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Community awareness of intestinal parasites and the prevalence of infection among community members of rural Abaye Deneba area, Ethiopia

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PEER REVIEW

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Comments

The paper showed a high prevalence of intestinal parasite infections in a community whose knowledge about the parasite was low. This suggests the necessity of integrated control strategies including health education to effectively prevent infection with intestinal parasites in regions endemic for the parasites.
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ABSTRACT

Objective: To assess the knowledge of Abaye Deneba community members regarding intestinal parasites and prevalence of intestinal parasitic infections.

Methods: Knowledge about intestinal parasites was assessed by administering a questionnaire to 345 randomly selected household heads. Parasitological stool examination of 491 randomly selected individuals was done using the formol ether concentration technique.

Results: Knowledge of the Abaye Deneba community about parasitic diseases such as schistosomiasis, amoebiasis, ascariasis and taeniasis was very low. However, 204 (59.3%) members correctly responded that the cause of giardiasis is related to contaminated water and 176 (51.2%) knew how to prevent it. In some cases, respondents did correctly identify causes, symptoms of intestinal parasite infection and ways to prevent it, but they did not accurately link it to the appropriate disease caused by the different intestinal parasite species. Among the 491 stool samples examined, 50.2% of study participants showed infection with at least one intestinal parasite. *Schistosoma mansoni* was the most prevalent (41.3%) followed by *Trichuris trichiura* (9.4%), *Ascaris lumbricoides* (8.4%), *Taenia saginata* (2.4%), *Enterobius vermicularis* (2.0%) and hookworm (0.4%). Prevalence of schistosomiasis was highest in men aged 15-24 years.

Conclusions: Intestinal parasitic infection is highly prevalent in communities of the Abaye Deneba area. Nevertheless, the knowledge of the community members about the parasite is less. Implementation of preventive chemotherapy, supplemented with health education, provision and use of sanitary facilities would be recommended to reduce morbidity and control transmission of intestinal parasites in this area.

KEYWORDS

Community awareness, Intestinal parasites, Prevalence, Ethiopia

1. Introduction

Soil-transmitted helminthiasis is a major public health problem in low and middle-income countries affecting about 2 billion people across the globe[1]. Schistosomiasis along with other soil transmitted helminths comprises over 40% of the illnesses caused by all tropical diseases apart from malaria[1]. Intestinal parasitic infections are particularly rampant in areas of the world where climate and poor sanitary conditions promote their survival, reproduction and transmission[2].

Intestinal parasitic infection may have serious consequences on human health, such as hepatomegaly, splenomegaly, esophageal varices and bleeding[1]. Besides

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morbidity, intestinal parasitic infection can also cause mortality, growth retardation and poor mental development in children[3]. Furthermore, helminth infected individuals could be susceptible for other infections such as malaria and HIV[4-7].

Prevention of intestinal parasitic infection usually involves treatment of cases with appropriate drugs. In most African countries where soil transmitted helminths and *Schistosoma mansoni (S. mansoni)* infections are endemic, world health organization recommends regular deworming of school age children with antihelmintic drugs to control infection with these parasites[1]. However, infection with these parasites remains to be a major public health problem in most of the endemic areas due to re-infection[3]. Thus, there is a need to undertake integrated control strategies which involve improved sanitation, health education and chemotherapy to effectively control intestinal parasitic infections in endemic African countries[8]. This requires understanding of the knowledge of the target communities about intestinal parasites. For example, people in Uganda were interested in receiving treatment for schistosomiasis after they were informed about the benefits of the treatment[9].

In Ethiopia, intestinal parasitic infection is a major public health problem throughout the country[10,11]. There is a need to ascertain the knowledge of affected communities regarding intestinal parasites in order to choose the best prevention strategy which is acceptable and effective in local settings. Thus, this study was conducted to assess the knowledge of Abaye Deneba village community, living in the shore of Lake Ziway, Ethiopia, towards intestinal parasites and determine prevalence of the parasites in this area.

