

# Prevalence and Associated Factors of Intestinal Parasites in Ethiopian Orthodox Tewahido Church Religious Students, Ethiopia

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## Research

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# Abstract

## Background

Intestinal parasitic infections are the most serious medical and public health problems in developing countries. In Ethiopia, intestinal parasites are among the top ten causes of morbidity, especially in children. The aim of this study was to assess the prevalence and associated factors of intestinal parasites among Ethiopian Orthodox church school students in Gondar town, northwest Ethiopia.

## Method:

an institutional-based cross-sectional study was conducted to assess the prevalence and associated factors of intestinal parasites among religious students in Gondar town from February 2019 to April 2019, northwest Ethiopia. A total of 360 participants were selected by the random sampling technique.

## Results

In this study, a total of 360 Orthodox Tewahido church school students were participated. The over all parasite prevalence, 24.7% was relatively low compared with previous studies conducted in other localities in Ethiopia. The predominant parasites were *A. lumbricoides*, *S. mansoni* and hookworm with (11.4%), (4.4%) and (3.6%) prevalence respectively. A significant association was observed among participants with habits of frequent swimming with 2.3 times higher probability of acquiring infections, but there was no association with gender, age, finger nail status, the habit of eating uncooked vegetables/ fruits, source of drinking water and proper toilet utilization.

## Conclusion

In general, the prevalence of intestinal parasite infections was high and calls for intervention actions on Orthodox Tewahido church students. Moreover, swimming frequency and habits had a significant association. Since the prevalence was high, improvement in awareness and enhancing health seeking behavior of the students, deworming and health education need to be focused on.

## Background

Intestinal parasites are among protozoan and helminth groups that cause nutrient deficiencies, anaemia, and impaired growth and cognitive development (1, 2). Intestinal parasitic infections have been described as the causes of the highest widespread infectious diseases, illnesses and the major public health problems in developing countries (2, 3). Children are at high risk as they are the major victims. Different surveys in Ethiopia showed high prevalence of 12–68% of intestinal parasitic infections in children. (4–11).

Common human pathogenic protozoan and helminth parasites are widely distributed and are killing and affecting the quality of life of people (12, 13). Even though most parasitic infections have the same geographical endemicity and can affect similar population groups, the majority of the parasites are under similar treatment and diagnostic methods. But still they are causing disease burden on communities (13). Therefore, professionally skilled parasitic identification and effective treatment are required to decrease the risk factors (4, 5, 14). Studies on the burden of different intestinal parasitic infections in different geographical regions are vital to develop appropriate control strategies (15).

The main contributors to the high prevalence of intestinal parasites in tropical and sub-tropical countries may include public and individual hygienic activities, community awareness about the prevention and control of parasitic infections, access to safe food sources, differences in climatic conditions, economic and educational status of study participants, previous control efforts, contact with soil polluted by animal faeces, condition of water sources, presence or absence of toilets, shoe wearing and swimming habits (16–18).

Several investigations were done on school children and other groups. Although there have been studies on religious students around the area to the best of our knowledge. Therefore, this study aimed to assess the prevalence of intestinal parasitic infections and to identify associated factors among the student population mentioned above. Moreover, the will provide to provide information about prevention and control strategies of intestinal parasites among Ethiopian Orthodox Tewahido church religious students.

## **Materials And Methods**

### **Study Area**

Gondar is found in the Amahara Regional State, northwest Ethiopia 748 km from Addis Ababa, the capital of Ethiopia. The study was conducted in Gondar town on Orthodox Tewahido church religious students. The students were living and studding in the church compounds. They also prepare their food after they collect different food items from the community. Over 27 churches in the city provide religious education to an estimated 3454 learners.

### **Study design and period**

A prospective cross-sectional study was conducted to assess the prevalence and associated factors of intestinal parasites among the students from February 2019 to April 2019 in Gondar town, northwest Ethiopia.

#### Population

Students in Debre Tsehay Qusquam and Aberra Giorgis churches of Gondar participated in the study.

