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Intestinal parasitic infections and associated factors among HIV/AIDS patients at Gulu regional referral hospital art clinic, Northern Uganda

Kalyetsi Rogers[1*], Odongtoo Simon[1], Zawedde Racheal[1], Nyiraguhirwa Deborah[1], Asiki Stephen[1], Ogule Jacob[1], Byaruhanga Aggrey[2], Temper Benjamin[3], Wewedru Izale[2]

[1]Department of Medical Laboratory Sciences, Faculty of Medicine, Mbarara University of Science and Technology, P.O. Box 1410 Mbarara Uganda.
[2]Uganda Institute of Allied Health and Management Sciences – Mulago, P.O. Box 34025, Kampala Uganda.
[3]Makerere University, P.O. Box 7062 Kampala, Uganda
*Corresponding author: Kalyetsi Rogers
E-mail; kalyetsirogersm@gmail.com & rkalyetsi@must.ac.ug
Telephone; +256-782081992 and +256705461612

ABSTRACT

Intestinal parasitic infections create a huge concern in the management and care of HIV positive people in Uganda. Understanding the prevalence and associated factors is vital for proper planning and patient management. To assess the prevalence of intestinal parasites and associated factors among HIV/AIDS patients at Gulu Regional Referral Hospital, a cross-sectional study was carried out. Three hundred twenty-nine participants were recruited using simple random sampling technique on consenting. Stool specimens were examined microscopically and macroscopically for intestinal parasites. A semi-structured questionnaire was used for demographic data collection and analysis was done using STATA software version 14.0. Prevalence of intestinal parasites was 25.8%; Isolated parasite species were *Entamoeba histolytic, Giardia lamblia, Cryptosporidium parvum, Ascaris lumbricoides, Hymenolepsis nana, Schistosoma Mansoni, Strongyloides stercolaris and* hookworm. History of abdominal pain (AOR= 12.12, 95% CI: 11.01-14.10, p-value <0.001), diarrhea (AOR= 11.1, 95% CI: 11.03-13.16, p-value 0.003), water source (AOR= 3.12, 95% CI: 2.91-4.31, p-value 0.02), and high viral load results (AOR= 2.9, 95% CI: 1.98-3.11, p-value 0.001) were associated with intestinal parasitic infections. Intestinal parasitic infections remain a health challenge among HIV/AIDs patients in the study area; *Entamoeba histolytic, Giardia lamblia,* and *Cryptosporidium parvum* being common intestinal parasites. History of diarrhea, abdominal pains, high viral load, unreliable safe water sources were associated with diarrhea in HIV/AIDS positive people in the study area. There is a need for health sensitization with emphasize on the importance of environmental sanitation and personal hygiene and enhancement of the prevailing opportunistic infection control interventions among HIV/AIDS positive people on Antiretroviral treatment (ART). Routine deworming and stool examination should be done during follow-up visits.

Keywords: Intestinal parasites; Prevalence; HIV/AIDs; Northern Uganda

INTRODUCTION

The prevalence of geohelminths and diarrhea infections remains high especially in Northern and Eastern Uganda even after highly active antiretroviral therapy (HAART) (Rubaihayo et al., 2016). Intestinal parasitic infections are among the most widespread of all chronic human infections worldwide (Girum, 2015); they are associated with acute and chronic diarrhea in human immunodeficiency virus (HIV) disease. The virus significantly weakens the immunity of the body rendering it susceptible to various opportunistic parasitic infections (Olopade and Idowu, 2017; Jegede et al., 2014).

Globally, the HIV/AIDS epidemic is a major public health challenge (United Nations Programme on HIV/AIDs, 2017). Sub-Saharan Africa is one of the regions adversely affected by this epidemic with an estimated 22 million adult patients (Ng'eno and Mwangi, 2014); 1.4 million people are estimated to be living with HIV/AIDS in Uganda (Uganda Ministry of Health, 2017). HIV positive patients in resource poor settings continue to suffer from opportunistic infections due to several factors including late diagnosis, sub-optimal HAART use, poor adherence, dug resistance, poverty, poor nutrition, high exposure to infectious agents (Moges and Kassa, 2014).

