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Prevalence of intestinal parasitosis, KAP and associated risk factors among people living with HIV/AIDS attending at ART clinic in Debre brehan referral hospital, Debre brehan, Ethiopia

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This is to certify that this thesis prepared by Tassew Tefera Shenkutie, entitled: **Prevalence of intestinal parasitosis, KAP and associated risk factors among people living with HIV/AIDS attending at ART clinic in Debre brehan referral hospital, Debre brehan, Ethiopia** submitted in partial fulfillment of the requirements for degree of Master of Science in Clinical Laboratory Science (Diagnostic and Public Health Microbiology Specialty) complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

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List of Abbreviations

AIDS	Acquired Immunodeficiency Syndrome
ART	Antiretroviral therapy
CD	Cluster of Differentiation
CI	Confidence Interval
DBRH	Debre Brehan Referral Hospital
DRERC	Department of Research and Ethics Review Committee
HAART	Highly active antiretroviral therapy
HIV	Human immunodeficiency virus
IP	Intestinal parasitosis
IPI	Intestinal parasitic infection
KAP	Knowledge, attitude and practice
OI	Opportunistic infection
PI	Principal Investigator
PLWHA	People Living With HIV/AIDS
SPSS	Statistical package for social science
TND	Target not detected
WHO	World Health Organization

Abstract

Background: Intestinal parasites (IP) cause a significant morbidity and mortality in most developing countries throughout the world and relatively a high burden was seen in those living with HIV/AIDS.

Objective: To determine the magnitude of intestinal parasites, KAP and associated risk factors among people living with HIV/AIDS attending ART clinic in Debre brehan referral Hospital, Debre brehan, Ethiopia.

Materials and methods: A total of 350 study participants were enrolled in the study. An institution based cross-sectional study design was implemented from March 01, 2019 to August 30, 2019. Structured questionnaire was used to collect socio demographic data, KAP (knowledge, attitude and practice on IP) and clinical data. Stool sample was collected and processed using direct microscopy, formol-ether concentration and modified acid fast laboratory techniques in DBRH laboratory. Data was analyzed using SPSS version 20 and $p < 0.05$ was considered as statistically significant.

Results: The overall prevalence of intestinal parasites among HIV/AIDS patients was 20.3% (71/350). Among this *E. histolytica/dispar* takes the highest rank (13.4%) followed by *G.lamblia* (2.9%) whereas Hook worm *(*0.8%), *Ascaris lumburcoids (*0.8%), *Hymenolepis nana (*0.6%), *Tanea species* (0.6%) and *Strongyloid stercoralis* (0.3%) were identified less frequently. Lack of latrine and high viral load count was significantly associated with intestinal parasitosis. Regarding to knowledge, attitude and practice of participants, 46.8% had poor knowledge, 84.5% had positive attitude and 91.8% had good practice on prevention and control of intestinal parasite. In addition, bad health practice of the participants had significant association with intestinal parasitosis (AOR = 2.88, 95% CI: 1.2, 6.88).

Conclusion: The overall prevalence of intestinal parasites in this study was low and lack of latrine, high viral load count and bad health practice was significantly associated with intestinal parasitosis. The association of lack of latrine and bad health practice initiates the need for awareness creation in the study area.

Key words: Intestinal parasites, HIV/AIDS, Prevalence, Debre brehan, Ethiopia.

1. Introduction

1.1. Back ground

Intestinal parasitosis is a gastrointestinal infection mainly caused by helminthes and protozoa (1). The multi cellular helminthes and unicellular protozoa are the major classes of parasites (2). Epidemiological studies shows that both helminthes and protozoa are prevalent in developing countries while protozoan parasites are more common cause of gastrointestinal infections compared to helminthes in developed countries. In general, Intestinal parasites cause a significant morbidity and mortality in developing countries throughout the world (3, 4).

Helminthes are multicellular worms such as; Nematodes (roundworms), cestodes (tapeworms) and trematodes (flatworms) are among the most common helminthes that inhabit the human gut (5). Soil-transmitted helminthes including: *Ascaris lumbricoides* (roundworm), *Trichiuris trichiuria* (whipworm), *Enterobius vermicularis* (pin worm), *Strongyloid stercoralis*, *Ancylostoma duodenale* and *Necator americanus* (hookworms) are also responsible for gastrointestinal infection (1, 6). *Entamoeba histolytica/dispar*, *Giardia lamblia*, *Cryptosporidium parvum*, *Isospora belli*, *Cyclospora cyatanensis* and *Microsporidium* species are among the protozoan parasite species which are most prevalent in tropical and subtropical regions of the developing world where adequate water and sanitation facilities are not sufficient (5, 7-10).

Currently, HIV/AIDS pandemic is a major public health crisis of the world. An estimated 37 million adults and children are living with the virus worldwide (11). Sub-Saharan Africa is one of the most affected regions by this pandemic (12). HIV /AIDS has the capacity to weaken the human immune system through target destruction of T helper(CD4) lymphocytes which have a vital role in coordination of the immune system of the human body (13, 14). HIV-associated immunodeficiency often results in the appearance of opportunistic infections (11, 15).

Gastrointestinal parasitic infections are prominent and common features of Human Immunodeficiency Virus infection (HIV), causing significant morbidity and responsible for some of Acquired Immune Deficiency Syndrome (AIDS)-related deaths (16). Co-infections of HIV and opportunistic parasites, including intestinal protozoa and helminthes are a great concern

in resource-poor settings where the health status of the population is generally poor and these opportunistic parasites are very common (10, 14).

Opportunistic parasites play an important role as a cause of disease and are one of the most common causes of morbidity and mortality in HIV/AIDS patients (15). Opportunistic parasitic infections affecting HIV-infected individuals can be caused by both protozoa and helminthes (14). These opportunistic parasitic infections are not only associated with symptomatic HIV-infected patients but also are more evident with decreasing immune status. *Cryptosporidiosis*, *Isosporidiosis* and *Microsporidiosis* are among the main enteric/intestinal opportunistic parasitic infections (13, 17, 18).

The increased prevalence of intestinal parasite in developing countries is highly associated with KAP (knowledge, attitude and practice) of individuals on prevention and control measures of intestinal parasitosis (19). Immunocompromised persons like HIV/AIDS patients with poor knowledge and bad practice for IP prevention are more susceptible to opportunistic and non-opportunistic parasitic infections (17). Consequently, the significance of awareness on intestinal parasitic infection is fundamental in preventing the transmission of intestinal parasites among people living with HIV/AIDS (20). The presence of good knowledge, positive attitude and good practice towards intestinal parasitosis is also instrumental for designing and implementing effective community-based prevention and control strategies (21).

Even though there has been an improvement in the survival of PLWHA through the provision of large scale ART Service in Ethiopia, there are still a considerable number of deaths related to AIDS across the country (16). Intestinal parasitosis was known to be one of the most common causes of morbidity and mortality among PLWHA due to depletion of immunity (3). Like other developing countries, intestinal parasites are commonly distributed in Ethiopia due to poor knowledge of IP prevention, the low level of environmental and personal hygiene, contamination of Food and drinking water as results of improper disposal of human excreta (20). However, information on the prevalence of IP, knowledge, attitude and practices (KAP) about intestinal parasitic infections and associated risk factors among PLWHA is deficient in the study area and providing such information is important for planning, implementing integrated and effective prevention and control measures, communication and social mobilization work (19).

1.2. Statement of the problem

According to different studies, it is an estimated that 3.5 billion people are affected with one or more intestinal parasites. Of which 450 million suffer from associated severe morbidity worldwide (22, 23). IP is the most prevalent infectious disease in developing countries where there are socioeconomically poor communities, poor environmental sanitation, overcrowding and inadequate access to safe water (22-26). *Entamoeba histolytica/dispar, Ascaris lumbricoides, Ancylostoma duodenale* and *Trichiuris trichiuria* are among the most common parasites in the world (5). According to the World Health Organization (WHO) estimates, there are 800–1000 million persons infected with *A. lumbricoides,* 700–900 million persons with Hookworm infections, 500 million with *T. trichiuria*, 200 million with *Giardia intestinalis* and 500 million infected with *E. histolytica/dispar* cases globally. Despite recent effort to control intestinal parasite infections, the diseases are still the leading causes of mortality and morbidity in the world (12, 22, 27).

Gastrointestinal infections are very common in HIV/AIDS patients (15, 20). Diarrhea is a common clinical manifestation of these gastrointestinal infections. About 30-60% of AIDS patients in developed countries and 90% of AIDS patients in developing countries develop diarrhea (4, 23, 28). The presence of opportunistic parasites such as *Cryptosporidium parvum*, *Cyclospora cayetanensis, Isospora belli* and *Microsporidia* are major cause of illness in patients with HIV/AIDS (15, 28, 29). Although they are not considered as opportunistic parasites; *E. histolytica/dispar, G.lamblia, T.trichiuria, A.lumburcoides* and *A.duodenale* are also frequently encountered in developing countries among AIDS patients (15, 23).

Now a days, HIV/AIDS has become one of the most devastating infectious diseases to have been emerged in the world (4). There are about 36.9 million People infected with HIV/AIDS globally; among these sub-Saharan Africa accounts for more than half (22.4 million) (10, 11). In Ethiopia, it has a prevalence of 2.4% (30, 31). Similarly, Intestinal Parasitic Infection (IPI) is endemic worldwide and has its contribution to the occurrence of HIV infection and plays a vital role in the prognosis of people living with HIV/AIDS (PLHA) (30). Almost 80% of AIDS patients die from AIDS-related infections rather than HIV infection itself. Opportunistic parasites become aggressive and cause debilitating illness in HIV/AIDS patients (8, 16). If such co-infections are

not diagnosed and prognosed properly, dramatically enhance the more rapid progression to AIDS (4, 16).

Co-infections of HIV and opportunistic parasites, including intestinal protozoa and helminthes are great concerns in resource-poor settings where the health status of the population is generally poor and these opportunistic parasites are very common (32). The resultant effect of such parasitic infections include chronic diarrhea, weight loss and malnutrition, which has been associated with death among AIDS patients (14, 33). Moreover, intestinal parasites contribute to protein and iron deficiencies, an increment in health costs, as well as long-term deleterious effects (7, 8).

Recent studies have stated that parasitic infections could disturb the balance of anti-HIV immune responses and contributed to HIV replication, which could accelerate progress to AIDS (34). The reduced immune response caused by HIV infection might also lead to a higher susceptibility to parasitic infections (23). Such co-infections present with more severe clinical symptoms compared to parasite infections of healthy people are more difficult to treat (35). Although HIV is becoming a major public health concern, Parasite - HIV co-infections are one of the neglected areas in HIV research activities (14, 34).

In developing countries, health practices like poor personal and environmental hygiene, poor nutrition, overcrowding and climatic conditions were known to favor the survival and development of parasites and contributes to the high prevalence of infection among people (19). Poor sanitation and personal hygiene, low educational attainment and lack of clean water are also key factors contributing to increased prevalence of intestinal parasite infection (36).

Despite intestinal opportunistic parasitic infection is one of the major causes of morbidity and mortality among PLWHA, information in the magnitude of both pathogenic and opportunistic intestinal parasites among PLWHA in Debre brehan, Amhara region was limited. Knowledge, attitude and practice (KAP) and associated risk factors with intestinal parasitic infection were not comprehensively assessed. Hence, the aim of this study was to determine the magnitude of intestinal parasites, KAP and associated risk factors among PLWHA attending at ART clinic in DBRH, Ethiopia.

1.3. Significance of the study

- ☞ This study provides information on the magnitude of intestinal parasites among people living with HIV/AIDS as an evidence data that guides the health care providers to the best care and treatment approaches for HIV/AIDS patients in the study area.
- ☞ The study also provides information on knowledge, attitude and practice of HIV/AIDS acquired individuals about prevention and control of intestinal parasites and their transmission ways.
- ☞ The study identify the potential risk factors for the spread of intestinal parasitic infection among people living with HIV/AIDS, This can provide a hint for the provision of health education and effective prevention and control strategies for parasitic infection.
- ☞ The study also describes the parasite distribution and indicates the target parasite species to be focused on for further investigation by researchers.

2. Literature review

Intestinal parasitic infections have a global burden of about 3.5 billion persons infected that a huge number of infection is from developing countries where there is poor socio-economic status, poor personal and environmental hygiene and overcrowded living conditions. Currently, intestinal parasitic infection had been classified among the most prevalent neglected tropical diseases. This parasitic infections become more worse due to increased prevalence of HIV/AIDS (23).

The study of opportunistic parasitic infection in HIV/AIDS patients conducted in Pune, India from 2002 to 2007 shows that the overall enteric parasite prevalence was 35%, of which 62.5% were opportunistic and 37.5% were non opportunistic. Among the non-opportunistic parasites, 50% had *E. histolytica/dispar*, 22.2% had *A. lumburcoides*, 16.7% had *A. duodenale* and 11.1% had *Hymenolepsis nana*. Opportunistic parasites were *C. parvum* (53.3%), *I. belli* (36.7%), *Microsporidia* (6.7%) and *Cyclospora* (3.3%). Overall, *Cryptosporidium* (12%) was the most frequently encountered opportunistic pathogen. In general, most of the infections in patients with CD4 count <200 cells/µl were due to opportunistic pathogens. The results of this study highlight the importance of evaluation of HIV infected individuals with diarrhea for intestinal parasitic infections which may help in better management of these patients (15).