### **Inclusion and exclusion criteria**

## Inclusion criteria

All religious students who volunteered to participate were included.

## Exclusion criteria

Students who received anti-parasitic drugs in the last month were excluded.

## Sample size and sampling technique

In this cross-sectional study a prevalence of 62.3% reported in Teda a town 15 kms from the study area was taken by considering a 95% level of confidence interval. Then, the minimum sample size was estimated using the formula  $n = (z^2 a/2 \times p (1 - p))/d^2$  that yielded  $1.96^2 \times 0.623 \times 0.377 / 0.0025 = 360$  which was the final sample size of this study (14).

## Sampling technique

The two churches and the participants of the research were selected by the random lottery sampling technique.

## Data collection and laboratory methods

The data was collected by using a pretested and semi-structured Amharic language questionnaire. Information on socio-demographic characteristic and associated factors were collected by interviews and observations. The students were given clean dry and leak proof labeled stool cups with applicator sticks to bring 2 gm of fresh stool sample for microscopic examinations. Some portions of the stool samples were examined within 30 minutes by direct saline wet mount method and the remaining stool samples were preserved by 10% formalin and processed by formal ether concentration procedure within two days (19).

## Data analysis and interpretation

Data obtained from the questionnaire and laboratory examination results were entered, cleaned and analyzed using SPSS version 20 statistical packages. The results were presented in the form of tables, percentage and odds ratios to measure associations by considering  $P$ -value  $\leq 0.05$ .

## Result

### Socio demographic characteristics of participants

A total of 360 Orthodox Tewahido Church church religious students participated from Debre Tsehay Qusquam and Aberra Giorgis churches. All of the participants were male with a mean age of 17 ranging from 10–35 years. Of the total participants, (26.1%), (61.7%) and (12.2%) were 10–14, 15–24 and > 25 years of age groups, respectively; Moreover 96.4% of the participants were from rural areas.

Table.1: Socio-demographic characteristics of the Ethiopian Orthodox Tewahido church religious students in Gondar, Ethiopia, from April 2019 to June 2019.

## Prevalence of intestinal parasites

Out of the total 360 participants 24.7% were positive for single or multiple intestinal parasitic infections. *Ascaris lumbricoides* was the predominant parasite (11.4%), followed by *S.mansoni* (4.4%) and Hook worm (3.9%).

Figure 1.Types of parasites and their proportion among Ethiopian Orthodox Tewahido Church Religious Students from April 2019 to June 2019.

## Prevalence and associated risk factors of intestinal parasite infection

There was a significant association between intestinal parasitic infections and swimming habits in the bivariate logistic regression analysis. Participants with swimming habits in the river were two times (COR, 2.283, 95% CI 1.146–4.549) more positive for intestinal parasitic infection than their counter parts. (Table 3)

Table 1  
Prevalence of intestinal parasite among Ethiopian Orthodox Tewahido church religious students in Gondar town, April 2019 to June 2019

Characters		Frequency	Percentage
Age of participants	10–14	94	26.1
	15–24	222	61.7
	> 25	44	12.2
Marital status	Married	9	2.5
	Single	351	97.5
Educational level	Nibab bet	55	15.3
	Zema bet	154	42.8
	Kine bet	151	41.9
Address(family residence)	Rural	347	96.4
	Urban	13	3.6

Table 2  
Prevalence of intestinal parasite and their associated factor  
among Ethiopian Orthodox Tewahido church religious students in  
Gondar Town from April 2019 to June 2019

Prevalence of parasites	Frequency	Percent
<i>Ascaris lumbricoides</i>	41	11.4
<i>S. mansoni</i>	16	4.4
Hookworm	14	3.9
<i>H. nana</i>	8	2.2
<i>E. vermicularis</i>	3	0.8
Cyst of <i>Entamoeba histolytica/dispar</i>	2	0.6
Hookworm & <i>S. mansoni</i>	2	0.6
Hookworm & <i>S. sterccoralis</i>	1	0.3
Hookworm & <i>H.nana</i>	1	0.3
<i>A.lumbricoides</i> & <i>T. trichuria</i>	1	0.3
Total	89	100.0

The frequency of swimming habit was statistically associated the intestinal parasite infections. An everyday swimming habit was 4 times more likely to result in being infected with intestinal parasites (AOR (4.655(95% 1.506–14.388) every month swimming habit was 7 times more likely to cause infection by intestinal parasites (95%, 2.252–26.722) according to the infection in the bivariate logistic regression. (Table 4).