2. Materials and methods

2.1. Study area and population

A community-based cross-sectional study was conducted in Abaye Deneba village in June 2008 to investigate the awareness of the community regarding intestinal parasites and to determine prevalence of the parasites in the area. The village is located approximately 18 km to the south east of Ziway Town and lays adjacent to the Lake Ziway. Ziway Town is situated at a distance of 180 km from south of Addis Ababa on the main road to Hawassa. The community members are engaged in mixed farming such as cultivation of maize, fishing and rearing livestock. Most of the community members meet their daily water needs for drinking and bathing from Lake Ziway.

2.2. Selection of study participants

Assuming 50% of the households had knowledge of intestinal parasitic infections (95% confidence and 5% degree of accuracy), a total of 384 adult participants were supposed to be included in the study. Initially, contact was made with the chairman of the village and the objective of the study was discussed. Following the discussion, permission was obtained from the community leader and study participants were systematically selected from a list of household heads obtained from the office of the community leader. Then, the selected participants were informed to come to a central place for interview and stool examination. In addition to the requirement that study participants be a member of preselected household, participants were only deemed eligible if they were either a husband or wife. In the absence of that appellation, they had to be the next older member of the household age over 15 years. Further, participants had to be willing to be included in the study on a voluntary basis. The interviewee was also requested to bring children to the center for intestinal parasite examination.

2.3. Data collection on awareness

A questionnaire having structured and open-ended questions was designed in order to collect data on socio-demographic characteristics and knowledge about the cause, mode of transmission and preventive methods of common intestinal parasites in English language. The questionnaire was then translated into the local language (Oromifa). The questionnaire was piloted on 20 household heads and then modified to fit the local situation before starting the actual data collection. A household heads or the oldest household member (in the absence of household heads) was interviewed in the local language by data collectors (12 grade graduate) selected from the study village for the purpose. Each interview was made independently in a convenient place. During the piloting process local names of the parasites of interest was documented and these names were used during data collection. Hence, the local name for schistosomiasis was 'Bilharzia', for ascariasis was 'MagaFerda', for taeniasis was 'Minni', for amoebiasis was 'Amoeba' and for giardiasis was 'Giardia'. Other intestinal parasitic diseases like trichuriasis and hookworm infection were not familiar to the community and had no local name; hence they were excluded from the interview questions. At the end of each interview, each interviewee was requested to provide his/her fresh stool sample and also the fresh sample of his/her child.

2.4. Stool sample collection and diagnosis

Participants were requested to provide their stool samples on a small piece of plastic sheet. Samples were placed in vials containing 10% formalin and processed by the formol-ether concentration method[12], and qualitatively examined for eggs and larvae of helminths and cysts of protozoan parasites after being transported to the Aklilu Lemma Institute of Pathobiology.

2.5. Ethical considerations

The study protocol was approved by the Institutional Review Board of the Aklilu Lemma Institute of Pathobiology, Addis Ababa University. As the study population was mainly illiterate, the Institutional Review Board endorsed obtaining oral consent of study participants. Seeing that the study involved minimal risk, the committee did not require tape recording or any other form of preserving the

processes of obtaining consent. The objective of the study was explained to the study participants or their guardians and verbal consent was obtained. Infected individuals were treated with the appropriate drugs. At the conclusion of each interview participants were well-informed about the source of infection, symptoms and prevention methods of intestinal parasites.

2.6. Data analysis

Data were entered in Excel and analyzed using STATA software. The prevalence of parasitic infections was expressed in percentage for the different helminth species found. The level of community member knowledge was expressed as a percentage in each category from the questionnaire.

3. Results

3.1. Socio-demographic characteristics

Out of 384 households contacted, 89.84% (345/384) consented for interview to assess their awareness towards human intestinal parasites, of which 54% (186) were males (Table 1).

Table 1

Socio-demographic characteristics of 345 household heads in Abaye Deneba kebele area, Central Ethiopia, 2008.

