atau satu cara pemeriksaan digunakan. Jumlah penurunan telur antara 72,9 - 91,0 persen.*

*Infeksi dengan Trichuris trichiura ternyata tidak begitu dipengaruhi oleh obat ini. Hanya terdapat penyembuhan antara 6,2 - 10,4 persen sedangkan jumlah penurunan telur antara 22,4 - 49,6 persen.*

Several surveys in different parts of Indonesia revealed that intestinal helminth parasites, especially soil-transmitted helminths, are widely distributed in this country (Cross et al., 1972), Clarke et al., 1973, Clarke et al., 1973, Karyadi et al., 1973, Kosin, 1973, Margono et al., 1974, Roesin and Saroso, 1974).

The most common intestinal helminths found by Clarke et al. (1973) in the area of Kresek, 30 miles west of Jakarta, West Java, were 90 per cent *Ascaris lumbricoides*, 91 per cent *Trichuris trichiura* and 67 per cent hookworm in Jogjakarta, Central Java, the prevalence in five villages for *Ascaris lumbricoides*, *Trichuris trichiura* and hookworm were respectively 84,6 per cent, 90,8 per cent and 52,1 per cent (Clarke et al., 1973). In North

Sumatera, Kosin (1973) mentioned that 100 per cent of the primary school children in rural areas were found to be infected with ascariis. Hookworm was found in 70 to 80 per cent of the inhabitants of rubber plantations. Prevalences of these three common intestinal parasites in laborers from the north coast of West Java were between 66.7 - 75.5 per cent, 58.3 - 63.7 per cent and 84.0 - 87.3 per cent respectively for ascariasis, trichuriasis and hookworm infection (Karyadi et al., 1973).

This study was done in three different groups of people in an effort to control these helminthic infections using pyrantel pamoate (combantrin). Other investigators have revealed that this drug was very effective for ascariasis and also for hookworm infections (Hsien and Chen, 1970, Bell and Nassif, 1971, Run and Lim, 1972). Side effects seemed to be negligible.

### MATERIALS AND METHODS

The survey was carried out near Cirebon, on the north coast of West Java, in several villages, subdistrict of Karangampel in the Regency of Indramayu.

Three groups of individuals were examined, of which two groups were selected from a

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community of employees of an oil company and their families. Group I (200 persons) consisted of individuals of the high socio-economic level, with good housing facilities provided by the company, from the village of Mundu, whereas group II (189 persons) were of the middle socio-economic level, without housing facilities from the company, living together in a community mixed with other people from the surrounding villages. Group III (210 persons) consisted of individuals taken from the village of Kedokan Bunder, of the middle socio-economic level and mostly living as farmers, fishers, laborers, vendors, etc. All individuals of the first two groups included in this study were randomly selected. The third group consisted of people living as neighbours of the individuals selected for the second group.

Treatment consisting of a single dose of pyrantel pamoate, 10 mg per kilogram body-weight was given to all persons above 1 year of age. Below 1 year of age only cases with helminth eggs in the stool were included in the treatment. The drug was administered in the morning after delivering the stool samples. No laxative was given before or after treatment. Side effects were recorded.

Two thick smears using a modification of Kato's method, were examined (Margono et al., 1974). The average weight of each sample per slide was 27.5 mg.

For each individual the egg count per slide

was recorded after examining two Kato's thick smears. The total egg count for all persons in each group was then calculated per gram of feces. This result was divided by the number of all persons in each group which gave the average egg count per person per gram feces.

For identification of larvae a modified Harada-Mori culture technic, described by Kosin et al. (1973) was used. Of each sample one plastic bag was prepared and after some days examined for larvae.

## RESULTS

Before treatment 33.0 per cent cases of group I, 56.6 per cent cases of group II and 80.0 per cent cases of group III were found infected with *Ascaris lumbricoides*. One month after treatment stools were examined and 6.0 per cent of group I, 6.9 per cent of group II and 9.5 per cent of group III were still infected with *A. lumbricoides*. For *T. trichiura* pyrantel pamoate did not seem to be very effective. Prevalence of 54.0 per cent were reduced to 47.5 per cent in group I, 74.1 per cent to 68.8 per cent in group II and 92.4 per cent to 86.7 per cent in group III. Decrease in egg counts were also not impressive. Cure rates and reduction rates in three groups of individuals examined 1 month after treatment for *A. lumbricoides*, *T. trichiura* and hookworm are presented in table I.

Table 1 Cure rates and egg reduction rates in three groups of individuals examined 1 month after treatment for *A. lumbricoides*, *T. trichiura* and hookworm.

