INTESTINAL PARASITOSES IN THE KANDY AREA, SRI LANKA

NR de Silva[1], HJ de Silva[2] and VP Priyanka Jayapani[1]

[1]Departments of Parasitology and [2]Medicine, Faculty of Medicine, University of Peradeniya, Sri Lanka

Abstract. The prevalence of intestinal protozoa and geohelminths was assessed among two diverse populations in the Kandy area: adults attending medical outpatients clinics at the Teaching Hospital Peradeniya, and pre-school children in low-cost housing areas within the Kandy Municipality. In addition to a brief history and examination, a fresh stool sample was obtained and examined by direct smears in saline and iodine, and by formol-ether concentration. The children's stool samples were also examined for *Cryptosporidium* by cold Ziehl-Neelsen staining. A total of 192 stool samples from the adult outpatients (101 males, age range 15-82 years, mean 51.4 years) and 354 samples from the pre-school children (age range 1-72 months, mean 30 months) were examined. *Entamoeba histolytica* was not seen in any of the samples; *Giardia* cysts and *Cryptosporidium* oocysts were seen in three and one sample respectively from the pre-school children. The overall prevalence of geohelminth infections was 21.3% among the adults and 24.5% among the children. *Ascaris lumbricoides* was the predominant species in both populations. Comparison of the rate of intestinal parasite infection among 37 adult patients with non-specific abdominal complaints, with the rate among 37 matched controls with no abdominal complaints showed no significant difference (16% and 19% respectively). This suggests that the presence of abdominal pain or diarrhea was unrelated to the presence of intestinal parasites in the adult study population. Although the techniques used were not highly sensitive, the absence of *E. histolytica* probably reflects a true decline in the prevalence of this parasite in Sri Lanka. A sizeable proportion of both children and adults however, still harbor geohelminths, especially *Ascaris*.

INTRODUCTION

Intestinal parasitic infections continue to be of importance in many countries, especially those in the tropics and subtropics, because of their high prevalence and effects on morbidity in the population (WHO, 1981). In Sri Lanka, the baseline studies of the 1950s and 1960s found that intestinal protozoan and geohelminth infections were common causes of morbidity among children and adults (Jayewardene, 1957; Sivalingam, 1961). However, new and effective drugs against intestinal parasites are now available. Therefore, where necessary, the implementation of control programs involving the use of mass chemotherapy (together with other measures such as sanitation and community education), is highly feasible. However, the need for such control measures must first be justified, by the demonstration of high prevalence rates of intestinal parasites, or by the demonstration of significant morbidity caused by these infections. Moreover, prevalence rates of intestinal parasites vary widely from one area of the country to another, from community to community, and with time. Up-to-date estimations of local prevalence rates are thus necessary for provision of efficient health care services aimed at control of these infections. Several studies on geohelminth infections have been carried out in many parts of Sri Lanka more recently (Fernando and Balasuriya, 1976; De Silva and Jayatilleka, 1981; Nageswaran and Sivarajah, 1986; Ismail *et al*, 1989; Wijesundera *et al*, 1993), but few studies have reported on protozoan infections (Nageswaran and Sivarajah, 1986; Mertens *et al*, 1990; Wijesundera *et al*, 1993), and those too, only in children.

We report the prevalence of intestinal parasites in two diverse populations in and around Kandy (the capital of the Central Province of Sri Lanka): adults attending medical out patient clinics at the Teaching Hospital Peradeniya and pre-school children living in low-cost housing within the Kandy Municipal Council area. We also examined the relationship between intestinal parasitic infections and the presence of abdominal complaints in the adult population, as it is common clinical practice in many tropical countries to treat non-specific abdominal pain and/or chronic diarrhoea with anti-parasitic agents, without stool microscopy.

Correspondence: Dr NR de Silva, Department of Parasitology, Faculty of Medicine, University of Kelaniya, PO Box 6, Talagolla Road, Ragama, Sri Lanka.

MATERIALS AND METHODS

Study populations

Adults: All patients attending two medical out patient clinics (one general and one special gastroenterological) at the Teaching Hospital Peradeniya (which is located about 5 km outside Kandy, and is the hospital of the Medical Faculty, University of Peradeniya) between October 1992 and July 1993 were eligible for recruitment to the study, irrespective of the presence or absence of abdominal symptoms. After a brief history was taken from the patient by a medical officer and a clinical examination was carried out, the findings were recorded on a data sheet. The patient was given a labeled container with a spoon and lid and asked to bring a sample of stools next time he/she visited the clinic. Initially each patient was asked to bring two stool samples, but as compliance was very poor (<10%), the study was confined to the examination of a single sample.

