

# To Study the Prevalence of Various Enteric Parasitic Infections Among HIV Infected Individuals in the P.D.U. Medical College and Hospital, Rajkot, Gujarat, India

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## ABSTRACT

**Background and objectives:** Enteric parasites are a major cause of diarrhoea in HIV infected individuals. The present study was undertaken to detect the enteric parasites in HIV infected patients with diarrhoea, who were at different levels of immunity.

**Methods:** This study was carried out in the P.D.U Medical College and Civil Hospital, Rajkot, India. during the period from June 2009 to June 2010. A total of 100 stool samples from HIV seropositive patients were examined for opportunistic, gastrointestinal parasitic infections. The samples were classified according to the age groups, sex, and occupation, a history of diarrhoea and different categories of the CD4 cell count. The stool samples were collected and examined for enteric parasites by microscopy and by special staining methods. The CD4 cell counts were estimated by using the FACS count system.

**Results:** The intestinal parasitic pathogens were detected in 28% patients. Among all, Isospora appeared to have the highest prevalence (18%), followed by Giardia lamblia (5%), Strongyloides stercoralis (3%) and Cryptosporidium parvum (2%). In the HIV infected patients with a CD4 count of < 200 cells/ $\mu$ l, Isospora was the most commonly observed (56%) pathogen. The proportion of the opportunistic pathogens in the patients with CD4 counts of <200 cells/ $\mu$ l was significantly higher as compared to those in the other two groups of patients with CD4 counts of >200 respectively.

**Interpretation and conclusions:** Parasitic infections were detected in 28% of the HIV infected patients and a low CD4 count was significantly associated with an opportunistic infection. The detection of the aetiologic pathogens might help the clinicians in deciding the appropriate management strategies.

**Key Words:** Diarrhoea, Enteric parasite, HIV

## INTRODUCTION

Gastrointestinal infections are very common in patients with the Human Immunodeficiency Virus (HIV) infection or AIDS [1]. Diarrhoea is a common clinical presentation of these infections. Reports indicate that diarrhoea occurs in 30-60% of the AIDS patients in the developed countries and in about 90% of the AIDS patients in the developing countries [2]. The aetiologic spectrum of the enteric pathogens which cause diarrhoea includes bacteria, parasites, fungi and viruses [3]. The presence of the opportunistic parasites, Cryptosporidium parvum, Cyclospora cayetanensis, Isospora belli and Microsporidia is documented in the patients with AIDS [4]. Non opportunistic parasites such as Entamoeba histolytica, Giardia lamblia, Trichuris trichiura, Ascaris lumbricoides, Strongyloides stercoralis and Ancylostoma duodenale are frequently encountered in the developing countries but are not currently considered as opportunistic in the AIDS patients [5]. In immunocompromised patients, the intestinal opportunistic parasites probably play a major role in causing chronic diarrhoea which is accompanied by weight loss [6]. The incidence and the prevalence of the infection which is caused by a particular enteric parasite in the HIV/AIDS patients is likely to depend upon the endemicity of that particular parasite in the community [7]. C. parvum, I. belli and E.histolytica have been reported as the most frequently identified organisms in HIV infected individuals with di-

arrhoea from India and other parts of the world [8-15]. The present study was undertaken to study the prevalence of the enteric parasites which cause diarrhoea and their association with the immune status in HIV infected patients in Rajkot, Gujarat, India.

## MATERIALS AND METHODS

This study was undertaken to determine the enteric parasitic infections among the HIV positive patients who attended the P. D. U. Medical College and Hospital, Rajkot, Gujarat, India. The samples from 100 HIV positive cases were collected from June 2009 to June 2010. These patients had already been tested for HIV at an ICTC centre as per Strategy III of the National AIDS Control Organization to establish the diagnosis of HIV.

**The stool examination:** Stool specimens were collected after taking an oral consent from the patients according to the standard procedure of the WHO and they were examined microscopically by following the direct and the formalin-ether concentration methods [16]. The stool samples were collected in labeled, leak proof, clean and sterile plastic containers and they were then transported to the laboratory within three hours of their collection. The stool samples were examined through a direct observation in saline (0.85% NaCl solution). Lugol's iodine was used for the demonstration of the internal nuclear structure of the parasites. The smears of the direct and the concentrated specimens were examined by

modified acid fast staining for *C. parvum*, *I. belli* and *Cyclospora* [16-17].

## RESULTS

A total of 100 stool samples from HIV seropositive patients were examined for the enteric parasitic infection. In the present study, a majority of the patients (76%) were in the 25-44 years age group and there was a male preponderance (76%) [Table/Fig-1]. Intestinal parasitic pathogens were detected in 28% patients. Diarrhoea was present in 26 out of the 28 (92.8%) parasite positive patients. Only 2 out of the 28 (7.14%) parasite positive cases had no diarrhoea.

