THE PREVALENCE OF INTESTINAL PARASITES AMONG CHILDREN AT THE GENERAL HOSPITAL, KUALA LUMPUR, MALAYSIA

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SUMMARY

A prevalence study for intestinal parasites among 305 infants and young children was conducted at the Paediatric wards of the General Hospital Kuala Lumpur, Malaysia. 40.8 percent of children were infected with at least one type of intestinal parasites: 39 percent were found to be infected with intestinal helminths and 4.26 percent with intestinal protozoa. ***Ascaris*** *formed 17.38 percent of the infestation followed by* ***Trichuris*** *(14.75 percent) and hookworm (2.95 percent); 0.3 percent of the cases had* ***Strongyloides*** *stercoralis; 2.30 percent and 2.62 percent of the children had* ***Entamoeba histolytica*** *and* ***Giardia lamblia*** *respectively. Indian children were the predominant group found infected, followed by the Chinese and Malays. A significant drop in infestation rate of soil-transmitted helminths was detected among the Malays.*

The significance of the changing pattern in the epidemiology of soil-transmitted helminths is discussed. A brief review of literature is also presented.

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INTRODUCTION

Parasitic diseases are common in the tropics; they constitute a major health hazard. [1]

The prevalence of intestinal parasitic infections is high in both rural and urban slum areas of Malaysia. Several prevalence surveys have been carried out in Malaysia. [2,3,4,5,6,7,8,9] The prevalence of intestinal protozoa and soil-transmitted helminths is particularly high and multiple infections are common.

In most of these surveys, both children and adults were equally infected; the prevalence rates tended to increase with age. [3,5] Lie [5] studied the prevalence patterns of soil-transmitted intestinal helminths among patients at the General Hospital, Kuala Lumpur, Malaysia. *Ascaris, Trichuris* and hookworm were common among these patients. The infection rates for *Ascaris* and *Trichuris* in children are relatively higher than in adults whereas hookworm infection is higher among the latter. Lie [5] further noted that the prevalence rates of these parasites found in recent years by various workers are not much lower than those found by Barnes and Russell (1925), and Russel (1935).

Apparently socioeconomic improvements have contributed little towards control of soil-transmitted helminthiasis. Since Lie's [5] study, no other clinical study has been done to compare the prevalence rates of soil-transmitted helminths, especially among children at the General Hospital,

TABLE I
CHILDREN POSITIVE FOR AT LEAST ONE INTESTINAL PARASITE, BY ETHNIC GROUP, AT THE GENERAL HOSPITAL KUALA LUMPUR, 1978

Ethnic Group	Number Examined	Positive Cases	
		Number	%
Indians	124	83	66.94
Chinese	86	19	22.09
Malays	94	17	18.09
Others	1	0	0
Total	305	119	39.02

Kuala Lumpur. Frequent comparative studies are necessary to detect, if any, changing patterns of intestinal parasitosis over the years. The aim of the present study is to assess the impact of rapid urbanization of the city on the epidemiological pattern of intestinal parasitosis. This paper presents the results of a study conducted at two Paediatric wards of the General Hospital Kuala Lumpur, Malaysia.

The infants and young children involved in the study were from the middle and lower income groups. They were admitted for various medical conditions.

MATERIALS AND METHODS

Subjects involved in the study were children from wards 2 and 3 of the Paediatric Unit of the General Hospital. The former is a ward for all Paediatric cases other than gastroenteritis and paediatric surgery; the latter is a gastroenteritis ward. All admissions were below the age of 7 years; the majority of the patients in the gastroenteritis ward were below 2 months old. Since no intestinal parasites were observed in babies less than 2 months old, this age-group was discarded from the study so that the population is not skewed towards the neonates.

Stool samples were collected from all new admissions into ward 2 and 3, between January to March 1978. Of 305 samples collected, 40.8 percent were from Indians, 30.9 percent Malays, 28.3 percent Chinese and 0.33 percent Eurasian. 58.88 percent of these subjects were males. Both sexes of all races were involved. All stool specimens were examined by the saline direct smear method; however both saline direct smear and thymol concentration methods were also used in one-third of the cases. Ten more positive cases were detected by using both the two methods. No other special techniques were employed.

