Original article

Intestinal parasitic infections among under-five children and maternal awareness about the infections in Shesha Kekele, Wondo Genet, Southern Ethiopia

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Abstract

Background: Few studies have reported the magnitude of intestinal parasitic infections among under-five children in tropical countries. Moreover, there is little information on maternal awareness about intestinal parasitosis.

Objective: To determine the prevalence of intestinal parasitosis among under-five children, and assess maternal awareness about it in Shesha Kebkele, Wondo Genet, Southern Ethiopia.

Methods: A cross-sectional study involving 288 under-five children was conducted and stool samples were collected and examined for intestinal parasites using Kato-Katz and formol-ether concentration methods. In addition, a total of 130 mothers of under-five children were interviewed regarding their awareness about intestinal parasitic infections.

Results: Of the 288 children, 245 (85.1%) were found infected with one or more intestinal parasites. The prevalence of *Trichuris trichiura*, *Schistosoma mansoni* and *Ascaris lumbricoides*, hookworm, and *Hymenolepis nana* infections as determined by Kato-Katz were 74.7%, 37.2%, 25.7%, 5.9%, and 4.5%, respectively. On the other hand, the prevalence of *Strongyloides stercoralis*, *Giardia lamblia*, *Entamoeba histolytica/dispar*, and *Entamoeba coli* infections as determined by formol-ether concentration method were 0.69%, 13.2%, 0.35%, and 2.1%, respectively. Most mothers were reasonably aware of the mode of transmission of ascariasis, amoebiasis and giardiasis while they had very limited knowledge of bilharzia and hookworm transmission. Almost all of the respondents reported that infections with intestinal parasites could cause retardation of growth and death in children unless treated.

Conclusion: Intestinal parasitic infections were prevalent in varying magnitude among under-five children in Wondo Genet area, Southern Ethiopia. Mothers in the study area had a fairly good knowledge of the impact of infections but limited knowledge of the mode of transmission of intestinal parasitic infections. Improvement of sanitation and health education are required besides preventive chemotherapy to control worms (except for schistosomiasis in under-five which need treatment on an individual basis) and other intestinal parasitic infections in the area. (*Ethiop. J. Health Dev.* 2010;24(3):185-190)

Introduction

Intestinal parasitic infections are among the major public health and socio-economic concerns that adversely affect the well-being of the poor in developing countries. It has been estimated that *Ascaris lumbricoides*, hookworm and *Trichuris trichiura* infect 1,450 million, 1,300 million and 1,050 million people worldwide, respectively, while schistosomiasis affects over 200 million people (1). *Entamoeba histolytica* and *Giardia lamblia* are also estimated to infect about 60 million and 200 million people worldwide, respectively (2).

In children, intestinal parasitic infections, particularly soil-transmitted helminthiasis is the cause of common health problems in tropical countries. Younger children are predisposed to heavy infections with intestinal parasites since their immune systems are not yet fully developed (3), and they also habitually play in faecally contaminated soil. In addition to considerable mortality and morbidity, infection with intestinal helminths has been found to profoundly affect a child's mental development, growth and physical fitness while also predisposing children to other infectious agents (4-8).

Several factors like climatic conditions, poor sanitation, unsafe drinking water, and lack of toilet facilities are the main contributors to the high prevalence of intestinal parasites in the tropical and sub-tropical countries (9). Further, lack of awareness about mode of transmission of parasitic infections increases the risk of infection. Hence, a better understanding of the above factors, as well as how social, cultural, behavioral and community awareness affect the epidemiology and control of intestinal parasites may help to design effective control strategies of these diseases (10, 11).

Most of the previous studies conducted in Ethiopia have focused on the prevalence and distribution of intestinal parasitic infections mainly among school children (12 - 16). Only few studies have reported the magnitude of intestinal parasitic infections among under-five children (17-19). Furthermore, there is limited information on the

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basic awareness of communities about the cause, transmission, and infection prevention in Ethiopia. Therefore, this study was designed to assess the prevalence of intestinal parasitic infections among under-five children, as well as the level of mothers' awareness about the cause, effect, mode of transmission, and preventive methods of intestinal parasitic infections in a village in Shesha Kekele, Wondo Genet, in Southern Ethiopia.

