International Journal of Scientific Reports
Muleta BK et al. Int J Sci Rep. 2021 Sep;7(9):448-453
http://www.sci-rep.com
pISSN 2454-2156 | eISSN 2454-2164
DOI: https://dx.doi.org/10.18203/issn.2454-2156.IntJSciRep20213259

Original Research Article

Prevalence of intestinal parasites and its association factors, knowledge, attitude and practice about intestinal parasite among HIV positive individuals in Saint Peter TB specialized hospital Addis Ababa, Ethiopia

Birhanu K. Muleta[1]*, Asmare M. Wube[2], Yeabkal D. Teka[2], Mistre W. Gebre[1], Biruk Z. Zerfu[1]

[1]Department of Medical Laboratory, College of Health Sciences, Addis Ababa University, Ethiopia
[2]Directorate of national laboratory and capacity building,Ethiopian Public Health Institute (EPHI), Addis Ababa, Ethiopia

Received: 04 June 2021
Revised: 13 August 2021
Accepted: 17 August 2021

***Correspondence:**
Birhanu K. Muleta,
E-mail: birhanukassaye03@gmail.com

ABSTRACT

Background: Intestinal parasitic infections and HIV/AIDS have been the leading and persisting public health problems in the world. There vital causes of morbidity and mortality are remarkably high in Sub-Saharan Africa.
Methods: A cross-sectional study was conducted among patients attending Saint Peter hospital from December 2019 to May 2020. A total of 328 participants were select by using convenient sampling method. Socio-demographic data and knowledge, attitude and practice were collected using a structured questioner. Stool specimen was collected using clean container and processed and analyzed for parasitological examination using direct wet mount, formal-ether sedimentation and modified Ziehl-Neelsen (ZN) staining techniques. Venous blood was collected and the CD4+ T-lymphocyte and hemoglobin analyzed by Presto instrument. The data were analyzed by using SPSS version 23 and p values less than 0.05 were considered statistically significant.
Results: A total of 328 HIV-positive individuals (59.8% female) of age ranging from 13-72 years (mean=41.8, SD=10.8) participated in this study. The overall prevalence of intestinal parasites among the study participants was 26.2% (86/328), from this 88.4% (76/86) was infected by single parasite. IP was significantly associated with CD4 count <200 AOR (4.736 CI: 2.338-9.594; p<0.001) and also anemia AOR (3.271 CI: 1.069-10.010).
Conclusions: Intestinal parasitic infections are still common health problems among HIV/ADIS patients in the study area, so the health professionals need to give attention to parasitological examinations in the routine treatment of HIV/AIDS patients and also give education on these three parts knowledge, attitude and practice, but more focus and follow up on the practice of HIV/AIDS patients on transmission, prevention and control mechanisms of intestinal parasitosis.

Keywords: Intestinal parasite, HIV/AIDS, Saint Peter TB specialized hospital, Ethiopia

INTRODUCTION

Intestinal parasitic infections are widely distributed in the world. The rate of infection is remarkably high in developing countries because of low socio-economic and poor living conditions.[1] Parasitic infections are an important cause of morbidity and mortality, especially with the emergence of immunosuppressive diseases such as human immunodeficiency virus (HIV/AIDS).[2]

The causative agents of intestinal parasites are varied from patient to patient and from country to country due to

different reasons. Some of them are endemicity, geographical distribution and also the immune status of the patient.[3] The most common enteroparasitoses in patients with HIV/AIDS are caused by *Strongyloides stercoralis*, nematodes and intestinal coccidian.[4] All these lead to greater morbidity and mortality because of opportunistic infections, opportunistic infections can be of viral, bacterial, fungal or parasitic origins which usually affect the gastrointestinal.[5]

About 80% of deaths of HIV/AIDS patients are associated with opportunistic infections rather than the virus itself and of these, more than 47% happen due to OIPs (opportunistic intestinal parasites).[6] Opportunistic protozoan parasites such as *Cryptosporidium* species, *Isospora belli* and *Microsporidia* have been identified in individuals living with HIV/AIDS.[6]