According to a cross-sectional study from September 2016 to February 2017 at Kathmandu hospital, Nepal on "Prevalence of intestinal parasitic infections among people living with HIV/AIDS"; the overall prevalence was 19.17% in PLHA and 10.81% in non-HIV patients. Prevalence was found highest in age groups ≤15, followed by age group ≥36 among study population. Prevalence was found higher in female than male. Prevalence of IPI among PLHA having diarrhea was significantly higher than that in subjects having other GIT disorders but difference was insignificant among non-HIV patients. Among 37 IPI positive cases of PLHA, 75.68% subjects revealed single intestinal parasites in their stool. Remaining 24.32% cases revealed more than one (poly) intestinal parasitic infection and protozoa was more prevalent than helminthes, 75.7% and 24.3% respectively. This study indicates that the higher prevalence of opportunistic protozoa among PLHA indicates the need of routine parasite investigation using sensitive methods so that it will be helpful for the proper therapeutic managements (4).

Another cross-sectional study from 15th November 2013 to 10th January 2014 in Pokhara, Nepal on patterns of intestinal parasitic infection in HIV/AIDS patients had results of total parasitic infection found to be 38(36.9%) out of 103 patients. Distribution of different intestinal parasite was *Entamoeba* 11 (25%), *Ascaris* 10 (22.7%), *Giardia* 7 (15.9%), *C. Parvum* 3 (6.8%), *Taenia* 3 (6.8%), *Isospora* 3 (6.8%), Hookworm 2 (4.5%), *Cyclospora* 2 (4.5%), *H. nana* 2 (4.5%) and *Microsporodia* 1 (2.2%) (23).

A case control study was done in a rural village of Fuyang, Anhui province, China in 2008. As a result, there was no significant difference in parasitic infection between HIV/AIDS positive and negative individuals. Among 605 study participants, the overall prevalence of intestinal helminthes infections was 29 (4.8%). Of which Hookworm were the most common parasites with 4.0% prevalence and prevalence of intestinal protozoa was 146 (24.1%) with the dominance of *B. hominis* 116 (19.2%) among HIV/AIDS positive individuals (34).

A study conducted in Brazil between June 2015 and March 2016 reveals that, As HIV/AIDS causes a progressive immunodeficiency condition characterized by depletion of CD4+ T-cells; patients with HIV/AIDS are 11.42 times more likely to develop parasitic infection than healthy individuals. Moreover; CD4+ T-cell counts (< 200 cells/ mm3) and viral load (between 10,001 and 100,000 cps/µl) increased the probability of diarrhea due to intestinal parasitic infection (OR: 1.434) and (OR: 4.911) respectively (17).

Different environmental, nutritional and immunological factors of the host affect the occurrence of different parasitic Co-infection and determine the establishment and the course of parasitic infections among HIV/AIDS patients. According to the study in University of Gondar, 2016 other factors also contributes to the more likely hood of intestinal parasitic infection; Washing hands before eating food and latrine availability were found to be significantly associated with the prevalence of intestinal parasitosis. Individuals who did not wash their hands before eating food were about 18 times more likely to be infected with parasites compared to their counter parts and those who didn't use Latrine were 6 times more affected by intestinal parasites than the latrine users (16).

A cross-sectional study by using Webe'sCromothrope stain and Kinyoun stain to detect the presence of *Microsporidia* and *Cryptosporidium species* respectively conducted at the HIV clinic of Federal Medical Centre, Nigeria; showed that among 231 PLWHA, 84 (36.4%) HIV patients had got at least one parasitic infection. Opportunistic parasites were dominant over the non-opportunistic parasites in this study. All the opportunistic intestinal parasites seen in the study were more prevalent in PLWHA with CD4+ cell count ≤ 200 cells/mm^3. *Cryptosporidium spp.* (80.8%), *Microsporidium spp*. (71.4%) and *S. stercoralis* (70.2%) were significantly higher in PLWHA with CD4+ count ≤ 200 cells/mm^3 compared to those with CD4+ count ≥ 200 cells/mm^3 (14).

A cross-sectional study conducted from December 2012 to February 2013 in Felegehiwot Referral Hospital, Ethiopia showed that the prevalence of enteric protozoan infections in on-ART patients was 25.5% (51/200), with 19% (38/200), 3.5% (7/200) and 3% (6/200) due to *E. histolytica/dispar*, *G. lamblia* and *Cryptosporidium species* respectively. With regard to the WHO clinical stage of the patients, most were in stage III 49.1% (196/399), followed by stage II 28.8% (115/399), stage I 19.3% (77/399), and stage IV 2.8% (11/399). The presence of associated opportunistic infections was seen in only 28 (7.02%) HIV patients out of the total study subjects (37).

According to a cross sectional study conducted in 2012 at ART clinic of Arbaminch Hospital, Ethiopia; the magnitude of intestinal parasites among 209 study participants was 95 (45.4%). Of them 57 (60.5%) and 38 (39.5%) were females and males respectively. The Parasite distribution among HIV/AIDS patients indicate that the highest was *G. Lamblia* 31 (32.6%) followed by *S. Stercoralis* 19 (20%), *A. luburcoides* 11 (11.6%), *E. vermicularis* 11 (11.6%) and H. worm 8 (8.4%) *(20).*

A comparative cross-sectional study at Dessie hospital from February 1 to April 30, 2012, Ethiopia shows that the prevalence of IP in pre-ART and on-ART was 39% and 17.6% respectively. From these the prevalence of protozoan and helminthes infections in pre-ART (on-ART) were 31% (12.5%) and 7.4% (5.1%) respectively. The prevalence of opportunistic intestinal parasites in pre-ART was 2.2% and from this 1.5% was *Cryptosporidium species* followed by *I. belli* 0.7%. But none of ART patients were identified with opportunistic parasitic

infection. The most prevalent intestinal parasite in both pre-ART and on-ART was *E. histolytica/dispar* with respective prevalence of 19.1% and 5.1%. Socio-demographic and clinical variables show significant associations, Being rural residence were almost 2 times more likely to had intestinal parasite than those of urban residence (COR = 2.12; 95% CI: 1.13, 3.96) and farmers were almost 2 times more likely to harbour intestinal parasite than government employed (COR = 2.42; 95% CI:1.06,5.56,). Adult HIV/AIDS patients whose source of water were river/unprotected are almost 6 times (AOR = 6.03; 95% CI: 1.14, 31.97) more likely to be infected for intestinal parasite than those whose source of water is tape water (8).

A similar study was conducted in 2014 at Goncha Sisso Enessie woreda, East Gojjam, Ethiopia; the overall prevalence of IP both in the pre ART and ART study participants was 42.6%. From all Pre ART participants account 53.7% and the prevalence of IP on the ART study participants was 36.8%; of which helminthes (14.75%) and protozoan (22.1%). *A.lumburcoides* (8.8%) was dominant followed by cyst of *E. histolytica/dispar* (7.4%). Opportunistic IP on ART was 4.9% with distribution of *C. parvum* (3.9%), *I. belli* (0.5%) and *S. stercoralis* (0.5%). The overall prevalence of IP in the pre ART (53.7%) was higher than on ART (36.8%) study participants (3).

An institution-based cross sectional study at Hawassa University Hospital from May 2013 to March 2014, Ethiopia stated that from 491 HIV infected individuals the prevalence of intestinal parasitic infections was 35.8 % (176/491). Individuals infected with protozoa accounted for 28.1% while 11% were infected with helminthes. The most prevalent parasites were *Cryptosporidium* (13.2 %), followed by *E. histolytica/dispar* (10.2 %) and *G. lamblia* (7.9 %) (18).

A similar study was conducted at Butajira Hospital, Ethiopia, between September 2015 and May 2016. The overall prevalence of intestinal parasites among HIV/AIDS patients receiving HAART was 35.9%. Protozoa, helminthes and opportunistic intestinal parasites were observed in 57 (17.1%), 46 (14.4%) and 28 (8.7%) participants respectively. The most prevalent protozoan parasites, helminthes and opportunistic intestinal parasites among HIV/AIDS patients were *E. histolytica/dispar* (7.1%), *Tanea species* (7.4%), and *C. parvum* (5.9%) respectively(25). The study indicates that immune-compromised patients whose CD4 T cell lymphocytes less than 200

and 200–349 cells/µl were more likely to be infected with one or more intestinal parasites as compared to those who had above 500 cells/µl (AOR 4.02) and (AOR 2.84) respectively (25).

An institution based cross sectional study at University of Gondar, Ethiopia from March to May 2016 reveals that the overall prevalence of intestinal parasitosis among HIV/AIDS patients was 65 (29.1%). *E. histolytica/dispar* 19(8.5%) was the most predominant parasite detected followed by *A. lumburcoides* 15(6.7%) and *S. stercoralis* (3.6%). The prevalence of opportunistic intestinal protozoan parasites were 5.8% and from these *Cryptosporidium species* accounted 3.1% followed by *Cyclospora cyatanensis* 2.7%. Parasitic infections were higher on pre-ART 39.1 % (9/23) participants compared to on ART 28% (56/200). Higher parasitic infection 73.1% (49/67) was observed in study participants with CD4+ T-cell count of <200 cells/ul, whereas the parasitic infection was found to be 8.6% (5/58) in clients with a CD4+ T-cell count of >500 cells/ul (16).

3. Conceptual frame work

This conceptual frame work shows associated risk factors for intestinal parasitic infection. It is hypothesized that socio-demographic, environmental and clinical characteristics of the study population are predisposing factors for the acquisition of intestinal parasitic infection.

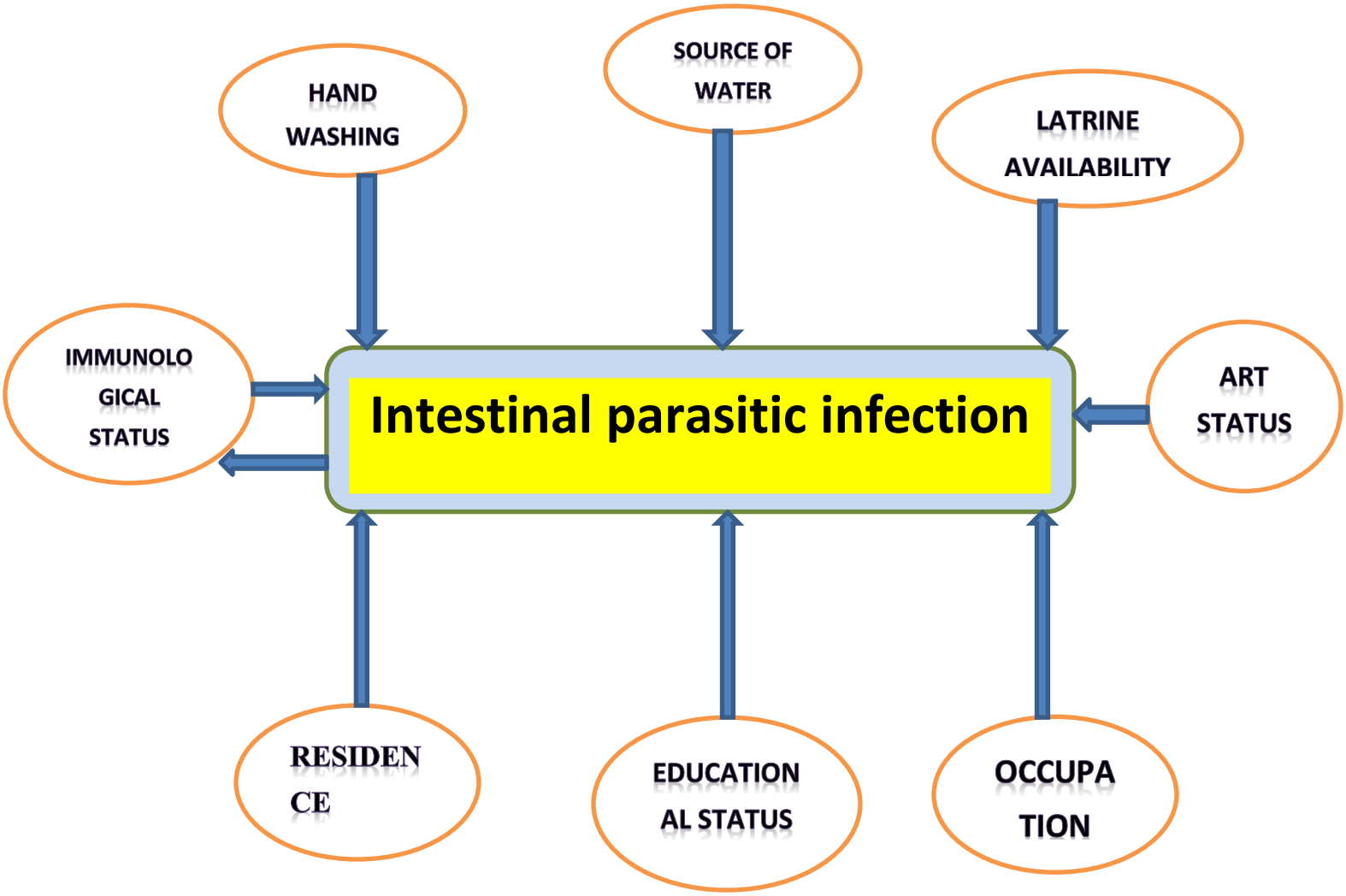

Figure 1. Conceptual frame work

4. Objectives of the study

4.1. General objective

- To determine the prevalence of intestinal parasites, KAP and associated risk factors among people living with HIV/AIDS in Debre brehan referral Hospital, Debre brehan, Ethiopia.

4.2. Specific objectives

- To determine the magnitude of intestinal parasites among people living with HIV/AIDS.
- To assess knowledge, attitude and practice of individuals towards intestinal parasitosis.
- To assess associated risk factors of intestinal parasitic infections among people living with HIV/AIDS

5. Hypothesis

- ☞ The magnitude of intestinal parasitic infection among people living with HIV/AIDS in Debre brehan referral Hospital is different from that of previous study conducted in University of Gondar Hospital.