Characteristic	Number (%)
Gender	
Male	187 (54.0)
Female	158 (46.0)
Age in years	
15-24	73 (21.0)
25-34	136 (39.0)
35-44	70 (20.0)
⩾45	66 (19.0)
Marital status	
Married	304 (88.4)
Single	36 (10.5)
Other	5 (1.4)
Educational status	
Illiterate	223 (64.8)
Read and write	28 (8.1)
Primary	74 (21.5)
Secondary	20 (5.8)
Water source for drinking	
Well	16 (4.6)
Lake Ziway	329 (95.4)
Place for removing wastes	
Toilet	7 (2.0)
Open field	338 (98.0)
Received health education before the study	
Yes	37 (10.7)
No	308 (89.3)

Their age ranged from 15 to 86 years with median age being 30 years. Most of the study participants were Muslim (99.4%), belonging to Oromo ethnic group (99.1%) and were farmers (91.3%). About 89% of the study participants were married and the highest proportions of interviewees (65%) were illiterate. Of the total respondents, 72.2% said that their children had frequent contact with water bodies (*e.g.* Lake Ziway, river or pond), and 60% responded that their children bathed in different sources of water. Moreover, 95.4% of the respondents use water from Lake Ziway for drinking, 98.0% defecate in open fields and 89.3% did not receive health education before the current study.

3.2. Awareness of the study participants

The interviewees' perception regarding the sources, symptoms of intestinal parasites and ways to prevention methods of it is shown in Table 2.

Table 2

Knowledge about causes, symptoms and prevention methods of intestinal parasitic infections perceived by 345 household heads in Abaye Deneba kebele area, Central Ethiopia, 2008.

Knowledge about different aspects of intestinal parasites	Names of parasites				
	Ascariasis	Taeniasis	Schistosomiasis	Amoebiasis	Giardiasis
Cause of parasitic infection (*n*=345)					
Don't know	128 (37.2)	67 (19.5)	63 (18.3)	84 (24.4)	68 (19.8)
Contaminated water	94 (27.3)	12 (3.5)	64 (18.6)	78 (22.7)	204 (59.3)
Contaminated food	35 (10.2)	16 (4.7)	4 (1.2)	44 (12.8)	6 (1.7)
Unboiled milk	31 (9.0)	94 (27.3)	-----	8 (2.3)	-----
Raw meat	26 (7.6)	50 (14.5)	-----	19 (5.5)	-----
Soil	21 (6.1)	-----	-----	-----	-----
Luck of food	20 (5.8)	1 (0.3)	-----	8 (2.3)	-----
Eating sorghum, wheat, bread, vegetable	9 (2.6)	5 (1.5)	-----	109 (31.7)	-----
Bath in river	-----	-----	5 (1.5)	-----	-----
Sexual intercourse	-----	-----	-----	27 (7.9)	-----
Others (evil eye, inborn, hygiene *etc.*)	19 (5.5)	6 (1.7)	-----	29 (8.4)	-----
Common symptoms (*n*=345)					
Don't know	12 (3.5)	12 (3.5)	3 (0.3)	11 (3.2)	48 (14.0)
Abdominal discomfort	289 (84.0)	103 (29.9)	13 (3.8)	296 (86.1)	132 (38.4)
Worm expel	30 (8.7)	39 (11.3)	-----	-----	-----
Back pain, headache	-----	-----	3 (0.9)	6 (1.7)	7 (2.0)
weight loss, weakness	5 (1.5)	8 (2.3)	1 (0.3)	-----	7 (2.0)
Enlargement of stomach	21 (6.1)	10 (2.9)	-----	-----	-----
Increasing appetite	43 (12.5)	10 (2.9)	-----	2 (0.6)	-----
Skin change	-----	10 (2.9)	1 (0.3)	-----	-----
Other (fever, bloody urine or diarrhea)	-----	-----	2 (0.6)	10 (2.9)	-----
Preventive methods					
Don't know	133 (38.7)	75 (21.8)	70 (20.4)	102 (29.7)	78 (22.7)
Avoid using contaminated water	56 (16.3)	5 (1.5)	49 (14.2)	58 (16.9)	176 (51.2)
Cook vegetables & hygienic practices	29 (8.4)	19 (5.5)	2 (0.6)	96 (27.9)	4 (1.2)
Avoid raw meat consumption	33 (9.6)	32 (9.3)	-----	-----	-----
Boil milk	20 (5.8)	40 (11.6)	-----	-----	-----
Treatment/drug	47 (13.7)	55 (16.0)	6 (1.7)	44 (12.8)	14 (4.1)
Using latrine	1 (0.3)	1 (0.3)	-----	3 (0.9)	-----
Other (avoid soil, milk, fatty food, sex)	18 (5.2)	10 (2.9)	-----	30 (8.7)	-----

Numbers in brackets are percentages.