METHODS

Sampling procedure

A cross-sectional study was conducted from December 2019 to May 2020 at St. Peter's specialized hospital, Addis Ababa, Ethiopia to identify and determine intestinal parasites among individuals living with HIV/AIDS. The study populations were all HIV-positive individuals who meet the inclusion criteria and gave assent/permission during the study period. All individuals on ART and volunteered to give consent/assent to participate were included in the study. Individuals who were taking anti-parasitic medications within the past two weeks, those with a history or diagnosis of anemia and also individuals who were under the ART regimen were excluded from the study because it was known to produce anemia.[7]

A convenient sampling technique was employed to include study participants who meet the inclusion criteria. Samples were collected consecutively until the required sample size was achieved based on a previous study performed at Alert hospital that reported the prevalence of intestinal parasites in-ART patients 26.5%.[8] The sample size was determined at a 95% level of confidence (z=1.96) and 5% margin of error (d) using the single proportion formula,

$$n=\frac{Z^2_{\alpha/2}P\,(1-P)}{d^2}.$$

Questionnaire

Socio-demographic characteristics, clinical presentation, treatment history and other variables of the study participants were collected using a structured questionnaire after written informed consent/assent was obtained. Data collectors were identified, trained and informed to collect the data as per the pre-structured questionnaire.

Laboratory analysis

Direct wet mount method

After the collection of stool specimens from each patient was examined by direct wet mount method using normal saline (0.85% NaCl solution) at St. Peter's specialized hospital laboratory. Lugol's iodine was used to detect the cyst of intestinal protozoan parasites. The remaining sample was preserved with 10% formalin and examined by formol-ether concentration technique and modified ZN method.[9]

Formol-ether concentration technique procedures

Formol-ether concentration technique was performed from each stool specimens collected from the study participants. Using a stick, an estimated 1 g (pea-size) of representative feces was emulsified in about 4 ml of 10% formol water contain in a screw-cap tube. The emulsified feces were sieved and 4 ml of diethyl ether will add. The sediment at the bottom of the tube was transferred to a slide and cover with a cover glass. Then the preparation was examined microscopically using the 10× and 40× objective lenses.[9]

Modified ZN method procedures

Smear from the remaining sediment was stain using modified ZN method. It was stained with carbolfuchsin for 15 min after air-dried and fixed with methanol for 2-3 min. The stain was decolorized with 1% acid alcohol for 15s and counterstain with methylene blue for 30-60 seconds then the preparation was examined microscopically using the 10× and 40× objective lenses.[9]

CD4 and hemoglobin analysis by BD FACS Presto

When blood was introduced into the BD FACS Presto cartridge, the specific antibodies bind to the surface antigens on the T lymphocytes and monocytes during the incubation period. When the stained cartridge was inserted into the counter, the dedicated software identified and counts the CD4+ T lymphocyte absolute and percentage cells and calculated the hemoglobin concentration. The cartridge also contained immobilized antibodies as a quality control measure which the instrument used to ensure that the reagents were present and sufficient blood specimen volume had been added.[10]

Data analysis and interpretation

For data entry and analysis, SPSS version 23 statistical software was used. The data was summarized and organized using graphs, tables and texts. The Chi square was used to see the association. Odds ratios (OR) and their 95% confidence intervals (CI) were estimated using bivariate and multivariate logistic regression analysis to identify possible explanatory variables on occurrence of intestinal parasites. The result at p value 0.05 was considered as statistically significant.

Ethical considerations

Ethical clearance was be obtained from the departmental research and ethics review committee of Addis Ababa university college of health sciences, school of sciences, department of medical laboratory sciences. Then a letter informing St. Peter's specialized hospital and permission was obtained from St. Peter's specialized hospital to access data from the study population. All eligible subjects were informed as their participation was voluntary and information obtained at any course of the study was kept confidential. For children, less than 18 the study aim was explained to all mothers/guardians and then informed assent was obtained from each child's mother/guardian, after explaining the research work, its confidentiality, protection and anonymity of data. Positive results were made available to clinicians for decision-making as early as available.