6. Materials and Methods

6.1. Study site

The study was conducted at Debre brehan referral hospital which is found in Amhara regional state, central Ethiopia. Debre brehan is 130 Km far from the capital city of the country, Addis Ababa. The hospital first established as a health facility in 1937 by Italian to serve their soldiers during the 2nd Italian attempt to colonize Ethiopia. Then after, it has served the local community for many decades and upgraded to referral hospital in 2010. It is the only hospital in North Shewa Zone/Amhara/ that serves as a referral center for seven governmental district hospitals and two private hospitals. Moreover it provides health services for over two million people of Amhara, Afar and two woreda's of Oromia regions with more than 200 beds. It has a range of specialties including pediatrics, surgery, gynecology, psychiatry, ophthalmology and HIV care and outpatient clinics. There were 2950 people living with HIV/AIDS registered for ART care and treatment service in the Hospital during the study period. Debre brehan is situated at an altitude of 2840 metre above sea level with mean annual temperature ranges from 10 to 16 °C (38).The weather condition of the town and surrounding areas is relatively cold, dry and windy with two distinctive seasons summer and winter.

6.2. Study design and period

- Institution based cross-sectional study design was implemented from March 01, 2019 to August 30, 2019.

6.3. Target population

- All persons living with HIV/AIDS and permanent residents in the service catchment area of Debre brehan referral Hospital during the study period.

6.4. Source population

- All persons living with HIV/AIDS and visiting Debre brehan referral Hospital for any types of health services during the study period.

6.5. Study population

- All HIV/AIDS patients attending at the ART clinic in Debre brehan referral hospital during the study period, which fulfills the inclusion criteria, were recruited as a study population.

6.5.1. Inclusion criteria

- All HIV/AIDS patients those were registered for ART follow up program and volunteer to participate in the study and those who did not diagnosed or were not taking anti parasites treatment currently.

6.5.2. Exclusion criteria

- HIV/AIDS patients refused to participate in the study
- Patients on anti-parasitic therapy.

6.6. Study variables

A. Independent variables

- Age
- Sex
- Source of water
- Educational status
- Occupation
- Residence
- Toilet use
- Vegetable feeding habit
- Viral load count

B. Dependent variables

- Magnitude of intestinal parasites
- KAP

6.7. Sample size determination

The required sample size was calculated using single population proportion formula by referring a similar study in Gondar, 29.1% prevalence of intestinal parasites among HIV/AIDS clients in

University of Gondar Hospital (16), 5% desired precision and 95% confidence interval (CI) is considered.

Using a sample size calculation formula

$$=>n = z^2 * p\ (1-p)/d^2$$

Where n = sample size,

Z = Z statistic for a level of confidence (95% level of confidence; z=1.96),

P = expected prevalence or proportion

(*P*= 0.291 taken from similar study of University of Gondar Hospital, and

d = precision (in proportion of precision 5%, *d* = 0.05).

$n = 1.96^2\ 0.291(1-0.291)/0.05^2$

n= 317

- ⇨ 10% non-respondents will be added = 32
- ⇨ So based on the above calculation the total sample size of 317+32 = 349 ≈ 350 collected during the study period.

6.8. Sampling methods and procedures

On the present study, convenient sampling method was used. The sampling procedure was performed through selecting all the study participants in order of their coming to attend ART service during the study period. Each participants of the study, after consenting, was asked to be filled on a standard questionnaire and gave stool sample for investigation. Additionally, clinical information and viral load counts was taken from the physician record and laboratory result records respectively.

6.8.1. Stool sample collection

Fresh stool sample was collected with clean and wide mouthed plastic containers. Direct wet mount, Formol-ether concentration and smear for modified acid fast staining techniques were performed soon after collection. When the specimens were not processed immediately, we preserved them by formalin.

6.8.2. KAP of study participants

Knowledge, attitude and practices (KAP) related to intestinal parasitosis, transmission ways, prevention and control of the disease were gathered with structured questionnaire. The study participants were asked a total of 31 KAP questions, of which 10 were to assess their knowledge, 10 were to assess their attitude and the rest were to assess their practice about transmission and prevention of intestinal parasites. Knowledge and practice questions were organized as closed ended and it allowed the participants to answer either "yes/no" or "select from the given choices". Questions like "have you ever heard about intestinal parasitosis?" were used. And also attitude questions were arranged as closed ended and for these the participants expected to choose "agree, disagree or no idea". Questions like "Intestinal parasitic infection is communicable disease (agree, Disagree, No idea)" were included. The responses of each KAP questions were summarized as "good knowledge" for individuals answered >= 5 (50%) questions correctly, "positive attitude" for individuals answered >= 5 (50%) questions correctly and "good practice" for those answered >= 6 (50%) questions correctly otherwise, "poor knowledge", "negative attitude" and "bad practice" respectively.

6.9. Laboratory Analysis

6.9.1. Stool examination: Direct microscopy

A stool sample was collected in labeled cups from all study participants and a direct saline wet mount of each sample was done at the laboratory for motile trophozoites stage, ova, cyst and larvae stage of intestinal parasites. The wet mounts were examined under light microscope at 10X and 40X objectives (39).

6.9.2. Stool examination: Formol- Ether concentration technique

Formol-ether sedimentation techniques in which parasites are concentrated by gravity or centrifugal force and the most frequently used technique because it concentrates a wide range of parasites with minimum damage to their morphology. The procedure was performed by taking a portion of fresh stool sample. Briefly, 1 gram of stool sample was placed in a clean 15ml conical centrifuge tube containing 7ml formalin and stirred with applicator stick. The resulting suspension was filtered through a sieve into a centrifuge tube. After adding 3ml of diethyl ether to the formalin solution, then centrifuged at 3200 rpm for 3 minutes. The supernatant was poured away and the tube is being placed in its rack. Finally, smear was prepared from the sediment and observe it under microscope with a magnification of 100x and 400x objectives (8, 40).

6.9.3. Stool examination: Modified Ziehl Nelson method

A small portion of the fresh stool sample was processed for detection of opportunistic parasites using the modified Ziehl Nielsen method. Briefly, thin smear was prepared directly from sediment of concentrated stool and allowed to air dry. Then the slides were fixed with methanol for 5 minutes and it is stained with 1% carbol fuchsine for 30 minutes. After washing the slides in tap water, slides were being decolorized with 1% acid alcohol for 1–3 minutes and stained in 0.5% methylene blue for 1 minute. The slides were then washed in tap water and observed under light microscope with a magnification of 1000X (8).

6.10. Data Analysis

The data were entered and analyzed using SPSS version-20 software. The descriptive statistics mean, SD, percentage and frequency were calculated. The relative contribution of independent variables for the outcome variables was assessed using logistic regression. A P-value of less than 0.05 was considered as statistically significant association between the presence of intestinal parasites and each contributing factors. Finally, the results were presented in text, graphs and tables.

6.11. Quality Assurance

The questionnaires were checked for their consistencies and completeness on thirty five study participants in the same study population prior to the study period. The clients who participated

in the study were informed about an appropriate sample collection. Special emphasis was given to diarrhea stool samples by giving priority due to its less time stability of trophozoites in diarrheal stool sample. In addition, formed and semi-formed stool samples were preserved by formalin for further examination by microscope and concentration techniques in impossible conditions to process it immediately. Internal quality control was also performed for each of laboratory techniques.

6.12. Operational Definition

Good knowledge: Individuals who answered ≥50% of the knowledge questions in the questionnaire.

Poor knowledge: Individuals who answered <50% of the knowledge questions.

Positive attitude: Individuals who answered ≥50% of the attitude questions.

Negative attitude: Individuals who answered <50% of the attitude questions.

Good practice: Individuals who answered ≥50% of the practice questions that supports IP prevention activities.

Bad practice: Individuals who answered <50% of the practice questions.

6.13. Result dissemination

The result produced from this study submitted to the Department of Medical Laboratory Science, Addis Ababa University. The result will also be disseminated to Debre brehan referral Hospital, North Shewa zone health office, Debre brehan town administration health office and other concerned bodies related with this public health issue programs according to the university's and other ethical regulations. Finally, the full manuscript will be published at international or national peer reviewed journals.

6.14. Ethical consideration

The study was conducted with the approval of the ethical review committee of Addis Ababa University, College of Health Sciences, Department of Medical Laboratory Science. And also it was reviewed and accepted by the institutional review board of Debre brehan referral Hospital. Informed consent/assent was taken from each study participants. They were informed that they have full rights to withdraw consent/assent at any time. All personal information is being kept

confidential unless IP positive results given to the respective physician for clinical management of the patients based on the result.

7. Results

7.1. Socio-demographic Characteristics of the study population

A total of 350 study participants living with HIV/AIDS were enrolled in the study. Of which 46.6% (163/350) were males. Most of the participants, 77.7% (272/350) were urban residents. Majority of the study participant's age group was from 16-45 years 74.6% (261/350) and 62.9% (220/350) of them are married. Regarding the educational status of the study participants, 31.4% (110/350) learned in elementary school level and 27.4% (96/350) of them are in high school grades. Occupational status of most of the study participants were Merchants 16.9% (59/350), Government office employees 16.6% (58/350) and most of the them had monthly income of < 1000 birr with frequency of 46.6% (163/350) (Table 1)

Table 1. Socio-demographic characteristics of PLWHA at Debre brehan, Ethiopia from march 01 to august 30, 2019.

Variables		**Frequency**	**Percent**
Gender	Male	163	46.6
	Female	187	53.4
Residence	Urban	272	77.7
	Rural	78	22.3
Age group	<= 15	8	2.3
	16-30	123	35.1
	31-45	138	39.4
	46-60	67	19.1
	>= 60	14	4.0
Marital status	Married	220	62.9
	Single	91	26
	Divorced	31	8.9
	Widowed	8	2.3
Educational status	No reading and writting	34	9.7
	Reading and writing	41	11.7
	Grade 1 - 8 complete	110	31.4
	Grade 9 - 12 complete	96	27.4
	College and above complete	69	19.7
Occupation	Agriculture	52	14.9
	Merchant	59	16.9
	Office work	58	16.6
	Daily wage laborer	49	14
	Student	44	12.6
	Driver	29	8.3
	House wife	47	13.4

7.2. Prevalence and distribution of intestinal parasites

The overall prevalence of intestinal parasite among people living with HIV attending at ART clinic in Debre brehan referral hospital was 20.3% (71/350). Among this *E. histolytica/dispar* accounted the highest rank 47 (13.4%) followed by *G.lamblia* 10 (2.9%). Hook worm, *Ascaris lumburcoids*, *Hymenolepis nana*, *Tanea species* and *Strongyloid stercoralis* accounted the least frequency of infection having proportion of 3 (0.8%), 3 (0.8%), 2 (0.6%), 2 (0.6%) and 1 (0.3%) respectively.

Distribution of helminthes parasites were dominated by protozoan parasites which accounted helminthes 13 (17.6%) and protozoa 61 (82.4%) parasites. Most of the IPI were single infections 68 (95.8%). But, multiple infections were seen in 3 (4.2%) study participants. Two of the co-infections of multiple infections were *E. histolytica/dispar* with Hook worm and one was *E. histolytica/dispar* with *G. lamblia*. In this study, *Strongyloid stercoralis* was the only opportunistic parasite identified by direct microscopy 1/71 (1.4%). Almost all are non-opportunistic infections (Fig. 1).

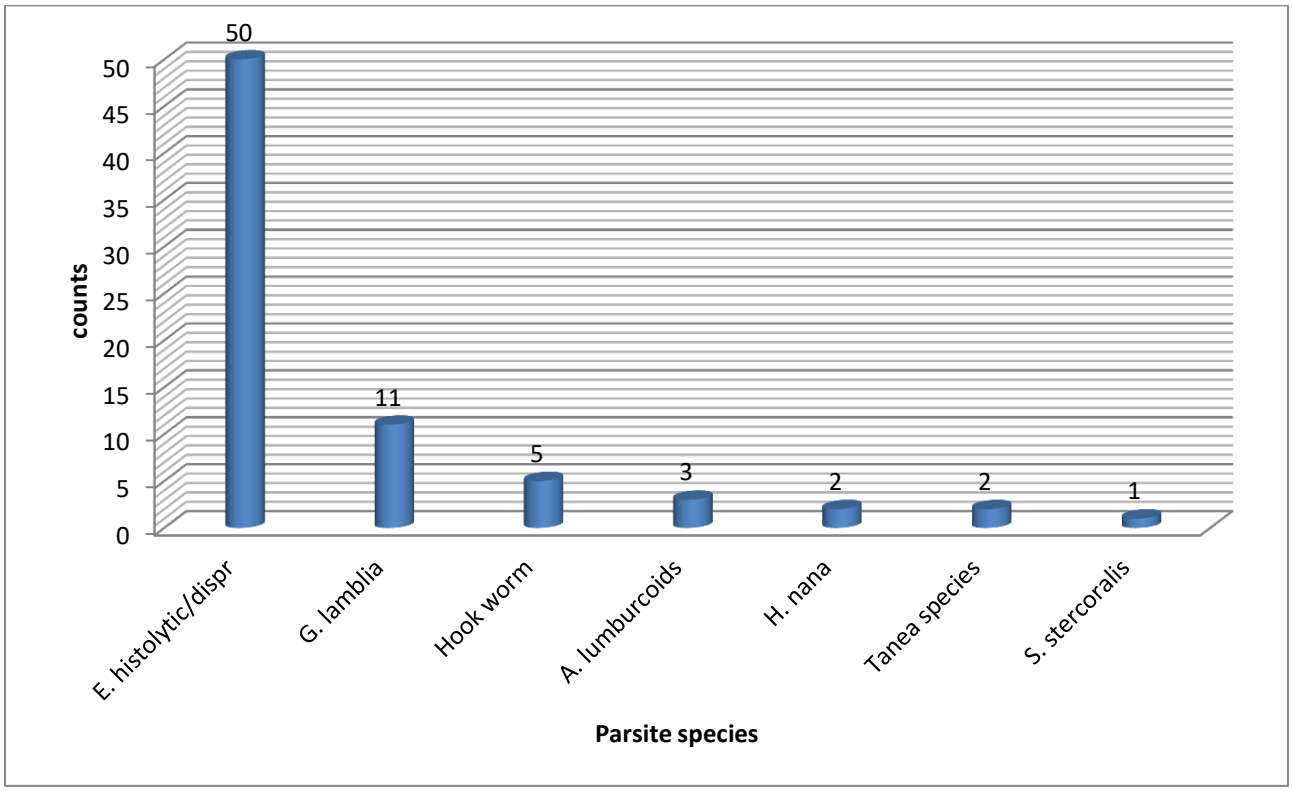

Figure 2. Intestinal parasite species distribution among people living with HIV/AIDS in DBRH, Debre brehan, Ethiopia from March 01 to August 30, 2019.

