

# The prevalence of *enterobius vermicularis* amongst primary school children in Pulau Ketam, Selangor – 1988

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## Summary

A survey was conducted to investigate the prevalence of *Enterobius vermicularis* in 1352 Chinese children between the ages of 6–12 years from the three National Type Chinese Primary Schools in Pulau Ketam in 1988, using the scotch-tape technique on three successive days. The overall prevalence was high (56.88%). The prevalence in Sin Bin School was significantly lower (50.86%) compared to the other two schools (56.60% and 61.04%). Prevalence was significantly higher amongst the 6–7 years age group (61.61%–70.18%) compared to other age groups (47.9%–59.29%). There was no difference in the prevalence between the boys and girls being 56.15% and 57.55% respectively.

*Key words:* *Enterobius vermicularis*, Enterobiasis, Island, prevalence.

## Introduction

Enterobiasis is perhaps the commonest helminth infection in humans, especially children.<sup>1</sup> The prevalence of this infection appears to be distributed without bias amongst younger age-group children in underdeveloped as well as developed countries.<sup>2</sup> Although *Enterobius vermicularis*, the causative agent, normally inhabits the caecum, appendix and adjacent portions of the ascending colon, ectopic migrations to other sites, especially up the female genital tract has been reported.<sup>3</sup>

Only one study has specifically focussed on pinworm infection in Malaysia<sup>4</sup> and another in Singapore.<sup>5</sup> However, incidental occurrences of eggs of *E. vermicularis* in faecal samples have been reported by many workers. In both the above studies the subjects studied were children attending paediatric clinics and thus do not represent the true prevalence in the population in Malaysia. Lack of study in this field may be due to the impracticality for researchers to do the scotch-tape cellophane technique in the general population.

The objective of this study was to enumerate the prevalence of *E. vermicularis* amongst school children in Pulau Ketam.

## Materials and Methods

**Site of study:** Children from the three primary schools located in three different areas of Pulau Ketam in the District of Klang, Selangor, peninsular Malaysia were chosen for this study.

Houses and roadways in this island are built on platforms that are mainly made of wood supported by stilts driven into the sea-bed. Five small rivers traverse the island and wooden bridges are present for crossing these rivers. The island has all the facilities of a moderately small town: a small market, entertainment centres, a Health Centre and a small police station. Launches traverse the sea between the mainland (Port Klang) and the island five times a day and the early morning trips bring in workers, tourists and all the food and provisions to the local shops.

**Social background:** The resident population of about 20,000 are Chinese (99.9%) with a sprinkling of Malays who are government staff. The predominant occupation is fishing and other related business. The three local primary schools are Government Type Chinese schools. Rain water is collected in drums and underground storage tanks and used for all purposes. During the dry seasons boats ferry in water from the mainland.

The interior of houses and immediate vicinity are adequately clean. However, faecal matter from house toilets and other household waste is thrown on to the sea bed. Such litter remains until high tide washes it away. In the inner portions of the island the rubbish remains in the ground for a great length of time. Pigs and dogs kept by residents forage on waste products deposited in the sea bed. Flies are plentiful.

**Specimen collection:** A total of 1352 school children ranging from the age of 6–12 years (650 males and 702 females) from the three schools Hwa Lien (HL), Kheng Chee (KC) and Sin Bin (SB) were included in this study which was conducted in 1988.

Due to the impracticality for us to do the scotch-tape technique on the children ourselves, we sought to get the co-operation of the children, their parents and guardians by distributing elaborately illustrated handouts prepared in the Chinese language. We received very good co-operation. The teachers helped to explain the technique to the children. This handout stressed the precautionary measures such as doing the technique as soon as they awoken, before defecating or washing themselves and doing it for three successive days.

Specimen were collected and stored in a cold room (4°F). Initially we examined the swabs after clearing with a drop of toluene but subsequently we examined them without toluene. When anyone of the three slides from a pupil was found to contain eggs of *E. vermicularis* the pupil was considered infected.

## Results

The results of this study is summarised in Table 1. The overall prevalence of *E. vermicularis* was found to be very high (56.88%) amongst the 1352 children. The prevalence ranged from 50.90% in SB School, 56.6% in KC School and 61.04% in HL School. There was a significant difference in the prevalence in the three schools ( $X^2 = 6.18$ , d.f. = 2). There was no significant difference in the prevalence between KC School and HL School ( $X^2 = 1.96$ , d.f. = 1). However there was

significant difference when HL School and KC School were considered together and compared with SB School ( $X^2 = 4.16$ , d.f. = 1).

There was a significant difference ( $X^2 = 14.4$ , d.f. = 5) in the prevalence in the different age groups. There was a decreased from 60.65% amongst children aged 6–6.9 years to 50.5% amongst those aged 10–10.9 years ( $X^2 = 14.4$ ). An increase of 3.2% was noted amongst children of 11–11.9 years.