RESULTS

Socio-demographic characteristics of study subjects

During the study period, 328 were included in the study with a 100 % response rate. Among 328 study participants, 132/328 (40.2%) were male and 196/328 (59.8%) were female. The study participants had age ranges between 13 and 72 years with a mean age of 41.80 years (SD=10.8). The majority of the participants were within the age range of 40-49 (114/328; 34.8%), at primary (1-8) educational level (192/328; 58.8%).

Clinical characteristics

The overall proportion of subjects with diarrhea was 35 (10.7%) and parasitic infection among patients with acute diarrhea was higher 7/14 (50.0%) than patients with chronic diarrhea 2/14 (14.3%), the majority of the participants CD4 counts 152/328 (46.3%) were between 200-500 cells/µl. Among CD4 count <200cells/µl, 200-500 cells/µl and >500 cells/µl, respondents, 35 (40.7%), 27 (31.7%) and 24 (27.9%) were positive for intestinal parasites respectively. From the total (328) ART initiated HIV positive respondents, stage one, stage two stage three was 95.4% (82/86, 2.3% (2/86) and 2.3% (2/86) respectively positive for an intestinal parasite (Figure 1).

The distribution of parasite species

The overall prevalence of intestinal parasites was 26.2% (86/328), specifically *Entamoeba histolytica*/dispar 11.3% (37/328), *Giardia intestinalis* 7.0% (23/328) and *Taenia* species 8.0% (8/328) was seized the majority among the study participants. From all, 88.4% (76/86) were infected by single parasites, (*E. histolytica*/dispar 48.7% (37/76), *G. intestinalis* 30.3% (23/76), *Taenia* species 10.5% (8/76), *Ascaris lumbricoides* 3.9% (3/76), *S. stercoralis* 5.3% (4/76) and *Hymenolepis nana* 1.3% (1/76) (Figure 2).

Knowledge, attitude and practice of study participants towards intestinal parasitosis

All study participants were interviewed for their knowledge, attitude and practices (KAPs) towards intestinal parasitosis and of the 89.9% (295/328) had good knowledge about the intestinal parasites, way of transmission, prevention of intestinal parasitosis and treatment of intestinal and remaining 10.1% (33/328) had poor knowledge. Among the total, 328 (81.1%) of participants had information on what intestinal parasites are.

Table 1: Prevalence of intestinal parasites and its association with socio-demographic and clinical factors on selected variables at St. Peter's TB specialized hospital Addis Ababa, Ethiopia.

Variables		No. of study participant	No. of individuals with IPs		COR (95% CI), p value	AOR (95% CI), p value
			Positive	Negative		
Wash hand after toilet	Yes	283	68	216	1	
	No	44	18	26	2.199 (1.137-4.254) 0.019	1.443 (0.527-3.953), 0.476
Knowledge	Good knowledge	295	66	229	1	1
	Poor knowledge	33	20	13	5.338 (2.521-11.301), <0.001	9.32 (3.902-22.27), <0.001
CD4 category	<200	62	35	27	4.861 (2.447-9.541), <0.001	4.736 (2.338-9.594), <0.001
	200-500	152	27	125	0.810 (0.439-1.495), 0.500	
	>500	114	24	90	1	1