Table 3

Prevalence of intestinal parasite and their associated factor among Ethiopian Orthodox Tewahido church religious students in Gondar Town from April 2019 to June 2019

Characters		Parasites positivity status		Total No	COR (95%CI)
		No	%		
Age	10-14	11	18.9	58	.565(.247-1.291)
	15-24	74	25.4	291	.843(.413-1.721)
	>25	4	36.4	11	1
Family residence	Rural	83	23.9	347	.367(.120-1.122)
	Urban	6	46.1	13	1
Educational level	Yenibab bet	11	20	55	.718(.338-1.527)
	Yezema bet	39	25.3	154	.974(.582-1.629)
	Yekine bet	39	25.8	151	1
Source of food	Community	85	24.8	342	1.158(0.371-3.612)
	Family	4	22.2	18	1
Eating habit of uncooked vegetable or fruit	Yes	31	22.1	140	.794(0.482-1.309)
	No	58	26.4	220	1
Do you have toilet?	Yes	47	27.5	171	.1
	No	42	22.2	189	.754(.466-1.218)1
Proper toilet utilization	Yes	33	32	103	1
	No	56	21.8	257	.591(.355-.983)
Swimming habit	Yes	68	24.9	273	2.283(1.146-4.549)
	No	21	24	87	1
Hand cleanness	Yes	2	15.4	13	.543(.118-2.500)
	No	87	25.1	347	1
Finger tripping habit	Tripped	14	20.3	<b>69</b>	<b>1</b>
	Not tripped	75	25.8	<b>291</b>	<b>1.364(0.717-2.594)</b>
Feeding material	Clean	1	7.1	14	1

<b>Cleanness</b>	Dirty	88	25.4	346	1.124(.403-3.141)
<b>Source of water</b>	River water	30	23.4	128	.459(0.073-2.878)
	Spring water	8	16.3	49	.293(0.042-2.043)
	Tap water	49	27.5	178	.570(0.092-3.514)

Table 4

The frequency of swimming habit and prevalence of parasite infections among Ethiopian Orthodox Tewahido church religious students in Gondar town from April 2019 to June 2019

Frequency of swimming	Positivity status		Total number of participants	COR (CI)
	Number of Positives	Percent of Positives		
Every day	8	44.4	18	4.655(1.506-14.388)
Every week	53	24.5	213	1.927(.946-3.925)
Every month	8	57.1	14	7.758(2.252-26.722)
Conditional	9	22.5	40	1.689(.634-4.500)
Not swim	11	14.7	75	1

## Discussion

In this study, the overall prevalence of intestinal parasites was (24.7%) relatively low compared with previous studies which reported 39.9%, 63.8%, 69.1%, 84.3%, 71.8%, 35.44%, 68.4%, 65.5%, 77.9% and 72.9% in Gamo area, Chench town, Zegie, Debre Elias primary schools, Addis Ababa city, Homesha elementary school, Motta primary school, Dona Berber primary school, Bahir Dar, Dagi primary school, ANRS and Azezo Atse Fasil primary school respectively (5, 17, 18, 20–26). The finding was comparable with that of a study conducted in Babile town 13.8% (27) but higher than of a study conducted in Ghana and noted 15% (28). The differences might be years of studies, cultural activities of people, geographical area and variations in sea level, health education given to the community about the prevention and control mechanisms of intestinal parasitic infections, availability of toilets and their proper use or might be due to dissimilarities in age and types of school.