RESULTS

Of the 305 patients examined, 40.8 percent were infected with at least one type of intestinal parasite: 87.9 percent were due to nematodes and 11.3 percent were due to protozoal infections. 16.1 percent had single, 69 percent had double and 3.0 percent had triple infections. 0.3 percent of these patients had more than 3 types of infections.

Thirty-nine percent of the children were found to be infected with intestinal helminths, of whom 66.9 percent were Indians, 22 percent Chinese and 18.1 percent Malays (Table I). *Ascaris* formed 17.38 percent of the infection, followed by *Trichuris* (14.75 percent) and hookworm (2.95 percent). In the present study, although no special techniques were used, *Enterobius vermicularis* (0.3 percent) *Strongyloides Stercoralis* (0.3 percent) were also detected.

2.30 percent and 2.62 percent of the children

TABLE II
PREVALENCE OF INTESTINAL PARASITES IN CHILDREN, BY ETHNIC GROUP

ETHNIC GROUP	NUMBER OF SAMPLES	Ascaris lumbricoides		Trichuris trichiura		Hookworm		Entamoeba histolytica		Giardia lamblia	
		Number	%	Number	%	Number	%	Number	%	Number	%
Indians	124	33	26.61	34	27.42	8	6.45	6	4.84	5	4
Chinese	86	10	11.63	7	8.14	1	1.16	0	0	1	1.16
Malays	94	10	10.64	4	4.26	0	0	1	1.06	2	2.13
Others	1	0	-	0	-	0	-	0	-	0	-
Total	305	53	17.38	45	14.75	9	2.95	7	2.30	8	2.62

TABLE III
PREVALENCE OF INTESTINAL PARASITES IN CHILDREN, BY SEX

Sex \ Intestinal Parasite	Number of samples	Ascaris lumbricoides		Trichuris trichiura		Hookworm		Entamoeba histolytica		Giardia lamblia	
		Number	%	Number	%	Number	%	Number	%	Number	%
Male	179	30	16.76	26	14.53	4	2.24	3	1.68	3	1.68
Female	125	23	18.40	19	15.20	4	3.20	4	3.20	3	2.40
Total	304	53	17.43	45	14.80	8	2.63	7	2.30	6	1.97

were infected with the intestinal protozoa, *Entamoeba histolytica* and *Giardia lamblia*, respectively (Table II). As in helminthiasis, Indians formed the predominant group found infected.

Table III shows the prevalence of intestinal parasites in children, by sex. 16.76 percent of the boys were found to be infected with *Ascaris*, 14.53 percent with *Trichuris* and 2.24 percent with hookworm. The prevalence rates of intestinal nematodes among the girls were however slightly higher than the boys, being 18.40 percent for *Ascaris*, 15.20 percent for *Trichuris* and 3.20 percent for hookworm. The pattern is the same too for intestinal protozoal infections; 3.20 percent and 2.40 percent of the girls were infected with *E. histolytica* and *G. lamblia* respectively, compared with only 1.68 percent for both protozoa among the boys.

All age groups were observed to have at least one type of parasitic infection (Table IV). *Ascaris* is the predominant infection among children of all ages, followed by *Trichuris* and hookworm. The youngest child to be infected was a 3 month old Chinese male. He was infected with both *Ascaris* and *Trichuris*. Hookworm infection although generally believed to be rare among infants and children, was seen in the present study in a 5 month old Indian male.

E. histolytica were detected in children of 2 months to 5 years age-groups. *G. lamblia* infection was only seen in children of 2 years to 5 years age-groups. The prevalence rates of all types of parasitic infections increase with age.

CONCLUSION AND DISCUSSION

Lie [5] studied soil-transmitted helminthiasis among infants and young children of the General Hospital, Kuala Lumpur. He noted that 45.2 percent harboured one or more of the soil-transmitted helminths. *Ascaris* (29.2 percent) and *Trichuris* (31.3 percent) were common among these children; the prevalence rate for hookworm was 7.7 percent. Earlier, Schacher and Danaraj [3] found a prevalence rate of 30 percent for *Ascaris*, 80 percent for *Trichuris* and 30 percent for hookworm, in children of 0-9 year age group. In two studies, [3,5] it was observed that Chinese children show a lower prevalence rate than Indian and Malay children. In the present study, 39 percent of all children examined were found to be infected