The household heads of Abaye Deneba kebele perceived multiple sources of the commonly available parasitic infections such as ascariasis, taeniasis, schistosomiasis, amoebiasis and giardiasis. Drinking contaminated water was the most frequently mentioned (by 27.3% of the respondents), and contaminated food was the most frequently mentioned for cause of ascariasis (10.2%). Few of the study participants mentioned soil (6.1%) and uncooked or uncleaned vegetables (0.6%) as causes of infection. Abdominal discomfort was the most common symptom of ascariasis perceived by the majority of the interviewees (84.0%). But, a considerable number of the study participantes (37.2%) did not know how to prevent infection with *Ascaris lumbricoides (A. lumbricoides)*. However, some participants (16.3%) mentioned that using clean water would prevent infection with *A. lumbricoides*. With regard to taeniasis the most perceived source of infection was consumption of unboiled milk (27.3%),

followed by raw meat (14.5%). The main symptom of taeniasis reported was abdominal discomfort (29.9%). Treatment with drugs was the main prevention method perceived by the participants (16.0%) followed by drinking boiled milk (11.6%) and avoiding eating raw meat (9.3%).

Schistosomiasis was the least perceived infection by the community among the common intestinal parasites in the area. The cause of schistosomiasis was relatively unknown (18.3%) and a small proportion of the respondents (18.6%) vaguely referred to water as the cause. Only 5 (1.5%) individuals specifically and correctly mentioned bathing in water as the cause of infection. There was a lack of response when asked about symptoms of schistosomiasis. Abdominal discomfort was mentioned as the main symptom of the infection by 3.8% of the study participants. The most frequently mentioned method of schistosomiasis prevention was avoiding the practice of using contaminated water (14.2%). The majority of respondents, however, stated that they did not know (20.4%).

Contaminated water was mentioned by 24.4% of the study participants to be the source of amoebaisis. The other sources of infection mentioned were contaminated food (22.7%), uncooked vegetables (16.6%), and sexual intercourse (7.9%). Gastrointestinal discomfort was the most pronounced symptom of amoebiasis which was perceived by 86.1% (296) of the respondents. The respondents believed that amoebiasis can be prevented through frequent use of clean water (16.9%), eating cooked vegetables and hygienic practices (27.9%). The majority of the respondents (59.3%) answered that contaminated water was the cause of giardiasis. About 51.2% of the participants responded that drinking boiled/clean water is the way to prevent giardiasis. A total of 78 (22.7%) of the individuals responded that they were not knowledgeable in the prevention of giardiasis. Giardiasis was also believed to be cause of severe abdominal discomfort by substantially high proportion of the community members (38.4%).

Of the total respondents, 98.6% noted that intestinal parasitic infection may causes serious health problems (reduced growth, 70.4%; loss of appetites, 60.7%; death, 50.4%; weakness, 47.8%; under-nutrition, 39% and other infection related morbidities 13.6%) to their children.

When the study participants were asked about the practice of health education on intestinal parasites, few participants (37.0%) mentioned that they were educated about intestinal parasites. About 17.7% of the participants had previously received treatment for at least one intestinal parasitic infection (38 cases of amoebaiasis, 14 cases of giardiaiasis, 13 cases of ascariasis, 2 cases of schistosomiasis and 1 case of taeniasis).