The predominant parasite in this study was *A.lumbricoides* with a prevalence of (11.4%), which was lower than reports in Addis Ababa, Chench, Zegie and Azezowhich found magnitudes of 34.9%, 60.5%, 18.4%, 28.8% (20–22, 26), respectively. This might be due to differences in age. In this study participants were  $\geq 10$  years old children expected to keep their personal hygiene.

Moreover, *S. mansoni* and hookworm were next to *A.lumbricoides* in prevalence with (4.4%) and (3.6%), respectively. The prevalence of *S. mansoni* was lower than those studies conducted in Zegie and Azezo and reported 29.9% and 43.5% respectively (21, 26). The prevalence of hookworm in this work was greater than the result of a study conducted in Babile (0.3%) (27) and lower than that of Bahir dar (22.8%) (24) and Debre Elias (71.2%) (5). This could be related to shoe wearing habits, distribution of the parasite in the community and differences in geographical area and population awareness about parasite transmission.

Others *E. vermicularis*, *H.nana* and cyst of *E. histolytica/dispar* were the least prevalent parasites in this study with 2.2, 0.6 and 0.6%, respectively. The predominance of *H.nana* was comparable with the result reported in Pakistan (0.9%) (29), but lower than reports from Zegie (4.6%) (21) and Babile (13%) (27).

*E. vermicularis* was also the least prevalent parasite in other studies but slightly higher than the report in Babile (0.6%) (27). On the other hand, *E. histolytica/ dispar* was the least in our study.

Among significantly associated factors observed, participants with high swimming frequencies and swimming habits had 2.3 times more rate of infection than those who had no habits. This was similar to studies which reported significant associations between parasitic infections and swimming practices and frequencies (30–32).

The other predisposing factors such as gender, age, finger nail status, habits of eating uncooked vegetables/ fruits, source of drinking water and proper toilet utilization had no association like the two studies conducted on school-age children in Amhara region, Northwest Ethiopia and reported gender, finger nail status, the habits of eating uncooked vegetables, the presence or absence of latrines, latrine usage, hand washing before meals, hand washing after defecation and water source for drinking had no association with the problem (4, 33).

Limitations, the fact that a single stool sample was collected and analyzed may underestimate the prevalence of intestinal parasites as multiple sample examinations increase the chance of detecting parasites. Besides, parasite egg count intensity which is vital to know the load and the severity of infections was not determined in the study.

## Conclusion

In this study, the overall prevalence of intestinal parasites was (24.7%) among the participants. *A. lumbricoides* was the most prevalent parasite, followed by *S. mansoni* and hookworm which accounted 11.4, 4.4 and 3.6%, respectively. Moreover, swimming frequency and habits of these participants showed 2.3 times more risk of infection when compared with non-swimming participants. In general, the prevalence of intestinal parasites in this study was high, so awareness on infection prevention and increasing health seeking behavior of participants and planning active surveys are essential to control intestinal parasitic infection, since these groups may be the source of infections even though deworming was going on.

## **Declarations**

### **Ethics approval and consent to participate**

Ethical clearance was obtained from Research and Ethical Review Committee of School of Biomedical and Laboratory Sciences, College of Medicine and Health Sciences, University of Gondar. Permission letter was also obtained from the school and given to the church administrator offices. Consent was taken from the study participants after explained the objectives of the study. The information obtained from the study participants was coded to maintain confidentially. Intestinal parasite infected students were given anti parasitic treatment.

### **Consent for publication**

Not applicable in this section

### **Availability of data and materials**

All data generated or analyzed during this study were included in this published article.

### **Competing interests**

The authors declare that they have no competing interests.

### **Funding**

No fund

### **Authors' contributions**

AA analyzed the data, prepared the scientific manuscript and critical reviewed. HG, ST and MZ involved in data collection and analysis. MB involved in data analysis and reviewed the manuscript. All authors reviewed and approved the manuscript.