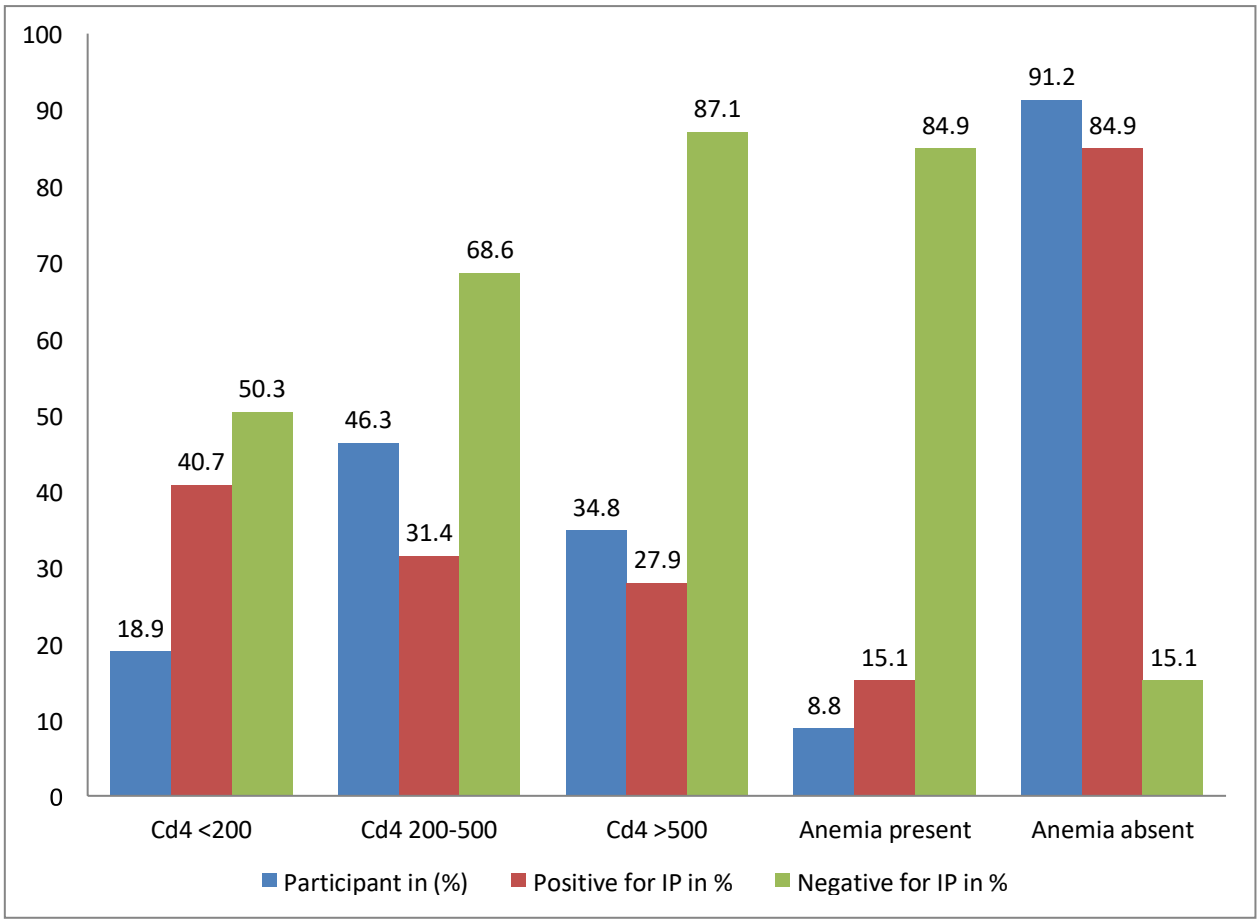

Figure 1: Intestinal parasite in relation to anemia and CD4 count study participant in St. Peter's TB specialized hospital Addis Ababa, Ethiopia.

