

Enteric Parasitosis in Patients with Human Immunodeficiency Virus (HIV) Infection and Acquired Immunodeficiency Syndrome (AIDS) in Nepal

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Abstract

- Introduction** Gastrointestinal tract (GIT) infections are among the most frequent infections in HIV/AIDS patients. Intestinal opportunistic parasitic infections in HIV-infected subjects present most commonly as diarrhoea. Chronic watery diarrhoea associated with severe weight loss (slim disease) is often the presenting illness of HIV-infected individuals. Reports indicated that diarrhoea occurred in 30 to 60 percent of AIDS patients in developed countries and in about 90 percent of such patients in developing countries. Moreover, the diagnosis of AIDS is often established by identifying a GIT pathogen. The slim disease in association with a positive HIV serology test is an AIDS defining illness.
- Objectives** The general objective of this study was to determine the prevalence of enteric parasitic infections in patients infected with HIV and suffered with AIDS and to investigate the association of these infections with diarrhoea.
- Methods** One hundred and forty eight stool specimens were collected from 75 confirmed cases of HIV/AIDS and examined by saline and iodine mounts and Kinyoun-modified Ziehl-Neelsen staining. Formalin-ethyl acetate sedimentation and Sheather's sucrose floatation was the concentration techniques used.
- Results** Among 75 patients studied, 32 percent were found infected with enteric parasites. Of 24 parasite-positive patients, 83.33 percent were diarrhoeagenic and rest remained asymptomatic. The protozoan parasites detected were *Cryptosporidium parvum* (10.67%), *Giardia lamblia* (6.7%), *Entamoeba histolytica* (5.33%) and *Cyclospora cayetanensis* (2.67%). The helminths detected were *Strongyloides stercoralis* and *Trichuris trichiura* each with 2.67 percent prevalence, and a single case (1.33%) of hookworm. Association of enteric parasitosis between male and female was not significant ($P>0.05$). Sixteen (25.8%) out of 62 HIV-seropositive patients and 8 (61.54%) out of 13 AIDS patients were harbouring with parasites and enteric parasitosis was significantly associated with AIDS patients compared to HIV positive patients ($P<0.05$). *Cryptosporidium parvum* was the commonest parasite and almost always associated with clinical diarrhoea.
- Conclusion** Enteric parasitosis might be one of the common health problems of Nepalese HIV/AIDS patients and *Cryptosporidium parvum* is an important enteric parasite causing diarrhoea in this population. Appropriate control measures, early diagnosis and treatment of enteric parasitosis might be helpful for improving the management of such patients.
- Keywords** Enteric parasites, HIV, AIDS, Nepal.

Introduction

Acquired Immunodeficiency Syndrome (AIDS) represented the most severe sequelae of immuno suppression caused by HIV and was a constellation of diseases reflecting the late manifestation of HIV infection. Immuno-suppression caused by HIV infection leads to the development of severe opportunistic

infections and otherwise rare tumours. Gastrointestinal tract (GIT) infections were among the most frequent infections in patients with HIV infection and AIDS, and best estimates suggested that 50 to 93 percent of all such patients would have marked GIT symptoms during the course of their illness¹.

Intestinal opportunistic parasitic infections in HIV-infected subjects presented most commonly as diarrhoea, and chronic watery diarrhoea associated with severe weight loss (slim disease) was often the presenting illness of HIV-infected individuals. Reports indicated that diarrhoea occurs in 30 to 60 percent of AIDS patients in developed countries and in about 90 percent of such patients in developing countries². Moreover, the diagnosis of AIDS was often established by identifying a GIT pathogen. The slim disease in association with a positive HIV serology test was an AIDS defining illness³.

A large range of protozoan, helminthic, viral and fungal organisms might cause GIT infections in HIV/AIDS patients. Protozoan parasites namely *Cryptosporidium parvum*, *Cyclospora cayentanensis*, Microsporidia like *Enterocytozoon bienewisi* and others, *Isospora belli*, *Entamoeba histolytica* and *Giardia lamblia* accounted for a significant number of cases of diarrhoea in HIV/AIDS population⁴. Helminthic infections had also been a major cause of morbidity and mortality, and *Strongyloides stercoralis* in AIDS patients might prove fatal. Other common helminths including *Ascaris lumbricoides*, *Trichuris trichiura* and hookworms also lead to morbidity in HIV-infected patients⁵.