TABLE IV
AGE/SPECIFIC PREVALENCE OF INTESTINAL PARASITES

Age group (years)	No. of Samples	Ascaris		Trichuris		Hookworm		E. histolytica		G. lamblia		S. stercoralis	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
2/12 - 1	137	9	6.57	4	2.92	1	0.73	1	0.73	0	-	0	-
1 - 2	84	19	22.62	10	11.91	1	1.20	2	2.38	0	-	1	1.2
2 - 3	38	11	28.95	11	28.95	4	10.53	2	5.26	4	10.53	0	-
3 - 4	14	4	28.57	5	35.71	1	7.14	1	7.14	2	14.29	0	-
4 - 5	13	5	38.46	7	53.85	0	-	1	7.69	2	15.39	0	-
5 - 6	7	0	-	3	42.86	1	14.29	0	-	0	-	0	-
6 - 7	9	3	33.33	4	44.44	1	11.11	0	-	0	-	0	-
7 years	3	2	66.66	1	33.33	0	-	0	-	0	-	0	-

with at least one type of soil-transmitted helminths. *Ascaris* formed 17.38 percent of the infection, followed by *Trichuris* (14.75 percent) and hookworm (2.95 percent). It is interesting to note in the present study that whereas the highest prevalence rates for all types of intestinal nematode infection is still among the Indians (66.9 percent), a change in prevalence rates between the Malays and Chinese was observed. When compared with Lie's [5] study, the prevalence rate among the Malay children (18.1 percent) has significantly dropped, and the Chinese (22 percent) has taken the second place. However, the change in infection rate among the Chinese was non-significant. Desowitz [4] observed no significant differences among ethnic groups living in the same area which suggests that there is no racial susceptibility or resistance. Our study supports Desowitz's [4] observations. The changing pattern of infestation observed in the present study may be due to higher Chinese admissions to the General Hospital by virtue of their larger population in the city of Kuala Lumpur. The Indian children, however, have a significantly higher prevalence rate for all three species of nematodes compared to the other ethnic groups. Socioeconomic status, personal hygiene and educational standards of their parents seem to be the main factors involved. [3,4,5,9] In rural areas, soil-transmitted helminths is often observed in whole families; this seems to be due to the environment and mode of life of the members within such families. [10]

Infection rates of *Ascaris* and *Trichuris* seem to increase with age. [3,5,6,7,11,12,9] *Ascaris lumbricoides* is found at a younger age than *Trichuris trichiura*. In the present study, the youngest patient found to be infected with *Ascaris* and *Trichuris* was a 3 month old Chinese male.

Schacher and Danaraj, [3] Lie [5] and Dunn [8] reported a lower incidence of hookworm infection in children. Hookworm is more common in males in the 10-39 year age-groups. Hookworm was not found in infants below the age of one year; [5] the infection rate increases gradually with age. This is expected since infants are not much in contact with the soil. However, in the present study, a case of hookworm infection was detected in a 5 month old Indian male. The overall prevalence rate for hookworm is also lower than that reported by Lie. [5] Our study recorded a prevalence rate of 6.4 percent among Indians, 1.2 percent among Chinese and 0 percent among the Malays; Lie [5] reported 11 percent among the Malays and 7 percent for both the Chinese and Indians.

The prevalence rate of *S. stercoralis* is low among children. [3,5,9] Schacher and Danaraj [3] recorded a prevalence rate of 4 percent for *Strongyloides* in Singapore; Lie [5] reported 0.9 percent among children in Kuala Lumpur. Sinniah *et al* [9] reported a prevalence rate of 1.3 percent in an oil palm estate population in Malaysia. The present study supports the observations of these workers. Only one case (0.3 percent) of *S. stercoralis* was detected. The patient was a one year old Indian male, and the infection was very heavy.