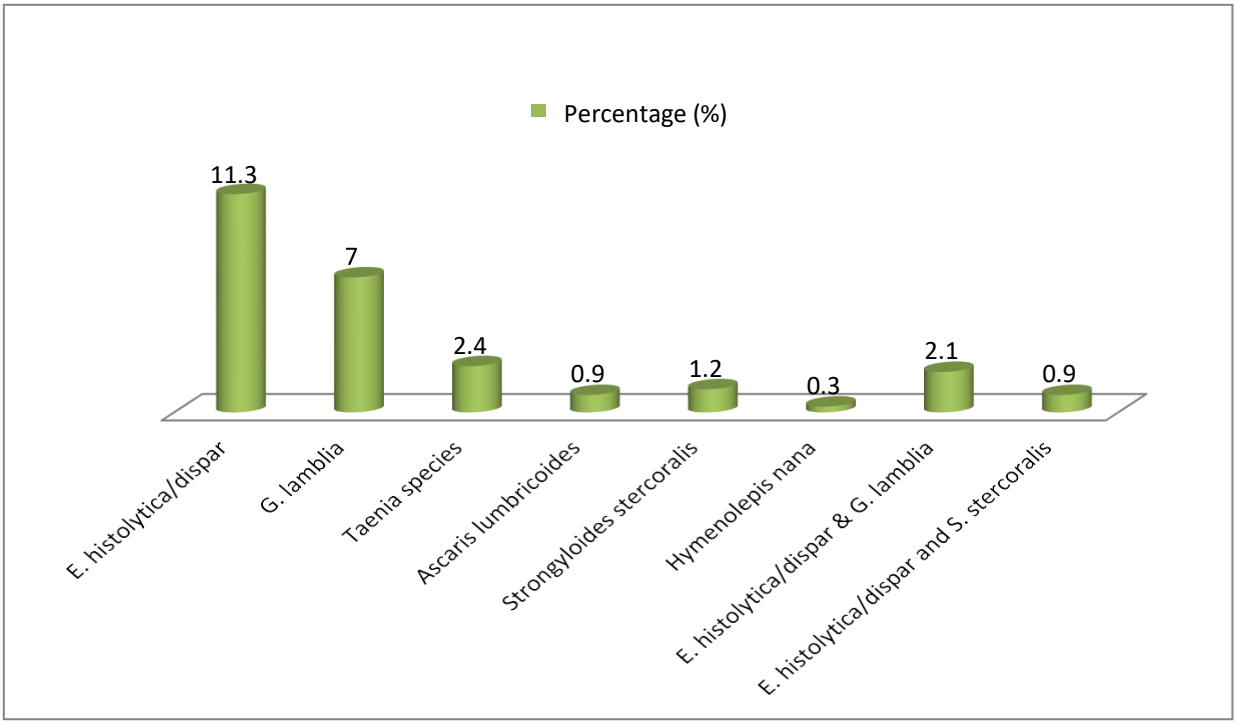

Figure 2: Distribution of intestinal parasites in the study participants in St. Peter's TB specialized hospital Addis Ababa, Ethiopia.

The overall practice of participants towards transmition, treatment and prevention and control of intestinal parasites are illustrated in Table 1. Of the 10 questions that were asked to measure practice towards intestinal parasite, from this 277/328 (77.7%) was a good practice, wash your hand after the toilet (86.3%), cut or clean fingernail (87.2%), take medication for intestinal parasite (75.9%), on the other hand, 73/328 (22.3%) participant were bad practice to on transmit ion, treatment and prevention and control on the intestinal parasite.

Multivariate analysis

Intestinal parasitic infection was significantly associated with CD4 count <200 AOR (4.736 CI: 2.338-9.594); p<0.001), not cutting or cleaning fingernail AOR (3.438 CI: 1.381-8.560; p=0.008), having diarrhea AOR (4.810 CI: 1.510-15.322; p=0.010), having moderate anemia AOR (3.271 CI: 1.069-10.010; p=0.038), poor knowledge AOR (9.323 CI: 3.902-22.279; p<0.001) and bad practices AOR (5.730 CI: 2.767-11.868; p<0.001). The remaining nine (current residence, sex, eat row and/or unwashed fruit, eat raw meat, defecate on an open field, abdominal pain, diarrhea condition and anemia status were failed to associate significantly with intestinal parasites in the multivariate model (Table 1).

DISCUSSION

In this study, the prevalence of intestinal parasite and their associated factors and the participant knowledge, attitude and practice on intestinal parasites was investigated. The overall prevalence rate of intestinal parasites was 26.2%. This prevalence was higher than the study conducted at Benin city Edo state Nigeria (18%), Kombolcha North Central Ethiopia (13.9%), Debre Markos referral hospital Northwest Ethiopia (24.2%), Dessie hospital ART clinic Northeast Ethiopia (17.6%), and hospital Kano Nigeria (11%).[11-15]