In Uganda, the prevalence of geohelminths and diarrheal infection among HIV/AIDS positive patients on ART is 23.5% and 14.3% respectively (Rubaihayo et al., 2016). Intestinal parasitic infections are associated with poor sanitation, lack of access to clean water, inadequate health services and poverty resulting in high morbidity and mortality throughout the country (Adu-Gyasi et al., 2018). Northern Uganda region has high prevalence of HIV at 7.2% above National level of 6.0% (Uganda Ministry of Health, 2017); the region also has limited access to safe and reliable water sources and low coverage of hand washing facilities despite efforts by the ministry of health and ministry of water and environment in improving water sanitation and hygiene (Uganda Bureau of Statistics, 2014; Uganda Ministry of Health, 2017).

According to the Health Management Information System (HMIS) report of 2018, Gulu Regional Referral Hospital diarrheal cases were at 7,822 and intestinal parasitic infections reported at 5,494 persons for the general patients from January to December 2018 (Un published data). Stool analysis is not routinely done among HIV/AIDS patients attending ART clinic and therefore patients are treated clinically for diarrheal diseases. However, there was limited documented information about the prevalence and associated factors of intestinal parasitic infections among HIV/AIDS patients.

Such information can guide public health bodies to make informed decisions to better check further spread within the general population and underlie the necessity of early diagnosis and management in order to prevent the health complications among HIV/AIDS patients. The present study therefore aimed at filling the information gap by determining the prevalence and associated risk factors for intestinal parasitic infections among HIV/AIDS patients receiving HIV services at ART clinic of Gulu Regional Referral Hospital.

MATERIALS AND METHODS

Study area and design

A descriptive cross-sectional study was carried out at ART clinic, Gulu Regional Hospital located in North Uganda. The clinic has a total of 66,766 HIV/AIDS positive people under their care. The study established prevalence of intestinal parasitic infection and associated factors among HIV/AIDS patients at Gulu Regional Referral Hospital Northern Uganda in November to December 2019.

Sample size and study population

Three hundred twenty-nine male and female HIV participants registered and on HAART at Gulu Regional Referral Hospital were recruited into the study. Sample size was estimated using Kish (1965) formula based on estimated proportion of parasitic infection as 28.81% (Alemu et al., 2018), 95% confidence interval and maximum error at 5%.

Sampling technique

Consecutive non-probability sampling technique was used to recruit 329 HIV/AIDS study participants attending ART clinic upon consent. A pre-tested structured questionnaire was administered to collect qualitative data on socio-demographic, socio-economic characteristics and associated factors for intestinal parasitic infections among HIV patients.

Sample collection and laboratory processing

Each participant was provided with a sterile labeled screw capped stool container and informed on how to collect stool samples which were then delivered to the laboratory after stool collection. Samples were examined in Gulu Regional Referral Hospital Laboratory; stool samples were analysed macroscopically for consistency, colour and for the presence of adult parasites and microscopically using direct saline, iodine, formal ether concentration technique and modified Ziehl-Neelsen staining technique. Specimens were preserved in 10% formal saline.

Data analysis and management

Filled questionnaire were double checked by the research team for completeness and correctness at the end of the interview and at the end of each day of data collection. Primary and secondary field editing and data entry was done by the researchers and then database was created. Coded data was cleaned, edited and backed up and safely stored in a separate place.

Data were coded, entered into SPSS version 23, and exported to STATA version 14 and analyzed with guidance from qualified statistician. The prevalence of intestinal parasitic infection was calculated and presented in frequency, percentage and table form. The list of intestinal parasites isolated from HIV patients was presented in a table form.

Bivariate analysis was run using chi-square to establish factors associated with the prevalence of intestinal parasites using a 95% confidence interval. Factors with a p-value of less than 0.05 were considered statistically significant.

Ethical Consideration

Approval was obtained from Faculty Research Committee (Our Ref: MUST/MLS/031), Faculty of Medicine, Department of Medical Laboratory Science, Mbarara University of Science and Technology. Permission to conduct the study was obtained from the Gulu Regional Referral Hospital administration.

Individual written informed consent was obtained from the study participants. The information of the participants was treated confidential. Study participants whose samples were positive for intestinal parasites were linked for further management.