7.3. Association of IPI with socio-demographic and other risk factors

The study participants who were living in the rural place (22.3%) and urban residence (77.7%) and those had occupational status of agriculture (14.9%), Merchant (16.9%), student (12.6%), driver (8.3%) and office work (16.6%) were among socio-demographic factors analyzed for its association with intestinal parasitosis.

From all study participants 334 (97.7%) had regular hand washing habit with soap before meal and after meal and 323 (94.6%) of them had latrine. Out of those who had latrine, 282 (82.9%) of them would have used private latrine, 41 (11.7%) had used public latrine and the rest 19 (5.4%) didn't have any type of latrine so defecates on open field. Among all participants including who didn't have latrine 319 (93.4%) have regular water supply and wash their hands after toilet, 16 (4.6%) wash sometimes and the rest wash their hands rarely after toilet.

Among all respondents 303 (88.8%) of them had pure/tape water supply for drinking and sanitary use. The rest 31 (8.9%) had used water from ponds and 8 (2.3%) from spring water sources. About 237 (68.9%) study participants had vegetable feeding habits. From these, 129 (55.2%) ate vegetable three times a week, 86 (35.7%) ate once a week and 22 (9.1%) ate daily. Among the vegetable feeders, 211 (89.2%) ate vegetable by cooking, 23 (9.5%) ate only by washing and 3 (0.9%) used raw vegetables without either washing or cooking. The habit of eating raw meat responded by number of participants was 204 (58.3%), 118 (33.7%), 20 (5.7%) and 8 (2.3%) never ate raw meat, rarely ate, sometimes ate and always ate raw meat respectively. About 210 (60%) of the study participants had animals living with them among these majority 132 (63.2%) were pet animals either cats or dogs.

Multivariate analysis was done to know further association of the potential confounding factors such as place of residence, type of occupation, presence of latrine/toilet, source of water supply, presence of animals and viral load levels with intestinal parasitosis. As a result, only viral load level and availability of latrine showed significant association. People living with HIV who had viral load count >1000 cps/ml were almost four times more likely to develop parasitic infection than those having a viral load count results TND (target not detected) or zero viral load count (AOR = 4.2, 95% CI: 1.4, 12.4) and those who did not have latrine were four times more likely acquire intestinal parasite infection than those who had latrine in their home (AOR = 3.97, 95% CI: 1.3, 11.84) (Table 2).

Table 2. Prevalence of Intestinal parasitic infections with regards to socio-demographic information and other associated risk factors among PLWHA, Debre brehan, Ethiopia, 2019.

Characteristics		Intestinal parasite		COR (95% CI)	P-value	AOR (95% CI)	P- value
		Positive	Negative				
Sex	Male	36 (22.1)	127 (77.9)	1			
	Female	35 (18.7)	152 (81.3)	0.81(0.48, 1.37)	0.43		
Age group	≤15	2 (25)	6 (75)	1.24(0.24, 6.53)	0.79		
	16-30	26 (21.1)	97 (78.9)	1			
	31-45	25 (18.1)	113 (81.9)	0.83(0.45, 1.5)	0.54		
	46-60	14 (20.9)	53 (79.1)	0.98(0.47, .05)	0.97		
	≥60	4 (28.6)	10 (71.4)	1.49(0.43, 5.1)	0.53		
Residence	Urban	46 (16.9)	226 (83.1)	1		1	
	Rural	25 (32.1)	53 (67.9)	2.3(1.3, 4.1)	0.004	1.45(0.55, 3.86)	0.45
Educational status	Unable to read and	8 (23.5)	26 (76.5)	1.21(0.45, 3.24)	0.71		
	Read and write	9 (22)	32 (78)	1.1(0.43, 2.84)	0.83		
	Grade 1-8	22 (20)	88 (80)	0.98(0.46, 2.1)	0.96		
	Grade 9-12	18 (18.8)	78 (81.2)	0.9(0.42, 1.97)	0.8		
	College and above	14 (20.3)	55 (79.7)	1			
Occupational status	Farmer	19 (36.5)	33 (63.5)	3.13(1.3, 7.8)	0.014	1.5(0.45, 5.1)	0.5
	Merchant	13 (22)	46 (78)	1.54(0.6, 3.94)	0.37	1.33(0.5, 3.6)	0.57
	Daily worker	5 (10.2)	44 (89.8)	0.62(0.19, 1.99)	0.42	0.5(0.15, 1.6)	0.25
	Student	10 (22.7)	34 (77.3)	1.6(0.59, 4.36)	0.357	1.37(0.48, 4.0)	0.56
	Driver	6 (20.7)	23 (79.3)	1.42(0.45, 4.47)	0.55	1.5(0.48, 4.99)	0.47
	House wife	9 (19.1)	38 (80.9)	1.29(0.47, 3.56)	0.62	0.85(0.28,2.58)	0.78
	Office work	9 (15.5)	49 (84.5)	1		1	
Habit of hand washing	Always	68 (20.5)	266 (79.5)	1			
	Sometimes	1 (33.3)	2 (66.7)	1.94(0.17, 21.7)	0.59		
	Rarely	0 (0)	4 (100)	0	0.99		
	Never	0 (0)	1 (100)	0	1.0		
Availability of latrine	Yes	58 (18)	265 (82)	1		1	
	No	11 (57.9)	8 (42.1)	6.21(2.4, 16.1)	0.000	3.97(1.33, 11.84)	0.013*
Source of water supply	Pipe	55(18.3)	248(81.7)	1		1	
	Pond	11(35.5)	20(64.5)	2.45(1.11,5.4)	0.026	1.1(0.4, 3.24)	0.83
	Spring	3(37.5)	5(62.5)	2.67(0.62,11.5)	0.19	1.1(0.18, 6.1)	0.95
Vegetable feeding habit	Yes	46 (19.5)	191 (80.5)	1			
	No	23 (22)	82 (78)	1.17(0.67, 2.03)	0.59		
Habit of eating raw meat	Always	1 (12.5)	7 (87.5)	0.6(0.07, 5.05)	0.64		
	Sometimes	3 (15)	17 (85)	0.75(0.21, 2.7)	0.65		
	Rarely	28 (23.7)	89 (76.3)	1.32(0.76, 2.28)	0.33		
	Never	37 (19.1)	160 (80.9)	1			
Presence of animals	Yes	49(23.8)	157(76.2)	1.77(1.01, 3.1)	0.046	1.5(0.78, 2.89)	0.23
	No	20(15)	116(85)	1		1	
Viral load	TND	44(17.7)	205(82.3)	1		1	
	<20 cps/ml	10(19.2)	42(80.8)	1.1(0.52, 2.4)	0.79	1.0(0.45, 2.27)	0.99
	20-1000 cps/ml	9(30)	21(70)	1.99(0.86, 4.65)	0.11	2.4(0.94, 6.1)	0.07
	>1000 cps/ml	8(42.1)	11(57.9)	3.4(1.3, 8.9)	0.013	4.2(1.4, 12.4)	0.009*

TND: Target not detected, **cps/ml**: copies/milliliter, **COR**: Crude odd ratio, **AOR**: Adjusted odd ratio, **CI**: confidence interval, ***** statistically significant

7.4. Knowledge, attitude and practice of study participants towards intestinal parasitosis

7.4.1. Knowledge about intestinal parasitosis

Among all study participants, 342 (97.7%) (Older than 15 years) were interviewed for their knowledge, attitude and practice towards intestinal parasitosis. In general from these interviewed participants; 182 (53.2) had good knowledge about intestinal parasitosis, its transmission and prevention mechanisms. Only 66 (19.3%) understood the relationship between intestinal parasitosis and HIV/AIDS that all responded as HIV/AIDS increases the morbidity due to intestinal parasitosis (table 3).

Table 3. Knowledge of PLWHA about transmission and prevention of intestinal parasitosis, Debre brehan, Ethiopia, 2019.

Knowledge variables	Yes no. (%)	No no. (%)	Total no. (%)
1. Have you ever heard about intestinal parasitosis?	200 (58)	142 (42)	342
2. If you heard, from where did you hear?			
a. Parent	20 (10)		
b. Friends	44 (22)		
c. Reading books and journals	95 (47.5)		
d. Mass media	41 (20.5)		
3. Do you know about the transmission ways of intestinal parasitosis	189 (55.3)	153 (44.7)	342
4. Which of the following is the most common transmission ways of IP?			
a. Eating contaminated food	172 (91)		
b. Drinking contaminated water	16 (8.5)		
c. Lack of personal hygiene	1 (0.5)		
5. Do you know about the relationship b/n Intestinal parasitosis and HIV/AIDS	66 (19.3)	276 (80.7)	342
6. What is the best treatment for intestinal parasitosis?			
a. Medicine prescribed by doctors	326 (95.3)		
b. Traditional medicine	13 (3.8)		
c. No treatment required	3 (0.9)		
Overall knowledge level			
Good knowledge	182 (53.2)		
Poor knowledge	160 (46.8)		
Total	342		

7.4.2. Attitude about intestinal parasitosis

Among 342 study participants, 260 (76%) considered IPI as a communicable disease. 255 (72.9%) of them agreed its transmission from person to person. From all respondents, 199 (58.2%) believed that HIV/IDS increases the risk of acquiring IP infection, while 147 (43%) believed that using antiretroviral treatment prevents IP infection (table 4).

Table 4. Attitude of PLWHA about transmission and prevention ways of IP infection, Debre brehan, Ethiopia, 2019.

Attitude variables	Agree no. (%)	Disagree no. (%)	No idea no. (%)	Total no. (%)
1. IP infection is communicable disease.	260 (76)	9 (2.6)	73 (21.3)	342
2. IP infection can be transmitted from person to person	255 (72.9)	8 (2.3)	79 (22.6)	342
3. HIV/AIDS increases the risk of IP infection	199 (58.2)	15 (4.4)	128 (37.4)	342
4. IPI can cause severe complications and death if not treated	264 (77.2)	25 (7.3)	53 (15.5)	342
5. Use of antiretroviral treatment prevents IP infection	147 (43)	36 (10.5)	159 (46.5)	342
6. Use of toilet and good personal hygiene practice protects from IP infection	317 (92.7)	4 (1.2)	21 (6.1)	342
7. If not protected well, water can be a potential source of IP infection	312 (91.2)	7 (2)	23 (6.8)	342
8. Raw met should not be eaten, b/c it can transmit IP infection	226 (66.1)	54 (15.8)	62 (18.1)	342
9. Without cooking, washing vegetables is enough to prevent IP infection	63 (18.4)	240 (70.2)	39 (11.4)	342
10. IP infection can be acquired from animal and animal products	266 (77.8)	4 (1.2)	72 (21)	342
Overall attitude level				
Positive attitude	289 (84.5)			
Negative attitude	53 (15.5)			
Total	342			

7.4.3. Practices related to IP infection

From study participants who responded for the questionnaire, 337 (98.5%) had regular hand washing habit with soap before meal and after meal. 323 (94.4%) of them had latrine. Among all respondents 303 (88.6%) had pure/tape water supply for drinking and sanitary use. 237 (68.9%) had vegetable feeding habits, of them 211 (89%) ate the vegetable by cooking (table 5).

Table 5. Practices of PLWHA related to prevention and control of IP infections, Debre brehan, Ethiopia, 2019.

Practice variables	Yes no. (%)	No no. (%)	Total no. (%)
1. Do you wash your hand before meal?	337 (98.5)	5 (1.5)	342
2. Do you have latrine for you and your families?	323 (94.4)	19 (5.6)	342
3. What type of latrine do you have?			
a. Private	282 (87.3)		
b. Public	41 (12.7)		
4. What is the source of your water supply?			
a. Pipe water	303 (88.6)		
b. Pond	31 (9.0)		
c. Spring	8 (2.4)		
5. Do you eat vegetables?	237 (69.3)	105 (30.7)	342
6. How do you feed vegetables?			
a. Raw vegetable without washing.	3 (1.3)		
b. By washing	23 (9.7)		
c. By cooking	211 (89)		
7. Do you eat raw meat?	145 (42.4)	197 (57.6)	342
8. Do you have animals living with you?	206 (60.2)	136 39.8)	342
Overall practice level			
Good practice	314 (91.8)		
Bad practice	28 (8.2)		
Total	342		

7.4.4. Association of KAP with intestinal parasitosis

This study showed that 182 (53.2%) of the study participants had good knowledge and 160 (46.8%) of the participants had poor knowledge, 289 (84.5%) had positive attitude while 53 (15.5%) had negative attitude and study participants also had good practice 314 (89.7%) and poor practice 28 (10.3%) about transmission, prevention and control of intestinal parasites. Although knowledge and attitude of study participants didn't show association, the overall performance of health practices was significantly associated with intestinal parasitosis. Persons who had poor health practices towards intestinal parasitosis were almost three times more likely to develop intestinal parasitosis than persons with good health practices related to transmission and prevention of IPI (AOR = 2.88, 95% CI : 1.2, 6.88) (table 6).