This study was lower than the prevalence of intestinal parasites reported from Felegehiwot referral hospital Bahir Dar Ethiopia (36%), Hiwot Fana specialized university hospital Eastern Ethiopia (33.7%), Arba Minch hospital in Southern Ethiopia (28.18%), Butajira Ethiopia (35.9%) and Addis Ababa Ethiopia (35.8%).[16-18] This difference might be due to variations reason such as sample size, study period, lifestyles and study participants might have good KAP for the prevention and control of intestinal parasites. On the other hand, this study result was almost similar to a report from St. Mary Aksum general hospital Tigray Ethiopia (26.4%), Debretabor general hospital Northern Ethiopia (25.3%), and Maputo, Mozambique (26.4).[19,20]

This study showed that patients who did not cut or clean fingernail were almost 3.4 times more likely (AOR 3.438 CI: 1.381-8.560, p=0.008) to have parasitic infection than those who had a habit of hand cut or clean fingernail, at the same time those with the participant did not good knowledge almost 9.3 times more likely AOR (9.323 CI: 3.902-22.279, p<0.001) to have the intestinal parasitic infection than the participant have good knowledge. Likewise, those with the HIV patient did not good the practice was 5.7 times AOR (5.730 CI: 2.767-11.868, p<0.001) to have the intestinal parasitic infection than those who have a good practice on the way of transmission, prevention and control of intestinal parasite.[21] A participant who had diarrhea was 4.8 times more likely AOR (4.810 CI: 1.510-15.322, p=0.010) to have had an intestinal parasitic infection than those who had formed stool and the result is similar to studies done in St. Mary Aksum general hospital, Tigray, Ethiopia.[22]

Limitations

To complete this study we faced some limitation like a hospital-based cross-sectional study certainly introduced selection bias making generalization impossible, we did not include highly active antiretroviral therapy naive patients, we used only single stool samples were collected from each participant and this study were not used other special technique such as Kato-Katz to identify intestinal helminth it may increase the current result of intestinal helminth, molecular techniques, immune-fluorescent techniques which was sensitive for parasites.

CONCLUSION

Intestinal parasitic infections are still common health problems among HIV/ADIS patients in the study area, so the health professionals give to attention parasitological examinations in the routine treatment of HIV/AIDS patients. Most of the participants in the study area had a positive attitude and good knowledge about intestinal parasite but the some of the participants had not good practice so the health educator or health worker gives education on this three parts (KAP), but more focus and follow up on the practice of HIV/AIDS patients on transmission, prevention and control mechanisms of intestinal parasitosis.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the institutional ethics committee

REFERENCES

1. Asires A, Wubie M, Reta A. Prevalence and associated factors of intestinal parasitic infections among food handlers at prison, East and West Gojjam, Ethiopia. Adv Med. 2019;2019:2101089.
2. Kumma WP, Meskele W, Admasie A. Prevalence of intestinal parasitic infections and associated factors among food handlers in Wolaita Sodo university students caterings, Wolaita Sodo, Southern Ethiopia: a cross-sectional study. Front Public Health. 2019;7:140.