RESULTS

Socio-demographic characteristics of the study participants

A total of 329 study participants living with HIV/AIDS were recruited and screened for intestinal parasites during the study period. This information was gathered using standard questionnaire. Among them, 65.6% (216/329) were females and 34.4 % (113/329) were males. The age range of respondents was 17 – 54 years, mean 35.21±10.24, median 34, and mode of 28 and majority of respondents 50.2% (165/329) were urban dwellers (Table 1).

The prevalence of intestinal parasites

The general prevalence for intestinal parasitic infections among HIV/AIDS patients at Gulu regional referrals hospital ART clinic was 25.8% (85/329).

Out of the 85 intestinal parasites identified from microscopic examinations of stool samples, *Entamoeba histolytica* (cysts) contributed 43.5% (37/85), *Giardia lamblia* (trophozoites) 23.5% (20/85), *Cryptosporidium parvum* (oocyst) 14.1% (12/85) *Ascaris lumbricoides* (eggs) 8.3% (7/85), *Hymenolepsis nana* (ova) 4.7% (4/85), *Schistosoma Mansoni* (ova) 3.5% (3/85), *Strongyloides stercolaris* (larvae) 1.2% (1/85) and hook worm (ova) 1.2% (1/85) indicating that *Entamoeba histolytica* is the most predominant parasite responsible intestinal parasitic infections in the study population (Fig. 1).

Table 1. Socio-demographic characteristics of the respondents

Variables	Frequency (n=329)	Percentage (%)
Age (Mean=35.21, S. D=10.24, Median=34, Mode=28)		
Gender		
Male	113	34.4
Female	216	65.6
Religion		
Pentecostal	27	8.2
Protestant	67	20.4
Catholic	229	69.6
Muslim	6	1.82
Area of Residence		
Rural	164	49.8
Urban	165	50.2
Marital status		
Single	56	17
Married	192	58.4
Widowed	59	17.9
Cohabiting	22	7
Level of education		
No formal education	45	13.7
Primary	102	31
Secondary	106	32.2
Tertiary	76	23.1
Occupation		
Peasant	179	54.4
Student	8	2.4
Business	78	23.7
Formal employment	64	19.6
Level of income		
≤50,00/=	86	26.1
50,001-250,000/=	153	46.5
>250,000/=	90	27.4