Table 6. Association of intestinal parasitosis with knowledge, attitude and practice (KAP) of PLWHA about transmission, prevention and control of IPI, Debre brehan, Ethiopia, 2019**.**

KAP performance of study participants		Intestinal parasitic infection		COR (95% CI)	P-value	AOR (95% CI)	P-value
		Positive (%)	Negative (%)				
Knowledge	Good knowledge	36 (19.8)	146 (80.2)	1			
	Poor knowledge	33 (20.6)	127 (79.4)	1.05 (0.62, 1.8)	0.84		
Attitude	Positive attitude	62 (21.5)	227 (78.5)	1			
	Negative attitude	7(13.2)	46(86.8)	0.56 (0.24, 1.3)	0.17		
Practice	Good practice	59 (18.8)	255 (81.2)	1		1	
	Bad practice	10 (35.7)	18 (64.3)	2.4 (1.05, 5.5)	0.037	2.88 (1.2, 6.88)	0.017

8. Discussion

In the present study, the overall prevalence of intestinal parasites among people living with HIV/AIDS following ART treatment and care program in the study area was 20.3% (71/350). This was relatively consistent with studies performed in Dessie Hospital on ART patients (17.6%) (8), in Abuja, Nigeria (24.7%) (10), Hospital of Kathmandu, Nepal (19.17%) (4). On the other hand, our finding was much lower when compared to prevalence in studies conducted in Arbaminch Hospital (45.4%), East Gojjam (36.8%), Butajira (35.9%) and Gondar Hospital (28%) (3, 16, 20, 25). This variation in magnitude of parasitic infection might be due to the difference in geographical location of the study site, endemicity of parasite, methodology, time gaps of the studies and climatic conditions at different study sites. In addition, the lower IP prevalence in our finding might be due to increment in awareness of PLWHA for the appropriate treatments or better adherence and implementing prevention activities in IP transmission. This also indicated that, there were improvements in clinical management system and health professionals were providing adequate health information regarding to the ways of preventing co-infections like opportunistic and non-opportunistic intestinal parasitic infections for people living with HIV/AIDS.

In this study, the parasite distribution of single infections were observed with *E. histolytica/dispar* 47 (69.1%), *G. lamblia* 10 (14.7%), *A. lumburcoids* 3 (4.4%), Hook worm 3 (4.4%), *Tanea species* 2 (2.9%), *H. nana* 2 (2.9%) and *S. stercoralis* 1 (1.5%). *E. histolytica/dispar (*69.1%*)* showed higher proportion when compared to other studies in Dessie (45.5%), East Gojjam (24%) and Arbaminch (7.4%) (3, 8, 20). However, the other parasite's frequency in our study *G. lamblia* (14.7%), *A.lumburcoids* (4.4%) and *S. stercoralis* (1.5%) was lower than a study conducted in Dessie, East Gojjam and Arbaminch (3, 8, 20). There was only 1 (1.5%) *S. stercoralis*, which was an opportunistic parasite in this study that was similar with the study conducted in Dessie (8). But studies in Arbaminch, East Gojjam and Butajira revealed highest number of opportunistic parasitic infections (3, 8, 20). The difference in frequency of individual parasite might be due to the difference in geographical location, altitude, climatic condition of study areas and hygiene and sanitation practice of study population.

Furthermore, the decrement of opportunistic infections especially *Cryptosporidium species* and *I. belli* suggested that an increase of health seeking behavior of the community intern resulted in good adherence of HIV/AIDS clients for ART treatment and care program. An improvement in

immunologic conditions of the patients and better response to infections also might be the reason.

The development in the provision of health care services like laboratory and other diagnostic units, consistent treatment program with updated guidelines and enough supplying system, adequate nutritional programs as required, Anthelminthic treatment for deworming purpose and subsequent health education system for HIV/AIDS patients improved their health status in general and reduced the occurrence of opportunistic infections. In fact opportunistic parasites were known to be resolved spontaneously with immune restoration among HIV/AIDS patients on ART (1).

In the current study we had also tried to see the associations of intestinal parasitic infections with different socio-demographic and clinical factors. According to the binary logistic regression analysis of each variable; residence, occupation, availability of latrine, types of water source, presence of animals and viral load level seemed to be associated with intestinal parasitosis. But by multivariate logistic regression analysis model only viral load level and availability of latrine showed statistically significant association.

Study participants who had viral load count >1000 cps/ml had higher IP infections when compared to patients with <1000 cps/ml viral load counts. Although there was no study found done on association of viral load count with IP infection, it is assumed to be reversed analogous with CD4 count of the clients. As CD4 count decreases the viral load count expected to increase that both designates immunosuppression of the clients (29). On this regard, study participants who had viral load count of > 1000 cps/ml were about four time more likely to be infected with intestinal parasites than those who had a viral load counts zero (Target not detected) (AOR = 4.2, 95% CI: 1.4, 12.4). This was similar with the study conducted in Dessie hospital that patients having CD4 count < 200 cells/µl were four times more likely to be infected with IPI than those having CD4 counts >500 cells/µl (COR =4.15,95% CI: 1.98,8.72) (8). Another study in Gondar shown a much higher association that patients with <200 cells/ µl CD4 count were 33 times more likely infected with IP than patients having CD4 counts of 200-499 cells/µl (AOR = 33.3, 95% CI: 9.16, 121.15) (16). The difference might be due to the improvements of health care services for PLWHA through time. The increment of viral load count or decrement of CD4 count

designated the progression of HIV infection to advanced level of AIDS and severe immunosuppression that might create great opportunity for parasites to infect the patient.

The other association was with availability of latrine, 323 (94.6%) of the study participants had latrine in their home. This study revealed that participants who did not have latrine were four times more likely to be infected with intestinal parasite than those having latrine (AOR = 3.97, 95% CI: 1.33, 11.84). This result was in line with a study in Gondar that study participants didn't have latrine were six times more likely infected with IP than those having latrine (AOR = 6.2, 95% CI: 1.75, 22.06) and also supported by a similar study in Dessie that patients who did not have latrine had IP infections almost 8 times more likely than those having latrine (AOR = 7.56, 95% CI: 1.3, 44.2) (8). These relative comparable results suggested the similarities in accessibility and using habit of toilet in those study sites.

In this study knowledge, attitude and practice of the individual participants towards intestinal parasitosis were assessed by structured questionnaire. As a result, 53.2% of study participants had good knowledge about transmission, distribution and prevention of intestinal parasitosis and its association with HIV/AIDS whereas the remaining 46.8% had poor knowledge. About 189 (55.3%) of study participants knew the transmission ways of intestinal parasitosis. Of which 172 (91%) understood that it was through eating contaminated foods. This result was slightly higher than the study conducted in Addis Ababa in which 49.4% understood the transmission ways and 63.5% of them believed transmission was through contaminated foods (41). This variation might be due to socio-demographic difference of study participants and time gap of studies.

In the present study, 92.7% of study participants agreed that use of toilet contributes to protect individuals from intestinal parasitic infections or failure to use toilet exposes for the infection. This result was higher compared to the study in Asmara, Eritrea provided that 60.3% of study participants agreed that defecating in open air or fail to use toilet contributes to intestinal parasitic infections (19). The difference might be due the difference in pathological outcome of the endemic intestinal parasite species in the study sites.

The current study revealed that 98.5% (337/342) of study participants had practiced hand washing before meal and 94.4% (323/342) of study participants had latrine. Of latrine users 87.3% (282/323) had private latrine while 12.7% (41/323) had public latrine. This result was

higher compared to another study among street dwellers conducted in Addis Ababa shown that 15.6% of the study participants practiced regular hand washing before meal and 95% had latrine. Of these latrine users 56.5% had private latrine and 38.5% had public latrine (41). The difference might be due to variation in economic and educational level of the study participants.

Health practices of the study participants were significantly associated with intestinal parasitosis. Persons who had poor health practices towards intestinal parasitosis were almost three times more likely to develop intestinal parasitosis than persons with good health practices related to transmission and prevention of IPI (AOR = 2.88, 95% CI : 1.2, 6.88). No study was found done on association of knowledge, attitude and practice (KAP) with intestinal parasitosis among PLWHA to be compared with this result.

9. Limitation of the study

- The current national treatment protocol stated that every person tested for HIV and results positive needs to start treatments immediately. Due to this reason it was difficult to get any ART naïve PLWHA during the study period and unable to analyze the outcomes comparatively for both groups of ART status as like as most of the previous studies.
- Similarly there was no CD4 count data available during the study period instead only viral load count had been used.
- There were limited studies done about association of knowledge, attitude and practice (KAP) with intestinal parasitosis among PLWHA that challenges to discuss the current result comparatively.

10. Conclusion

This study revealed the prevalence of intestinal parasites and associated risk factors among people living with HIV/AIDS following ART treatment in the study area. In the study *E. histolytica/dispar* and *G. lamblia* showed greater proportion of parasite distribution. According to this study absence of latrine and increased viral load count for PLWHA were identified as the potential risk factors for the acquisition of intestinal parasitic infections. Unlike many of the previous studies the present study showed least opportunistic parasite distribution. The results of the present study indicated that there was a good success in minimizing the spread of OIs.

The study showed that most of the study participants had positive attitude, good practices and poor knowledge related to the transmission and prevention activities of intestinal parasitosis. Health practices of the study participants related to transmission and prevention showed significant association with intestinal parasitosis.

11. Recommendations

- The increased proportion of *E. histolytica/dispar* infection in this study suggests for all stakeholders to implement and strengthen a better strategies to diagnose, treat, control and prevent the infection among PLWHA.
- The high proportion of *E. histolytica/dispar* also indicates a need to the wide provision of health education, care and treatment programs for PLWHA to prevent intestinal parasitic infection.
- Subsequent evaluation of HIV/AIDS patients for intestinal parasitic infections is important for better managements of these patients.
- The results of this study showed less prevalence of opportunistic intestinal parasites compared to previous studies. This might be the results of better improvements of ART services. Thus ART service providers should have to maintain this promising achievement.

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13. Annexes

Annex- I. Information sheet (English version)

Addis Ababa University Postgraduate schedule

PI: Tassew Tefera

Name of organization: Addis Ababa University College of Health Science, Department of Medical Laboratory Science information sheet.

Title: Prevalence of intestinal parasitosis, KAP and associated risk factors among people living with HIV/AIDS attending at ART clinic in Debre brehan referral hospital, Debre brehan, Ethiopia

Aim: To determine the magnitude of intestinal parasitosis, KAP and associated risk factors among people living with HIV/AIDS.

Duration: For the purpose of stool sample collection you will spend only 20 to 30 minutes. The questionnaire is filled and the consent form is signed.

Procedure to be followed: For this study to be successful we need your participation. If you are voluntary to participate, you are expected to understand and sign the informed consent. Then socio demographic information is important and will be taken for the study. Stool sample will be collected and laboratory investigation will be done as soon as possible in DBRH laboratory.

Risk: There is no risk associated with sample collection except your time.

Expected benefits: As a participant of the study you are expected to bring 1-2 gram of stool sample and check the presence of intestinal parasite using wet mount, formol ether concentration and modified acid fast staining. The result will be discussed with the responsible physician but your personal information will not be disclosed to anyone. Only identification code will be used.

Confidentiality: All information that you give and the results from your specimen will be used for this study only. Limited number of professionals will have access to the information. All the information will be encoded in a computer and password protected.

Right: participation in the study is voluntary and refusal to participate involves no penalty and loss of benefit to which you are otherwise entitled. You have the right to with hold information, decline to cooperate in the study and refuse provision of specimen.

Approval: This research project has got ethical clearance from the department research and ethics review committee (DRERC) of Addis Ababa University College of Health Science School of Allied Health Science Department of Medical Laboratory Science and DBRH.

Whom to contact: If you have any question about this study you can communicate through the following address.

➔ Addis Ababa University College of Health Science Department of Medical Laboratory Science

- Tel. ----------
- Fax.----------
- Email----------

➔ Principal Investigator : Tassew Tefera

- Phone : 0922406465
- E-mail : tassewtefera@gmail.com

Annex-II Consent form for the study participants (English Version)

Code No. ----------

Name of the participant ----------

I have been informed about the study which is aimed in determining the magnitude of intestinal parasitosis, KAP and associated risk factors among people living with HIV/AIDS attending at DBRH ART clinic. For this study stool sample will be required. The aim and possible risk of the study were explained to me well. I have also informed that all the information contained in questionnaire is to be kept confidential. Moreover, I have been informed the rights to withdraw from study. It is therefore with full understanding I gave the informed consent voluntarily to the researcher to use my information and specimen for this study.

Participant's signature/Finger print ----------

Name of data collector ---------- Sign ---------- Date ----------

Please contact us for any question or problems you may encounter during the study

Principal investigator: Tassew Tefera

Phone- 0922406465

E-mail:tassewtefera@gmail.com

Annex-III. Assent form for the study participants (English Version)

Code No. ----------

Name of study participant ----------

Name of the participant's family or Guardian ----------

I have been informed about the study which is aimed in determining the magnitude of intestinal parasitosis, KAP and associated risk factors among people living with HIV/AIDS attending at DBRH ART clinic. For this study stool sample will be required. The aim and possible risk of the study were explained to me well. I have also informed that all the information contained in questionnaire is to be kept confidential. Moreover, I have been informed the rights to withdraw from study. The study participant mentioned above who is not able to give informed consent himself because he/she is younger than 18 years not allowed deciding on him/herself. It is therefore with full understanding; by taking a full responsibility I gave my assent voluntarily to the researcher to use his/her information and specimen for this study.