**Table 1**  
**Enterobiasis in Three Chinese Primary School Children in Pulau Ketam, Klang, Selangor**

Standard	Average age (year)	Sex	No. examined	No. infected	% infected
1	6.6	F	120	73	60.83
	6.6	M	124	75	60.48
	—	F+M	244	148	60.65
2	7.5	F	114	80	70.18
	7.5	M	112	69	61.61
	—	F+M	226	149	65.92
3	8.6	F	113	67	59.29
	8.6	M	134	69	51.49
	—	F+M	247	136	55.06
4	9.4	F	112	63	56.25
	9.3	M	98	53	54.08
	—	F+M	210	116	55.23
5	10.6	F	119	57	47.90
	10.6	M	101	53	52.48
	—	F+M	220	110	50.0
6	11.6	F	124	64	51.61
	11.6	M	81	46	56.79
	—	F+M	205	110	53.66
TOTAL	—	F	702	404	57.55
	—	M	650	365	56.15
	—	F+M	1352	769	56.88

F = Female; M = Male

There was no difference in the overall prevalence of infection between boys and girls which was 56.15% and 57.55% respectively ( $X^2 = 0.3$ , d.f. = 1). Neither was there any differences amongst boys and girls of different age groups.

## Discussion

Enterobiasis is a highly transmissible parasite which has a short life cycle and is reputed to be the highest of any worm infection due to its distribution in both tropical and temperate countries.<sup>3</sup>

Although the prevalence of *E. vermicularis* is generally regarded to be high in Malaysia, to date, there has been no survey conducted amongst any group of general population. Our study is the first survey specifically conducted for detecting *E. vermicularis* infection among school children. The prevalence of this worm was found to be high i.e. 56.88% amongst primary school children in Pulau Ketam. In a hospital based study<sup>4</sup> conducted in the paediatric wards in the University Hospital Kuala Lumpur, the prevalence was noted to be 24.6%. Another study in Singapore<sup>5</sup> found the prevalence to be 21.3%. A survey of parasitic infections in Pulau Ketam in the early part of 1980 has found the prevalence of *E. vermicularis* to be very low (3.9%).<sup>6</sup> The low prevalence was because they examined faecal samples rather than examining the children using the scotch-tape technique which will better reflect the true prevalence.

The residents of Pulau Ketam live in houses that are compactly arranged and the population density is high and their contact with soil is minimal. Thus overcrowding can result within houses, making conditions ideal for the transmission of this worm. Such crowded environments are similar to those of hostels, army barracks and other institutions where there is high prevalence of this parasite.<sup>3</sup>

Our results indicate that there was a significant difference in the prevalence of this worm among children of different age groups especially children between the ages of 6–8 years compared to the older children. The older children are probably more aware and conscious of their personal health and may also have been influenced by health education lessons. Kan et al<sup>4</sup> however noted that the prevalence was highest among the 10–11 year age groups. In another study on 110 infants in paediatric wards, the prevalence was only 3.6% whereas in children between the ages of 1–5 years higher prevalence (22.2%) and the age group 10 years and above (29.8%).<sup>5</sup>

We did not observe any difference in the prevalence of this worm amongst boys and girls in any of the age groups. This is in agreement with the findings by other workers<sup>4,5</sup> as both sexes are equally exposed. The subjects in this study were all Chinese and thus no comparison could be made between the 3 major ethnic groups in Malaysia. In Singapore<sup>5</sup> Malay children were more frequently infected (26.9%) compared with the Chinese children (21.2%) and Indians (13.5%). The three main ethnic races that live in peninsular Malaysia have different sanitary habit after defecation. Whilst the Malays and Indians use water to wash themselves the Chinese normally use sanitary tissues. Whether this can result in difference in the prevalence of *E. vermicularis* amongst the three groups is yet to be determined.

Currently no method is available to estimate worm load in subjects infected with *E. vermicularis* and swabs with heavier load of eggs do not indicate severity of infection. Ordinarily the migrating *E. vermicularis* and the deposited eggs cause much pruritis in the perineum, nervousness, much discomfort and distress at night resulting in sleeplessness. Apart from this there have been reports from Malaysia and elsewhere of the parasite being found in ectopic sites such as the prostate, pelvic peritoneum, and to cause tubo-ovarian abscess, intraperitoneal granulomas, and unilateral

salpingitis.<sup>7,8,9,10,11,12</sup> Eggs of this worm have been found in vaginal smears.<sup>13,14</sup> Neri et al<sup>8</sup> reported a case of *E.vermicularis* causing granulomatous disease of the pelvic peritoneum causing pelvic adhesions and infertility. Although the presence of this worm in the peritoneal cavity is of no clinical significance it may however be a source of anxiety to surgeons at the time of discovery of the worm and may be confused with other conditions such as tuberculosis, fibromyomas and peritoneal carcinomas.<sup>14</sup>

Reinfection with *E.vermicularis* is major problem. Unless the entire family and all class pupils are treated at the same time the possibility of reinfection by this worm is indeed great. Control can only be achieved by scrupulous personal hygiene and clean environment. We feel that due to the high prevalence of pinworm that exists amongst the young children in Malaysia, greater attention should be given to this infection, especially, in females who are more prone to infections of the genital tract.

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