Group individual examined	<i>A. Lumbricoides</i>									<i>Trichuris trichiura</i>						Hookworm*					
	Prevalence			Mean egg count per feces per person						Prevalence			Mean egg count per feces per person			Prevalence			Mean egg count per feces per person		
	Before	After	CR	Before	After	ER	Before	After	CR	Before	After	ER	Before	After	CR	Before	After	ER			
I.	200	33.0	6.0	81.8	2761	150	94.6	54.0	47.5	10.4	181	125	22.4	20.0	6.0	70.0	59	16	72.9		
II.	189	56.6	6.9	87.9	11447	480	95.8	74.1	68.8	7.1	763	453	40.6	38.1	12.2	68.1	288	26	91.0		
III.	210	80.0	9.5	88.1	16733	603	96.4	92.4	86.7	6.2	1583	798	49.6	41.8	20.6	50.6	1099	150	86.4		
														74.3	44.3	40.4					
														82.4	63.8	22.6					

CR = Cure rate

ER = Egg reduction rate

\* = Cure rates evaluated with one method or two methods of stool examination.

Pyrantel pamoate was more effective for *A. duodenale* infections than for *N. americanus* infections. In group I, II and III cure rates were respectively 51.2 per cent, 52.7 per cent and 14.5 per cent for *N. americanus* and 71.4 per cent, 84.6 per cent and 95.8 per cent for *A. duodenale* (table 2).

Table 2 Cure rates for *N. americanus* and *A. duodenale* in three groups of individuals examined before and after treatment.

Group	<i>N. americanus</i>			<i>A. duodenale</i>		
	No. Cases			No. Cases		
	before	after	CR	before	after	CR
I.	41	20	51.2	7	2	71.4
II.	55	26	52.7	13	2	84.6
III.	138	118	14.5	96	4	95.8

Side effects could be neglected as only 3 persons in group I, two adults and one child, had some complaints. The child vomited once, and the adults suffered respectively from nausea and abdominal discomfort.

As can be expected for this part of the world, why prevalences of *N. americanus* were higher than that of *A. duodenale*. Infections with *N. americanus* only was discovered in 85.4 per cent, 77.2 per cent and 36.4 per cent respectively in group I, II and III. In group I infections with *A. duodenale* only was not encountered whereas in group II and group III, respectively 3.5 per cent and 8.6 per cent cases were found infected with this species only. Mixed infections of *N. americanus* and *A. duodenale* found in all three groups (table 3).

Most of the *Strongyloides stercoralis* infections were found in group III. Before treat-

Table 3 Comparison of frequencies of *N. americanus* and *A. duodenale* infections in three groups of individuals before treatment = (%).

Group	<i>N. americanus</i>	<i>A. duodenale</i>	<i>N. americanus</i> and <i>A. duodenale</i>
I.	41 = 85.4	0 = 0	7 = 14.6
II.	44 = 77.2	2 = 3.5	11 = 19.3
III.	55 = 36.4	13 = 8.6	83 = 55.3

ment 11 cases, all mixed with hookworm infections, were encountered in group III, which was reduced to 2 cases after treatment. Six cases were mixed with *N. americanus* and *A. duodenale* whereas 5 cases were mixed with *N. americanus* only. No cases of strongyloides infection were in group I before or after treatment. In group II three cases were discovered one month after treatment.

## DISCUSSION

In this study the cure rates for *A. lumbricoides* infections were 81.8 per cent, 87.9 per cent and 88.1 per cent respectively in group I, II and III. Various authors using pyrantel pamoate, show different cure rates, although in general cure rates for ascaris infections were significant. Kosin (1973) found a cure rate of 92.5 per cent in a group of 80 children. A cure rate of 96.49 per cent was found established in 114 cases treated by Chanco et al. (1971). This trial was evaluated by the zinc sulfate centrifugal flotation method. Abadi et al. (1975), using the Mc Master egg counting technique, found a cure rate of 98.6 per cent in 75 cases with ascaris infections. Lower cure rates and egg reduction rates can be expected if methods of examinations are more sensitive.

Egg reduction rates for *A. lumbricoides* in these 3 groups were 94.6 per cent, 95.8 per cent and 96.4 per cent respectively for group I, II and III.

In this study heavier infections with *A. lumbricoides* gave higher cure rates and higher egg reduction rates. Other trials gave egg reduction rates of 99.92 per cent (Abadi et al., 1975), 90 per cent - 100 per cent (Chandra et al., 1971) and 100 per cent (Rim and Lim, 1972 and Bell and Nassif, 1971).

