

## Prevalence and Risk Factors for Intestinal Parasite Infections in HIV/AIDS Patients with Anti-Retroviral Treatment in South West Ethiopia

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### Abstract

**Background:** There was high prevalence of intestinal parasitic infections among HIV-infected patients due to poor personal hygiene and suppressed immune system. The objective of this study was to determine the prevalence of intestinal parasitic infections in HIV-infected patients who are on anti-retroviral therapy (ART).

**Objective:** To assess and determine the prevalence of intestinal parasitic infection and associated risk factors among HIV patients attending ART.

**Materials and Methods:** An institution based cross-sectional study was conducted from April 2015 to June 2015. The present study included 150 study participants. The study participants were selected conveniently. Socio-demographic characteristics and other related data were collected by using interview based semi-structured questionnaire. Patients' record was assessed to obtain their current CD4 cell count status during the study period. Assessing current CD4 cell count helps identify the status of intestinal parasite infection among HIV patients with respective the CD4 count status. Labeled plastic cups were used to collect stool specimen from each study participants. Descriptive statistics, bi-variate and multivariate logistic regression were performed using SPSS-V 20 software. P value less than 0.05 was used as statistically significant.

**Result:** Direct wet mount, Formol-Ether Concentration and modified Ziehl-Neelson staining was done only for 120 individuals, and intestinal parasites were detected in 54 (45.0 %) of the study participants harboring one or more parasites. Among the detected intestinal parasites, *A. lumbricoid* accounted for 11.7% followed respectively by *E. histolytica* (9.2%), *S. stercoralis* (7.5%) and opportunistic parasites (5.0%).

**Conclusion and recommendation:** Health education about personal hygiene and regular de-worming is very essential for HIV-infected patients.

**Keywords:** ART; HIV; South West Ethiopia

### Introduction

Helminthes or protozoan parasitic infections are among the most widely spread human infections worldwide [1-4]. An intestinal parasite infection which is one of the common major problems in developing countries due to poor personal hygiene is also common among HIV-infected patients who are on ART. Super imposed infection due to immune suppression is one of the major common problems in these patients [5-7].

There is a high prevalence of intestinal parasite infections reported from tropical and sub-tropical countries among people living with HIV. As certain studies indicated the higher prevalence of intestinal parasites among HIV patients was associated to factors including low CD4+ counts, persistent diarrhea, living conditions and poor nutrition [8-12]. When CD4+ T-cell count has been severely depleted mostly below 200cells/mm<sup>3</sup>, almost 80% of AIDS patients die of AIDS-related infections including opportunistic or other intestinal parasites rather than of the HIV infection itself which usually occur late in the course of HIV infection. Patients on ART with low CD4 + counts may suffer from intestinal parasitic infections [13,14].

Due to the low level of environmental and personal hygiene, contamination of food and drinking water that results from improper disposal of human excreta, intestinal parasites are widely distributed in Ethiopia.

Thus, the present study is aimed at assessing the prevalence and associated factors of intestinal parasitic infections among HIV patients on ART at the study area.

### Materials and Method

#### Study area and period

The study was conducted from April 2015 to June 2015 at ART clinic of Jimma University Specialized Hospital (JUSH). Jimma Town is located at 364 km from capital city of Ethiopia, Addis Ababa, in South West. The town has an altitude of about 1760m above sea level with temperature ranges from 11.5- 27.1°C and rain fall ranges between 1200- 2000 millimeter . The total population of the town is estimated to be 144, 369.

#### Study design and subject

An institution based cross-sectional study was used. All HIV sero-positive patients registered at ART clinic were source population and only those who started ART were study population. Study participants who started ART but treated for parasitic infections before sixth months during sample collection date for each study participants were excluded and this was why the sample size becomes too small.

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## Ethical consideration

Ethical clearance was obtained from Jimma University College of health science research and ethical review committee. All the study participants were explained about the purpose of the study and those who were unwilling to participate were not included. Only those who were given their written consent to participate in the study were included. All personal information of the participants was kept confidential and those participants positive for intestinal parasites were treated using standard drugs by nurse in ART clinic. ART follow up record was retrieved by nurses working in ART clinic.

## Data collection techniques and analysis

A convenient non-probability sampling technique was used to obtain data from each study participants. An interview based structured questionnaire was used to collect socio-demographic and other related data from each study participants. The patients' record was assessed to obtain their current CD4 cell count status during the study period. The data were checked for clarity and edited for inconsistency manually and data analysis was performed by using SPSS version 20 software. The prevalence of intestinal parasites was determined in relation to different variables by using chi-square test and the results were expressed graphically and summarized in dummy tables.

