

# Prevalence of Intestinal Parasites among HIV Seropositive Individuals at Mettu Karl Hospital, Southwest Ethiopia (Preliminary Study)

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## ABSTRACT

Recently reported studies showed that, intestinal parasitic infections disturb anti-HIV immune response and facilitate the faster HIV viral replication. This phenomenon accelerates the progression of AIDS. A hospital based cross-sectional study was conducted at Mettu Karl hospital from March to June, 2013 to determine the prevalence rate of intestinal parasites in HIV seropositive and ART naïve individuals. Stool specimens from the total of 96 individuals enrolled in the study were screened for intestinal parasitic infections using direct wet mount and formol-ether concentration methods. The overall prevalence of parasitic infection was 60(62.5%); of which 49(51.1%) were infected only with a single parasite and 11(11.4%) were found with mixed infections. Five species of intestinal parasites including *Entamoeba histolytica/dispar* (38.9%), *Giardia lamblia* (22.2%), *Ascaris lumbricoides* (26.4%), *Trichuris trichuria* (8.3%) and Tapeworm (4.2%) cases were diagnosed from the study participants. Even though it was not significant ( $P>0.05$ ), the socio-demographic characteristics of the study participants such as Age, Income and Family size were found in association with the rate of parasitic infection. The overall result indicates, intestinal parasites and HIV co-infection is high in the study area. Thus, anti-intestinal parasite Mass Drug Administration to HIV infected individuals is urgently needed.

**Keywords:** ART-naïve, HIV/AIDS, Intestinal parasites, Mixed-infections, Socio-demographics.

## INTRODUCTION

AIDS is the most devastating health catastrophe in the human population. [1] Since the first case reported in 1981, more than 65 million peoples become infected and approximately 25 million of them have lost their lives. [2] According to the recent reports; over 33 million peoples are living with HIV/AIDS and around 67% of the global burden of the disease is found in sub-Saharan African regions. In this region, other

infectious agents such as intestinal parasites are also highly prevalent. [3-6]

Intestinal parasites are the top most health problems and are endemic in tropical and sub-tropical regions of the world. [7] It is estimated as much as 60% of the world's population is infected with one or more intestinal parasites. The infection plays a significant role in morbidity and mortality of millions of people every year. The majority affected groups are HIV infected individuals as a result of severe systemic

illness and diarrhea. [8] Amoebiasis, giardiasis, ascariasis, trichiuriasis, hookworm and Schistosoma infections are among the ten most common intestinal parasites in regions of the developing world where majority of HIV and AIDS cases are highly concentrated. [7,9,10]

Intestinal parasites especially intestinal helminths cause constant immune activation that is characterized by a dominant Th2 type cytokine profile with the secretion of high level of IgE and eosinophilia. Such immune profiles have an adverse impact on the efficacy of Th1 cytokines in the suppression of HIV viral replication. [11] Several reports also showed that intestinal parasitic infections undermine the anti-HIV immune response in HIV seropositive individuals. This situation could contribute to the faster HIV viral replication. [12-17] The reduced immune response caused by HIV infection might also lead individuals to a higher susceptibility to other parasitic infections. [18,19] In literatures, there was no data that shows the prevalence of intestinal parasites and HIV co-infection in the study area. This preliminary study therefore aimed at determining the magnitude of intestinal parasitic infections in HIV infected and pre-ART individuals who have been attending ART clinics of Mettu Karl hospital, Southwest Ethiopia.

## **MATERIAL AND METHODS**

### **Study area**

Mettu is a capital town of Mettu district and Ilu Aba Bora zone. The town is located approximately 600km southwest of the capital Addis Ababa, Ethiopia. The district covers an area of 1452km<sup>2</sup> which lies between 8°6' and 8°31'N latitude and 35°10' and 35°50'E longitude plus an altitude ranges from 1000-2027m above sea level ([www.oromia.com/index](http://www.oromia.com/index). Oromia National Regional State).

### **Study design**

#### **Socio-demographic data**

A structured questioner was utilized to collect the socio-demographic

characteristics of the study participants during parasitological laboratory examination at laboratory department of the hospital.

#### **HIV serology tests**

HIV status was assessed in all participants using the current rapid HIV testing kits with KHB, STAT-PACK and Uni-Gold following manufacturer instructions in ART clinic of the hospital. Results were then interpreted following the current national algorithm of the country for screening of sera of HIV-1 infection that was adopted from WHO.

#### **CD4 Count Assessment**

CD4 T-lymphocyte count of HIV-positive study participants were enumerated in EDTA mixed blood using FACS CD4 count machine. Then, whose CD4 cells greater than 200/μl and who did not start ART were only included in the study.