For *T. trichiura* cure rates were only 10.4 per cent, 7.1 per cent and 6.2 per cent and egg reduction rates were 22.4 per cent, 40.6 per cent and 49.6 per cent for the three groups. Low cure rates in cases with trichuris infection were also mentioned by other authors. Abadi et al. (1975) found a cure rate of 10.6 per cent and an egg reduction rate of

72.4 per cent four weeks after treatment. Pyrantel pamoate, as one of the anthelmintics used for rural primary school children, was found not to have a significant effect on trichuris (Lo. 1973).

Hookworm infections were evaluated with the modified Kato's thick smear and modified Harada-Mori culture technic. In using only Kato's thick smear method cure rates of 70.0 per cent, 68.1 per cent and 40.4 per cent were found respectively for group I, II and III. If both techniques were considered, cure rates were reduced to 55.5 per cent, 50.6 per cent and 22.6 per cent for the three groups (table 1).

Although the cure rates for hookworm infections were not very impressive egg reduction rates were high. In group I, II and III egg reduction rates were respectively 72.9 per cent, 91.0 per cent and 86.4 per cent. Results in hookworm infections were more or less the same as those shown by other investigators. A cure rate of 65.3 per cent and an egg reduction rate of 83.4 per cent were reported by Abadi et al (1975) in 75 cases with hookworm infections. Kosin (1973) had a cure rate of 69.5 per cent and an egg reduction rate of 92 per cent in 233 cases.

Distinct differences in cure rates were noticed for infections with *N. americanus* and *A. duodenale* (table 2). Pyrantel pamoate seemed to be more effective against *A. duodenale*. As the dominant species in this area of the world is *N. americanus* (table 3) high cure rates cannot be expected.

In group I, II and III cure rates for *N. americanus* were respectively 51.2 per cent, 52.7 per cent and 14.5 per cent in comparison with cure rates for *A. duodenale* which were respectively 71.4 per cent, 84.6 per cent and 95.8 per cent (table 2).

For *N. americanus* the lowest cure rate was obtained for the heaviest infected group, contrarily for *A. duodenale* the highest cure rate was observed for the heaviest infected group. Most of these cure rates were lower than those found by Hsien and Chen (1970), who mentioned a cure rate of 71 per cent for *N. americanus* and 91 per cent for *A. duodenale*.

*A. duodenale* only and mixed with *N. americanus* were relatively more discovered in groups with heavier infections (table 3). The number of *A. duodenale* larvae found in the Harada Mori cultures was much lower than the number of *N. americanus* larvae in mixed infections. In general *A. duodenale* infections seemed to be lighter than *N. americanus* infections. This is in accordance with the results of autopsies in Jakarta (Machfudin, 1973) who mentioned an average worm burden of 38.1 and 16.6 for respectively *N. americanus* and *A. duodenale*.

Effect of pyrantel pamoate on strongyloides infections could not be evaluated in this study. Eleven cases in group 3 before treatment were reduced to 2 cases after treatment, but in group 2 no cases were found before treatment whereas 3 cases were discovered after treatment. The possibility, that light infections with strongyloides in group 2 were not discovered, should be considered.

## SUMMARY

Treatment of ascaris infections with pyrantel pamoate (combiantrin) gave excellent results. Cure rates of 81.8 per cent, 87.9 per cent and 88.1 per cent were obtained in 3 groups of people, with light and heavier infections. Egg counts were reduced to 94.6 per cent, 95.8 per cent and 96.4 per cent in these groups.

For hookworm cure rates were not too impressive, variations of 22.6 per cent — 70.0 per cent were found, depending if two or one method of examination techniques were used. Egg reduction rates for hookworm infections were high; variations of 72.9 — 91.0 per cent were observed.

The efficacy of pyrantel pamoate against *A. duodenale* was more satisfying than against *N. americanus*. In this area more *N. americanus* infections were found, so that not too high cure rates for hookworm cases were to be expected. Cure rates between 14.5 — 52.7 per cent and between 71.4 — 95.8 per cent were obtained for respectively *N. americanus* and *A. duodenale*.

Trichiuris infections seemed to be more resistant to the drug. Although cure rates were low variations of 6.2 – 10.4 per cent, egg reductions rates were higher, variations of 22.4 – 49.6 per cent. Pyrantel pamoate was more effective for *A. lumbricoides* and *A. duodenale* infections. In these cases cure rates were highest in the heaviest infected group. For *A. lumbricoides* the egg count was also reduced at the most in the group with the highest egg count.

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