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## Figures

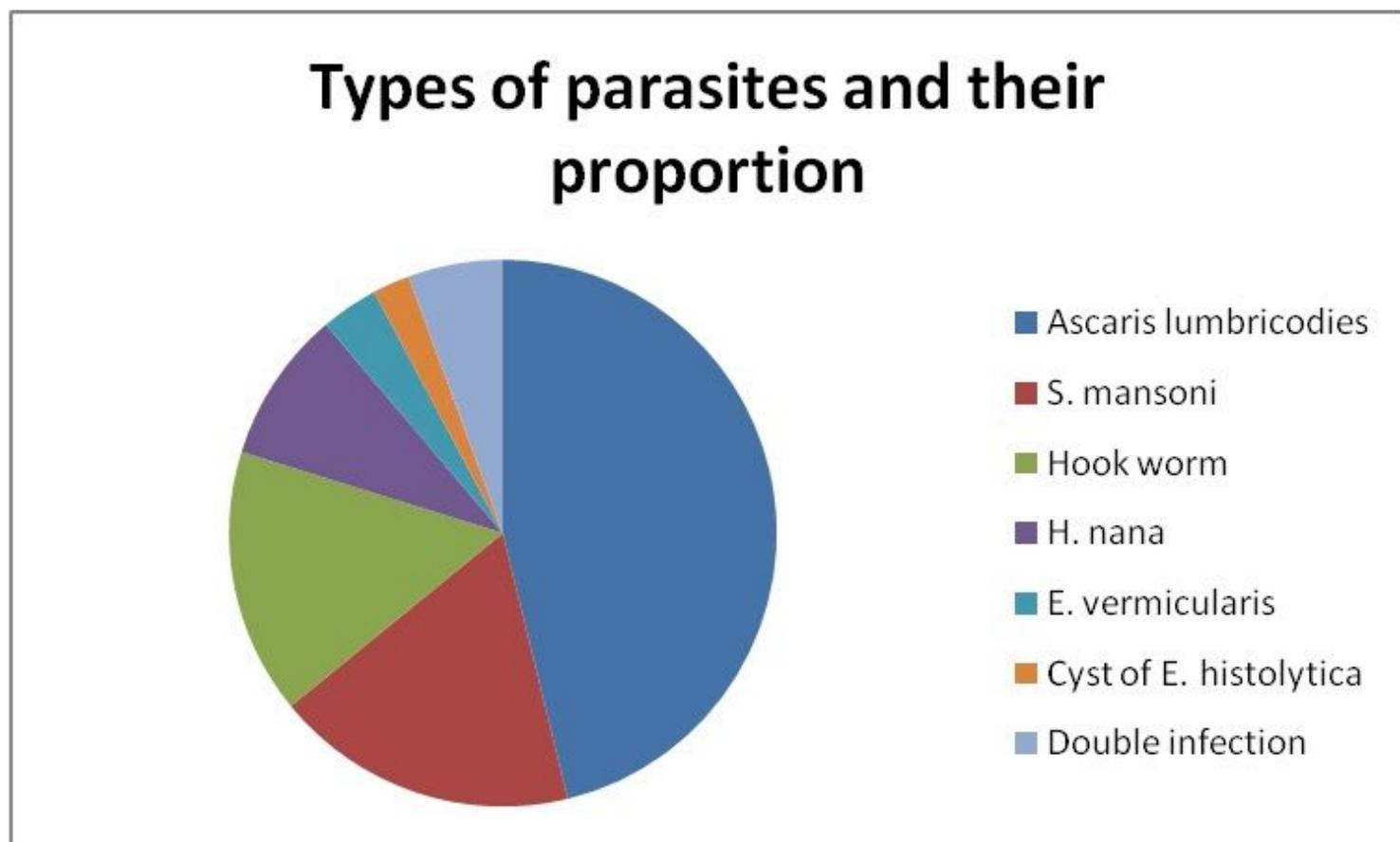


Figure 1

Types of parasites and their proportion among Ethiopian Orthodox Tewahido Church Religious Students from April 2019 to June 2019

## Supplementary Files

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