#### **Parasitological examination**

Stool specimen of all study participants who fulfil the eligible criteria was examined using light microscopy of the direct wet mount followed by formol-ether concentration methods according to WHO guideline [20] in the hospital's parasitology research laboratory room.

#### **Sample size determination**

A total of 100 HIV positive and ART naïve study participants were estimated to be included in the study. They were among HIV positive individuals receiving PIHCT and VCT at Karl hospital by considering a 95% confidential interval and 5% degree of freedom calculated using Daniel statistical utility formula. [21] Taking an average HIV prevalence in the hospital was 7%, sample size approximately determined to be 100 individuals for the study with 4 participants being rejected.

#### **Ethical clearance**

The study was carried out after receiving an ethical clearance endorsement from Mettu University Research Technical and Ethical Clearance Review Committee. In addition, verbal consent was obtained from the study participants and guardians of children after informing them with the

importance of the study using their own language.

### Statistical Analysis

Analysis of the data was undertaken using IBM SPSS version 20 software. Percentage and frequency distribution were used to determine the rate of parasitic infection. To see the association between the socio-demographic characteristics of the study participants and the rate of parasite infections; one sample T-test was employed. Values were considered statistically significant when  $p < 0.05$ .

## RESULTS

### Socio-demographic characteristics of the study participants

Table 1: Socio-demographic characteristics of the study participants

Socio-demographic		Frequency	Percent
Sex	Male	37	38.5
	Female	59	61.5
Age	0-9	5	5.2
	10-18	7	7.3
	19-30	36	37.5
	31-45	41	42.7
	>45	7	7.3
Marital status	Single	22	22.9
	Married	54	56.3
	Divorced	20	20.8
Educational status	Illiterate	11	11.5
	<10	54	56.3
	10-10+3	26	27.1
	≥Degree	5	5.2
Family size	1	22	23
	2-5	61	63.5
	>5	13	13.5
Income/ETH Birr	<500	64	66.7
	501-1500	21	21.9
	1501-3000	11	11.4
	<b>Total</b>	<b>96</b>	<b>100</b>

A total of 96 HIV positive and ART naïve individuals were participated in the study. Thirty seven (38.5%) were males and 59(61.5%) were females. Twelve (12.5%) were found below 18 years old. Whereas, 36(37.5%), 41(42.7%) and 7(7.3%) were within the age range of 19-30, 31-45 and greater than 45 years respectively. In addition, 6(6.25%) were involved in the teaching activities; while the policemen covered the sample size of 4(4.2%). Merchants, housewife, bar lady, students and those who did not have jobs covered 10(10.4%), 6(6.25%), 1(1%), 12(12.5%)

and 17(17.7%) respectively. But, majority (41.7%) of the study participants was daily worker and farmers. Sixty four (66.7%) of them offered a monthly income less than 500 Ethiopian birr and 61(63.5%) had the family number in between 2 and 5 individuals. Similarly, 65(67.45%) achieved an educational status less than grade ten. Whereas; those who hold diploma and degree covered the sample size of 31(32.3%). Furthermore, only 11(11.4%) of the participants gained a monthly income greater than 1,500 Ethiopian birr (Table 1).

Table 2: Prevalence of intestinal parasites among study participants in relation to Age and Sex

Age/year		Parasitic infections			
		Infected	Non-infected	p-value	
0-9	Sex	Male	2		
		Female	3		
	<b>Total</b>	<b>5(5.2)</b>	<b>0</b>	<b>--</b>	
10-18	Sex	Male	2		
		Female	5		
	<b>Total</b>	<b>7(7.3)</b>	<b>0</b>	<b>--</b>	
19-30	Sex	Male	8		
		Female	15		
	<b>Total</b>	<b>23(24)</b>	<b>13(13.5)</b>	<b>0.13</b>	
31-45	Sex	Male	11		
		Female	10		
	<b>Total</b>	<b>21(21.9)</b>	<b>20(20.1)</b>	<b>0.12</b>	
>45	Sex	Male	2		
		Female	2		
	<b>Total</b>	<b>4(4.2)</b>	<b>3(3.12)</b>	<b>0.23</b>	
<b>Total</b>	Sex	Male	25(26)	12(12.5)	0.26
		Female	35(36.4)	24(25)	0.10
	<b>Total No. (%)</b>	<b>60(62.5)</b>	<b>36(37.5)</b>	<b>0.15</b>	

### Parasitological results

Table 3: Prevalence of intestinal parasites among study participants in relation to Monthly income and Family size

