



## Original Research Article

### Intestinal Parasitosis among Human Immunodeficiency Virus Infected Patients Visiting Different Care Centers of Eastern Nepal

Hemanta Khanal<sup>1</sup>\* and Sanjita Bhujel<sup>2</sup>

<sup>1</sup>Department of Microbiology, Central Campus of Technology, Hattisar Dharan

<sup>2</sup>Sunsari Technical College, Dharan, Sunsari, Nepal

\*Corresponding Author: Hemanta Khanal, Department of Microbiology, Central Campus of Technology, Trinhuvan University, Dharan, Nepal, E-mail: [khanal.hemanta@gmail.com](mailto:khanal.hemanta@gmail.com)

#### Abstract:

Gastrointestinal parasitic infections are the major sources of diarrheal disease in developing countries and Human Immunodeficiency virus (HIV) infected patients are at the most risk. The objective of this study was to determine the prevalence of intestinal parasitic infections (IPIs) in the HIV-infected individuals visiting different care centers of Morang and Sunsari districts. The present cross-sectional study was conducted from two different HIV rehabilitation centers and one antiretroviral therapy center from eastern Nepal. A semi structured questionnaires was provided to HIV patients and 149 stool specimens were collected to analyze macroscopically and microscopically for the presence of enteric parasites. Data were analyzed by SPSS version 16. A total of 149 HIV seropositive patients with and without diarrhea were included in the study. Overall prevalence rate of enteroparasites was 19.46%. The prevalence rate of enteric parasites in HIV patients showed higher rate of protozoan infections (58.6%) than helminths (41.4%). High prevalence of parasitic infection was seen in male and also among male in the age groups of 31-40 years. The polyparasitism was not detected. A significant difference ( $p < 0.05$ ) was observed in the level of infection of intestinal parasites between the HIV seropositive with gastrointestinal tract (GIT) symptoms and HIV seropositive without GIT symptoms. The enteric parasitic infections were detected in 19.46% among HIV seropositive patients. Early detection of enteric parasitic infections could help in the management and improvement of the quality of life for HIV-infected individuals.

**Keywords:** Prevalence, HIV/AIDS patients, gastrointestinal parasites, Eastern Nepal

#### Introduction

Human immunodeficiency virus (HIV) causes a chronic infection which develops into acquired immunodeficiency syndrome (AIDS). The patients with AIDS are more susceptible to infections by many opportunistic pathogens and infections to AIDS patients boost morbidity and mortality (Agholi et al, 2013; Bhajjee et al, 2011). A constant transmission of HIV and parasites are common among most of the developing countries (UNAIDS/WHO 2002).

In developing countries, the parasitic infections are among the most of the frequent infections in patients with HIV/AIDS. Intestinal parasitic infections in HIV-infected patients complain acute and chronic watery diarrhea most commonly associated with severe weight loss (slim disease). The slim disease in association with a positive HIV cases is an AIDS-defining illness (Deveikis

1994). These gastrointestinal illnesses to HIV-infected individuals are threats in developing chronic parasitosis (Scandlyn, 2000).

Reports indicated that diarrhea occurs in 30 to 60 percent of HIV/AIDS patients in developed countries and many other similar types of research had reported that 50 to 93 percent of all such patients would have marked GIT symptoms during the course of their illness (McGowan, 2017).

The parasitic infestations among HIV/AIDS patient depend on the endemic status of that specific parasite in the particular region (Janoff and Smith 1988; Sapkota et al, 2008). Microsporidia and coccidian are the commonly isolated parasites from the stool specimens of HIV/AIDS associated diarrheal patients and the non

opportunistic protozoans parasites are amoeboids and flagellates (Sherchan et al, 2012). *C. parvum*, *Isospora belli* and *E. histolytica* have been reported as the most frequently identified organisms in HIV infected individuals with diarrhea from Nepal, India and other countries (Ahmed and Choudhary 2015; Kulkarni et al, 2009).

Many researches from developed and developing countries have revealed that some gastrointestinal syndromes due to intestinal parasites were often associated with severe diarrhea in HIV patients. Parasites frequently associated with acute and chronic diarrhea in HIV disease include various species of protozoans and helminthic parasites which are *Cryptosporidium* spp, *Isospora belli*, *Microsporidium* spp, *Giardia intestinalis*, *Entamoeba* spp, *Cyclospora cayetanensis*, *Blastocystis*, *Strongyloides*, and *Ascaris lumbricoides* (Gbakima et al,

2007; Gupta et al, 2008). The protozoan parasites although being less common are associated with the highest number of mortalities (Agholi et al, 2013). The health condition of HIV AIDS patients concerning the opportunistic infections are constantly monitored by various governmental and non-governmental agencies (Mahato et al, 2013, Wasti et al, 2009).