Participant's signature/Finger print ----------

Participant's family/Guardian signature ----------

Name of data collector ---------- Sign ---------- Date ----------

Please contact us for any question or problems you may encounter during the study

Principal investigator: Tassew Tefera

Phone- 0922406465

E-mail:tassewtefera@gmail.com

Annex-IV. Questionnaire (English version)

This questionnaire is prepared by Addis Ababa University, College of health science, Department of Medical Laboratory Science diagnostic and public health microbiology extension program graduate student.

I thanks gratefully for your agreement to participate in this study. Now I am going to ask you interview questions and the interview is about general socio-demographic characteristics and clinical data. All of the answers you provide in this study will be kept confidential. The information you give me is very essential for this study. Therefore I politely ask you to give me the right response.

Part I. Socio-demographic information

1. Code no. ---------- Age…… Sex: M ☐ F ☐
2. Address: Urban ☐ Rural ☐
3. Marital status A. married B. single C. Divorced D. Widowed
4. What is your educational status?

   A. Unable to read and write B. Read and Write only

C. Grade 1 – 8 completion D. Grade 9 – 12 completion

E. College and Above

5. What is your occupation?

   A. Farmer B. Merchant C. Office work/employee D. Daily wage laborer

   E. Student F. Driver G. House wife

   H. Others specify----------

6. How much is your average monthly income?

A. Less than 1000 Birr B. 1000 -2000 Birr C. 2000 - 3000 Birr

D. 3000 – 4000 Birr E. 4000 – 5000 Birr F. > 5000 Birr

Part II. Knowledge of study participants about intestinal parasitic infection

7. Have you ever heard about intestinal parasitosis? A. yes B. No
8. If your answer is yes for question no. 7 from where did you hear?

A. Parents B. Friends C. Reading books and journals D. Mass media E. If other specify ----------

9. Do you know about the transmission ways of intestinal parasitosis?

A. Yes B. No

10. If Yes for question no. 9 which of the following is the most common transmission ways of intestinal parasitosis? A. Eating contaminated food B. Drinking contaminated water C. Lack of personal hygiene D. Blood transfusion
11. What is the most prevalent intestinal parasite in your local area?

A. Amoeba B. Gardia C. Taenea D. Ascaris E. No idea F. If other, specify---------

12. Do you know about the relationship between intestinal parasitic infection and HIV/AIDS?

A. Yes B. No

13. If Yes for question no.12, How?

A. HIV/AIDS increases morbidity due to intestinal parasitosis
B. HIV/AIDS prevents transmission of intestinal parasitic infection
C. Intestinal parasitosis increases the risk of HIV/AIDS infection
D. Intestinal parasitosis has no significant effects on HIV/AIDS patients

14. Do you know the commonest parasitic infection among HIV/AIDS patients

A. Yes B. No

15. If yes for question no. 14, what is the most common parasitic infection among HIV/AIDS patients?

A. Amoebiasis B. cryptosporidiosis C. Toxoplasmosis D. others, specify ----------

16. What is the best treatment for intestinal parasitosis?

A. Medicine prescribed by doctors B. Traditional medicine C. Treatment not required

Part III. Attitude of study participants about intestinal parasitic infection

17. Intestinal parasitic infection is communicable disease.

A. Agree B. Disagree C. I don't have idea

18. Intestinal parasitic infection can be transmitted from person to person.

A. Agree B. Disagree C. I don't have idea

19. HIV/AIDS increases the risk of intestinal parasitic infection.

A. Agree B. Disagree C. I don't have idea

20. Intestinal parasitosis can cause severe complications and death if not treated.

A. Agree B. Disagree C. I don't have idea

21. Use of antiretroviral treatment prevents intestinal parasitosis among people living with HIV/AIDS.

A. Agree B. Disagree C. I don't have idea

22. Using toilet appropriately and practice good personal hygiene protects from intestinal parasitic infection.

A. Agree B. Disagree C. I don't have idea

23. If not protected well, water can be a potential source of intestinal parasitic infection.

A. Agree B. Disagree C. I don't have idea

24. Raw meat should not be eaten because it can transmit intestinal parasitic infection.

A. Agree B. Disagree C. I don't have idea

25. Without cooking, washing is enough to prevent parasitic infection while using vegetables.

A. Agree B. Disagree C. I don't have idea

26. Intestinal parasitic infections can be acquired from animals and animal products.

A. Agree B. Disagree C. I don't have idea

Part IV. Practice of study participants related to intestinal parasitic infection.

27. Your habit of hand washing with soap before meal?

A. Always B. Sometimes C. Rarely D. Never

28. Do you have latrine for you and your families. A. Yes B. No

29. If yes for question no. 28, what type of toilet you are using?

A. Private B. Public C. No toilet, open defecation

30. Your habit of hand washing with soap after toilet?

A. Always B. Sometimes C. Rarely D. Never

31. What is the source of your water supply?

A. Pipe water B. pond C. spring D. River

32. Do you have habit of vegetable feeding A. yes B. No

33. If yes for quest. No. 32, how often?

A. Every day B. three times a week C. Once a week

34. If yes for quest. No. 32, How?

A. Raw vegetable without washing B. By washing C. By cooking

35. Your habit of eating raw meat?

A. Always B. Some times C. Rarely D. Never

36. Do you have animals living with you? A. Yes B. No

37. If yes for question no. 36, what type of animals?

A. Cat/dogs B. cattle C. poultry D. Others, specify----------

Part-V. Health related information to be filled with clinical professionals

38. What is the clinical stage of the patient

A. Stage I B. Stage II C. Stage III D. Stage IV

39. Is the patient checked for viral load count in this month? A. yes B. No

40. If yes for question no. 39, How much ----------

Part VI. Health information to be filled with laboratory professionals

1. Date of specimen collection ---------- Time ----------
2. Date of specimen processed----------Time ---------- TAT ----------
3. Stool consistency A. Formed B. Semi formed C. Diarrhea
4. Stool appearance A. Normal/brown B. Mucus C. Bloody
5. Result

Ser. No.	Type of parasite identified/with developmental stage/	Laboratory method used		
		Direct microscopy(✓)	Formol-ether concentration(✓)	Modified acid fast staining(✓)
1.				
2.				
3.				

Annex V. Information sheet (Amharic version)

አዲስ አበባ ዩኒቨርሲቲ የድህረ-ምረቃ ፕሮግራም

ጥናቱን የሚሰራዉ ሰዉ ስም፡ ጣሰዉተፈራ

ጥናቱን የሚያሰራዉ ተቋዋም፡ አዲስ አበባ ዩኒቨርሲቲ የጤናሳይንስ ኮሌጅ የህክምና ላቦራቶሪ ትምህርት ክፍል

የጥናቱ ርዕስ፡ HIV በደማቸዉ ዉስጥ በሚገኝባቸዉ ሰዎች ላይ የሚከሰት የአንጀት ትላትሎች በሽታ እና ተዛማጅ መንስኤዎች በሚል ርዕስ ለሚደረገዉ ጥናት የተዘጋጀ መረጃ

በአዲስ አበባ ዩኒቨርሲቲ በ"Diagnostic and public health microbiology" የማስተርስ ዲግሪ ተማሪ የመመረቂያ ጥናት ላይ እንዲሳተፉ ተጋብዘዋል፡፡ እባክዎ በዚህ ጥናት ለመሳተፍ ከመስማማትዎ በፊት ከዚህ ቀጥሎ የሚገኘዉን ምንባብ በጥሞና ያንብቡና ግልፅ ያልሆነዉን ይጠይቁ፡፡

የጥናቱ ዓላማ፡ HIV በደማቸዉ ዉስጥ በሚገኝባቸዉ ሰዎች ላይ የአንጀት ትላትሎች በሽታ ስርጭት እና ተዛማጅ መንስኤዎችን ማጥናት

እዚህ የሚቆይበት ጊዜ፡ የተሰጠዎትን መጠይቅ ከሞሉና ከፈረሙ በኋላ ለጥናቱ የሚያስፈልገዉን የሰገራ ናሙና በማምጣት ሂደቱን ይጨርሳሉ፡፡ ለዚህም ተግባር ከ 20 እስከ 30 ደቂቃ ብቻ ያጠፋሉ፡፡

በዚህ ጥናት ሲሳተፉ የሚፈፅሟቸዉ ተግባራት፡ ለዚህ ጥናት መሳካትና ዉጤታማነት የእርስዎ አስተዋፅዖ በጣም ከፍተኛ ሲሆን ለመሳተፍ ፈቃደኛ በመሆንዎ እያመሰገንን፣ በጥናቱ ከመሳተፍዎ በፊት የፈቃደኝነት ዉሉን በደንብ አንብበዉ በመረዳት መፈረም ይጠበቅብዎታል፡፡ ከዚህ በመቀጠል በቃለ መጠይቁ ላይ የቀረበዉን ስለርስዎ አጠቃላይ መረጃ በጥንቃቄ ከሞሉ በኋላ በሚሰጥዎት እቃ በግምት አንድ ግራም የሚሆን የሰገራ ናሙና ያመጣሉ፡፡ ናሙናዉም በደብረ ብርሃን ሪፈራል ሆስፒታል ላቦራቶሪ ጥራቱን በጠበቀ ሁኔታ የአንጀት ትላትሎች ምርመራ ይደረግበታል፡፡

በዚህ ጥናት መሳተፍ የሚያስከትለዉ ጉዳት፡ በጥናቱ መሳተፍ ናሙና ለመስጠት ከሚየጠፉት ጊዜ ዉጪ ምንም ዓይነት ጉዳት አያስከትልም፡፡

በዚህ ጥናት መሳተፍ የሚያስገኛቸዉ ጥቅሞች እና የመረጃ ሚስጥራዊነት፡ የጥናቱ ተሳታፊ በመሆንዎ የሚያመጡት የሰገራ ናሙና ጥራቱ በሚገባ ተጠብቆ ልምድ ባላቸዉ ባለሙያዎች ሦስት ዓይነት የተሻሻሉ የላቦራቶሪ

የምርመራ ዘዴዎችን በመጠቀም የአንጀት ትላትሎች ምርመራ እናደርጋለን። የምርመራ ዉጤትዎንም ለሚመለከተዉ ሃኪምዎ ብቻ በማሳዎቅ አስፈላጊዉን ህክምና እንዲየገኙ እናደርጋለን። በስም ምትክ የሚስጥር ቁጥር ስለምንጠቀም ማንኛዉንም ዓይነት መረጃዎን ከሚመለከተዉ አካል ዉጪ ያለርስዎ ፈቃድ አናሳዉቅም።

የጥናቱ ተሳታፊ መብት፡ በዚህ ጥናት መሳተፍ የሚቻለዉ በራስ ተነሳሽነትና በሙሉ ፈቃደኝነት በመሆኑ፤ በማንኛዉም ጊዜና ሁኔታ መሳተፍ አልፈልግም ብሎ መተዉ ይቻላል። ጥናቱን አልሳተፍም ብሎ በመተዉ ምክንያት የሚደርስ ምንም ዓይነት ቅጣት፣ ኪሳራ እና ያልተገባ ዉንጀላ ወይም ነቀፌታ የለም። ፈቃደኛ ካልሆኑ መረጃዎትን የመደበቅ ወይም ያለመናገር፣ በጥናቱ ያለመሳተፍ እናም ለጥናቱ የሚያስፈልገዉን የሰገራ ናሙና ያለማምጣት ሙሉ መብት አለዎት።

ስለ ጥናቱ ማረጋገጫ፡ ይህ ጥናት ከአዲስ አበባ ዩኒቨርሲቲ የጤናሳይንስ ኮሌጅ የአላይድ ጤናሳይንስ ት/ቤት የህክምና ላቦራቶሪ ትምህርት ክፍል የምርምርና ህጋዊነት ኮሚቴ እዉቅናና ፈቃድ አግኝቷል። እንዲሁም ጥናቱ በሚሰራበት በደብረብርሃን ሪፈራል ሆስፒታል የበላይ ሀላፊዎችን በማስፈቀድ የሚሰራ ጥናት ነዉ።

ጥያቄ ቢኖረኝ/ችግር በያጋጥመኝ ምን ማድረግ እችላለሁ፡- ጥናቱን የተመለከተ ማንኛዉም ዓይነት ጥያቄ ካለዎት በሚከተሉት አድራሻዎች በመጠቀም መጠየቅ ይችላሉ፤

አዲስ አበባ ዩኒቨርሲቲ ጤና ሳይንስ ኮሌጅ የህክምና ላቦራቶሪ ትምህርት ክፍል

ስልክ ቁጥር፡ ----------

ፋክስ፡ ----------

ኢ-ሜይል፡ ----------

ጥናቱን የሚሰራዉ፡ ጣሰዉተፈራ

ስልክ ቁጥር፡ 0922406465

ኢ-ሜይል፡ tassewtefera@gmail.com

Annex-VI. Consent form for the study participants (Amharic Version)

