

THE INCIDENCE OF INTESTINAL PARASITES IN VARIOUS COMMUNITIES OF SINGAPORE ISLAND

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In a complex society such as that of Singapore the cultural practices of the ethnic groups and the different conditions under which the various communities live may influence the incidence of intestinal parasitism. There is too, the possibility that a race may have a particular susceptibility or resistance to a parasite. Surveys, such as the recent one carried out by Schacher and Danaraj (1960) give unmistakable evidence that the incidence of intestinal parasitism is high in the population of Singapore. However, the great majority of surveys have drawn their samples from hospital cases. While this has given an overall picture of the prevalence there is no clear indication of the incidence in the individual communities of Singapore. Information regarding the quantitative and qualitative aspects of intestinal parasitism on a community basis is necessary for the logical development of programmes designed to control or eradicate these infections, particularly hookworm, and it was largely for this reason that the present survey was undertaken.

METHODS

Containers were distributed in the area to be surveyed, the cups with stool samples collected the next morning and taken to the laboratory where they were examined by the Beaver (1952) modification of the zinc-sulphate centrifuge flotation method of Faust et al (1939). When protozoan cysts were observed iodine preparations were also made to facilitate species identification. This survey comprises the following areas and groups:—

- (1) *Tenement area*, Upper Nanking Street (Chinese): Units of habitations with common kitchens and toilets, excreta disposal by bucket system.
- (2) *Urban Kampong area*, Henderson Road (Chinese): A group of habitations of wood with dirt, wood or occasionally concrete floors. The inhabitants engage in extensive pig rearing. Bucket system of excreta disposal but indiscriminate defaecation is the usual practice. Pigs often eat voided faeces.
- (3) *Urban Farm area*, Braddell Road (Chinese): A group of habitations in a predominantly

agricultural area in the city. Inhabitants probably use night soil as fertilizer although this was denied.

- (4) *Rural Farm area*, Bedok (Chinese): A group of habitations in a predominantly agricultural area of the Rural Areas. Houses of wood and attap with floors of earth. Some outdoor privies but often indiscriminate defaecation, particularly by children.
- (5) *Labour Lines*, Bedok (Indian, Malay): A group of habitations for Government daily workers. Floors of concrete. Bucket system of excreta disposal,
- (6) *Coastal Kampong area*, Pasir Panjang (Chinese, Malay): A group of habitations, many of wood and attap with earth, wood or concrete floors. Some agricultural and farming activities. Bucket system of excreta disposal but indiscriminate defaecation common.
- (7) *Medical Students*, (Chinese, Indian).

RESULTS AND DISCUSSION

The results of the survey are shown in Table I. It will be seen from this table that the prevalence of intestinal parasites is especially high in communities living in close contact with the soil. Parasitism is lowest in those living in tenements or middle and upper class homes. It is of interest of note that infection rates do not appear to be widely divergent between city dwellers living in poor conditions (Nanking Street) and those (Medical Students) presumably living under very much better conditions; the only differences being that the hookworm and *E. histolytica* rates are somewhat higher in the former group. *Trichuris trichuris* is the most common parasite in all communities surveyed. *Ascaris* is, as would be expected, highest amongst people associated with farming, earth and nightsoil fertilizer being the common sources of infection. The infection rates with hookworm are of considerable interest since infection with this parasite might well represent one of the most important public health problems

TABLE I
THE INCIDENCE OF INTESTINAL PARASITES IN
SOME COMMUNITIES OF SINGAPORE ISLAND

	Per cent Infected						
	Tenement area	Urban kampong	Urban farm	Rural farm	Labour lines	Coastal kampong	Medical students
No. of persons examined	54	95	98	104	101	111	51
Per cent infected with one or more parasites	53.7	92.6	94.9	98.1	90.4	84.13	51.0
Trichuris	50.0	75.8	72.5	87.5	81.2	78.9	31.4
Ascaris	5.5	61.0	53.1	60.6	47.5	46.6	3.9
Hookworm	16.6	10.5	28.6	77.9	55.5	38.5	3.9
Taenia	—	—	—	1.0	—	—	—
Hymenolepis	—	—	—	—	1	—	—
Chlonorchis	1.8	—	—	—	—	—	—
Giardia	7.4	10.5	11.2	21.2	6.9	8.6	2.0
E. histolytica	9.2	5.3	8.2	1.9	6.1	1.9	3.9
E. coli	—	2.1	4.1	3.9	8.9	2.4	5.9
Endolimax	—	—	—	1.9	4.0	1.0	2.0
Iodamoeba	—	—	1.0	0.9	1	0.5	—
Balantidium	—	1.0	—	—	—	—	—
Chilomastix	—	—	—	—	—	0.5	—

TABLE II

THE INCIDENCE OF INTESTINAL PARASITES
IN MALAYS AND INDIANS OF THE LABOUR
LINES (BEDOK)

	Malay	Indian
No. of persons examined	27	74
Trichuris	77.78%	82.43%
Ascaris	48.15%	47.30%
Hookworm	18.51%	68.92%
Hymenolepis	—	1.35%
Giardia	3.70%	8.11%
E. histolytica	7.40%	5.40%
E. coli	3.70%	14.86%
Iodamoeba	—	1.35%
Endolimax	3.70%	6.76%
% Positive	88.89%	91.89%

TABLE III

THE INCIDENCE OF INTESTINAL PARASITES
IN CHINESE AND MALAYS OF A
COSTAL KAMPONG (PASIR PANJANG)

	Chinese	Malay
No. of persons examined	111	90
Trichuris	72.97%	87.77%
Ascaris	42.34%	52.22%
Hookworm	38.74%	37.78%
Giardia	9.01%	8.89%
E. histolytica	2.70%	1.11%
E. coli	2.70%	2.22%
Endolimax	—	2.22%
Iodamoeba	—	1.11%
Chilomastix	—	1.11%
% Positive	81.08%	87.78%

of Singapore. The infection rate is highest in the rural farm area, the conditions there being ideal for the transmission of hookworm. The farmers use nightsoil, the soil is sandy and there is shade from the fringing coconut palms. It is of interest that the prevalence of hookworm is considerably lower in the urban farmers. The area is less shaded and the soil less sandy. Furthermore it is conceivable that the D.D.T. which these farmers use liberally might exert some larvicidal activity. Although no actual counts were done it is our impression that the hookworm burdens in the urban farmers were distinctly lower than those in the rural farmers. The *Ascaris* and *Trichuris* rates are high in the urban kampong dwellers but hookworm infection is relatively rare. The soil is clayey and poorly drained in this area, there is contamination with pig urine and these factors probably tend to suppress the hookworm's development. Barnes (1925) found hookworm rates of approximately the same level as we have noted in this present survey. Whereas other aspects of public health have made important advances in Singapore it is an unfortunate fact that the hookworm incidence has not altered in thirty five years. It is not within the context of

this paper to comment upon the medical significance of these findings but one can question whether a State committed to industrialization can afford the drain on the mental and physical energies taken by hookworm and other intestinal parasites.

There appears to be no clear-cut difference in incidence of parasites between the ethnic groups. Two communities were surveyed which were composed of mixed races; the Labour Lines (Indian, Malay) and the Coastal Kampong (Chinese, Malay). Comparison of the ethnic groups is shown in Tables II and III. The hookworm rate is lower in the Malays of the Labour Lines but the sample here is relatively small and probably not significant.

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