3. Kaniyarakkal V, Mundangalam N, Moorkoth AP, Mathew S. Intestinal parasite profile in the stool of HIV positive patients in relation to immune status and comparison of various diagnostic techniques with special reference to cryptosporidium at a tertiary care hospital in South India. Adv Med. 2016;2016:3564359.
4. Barcelos N, Dias R, Filho HM, Rodrigues R. Opportunistic and non-opportunistic intestinal parasites in HIV/AIDS patients in relation to their clinical and epidemiological status in a specialized medical service in Goiás, Brazil. Rev Inst Med Trop Sao Paulo. 2018;60:13.
5. Nwokediuko S, Bojuwoye B, Onyenekwe B. Apparent rarity of cryptosporidiosis in human immunodeficiency virus (HIV)-related diarrhea in Enugu, South-Eastern, Nigeria. Niger Postgrad Med J. 2002;9(2):70-3.
6. Curry A, Turner AJ, Lucas S. Opportunistic protozoan infections in human immunodeficiency virus disease: review highlighting diagnostic and therapeutic aspects. J Clin Pathol. 1991;44(3):182-93.
7. Koduri PR, Parekh S. Zidovudine-related anemia with reticulocytosis. Ann Hematol. 2003;82(3):184-5.
8. Taye B, Desta K, Ejigu S, Dori G. The magnitude and risk factors of intestinal parasitic infection in relation to human Immunodeficiency virus infection and immune status, at Alert Hospital, Addis Ababa, Ethiopia. Parasitol Int. 2014;63(3):550-6.
9. Cheesbrough M. District laboratory practices in tropical countries, part 1. United Kingdom: Cambridge University Press; 2009.
10. Bdbiosiences.com. 2017. Availablefrom https://clinicaltrials.gov/ct2/show/NCT02396355.
11. Akinbo FO, Okaka CE, Omoregie R. Prevalence of intestinal parasites in relation to CD4 counts and anemia among HIV-infected patients in Benin City, Edo State, Nigeria. Libyan J Med. 2010;5.
12. Gebretsadik D, Haileslasie H, Feleke DG. Intestinal parasitosis among HIV/AIDS patients who are on antiretroviral therapy in Kombolcha, North Central, Ethiopia: a cross-sectional study. BMC Res Notes. 2018;11(1):613.
13. Missaye A, Dagnew M, Alemu A, Alemu A. Prevalence of intestinal parasites and associated risk factors among HIV/AIDS patients with pre-ART and on-ART attending Dessie hospital ART clinic, Northeast Ethiopia. AIDS Res Ther. 2013;10(1):7.
14. Gietaneh W, Agegne A, Gedif G. Prevalence of intestinal parasites and associated factors among HIV patients who had follow up at Debre Markos referral hospital, Northwest Ethiopia, from 2015-2019. Res Square. 2019.
15. Jegede EF, Oyeyi ET, Bichi AH, Mbah HA, Torpey K. Prevalence of intestinal parasites among HIV/AIDS patients attending infectious disease hospital Kano, Nigeria. Pan Afr Med J. 2014;17:295.
16. Kiros H, Nibret E, Munshea A, Kerisew B, Adal M. Prevalence of intestinal protozoan infections among individuals living with HIV/AIDS at Felegehiwot referral hospital, Bahir Dar, Ethiopia. Int J Infect Dis. 2015;35:80-6.
17. Gedle D, Kumera G, Eshete T, Ketema K, Adugna H, Feyera F. Intestinal parasitic infections and its association with undernutrition and CD4 T cell levels among HIV/AIDS patients on HAART in Butajira, Ethiopia. J Health Populat Nutr. 2017;36(1):15.
18. Alemu G, Alelign D, Abossie A. Prevalence of opportunistic intestinal parasites and associated factors among HIV patients while receiving ART at Arba Minch Hospital in southern Ethiopia: a cross-sectional study. Ethiopian J Health Sci. 2018;28(2):147-56.
19. Gebrewahid T, Gebrekirstos G, Teweldemedhin M, Gebreyesus H, Awala A, Tadla K. Intestinal parasitosis in relation to CD4 count and anemia among ART initiated patients in St. Mary Aksum general hospital, Tigray, Ethiopia. BMC Infect Dis. 2019;19(1):350.
20. Kindie Y, Bekele S. Prevalence and risk factors for intestinal parasite infections in HIV/AIDS patients with anti-retroviral treatment in South West Ethiopia. J Trop Dis. 2016;4:3.
21. Ahmed KS, Siraj NM, Fitsumberhan H, Isaac S, Yohannes S, Eman, et al. Knowledge attitude and practice (KAP) assessment of intestinal parasitic infection among school children in Asmara, Eritrea. Scientif Res. 2017;9(1):57-68.
22. Pullan RL, Smith JL, Jasrasaria R, Brooker SJ. Global numbers of infection and disease burden of soil-transmitted helminth infections in 2010. Parasite Vectors. 2014;7(1):1.

Cite this article as: Muleta BK, Wube AM, Teka YD, Gebre MW, Zerfu BZ. Prevalence of intestinal parasites and its association factors, knowledge, attitude and practice about intestinal parasite among HIV positive individuals in Saint Peter TB specialized hospital Addis Ababa, Ethiopia. Int J Sci Rep 2021;7(9):448-53.