3.3. Prevalence of intestinal parasite infection

A total of 491 participants (41.8% females and 58.3% males, age ranging from 8 months to 78 years (median age: 18 years) provided stool samples (Table 3). Among the 491 study participants, 23.6% (116) were children below 5 years. *S. mansoni* was the most prevalent parasite (41.3%). Males in the 15-24 age group were the most affected (73.4%) followed by the 35-44 age group (72.4%). There were individuals with low, moderate, and heavy infection with *S. mansoni*. Ascariasis, trichiuraisis, entrobiasis, taeniasis and hookworm infection was found in 8.3%, 9.3%, 2%, 2.4% and 0.4% of the participants who provided stool sample, respectively. Out of the 492 study participants, 37.7% (185), 11.3% (56) and 1.2% (6) had single, double and multiple infections, respectively. Of the interviewed household heads, 25.2% reported that at least one of their children had taken antihelminthic medication in the past. However, the individuals were not able to list the name of the antihelminthic drugs that they took.

Table 3

Prevalence of intestinal helminth infection among 491 residents (household heads and their children) in Abaye Deneba kebele area, Central Ethiopia, 2008.

Variables	Number examined	*S. mansoni* (%)	*A. lumbricoides* (%)	*Trichuris trichiura* (%)	Others*
Sex					
Females	205	41 (20)	17 (8.3)	24 (11.7)	9 (4.4)
Males	286	162 (56.6)	24 (8.4)	22 (7.7)	15 (5.2)
Age in years					
≤5	116	-----	3 (2.6)	2 (1.7)	1 (0.8)
6-14	105	42 (40.0)	15 (14.3)	23 (21.9)	5 (4.8)
15-24	79	58 (73.4)	8 (10.1)	6 (7.6)	4 (5.1)
>25	191	103 (53.9)	15 (14.6)	15 (9.4)	14 (7.3)
Total	491	203 (41.3)	41 (8.4)	46 (9.4)	24 (4.9)

Others*= *Trichuris saginata*, *Enterobius vermicularies* and hookworm.

4. Discussion

Knowledge about intestinal parasites and prevalence of parasitic infections was assessed in Abaye Deneba community, eastern Showa Zone, Oromia Regional State of Ethiopia. This is the first study done in the area and represents baseline information on the knowledge and prevalence of intestinal parasitic infections. Overall, knowledge of inhabitants about specific intestinal parasitic species was little. However, knowledge of the study participants about giardiasis was moderate.

A relatively low level of Abaye Deneba community knowledge about intestinal parasitic infections is in line with the investigation in other area of the country[13]. Care must be taken when participants responded with the correct answers because some responses could have been guesses. Even though questions asked were open ended and there were no options for them to choose, participants may have said whatever came to their mind rather than saying they do not know. This can be ascertained from the finding that while 50 (14.5%) individuals perceived raw meat as the cause of taeniasis, only 32 (9.3%) responded that avoiding raw meat is the way to prevent the disease, and among the individuals who responded raw meat to be the source, 36% did not answer that avoiding raw meat would be a way to prevent the disease. An explanation for how community members were knowledgeable about giardiasis is that the symptoms are extremely uncomfortable and therefore very memorable. A person would then be more likely to note the sickness and remember details about it.

S. mansoni was the most prevalent parasite in the community regardless of age and gender. The high

prevalence of this parasite could be associated with Lake Ziway, which is the only source of water for the community and known for transmission of schistosomiasis[14]. Particularly, activities such as unhygienic bathing, fishing and cloth washing in the lake could promote infection with shistosoma. Even though Ziway is known as an area endemic for schistosomiasis[14], community members were still not very knowledgeable about it. Conversely, in Brazil inhabitants of rural communities are highly knowledgeable about the relationship between schistosomiasis and contact with water and this information is passed on from one generation to the next through family and friends[15]. Hence, community health workers and concerned health sectors of the area should teach the community about the parasite and possible controlling methods such as avoiding swimming, avoiding waste disposal along or nearby the lake, using latrines and treating infected individuals.

Prevalence of *S. mansoni* was lower in children than in adults. This is contrary to the normal expectation that children would have approximately similar rates of infection or higher rates than adults[16]. This is perhaps due to frequent contact with water among most adults since they earn their living as fishermen in addition to mixed farming compared to children. Nevertheless, definite explanation for this requires detailed water contact and immunological investigations. Additionally, *A. lumbricoides* and *Trichuris trichiura* prevalence can be explained by low level of personal hygiene and sanitary conditions of the area and the lifestyle of the indigenous community, which expose them to contaminated soil.