Pre-school children: A door-to-door survey was carried out during the same time period in the Mahaiyyawa Model Tenements and Municipal Council Lines which lie within the Kandy Municipal Council limits. This is an area of 4-5 acres in extent and contains about 700-800 low cost housing units and many un-authorized temporary structures. The water supply is through a mains system including roadside taps and tanks for public use, provided by the Municipal Coun-cil. Water-sealed pour-flush latrines have been con- structed by the Municipal Council. Each latrine in the Model Tenements is shared by 2-3 families. In the Municipal Council Lines, however, there are only about 80 latrines for the use of about 6,000 individuals. As a result, many of the inhabitants, especially the children, do not use these latrines, but defecate into the open sewers.

Following the door-to door survey, all pre-school children were identified and the mothers (or principal caretaker in the absence of the mother) were given a labeled container with spoon and lid and asked to provide a sample from the child's stools the following day. These samples were collected from each house and taken back to the laboratory for examination. These two populations were selected mainly for reasons of accessibility.

Examination of stool samples

All samples were examined on the same day that they were collected, by direct smears in saline and iodine, and by formol-ether concentration, followed by staining with Lugol's iodine. The children's stool samples were also examined for *Cryptosporidium* oocysts: air-dried smears were fixed in formalin and stained with cold Ziehl-Neelsen stain and examined under oil immersion. All those found positive for pathogenic protozoa and geohelminths were given appropriate chemotherapy.

RESULTS

Prevalence rates in the adult population

Four hundred and ten patients were recruited to the study; 192 brought stool samples for examination (46% compliance). Of the 192, 101 were males (male: female ratio 1 : 0.9). Their ages ranged from 15 to 82 years (mean 51.4 years, SD 15.8). Abdominal complaints such as pain or diarrhea were seen in 55 (28.6%). Neither cysts nor trophozoites of *E. histolytica* or *Giardia lamblia* were found in any of these stool samples (*ie* prevalence < 0.5%). However, cysts of other non-pathogenic intestinal protozoa were seen (Table 1), as were ova of *Ascaris lumbricoides, Trichuris trichiura* and hookworm (Table 2).

Prevalence rates among pre-school children

Four hundred and forty children were recruited; stool samples were obtained from 354 (80% compliance). The ages of the 354 children ranged from 1-72 months (mean 30, SD 18). The male: female ratio was 1 : 1.17. Forty-eight of these children (13.5%) had occasional diarrhea or abdominal pain. In this population too, neither cysts nor trophozoites of *E. histolytica* were seen (*ie* the prevalence is < 0.3%) but 3 samples were positive for *Giardia* cysts (0.8% prevalence) and one for *Cryptosporidium* oocysts (0.3% prevalence). All 3 children with *Giardia* were asymptomatic, but the child with *Cryptosporidium* had a mild, chronic, watery diarrhea of about one month's duration. As in the adult population, cysts of other non-pathogenic protozoa and geohelminth ova were seen (Tables 1, 2).

Geohelminth infection and abdominal complaints in adults

We attempted to assess a possible association between the presence of intestinal parasites and chronic abdominal symptoms in the adult population in the

Table 1

Prevalence of intestinal protozoa in the adult and pre-school populations.

Protozoa	Pre-school children (n = 354) no.+ve (% prevalence)		Adult population (n = 192) no.+ve (% prevalence)	
Entamoeba histolytica	0	(< 0.3)	0	(< 0.5)
Giardia lamblia	3	(0.8)	0	(< 0.5)
Cryptosporidium	1	(0.3)	NE	
Entamoeba coli	4	(1.1)	2	(1.0)
Endolimax nana	2	(0.5)	3	(1.6)
Iodamoeba butschlii	2	(0.5)	1	(0.5)

NE - not examined

Table 2

Prevalence of geohelminths among pre-school and adult populations.

