Prevalence of Intestinal Parasites among Schoolchildren in a Coastal Rural Area of Maragondon, Cavite, Southern Luzon, Philippines

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Abstract. Fresh stool samples were collected from 259 pupils enrolled in Santa Mercedes and Pinagsanhan Elementary Schools in Maragondon, Cavite with the ratio of 2:1. The samples were processed using Formol-ether and Kato-Katz Concentration Techniques and then microscopically examined for the presence of intestinal parasites.

Of the 259 pupils examined from a population of 557 pupils, 217 (83.8%) had one or more parasites. The prevalence of parasites are as follows in decreasing order: Ascaris lumbricoides was the highest (66.4%) followed by hookworms (21.2%), Trichuris trichiura (14.7%), Taenia spp (13.9%), Entamoeba histolytica/dispar (12.7%), Giardia lambila (6.2%) and Strongyloides stercorales (5.8%), and E. vermicularis (2.7%), in that order. The occurrence of various intestinal parasites and high prevalence of Ascaris lumbricoides infection among school children of the two coastal rural areas in Maragondon, Cavite, Southern Luzon, Philippines, necessitates the immediate action of the proper health authorities in the area, coupled with public health education on the prevention of infection with Ascaris lumbricoides. Organization of education seminars including the topics such as prevention of infectious diseases, improving general hygienic conditions and application of supportive programs for the parents must be done not only to reduce intestinal parasitic infections but also to elevate the socio-cultural levels.

Keywords: intestinal parasites, schoolchildren, Maragondon, Cavite, Formol-ether & Kato-katz Concentration Techniques, soil transmitted helminths

INTRODUCTION

Intestinal parasitism is one of the common major diseases in the Philippines [1]. Apart from causing mortality and morbidity, infection with intestinal parasites has been associated with stunting of growth, physical weakness and low educational achievement among school children [2-5]. Furthermore, chronic intestinal parasitism has become the subject of speculation and investigation in relation to the spread and severity of tuberculosis, malaria and other infectious diseases of viral origin, [6-9]. However, the role of intestinal parasites in the pathogenesis of other infectious diseases

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differs from species to species. Similarly, the
distribution and prevalence of various
species of intestinal parasites also differs
from region to region because of several
social, environmental and geographical
factors. Hence, study on the prevalence of
various intestinal parasitic infections is a
prerequisite, not only in the formulation of
appropriate control strategies, but also to
predict risk for communities under
consideration.

Although several parasitological surveys
have been conducted on the distribution and
prevalence of intestinal parasites in the
Philippines [10-12], there are still several
localities for which epidemiological
information is not available. Hence, the
objective of the present study was to assess
the prevalence of intestinal parasitism
among school children in two coastal
elementary schools in Maragondon, Cavite,
Southern Luzon, Philippines, from April to
December, 2005.

EXPERIMENTAL

Study Area and population: A cross-
sectional parasitological survey was
conducted in children enrolled in Santa
Mercedes and Pinagsanhan Elementary
Schools in Maragondon, Cavite, about 250
km south of Manila, Philippines in April,
2005. The two schools are situated at an
altitude of 100 m above sea level. Children
from the two schools were living under similar
poor environmental sanitation and low socio-
economic status. There was no adequate safe
water supply in the areas. The majority of the
inhabitants are fishermen and farmers. They
chiefly earn their living by fishing, cultivation
of rice and rearing of hogs, chicken and cattle.
There is only one clinic, which serves the
communities of the two areas. Malaria is
highly endemic in the area (Figure 1)

Selection of study subjects: At the time of the
study, the overall of the student population
enrolled in the two elementary schools was
557 (363 in Santa Mercedes and 194 in
Pinagsanhan Elementary School). Consent
was first obtained both from the teachers,
parents and pupils. Pupils were then selected
by systematic random sampling based on the
master list of the schools. Accordingly, 259
pupils (170 from Santa Mercedes and 89 from
Pinagsanhan Elementary School) were
selected for the study. Among the selected
pupils, 161 were males and 98 were females,
with ages ranging from 6 to 14 years.

Figure 1. Map of Maragondon, Cavite showing the study areas [13]
Stool sample collection and examination: From each pupil, about 3 g of fresh stool samples were collected using small, clean, disposable plastic containers with cover. A portion of the specimen was processed using Kato-Katz Technique. This technique quantitatively measure the eggs of helminthes and protozoa using dilute NaOH. It uses an exact amount of 1 gram of feces counted in a special slide and multiplied by 100 to obtain the number of eggs per gram of feces [14,15]. Because of time constraint, egg count for hookworm was done on the spot for 75 individuals only, within one hour after stool collection [16].

The Scotch Tape Swab was performed for the detection of *E. vermicularis* eggs. All slides were examined for *Ascaris lumbricoides*, *Trichuris trichiura* and *Hymenolepis nana* a week later in the Pure and Applied Microbiology Laboratory, Thomas Aquinas Research Complex, University of Santo Tomas. Part of the stool samples collected into plastic vials containing 10% formalin was processed by the formol-ether concentration method. Formol-ether Concentration Technique uses 1 gram of feces emulsified with 5% formalin and 2% ether. The mixture is centrifuged and the middle layer between the formalin and ether is decanted as it contains the concentrated cysts of protozoa and eggs of helminthes. This technique gives an accurate account of the number as well as the kinds of parasites that may be present in the particular fecal sample [17].

