

Research article

Prevalence of Intestinal Protozoan among Students Visiting Wollega University Students' Clinic

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Abstract

Protozoan parasites *Giardia lamblia*, *Entamoeba histolytica/dispar*, and *Cryptosporidium parvum* are ubiquitous that affect humans, domestic animals and wildlife throughout the world and have been highlighted as significant waterborne parasitic pathogens. The present study was conducted to on the prevalence of intestinal protozoan among students visiting Wollega University clinic from March 16 to April 31, 2013 to identify the most prevalent intestinal protozoan, to see the risk factor and to suggest control mechanism. Single stool specimens were collected from a total of 350 students of different age range and processed for *Giardia*, amoeba, *C. parvum* and other intestinal parasites were detected using formalin-ether concentration and direct wet mount methods. Out of 350 students examined, an overall prevalence of 19.9% intestinal protozoan infection was found. Of this 111(31.6%), 44 (12.5%), and 8 (2.3%) were infected with *Entamoeba histolytica/dispar*, *Giardia lamblia*, and *Cryptosporidium parvum*, respectively. According to this study the prevalence of intestinal protozoan infection accounted 12.6 %, 8.6%, 13.4% 11.7%, 12.6%, 7.5% in male, 21-25 years of age, on those living in rural areas, in those who don't have the habit of washing vegetables and water treatment respectively. Factors such as sex, residence, washing vegetables and treating water were the risk factors at $P=0.05$ and 95%CI. Based on the current study keeping personal hygiene, creating awareness about sanitation, properly treating those students affected by intestinal protozoan infection, eating properly washed vegetables and developing the habit to treat water using physical or chemical methods have paramount importance in order to reduce the prevalence of protozoan infection. Copyright © WJSRR, all rights reserved.

Key words: Intestinal Protozoa, risk factors, prevalence of protozoan and protozoan infection

Introduction

It is estimated that as much as 60% of the World's population is infected with intestinal parasites, which may play a significant role in morbidity due to intestinal infections. Intestinal parasitic infections are among the most common Worldwide. It is estimated that some 3.5 billion peoples are affected, and 450 millions are ill as a result of these infections. The rate of infection is remarkably high in sub-Saharan Africa, where the majority of HIV and AIDS cases are concentrated. The incidence of intestinal parasitic infections is 50% in developed countries, where as it reaches up to 95% in developing countries (Haileeyesus and Beyene, 2009)

Parasitic diseases are incriminated in causing more than 33% of global deaths of which intestinal parasitic infections are believed to take the major share. Lack of safe drinking water and environmental sanitation are largely responsible for more than 800 million expected case of diarrheal disease and 4.5 million associated deaths in many developing countries every year. Morbidity and mortality due to diarrheal disease in developing countries remain to be the main public health problems that need due attention (Eyasu.*et al.*, 2010).

Intestinal parasitic infections are among the major health problems in sub-Sahara Africa. Apart from causing mortality and morbidity, infections with intestinal parasites has been associated with stunting of linear growth, physical weakness and low educational achievement in school children (Mengistu and Berhanu, 2004)

In Ethiopia due to poverty, low level of environmental sanitation, and ignorance of simple health promotion; the disease remain the most serious public health problems such as malabsorption, poor working capacity, poor knowledge and morbidity rate .Intestinal protozoan are frequently transmitted by unhygienic habits that include direct transfer of ova or cysts to mouth, eating with unwashed hands, eating and dirking of contaminated food and dirking and poor sanitary conditions (Tadesse. *et al.*,2004).

The study of parasites has more importance to developing countries where the social and economic condition require great deal of improvement in terms of better clothing, shelter, food provision of wells, latrines and sewage and other waste disposal facilities together with the means of controlling vectors. The tropical or the semi-tropical nature of places where most of the people of the developing nations live not only provides better environmental conditions for larval development of parasites than that of the temperate regions where most of the developed countries are found, but also provides better conditions for the multiplication of vectors(Mohammed and Waqtola, 2006). The survey reviled that among student who gives stool samples for microscopic examination, most are positive for intestinal protozoan. Therefore, this survey is an indicative of the existence of the problem in the students placed at Wollega University, which requires further investigation of the prevalence of the intestinal protozoan infection.

