

## Original Article

# A Comparative Analysis of Intestinal Parasitic Infections between HIV+/AIDS Patients and Non-HIV Infected Individuals

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## Abstract

**Background:** The aim of this study was to verify the occurrence of intestinal parasitic infections in human immunodeficiency virus (HIV)/acquired immunodeficiency syndrome (AIDS) patients in Iran in comparison with non-HIV individuals.

**Methods:** A total of HIV+/AIDS patients (Group I) and 1220 clinically healthy individuals (Group II) were submitted to coproparasitological examination from 2003 to 2005.

**Results:** The overall prevalence of intestinal parasites in group I and group II was 11.4% and 11.6%, respectively, without significant difference between two groups. The prevalence of infection for each helminth and pathogenic protozoan, in every group, was as follows: Group I: *Blastocystis hominis* (6.1%); *Giardia lamblia* (4.2%); *Cryptosporidium* spp. (0.9%); *Iso spora belli* (0.26%); *Strongyloides stercoralis* (0.26%); *Hymenolepis nana* (0.13%); and *Rhabditis axei* (0.13%). Group II: *Blastocystis hominis* (6.5%); *Giardia lamblia* (4.1%); *Strongyloides stercoralis* (0.33%); *Hymenolepis nana* (0.16%); and *Trichostrongylus* sp. (0.16%). Although the prevalence of infection for extracellular parasites was not statistically different between two groups, however, the infection rates for enteric coccidians including *Cryptosporidium* spp. and *I. belli* were significantly higher in patients at AIDS stage than Group II.

**Conclusion:** The results emphasize the needs for especial consideration of enteropathogenic intracellular coccidians in immunocompromised patients.

**Key words:** Intestinal parasites, HIV+/AIDS patients, Iran

## Introduction

Patients with acquired immunodeficiency syndrome (AIDS) are threatened by a great number of diseases including those caused by different kinds of biological agents. In such patients, opportunistic parasitic gut infections cause severe diarrhea, profoundly compromise the absorptive func-

tion of the small intestine, leading to significant mortality (1). Protozoan parasites, namely *Cryptosporidium parvum*, *Iso spora belli*, *Cyclospora cayetanensis*, *Microsporidia*, *Entamoeba histolytica/ Entamoeba dispar*, and *Giardia lamblia* account for a significant number of cases of diarrhea in this population (2).

In spite of recent increases in the number of HIV-infected patients in Iran, little attention has been paid on the opportunistic parasitic infections among those patients. Therefore, the current study was undertaken to verify the prevalence of intestinal parasite infections in a group of Iranian HIV+/AIDS patients and to compare the results with a group of non-HIV infected individuals.

## Material and Methods

### Sampling

This study was conducted from November 2003 to September 2005 at the School of Public Health, Tehran University of Medical Sciences in Tehran, Iran.

Two groups of people were included in the study; first group was composed of 781 serologically confirmed HIV infected symptomatic patients, among those 191 persons had AIDS. The second group included 1220 HIV seronegative and clinically healthy individuals. The HIV+ patients were included all confirmed individuals referring to Imam Khomeini Hospital and some other centers in Tehran, during the course of the study. The CD4 counts of the patients were withdrew from relevant files in every center.

For every individual, one fresh fecal specimen from early morning discharge was collected and prepared for examinations.

### Examination of specimens

Every specimen was collected in 10% buffered formalin in a clean wide-mouthed plastic container and was subjected to concentration by a formalin-ethyl acetate concentration technique (3). Specimens were then examined as wet saline mounts and in iodine preparation for the detection of protozoan cysts or oocysts, helminth eggs and larvae. Also, a modified version of the Ziehl-Neelsen technique was used for

the staining of *Cryptosporidium* and other coccidian parasites (3). The diagnosis of *Rhabditis axei* was fulfilled after cultivation of infected stool samples in agar plate culture and considering morphological characteristic of adults (Fig. 1 and 2). The statistical analysis was performed using Chi-Square and Fisher tests.