Detection of intestinal parasites and understanding the status of the infections will greatly facilitate in proper management and treatment of HIV/AIDS patients. The patients may require the combination therapy and this is noteworthy when parasites are detected from the stool samples of HIV-infected patients visiting different rehabilitation centers in developing countries, like Nepal. Hence, the purpose of this study was to determine the prevalence of parasitic infections from two different HIV care centers and antiretroviral therapy centers.

## Materials and Methods

This cross-sectional study was conducted among almost all HIV patients who constantly visited Kirant Yakthung Chumlung (KYC) Rehabilitation Center, Dharan Positive Group (DPG) and Anti-Retroviral Therapy (ART) Clinic BPKIHS of Morang and Sunsari districts from June 2014 to February, 2015 and processed in the parasitology laboratory of Sunsari Technical College Dharan, Sunsari, Nepal. A total of 149 stool samples were collected from different HIV Rehabilitation centers.

The samples were collected in a clean 50 mL wide necked leak-proof disposable vial. The stool specimens were transported in an ice box maintaining a ice cold temperature. The information regarding socioeconomic status, mode of HIV transmission and gastrointestinal disorders were collected by a written informed consent and parents were asked in the case of children.

Macroscopic examination was done for color, consistency and presence of adult worms or worm segments in the stool. Iodine wet mount and formalin-ether sedimentation technique were used for the microscopic study of protozoal trophozoite, cyst and helminthic eggs and larvae. Lab diagnosis of oocyst of *Cyclospora*, *Isospora*, and *Cryptosporidium* was done by modified acid-fast stain as described by Sherchan et al (2012). Each sample was observed in triplicate for finding the multiple parasitic infections as well as confirmation of the negative. The data collected were entered in Microsoft office excel 2010. The descriptive and inferential statistics were analyzed with SPSS version 16 and chi-square test was used to determine the association of dependent variables at 5% level of significance. The test was said to be significant when the p-value was less than 0.05.

## Results and Discussion

The study was conducted among 149 people in which 86 (57.7%) were male and 63(42.3%) were female. A total of 91 (61.07%) HIV patients from Kirant Yakthung Chumlung Rehabilitation Center of Morang district, 24 (16.10%) from Dharan Positive Group and 34 (22.81%) from Antiretroviral Therapy Clinic of BP Koirala Institute of Health Sciences of Sunsari district, Nepal were involved in this study. The mean age of the study populations was 31.7 years. The overall prevalence of the parasitosis among the HIV infected patients was 19.46% (29/149). The highest prevalence (33.3%) of parasitosis was seen in the age group of 51-60 years. The parasitic infections with the age group and gender were

statistically insignificant. Out of 29 HIV infected patients, 17 (58.6%) had protozoal and 12 (41.4%) had helminthic infections (Table 1). This study investigated the prevalence of intestinal parasitic infections among HIV seropositive individuals dwelling and visiting different rehabilitation centers and ART Clinic of Morang and Sunsari district. The HIV causes acquired immunodeficiency syndrome (AIDS) which is a progressive decline in immune system by lowering CD4 count (<200 cell/ $\mu$ L) resulting a different parasitic as well as opportunistic infections among HIV patients (Lee et al, 2005).

Parasitosis among males was 20.9% (18/86) higher than females 17.4% (11/63). This result is in agreement to one study of Nepal reporting 42.6% and 21.2% enteric parasitosis in male and female HIV/AIDS patients respectively (Sherchan et al, 2012). Predominance of parasites among male might be due to their migration to metropolitan cities in the search of work and due to the change in the food habits (Okwa 2007). The intestinal

parasitic infection was highest in the age group of 31-40 years but the result was statistically insignificant. This result agrees with the result reported by Garcia et al, (2005) and NASCOP (2008). The reason behind this may be due to maximum study population between this age group and also the population in this group is highly active (Table 1).