Materials and Methods

Study area and population

The study was conducted in Wollega university located in East Wollega Zone; West Ethiopia; Nekemte town. Nekemte town is located at latitude and longitude of 9°5'N36°33'E and an elevation of 2,088m.a.s.l at a distance of 331 km from the capital city Addis Ababa. The average temperature ranges 14 to 26°C and annual rain fall of 1854.9mm (<http://en.wikipedia.org/wiki/Nekemte>.,2013).

Study design and sampling procedures

Cross-sectional study design was conducted from March16 to April 31, 2013 at Wollega University using structured questioner survey and stool examination. The sample size was determined using the single proportion population formula $n = (Z\alpha/2)^2 P(1-P)/d^2$, since the overall prevalence rate (P) of intestinal parasite is not known in the study area; (p) was taken as 50%. For the calculation a 95% confidence interval (z) and a 5% margin of error (d) was used.

Where: n= number of sample size

P=prevalence of intestinal protozoan (50%)

D=marginal error between the sample and population (0.05)

Z $\alpha/2$ =Critical value at 95% certainty (1.96)

The calculated study population size was 350 students who are visiting Wollega university clinic and ordered for stool examination.

Selection of study subjects

Students who only visit the Wollega university clinic and ordered to give stool sample by the nurses for stool examination; who are not treated for intestinal protozoa parasite 3 months before.

Stool sample collection and examination

From each student, about 2g of fresh stool samples was collected using small clean and labeled clean plastic container, toilet tissue paper, pieces of applicator sticks from all students. As soon as the stool samples presented all specimens was checked for their label, quantity, time, procedure of collection and a portion of the specimen was processed and stool examinations was done in the medical laboratory found in the institute using direct technique (saline and iodine mounts) and formol-ether concentration technique to identify and detect each stage of intestinal parasites in less than 20 min of stool sample collection.

Data analysis

Data entry and analysis was done using SPSS version 20 computer software. The base line characteristics of the study population summarized using medians and ranges for continuous variables, simultaneously proportions and frequencies for categorical variables. Internal comparison was made using logistic regression to determine the independent effect of the variables by calculating the strength of the association between infection and risk factors using odds ratio (OR) and 95% confidence interval (CI). Crude and adjusted OR will be computed using bivariate and multivariate logistic regression analysis respectively.

Results

Prevalence of intestinal parasites

A total of 350 students of Wollega University attending the clinic took part in the study and were included in the present analysis. Of these, 214 (61.0%) were male and 136 (39.0%) female. Majority of the study subjects were reside in rural 227(64.7%). Microscopic stool sample examination using wet mount and formol-ether concentration technique showed that infections with various intestinal protozoan parasites were common in students of Wollega University. Out of the 350 students examined, three species of intestinal protozoa and other protozoan were identified with an overall prevalence of 70 (19.9%). The most prevalent intestinal protozoa identified were *E. histolytica/dispar* 111(31.6%), *G. lamblia* 44 (12.5%), *Cryptosporidium parvum* accounts 8 (2.3%) other intestinal parasites accounts 30 (8.5%). Table 1 below summarizes the prevalence of intestinal protozoan.

Table 1: Prevalence of major protozoan in Wollega University

Species	No. positive (%)	No. negative (%)
<i>E. histolytica/dispar</i>	111(31.6)	239 (68.3)
<i>G. lamblia</i>	44(12.5)	306(87.4)
<i>Cryptosporidium parvum</i>	8(2.3)	342 (97.7)
Others	30 (8.5)	320 (91.4)

Table-2 below summarizes the prevalence intestinal protozoan infection in different age groups, sex, residence; the washing habit of vegetables and water treatment.

Table 2: Prevalence of intestinal protozoan infection

Risk factors	Total positive (%)	Total negative (%)
Age		
15-20	30 (8.6)	109(31.1)
21-25	37(10.60)	153(43.7)
26-30	3 (0.86)	18(5.14)
Sex		
Male	44 (12.6)	170 (48.6)
Female	26(7.4)	111(31.7)
Residence		
Urban	23(6.6)	101(28.9)
Rural	47(13.4)	179 (51.1)
Washing vegetables		
Yes		
No	41(11.7)	177(50.6)
	29(8.3)	104(29.7)
Water treatment		
Yes	25(7.1)	110(31.4)
No	45(12.6)	171 (48.6)

The association between the risk factors indicated in this study Residence, age, sex, washing vegetables, water treatment and intestinal protozoan infection is calculated using OR at $\alpha=0.05$ and 95%CI. According to this finding there is an association between the prevalence of intestinal protozoan infection and the risk factors such as Age, sex ,residence, washing vegetables and water treatment at $P<0.01$ which is summarized on Table-2.