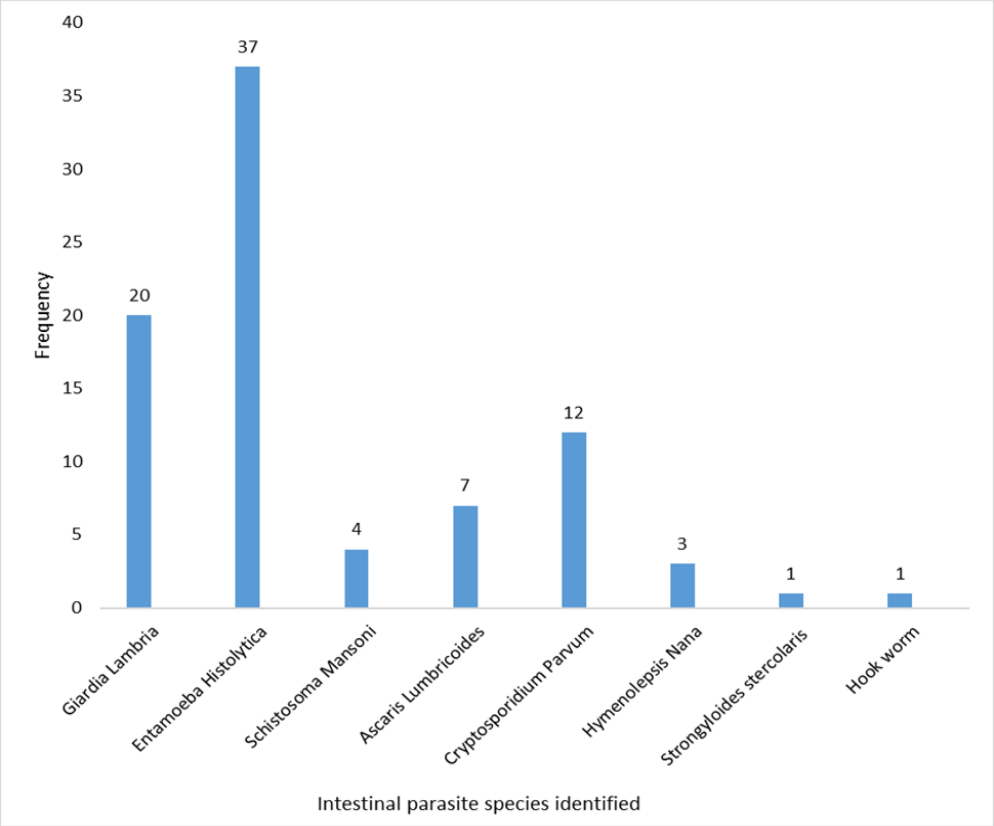

Fig. 1. A column graph showing frequency of intestinal parasite species identified among study participants

Socio-cultural, environmental and sanitation factors associated with intestinal parasitic infection among HIV/AIDS patients.

The study findings (Table 2) showed that having animals at home (x2=6.85, p value 0.009), the distance of water source less than 30 meters from latrine (x2=5.27, p value 0.02) and sharing water source with animals (x2=6.41, p value 0.03) were significantly associated with intestinal parasitic infection. Whereas having toilet/latrine at home (p-value 0.4), washing hand with soap after using latrine (p-value 0.11), washing hand before eating food (p-value 0.9), washing fresh fruit/vegetables before eating (p-value 0.71), doing any activity in water (p-value 0.6) and treating drinking water (0.09) were not significantly associated with intestinal parasitic infection among HIV/AIDS patients at Gulu regional referral hospital (Table 2).

Health related factors associated with intestinal parasitic infection among HIV/AIDS patients

The study findings showed that having history of abdominal pain and diarrhea in past one month were strongly associated with intestinal parasitic infections with x2=30.1, p-value-<0.001 and x2=31.9, p-value-<0.001 respectively. People with a viral load greater than 1000 copies/ml were significantly associated with intestinal parasitic infections (x2=5.31, p-value-0.02) (Table 3).

Table 2. Socio-cultural, environmental and sanitation factors associated with intestinal parasitic infection among HIV/AIDS patients

	Status of intestinal parasite infection			
Variables	**Positive (%)**	**Negative (%)**	**Chi-square (x^2)**	**p-value**
Do you wear any footwear				
Yes	34 (40.0)	131 (57.0)	4.73	**0.03**
No	52 (60.0)	113 (43.0)		
Do you have animals at home				
Yes	63 (74.1)	139 (57.0)	6.85	**0.009**
No	22 (25.9)	105 (43.0)		
Do you have toilet/latrine at home				
Yes	83 (97.6)	233 (95.5)	0.69	0.4
No	2 (2.4)	11 (4.5)		
Do you wash hands with soap after using latrine				
Yes	70 (82.4)	183 (75.0)	2.43	0.11
No	15 (17.6)	61 (25.0)		
Do you wash hands before eating food				
Yes	80 (94.1)	230 (94.3)	0.01	0.9
No	5 (7.1)	14 (5.7)		
Do you wash fruits before eating				
Yes	61 (71.8)	178 (73.0)	0.13	0.71
No	24 (28.2)	66 (27.0)		
Do you do any activity in water				
Yes	22 (25.9)	42 (17.2)		
No	63 (74.1)	202 (82.8)	3.52	0.6
How far is water source from latrine				
<30 meters	34 (40.0)	64 (26.2)	5.27	**0.02**
>30 meters	51 (60.0)	180 (73.8)		
Do you share water with animals				
Yes	26 (30.6)	71 (29.1)	6.41	**0.03**
No	59 (69.4)	173 (70.9)		
Do you treat water before drinking				
Yes	63 (74.1)	200 (82.0)	2.87	**0.09**
No	22 (25.9)	44 (18.0)		

Health related factors associated with intestinal parasitic infection among HIV/AIDS patients

The study findings showed that having history of abdominal pain and diarrhea in past one month were strongly associated with intestinal parasitic infections with x2=30.1, p-value-<0.001 and x2=31.9, p-value-<0.001 respectively. People with a viral load greater than 1000 copies/ml were significantly associated with intestinal parasitic infections (x2=5.31, p-value-0.02) (Table 3).