HIV infection and AIDS were fast becoming a major threat in Nepal. As of 31 December 2003, 3312 HIV-sero-positive cases had been detected, with 704 cases of AIDS; the estimated number was much higher – about 60,000. On the other hand, prevalence of enteric parasitic infections in such patients of the country was still not assessed. Hence the objectives of our study were to report the prevalence of enteric parasitosis in Nepalese HIV/AIDS population, and to investigate the association of these infections with diarrhoea. Patterns of parasitic infections in developing countries like ours, where hygiene is poor and intercurrent infection rates are high, may differ in several important ways from patterns of the developed countries. Knowledge of the pattern of infection can often guide therapy when resource limitations hamper the exact diagnosis of the etiological agent in HIV-associated diarrhoea, at least in developing countries like Nepal.

Methodology

The study was conducted at the research laboratory of Central Department of Microbiology, Tribhuvan University, Kirtipur in collaboration with SukraRaj Tropical Disease Hospital, Kathmandu and Maiti Nepal, a non-governmental organization with hostels for

HIV/AIDS women in Kathmandu and Jhapa. During the study period from November 2002 to July 2003, a total of one hundred and forty eight stool samples were collected from 75 confirmed cases of HIV/AIDS with or without GIT symptoms and processed for further study. Multiple stool samples were collected from those symptomatic patients who showed no parasites in first/second samples.

About 20 grams or 20 ml stool specimen was collected after counseling each patient for appropriate specimen collection as per standard protocol⁶. Specimens were examined immediately after collection wherever possible. The other specimens were preserved with 10 times diluted Bayer's solution and transported to the laboratory⁷. A questionnaire relating to the clinical history and use of antiprotozoal and antihelminthic agents was completed for each patient. Patients were grouped as HIV-sero-positive and AIDS according to patients staging criteria as proposed by Centers for Disease Control, USA⁸.

Each stool specimen was examined by wet saline and Iodine mount techniques for the detection for protozoan trophozoites and cysts, and helminthic eggs and larvae⁹. Coccidian oocysts were stained and identified by using Kinyoun-modified Ziehl-Neelsen technique¹⁰. When original specimens were parasite-negative, they were subjected to formalin-ethyl acetate sedimentation and Sheather's sucrose floatation techniques to concentrate cysts, oocysts, eggs and larvae¹¹. The concentrated specimens were examined in the same way as for the original specimens. For the confirmation of *Cyclospora* oocysts, their sporulation was enhanced by keeping the stool specimens in 2.5 percent $K_2Cr_2O_7$ solution at room temperature ($\sim 29^\circ C$) for 3 weeks¹². Chi-square test was used to evaluate apparent differences for significance. Association of parasitic infection and diarrhoea between HIV-positive and AIDS patients and between male and female was tested.

Results

From the study, the overall prevalence of enteric parasitosis in HIV/AIDS population was found to be 32 percent (24/75). Among 75 patients, 56 percent were male and 44 percent were female. The prevalence of enteric parasites in males was 35.5 percent (15/42) and that in female was 27.3 percent (9/33), and the difference between the two prevalence figures was statistically non-significant. Out of 75 patients studied, 62 were classified as HIV-sero-positive and 13 as AIDS

(Table 1). The prevalence of enteric parasites in HIV-positive patients was 25.8 percent (16/62) and that in AIDS patients was 61.54 percent (9/13), and the difference between the two was statistically significant.

The twenty-four enteric parasites detected were *Cryptosporidium parvum* (8, 33.33%), *Giardia lamblia* (5, 20.83%), *Entamoeba histolytica* (4, 16.67%), *Cyclospora cayetanensis* (2, 8.33%), *Strongyloides stercoralis* (2, 8.33%), *Trichuris trichiura* (2, 8.33%) and hookworm (1, 4.17%). Thus the proportion of protozoan parasites was 19/24 (79.17%) and that of helminthic parasites was 5/24 (20.83%). Distribution of different enteric parasites in HIV-positive patients and AIDS patients was depicted in Table 2.