Table 3: Determination of the risk factors using OR

Risk factors	Total positive (%)	Total negative (%)	P-value	OR (95% CI)
Sex				
Male	44 (12.6)	170 (48.6)	0.717	0.82 (0.53, 1.55)
Female	26(7.4)	111(31.7)		
Residence				
Urban	23(6.6)	101(28.9)	0.637	0.73(0.50, 1.52)
Rural	47(13.4)	179 (51.1)		
Washing vegetables				
Yes			0.495	0.59(0.49, 1.42)
No	41(11.7)	177(50.6)		
	29(8.3)	104(29.7)		
Water treatment				
Yes	25(7.1)	110(31.4)	0.597	0.7 (0.50, 1.49)
No	45(12.6)	171 (48.6)		

Discussion

The prevalence of intestinal protozoan parasites among the undergraduate students of Wollega University was carried out between June, 2008 and May, 2009 to investigate the occurrence of intestinal protozoan parasites among the students. From the results, a total of 350 students were examined for various intestinal protozoan parasites and an overall prevalence of 70 (19.9%) was found (Table-1 and 2). Thirty seven (10.6%) within the age group 21-25 years old were most infected with different protozoan parasites, while the least infected were within the age group 26-30 years of age 3(0.86%). The current finding of intestinal protozoan infection is lower the report made by Ngele, 2012 who had find 68% intestinal protozoan infection from his work carried out on the undergraduate students of akanu ibiam federal polytechnic, unwana, ebonyi state Nigeria. though the prevalence is lower (0.86%), still those students at the age of 26-30 harbor less protozoan infection which is similar with the findings of Ezeama, 2007 reported in his work carried out among student at Enugu where 32-36 years old students were found to harbor the least of intestinal protozoan parasites (42.3%). The reason for the differences being that those within 26- 30 years old had low level of personal hygiene as against those within 31 – 35 years of age who are more matured and had better understanding of personal hygiene than those within 21-25 years of age (Okeke *et al*; 2001).

Entamoeba histolytica had the highest prevalence of infection (31.6%) among the students, as against (2.3%) prevalence of *Cryptosporidium* which was the least among the students which is comparable with the finding of Ngele, 2012 who reported higher prevalence of *Entamoeba histolytica* that accounted (26.5%). *Entamoeba histolytica* is transmitted through houseflies and cockroaches which carry the infective cysts and depositing it on human foods and water mainly in unhygienic or dirty environments. The students' hostels are quite un kept and houseflies and cockroaches are commonly seen within the environment.

The prevalence of intestinal protozoan infection in relation to sex according to this study indicated that higher in male (12.6) students than female students which is against the findings of Ngele, 2012 who indicated higher prevalence in female infected (36.0%) than males 18.3%. Ezeama and Umeche (2007) also showed higher prevalence of in female than male, which is in contrary to current finding. This is might be due to females had better understanding of personal hygiene than male as well as the used to eat vegetable after properly washing them.

This study also indicated that the prevalence of intestinal protozoan infection higher among students from rural areas (13.4%) than students from urban areas (6.6%). The students from rural areas are engaged in dirty environment and they usually uses river or spring waters which are not properly treated hence the prevalence is higher. Unable to washing vegetables before eating and treatment of water physically or chemically can also increases the prevalence of intestinal protozoan infection (Table-2).

Conclusion

Intestinal protozoan infection was highly prevalent and important health problem among students of Wollega University. Among intestinal protozoan *E. histolytica/dispar* takes the higher prevalence and followed by *G.*

lamblia. Cryptosporidium is the least prevalent protozoan in the University. Age, sex, residence, washing vegetables and treatment of water were found to have an association with the intestinal protozoan infection.

Recommendations

Based on the above facts the followings are recommended

- ✓ Male Students should maintain proper personal hygiene
- ✓ Students should adapt washing vegetables before using them
- ✓ Water for drinking should be well treated with physical or chemical means before drinking
- ✓ The students who come from rural area should visit the student clinic for intestinal protozoan infection as soon as they arrive to Wollega University

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