Methods

Study area and population: In June 2007, a cross-sectional study was carried out on the prevalence of intestinal parasitic infections among children aged 6 months to five years and maternal awareness about intestinal parasites. Shesha Kekele is located 270 km south of Addis Ababa in Wondo Genet at an altitude of about 1800 m above sea level. Sidama, Hadiya, Wolayita and Oromo ethnic groups are the main inhabitants in the area. Most of the inhabitants earn their living as farmers practicing settled mixed agriculture. Enset (*Ensete ventricosum*) and maize are the principal food crops. Sugar cane and chat (*Catha edulis*) are the principal cash crops produced using traditional irrigation methods. Soil-transmitted helminthiasis and intestinal schistosomiasis are known to be highly prevalent in the area (15). The study population included all mothers who had under-five children. Accordingly, 130 mothers and 288 children (6 months to 5 years) found in the area in June 2007, participated in the study.

Stool sample collection and examination: Before collecting the stool samples, the aim of the study was explained to the leaders of the peasant association and permission was obtained. Next, mothers were informed to bring their under-five children (6 months to 5 years) to a central place for examination of intestinal parasitic infections. After explaining the aim of the study to the mothers, a clean piece of plastic sheet was distributed to each volunteer mother and instructed to provide about 2g of fresh stool sample from their. A portion of the sample was processed by Kato method using a template delivering a plug of 41.7 mg of stool (20) and the remaining was placed in vials containing 10% formalin. Samples processed by Kato were qualitatively examined on the spot for hookworm ova and other intestinal helminthic infections. Quantitative examination of the Kato-Katz slides for helminthiasis (except for hookworms) was done in the laboratory within one week of stool collection. Stool specimens placed in vials were also qualitatively examined in the laboratory for strongyloidiasis and protozoan parasites by the formol-ether concentration method.

Assessment of maternal awareness: Volunteer mothers who brought their children for examination were interviewed about the source of intestinal parasitic infection, mode of transmission, symptoms, and the effects of helminth infection on the children's health and preventive methods of some of the common intestinal parasites in the area. Each mother was interviewed in local language using open-ended questions by data the collectors selected from the study areas under the supervision of the research team.

Data analysis: The prevalence of parasitic infections was expressed in percentages and the classes of intensity of infection as light, moderate and heavy based on the egg count per gram of stool (1). The level of maternal awareness was expressed as percentage for different categories of determinants and presented in table.

Ethical considerations: The study obtained ethical clearance from the Ethical Clearance Committee of the Aklilu Lemma Institute of Pathobiology. At the end of the study, infected children were appropriately treated, while mothers were given health education about the transmission of intestinal parasites, the symptoms of infection and how to minimize and prevent infection of their children.

Results

Prevalence of intestinal parasitic infections: A total of 288 children [(148 (51.3%) females and 140 (48.6.0%) males] aged 6 to 5 months (median age: 45 months) were examined for intestinal parasitic infections (data not shown). Of those, 245 (85.1%) children were found to be infected with one or more intestinal parasites. The prevalence of *T. trichiura*, *S. mansoni*, *A. lumbricoides*, *Hymenolepis nana*, and hookworm infections as determined by Kato-Katz method were 74.7%, 37.2%, 25.7%, 4.5%, and 5.9%, respectively (Table 1). The prevalence of *Strongyloides stercoralis*, *Giardia lamblia*, *Entamoeba histolytica/dispar* and *Entamoeba coli* infections among children as determined by formol-ether concentration method were 13.2%, 0.35%, and 2.1%, respectively.

Table 1 presents the percentage of children infected with soil-transmitted helminths. Generally, the prevalence of infections with intestinal parasites tended to increase with age.

Of the 245 infected children, 34.5%, 33.3% and 23.2% had single, double and multiple parasitic infections, respectively (data not shown). The majority of the children were found to harbor light to moderate infections for *T. trichiura*, *S. mansoni*, *and A. lumbricoides* (Table 2). Although examination for hookworm was done by Kato-Katz method within one hour of preparation, classes of intensity were not determined, but noted as only the presence or absence of infection.