Ethico-Moral Aspect: The objective of the study was explained to the teachers and pupils at the time of specimen collection. Individuals positive for intestinal helminthes and protozoa were treated with mebendazole and praziquantel under the supervision of the local nurse.

RESULTS AND DISCUSSION

Microscopic stool sample examination showed that infection with various intestinal helminthes and protozoan parasites was common in children from both schools. The prevalence of infection with different intestinal helminthes and protozoan parasites for Santa Mercedes and Pinagsanhan Elementary school children is shown in Figure 2.

*Figure 2.* Prevalence of intestinal parasites in school children from Santa Mercedes and Pinagsanhan, Elementary Schools, Maragondon, Cavite, Philippines.

Legend: Hw - Hookworm; Al - Ascaris lumbricoides; Tt - Trichuris trichiura; Ts - Taenia solium; Ev - Enterobius vermicularis; Hn - Hymenolepis nana; St - Strongyloides spp.; Eh/d - Entamoeba histolytica/dispar; Gl - Giardia lamblia; Ec - Entamoeba coli
Out of 170 stool samples collected from school children in Santa Mercedes, 150 (88.2%) were positive for at least one of the parasites discovered. Similarly, of the 89 stool samples collected from the schoolchildren Pinagsanhan Elementary school children, 67 (75.3%) were positive for at least one parasite. The overall prevalence of at least one intestinal parasitic infection was 83.8% among the study subjects.

Among the intestinal helminthes, *Ascaris lumbricoides*, was found to be the predominant parasite. 72.9 % in Santa Mercedes and 53.9 % in Pinagsanhan. The prevalence of *Trichuris trichiura*, hookworm, *Enterobius vermicularis* and *Taenia spp* was higher in Santa Mercedes than in Pinagsanhan Elementary School (p d’ 0.05).

Non-pathogenic protozoan parasites such as *Entamoeba coli* and *Iodamoeba butschlii* were not found in stool samples from Pinagsanhan. On the other hand, cysts of protozoan parasites such as *Entamoeba histolytica/ dispar* and *Giardia lambia* were found in some of the stool samples collected from both schools. Prevalence of infections with more than one parasite was higher in Santa Mercedes than in Pinagsanhan (Figure 3).

The intensity of infection for *Ascaris lumbricoides*, hookworm and *Trichuris trichiura* is shown in Figure 4. *S. stercorales* larvae were counted from the feces, instead of the eggs, since eggs are not found in the stool. The highest egg count for *Ascaris lumbricoides* was 1440 eggs per gram (epg) of stool in one male student in Santa Mercedes Elementary School and 1200 epg for one male student in Pinagsanhan Elementary School. Figure 5 shows the prevalence by age group of intestinal parasites, *Ascaris lumbricoides*, *Trichuris trichiura* and hookworm in both study areas. The percentage of infection for *Ascaris* and *Trichuris* was high among subjects 7-13 years old.

Epidemiological study on the prevalence of infection of intestinal parasites in different localities/regions is a primary objective to identify high-risk communities and formulate appropriate intervention. In line with this view, the present study attempted to assess the presence of different intestinal parasitic infections in school children in Maragondon, Cavite, Southern Luzon, Philippines. The results of the study showed the occurrence of several intestinal parasites of public health importance among school children in two elementary schools in Maragondon, Cavite, Southern Luzon, Philippines.

The presence of *Ascaris lumbricoides* infection was high in the study children in both schools with an overall prevalence of 66.4 %. This is in agreement with those studies previously reported from different regions of

![Figure 3](image-url)
the Philippines. The high incidence of ascariasis can be inferred from the observations that many residents of the two communities, most of them from the lower income group, contribute to the spread of the parasites by poor hygiene, unsanitary living conditions and improper waste disposal. Further observations showed that toilet facilities are usually inadequate and when present are often unsanitary.

Multiple infections with two or more parasites were noted, *Ascaris*, hookworm and *Trichuris* figuring in a majority of cases. This phenomenon has been mentioned by previous investigators [12,19] and has been attributed to similarities in the requirements for dissemination of the three parasites, all of which are usually transmitted through infected soil. In addition, these parasites are distributed over much wider areas in contrast to other parasites which showed spotty, uneven distribution.

**Figure 4.** Comparative levels of parasitism among schoolchildren in Santa Mercedes and Pinagsanhan Elementary Schools, Maragondon, Cavite, Philippines

**Figure 5.** Comparative prevalence of intestinal parasites by age group among schoolchildren in Santa Mercedes and Pinagsanhan Elementary Schools, Maragondon, Cavite, Philippines
CONCLUSION

The study showed that intestinal parasites were present at varying levels among school children found in Maragondon, Cavite, Southern Luzon, Philippines. This phenomenon is very alarming and calls for an immediate action from the proper health authorities. Treatment of infected individuals, improvement of sanitation and provision of clean water for the residents should be on the top priority. Socio-economic advocacy, together with concern on the health and wellness for every child should be the ultimate goal of the public officials in the communities. Health education programs should be regularly implemented coupled with medical and dental missions as a follow-up to the previous health programs administered. This current work done in 2005 is a part of a continuing health program advocacy geared for the betterment of the people in far and remote communities of the country.

We conclude that organization of education seminars including the topics such as prevention of infectious diseases, improving general hygienic conditions and application of supportive programs for the parents must be done not only to reduce intestinal parasitic infections but also to elevate the socio-cultural levels.

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