Researchers and health professionals in other parts of the world might be interested in the findings of this study because it shows that knowledge about intestinal parasites is little for inhabitants of countries that are endemic with similar parasites. This information reinforces the necessity to educate members of rural communities about intestinal parasitic infection. We took a challenging approach in this study by interviewing community members face to face and asking them open ended questions. By probing respondents in an open ended manner, there was reduced bias in the responses we received. Additionally, the study revealed a wide range of responses that may not have been expected, such as "evil eye" being the cause of disease. However, better information would have been generated from the current result if larger sample size had been used.

This study has significant public health importance because it shows that there is a need to educate individuals who are at risk of being infected with intestinal parasites. Relative to the focus on children and their mothers, very little attention has been given to knowledge of male regarding intestinal parasites in Africa, and more specifically in Ethiopia. As stated previously, this study is the first report in this area to probe an entire community; therefore these results are a baseline for rural knowledge. Future studies could be designed to measure any changes.

Even after 7 years of education via signage, which encouraged people to be in search of health to change their behavior, community members of rural Senegal still had little knowledge[17]. Therefore, proactive community wide health education in rural populations need to be implemented. Health education in tandem with deworming and other preventative methods will help combat the problem because it clarifies the main aspects of the problem for the people affected by it.

As demonstrated by a study done in Burundi, attempts to control snails to reduce the incidence of schistosomiasis fell short of the goal because of repopulation of the snails. Similarly, efforts to use chemotherapy as a weapon against infection failed because of re-infection[18]. To make large scale health education programs successful, a combination of factors is required. Financial resources, usage of latrines and access to alternative sources of water in addition to education are important[18]. It is important to fix any problems with current drinking water source and subsequent maintenance must be put in place initially to ensure upkeep of the system[19]. In some cases, community members are knowledgeable, but because there are no alternatives to their current source of water, they continue to use it[20]. A study in Upper Egypt designed to determine implications of knowledge, perceptions and behavior of mothers on the control of intestinal parasitic infections in children[21], suggests that educating people about good hygiene is more efficient than educating them about the disease specifics.

In conclusion, the prevalence of intestinal parasitic infection is high in communities of the Abaye Deneba area however, the knowledge of the communities about intestinal helminths and protozoa is low. Thus, implementation of measures such as preventive chemotherapy, health education, use of sanitary facilities to the community members in the area and the appropriate provisions to enable the execution and maintenance of the aforementioned measures is recommended to reduce morbidity and control transmission of intestinal parasites in the area.

Conflict of interest statement

We declare that we have no conflict of interest.

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Comments

Background

Infection with intestinal parasites remains to be a major public health problem in most of the developing regions due to re-infection. Integrated control strategies such as improved sanitation, health education and chemotherapy

could be important to effectively control intestinal parasitic infection. This requires understanding of the knowledge of the target communities about the parasites in order to choose the best prevention strategy which is acceptable and effective in local settings.

Research frontiers

Knowledge of the Abaye Deneba community about soil-transmitted helminthiasis and *Schistosoma* was very low, and prevalence of intestinal parasitic infection in communities of the Abaye Deneba area was high. Knowledge about intestinal parasites was assessed by administering a questionnaire, and stool examination was done using the formol ether concentration technique.

Related reports

Previous studies in different regions endemic for intestinal parasitic infection documented association between good knowledge about intestinal parasites and high practice towards prevention of infection with these parasites.

Innovations and breakthroughs

Ascertaining the knowledge of communities infected with intestinal parasites would be helpful to choose the best prevention strategy which will be acceptable and effective in a local setting. In the present study, authors found a high prevalence of intestinal parasite infection in communities with low knowledge about the parasites.

Applications

Previous studies reported association between knowledge about intestinal parasites and prevalence of infection with the parasites. The current study support and suggest health education along with other strategies such as improved sanitation and chemotherapy to effectively prevent infection with intestinal parasites.

Peer review

The paper showed a high prevalence of intestinal parasite infections in a community whose knowledge about the parasite was low. This suggests the necessity of integrated control strategies including health education to effectively prevent infection with intestinal parasites in regions endemic for the parasites.

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