## Laboratory investigation procedures

Parasitological diagnosis was done by obtaining a single stool specimen in labeled cup from each consent study participants. Direct saline, Formol ether concentration and modified Ziehl-Neelsen techniques was done for each patient strictly following the laboratory standard operating procedures.

The direct saline examination was done immediately after collection to identify motile parasites, helminthes eggs, cysts and oocysts of intestinal protozoa. Formol ether concentration technique was done for each consent study participants. About one gram of stool was emulsified in about 4 ml of 10% formol water contained in a test tube, after well mixing by shaking the emulsified stool was sieved and the sieved suspension was centrifuged by using conical test tube. After centrifugation the sediment was examined microscopically. Modified Ziehl-Neelsen method was done by preparing a smear from the sediment obtained by the formol ether concentration technique. The smear was air dried and fixed with methanol for 2-3 minutes then stained with carbol fuchsin for 15 minutes, decolorized with 1% acid alcohol for 15 seconds, counterstained with methylene blue for 30 seconds, there was washing off the water between each step, and finally the air dried slide was examined microscopically by using a low power magnification to detect the oocysts and the oil immersion objective to identify them. The study participant's most recent CD4 cell count was obtained from their ART follow up record in the ART clinic.

## Results

### Socio-demographic characteristics of study participants

Over a period of three months a total of 150 fecal samples were collected from HIV sero-positive individuals who were visiting ART clinic during the study period. A complete data was obtained only from 120 study participants who were on ART and never treated for parasitic infection before sixth months starting from sample collection date for each individual. The response rate was 86.7% and due to insufficient volume and inappropriate sample container 20 samples were rejected, except sample rejection they have similar CD4 counts and socio-

demographic characteristics. From total study participants, 60.8% of them were females, 38.3% of them were between age groups of 25-34 years, 78.3% of them were urban dwellers, 41.7% of them were married and the educational status of majority of them was from grade 1-8 (Table 1).

Concerning the distribution of parasitic infection, the overall prevalence of intestinal parasitic infections among study participants was 45%. Six different parasitic species were detected with *A. lumbricoides* among the leading parasite accounting for 11.7% followed by *E. histolytica*, 9.2% (Table 2).

Concerning the CD4 cell counts of the study participants, 35 (29.2%) of them had CD4 cell counts less than 200 cells/ $\mu$ l, 36 (30%) of them had CD4 cell counts between 200-500 cells/ $\mu$ l whereas 49 (50%) of them had greater than 500 cells/ $\mu$ l CD4 cell counts. Compared to those individuals with greater than 500 cells/ $\mu$ l CD4 cell counts, individuals with CD4 cell counts between 200-500 cells/ $\mu$ l had statistically significant association with intestinal parasitic infections. The 5.0%

Variables	Category	Number (%)
Age	4-14	13(10.8%)
	15-24	10(8.3%)
	25-34	46(38.3%)
	35-44	31(25.8%)
	45-54	17(14.2%)
	55-60	2(1.7%)
	>60	1(0.8%)
Sex	Male	47(39.2%)
	Female	73(60.8%)
Residence	Urban	94(78.3%)
	Rural	26(21.7%)
Educational status	Illiterate	11(9.2%)
	Read & write only	9(7.5%)
	Grade 1-8	37(30.8%)
	Grade 9-12	34(28.3%)
Marital status	Grade 12 +	29(24.2%)
	Single	34(28.3%)
	Married	50(41.7%)
	Cohabitation	7(5.8%)
	Divorced	23(19.2%)
Occupation	Widowed	6(5.0%)
	House wife	24(20.0%)
	Private work	9(7.5%)
	Student	21(17.5%)
	Government employee	25(20.8%)
	Farmer	8(6.7%)
	Merchant	28(23.3%)
Others	5(4.2%)	

Table 1: Socio- demographic characteristics of HIV sero-positive patients on ART.

Type of parasite	Number (%)
<i>A. lumbricoides</i>	14(11.7%)
<i>E. histolytica</i>	11(9.2%)
<i>S. stercoralis</i>	9(7.5%)
<i>T. trichuria</i>	7(5.8%)
<i>G. lamblia</i>	5(4.2%)
<i>Taenia</i> species	2(1.7%)
Others(opportunistic)	6(5.0%)

Table 2: Prevalence of intestinal parasitic species among HIV sero-positive patients on ART.

opportunistic parasites identified were from those study participants with less CD4 count, <200 cells/μl (Table 3).

