

# The Prevalence of Intestinal Parasitic Infestation and the Related Profile of the CD<sub>4</sub><sup>+</sup> Counts in HIV/AIDS People with Diarrhoea in Jaipur City

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## ABSTRACT

**Introduction:** Gastrointestinal Tract (GIT) infections are among the most frequent infections in HIV/AIDS patients. The intestinal opportunistic parasitic infections in HIV-infected subjects present most commonly as diarrhoea. A study was conducted to determine the prevalence of enteric parasitic infections in HIV infected patients with diarrhoea, with different levels of immunity.

**Methods:** This study was carried out at the HIV Lab of the Microbiology Department of a tertiary care teaching hospital in Jaipur, Rajasthan, between June–October 2009 among consecutively enrolled 75 HIV infected patients who presented with diarrhoea. Stool samples were collected and examined for enteric parasites by using microscopy and special staining methods. The CD<sub>4</sub><sup>+</sup> cell counts were estimated by using the FACS count system.

**Results:** Intestinal parasitic pathogens were detected in 38.66% patients, *Cryptosporidium species* was the most common enteric opportunistic parasite which accounted for 37.93 % of the total parasites, followed by *Isospora belli* 31.03 %. In the HIV infected patients with CD<sub>4</sub><sup>+</sup> counts of < 200 cells/μl, parasites were identified in 56.25 % patients and in HIV patients with CD<sub>4</sub><sup>+</sup> counts between 200–499 cells /μl, parasites could be identified in 27.5 % of the patients . No parasite was detected in the patients with CD<sub>4</sub><sup>+</sup> counts of >500 cells/ μl.

**Conclusion:** Parasitic infections were detected in 38.66% HIV infected patients with diarrhoea and a low CD<sub>4</sub><sup>+</sup> count was significantly associated with opportunistic infections. Identification of the aetiological agent of diarrhoea in an HIV patient is very important, as it can help in the institution of the appropriate therapy and the reduction of the morbidity and the mortality in these patients.

**Key Words:** Parasite, HIV, CD<sub>4</sub><sup>+</sup>

## INTRODUCTION

Ever since the Human Immunodeficiency Virus (HIV) was found in Chennai in 1986, India has had an AIDS epidemic [1]. In spite of the world wide efforts and the promising advances which are aimed at the control of the Acquired Immuno-Deficiency Syndrome (AIDS), the number of individuals who are infected by the Human Immunodeficiency Virus (HIV), as well the number of deaths which are related to this disease, are growing. In 2009, the estimated adult HIV prevalence rate (among those who were aged 15-49 years) was 0.3 [2].

In HIV infected patients, a progressive decline in their immunological responses makes them extremely susceptible to a variety of common and opportunistic infections. The gastrointestinal involvement in HIV/AIDS is almost universal, and a significant disease occurs in 50-90% of the patients [3]. The aetiologic spectrum of the enteric pathogens includes bacteria, parasites, fungi and viruses [4]. Several species of protozoa have been associated with the acute or chronic diarrhoea in HIV patients. These include *Cryptosporidium parvum*, *Isospora belli*, *Microsporidia species*, *Giardia lamblia*, *Entamoeba histolytica*, *Cyclospora species*, *Blastocystis hominis*, *Dientaemeba fragilis*, etc [5]. Nematodes like *Strongyloides stercoralis* can cause diarrhoea and overwhelming infestations in patients with variety of immunosuppressive disorders, which include HIV/AIDS [3].

The broad spectrum of the diseases which are caused by intestinal parasites in HIV patients range from asymptomatic infestations to severe life threatening diarrhoea, dehydration and mal- absorption [6]. The incidence and the prevalence of a particular enteric parasite depend upon the endemicity of that particular parasite in the community [7].

The magnitude of these parasitic infections in HIV-positive patients requires careful attention in the developing countries. There have been reports from different parts of India, on the frequencies of various pathogens which cause diarrhoea in HIV positive patients [8-12]. However, studies regarding the prevalence of intestinal parasites and their association with the CD<sub>4</sub><sup>+</sup> levels in HIV infected patients with diarrhoea have not been conducted extensively in India.

The present study was undertaken to determine the prevalence and the pattern of intestinal parasitic infestations in HIV/AIDS patients with diarrhea, who attended the Integrated Counseling and Testing Centre (ICTC) at a tertiary care teaching hospital in Jaipur city and also to correlate the association of intestinal parasitosis with the CD<sub>4</sub><sup>+</sup> counts.

## MATERIAL AND METHODS

This study was conducted on 75 HIV infected patients who attended the ICTC at a tertiary care teaching hospital in Jaipur,

India. It was conducted over a period of 5 months, from June to October 2009. It was conducted after the informed consent of all the subjects of study were obtained for a routine workup. This included the consent to perform a CD<sub>4</sub><sup>+</sup> estimation, record the clinical history and to perform non invasive diagnostic tests. The CD<sub>4</sub><sup>+</sup> counts were measured by using a FACS count system (Becton Dickinson, Singapore BD). The patients were categorized on the basis of their immune systems, according to the 1993-revised classification system for the HIV infection as per the CD<sub>4</sub><sup>+</sup> T cell categories [13].

The subjects were requested to submit three consecutive stool samples in wide mouthed leak proof containers. Direct microscopy of the stool samples as wet mounts and iodine mounts was performed. The specimens were further processed by using the formalin-ether sedimentation technique. The direct smears and the smears which were made from deposits of the sediment were stained by the modified AFB procedure and they were examined for coccidian parasites [14].

## RESULTS

A total 75 HIV positive patients, 50(66.66%) males and 25(33.33%) females, were enrolled in the study. The mean age of the male patients was 31.46 years with an age range of 9-54 years and the mean age of the females was 31.48 years with an age range of 15-52 years. Overall, the prevalence of intestinal parasites was found to be 38.66% in the stool samples.