## Results

Overall, 781 HIV+/AIDS patients (Group I) and 1220 non-HIV+ individuals (Group II) were examined for intestinal parasitic infections. The prevalences of infectivity with different species of intestinal helminth and pathogenic protozoa, in each group, are summarized in Table 1. According to this table, the overall prevalence of infection in group I was 11.4% and in group II, 11.6%. For both groups, infection with protozoan parasites was more prevalent than that of helminths (11.5% v.s. 0.64% in group I and 10.8% v.s. 0.74% in group II). However, for none of the above mentioned prevalences, there was statistically significant difference between two groups. For both groups, the two most prevalent species were the same, including *Blastocystis hominis* and *Giardia lamblia* (Table 1).

In contrast to the extracellular parasites, the two coccidian parasites, i.e. *Cryptosporidium* spp. and *I. belli* were merely detected in Group I. Actually, all 7 cases of cryptosporidiosis and 2 cases of isosporiasis, with clinical picture of severe diarrhea, were exclusively found in those HIV+ patients who were at AIDS stage. Moreover, there were statistically significant differences between AIDS patients (191 people) and group II in terms of infection with either *Cryptosporidium* spp. ( $P= 0.000001$ ) or *I. belli* ( $P= 0.01$ ). In all 7 patients infected with *Cryptosporidium*

spp. the mean number of CD4+ lymphocyte was  $50.1 \pm 8.8 / \text{mm}^3$ , whereas in 2 patients infected with *I. belli* this number was  $137 \pm 23.8 / \text{mm}^3$ .

In both groups, *S. stercoralis* were also detected, but in group I both patients showed *S. stercoralis* hyperinfection syndrome.

**Table 1:** Prevalences of intestinal parasitic infections in 781 HIV+ patients and 1220 non-HIV infected individuals in Tehran, Iran

Parasite species	Number (%)	
	HIV+ patients*	non-HIV infected individuals
Helminths		
<i>Strongyloides stercoralis</i>	2 (0.26) **	4 (0.33)
<i>Hymenolepis nana</i>	1 (0.13)	2 (0.16)
<i>Trichostrongylus</i> sp.	0 (0)	2 (0.16)
<i>Dicrocoelium dendriticum</i> ***	1 (0.13)	1 (0.08)
<i>Rhabditis axei</i>	1 (0.13)	0 (0)
Total	5 (0.64)	9 (0.74)
Protozoa		
<i>Giardia lamblia</i>	33 (4.2)	50 (4.1)
<i>Entamoeba histolytica/dispar</i>	0 (0)	2 (0.16)
<i>Blastocystis hominis</i>	48 (6.1)	80 (6.5)
<i>Cryptosporidium</i> spp.	7 (0.9)	0 (0)
<i>Isospora belli</i>	2 (0.26)	0 (0)
Total	90 (11.5)	132 (10.8)
Total****	95 (11.4)	141 (11.6)

\* Only 191 individuals were at AIDS stage.

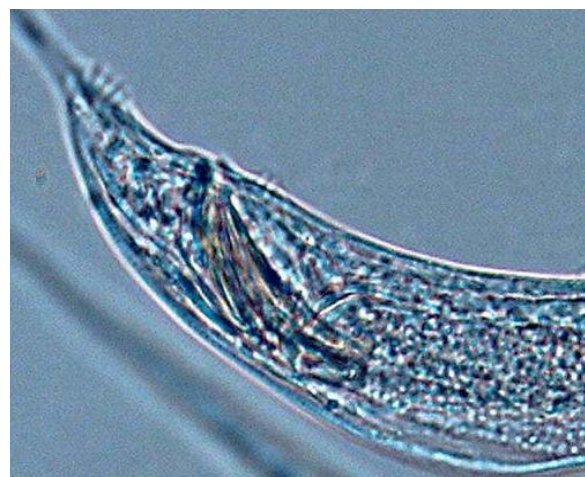
\*\* Both cases had hyperinfection syndrome.

\*\*\* Not necessarily indication of true disease due to probable spurious infection.

\*\*\*\* There were 6 cases of coinfection with parasites.



