

The Ethiopian Journal of Health Development

Original article

Intestinal helminthic infection among children at Lake Awassa Area, South Ethiopia

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Ethiop. J. Health Dev. 2001(1);15:31-38

Abstract

Background: The habit of raw fish eating is common among fishermen and people around lakes. Thus periodic assessment to determine fish tapeworm and helminthic infection is important.

Objective: To determine the presence of fish tape worm and other helminthic parasites.

Methods: A cross sectional coproparasitologic study was conducted during the month of November, 1998 among 150 children under the age of 15 engaged in fishing, and fish processing in Awassa Southern Ethiopia. All study subjects were screened for fish tape worm and other intestinal helminthic infections. Stool samples were examined microscopically using direct smear, Formol ether concentration and Zinc Sulphate flotation techniques. **Results:** The over all prevalence for at least one helminthic infection was 92.7%. The most prevalent parasites were *A.lumbricoides* (76%), Hook worm species (62.5%) *T.trichuria* (60%) and *S.mansoni* (33%). Three cases of Hetrophid infections transmitted by eating raw fish were also recorded.

Conclusion: The public health implication of intestinal parasites among the study groups is discussed and necessary recommendations are suggested. [*Ethiop. J. Health Dev.* 2001;15(1):31-37]

Introduction

Infections due to intestinal parasites are common through out the tropics, posing serious public health problems in developing countries (1-3). In these parts of the world the high prevalence rate of intestinal parasite is attributed largely to socio-economic status, poor sanitation, inadequate medical care and absence of safe drinking water supplies (2,3). According to the World Health Organization (WHO) estimate, globally there are 800 - 1000 million cases of Ascariasis, 700 - 900 million of Hook Worm infection, 500 millions of Tricuriasis , 200 million of Giardiasis and 500 million of Entameba histolytica (4) . Among the intestinal parasite infections, helminthic infections are the most common (4). According to the WHO comment, the level of helminthic infections can be viewed as an index of a community's progress towards a desirable level of sanitation (5). The low economic standard, poor sanitation and ignorance of simple health promotion practices favour the wide distribution of intestinal helminths in Ethiopia (6). Of all types of diseases in our country, helminthiasis is the second most common cause of out patient morbidity next to malaria (7). Several studies in the country have also revealed that intestinal parasite infections are widely distributed with high prevalence rates (6, 8 ,9). Children are the most affected group and serve both as source of infection and as victims, thus contributing to transmission of most parasitic infections with in the community (4,10,11).

A major effect of intestinal parasites on the host is that they may reduce host resistance to other disease causing agents. *Diphylobothrium latum* is typically a parasite of human being, which has worldwide distribution, mainly prevalent in cold lake regions where raw or undercooked fresh water fish is eaten (5,12,13). According to the recent estimate, more than 9 million people are infected worldwide (5). Children appear to be more susceptible than adults (8). Unsanitary sewage disposal, the

habit of eating raw or semi-raw fish and the practice of allowing untreated infected sewage to drain in fresh water lakes are responsible for the establishment and maintenance of the parasite (11,14).

Surveys conducted in some developing countries revealed the presence of *D.latum* among people having the habit of eating raw fresh water fish (15-17). In Africa the parasite was reported from Uganda (8, 11). There is no report on the presence of *D.latum* in Ethiopia (6,8) despite the presence of the habit of eating raw fish. This might be due to the fact that different lakes in Ethiopia have not been studied thoroughly for the presence of the parasite or the fishes in the lakes are not infected. There is one study conducted on 500 inhabitants in the islands of lake Zway (18) and the result revealed that none of them were detected to have eggs of *D.latum*.

Though, several surveys have been conducted on the prevalence of intestinal helminthiasis in Ethiopia, no significant study have been made regarding diphylobothriasis and the other intestinal helminthic infections in Awassa in general and among the inhabitants of Awassa lake in particular. The Awassa Health Center reports helminthiasis as one of the major health problems in 1998(19).

Majority of children living around Lake Awassa are involved in fishing activity, eat raw fish, swim in the lake which is known to be polluted with cercaria of schistosoma (6) and defecate in the open field which contributes to the wide distribution of intestinal parasites. Due to these peculiar habits of the children, therefore diseases related to the above risk behaviors as diphylobothriasis, schistosomiasis and other intestinal helminthic infections are expected to prevail.

The study was conducted to determine the presence of fish tapeworm and the magnitude of other intestinal helminthic parasites and their public health importance. The study was conducted in around Lake Awassa, which is a rift valley lake found 275 kms South of Addis Ababa, in Sidama zone of Southern Ethiopia. Around the lake small-scale business activities related to fishing and catering services are carried out by the local people.