[Table/Fig-1] demonstrates the distribution of the parasites as per the CD<sub>4</sub><sup>+</sup> counts. Among the enteric parasites which were detected, 20(68.97%) were opportunistic and 9 (31.03%) were non opportunistic. *Cryptosporidium species* was the most common enteric opportunistic parasite which accounted for 37.93% of the total parasites, followed by *Isospora belli*, which accounted for 31.03%. Among the non opportunistic enteric parasites, *Giardia lamblia* and *Entamoeba histolytica /dispar* accounted for 13.79% and 10.34% of the total enteric parasites respectively.

Parasite	No. isolated (%)	CD <sub>4</sub> <sup>+</sup> Count <200cells /microlitres	CD <sub>4</sub> <sup>+</sup> Count 200-499 cells/ microlitres	CD <sub>4</sub> <sup>+</sup> Count >500 cells/ microlitres
<i>Cryptosporidium species</i>	11(37.93)	09	02	00
<i>Isospora belli</i>	9(31.03)	05	04	00
<i>Entamoeba histolytica/dispar</i>	4(13.79)	03	01	00
<i>Giardia lamblia</i>	3(10.34)	01	02	00
<i>Ascaris lumbricoides</i>	2(6.89)	00	02	00
Total parasite	29(100)	18	11	00
Total patients	75	32	40	3
% parasite isolation	29/75 (38.66%)	18/32 (56.25%)	11/40 (27.50%)	0/3 (0%)

[Table/Fig-1]: Distribution of Enteric parasites by CD<sub>4</sub><sup>+</sup> counts

The study population consisted of 32 patients with CD<sub>4</sub><sup>+</sup> counts of < 200 cells/ μl, 3 patients with CD<sub>4</sub><sup>+</sup> counts of ≥500 cells / μl and 40 patients with CD<sub>4</sub><sup>+</sup> counts between 200-499cells/ μl. Among the 32 patients with CD<sub>4</sub><sup>+</sup> counts of < 200cells/ μl, parasites were identified in 18 (56.25%) patients. This included opportunistic parasites in 14 (43.75%) patients and other parasites in 4 (12.5%) patients. *Cryptosporidium species* was the commonest parasite in this category of CD<sub>4</sub><sup>+</sup> counts, followed by *Isospora belli*.

Among the 40 patients with CD<sub>4</sub><sup>+</sup> counts between 200-499 cells /μl, parasites could be identified in 27.5 % of the patients and opportunistic parasites were detected in as many as 15% patients. No parasites were seen in the patients with CD<sub>4</sub><sup>+</sup> cell counts of ≥500cells/ μl.

## DISCUSSION

The infections which are caused by intestinal parasites have been studied much more than any other infections in HIV seropositive individuals and in AIDS patients. Our study showed a male preponderance in the HIV infected patients with diarrhoea, which was similar to the findings of previously done studies [10]. In our study, the overall prevalence of the enteric parasites in males was 40% (20/50) and 36% (9/25) in females. A previous study from Nepal reported 56% and 44% enteric parasitosis in male and female HIV/AIDS patients [15]. The prevalence of enteric pathogens in this study was 38.66%. A similar finding as ours, with a prevalence of 39% of enteric parasites in HIV positive patients with diarrhoea, was reported from Mumbai [9]. A study from Pune reported 35% of intestinal parasitic infestation in HIV infected patients with diarrhoea [4]. However, a prevalence of enteric parasitosis of 20% was reported from a similar patient group from New Delhi [10]. Different factors contribute to the prevalence of intestinal parasites among a given population, the most important ones being environmental, parasitic and host factors [14]. Studies which have been done around the globe have reported a variable prevalence of enteric parasitosis in HIV positive patients, which ranged from 17-84% [15-18].

Among the enteric parasites which were detected in our study, 20(68.97%) were opportunistic and 9(31.03%) were non opportunistic. The prevalence of non opportunistic parasites which was reported in earlier studies, varied from 5-30% [4]. The prevalence of Cryptosporidial diarrhoea in HIV infected adults in different parts of the India has ranged from 0.7-87% in the symptomatic patients and from 1.4-57% in asymptomatic individuals [19]. As was seen in studies from north India [20, 21], *Cryptosporidium species* was observed as the most common enteric opportunistic parasite in our study, followed by *Isospora belli*. However, *Isospora belli* has been reported as a predominant parasite among HIV-infected patients in south India [8, 22].

Intestinal protozoan parasites were detected more frequently in cases with CD<sub>4</sub><sup>+</sup> counts of < 200cells/ μl. An increased association between the intestinal parasites and the individuals with a reduced immunity which was caused by CD<sub>4</sub><sup>+</sup> T lymphocyte depletion in HIV/AIDS has been well documented [18, 23]. We found no parasite in the HIV patients with CD<sub>4</sub><sup>+</sup> counts of ≥500cells /microlitres. The limited sample size of just 3 subjects in this category could be a factor which was responsible for such an observation. However, it has been reported that the diagnostic yield of the stool analysis is low in patients with higher CD<sub>4</sub><sup>+</sup> counts. It has also been suggested that HAART helps in eradicating opportunistic protozoal infections and that it is associated with the influx of CD<sub>4</sub><sup>+</sup> cells into the lamina propria [24].

This study enhances the awareness of the prevalent enteric parasitic infections in HIV/AIDS patients in this part of the country i.e. the state of Rajasthan. However, additional thorough investigations on a large number of patients are required, not only to determine the exact role of these enteric parasites in HIV-related diarrhoea in India, but also for their proper management.

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