Gastrointestinal infections are very common in patients with HIV infection or AIDS. Diarrhoea is a common clinical presentation of these infections. Reports indicate that diarrhoea occurs in 30-60 per cent of AIDS patients in developed countries and in about 90 per cent of AIDS patients in developing countries. The aetiologic spectrum of enteric pathogens causing diarrhoea includes bacteria, parasites, fungi and viruses. The presence of opportunistic parasites Cryptosporidium parvum, Cyclospora cayetanensis, Isospora belli and Microsporidia are documented in patients with AIDS. Non opportunistic parasites such as Entamoeba histolytica, Giardia lamblia, Trichuris trichiura, Ascaris lumbricoides, Strongyloides stercoralis and Ancylostoma duodenale are frequently encountered in developing countries but are not currently considered opportunistic in AIDS patients. In immunocompromised patients, the intestinal

Opportunistic parasitic infections in HIV/AIDS patients presenting with diarrhoea by the level of immunesuppression

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Background & objectives: Enteric parasites are major cause of diarrhoea in HIV infected individuals. The present study was undertaken to detect enteric parasites in HIV infected patients with diarrhoea at different levels of immunity.

Methods: The study was carried out at National AIDS Research Institute, Pune, India, between March 2002 and March 2007 among consecutively enrolled 137 HIV infected patients presenting with diarrhoea. Stool samples were collected and examined for enteric parasites by microscopy and special staining methods. CD4 cell counts were estimated using the FACS count system.

Results: Intestinal parasitic pathogens were detected in 35 per cent patients, and the major pathogens included Cryptosporidium parvum (12%) the most common followed by Isospora belli (8%), Entamoeba histolytica/Enatmoeba dispar (7%), Microsporidia (1%) and Cyclospora (0.7%). In HIV infected patients with CD4 count < 200 cells/µl, C. parvum was the most commonly observed (54%) pathogen. Proportion of opportunistic pathogens in patients with CD4 count <200 cells/µl was significantly higher as compared with other two groups of patients with CD4 count >200-499 and ≥ 500 cells/µl (P=0.001, P=0.016) respectively.

Interpretation & conclusions: Parasitic infections were detected in 35 per cent HIV infected patients and low CD4 count was significantly associated with opportunistic infection. Detection of aetiologic pathogens might help clinicians decide appropriate management strategies.

Key words Diarrhoea - HIV - opportunistic parasites
opportunistic parasites probably play a major role in causing chronic diarrhoea accompanied by weight loss. The incidence and prevalence of infection with a particular enteric parasite in HIV/AIDS patients is likely to depend upon the endemicity of that particular parasite in the community. C. parvum, I. belli and E. histolytica have been reported as the most frequently identified organisms in HIV infected individuals with diarrhoea from India and other parts of the world.

The present study was undertaken to study the prevalence of enteric parasites causing diarrhoea and their association with immune status in HIV infected patients in Pune, India.

**Material & Methods**

The study was carried out in seven clinics set up by the National AIDS Research Institute (NARI), India, in the city of Pune, Maharashtra. Two of these seven clinics are located at two tertiary care hospitals, two in municipal corporation dispensaries, two are HIV referral clinics on NARI campus and one is set up in the red light area of Pune. STD and HIV diagnostic services, care and support services to HIV infected patients are provided at these clinics. During March 2002 to March 2007 consecutive HIV infected patients presenting with diarrhoea at these seven clinics were considered for inclusion in the study. Study patients were interviewed using the structured questionnaire and information was obtained on demographic characteristics, present and past history of diarrhoea and antibiotic treatment. Diarrhoea was defined as two or more liquid or three or more soft stools per day. Patients already on antibiotic treatment were excluded from the study. A total of 137 patients were enrolled in the study.

Blood samples (plain & EDTA) 5 ml each were obtained from enrolled patients. Serum samples were used for HIV testing. HIV serostatus of the patients was determined by using commercially available ELISA antibody tests (Genetic system, Biorad Labs, USA and Tridot, J Mitra & Co., New Delhi) using National AIDS Control Organisation (NACO) recommended algorithm.

CD4 cell counts were measured by using a FACS count system (Becton Dickinson, Singapore BD). Patients were categorized by their immune status according to the 1993 – revised classification system for the HIV infection by CD4 T-cell categories.

**Stool examination:** Stool specimens were collected according to the WHO standard procedure and examined microscopically following direct and formalin-ether concentration methods. Stool samples were collected at home in labelled, leak proof, clean sterile plastic containers and then submitted at NARI clinics and were transported to the laboratory within three hours of collection. The stool samples were fixed in 10 per cent formalin saline, concentrated using formyl/ethyl acetate and examined through direct observation in saline (0.85% NaCl solution). Lugol’s iodine was used for the detection of ova, larvae, trophozoites and cysts of intestinal parasites. E. histolytica and E. dispar was studied by light microscopy (Carl Zeiss Inc, USA) by trained observers. Smears of direct and concentrated specimens were examined by modified acid fast staining for C. parvum, I. belli and Cyclospora. Modified trichrome stain (Hi-media laboratories, India, Qualigen’s Fine Chemicals, India) was used for detecting Microsporidia. The study was approved by institutional ethics committee.