All the patients with positive parasitic infections had CD4 counts of <500 cells/ $\mu$ l. Parasites were detected in 16 out of 24 (66.7%) patients with CD4 counts of <200 cells/ $\mu$ l, which was highly significant (Chi squared equals 20.964 with 1 degree of freedom, the two-tailed p value was less than 0.0001) and in 12 out of 76 (15.7%) cases in the patients with CD4 counts of >200 cells/ $\mu$ l. The chances of a parasitic infection was higher if the CD4 count was <200 cells/ $\mu$ l [Table/Fig-2].

| Age(years)   | Male (%)       | Female (%)     | Total      |
|--------------|----------------|----------------|------------|
| <15          | -              |                |            |
| 15-24        | 14(18.4%)      | 05(20.8%)      | 19(19%)    |
| 25-44        | 59(77.6%)      | 17(70.8%)      | 76(76%)    |
| >45          | 03(3.9%)       | 02(8.3%)       | 05(5%)     |
| <b>Total</b> | <b>76(76%)</b> | <b>24(24%)</b> | <b>100</b> |

[Table/Fig-1]: Age & Sex distribution among HIV positive patients

| CD4 cell count(cell/ $\mu$ l) | Parasite positive | Parasite negative | Total      |
|-------------------------------|-------------------|-------------------|------------|
| <200                          | 16 (67.7%)        | 08                | 24         |
| >200                          | 12 (20.7%)        | 64                | 76         |
| <b>Total</b>                  | <b>28</b>         | <b>72</b>         | <b>100</b> |

[Table/Fig-2]: Parasite detection in relation to CD4 count

| CD4 cell count (cell/ $\mu$ l) | Total examined | positive for any parasite | Iso-spora belli | Giardia lamblia | Strongiloides stercoralis (larva) | Cryptosporidium parvum |
|--------------------------------|----------------|---------------------------|-----------------|-----------------|-----------------------------------|------------------------|
| <200                           | 24             | 16                        | 09              | 02              | 03                                | 02                     |
| 200-499                        | 58             | 12                        | 09              | 03              | 00                                | 00                     |
| >500                           | 18             | 00                        | 00              | 00              | 00                                | 00                     |
| <b>Total</b>                   | <b>100</b>     | <b>28</b>                 | <b>18</b>       | <b>05</b>       | <b>03</b>                         | <b>02</b>              |

[Table/Fig-3]: Distribution of Parasite in relation to CD4 count

|                                | Isospora belli (%) | Giardia lamblia (%) | Strongiloides stercoralis (larva) (%) | Cryptosporidium parvum (%) |
|--------------------------------|--------------------|---------------------|---------------------------------------|----------------------------|
| Present Study                  | 18                 | 05                  | 03                                    | 02                         |
| Dwivedi KK et al.,[18]         | 2.7                | 13.3                | 00                                    | 33                         |
| Kulkarni et al.,[19]           | 08                 | 00                  | 00                                    | 12                         |
| Malaji M Sangamesh et al.,[20] | 10                 | 02                  | 00                                    | 20                         |
| Vyas N et al.,[21]             | 10.9               | 06                  | 00                                    | 25                         |

[Table/Fig-4]: Comparison of Result with other study

Among all the parasites which were detected in 28% of the HIV seropositive patients, *Isospora* appeared to have the highest prevalence (18%), followed by *Giardia lamblia* (5%), *Strongyloides stercoralis* (3%) and *Cryptosporidium parvum* (2%). All the *Cryptosporidium* and the *Strongyloides* isolates were detected in patients with CD4 counts of <200 cells/ $\mu$ l. *Isospora* and *Giardia* were detected equally in patients with CD4 counts of >200 cells/ $\mu$ l and <200 cells/ $\mu$ l [Table/Fig-3].

All the parasitic infections in the HIV seropositive patients were associated with diarrhoeal symptoms, except 2 cases with the *Isospora belli* infection, who did not have diarrhoea.

There were no dual or multiple parasitic infections in all the patients.

## DISCUSSION

In our study, *Isospora* appeared to have the highest prevalence (18%), followed by *Giardia lamblia* (5%), *Strongyloides stercoralis* (3%) and *Cryptosporidium parvum* (2%). The earlier studies from India [18-21] had found *Cryptosporidium* to be the most common parasite, while the prevalence of *Isospora belli* was found to be much lower [Table/Fig-4].

In the present study, the prevalence of the intestinal parasites was significantly higher in the patients with diarrhoea (39.39%) than in those without diarrhoea (5.88%), which was comparable to the findings of Gupta M. et al's study [22] (41.37% and 2.38% respectively). In the present study, the prevalence of the enteric parasites was significantly higher in males (76%), which is comparable with the findings of other studies like those which were done by Kulkarni et al., [19] (73%) and Vyas N et al., [20] (69.2%).

In the present study, being classified by the CD4 cell categories, the enteric parasite infections showed the highest prevalence (66.7%) in the patients with CD4 cells of <200/ $\mu$ l, which was comparable to the findings of Shimelis A. et al's study [23] (83.6%). There were some limitations in our study. This study was done on a small sample size. A majority of the patients were referred from the general practitioners or from primary or secondary care centres. A majority of the patients who were seen at these centres had already received antibiotics prior to their visit and therefore, the number of symptomatic patients was less.

In conclusion, intestinal parasitic infections caused diarrhoea in 28% of the study subjects and *Isospora* appeared to have the highest prevalence (18%). Most of the infections in the patients with CD4 counts of < 200/ $\mu$ l were caused by enteric parasites. The results of our study highlight the importance of the evolution of HIV infected individuals with diarrhoea for intestinal parasitic infections, which may help in a better management of these patients. The aetiology of the diarrhoea could not be determined in 65% of the study patients, thus suggesting a need for comprehensive aetiological studies which cover the bacterial, fungal, viral, and the parasitic causes of diarrhoea among the HIV infected patients in India.

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