While respondents whose home were greater than 5 kilometers from the facility (p-value 0.24), getting health education from home (p-value 0.1), getting health education from health facilities (p-value 0.53), having their stool sample tested for presence of intestinal parasitic infection (p-value 0.67), and being treated for any intestinal parasitic infection (p-value 0.88) were not statistically significantly associated with intestinal parasitic infections.

Multivariate analysis for the independent factors associated with intestinal parasite infections among HIV/AIDS patients

At multivariate analysis (Table 4), The variable with p value of <0.05 were included in multivariate analysis. Patients who had history of abdominal pain were 12.12 times more likely to be diagnosed with intestinal parasites (AOR= 12.12, 95% CI: 11.01-14.10, p value <0.001) and those who had history of diarrhea were 11.1 times likely to be diagnosed with intestinal parasites (AOR= 11.1, 95% CI: 11.03-13.16, p value 0.003). The patients who shared water source with animals (AOR= 3.12, 95% CI: 2.91-4.31, p value 0.02) and those who had a viral load greater than 1000 copies/ml (AOR= 2.9, 95% CI: 1.98-3.11, 0.001), had significant positive association with prevalence of intestinal parasitic infections.

Table 3. Health related factors associated with intestinal parasitic infection among HIV/AIDS patients

Variables	Status of intestinal parasites infection			
	Positive (%)	**Negative (%)**	**Chi-square (x^2)**	**p-value**
Distance from home to health facility				
≤ 5km	52 (61.2)	132 (54.1)	1.37	0.24
> 5km	33 (38.8)	112 (45.9)		
Do you get health education from home				
Yes	34 (40.)	126 (51.6)	2.6	0.12
No	51 (60.0)	118 (48.4)		
Do you get health education from Health Facility				
Yes	80 (94.1)	224 (91.8)	0.39	0.53
No	5 (5.9)	20 (8.2)		
When was your viral load last done				
<6 months	60 (70.6)	181 (74.2)	0.87	0.64
≥6-12 months	20 (23.5)	53 (21.7)		
>12 months	5 (5.9)	10 (4.1)		
What was your last viral load results				
<1000 copies	52 (61.2)	179 (73.4)	5.31	**0.02**
>1000 copies	33 (38.8)	65 (26.6)		
Do you have a history of diarrhoea in the past 1 month				
Yes	62 (72.9)	88 (36.1)	31.9	**<0.001**
No	23 (27.1)	156 (63.9)		
Do you have a history of abdominal pain in past 1 month				
Yes	74 (87.1)	128 (52.5)	30.1	**<0.001**
No	11 (12.9)	116 (47.5)		
Has your stool ever been examined				
Yes	19 (22.4)	62 (25.4)	0.17	0.67
No	66 (77.6)	182 (74.6)		
Ever been treated for any intestinal parasites				
Yes	39 (45.9)	114 (46.7)	0.023	0.88
No	46 (54.1)	130 (53.3)		

Table 4. Multivariate analysis for the independent factors associated with prevalence of intestinal parasites among HIV patients.

	Status of intestinal parasites				
Variables	**Positive (%)**	**Negative (%)**	**Chi-square (x^2)**	**Adj. OR (95% CI)**	**p-value**
The last viral load results					
<1000 copies	52 (61.2)	179 (73.4)	1	1	
>1000 copies	33 (38.8)	65 (26.6)	5.31	2.9 (1.98-3.1)	0.02
Having history of abdominal pain					
No	11 (12.9)	116 (47.5)	1	1	
Yes	74 (87.1)	128 (52.5)	31.9	12.1 (11.01-14.1)	<0.001
Having a history of diarrhoea					
No	23 (27.1)	156 (63.9)	1	1	
Yes	62 (72.9)	88 (36.1)	30.1	11.1 (11.03-13.6)	0.003
Sharing water source with animals					
No	59 (69.4)	173 (70.9)	1	1	
Yes	26 (30.6)	71 (29.1)	6.41	3.1 (2.9-4.3)	0.02

DISCUSSION

Intestinal parasitic infections remain a health challenge among HIV/AIDS patients in Uganda. Information on the prevalence of intestinal parasitic infections in an area is vital for public health bodies to better check further spread within the general population. Such data underlie the necessity of early diagnosis and management in order to prevent the health complications among HIV/AIDS patients. The present study determined the prevalence of intestinal parasitic infection and associated factors among HIV/AIDS patients attending ART clinic at Gulu Regional Referral Hospital Northern Uganda.