**Results & Discussion**

Of the 137 patients, 100 (73%) were males and 37 (27%) females. The mean age of the male and female patients was 34.6 ± 7.51 and 33.2 ± 9.95 yr respectively. The study population consisted of 19 patients with CD4 count > 500 cells/µl, 53 patients with CD4 count 200-499 cells/µl and 65 patients with CD4 count < 200 cells/µl. Enteric parasites were detected in 48 (35%) stool samples, of which 30 (62.5%) were opportunistic and 18 (37.5%) were non opportunistic. Among the 18 patients with non opportunistic parasites, nine had E. histolytica/E. dispar, four had Ascaris lumbricoides, three had Ancylostoma duodenale and two had Hymenolepis nana. Opportunistic parasites were C. parvum (16), I. belli (11), Microsporidia (2) and Cyclospora (1). Overall, Cryptosporidium (12%) was the most frequently encountered pathogen in the study population followed by Isospora (8%) and E. histolytica/E. dispar (6.6%).

Among the 65 patients with CD4 count < 200 cells/µl, parasites could be identified in 30 (46%) patients and opportunistic parasites were detected in as many as 24 (37%) patients. Cryptosporidium (13) was the most common pathogen followed by I.belli (8), Microsporidia (2) and Cyclospora (1). Of the 53 (39%) patients with CD4 count 200-499 cells/µl,
parasite could be identified in 12 (23%) patients, and opportunistic parasites in 5 patients only. *E. histolytica/ E. dispar* (4) was the most common parasite followed by *Cryptosporidium* (3). The other parasites detected were *I. belli* (2), *A. duodenale* (2) and *A. lumbricoides* (1). Parasites were detected in only 6 patients with CD4 count $>$500 cells/µl, of which *H. nana* was detected in 2, and *E. histolytica/E. dispar, A. duodenale* and *A. lumbricoides* were detected in 1 patient each. Interestingly, *I. belli* was detected in one patient. The proportion of opportunistic pathogens in patients with CD4 count <200 cells/µl was significantly higher than that in the other two groups of patients with CD4 count $>$ 200 cells/µl ($P=0.001$ and $P=0.016$).

Numerous opportunistic infections occur in HIV infected patients, due to downregulation of the immune system. Gastrointestinal parasitic infection is a universally recognized problem in these patients. These infections largely present with diarrhoea leading to life threatening complications. In the present study, enteric parasites were detected in 35 per cent of HIV infected patients with diarrhoea. Various studies from India and other countries have reported a high prevalence of intestinal parasite, ranging from 30 to 60 per cent. Almost half of the patients with CD4 count less than 200 cells/µl were found to have gastrointestinal parasitic infections and a majority of which were opportunistic parasites (37%). Among the opportunistic parasites, *C. parvum* (54%) was the predominant pathogen. Several studies from India and other parts of the world also have reported the same. The prevalence of opportunistic parasites in patients with CD4 count 200-499 cells/µl was found to be 9 per cent.

Thus, like many other studies, we also found that infections with opportunistic pathogens were the leading cause of diarrhoea in HIV infected individuals, especially, in subjects with advanced disease. *C. parvum* and *I. belli*, were the most common pathogens. Among the non opportunistic pathogens *E. histolytica/E. dispar* seemed to contribute significantly has shown earlier. Similar to other reports, *Microsporidia* and *Cyclospora* were detected in a few patients only.

The reported prevalence of non opportunistic parasites varied from 5-30 per cent in HIV infected patients. In the present study, non opportunistic parasites were detected in 13 per cent patients across different CD4 groups, thus, highlighting the need for early detection and treatment of such infections among HIV-infected patients to reduce the morbidity.

There was some limitations in our study. The study was done on a small sample size as a majority of the patients who came to NARI clinics were referred from the general practitioners or from primary or secondary care centers. Patients were also referred from Voluntary Counseling & HIV Testing centers. Majority of the patients seen at these centers had already received antibiotics prior to their visit and therefore the number of symptomatic patients was less.

In conclusion, intestinal parasitic infection caused diarrhoea in 35 per cent of the study subjects. Most of the infections in patients with CD4 count <200 cells/µl were due to opportunistic pathogens. The results of our study highlight the importance of evaluation of HIV infected individuals with diarrhoea for intestinal parasitic infections which may help in better management of these patients. A etiology of diarrhoea could not be determined in 65 per cent of the study patients, suggesting a need for a comprehensive aetiological studies covering bacterial, fungal, viral, and parasitic causes of diarrhoea among HIV infected patients in India.

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**References**


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