

PREVALENCE AND INTENSITY OF HELMINTHIC INFECTIONS IN ADULTS AMONG THE ETHNIC GROUPS IN SINGAPORE

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INTRODUCTION

No information is available with regard to the prevalence and intensity of infection with intestinal parasites in relation to the ethnic group, age and sex among the adult population in Singapore. Desowitz *et al* (1961) surveyed the incidence of intestinal parasites in various communities in the island but observed no clear-cut differences between the different ethnic groups in the various communities. A recent survey of helminthiasis in a paediatric ward in Singapore revealed a significant differences in the prevalence and degree of infection with soil-transmitted helminths among children of different ethnic groups and ages (Siak and Kan, 1969). The present survey is carried out to investigate the possible relationship between the prevalence and intensity of infection with intestinal parasites and the ethnic group, age and sex of adults in Singapore.

MATERIALS AND METHODS

A total of 300 inpatients and outpatients in Medical Unit One, Outram Road General Hospital, Singapore, were examined for intestinal parasites. Helminth eggs and protozoan cysts were examined with the direct fecal smear and the zinc sulphate centrifuge flotation method of Faust *et al* (1939). The standards adopted in the estimation of intensity of infection with *Ascaris*, *Trichuris* and hookworm were those employed by Kleevens (1966). Larvae of *Strongyloides stercoralis* were examined from direct fecal smears and confirmed by culturing the larvae to the diagnostic third larval stage (Faust and Russel, 1957). Infection with *Enterobius vermicularis* was examined by the modified adhesive tape method of Beaver (1952). The adhesive tape smear was applied before a bowel movement and a bath in the morning.

RESULTS

The results of the survey are shown in Table I.

As the soil-transmitted helminths—*Ascaris*, *Trichuris*, hookworm and *Strongyloides* are

most frequently encountered in the survey, the prevalence and intensity of infection with these helminths are further analysed (Table II).

An overall prevalence of infection of 37.7% was observed, 14.2% of which was heavily infected. The prevalence and intensity of infection with these helminths are also analysed according to the ethnic group, age and sex of the patients, as shown in Table III.

The Malays showed the highest prevalence and intensity of infection. This was followed closely by the Indians. The Chinese were least frequently and least heavily infected among the three main ethnic groups. The prevalence and intensity of infection was highest in patients of 10-19 years of age. This was followed by the 50-59 and 20-29 age groups. Those between the ages of 30-49 were quite frequently infected but less heavily so. Infection with soil-transmitted helminths was significantly lower in patients above 60 years of age. Males were slightly more frequently and heavily infected than females.

In order to ascertain whether the distribution of infection in the different ethnic groups is a function of the age of the patients, the age composition of the patients in the different ethnic groups is analysed (see Table IV).

The distribution of light to trace infections among the Chinese was similar to the age composition of this group, where positive cases were distributed relatively evenly in the different ethnic groups except for a significant decrease in those above 60 years of age. Similarly, the distribution of light to trace infections among the Malays and Indians was also a function of the age of the patients, with the majority of the positive cases falling within the 30-59 age group, and a slightly lower number in the 10-19 age group. On the other hand, all the 5 cases of heavy infection reported among the Chinese were found in patients between the ages of 13-21. In addition, the distribution of heavy infection among the Malays and Indians did not have any pattern but occurred in all the age groups except in those over 60 years of age. Thus, the higher intensity of infection observed among Malays and Indians and the tendency for young Chinese

TABLE I
PREVALENCE OF INFECTION WITH
INTESTINAL PARASITES

Number of persons examined	-	300
Percent infected with one or more of the following parasites:		
<i>Ascaris lumbricoides</i>	-	11.3
<i>Trichuris trichiura</i>	-	29.3
Hookworm	-	6.3
<i>Strongyloides stercoralis</i>	-	3.7
<i>Enterobius vermicularis</i>	-	6.7
<i>Clonorchis sinensis</i>	-	0.3
<i>Hymenolepis nana</i>	-	0.3
<i>Giardia lamblia</i>	-	1.3
<i>Entamoeba histolytica</i>	-	0.7
<i>Entamoeba coli</i>	-	2.0

TABLE II
PREVALENCE AND INTENSITY OF IN-
FECTION WITH SOIL-TRANSMITTED
HELMINTHS

Total number of patients examined	300
Number of positive cases	113
Percent infected	37.7
Number of cases of moderate to heavy (M-H) infection	16
Percent of M-H infection to total infection	14.2
Number of cases of light to trace (L-T) infection	97
Percent of L-T infection to total infection	85.8

TABLE III
PREVALENCE AND INTENSITY OF INFECTION WITH SOIL-
TRANSMITTED HELMINTHS IN RELATION TO ETHNIC
GROUP, AGE AND SEX