የጥናቱ ተሳታፊዎች የስምምነት ቅጽ

የሚስጥር ቁጥር ----------

የተሳታፊዉ ስም ----------

እኔ ከዚህ በላይ ስሜ የተጠቀሰዉ የጥናቱ ተሳታፊ “HIV በደማቸዉ ዉስጥ በሚገኝባቸዉ ሰዎች ላይ የአንጀት ትላትሎች በሽታ ስርጭት እና ተዛማጅ መንስኤዎችን በደብረብርሃን ሪፈራል ሆስፒታል ማጥናት” በሚል ርዕስ ስለሚሰራዉ የምርምር ስራ አስፈላጊዉ መረጃ ሁሉ ተነግሮኛል። ለዚህ ጥናት የሰገራ ናሙና መስጠት እንዳለብኝ፣ የምርምሩ ዓላማ ምን እንደሆነ እና በጥናቱ ምክንያት ሊከሰቱ የሚችሉ ጉዳቶች በዝርዝር ማብራሪያ ተሰጥቶኝ ተረድቻለሁ። በተጨማሪም ማንኛዉም ዓይነት ለዚህ ጥናት የሰጠሁት መረጃዬ በሚስጥር ተጠብቆ እንደሚያዝልኝ እና በፈለግሁት ግዜና ሁኔታ በጥናቱ መሳተፍ ካልፈለግሁ ማቋረጥ መብቴ እንደሆነ በግልፅ ተነግሮኛል። ስለዚህ የተሰጠኝን መረጃ መሰረት በማድረግ እና ዓላማዉንም በመረዳት በፈቃዴ የምሰጠዉን እኔን የሚመለከት መረጃእና የሰገራ ናሙና ለምርምር አገልግሎቱ እነዲያዉሉት ተስማምቼ መፍቀዴን በፊርማዬ አረጋግጠለሁ።

የተሳታፊዉ ፊርማ ----------

የመረጃ ሰብሳቢዉ ስም ---------- ፊርማ ---------- ቀን ----------

ማንኛዉም ችግር ካጋጠመዎት በሚቀጥለዉ አድራሻዎች ያሳዉቁን

የጥናቱ ባለሙያ፡ ጣሰዉ ተፈራ

ስልክ ቁጥር፡ 0922406465

ኢ-ሜይል፡tassewtefera@gmail.com

Annex-VII Assent form for the study participants (Amharic Version)

የጥናቱ ተሳታፊ ለሆኑ ህፃናት ወላጅ/አሳዳጊ የስምምነት ቅጽ

የሚስጥር ቁጥር ----------

የተሳታፊዉ ስም ----------

የተሳታፊዉ ወላጅ/አሳዳጊ ስም ----------

እኔ ከዚህ በላይ ስሜ የተጠቀሰዉ የጥናቱ ተሳታፊ ህፃን ወላጅ/አሳዳጊ ቤተሰብ "HIV በደማቸዉ ዉስጥ በሚገኝባቸዉ ሰዎች ላይ የአንጀት ትላትሎች በሽታ ስርጭት እና ተዛማጅ መንስኤዎችን በደብረብርሃን ሪፈራል ሆስፒታል ማጥናት" በሚል ርዕስ ስለሚሰራዉ የምርምር ስራ አስፈላጊዉ መረጃ ሁሉ ተነግሮኛል። ለዚህ ጥናት የሰገራ ናሙና መስጠት እንዳለብኝ፣ የምርምሩ ዓላማ ምን እንደሆነ እና በጥናቱ ምክንያት ሊከሰቱ የሚችሉ ጉዳቶች በዝርዝር ማብራሪያ ተሰጥቶኝ ተረድቻለሁ። በተጨማሪም ማንኛዉም ዓይነት ለዚህ ጥናት የሰጠሁት መረጃዬ በሚስጥር ተጠብቆ እንደሚያዝልኝ እና በፈለግሁት ግዜና ሁኔታ በጥናቱ መሳተፍ ካልፈለግሁ ማቋረጥ መብቴ እንደሆነ በግልፅ ተነግሮኛል። ከላይ በስም የተጠቀሰዉ የጥናቱ ተሳታፊ ከ18 ዓመት እድሜ በታች በመሆኑና በራሱ ፈቃድ ለመሳተፍ ስምምነት መፈራረም ስለማይችል እኔ የእርሱ ወላጅ/አሳዳጊ ቤተሰብ በመሆኔ የተሰጠኝን መረጃ መሰረት በማድረግ እና ዓላማዉንም በመረዳት በፈቃዴ የምሰጠዉን ልጄን የሚመለከት መረጃ እና የሰገራ ናሙና ለምርምር አገልግሎቱ እነዲያዉሉት ተስማምቼ መፍቀዴን በፊርማዬ አረጋግጠለሁ።

የተሳታፊዉ ፊርማ ----------

የተሳታፊዉ ወላጅ/አሳዳጊ ፊርማ----------

የመረጃ ሰብሳቢዉ ስም ---------- ፊርማ ---------- ቀን ----------

ማንኛዉም ችግር ካጋጠመዎት በሚቀጥለዉ አድራሻዎች ያሳዉቁን

የጥናቱ ባለሙያ፡ ጣሰዉተፈራ ስልክ ቁጥር፡ 0922406465

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Annex-VIII. Questionaire (Amharicversion)
የተሳታፊ መጠየቆች

ይህ መጠይቅ በአዲስ አበባ ዩኒቨርሲቲ ጤና ሳይንስ ኮሌጅ የህክምና ላቦራቶሪ ትምህርት ክፍል በ“diagnostic and public health microbiology extension program” የድህረ-ምረቃ ተማሪ የተዘጋጀ ነዉ።

በቅድሚያ በዚህ ጥናት ላይ ለመሳተፍ ፈቃደኛ በመሆንዎ ላቅ ያለ ምስጋናዬን እያቀረብኩ ከዚህ በመቀጠል ለጥናቱ አስፈላጊ የሆኑ አጠቃላይ እርስዎን የሚገልጹ የስነ-ህዝብ እና የጤና ሁኔታ መረጃዎችን የሚያሳዩ ቃለ መጠይቆች ስላሉኝ በጥንቃቄ በመሙላት እንዲተባበሩኝ እጠይቃለሁ። እርስዎ የሚሰጡት መረጃ ለጥናቱ ወሳኝ በመሆኑ ትክክለኛዉን መረጃ በጥንቃቄ እንዲሰጡ እየጠየቅሁ እርስዎ የሚሰጡት ማንኛዉም ዓይነት መረጃ ሚስጥራዊነቱ የተጠበቀ እንደሚሆን ላረጋግጥልዎ እወዳለሁ።

ክፍልአንድ. የስነ- ህዝብ መረጃዎች

1. የሚስጥር ቁጥር ---------- ዕድሜ…… ፆታ: ወንድ ☐ ሴት ☐
2. አድራሻ: ከተማ ☐ ገጠር ☐
3. የጋብቻ ሁኔታ ሀ. ያገባ ለ. ያላገባ ሐ. አግብቶ/ታ የተፋታ/ች መ. ባሏ/ሚስቱ የሞተባት/ችበት
4. የትምህርት ደረጃዎ ምን ያህል ነዉ?

ሀ. ማንበብና መጻፍ የማይችል ለ. ማንበብና መጻፍ የሚችል ሐ. ከ 1ኛ – 8ኛክፍል የጨረሰ

መ. ከ 9ኛ – 12ኛክፍል የጨረሰ ሠ. ከሌጅና ከዚያ በላይ የተማረ

5. የሚተዳደሩበት ስራ ምንድነዉ?

ሀ. በግብርና ለ. በንግድ ሐ. የቢሮ ስራ መ. የቀን ስራ ሠ. ተማሪ

ረ. ሹፌር ሰ. የቤት እመቤት ቀ. ሌላ፣ይጥቀሱ ----------

6. አማካኝ የወር ገቢዎ ስንት ነዉ?

ሀ. ከ 1000 ብር በታች ለ. ከ 1000 እስከ 2000 ብር ሐ. ከ 2000-3000 ብር

መ. ከ3000-4000 ብር ሠ. ከ4000-5000 ብር ረ. ከ 5000 ብር በላይ

ክፍል ሁለት፡ የጥናቱ ተሳታፊዎች ስለ አንጀት ጥገኛ ትላትል በሽታ ያላቸዉን እዉቀት የሚዳስሱ መረጃዎች

7. ስለ አንጀት ጥገኛ ትላትል በሽታ ሰምተዉ ያዉቃሉ? ሀ. አዎ ለ. አላዉቅም

8. ለተራ ቁጥር 7 ጥያቄ መልስዎ አዎ ከሆነ ከየት ነዉ የሰሙት?

ሀ. ከቤተሰብ ለ. ከጓደኛ ሐ. መጻህፍትና በራሪ ጽሁፎችን በማንበብ

መ. መገናኛ ብዙኃን በመከታተል ሠ. ሌላ፣ ይጠቀስ----------

9. የአንጀት ጥገኛ ትላትል በሽታ መተላለፊያ መንገዶችን ያዉቃሉ?

ሀ. አዎ አዉቃለሁ ለ. አላዉቅም

10. ለተራ ቁጥር 9 ጥያቄ መልስዎ አዎ ከሆነ ከሚከተሉት ዉስጥ በአብዛኛዉ የበሽታዉ መተላለፊያ መንገድ የትኛዉ ነዉ ?

ሀ. የተበከለ ምግብ መመገብ ለ. የተበከለ ዉሃ መጠጣት ሐ. የግል ንፅህና አለመጠበቅ

መ. የደም ልገሳ

11. በእርስዎ አካባቢ በብዛት ተሰራጭቶ የሚገኘዉ የአንጀት ጥገኛ ትላትል ምንድነዉ?

ሀ. አሜባ ለ. ጃርዲያ ሐ. ኮሶ መ. ወስፋት ሠ. አላዉቅም ረ. ሌላ፣ ይጠቀስ ------

12. የአንጀት ጥገኛ ትላትል በሽታ እና የኤች አይ ቪ/ኤድስ በሽታ ያላቸዉን ግንኙነት ያዉቃሉ?

ሀ. አዉቃለሁ ለ. አላዉቅም

13. ለተራ ቁጥር 12 ጥያቄ አዉቃለሁ ካሉ፣ ግንኙነታቸዉ እንዴት ነዉ?

ሀ. የኤች አይ ቪ/ኤድስ በሽታ መኖር የአንጀት ጥገኛ ትላትል በሽታ የሚያደርሰዉን ጉዳት ይጨምረዋል

ለ. የኤች አይ ቪ/ኤድስ በሽታ መኖር የአንጀት ጥገኛ ትላትል በሽታን ይከላከላል

ሐ. የአንጀት ጥገኛ ትላትል በሽታ መኖር በየኤች አይ ቪ/ኤድስ በሽታ የመያዝ እድልን ይጨምራል

መ. የአንጀት ጥገኛ ትላትል በሽታ በየኤች አይ ቪ/ኤድስ በሽተኛ ላይ የከፋ ጉዳት አያስከትልም

14. HIV/AIDS በደማቸዉ ዉስጥ በሚገኝባቸዉ ሰዎች ላይ የሚከሰት የአንጀት ጥገኛ ትላትል በሽታ ያዉቃሉ? ሀ. አዎ

ለ. አላዉቅም

15. ለጥያቄ ቁጥር 14. መልስዎ አዎ ከሆነ፤ ከሚከተሉት ዉስጥ በአብዛኛዉ የሚከሰተዉ የትኛዉ ነዉ?

ሀ. አሜባ ለ. ክሪፕቶስፖሪዶሲስ ሐ. ቶክሶፕላስሞሲስ መ. ሌላ፤ ይጠቀስ----------

16. ለአንጀት ጥገኛ ትላትል በሽታ የተሻለ መፍትሔ ሊሆን የሚችለዉ ምንድነዉ?

ሀ. በሀኪም የታዘዘ መድኃኒት ለ. ባህላዊ መድኃኒት ሐ. ምንም መድኃኒት አያስፈልገዉም

ክፍል ሦስት፡ የጥናቱ ተሳታፊዎች ስለ አንጀት ጥገኛ ትላትል በሽታ ያላቸዉን አመለካከት የሚዳስሱ መረጃዎች

17. የአንጀት ጥገኛ ትላትል በሽታ ተላላፊ በሽታ ነዉ።

ሀ. እስማማለሁ ለ. አልስማማም ሐ. አላዉቅም

18. የአንጀት ጥገኛ ትላትል በሽታ ከሰዉ ወደ ሰዉ ወይም ከእንስሳት ወደ ሰዉ ሊተላለፍ ይችላል።

ሀ. እስማማለሁ ለ. አልስማማም ሐ. አላዉቅም

19. የኤች አይ ቪ/ኤድስ በደምዎ ዉስጥ መኖር ለአንጀት ጥገኛ ትላትል በሽታ ተጋላጭነትን ይጨምራል።

ሀ. እስማማለሁ ለ. አልስማማም ሐ. አላዉቅም

20. የአንጀት ጥገኛ ትላትል በሽታ ካልታከመ የከፋ ጉዳት ወይም ሞት ሊያስከትል ይችላል።

ሀ. እስማማለሁ ለ. አልስማማም ሐ. አላዉቅም

21. የኤች አይ ቪ/ኤድስ በደማቸዉ ዉስጥ ያለባቸዉ ሰዎች ፀረ- ኤች አይ ቪ መድኃኒት በመጠቀማቸዉ የአንጀት ጥገኛ ትላትል በሽታን ይከላከላሉ። ሀ. እስማማለሁ ለ. አልስማማም ሐ. አላዉቅም

22. ሽንት ቤት በአግባቡ በመጠቀምና የግል ንጽህናን በመጠበቅ የአንጀት ጥገኛ ትላትል በሽታን መከላከል ይቻላል። ሀ. እስማማለሁ ለ. አልስማማም ሐ. አላዉቅም

23. በአግባቡ ካልተጠበቀ ዉሃ የአንጀት ጥገኛ ትላትል በሽታ መንስኤ ሊሆን ይችላል።

ሀ. እስማማለሁ ለ. አልስማማም ሐ. አላዉቅም

24. የአንጀት ጥገኛ ትላትል በሽታን ስለሚያስተላልፍ ጥሬ ስጋን በፍጹም መመገብ የለብዎትም።

ሀ. እስማማለሁ ለ. አልስማማም ሐ. አላዉቅም

25. የአንጀት ጥገኛ ትላትል በሽታን ለመከላከል፤ ማብሰል ሳያስፈልገዉ አትክልትን አጥቦ መጠቀም ብቻ በቂ ነዉ። ሀ. እስማማለሁ ለ. አልስማማም ሐ. አላዉቅም

26. የአንጀት ጥገኛ ትላትል በሽታ ከእንስሳትና የእንስሳት ዉጤቶች ወደ ሰዉ ሊተላለፍ ይችላል።

ሀ. እስማማለሁ ለ. አልስማማም ሐ. አላዉቅም

ክፍል አራት፡ የጥናቱ ተሳታፊዎች ስለ አንጀት ጥገኛ ትላትል በሽታ የመከላከል ተግባርን የሚዳስሱ መረጃዎች

27. ከመመገብዎ በፊት እጅዎትን በሳሙና የመታጠብ ልምድ አለዎት?