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Table 1: **Prevalence of intestinal parasitic infections by age groups among children in Shesha Kekele Village, Wondo Genet, Southern Ethiopia, June 2007**

Parasite species	Age group (in years)				
	1 (n=13)	2 (n=43)	3 (n=53)	4 (n=74)	5 (n=105)
T. trichiura	2 (15.4%)	28 (65.1%)	41 (77.4%)	59 (80.0%)	85 (81.0%)
S. mansoni	0 (0%)	6 (14.0%)	12 (2.6%)	33 (45.0%)	56 (53.3%)
A. lumbricoides	1 (7.7%)	6 (14.0%)	16 (30.2%)	16 (21.6%)	35 (38.7%)
H. nana	0 (0%)	0 (7.0%)	1 1.9%)	4 (5.4%)	8 (7.6%)
Hookworms	0 (0%)	4 (9.3%)	3 (5.7%)	4 (5.4%)	6 (5.7%)
*G. lamblia***	2 (14.3%)	11 (25.6%)	12 (22.2%)	22 (29.3%)	20 (18.9%)
Others**	0 (0%)	1 (2.3%)	2 (3.8%)	3 (4.1%)	8 (7.6%)

* Examined by formol-ether concentration (FEC).
** Others examined by FEC include *S. stercoralis*, *E.histolytica/dispar* and *E. coli.*

Table 2: **Intensity of helminthic infections among under-five children in Shesha Kekele Village, Wondo Genet, Southern Ethiopia, June 2007**

Helminth species	Intensity of infections		
	Light	Moderate	Heavy
S. mansoni	53/102 (52.0%)	34/102(33.3%)	15/102(14.7%)
A. lumbricoides	30/65 (46.2%)	31/65 (47.7%)	4/65 (6.2%)
T. trichiura	170/205 (82.9%)	31/205 (15.1%)	2/205 (1.0%)

Table 3: **Knowledge of mothers about intestinal parasitic infections in Shesha Kekele Village, Wondo Genet, Southern Ethiopia, June 2007**

Variables	Number of respondents (%), n= 130
Do you know how a child gets infection with intestinal parasites?	
Yes	116 (89.2%)
No	14 (10.8%)
How do children get ascariasis?	
Chewing sugar cane	45 (38.8%)
Eating contaminated food	27 (23.3%)
Drinking dirty water	23 (19.8%)
Eating enset, uncooked cabbage	23 (19.8%)
Eating sweet food, potato, raw milk, evil eye	42 (36.2 %)
Do not know	12 (10.3%)
How do children get hookworm?	
Drinking dirty water	6 (5.2%)
Other	4 (3.4%)
Do not know	110 (94.8%)
How do children get bilharzia (schistosomiasis)?	
Drinking dirty/river water	19 (16.4%)
Washing in river water	8 (6.9%)
Others (bad air, contaminated food, poor sanitation)	13 (11.2%)
Do not know	82 (70.7%)
How do children get amoebiasis?	
Eating uncooked cabbage, red/green pepper	45 (38.8%)
Drinking dirty water	22 (19.0%)
Eating contaminated food	10 (8.6%)
Others like eating tomato, potato, sugar cane and lack of food	42 (36.2%)
Do not know	21 (18.1%)
How do children get giardiasis?	
Drinking dirty/river water	67 (57.8%)
Others like contaminated food, lack of food and poor sanitation	19 (16 .3 %)
Do not know	37 (31.9%)

Maternal awareness: A total of 130 mothers (aged 18-60 years, mean age 29.7) were interviewed about intestinal parasitic infections. The majority of the participants were farmers (86.9%), Christians (91.5%) and illiterate (55.4%). Ethnicity wise, 30.8%, 24.6%, 13.1% and 31.5% of the participants were from Oromo, Sidama, Wolayta and others, respectively.

Results of the questionnaire survey showed that the majority of the mothers were reasonably aware about transmission of ascariasis, amoebiasis and giardiasis (Table 3). When asked specific questions such as how a child gets ascariasis, 38.8% of the mothers associated the cause with eating sugar cane, while others mentioned various causes like eating contaminated food, drinking

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dirty water, and eating uncooked cabbage. Consumption of uncooked cabbage or red/green pepper was suggested by the mothers (38.8%) as a major cause of amoebiasis in children, though others mentioned drinking dirty water, eating contaminated food or consuming tomato and potato as the cause of amoebiasis. Most of the mothers (57.8%) responded that unclean water is the cause of giardiasis. 70.7% and 94.8% of the mothers responded that they do not know how children get bilharzia and hookworm infections, respectively.

Regarding the symptoms of intestinal parasitic infections, almost all the mothers suggested one or more symptoms like diarrhea (50.8%), vomiting (39.2%), loss of appetite (36.9%), abdominal discomfort (35.3%) and an enlarged abdomen (30%). They also responded that infection with intestinal parasites could cause growth retardation, thinness, weakness, and child death.