Ethnic Group	Number Examined	Positive Cases	Percent Infected	Number of Heavy Infection	Percent of Heavy Infection
Race:					
Chinese	225	72	32.0	5	2.2
Malays	32	19	59.4	7	21.9
Indians	39	21	53.9	4	10.3
Others	4	1	25.0	0	0.0
Age:					
10-19 yrs.	50	25	50.0	7	14.3
20-29 yrs.	45	17	37.8	3	6.7
30-39 yrs.	58	19	32.8	2	3.5
40-49 yrs.	59	23	39.0	1	1.7
50-59 yrs.	50	22	44.0	3	6.0
60 and above	37	7	18.9	0	0.0
Sex:					
Males	185	75	40.5	11	6.0
Females	115	38	33.3	5	4.4

TABLE IV
AGE COMPOSITION OF PATIENTS OF DIFFERENT ETHNIC GROUPS

Ethnic Group	Number Examined	Percent of Patients in Different age Groups					60 and Above
		10-19	20-29	30-39	40-49	50-59	
Chinese	255	16.8	17.3	20.5	16.0	15.6	13.8
Malays	32	15.6	6.3	18.8	34.4	15.6	9.4
Indians	39	15.4	7.7	20.6	28.2	23.1	5.1

to be heavily infected is not a function of the age of these patients, but is possibly related to the general socio-economical conditions of the different ethnic groups.

The kinds of infections with soil-transmitted helminths encountered in this survey are listed in Table V.

TABLE V

KINDS OF INFECTIONS WITH SOIL-TRANSMITTED HELMINTHS

	Number of Light Cases	Number of Heavy Cases
Single infections:		
<i>Ascaris</i> - -	10	2
<i>Trichuris</i> - -	56	1
Hookworm - -	4	1
<i>Strongyloides</i> - -	6	0
Double infections:		
<i>Ascaris</i> & <i>Trichuris</i>	12	6
<i>Ascaris</i> & Hookworm - -	1	0
Hookworm & <i>Trichuris</i> - -	7	4
Triple infections:		
<i>Ascaris</i> , <i>Trichuris</i> & hookworm -	1	2
TOTAL	97	16

Of the 97 cases of light to trace infections, about 60% was single infections with *Trichuris*. Trace infections with mixed *Ascaris* and *Trichuris* or *Ascaris* alone were next frequently encountered. Among the 16 cases of heavy infections, mixed double infections with *Ascaris* and *Trichuris*, and frequently with *Ascaris* as the predominating parasite, were most prevalent.

Enterobiasis was more prevalent among the Chinese and Malays where it was relatively evenly distributed among males and females of different ages. *Enterobius* occurred either as single infections or together with one or some of the soil-transmitted helminths or intestinal protozoans. One case of heavy Enterobiasis together with light infections with *Trichuris*, hookworm and *Strongyloides* was reported.

Infections with intestinal protozoans is relatively low. A case of heavy Giardiasis together with heavy *E. histolytica*, *E. coli* and light to trace infections with *Ascaris* and *Trichuris* was found.

DISCUSSION

The prevalence of infection with soil-transmitted helminths in adults (37.7%) is very close to that reported in children (38%) by Siak and Kan (1969). This percentage is very much lower than that reported by Desowitz *et al* (1961). This could be partly attributed to the fact that the latter survey was made almost a decade ago. On the other hand, the degree of infection is much lower in adults than in children. Only about one seventh of the positive cases among adults was heavily infected, whereas about one third of the infected children had heavy parasitic loads. In addition, the ova-counts encountered in heavy cases in adults never exceeded 200 eggs per fecal smear, whereas some heavy cases reported among children had 700-800 eggs per smear.

Like helminthiasis in children, the prevalence and intensity of infection among adults are higher in Malays and Indians, followed by the Chinese. This may be related to some inherent differences in the diet and cultural and hygienic habits of the different ethnic groups. The tendency for young Chinese patients to harbour heavy worm infections probably results from an infection acquired in early childhood. Because of the relatively milder degree of infection compared to those in Malay or Indian children, the parasites were tolerated and maintained by the host to early youth. Heavy infections in Malay and Indian children are probably so severe in some cases that these infections are terminated by the death of the host, or the severity of the infection would warrant medical attention and consequent elimination of the parasite in most cases, thus accounting for the comparatively fewer cases of heavy worm infections in young Malays and Indians observed in this survey. The lower incidence of infection in patients above 60 years of age probably indicates the acquisition of an immune state by the host.

SUMMARY

300 patients (185 males, 115 females) were examined for intestinal parasites. About 40% of these patients was infected, 14% of which was heavily infected. The highest prevalence and intensity of infection with soil-transmitted helminths was found among Malays and Indians of different ages. Heavy infections with these helminths were also frequently encountered in young Chinese. Helminthic infections in patients over 60 years of age was significantly lower. There was no significant differences in the

prevalence and degree of infection among males and females. The commonest helminth encountered was *Trichuris trichiura*, which usually occurred as trace single infections. Mixed infections with *Ascaris* and *Trichuris*, usually with the former as the predominating parasite, were also frequently observed.

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