**Table 1: Age and gender-wise distribution of parasitic infection among HIV patients**

Age	Male			Female			Overall prevalence	p-value
	Helminthes	Protozoa	Total Population	Helminthes	Protozoa	Total Populations		
1-10	1	4	16	--	--	1	5/17 (29.4%)	0.1
11-20	--	--	--	0	1	4	1/4 (25%)	
21-30	2	--	15	1	2	20	5/35 (14.3%)	
31-40	4	3	38	3	4	25	14/63 (22.2)	
41-50	1	2	15	--	--	12	3/27 (11.1%)	
51-60	--	1	2	--	--	1	1/3 (33.3%)	
Total	8	10	86	4	7	63	29/149 (19.46%)	

This study showed that the intestinal parasitic infections were found on 29 (19.46%) out of 149 HIV/AIDS patients. The prevalence of parasites in this study was comparable to another similar study of Nepal by Tiwari et al, (2013) and the value obtained in this study was within the range reported by Adhikari et al, (2006), Akinbo et al, (2010), Amatya et al, (2011); Fariba et al, (2010), Sapkota et al, (2008), Sherchan et al, (2012), Tiwari et al, (2013).

Out of 149 study population, 40 (26.8%) were diarrheal and 109 (73.2%) were non-diarrheal. The symptomatic patients were considered those with acute and chronic diarrhea during sample collection. The prevalence of parasites among diarrheal and asymptomatic cases were 15 (37.5%) and 14 (12.84%) respectively. This study was found to have significant association (p-value= 0.001) between parasitic infections with the gastrointestinal tract symptoms (Table 2).

**Table 2: Parasitosis based on Diarrheal symptoms**

S.N.	GIT Symptoms	Total number	Positive number	p-value
1	Diarrheal	40	15 (37.5%)	0.001
2	Non-Diarrheal	109	14 (12.84%)	
	Total	149	29 (19.46%)	

The other studies of intestinal parasitosis among school going children with bowel symptoms, malnutrition children, hospital visiting out patients department (OPD), children from squatter community showed the higher prevalence than on the HIV/AIDS patients (Malla et al, 2008; Shrestha et al, 2012; Shrestha and Maharjan 2013; Agrawal et al, 2012; Magar et al, 2011). The lower parasitosis among HIV patients in this study may be due to the excessive care to those in different care centers.

Out of 149 HIV patients, 58 (38.9%) were living in the different rehabilitation centers and ART Clinics of Morang and Sunsari districts and 91 (61.1%) were dwellers. Among 58, 21 (14.09%) were infected and out of 91 dwellers, 8 (5.37%) were infected (Table 3). Higher prevalence in resident HIV patients may be due to cross infections between patients or may be due to sharing of foods.

**Table 3: Dwelling status and parasitic infections among HIV patients**

S.N	Dwelling Status	Total n	Pos n	p-value
1	Living in rehabilitation centre	58	21 (36.2%)	0.00
2	Not Living in rehabilitation centre	91	8 (8.8%)	
	Total	149	29 (19.46%)	

Among 29 HIV patients infected with parasites, 17 (58.6%) had protozoan parasitosis and 12 (41.4%) had helminthic infections. *Giardia lamblia* was the most prevalent parasites among 12/29 (41.4%) patients and *Cyclospora cayetanensis* from 5 (17.2%) HIV infected

individuals. Similarly among helminths, *Ascaris lumbricoides* was detected from 8 patients (27.6%), *Ancylostoma sps* from 3 (10.3%) and *Hymenolepis nana* from 1 (3.4%) (Table 4).

**Table 4: Pattern of parasites detected among HIV patients**

Parasites	Positives
<b>Protozoans</b>	
<i>Giardia lamblia</i>	12 (41.4%)
<i>Cyclospora cayetanensis</i>	5 (17.2%)
<b>Helminths</b>	
<i>Ascaris lumbricoides</i>	8 (27.6%)
<i>Ancylostoma sps.</i>	3 (10.34%)
<i>Hymenolepis nana</i>	1(3.4%)
Total	29 (100%)

Present study showed that among 29 infected populations, the prevalence of protozoal was 58.6% (17/29) and helminthic was 41.4% (12/29) among HIV/AIDS individuals. Multiple parasitic infections were not observed in this study though it was recorded in other similar studies on HIV-AIDS patients (Basnet et al, 2010). This might be due to the limited numbers of study sample and good monitoring of health in the study centers. In this study, *Giardia lamblia* was most prevalent followed by *Cyclospora cayetanensis* (17.2%). In the study, 41.4% (12/29) cases comprise of helminths Hookworm, *Hymenolepis nana* and *Ascaris lumbricoides*. The difference in the prevalence pattern of parasites might be due to differences in their life cycle. The study result was similar to the other studies (Adhikari et al, 2006). In this study, asymptomatic cases were 73.2% and symptomatic cases were 26.8%. The parasitic infection among symptomatic cases was 37.5% (15/40) and asymptomatic cases were 12.8% (14/109). The result

was statistically significant but was higher as compared to the study of Amatya et al, (2011).