The general prevalence of intestinal parasitic infections was 25.8% implying that intestinal parasitic infections remain a health challenge in HIV/AIDS patients in Northern Uganda. The intestinal parasite species identified were *Entamoeba histolytica* (cyst), *Giardia lamblia* (trophozoites), *Cryptosporidium parvum* (oocyst), *Ascaris lumbricoides* (larvae),

Hymenolepsis nana (ova), *Schistosoma Mansoni* (ova), *Strongyloides stercolaris* (larvae) and hook worm (ova) (Fig. 1).

The present study findings are in conformity with findings from other studies by Mengist et al, (2015); Missaye et al, (2013); Olopade and Idowu, 2017. The current situation could be attributed to geographical location of study area being in the tropical region that favors survival of ova for most intestinal helminthes and cysts of protozoan parasites, immunosuppression brought about by HIV, inadequate access to health services, lack of access to safe and reliable sources of water and poor personal hygienic practices. Public health measures should continue to emphasize the importance of environmental sanitation and personal hygiene as well as provision of safe drinking water will reduce the incidence of parasitic infections in the study population and the general population. Routine stool examination during follow-up of patients attending ART clinic for early diagnosis and management could help prevent and minimize spread of parasitic infections in the general population.

History of abdominal pain, diarrhea, sharing water source with animals and high viral load count had significant association with prevalence of intestinal parasitic infections. Having animals at home, the distance to water source of less than 30 meters from latrine and sharing water source with animals were significantly associated with intestinal parasitic infections (Table 4). The study findings are in conformity with findings from other studies by Mengist et al, (2015); Missaye et al, (2013); Singh and Singh, (2015); Olopade and Idowu, 2017). Discouraging sharing homes with domestic animals and routine deworming could help minimize or prevent transmission of zoonotic parasitic infections; Provision of safe and reliable sources of water and discouraging sharing of water sources with animals is vital in this study area if parasitic infections are to be minimized.

Study participants with a viral load results of greater than 1000 copies/ml were likely to suffer from intestinal parasitic infections compared to their counterparts with viral load less than 1000 copies/ml. This is attributed to the effect of the virus on the immune status of the patients whereby a high viral load is associated with a high immunosuppressive effect hence compromising the body's ability to fight infections. Interventions like counseling and follow up of HIV/AIDS positive people on ART to promote adherence to Antiretroviral treatment could play a vital role in prevention of opportunistic infections among immunosuppressed HIV/AIDS patients on ART at Gulu Regional Referral Hospital Northern Uganda.

CONCLUSION

Intestinal parasitic infections remain a health challenges among HIV/AIDs positive people attending ART clinic at Gulu Regional Referral hospital, Northern Uganda with 25.8% prevalence; *Entamoeba Histolytica*, *Giardia Lamblia*, and *Cryptosporidium parvum* were the main intestinal parasite species responsible for ill health. Lack of safe and reliable sources of water, history of diarrhea and abdominal pain, high viral load and sharing water sources with animals were significantly associated with parasitic infections in the study area.

RECOMMENDATIONS

There is need for sensitization with emphasize on the importance of environmental sanitation and personal hygiene as well as provision of safe drinking water and enhancement of the prevailing opportunistic infection control interventions among HIV/AIDS positive people on ART.

Stool examination should be routinely performed in the follow-up of patients with HIV/AIDS attending ART clinic for early diagnosis and for better patient management.

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CONFLICT OF INTEREST

All authors declare no conflict of interest in the study.

SUBMISSION DECLARATION AND VERIFICATION

The authors declare that this manuscript is original, has not been published before and is not currently being considered for publication elsewhere.

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