**Fig. 1:** Female of *Rhabditis axei* (400×)



**Fig. 2:** Posterior end of male of *Rhabditis axei* (1000×)

## Discussion

Opportunistic infections continue to be ubiquitous complication of advanced HIV infections and the one that exacts a heavy toll in terms of morbidity and mortality (4). Among those, opportunistic parasites play a major role as etiologic agents of chronic diarrhea in HIV infected patients. In this regard, in order to have a better understanding of the role of opportunistic parasitic gut infections, an analytical comparison was performed on two HIV+/AIDS patients (Group I) and non-HIV+ infected individuals (Group II) from Iran. According to the results the overall prevalences of either helminth or protozoan parasites were not statistically different between two groups. This observation may agree with several reports stating that intestinal parasitic infections in AIDS patients depend largely on the prevalence of intestinal parasitism in the local community (5). The only difference between the two groups was the presence of enteropathogenic intracellular coccidian including *Cryptosporidium* spp. and *I. belli*, known as opportunistic agents in AIDS patients with significant differences in prevalences. Similar results have also been reported by other authors (1, 6, 7). This can be explained by understanding the nature of the immunological disturbances in AIDS patients in whom immune damage is most related to T-cell subpopulations and lymphokines, in close relation to the cellular immunoresponse of T helper 1 (Th1) CD4 lymphocytes against intracellular parasites. On the other hand, the similarity in the prevalences of extracellular intestinal parasites in both groups, could be explained by the fact that control Th2 CD4 lymphocytes, which are highly necessary to protect the host against such parasites, remain less affected than Th1 in HIV seropositive patients (8).

In Iran, the exact coccidian infection rates are not known; although, there are rare studies on cryptosporidiosis. The previous reports indicate the prevalence of this infection in diarrheic children 7% (9) and in HIV+ patients 1.5% (10). Among patients infected with AIDS, an infection rate of 2.3% has already been reported (11).

There is no report available on the prevalence of isosporiasis in Iran. The actual rate of this infection in immunocompetent individuals and in AIDS patients is likely to be underestimated, because of the asymptomatic shedding of oocysts. Treatment with trimethoprim-sulfamethoxazole (TMP-SMX) for other infections in AIDS patients may confer some protection against this protozoa, faeces of patients are not submitted to laboratories for concentration techniques and the number of oocysts excreted is usually small (1). The higher occurrence of cryptosporidiosis and isosporiasis in AIDS patients in the current study, compared to group II implies the needs for specific consideration of this parasite in HIV+ patients.

*Cyclospora cayetanensis* is an opportunistic protozoan related to outbreaks, and to endemic areas, causing prolonged diarrhea in immunocompetent, as well as, in immunocompromised individuals (12). Failure in detection of this enteric coccidian parasite in the current study appears to be to its rare distribution in Iran; as there are only two cases reported, so far (13, 14).

*G. lamblia*, compared to intestinal coccidians is not considered an opportunistic agent and less frequently observed to cause severe illness in HIV+/AIDS patients (15). In the present study, *G. lamblia* was the second most prevalent parasite detected in both groups, without significant difference. In an earlier study in Iran, rate of infection with *G. lamblia* in HIV+ patients has been reported between 1-7.3%

(10). These findings show that giardiasis does not occur in greater prevalences in HIV-positive patients than in HIV-negative individuals.

*S. stercoralis* has the unique feature of transmitting from the parasitic form to the infective stage within the body, rather than emerging and forming free-living stages and causing autoinfection. This may lead to latent infection for an indefinite period in an immunocompetent host, but may also cause fatal hyper-disseminated infection in immunocompromised individuals, such as patients with AIDS, organ transplant recipients, cancer and other immunosuppressive conditions (16, 17). In the present study both cases of strongyloidiasis were accompanied with hyperinfection syndrome. This issue reinforces the importance of early strongyloidiasis diagnosis and treatment in AIDS patients.

In conclusion, the overall prevalences of intestinal parasites in HIV-positive patients was in general very similar to that of non-HIV infected individuals. However, intestinal coccidian parasites are considered as opportunistic infections in AIDS patients and require early diagnosis and treatment.

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