Geohelminth	Pre-school children (n = 354) no.+ve (% prevalence)		Adult population (n = 192) no.+ve (% prevalence)	
Ascaris lumbricoides	77	(21.7)	23	(11.9)
Trichuris trichiura	23	(06.5)	09	(04.7)
Hookworm	05	(01.5)	13	(06.7)
Mixed infections (*Ascaris* and *Trichuris* and/or hookworm)	16	(04.5)	03	(01.5)
Total infected with geohelminths	87	(24.5)	41	(21.3)

following manner. From within the population of patients whose stools were examined, 37 individuals (22 males and 15 females, mean age 44 years, range 18 - 72 years) who had non-specific lower abdominal pain and/or diarrhea of at least one month's duration were matched with 37 others of comparable sex, age, race and social class based on occupation (Barker and Hall, 1991), who had no abdominal symptoms. None had symptoms suggestive of urinary tract or gynecological disease. The clinical examination in all these patients was normal. Where indicated, subsequent investigations (including radiology and endoscopy) excluded other bowel pathology, especially inflammatory bowel disease and colonic neoplasms. Comparison of the 2 groups showed that 6 (16%) of those with abdominal symptoms and 7 (19%) of those without abdominal complaints were positive for intestinal parasites (all geohelminths). The difference was not statistically significant (Fisher's exact test).

DISCUSSION

The absence of *E. histolytica* in both adult and pre-school populations was unexpected. This may reflect a true decline in the prevalence of the organism in the Kandy area, or it may be that the methods used for the detection of cysts were not sensitive enough. It is well known that examination of 3 or more stool samples maximizes cyst detection rates, but for reasons of compliance and logistics, the results of many studies are based on examination of a single stool sample (Gathiram and Jackson, 1985; Allason-Jones *et al*, 1986). In our study, the compliance rate for providing even a single sample was 46% for the hospital based adult population. The 80% compliance in the pre-school population was only obtained through repeated visits to each home to collect the stool sample. Within the constraints of examining only a single sample, however, formol-ether concentration optimises sensitivity by increasing the rate of cyst detection by 40-50% above that found by direct smear alone (Walsh, 1986).

E. histolytica was not found in 2 other community-based studies of intestinal parasites in children carried out in Sri Lanka within the last 10 years: the first, a survey of under-5s in an underprivileged sector of the Jaffna Municipality in 1986 (Nageswaran and Sivarajah, 1986) and the second a survey of schoolchildren in Mahaweli System C (a new irrigation project in the North East of Sri Lanka), done between 1987 and 1989 (Wijesundera *et al*, 1993). Although no concentration techniques were used in the latter study, formol-ether concentration was used in the Jaffna study.

On the other hand, the one study in which *E. histolytica* was detected in the recent past was hospital-based, and the stool samples were from children brought with diarrhea to the General Hospital, Kurunegala, in North Western Sri Lanka (Mertens *et al*, 1990). Even in this study, the prevalence was low (0.7%) when compared with the rates found in studies done before 1960; Sivalingam (1961) found that 22% of a general population of adults and children examined between 1946 and 1952 harbored *E. histolytica*. Our findings may, therefore, reflect a true decline in the incidence of *E. histolytica* in Sri Lanka.

Giardia cysts were found in 0.8% of the stool samples from pre-school children of the Mahaiyyawa area. This is much lower than that found in both the Mahaweli System C study (8-10%) (Wijesundera *et al*, 1992) and the Jaffna study (17%) (Nageswaran and Sivarajah, 1986). This disparity may possibly be due to the fact that, though the general sanitation in the Mahaiyyawa community was extremely low, the water used for domestic consumption was purified water from the mains supply, whereas in the Mahaweli area for example, the water was from untreated surface sources. A low prevalence was also reported from Kurunegala (Mertens *et al*, 1990) where < 2% of diarrheal stool samples were positive for *Giardia*. It would appear that giardiasis is still endemic among children in Sri Lanka, although the prevalence rates may vary from one part of the country to another.

In contrast to the very low prevalence of pathogenic intestinal protozoa, a sizable proportion of both adults and children (21.3% and 24.5% respectively) harbored geohelminths, especially roundworm, despite easy availability of anthelmintics. The prevalence rate in the pre-school children, when taken together with the unsanitary conditions in which they live, and the fact that both roundworm and whipworm infections are undeniably associated with growth retardation (Savioli, 1992; Crompton, 1992; Hall, 1993), is a strong indication for selected mass chemotherapy in that community.

In the adult population, however, from the crude comparison of the rates of parasitic infections among those with abdominal complaints and those without, it appears that the presence of geohelminth infection is not significantly related to the occurrence of lower abdominal pain and/or diarrhea. We suggest therefore that the use of anti-parasitic agents (both antiprotozoals and anthelmintics) in adults in the Kandy area without proof of infection (through stool microscopy) is inappropriate, and may actually delay investigation and identification of the actual etiology of the abdominal complaints.

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