Discussion

In this study, the prevalence of both intestinal helminthic and protozoan infections among children aged 6 months to five years was determined in Shesha Kekele Village in Wondo Genet, Southern Ethiopia. The results of the study revealed the presence of various intestinal parasitic infections in varying degrees among under-five children. Among helminthiasis, trichuriasis was the most prevalent infection, followed by intestinal schistosomiasis and ascariasis, whereas giardiasis was the leading infection among protozoan infections. The high prevalence of trichuriasis observed in this study was comparable to the results of previous community-based studies in the same area (15). However, in contrast to a previous study conducted in other intestinal schistosomiasis endemic areas of Ethiopia (18), the present study revealed high prevalence of *Schistosoma mansoni* infection among under-five children. The trend of infections with the different parasites was found to increase with age, in agreement with the observation among under-five children in Kenya (21).

Heavy infections with *T. trichiura, Schistosoma mansoni, A. lumbricoides* and *G. lamblia* are known to affect childhood health. Previous studies have revealed that moderate to heavy infection with *T. trichiura* could result in chronic dysentery commonly known as *Trichuris* dysentery syndrome (TDS), rectal prolapse, iron deficiency anaemia, growth and mental impairment (22 - 24). Similarly, ascariasis is associated with severe morbidity such as intestinal obstruction. Biliary and pancreatic ascariasis can result in mortality, reduced physical growth and cognitive development depending upon the intensity of infection (5). Evidence has also indicated that infection with *G. lamblia* could cause mal-absorption, chronic diarrhea and long-term growth retardation in children (25). Intestinal schistosomiasis could cause diarrhea, loss of appetite, loss of weight, growth retardation, cognitive defects and hepato-splenomegaly in chronic cases which may lead to death in children **(**26, 27). Although the impact of the infections on the children was not assessed in this study, it is likely that the infections would exert considerable health impact on the children depending on the intensity of the infection.

High prevalence of trichuriasis (74.7%) and *S. mansoni* (37.2%) observed among under-five children are a serious concern because health problem in this age group is compounded by co-infection of these worms with malaria. In addition, since there is no documented information on the safety of antischistosomal drug (praziquantel) for children under 4 years of age at the moment, preventive chemotherapy for schistosomiasis is not indicated for this age group (28). Nevetheless, children of this age group can be treated on an individual basis by medical personnel.

Except for bilharzia and hookworm infections, questionnaire survey results indicated that mothers have some knowledge about the modes of transmission of intestinal parasites. 70.7% and 94.8% of the mothers responded that they do not know how children get bilharzia and hookworm infections, respectively. This is also partly attributed to failure of the study to identify and use appropriate terms by which these parasites are known locally, particularly for hookworm.

Mothers had relatively reasonable knowledge about intestinal parasitic infections, and they are very well aware of their impact. In agreement with the study from Upper Egypt (29), almost all of the mothers/respondents realized that infection with intestinal parasites could cause serious health problems including growth retardation, malnutrition and child death unless treated.

Availability of effective drugs, community awareness about the etiologic agents, and mode of transmission of intestinal parasites could contribute to the development of integrated control strategies of parasitic infections (29 - 31). In this study, we assessed mothers' awareness about the cause of infection, mode of transmission, symptoms, impact of the infection on children's health, and methods of prevention of common intestinal parasitic infections. Unlike studies in Nigeria (32), the present observations showed that mothers in the study area had some knowledge about mode of transmission of ascariasis, giardiasis, and amoebiasis. Most of the mothers responded that drinking river water, chewing sugar cane, feeding a child with uncooked cabbage and green pepper are responsible for ascariasis and amoebiasis. Observation also showed that chewing sugar cane is a common practice among children in the area and it is possible that children get infection from sugar cane contaminated with parasite agents. Obviously, consumption of uncooked contaminated vegetables also serves as a means of intestinal parasitic infections.

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In conclusion, the results of the present study revealed that intestinal parasitic infections were prevalent in varying magnitude among under-five children in the study area. The study also revealed that mothers in the study area had limited or some knowledge about various intestinal parasitic infections, and they were aware of the impact. In addition to preventive chemotherapy for worms, improvement of sanitation and provision of health education are required to control and eliminate all intestinal parasitic infections in the area.

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