Diarrhoea was present in 30.67 percent (23 out of 75) patients. It was present in 83.33 percent (20 out of 24) patients harbouring enteric parasites. Four parasitic infections in HIV-positive individuals- one case each of *Giardia lamblia*, *Entamoeba histolytica*, *Strongyloides stercoralis* and *Trichuris trichiura*- were asymptomatic. None of the AIDS cases with enteric parasites was free of clinical diarrhoea. *C. parvum* infections were almost always symptomatic and all four cases of cryptosporidiosis in AIDS patients were accompanied by chronic watery diarrhoea of more than one-month duration.

Table 1: Clinical presentation based on which AIDS patients were diagnosed

Manifestation	No. of Patients
Chronic cryptosporidiosis	4
Cryptococcosis	1
Toxoplasmosis	1
Systemic Herpes Simplex Virus infection	1
<i>Pneumocystis carinii</i> pneumonia	2
CD ₄ count below 200/mm ³	4
Total	13

Table 2: Intestinal parasites in HIV-positive and AIDS patients

S.N.	Parasites	HIV-positive		AIDS	
		Frequency	%	Frequency	%
1.	<i>C. parvum</i>	4/62	6.45%	4/13	30.77%
2.	<i>G. lamblia</i>	3/62	4.84%	2/13	15.38%
3.	<i>E. histolytica</i>	3/62	4.84%	1/13	7.69%
4.	<i>C. cayetanensis</i>	1/62	1.61%	1/13	7.69%
5.	<i>S. stercoralis</i>	2/62	3.22%	0/13	0
6.	<i>T. trichiura</i>	2/62	3.22%	0/13	0
7.	Hookworm	1/62	1.61%	0/13	0

Discussion

The results of the present study showed a high prevalence of enteric parasites among Nepalese HIV/AIDS population and *C. parvum* as the commonest parasite in this population. The study findings were in line with the study conducted in Northern India, which reported 30 percent prevalence of GIT parasites in HIV-sero-positive cases and *C. parvum* as the commonest parasite¹³. In a retrospective study of one decade, the positive rate of intestinal parasites was seen to be varying from 29.1 to 44.2 percent (average 36.65%) in non HIV/AIDS individuals of Nepal¹⁴. Thus the prevalence of enteric parasites in HIV/AIDS population as reported by this study seemed to be lower than that in non-HIV/AIDS population. This could be due to relatively better personal and environmental hygiene at Maiti Nepal (from where 24 patients were studied). It is possible that in addition to impaired immune system in HIV/AIDS subjects itself, poor hygiene, poverty, illiteracy, unhealthy environment and lack of proper counselling to them might be important factors behind the high burden of GIT parasites among HIV/AIDS population of Nepal.

C. parvum was the commonest parasite detected because it is a zoonotic species, and Nepal being an agricultural country, there is a high probability of transmission of *C. parvum* through zoonosis. In addition to this, cryptosporidiosis is also spread person-to-person and through contaminated water and food¹⁵. Moreover, several aspects of *C. parvum* indicated a high possibility of sexual transmission¹⁶. Finally, small unfilterable size (3-5 µm) of oocysts, their resistance to chlorine disinfections and low infective dose are the major infective potential of *C. parvum*.

This study suggested that patients with AIDS had significantly more enteric parasitic infections than HIV-seropositive patients. A similar finding was obtained in a study in Brazil¹⁷. This might be due in part to more damaged immune system in AIDS patients than in HIV-positive patients. In fact, a CD4 lymphocyte count of less than 200/mm³ as in an AIDS patient, made an individual more vulnerable to increased rate of infection and to more severe clinical course. For the same reason, *C. parvum*, a well-recognized opportunistic parasite was relatively more prevalent among AIDS patients in which it was strongly associated with an AIDS-defining condition (chronic diarrhoea for more than one month).

Parasites were not found in 3 of 23 diarrhoeal cases. These 3 cases of diarrhoea might be bacterial, viral, fungal, neoplastic or idiopathic.

Conclusion

In conclusion enteric parasitosis might be one of the major health problems among patients infected with HIV, particularly those with AIDS. *C. parvum* stands as the commonest enteric parasite and routine testing of the stool specimens for its oocysts is rather important. Given the severe and untreatable nature of Cryptosporidiosis among HIV/AIDS patients, its control measures are very critical. Finding of other trivial parasites is a reflection of poor personal and environmental hygiene. Finally, appropriate control measures, early diagnosis and treatment of enteric parasitosis may help to reduce morbidity and untimely mortality of HIV/AIDS patients of Nepal.

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