The prevalence of opportunistic parasites reported in the study was *Cyclospora cayetanensis* (17.2%) among HIV patients.

Studying with the different HIV infected populations, 52 (34.9%) patients were migrants and 10 were infected with intestinal parasites and 10 were also infected among 57 (38.2%) spouses of different migrants. Among 20 (13.4%) children affected by birth (CABA), 6 were infected and only 3 patients among 19 (12.7%) intravenous drug users were detected to be parasitosis but a single female sex worker was reported to be infected (0.7%) in this study. The test between the different population and parasitosis were statistically insignificant (Table 5).

**Table 5: Parasitic infections among different risk group of HIV Patients**

MARP (Most at Risk Populations)	Total case	Total parasite positive	p-value
Spouse of migrants	57	10	>0.05
Migrant	52	10	
CABA (Child Affected by AIDS)	20	6	
IDUS	19	3	
Female sex worker	1	--	
Total	149	29	

The prevalence of the parasitic infection was found higher among HIV infected population living in different care centers of the Morang and Sunsari districts in comparison to those who were migrants. The result was found statistically significant. Though the patients living

in care centers obtain better environment but still the study showed high prevalence among them. This might be due to the samples obtained from those who had recently arrived in rehabilitation centre for care due to any health disorders.

## Conclusions

Intestinal parasitic infections are one of the consequential health problems in Nepal, especially among HIV-infected persons. Lack of proper awareness, health facilities, inadequate treatment, bad food hygiene and suppressed immune status may be the causes of increasing intestinal parasitic infections among HIV

patients. From our study it was concluded that patients with GIT symptoms and those residing in rehabilitation centers were more prone to parasitic infections. The concerned authorities of HIV treatment programs should take into account of these facts for more efficacious therapeutic outcomes.

## Acknowledgements

We would like to thank all the staffs of Department of Microbiology Central Campus of Technology and

Sunsari Technical College for their support during study and all patients for providing stool samples.

## References

- Adhikari N, Rai SK, Singh A, Dahal S and Ghimire G. Intestinal parasitic infections among HIV seropositive and high risk group subjects for HIV infection in Nepal. *Nepal Medical College journal*, 2006, 8(3):166-70.
- Mahmoud A, Hatam GR and Motazedian MH. HIV/AIDS-Associated Opportunistic Protozoal Diarrhea. *AIDS research and human retroviruses*. 2013 29(1):35-41.
- Agrawal, PK, Rai SK, Khanal LK, Ghimire G, Banjara MR and Singh A. Intestinal parasitic infections among patients attending Nepal Medical College Teaching Hospital, Kathmandu, Nepal. *Nepal Med Coll J*, 2012, 14(2):80-3.
- Ahmed NH and Chowdhary A. Pattern of co-infection by enteric pathogenic parasites among HIV seropositive individuals in a Tertiary Care Hospital, Mumbai, India. *Indian journal of sexually transmitted diseases*, 2015, 36(1):40-7.
- Akinbo FO, Okaka CE and Omoregie R. Prevalence of intestinal parasitic infections among HIV patients in Benin City, Nigeria. *Libyan Journal of Medicine*, 2010, 5(1):1-6.
- Amatya R, Shrestha R, Poudyal N and Bhandari S. Opportunistic intestinal parasites and CD4 count in HIV infected people. *Journal of Pathology of Nepal*, 2011, 1(2):118-21.
- Basnet A, Sherchan BB, Rijal B, Sharma S and Khadga P. Detection of coccidian parasites and their clinical manifestation, treatment and prophylaxis in HIV infected patients in Tribhuvan University Teaching Hospital. *Scientific world*, 2010, 8(8):51-5.
- Bhaijee F, Subramony C, Tang SJ and Pepper DJ. Human immunodeficiency virus-associated gastrointestinal disease: Common endoscopic biopsy diagnoses. *Pathology Research International*, 2011, 226:47.
- Deveikis A. Gastrointestinal disease in immunocompromised children. *Pediatric annals*, 1994, 23(10):562-9.
- Fariba B, Sarvghad MR, Abdolmajid F, Zahra H, Elena S, Majid G and Robabeh IJ. A study of the prevalence of intestinal parasitic infection in HIV positive individuals in Mashhad, Northeast Iran. *Jundishapur Journal of Microbiology*, 2010 (2, Spring):61-5.
- Garcia C, Rodriguez E, Do N, deCastilla D L, Terashima A and Gotuzzo E. Intestinal parasitosis in patients with HIV-AIDS. *Revista de gastroenterologia del Peru: organo oficial de la Sociedad de Gastroenterologia del Peru*, 2005, 26(1): 21-4.
- Gbakima AA, Konteh R, Kallon M, Mansaray H, Sahr F, Bah ZJ, Spencer A and Luckay A. Intestinal protozoa and intestinal helminthic infections in displacement camps in Sierra Leone. *African Journal of Medicine and Medical Sciences*, 2007, 36(1):1-9.
- Gupta S, Narang S, Nunavath V and S Singh. Chronic diarrhoea in HIV patients: prevalence of coccidian parasites. *Indian Journal of Medical Microbiology*, 2008, 26(2):172-5.
- Janoff EN and Smith PD. Perspectives on gastrointestinal infections in AIDS. *Gastroenterology Clinics of North America* 1988, 17(3):451-63.
- Kulkarni SV, Kairon R, Sane SS, Padmawar PS, Kale VA, Thakar MR, Mehendale SM and Risbud AR. Opportunistic parasitic infections in HIV/AIDS patients presenting with diarrhoea by the level of immunosuppression. *Indian Journal of Medical Research*, 2009, 130(1):63.
- Lee JK, Song HJ and Yu JR. Prevalence of diarrhea caused by *Cryptosporidium parvum* in non-HIV patients in Jeollanam-do, Korea. *The Korean journal of Parasitology*, 2005, 43(3):111-4.
- Magar DT Rai SK, Lekhak B and Rai KR. Study of parasitic infection among children of Sukumbasi Basti in Kathmandu valley. *Nepal Med Coll J* 2011, 13(1):7-10.
- Mahato PK, Bi P and Burgess T. Voluntary Counseling

