

PREVALENCE OF PARASITIC INFECTIONS IN MALAYSIAN OIL PALM ESTATE WORKERS

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INTRODUCTION

Parasitic diseases common in the tropics are a major health hazard. Although several surveys have been carried out in Malaysia (Jepps, 1923; Sandosham, 1955; Schacher and Danaraj, 1960; Lie, 1964, 1971; Bisseru and Aziz, 1970; Dunn, 1972; Lee and Danaraj, 1972; Dissanaiké *et al.*, 1978), these were largely confined to school children or hospital patients and dealt mainly with helminth infections.

Most of the oil palm estates in Malaysia are heavily infested with rats capable of transmitting a number of parasites to man. Hitherto no surveys have been conducted and the situation with regard to human infection with parasites in oil palm estates is not known. Since the estates in Malaysia are heavily infested with rats, the habits of the people suggest that they would be infected with some of the rat transmitted parasites not usually seen in the rest of the local populations. The objective of this survey is to study the intestinal and blood parasites with special references to rat-borne diseases in workers and their families resident in an oil palm estate in Malaysia.

MATERIALS AND METHODS

This study was carried out in a 7,000 acre oil palm estate, 20 miles south-west of Kuala Lumpur and 3 miles west of the town of Kelang. The population comprises estate workers and families who are mainly of Indian origin. They are housed in two settle-

ments within the estate in quarters consisting of rows of two-roomed houses with attached bathroom and toilets and are provided with piped water and electricity. Some of the families are known to use the toilets as store rooms and defaecate indiscriminately among the oil palm trees. An average family consists of father, mother and four children. The children usually play near their houses and in vegetable gardens. A number of workers rear chicken, ducks, goats and cattle; some also keep cats and dogs. The average income per family is between Malaysian \$200 - \$250 per month.

A representative 150 subjects were randomly selected from this community for this study. They included 87 males and 63 females of whom 45 were aged between 1-9 years; 20 were between 10-19 years and the rest were adults with a mean age of 38 years and ranged from 20 - 65 years. The subjects were seen between 5 p.m. and 7 p.m. and were questioned about their health. After a brief clinical examination blood sampling was carried out. It would have been better to obtain blood smears closer to midnight in order to study filaria infections, however, it is not possible as most of the subjects go to sleep early, as they have to get up around 5 a.m. to go to work.

Thick and thin blood films were made from all the 150 subjects and were examined for malaria and filariasis infections using Giemsa stain. Haemoglobin concentration, white blood cell count and eosinophil count were determined on venous blood. Faeces were also collected from the same 150 subjects

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according to the method of Sapero and Lawlers (1953) and examined by direct smear, brine flotation, formalin ether and sedimentation techniques. Generic or specific identification of helminths were based solely on egg morphology; no attempt was made to recover the adult worms.

RESULTS

Parasitic infection was found in 90.7% of the subjects, 24% per cent had protozoan infections and 82.7% had helminth infections.

Table 1 summarises the prevalence according to age and sex. Malaria and microfilarial parasites were absent in all blood films.

Ascaris lumbricoides and hookworm infection were more common in the 10-39 years age group; *A. lumbricoides* being more common in the females and hookworm in the males. Mixed infections by two or more parasites were found in 45.8% of the subjects as shown in Table 2.

The haemoglobin concentration and blood eosinophil count in relation to parasitic in-

Table 1
The prevalence of intestinal parasites in oil palm estate workers, by age and sex.

Parasites	Sex		Age						Total % posit.
	Male (87)*	Female (63)	1-9 (45)	10-19 (20)	20-29 (16)	30-39 (27)	40-49 (20)	50+ (22)	
Protozoa									
<i>Entamoeba histolytica</i>	2.3	-	-	-	6.2	3.7	-	-	1.3
<i>Entamoeba coli</i>	10.3	12.7	6.7	10	18.8	18.5	-	18.1	11.3
<i>Giardia lamblia</i>	9.2	14.3	24.4	15	12.5	-	5	-	11.3
Total	21.8	27.0	31.1	25	37.5	22.2	5	18.1	24.0
Helminths									
<i>Ascaris lumbricoides</i>	43.7	63.5	62.2	60	62.5	48.1	50	22.7	52
<i>Trichuris trichiura</i>	50.6	63.5	60	50	75	63	50	36.4	56
Hookworm	35.6	17.5	11.1	40	56.3	22.2	40	27.3	28
<i>Strongyloides stercoralis</i>	2.3	-	-	-	6.2	3.7	-	-	1.3
<i>Enterobius vermicularis</i>	1.1	-	-	-	-	-	-	4.5	0.7
<i>Hymenolepis diminuta</i>	1.1	-	-	-	6.2	-	-	-	0.7
<i>Hymenolepis nana</i>	1.1	-	-	-	-	-	-	-	0.7
Total	93.1	88.1	93.3	95	100	96	80	17.7	90.7

*() number examined in each group.

Table 2

Prevalence of single and multiple infections with soil-transmitted helminths.