Methods

This descriptive cross-sectional study was conducted during the month of November 1998. It consisted of copro-parasitologic studies and questionnaires. All children under the age of 15 years involved in fishing and fish processing activity during the study period around the lake were identified and enrolled in the study.

A pretest was performed one week prior to the main study on 17 randomly selected children. The importance of the study was clarified one day prior to the beginning of data collection to all children in the study population. The value of having their stools examined and the methods of collecting specimens were also thoroughly made clear. They were provided with labeled clean stool cups containing 10ml of 10% formalin, toilet tissue paper and clean pieces of applicator sticks with the request for fresh morning specimens in the next day. The toilet paper was intended to be used to defecating directly on it in order to avoid contamination of feces. Every child was instructed to bring his own stool so that no mixing up occurs. On delivery of the stool specimen, each child was interviewed using a uniform questionnaire.

Stool examination was done using direct smear, Formol- Ether concentration and Zinc sulfate flotation techniques. Since these three methods have their own scope of detecting parasites (11), each stool specimen was treated with these methods to maximize the possibility of detecting the parasites. Positive samples containing Heterophid ova, *D. latum* ova and Heterophid transmitting snails (*Pirenella conica* and *Melania tuberculata*) were confirmed by the referral laboratory of Jimma Institute of Health Sciences (JIHS).

Results

A total of 150 children were involved in the study. All children were males, no female was involved in fishing and fish processing activity during the current study. Most of the children were aged 10-15 years 83 (55.3%) and the remaining 67 (44.7%) were between 5-9 years. The overall prevalence rate of intestinal helminthic infection was 92.7% [139 out of 150] (Table 1). Out of the 9 parasite species identified, the predominant parasites were *A. lumbricoides* 107 (76.9%), Hook worm species 87 (62.7%), *T. trichuria* 84 (60%) and *S. mansoni* 46 (33%). (Table 2). In this study three cases of heterophid infections were identified for the first time in Ethiopia. Heterophid transmitting snails were also collected from the Awasa lake which are *Prinella conica* and *Melania tuberculata*. No case of *D. latum* was detected. Out of 139 children found infected, 23 (16.7%) were infected with a single parasite, 79 (56.8%) with two parasites, 38 (27.3%) with three parasites and 36 (25.8%) with four and more parasites.

Discussion

The overall prevalence of intestinal helminthic parasites reported in this study (92.7%) is relatively high compared to that reported by Asefa et al (20) and Dagne et al (9) which were 43.3% and 61%, respectively. However, the prevalence rate is almost similar to that reported from Wondo-Genet-Zuria district, Southern Ethiopia which was 89.4% (4). The relative high prevalence rate observed in this study might be due to the favorable climatic and environmental conditions of the area for intestinal parasites and partly due to the methods employed for stool examination.

A. lumbricoides was found to be the predominant helminthic parasite (76.9%). This result is comparable to the 75.2% prevalence reported by Roma et al (4) and 77.7% reported by Erko et al (2). The next highly prevalent parasite in this study was hookworm (62.5%). Prevalence rates of 20%, 17% and 67% were reported (4,22,23) in different studies conducted in Ethiopia. The two hookworm species; *A. doudenale* and *N. americanus* are known to exist at varying levels in different geographical localities of the country (21). It is expected that both species are present in Awassa but the parasite identified was not differentiated into species because it is impossible to differentiate the species of hookworm only on the basis of egg morphology (2) without stool culture technique.

Prevalence rate of *T. trichuria* was 60% in this study. Previous studies on *T. trichuria* in Zway islands and Delo Awraja have also reported a high rate of infection (18, 23). The co-existence of *A. lumbricoides* and *T. trichuria* may indicate that they need similar environmental condition for their lifecycle development (2). Although it was also expected to observe the co-existence of Hookworm species and *S. stercoralis*, in this study we found a low prevalence of *S. stercoralis* (2.8%) compared to Hookworm species (62.5%).

As the majority of people in the area have frequent water contact for different activities such as washing, swimming, and drinking, *S. mansoni* infection was common. The high prevalence recorded in this study concurs with those reported elsewhere in Ethiopia (4,24,25). In this study the infection rate was high among 10-14 years old children. This is probably due to the increased water contact time due to swimming, bathing or their engagement in fishing activities (20,26,27).

In considering the impact of parasites on human health, *A. lumbricoides* seriously impairs the mental and physical development of children, Hookworm species and schistosoma cause iron deficiency anemia both in adults and children (11,14,22). The high prevalence rate of these parasites reported in the present study should get emphasis in relation to the effect they impose on children.