- and Testing (VCT) services and its role in HIV/AIDS prevention and management in Nepal. *South East Asian Journal of Public Health*, 2013, 3(1):10-6.
- Malla B, Sherchand JB, Ghimire P and Gauchan P. Prevalence of intestinal parasitosis infection in malnutrition among children in rural community of Sarlahi, Nepal. *Journal of Nepal Health Research Council*. 2008.
- McGowan JA, Sherr L, Rodger AJ, Fisher M, Miners A, Anderson J, Johnson MA, Elford J, Collins S and Hart G. Age, time living with diagnosed HIV infection, and self-rated health. *HIV medicine*, 2017, 18(2):89-103.
- NASCOP, National AIDS and STI Control Programme. Kenya AIDS Indicator Survey 2007. Ministry of Health Preliminary Report, Nairobi, Kenya. 2008.
- Okwa OO. Tropical parasitic diseases and women. *Annals of African medicine*, 2007, 6(4):157.
- Sapkota D, Manandhar S and Ghimire P. Enteric Parasitosis in Patients with Human Immunodeficiency Virus (HIV) Infection and Acquired Immunodeficiency Syndrome (AIDS) in Nepal. *Journal of Nepal Health Research Council*, 2008, 2(1):1-4.
- Scandlyn J. When AIDS Became a Chronic Disease. *Western Journal of Medicine*, 2000, 172(2):130-3.
- Sherchan JB, Ohara H, Sakurada S, Basnet A, Tandukar S, and Bam DS. Enteric Opportunistic Parasitic Infections Among HIV Seropositive Patients in Kathmandu, Nepal. *Kathmandu University Medical Journal*, 2012, 10(2):14-7.
- Shrestha A., Narayan KC and Sharma R. Prevalence of intestinal parasitosis among school children in Baglung District of Western Nepal. *Kathmandu University Medical Journal*, 2012, 10(1):62-5.
- Shrestha R and Maharjan M. Prevalence of intestinal helminth parasites among school-children of Bhaktapur district, Nepal. *Nepalese J Zool* 2013, 1:48-59.
- Tiwari BR, Ghimire P, Malla S, Sharma B and Karki S. Intestinal parasitic infection among the HIV-infected patients in Nepal. *The Journal of Infection in Developing Countries*, 2013, 7(07):550-5.
- Tuli L, Gulati AK, Sundar S and Mohapatra TM. Correlation between CD4 counts of HIV patients and enteric protozoan in different seasons—An experience of a tertiary care hospital in Varanasi (India). *BMC gastroenterology*, 2008, 8(1-6):6.
- UNAIDS/WHO. HIV Epidemic Update. Geneva: UNAIDS, 2002.
- Wasti SP, Simkhada P, Randall J and Teijlingen EV. Issues and challenges of HIV/AIDS prevention and treatment programme in Nepal. *Global Journal of Health Science*, 2009, 1(2):62-72.