ሀ. ሁል ጊዜ እታጠባለሁ ለ. እንደ የሁኔታዉ እታጠባለሁ ሐ. አለፎ አልፎ መ. በፍፁም አልታጠብም

28. ለርስዎና ለቤተሰብዎ የሚጠቀሙበት ሽንት ቤት አለዎት ? ሀ. አለ ለ. የለም

29. ለተራቁጥር 28 ጥያቄ መልስዎ አለ ከሆነ ምን ዓይነት ሽንት ቤት ነዉ የሚጠቀሙት?

ሀ. የግል ለ. የጋራ/የህዝብ ሐ. ሽንት ቤት የለኝም ሜዳ ላይ ነዉ የምንጸዳዳዉ

30. ሽንት ቤት ከተጠቀሙ በኋላ እጅዎትን በሳሙና/በአመድ የመታጠብ ልምድ አለዎት?

ሀ. ሁል ጊዜ እታጠባለሁ ለ. እንደየሁኔታዉ እታጠባለሁ ሐ. አለፎ አልፎ መ. በፍፁም አልታጠብም

31. ለመጠጥና ለምግብ ማብሰያ የሚጠቀሙትን ዉሃ የሚያገኙት ከየት ነዉ?

ሀ. ከቧንቧ ለ. ከጉድጓድ ሐ. ከመሬት ከሚወጣ ምንጭ መ. ከወራጅ ወንዝ

32. አትክልት አዘዉትረዉ ይጠቀማሉ? ሀ. አዎ ለ. አልጠቀምም

33. ለተራ ቁጥር 32 ጥያቄ መልስዎ አዎ ከሆነ ለምን የህል ጊዜ ይጠቀማሉ?

ሀ. በየቀኑ ለ. በሳምንት ሶስት ጊዜ ሐ. በሳምንት አንድ ጊዜ ብቻ

34. ለተራ ቁጥር 32 ጥያቄ መልስዎ አዎ ከሆነ እንዴት ነዉ የሚጠቀሙት?

ሀ. ጥሬዉን አትክልት ሳይታጠብ ለ. በማጠብ ብቻ እጠቀማለሁ ሐ. በማብሰል እጠቀማለሁ

35. ጥሬ ስጋ የመመገብ ልምድ አለዎት ?

ሀ. ሁል ጊዜ እመገባለሁ ለ. እንደየሁኔታዉ እመገባለሁ ሐ. አለፎ አልፎ መ. በፍፁም አልመገብም

36. ከእርስዎ ጋር አብሮዎት የሚኖሩ እንስሳት አሉዎት? ሀ. አዎ ለ. የለኝም

37. ለተራ ቁጥር 36 ጥያቄ መልስዎ አዎ ከሆነ፤ምን ዓይነት እንስሳት ናቸዉ ያለዎት?

ሀ. ድመት/ዉሻ ለ. የቀንድ ከብት ሐ. የአዕዋፍ ዝርያ/ዶሮ መ. ሌላ፤ ይጠቀስ----------

ክፍል አምስት፡ በጤና ባለሙያዎች የሚሞላ የጤና መረጃ

38. በአለም የጤና ድርጅት ፍረጃ መሰረት የታካሚዉ የጤና ሁኔታ ስንተኛ ደረጃ ነዉ ?

ሀ. ደረጃ አንድ ለ. ደረጃ ሁለት ሐ. ደረጃ ሦስት መ. ደረጃ አራት

39. ታካሚዉ በዚህ ወር የቫይረስ ቆጠራ ተደርጎለታል? ሀ. አዎ ለ. አልተሰራም

40. ለተራ ቁጥር 39 ጥያቄ መልስዎ አዎ ከሆነ የቫይረስ ቁጥሩ ስንት ነዉ ? ----------

ክፍል ስድስት፡ በህክምና ላቦራቶሪ ባለሙያዎች የሚሞላ የጤና መረጃ

1. የሰገራ ናሙናዉ የተወሰደበት ቀን---------- ሰዓት----------
2. የሰገራ ናሙናዉ ምርመራ የተሰራበት ቀን---------- ሰዓት----------
3. የሰገራ ናሙናዉ ኮንሲስታንሲ ሀ. ጠጣር ለ. ከፊል ጠጣር ሐ. ተቅማጥ
4. የሰገራ ናሙናዉ እይታ/ቀለም
   ሀ. ኖርማል/ቡናማ ለ. ሙከስ ሐ. ደም የተቀለቀለበት
5. የምርመራ ዉጤት

ተራ ቁጥር	በምርመራ የተገኘዉ የአንጀት ጥገኛ ትላትል/የእድገት ደረጃዉን ይግለጹ/	የተጠቀሙበት የላቦራቶሪ የምረመራ ዘዴዎች		
		Direct microscopy(✓)	Formol-ether concentration(✓)	Modified acid fast staining(✓)

Annex-IX. SOPs for laboratory investigation

1. SOP for preparation of direct stool microscopy examination (Wet mount)

Purpose: This sop provides instruction for the preparation and examination of stool sample direct microscopy.

Principle: The saline used in this method dissolves the formed stool and provides it to be a thin smear and can pass the light that enable us to see the ova, trophozoites, adults and other forms of the parasite in the stool.

Materials and reagents:

Normal saline	Pasture pipette
Applicator stick	Marker/pen
Glass microscopic slides	Disposable glove
Glass microscopic cover slides	Biohazard bag
Light microscope	Patient register

Sample : Fresh stool sample(within 30 minutes of passage)

Safety:

- ☞ stool sample should be treated as biohazards and universal precautions are always considered.
- ☞ Avoid contact with bare fingers, always wear gloves while working

Procedure:

1. Prepare normal saline or lugol's iodine
2. As soon as the specimen is received in the laboratory, check and document the physical characteristics of the stool like consistency, color, presence of blood or mucus and presence of adults of large parasites that can be seen with our naked eye.

3. Then to examine the stool microscopically, place one drop of normal saline on a microscopic slide
4. Using an applicator stick take a piece of stool approximately 1 gram and thoroughly emulsify it with normal saline. The sample should be spread thinly enough that allow reading the printed paper barely when the slide is placed on top of the text.
5. Place a 22mm cover slide on the emulsified stool sample and press the cover slide to disperse the fecal material evenly.
6. Place the slide on the microscope stage and scan for any parasitic stages such as trophozoites, cyst, ova, adult, RBC, pus cells and other findings with 10X LPF.
7. Switch to 40X HPF for more detail study of any suspected eggs or protozoa.

Reporting of results

- Results should be recorded for each species separately in the hospital lab register and in the laboratory reporting forms.
- Record if the test was done or not, and if the test was not done, provide a reason for not doing it.
- Record if the result is POSITIVE or NEGATIVE.
- If POSITIVE, record the species and number of helminth eggs or protozoa
- Negative (no cysts or trophozoites is seen in the entire sediment).

References

Cheesbrough M. District laboratory practice in tropical countries: Cambridge university press; 2006
WHO. Basic laboratory procedures in clinical bacteriology: Geneva, 2nd edition; 2003
WHO. Manual of basic techniques for a health laboratory: Geneva, 2nd edition; 2003

2. SOP for preparation of formol-ether concentration

Purpose: This sop provides instruction for the preparation and examination of stool sample with formol-ether concentration technique.

Principle: Sedimentation technique uses centrifugation to concentrate protozoan cyst, helmenth ova and larvae and can be recovered in the bottom of the tube. Ether used as an extractor of debris and fat particles of the faces.

Materials and reagent required:

- Funnel
- Wooden applicator stick
- 10% formaldehyde
- Normal saline
- Diethyl ether
- Stool container
- Centrifuge and centrifuge tube
- Medical gauze
- Rubber stopper
- Plastic pipette
- Microscopic slide
- Cover slip
- Light microscope
- 70% alcohol
- Examination glove
- Biohazard safety contain

Sample : Fresh stool sample(within 30 minutes of passage)

Safety:

- ☞ stool sample should be treated as biohazards and universal precautions are always considered.
- ☞ Avoid contact with bare fingers, always wear gloves while working

Procedure

1. Prepare 10% formalin solution
2. Label 15ml centrifuge tube with correct patient code number
3. Label small bakers with correct code number
4. Place a small baker containing 10ml of 10% formalin to approximately 1 gm of faces and stir with an applicator stick, until you get slightly cloud suspension. Fit a guaze filter into a funnel and place the funnel on the top of the centrifuge tube
5. Pass the fecal suspension through two layer gauze into the centrifuge tube until the 10ml mark reached. Remove the filter and discard the filter with the lumpy residue.
6. Add 3ml of ether to the suspension in the tube and mix well by putting a rubber stopper in the tube and shaking vigorously for 10 seconds.
7. Remove the stopper and place the tube and centrifuge at 400-500 gm for 2-3 minutes
8. Remove the tube from the centrifuge, loosen the fatty plug/debris with an applicator stick and pour away the supernatant by quickly inverting the tube
9. Use 10X and 40X objective to examine the whole area under the cover slip for ova, cyst and larvae.

Reporting of results

- Results should be recorded for each species separately in the hospital lab register and in the laboratory reporting forms.
- Record if the test was done or not, and if the test was not done, provide a reason for not doing it.
- Record if the result is POSITIVE or NEGATIVE.
- If POSITIVE, record the species and number of helminth eggs or protozoa
- Negative (no cysts or trophozoites is seen in the entire sediment).

References

Cheesbrough M. District laboratory practice in tropical countries: Cambridge university press; 2006

WHO. Basic laboratory procedures in clinical bacteriology: Geneva, 2nd edition; 2003

WHO. Manual of basic techniques for a health laboratory: Geneva, 2nd edition; 2003

3. SOP for preparation of Modified acid fast staining

Purpose: This sop provides instruction for the preparation and examination of stool sample with modified acid fast staining technique

Principle: Oocyst of Cryptosporidium, Cyclospora, Isospora and sarcocystes are acid fast and can be stained and detected with modified acid fast stain.

Materials and Reagent

- Microscopic slide
- Pasture pipette
- Glass cylinder
- Staining jar
- 70% alcohol
- Disposable glove
- Biohazard container
- 1% Carbol fuchsin solution
- 1% acid alcohol
- 0.3% methylene blue
- Absolute methanol

Sample : Fresh stool sample(within 30 minutes of passage)

Safety:

- stool sample should be treated as biohazards and universal precautions are always considered.
- Avoid contact with bare fingers, always wear gloves while working

Procedure

1. Prepare fecal thick smear
2. Air dry
3. Fix the smear with the absolute methanol for one minute, allow the smear to dry
4. Cover with coarbolfuchsin for 30 minutes
5. Wash the slide with tape water
6. Decolorize with 1% acid alcohol decolorizing agent for 10-15 seconds
7. Gently wash with running tape water
8. Cover the slide 0.3% methylene blue for 1 minute
9. Gently wash the slide with tape water
10. Air dry slides in vertical position
11. Examine the smear microscopically for oocysts, using a low power magnification to detect the oocysts and the oil immersion objective to identify them.

Reporting of results

- Results should be recorded for each species separately in the hospital lab register and in the laboratory reporting forms.
- Record if the test was done or not, and if the test was not done, provide a reason for not doing it.
- Record if the result is POSITIVE or NEGATIVE.
- If POSITIVE, record the species and number of helminthes eggs or protozoa
- Negative (no cysts or trophozoites is seen in the entire sediment).

References

Cheesbrough M. District laboratory practice in tropical countries: Cambridge university press; 2006

WHO. Basic laboratory procedures in clinical bacteriology: Geneva, 2nd edition; 2003

WHO. Manual of basic techniques for a health laboratory: Geneva, 2nd edition; 2003

Annex -X. Laboratory result form

Code ---------- Age ---------- Sex----------

1. Date of specimen collection ---------- Time ----------
2. Date of specimen processed----------Time ----------

3. Stool consistency A. Formed B. Semi formed C. Diarrhea
4. Stool appearance A. Normal/brown B. Mucus C. Bloody
5. Result

Ser. No.	Type of parasite identified with developmental stage	Laboratory method used		
		Direct microscopy	Formol-ether concentration	Modified acid fast staining
4.				
5.				
6.				
7.				

Annex-XI. Declaration

I the undersigned candidate, declare that this thesis is my original work and has not been presented for a degree in this or any other university and all resources used for this thesis have been acknowledged.

Name of the student: Tassew Tefera Shenkutie

Signature: _____

Date: _____

Approval of the primary Advisor

Name of the primary advisor: _____

Signature: _____

Date: _____

Approval of the Co-Advisor

Name of the co-dvisor: _____

Signature: _____

Date: _____