Income/Eth Birr		Parasitic infection			
		Infected	Non-infected	p-value	
<500	Family size	1	11		
		2-5	29		
		>5			
<b>Total</b>	<b>40(35.4)</b>	<b>24(25)</b>	<b>0.17</b>		
501-1500	Family size	1	2		
		2-5	10		
		>5	4		
<b>Total</b>	<b>16(13.5)</b>	<b>5(5.2)</b>	<b>0.63</b>		
1501-3000	Family size	2-5	2		
		>5	2		
		<b>Total</b>	<b>4(2.1)</b>	<b>7(7.3)</b>	<b>0.90</b>
<b>Total</b>	Family size	1	13(11.5)	9(9.4)	0.11
		2-5	41(34.3)	20(20.1)	0.25
		>5	6(5.2)	7(7.3)	0.16

From the 96 study participants, 60(62.5%) of them were identified with parasitic infections, while the remaining diagnosed free. Twenty eight (29.2%) were infected with intestinal protozoans only and

21(21.9%) were by intestinal helminthes alone. A total of five species of intestinal parasites including *Entamoeba histolytica/dispar*, *Giardia lamblia*, *Ascaris lumbricoids*, *Trichuris trichiura* and Tapeworm were identified from the study participants. Mixed infections were also found and diagnosed from 11(11.4%) of the total study subjects (Table 2 & 3).

During the course of parasitological analysis of stool specimen, 72 parasitic cases were found. Majority of them were due to protozoan agents. *Entamoeba histolytica/dispar* accounted 28(38.9%) and *Giardia lamblia* was 16(22.2%). Whereas, intestinal helminthic infections caused by *Ascaris lumbricoids* 19(26.4%), *Trichuris trichiura* 6(8.3%) and tapeworm infections occupied 3(4.2%) of the case rate.

## DISCUSSION

HIV virus suppresses the immunity of individuals and result in the reduced immune response against other pathogens. For this reason, they become at high risk of acquiring intestinal parasites. The result denotes that, the high prevalence (62.5%) of intestinal parasitic infections in the study area. Amoebiasis, Giardiasis, Ascariasis and Trichiuriasis are among the most commonly diagnosed intestinal parasites from the study participants. Accordingly, this finding was found in consistent with the report of [22,23] on the prevalence of intestinal parasites determined from Africa and other tropical and sub-tropical countries.

*Entamoeba histolytica/dispar* and *Giardia lamblia* infection was found highly prevalent intestinal protozoan parasites. This is probably due to the cosmopolitan nature, short life generation time, presence of resistant stage and easy transmission rout of the parasites. Consequently, the result of herein study is also in agreement with other similar epidemiological reports conducted in different areas of the same country. [23,24]

Three species of intestinal helminthes including *Ascaris lumbricoids*, *Trichuris trichiura* and Tapeworm infections were identified in 28 (29.2%) participants of

the study. However, *Ascaris lumbricoids* was the most frequently diagnosed intestinal helminthes. The high prevalence of *Ascaris lumbricoids* is probably due to the fact that the presence of wet and humid air condition in the study area which is favorable for the survival and high transmission rate of its Ova. The finding is in agreement with the report by Wolday, et al (2002); Abossie (2010) where *Ascaris* and HIV co-infection was found endemic in wet and humid regions of Ethiopia.

Mixed infection is commonly reported from sub-Saharan African regions where the living standard of the people is very low. [23] In this study, multiple infections were also found from the study participants. Eleven (11.4%) of them were diagnosed with two and three intestinal parasitic agents. Among them, 4(4.16%) were harbouring *Entamoeba histolytica/dispar* and *Giardia lamblia*; 2(2.1%), *Entamoeba histolytica/dispar* and *Ascaris lumbricoids* and 1(1.1%), *Entamoeba histolytica/dispar* and tapeworm infections. While, *Giardia lamblia* and *Ascaris lumbricoids* were diagnosed in 3(3.1%) of the study participants. The report is found to be similar with the findings of [22,23] where HIV and multiple intestinal parasite co-infection is common from sub-Saharan African regions.

Intestinal parasitic infection was found highest in age groups between 19-45 years old. It is the age category in which most of HIV cases and intestinal parasite co-infections were reported in Ethiopia. [25-27] In relation to gender, even though there was no significant association ( $P>0.05$ ) with the prevalence of parasitic infection, it was found high in females. This could probably because of the household activities that they engaged in child care, constant contact with water and contaminated soil in most of their time than men. Hence, they became exposed to parasitic infection. [28]

The prevalence of *Giardia lamblia* was found much lower than the prevalence of *Entamoeba histolytica/dispar* and *Ascaris lumbricoids* in this study. It might be

because of the study participants that are comprised most from the adult age group (19-45 years old) and native peoples, in whom *Giardia lamblia* infection is much lower compared to children and other new comer. Birrie and Eriko, [30] and Tekola, [29] are also reported the same results from the Western parts of the same country.

## CONCLUSION

Prevalence of HIV and intestinal parasitic co-infection is high in the study area. Study participants who were found in the age between 19 and 45 years old plus females were the most affected group of individuals.

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