Information on the prevalence of intestinal protozoa in Malaysia is scarce. Sinniah *et al* [9] recorded a prevalence rate of 0 percent for E. histolytica and 24.4 percent for *G. lamblia* among 1-9 year old children in an oil palm estate. Cross *et al,* [11] reported a prevalence rate for 6 — 10 percent for *E. histolytica* and 8 — 9 percent for *G. lamblia* among 1 - 9 year old children in Indonesia. In the present study, *E. histolytica* and *G. lamblia* was detected in 2.30 percent and 2.62 percent of the samples respectively. Perhaps a more sensitive technique should be employed to detect intestinal protozoal infections. The indirect hemagglutination test has been shown by several workers [13,12] to be an effective method for estimating the prevalence of *E. histolytica* antibodies in population groups. However, it is not always possible to adequately compare the serological findings with the presence of *E. histolytica* in the stool samples. Cross *et al* [12] demonstrated only 14 percent of those with positive stools and antibody titres above 1 : 4 and 4 percent have positive titre of 128.

The above observations are in agreement with the general epidemiological pattern and distribution of parasites according to age and sex, as described by other workers. [2,3,5,7,11,9] The older children had relatively higher infection rates for *Ascaris, Trichuris* and hookworm than boys. Lie [5] noted a slight decrease in *Ascaris* and hookworm infections, with *Trichuris* infection rates remaining at the same level as it was 35 years ago. However, in the present study, a significant increase in incidence of *Ascaris* infection among children is observed although hookworm and *Trichuris* infection rates are approximately the same as it was 14 years ago.

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REFERENCES

[1] Beaver P C (1961) Control of soil-transmitted Helmiths. *Pub. Hlth. papers,* No. 10 W.H.O. Geneva. pp 44.

[2] Sandosham A A (1955) A checklist of the helminth parasites of man in Malaya with brief notes on their incidence. *Proc. Allumni Ass. Malaya.*, 8, 258 - 265.

[3] Schacher J F and Danaraj T J (1960) Intestinal helminths in relation to eosinophilic lung (Tropical Eosinophilia) in Singapore. *Amer. J. Trop. Med Hyg.*, **9,** 616 - 619.

[4] Desowitz R S, Zaman V, and Ng W K (1961) The incidence of intestinal parasites in various communities of Singapore Island. *Singapore Med. J.*, **2,** 91-93.

[5] Lie K J (1964) Prevalence of intestinal helminths among patients in General Hospital, Kuala Lumpur, Malaysia. *Trop. Geog. Med.*, **16;** 229 -237.

[6] Heyneman D, Ramachandran C P, Balasingam E and Umathevy T (1967) Pulau Tioman: A combined Parasitological Survey III. Preliminary observations on intestinal parasitism in the island population. *The Med. J. Malaya.*, Vol. XXI 3,265-268.

[7] Lie K J, Hoa K E and Owyang C K (1971) Soil transmitted helminths in rural infants and children near Kuala Lumpur, Malaysia. *Southeast Asian J. Trop. Med. Pub. Hlth.*, **2** (2), 196 -200.

[8] Dunn F L (1972) Intestinal parasitism in Malayan Aborigines (Orang Asli). *Bull. W. H. O.* 46 (1), 99 - 113.

[9] Sinniah B, Sinniah D, Manmohon Singh and Poon G K (1978) Prevalence of parasitic infections in Malaysian Oil Palm Estate workers. *Southeast Asian J. Trop Med. Pub. Hlth,*9 (2) 272 - 276.

[10] Muller R (1975) **Worms and Diseases.** A manual of medical helminthology. *William Heineman Medical Books Ltd. London.* pp. 161.

[11] Cross J H, Clarke M D, Carney W P, Putrali J, Joesoef A, Sajidiman H, Partono F, Hudojo and Sri Oemijati (1975) Parasitology survey in the Palu Valley Central Sulawesi (Celebes) Indonesia *Southeast Asian J. Trop. Med. Pub. Hlth.*, **6** (3), 366-375.

[12] Cross J H, Clarke M D, Durfee P T, Irving G S, Taylor J, Partono F, Jeosoef A, Hudojo and Sri Oemijati (1975) Parasitology survey and seroepidemiology of *Amoebiasis* in South Kalimantan (Borneo) Indonesia. *Southeast Asian J, Trop. Med. Pub. Hlth.* **6,** (1), 52-60.

[13] Cuardrado R R and Kagan I G (1967) The prevalence of antibodies to parasitic diseases in sera of young army recruits from the United States and Brazil. *Amer. J. Epidem.*, **86,** 330 -340.