In this small commercial fishing area of Awassa Fishermen Association, poor sanitation such as open field defecation, unclean water source (the lake) and low economic standard of the people are probably important causes for the high prevalence rate of helminthic infections noted.

The prevalence of *Hymenolopis nana* reported in the present study was 14 (10%). In previous studies, prevalence rates of 2.2%, 3% and 3.5% were reported (9,18,28). Only one case infected with *H. diminuta* was found in the present study.

The prevalence rate of *S. stercoralis* in the present study (2.8%) was relatively low as compared to the finding reported by Tesfa Yohannes et al (18) which was 13.8% but almost comparable to results from Ziway Health Center (2.2%) and small villages near Lake Tana (2.1%) (28,9). If the Bermans method (20) of detection for the parasite had been employed, the prevalence of this parasite would have been increased.

E. vermicularis was not detected in this survey. This is probably because perianal swabbing which is the ideal method of detection (14) was not used. Studies conducted so far in Ethiopia reported low prevalence rates of *E. vermicularis* possibly due to the failure of the routine stool examination method to detect the eggs of the parasite (18). Using such routine stool examination method, prevalence rates of up to 1% were reported in Ethiopia (2,20).

Low prevalence rate of *Taenia* worms (1.4%) was reported in the present survey. Prevalence rates of 2.5%, 2% and 7% have been reported from different parts of the county (2,18,28). Since children enrolled in the study were under 15 years, high prevalence rates of *Taenia* worms are not expected, because eating raw meat is commonly a habit practiced mainly by adults in Ethiopia.

Although a single case of *D. latum* egg was identified in the preliminary study no *D. latum* egg was reported in this study despite the fact that majority of the children are engaged in fishing and fish processing activities, and are eating raw fish. Similar observations were reported from Ziway islands (18). The single egg that was detected in the preliminary study was an operculated egg, light golden yellow in color and similar size with that of *D. latum* egg. The egg was compared and confirmed with reference slides used for teaching purpose in JIHS by senior professor of Medical Parasitology. However to be more reliable it is necessary to deworm the patient to obtain any detached proglottides or expelled worms to study further characteristics of the parasite. Three cases that were infected with trematode Hetrophid eggs were identified. The Hetrophid parasites can not be identified to the species level on the basis of egg morphology since all Hetrophid parasite eggs look morphologically similar. The Hetrophids are small or minute intestinal parasites transmitted by eating raw fishes infected by cercaria of the parasite (11). The detection of one case of *D. latum* in the preliminary study and the detection of three cases of Hetrophid infections in the main study should alert the public health sector. It also warrants further study.

In conclusion, the study revealed the presence of fish transmitted helminthic infection among the study group. Moreover, the high parasite prevalence rate observed in this study supports the idea that children are the most affected groups in the community and they also serve as sources of infection and therefore responsible for parasite transmission in the community at large and calls for immediate measures. It is therefore suggested that intervention measures have to be adopted to reduce intestinal helminthic infection among children and the community. This may include: improving sanitation and personal hygiene through continuous health education, mass deworming and periodic treatment of the children. Further studies are required focusing on the problem of fish transmitted parasites.

Acknowledgments

We would like to extend our sincere gratitude to Jimma Institute of Health Sciences and Southern Nation, Nationalities and Peoples Regional Health Bureau for providing financial support and working environment, respectively. The valuable contributions from the staff of JIHS, particularly that of Dr. Mekonen Assefa, Dr. Tadele Bogale, Ato Tesfaye Bekele, and from EHNRI Ato Mulugeta Gelaw are highly acknowledged. We also thank deeply those children who took part in this study and the staff of the CHRL for their co-operation throughout the study.

Tables

Table 1: Prevalence of intestinal helminthes, Awassa Fishermen Association, 1998

Stool examination	Number	Percent
Positive	139	92.7
Negative	11	7.3
Total	150	100.0

Table 2: Distribution of different parasites by age, Awassa Fishermen Association, 1998

Parasite Type	Age category in years										
	5-9 (n=64)		10-14 (n=75)		Total (n=139)						
	No	%	No	%	No	%					
A. lumbricoides	21	15.0	86	61.8	107	76.9	Hook worm species	16			
	11.5	71	51.0	87	62.5	T. trichuria	18	12.9	66	47.0	84
	60.0										
S. mansoni	7	5.0	39	28.0	46	33.0					
H. nana	2	1.4	12	8.6	14	10.0					
H. diminuta	-	-	1	0.7	1	0.7					
S. stercoralis	1	0.7	3	2.1	4	2.8					
Hetrophid	-	-	3	2.1	3	2.1					
Taenia Species			1	0.7	11	0.7			2		1.4

Figures

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