The pre-disposing factors of HIV sero-positive patients to different parasitic infections were assessed during the study period. According to this assessment, there was no any study participants infected by intestinal parasites from those who always washed their hands before eating their meals. From those study participants who had the habit of washing fruits only some times, 30 (34.2%) of them were infected by different parasites. According to this finding there was no any detection of *H. worm* whose main mode of transmission is through

skin penetration by infective larva. From those study participants who had always the habit of wearing shoes, 47 (39.2%) of them were infected by different intestinal parasites whose mode of transmission of majority of them is different from infective larval skin penetration (Tables 4 and 5). There is no any statistically significant association between pre-disposing factors and intestinal parasitic infections (Table 5). According to this finding frequently hand and fruit washing before eating and after latrine is effective practice to prevent intestinal parasitic infection overall and particularly for HIV infected patients whose immune system is compromised.

CD4+ count	Number of patients (%)	Intestinal parasites result		COR(95% C.I.)	P value	AOR (95%C.I.)	P value
		Positive	negative				
<200 cells/μl	35(29.2%)	23	12	1.9 (1.02, 3.51)	0.031	2.06 (1.05, 4.01)	0.003
200-500 cells/μl	36(30.0%)	17	19	0.89(0.41,1.52)	0.634	0.68 (0.32, 1.32)	0.308
>500 cells/μl	49(40.8)	14	35	1		1	

Table 3: CD4 cell counts and intestinal parasitic infection among HIV sero-positive patients on ART.

Variable	Category		
	Always	Sometimes	Not at all
	Number (%)	Number (%)	Number (%)
Hand washing habit before eating	114(95.0%)	6(5.0)	0(0.0%)
Hand washing habit after latrine	85(70.5%)	31(25.8)	4(3.3%)
Shoe wearing habit	102(85.0%)	18(15.0)	0(0.0%)
Habit of eating raw meat	1(0.8%)	7(5.8)	112(93.3%)
Habit of washing fruits	67(55.8%)	39(32.5)	14(11.7%)
Proper use of latrine	101(84.2)	16(13.3)	3(2.5%)

Table 4: Practice of parasitic infection prevention method by HIV Sero-positive patients on ART.

Pre-disposing factors	Category	Intestinal parasite result		COR (95% C.I.)	P value	AOR (95%C.I.)	P value
		Positive	Negative				
Hand washing habit before eating	Always	0(0%)	114(95.0%)	1		1	
	Some times	4(3.3%)	2(1.7%)	6.4(2.9,21.3)	0.34	4.4(2.7,2.3)	0.27
	Not at all	0(0.0%)	0(0.0%)	3.3(1.9,21.2)	0.41	4.2(2.1,5.6)	0.31
Hand washing habit after latrine	Always	3(2.5 %)	82(68.3)	1		1	
	Some times	19(15.8%)	12(10.0%)	1.93(.97-3.81)	0.219	3.1(0.433-21.6)	0.26
	Not at all	4(3.3%)	0(0.0%)	2.98(1.7,5.2)	0.178	2.1(0.271-15.8)	0.48
Shoe wearing habit	Always	47(39.2%)	55(45.8%)	1		1	
	Some times	7(5.8%)	11(9.2%)	1.092(0.49-2.42)	0.82	0.82(0.33-2.02)	0.66
	Not at all	0(0%)	0(0%)	1.116(0.47-2.63)	0.8	0.82(0.31-2.1)	0.7
Habit of eating raw meat	Always	0(0%)	1(100%)	1			
	Some times	3(2.5%)	4(3.3%)	0.51(0.141-1.8)	0.3	0.4(0.10-1.7)	0.65
	Not at all	51(42.5)	61(50.8%)	0.87(0.30-2.5)	0.8	0.8(0.3-2.6)	0.91
Habit of washing fruits	Always	9(7.5%)	58(48.3%)	1		1	
	Some times	30(34.2%)	9(7.5%)	4.21(2.4-7.4)	0.42	4.8(2.57-9.0)	0.25
	Not at all	9(7.5%)	5(4.2%)	3.8(1.5-9.70)	0.52	6.59(2.2-19.6)	0.34
Proper use of latrine	Always	8(6.7%)	93(77.5%)	1		1	
	Some times	12(10.0%)	4(3.3%)	0.53(0.11-2.7)	0.67	.74(0.19-2.83)	0.44
	Not At all	2(1.7%)	1(0.8%)	1.2(0.36-3.7)	0.8	0.8(0.184-3.57)	0.78
Water source for drinking	Pipe water	6(5.0%)	75(62.5%)	1		1	
	protected spring	17(14.2%)	14(11.6%)	0.51(0.141-1.83)	0.3	0.4(0.10-1.72)	0.76
	Un protected spring	5(4.2%)	3(2.5%)	.87(0.30-2.46)	0.79	0.83(0.26-2.6)	0.71

Table 5: Association of pre-disposing factors and intestinal parasitic infections among HIV sero-positive patients on ART.

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