Helminth infections	No. of subjects with infections	Percentage with infections
Single Infections		
<i>Ascaris lumbricoides</i>	16	10.7
<i>Trichuris trichiura</i>	24	16.6
Hookworm	13	8.7
<i>Strongyloides stercoralis</i>	1	0.7
Double infections		
<i>A. lumbricoides</i> + <i>T. trichiura</i>	40	26.7
<i>A. lumbricoides</i> + hookworm	9	6.0
Hookworm + <i>T. trichiura</i>	7	4.7
Triple infections		
<i>A. lumbricoides</i> + <i>T. trichiura</i> + hookworm	13	8.7
Total	123	82.0

fection is shown in Table 3. Anaemia as defined by W.H.O. standards (W.H.O., 1972) was found in association with hookworm in 70% of children aged 6 months to 6 years; 62% of adult females and children aged 7-14 years and 59.7% of adult males. *Trichuris trichiura* and *A. lumbricoides* infections per se were not significantly associated with anaemia.

Eosinophilia (absolute eosinophil count > 1000/c.mm) was found in 25% per cent of non-infected subjects and in 40%, 66% and 70% of subjects with *A. lumbricoides*, hookworm and *T. trichiura* infections respectively.

DISCUSSION

Lie (1964) found *A. lumbricoides*, *T. trichiura* and hookworm endemic in Malaysia and a problem especially among the rural population. The present study reveals that a high prevalence of soil-transmitted helminths, *Giardia lamblia* and *Entamoeba coli* among oil palm workers and their families. The high prevalence is due to poor socioeconomic conditions, low standards of sanitation and

hygiene, lack of health education and failure to wear shoes.

A. lumbricoides, *T. trichiura* and *G. lamblia* were common in the younger subjects probably because of their greater outdoor activities and increased chance of exposure to soil-transmitted helminths. It is generally accepted that ascariasis is more intense in the younger age groups. This is probably due to such factors as lack of natural or acquired resistance and differences in behavioral and occupational habits between children and adults. In rural areas ascariasis is often observed in whole families, this seems to be due to the environment and mode of life of the members within such families (Muller, 1975).

Schacher and Danaraj (1960), Lie (1964) and Dunn (1972) reported a lower incidence of hookworm infection in children. Dunn (1972) reported that although hookworm infection is generally acquired later, its incidence rapidly surpasses that of *A. lumbricoides* and *T. trichiura*, and remains at a plateau throughout the life in the Orang

Table 3

Haemoglobin concentration and eosinophil counts in relation to parasitic infections in 150 subjects.

Helminthic infection	Haemoglobin gm%			Eosinophil counts per c.mm		
	6 mths-6 yrs.	7-14 yrs + adult females	Adult males	< 1,000	1,001-2,500	2,500-5,000
<i>Ascaris lumbricoides</i>	10.0*	12.0	8.3	60.0**	40.0	-
<i>Trichuris trichiura</i>	4.4	15.2	5.0	30.1	62.3	7.6
Hookworm	70.0	62.0	59.7	34.0	45.0	21.0
Negative	9.0	12.1	17.0	75.0	20.0	5.0

*Percentage of anaemic subjects as defined by W.H.O. (1972).

**Percentage of subjects.

Aslis. Hookworm is more common in males and in the 10-39 years age group. Most of the workers fall within this category and become infected when they work barefooted in the field. The incidence of hookworm infection in our subjects is high and is similar to that among the Orang Aslis (Dissanaiké *et al.*, 1978).

Anaemia was observed in the majority of our subjects with hookworm infection. Improved socioeconomic conditions, sanitation, personal hygiene, wearing of shoes and a programme of periodic deworming and provision of iron supplements will improve the health and performance of this community.

The incidence of *Enterobius vermicularis* and *Strongyloides stercoralis* infections was low in our survey. This may be low because we did not employ special techniques to search for them.

Twenty-five per cent of subjects not found to have parasitic infections had a raised eosinophil count. It is possible that some residents in the estate may have rat-borne human diseases in view of the high incidence of *Capillaria hepatica* infection (77.8%), (Sinniah *et al.*, in press) and *Angiostrongylus*

(43.2%) infection (Sinniah, unpublished) in rats trapped from this estate.

The incidence of cestode infection in Malaysia is low (Schacher and Danaraj, 1960; Lie, 1964, Bisseru and Aziz, 1971). In our survey we found one case of *Hymenolepis nana* and one case of *Hymenolepis diminuta* infection which was identified by egg morphology as well as recovery of the adult worms following treatment with niclosamide. This is the first human case of *Hymenolepis diminuta* infection reported in Malaysia.

SUMMARY

A survey of workers and families resident in an oil palm estate in Malaysia revealed high incidence of parasitic infections. The commonest parasites are *T. trichiura* (56%), *A. lumbricoides* (52%), hookworm (28%), *Entamoeba coli* (11.3%) and *Giardia lamblia* (11.3%). Mixed infections by two or more parasites was seen in 46% of the subjects.

Anaemia was present in 70% of children with hookworm infection. Eosinophilia was observed in 69% of subjects. One each of *Hymenolepis nana* and *Hymenolepis diminuta*

infection was detected. This is the first report of *Hymenolepis diminuta* infection in man in Malaysia.

ACKNOWLEDGEMENTS

The authors thank Professor A.S. Dissanaïke, Head, Department of Parasitology, Faculty of Medicine, University of Malaya for his valuable suggestions and textual criticism. Thank also to Mr. L.G. Gowie and Mr. Adolf Miranda of the Bukit Rajah Estate, Kelang, Malaysia; and also grateful to the University of Malaya for the grant that made this research possible.

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