

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/ μ l, Isospora was the most commonly observed (56%) pathogen. The proportion of the opportunistic pathogens in the patients with CD4 counts of <200 cells/ μ 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/ μ l. Parasites were detected in 16 out of 24 (66.7%) patients with CD4 counts of <200 cells/ μ 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/ μ l. The chances of a parasitic infection was higher if the CD4 count was <200 cells/ μ 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%)
Total	76(76%)	24(24%)	100

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

CD4 cell count(cell/ μ l)	Parasite positive	Parasite negative	Total
<200	16 (67.7%)	08	24
>200	12 (20.7%)	64	76
Total	28	72	100

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

CD4 cell count (cell/ μ 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
Total	100	28	18	05	03	02

[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/ μ l. *Isospora* and *Giardia* were detected equally in patients with CD4 counts of >200 cells/ μ l and <200 cells/ μ 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/ μ 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/ μ 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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REFERENCES

- [1] Janoff EN, Smith PD. Prospectives on gastrointestinal infections in AIDS. *Gastroenterol Clin North Am.* 1988; 17: 451-63.
- [2] Framm SR, Soave R. Agents of diarrhea. *Med Clin North Am.* 1997; 81 : 427-47.
- [3] Mitra AK, Hernandez CD, Hernandez CA, Siddiqi Z. Management of diarrhea in HIV infected patients. *Int J STD AIDS.* 2001; 12: 630-39.
- [4] Goodgame RW. Understanding intestinal spore forming protozoa: Cryptosporidia, Microsporidia, Isospora and Cyclospora. *Ann Intern Med.* 1996; 124: 429-41.
- [5] Lucas SB. Missing infections in AIDS. *Trans R Soc Trop Med Hyg.* 1990; 86: 353-54.
- [6] Hammouda NA, Sadaka HA, El-Gebaly WM, El-Nassery SM. Opportunistic intestinal protozoa in chronic diarrheic immunosuppressed patients. *J Egypt Soc Parasitol.* 1996; 26: 143-53.
- [7] Mannheimer SB, Soave R. Protozoal infections in patients with AIDS. Cryptosporidiasis, Cyclosporiasis and Microsporidiasis. *Infect Dis Clin North Am.* 1994; 8: 483-98.
- [8] Sapkota D, Ghimire P, Manandhar S. Enteric parasitosis in patients with human immunodeficiency virus (HIV) Infection and acquired immunodeficiency syndrome (AIDS) in Nepal. *J Nep Health Res Council.* 2004; 2: 9-13.
- [9] Gumbo T et al. Intestinal parasites in patients with diarrhea and human immunodeficiency virus infection in Zimbabwe. *AIDS.* 1999; 13: 819-21.
- [10] Prasad KN, Nag VL, Dhole TN, Ayyagari A. Identification of enteric pathogens in HIV-positive patients with diarrhea in northern India. *J Health Popul Nutr.* 2000; 18: 23-26.
- [11] Mukhopadhyaya A, Ramakrishna BS, Kang G, Pulimood AB, Mathan MM, Zacharian A, et al. Enteric pathogens in southern Indian HIV-infected patients with and without diarrhea. *Indian J Med Res.* 1999; 109: 85-89.
- [12] Dwivedi KK, Prasad G, Saini S, Mahajan S, Lal S, Baveja UK. Enteric opportunistic parasites among HIV-infected individuals: associated risk factors and immune status. *Jpn J Infect Dis.* 2007; 60: 76-81.
- [13] Mohandas, Sehgal R, Sud A, Malla N. Prevalence of intestinal parasitic pathogens in HIV-seropositive individuals in northern India. *Jpn J Infect Dis.* 2002, 55: 83-84.
- [14] Ramakrishnan K, Shenbagarathai R, Uma A, Kavitha K, Rajemdran R, Thirumalai P. Prevalence of intestinal parasite infestation in HIV/AIDS patients with diarrhea in Madurai, South India. *Jpn J Infect Dis.* 2007; 60: 209-10.
- [15] Anand L, Dhanachand C, Brajachand N. Prevalence and epidemiologic characteristics of opportunistic and nonopportunistic intestinal parasitic infections in HIV positive patients in Manipur. *Natl Med J India.* 2002; 15: 72-74.
- [16] World Health Organization. Basic laboratory methods in medical parasitology. *Geneva: World Health Organization.* 1991; 9-31.
- [17] Centers for Disease Control and Prevention. DPDx: Laboratory identification of parasites of public concern. *Modified 04/06/2001 DPDx;* available at www.dpd.cdc.gov/dp_dx.
- [18] Dwivedi KK, Prasad G, Saini S, Mahajan S, Lal S, Baveja UK. Enteric opportunistic parasites among HIV- infected individuals: associated risk factors and immune status. *Jpn J Infect Dis.* 2007; 60: 76-81.
- [19] Kulkarni SV, Kairon R, Sane SS, Padmawar PS, Kale VA, Thakar MR et al. Intestinal parasites in HIV infected patients with diarrhea. *Indian J Med Res.* July 2009; 130: 63-66.
- [20] Malaji M S, Bajaj G, Kora SA, Biradar S, Chikkamath R. *Journal of Pharmaceutical and Biomedical Sciences.* 2012; 20 (10): .
- [21] Vyas N, Pathan N, Aziz A. Enteric pathogens in HIV-positive patients with diarrhoea and their correlation with the CD4+ T-lymphocyte counts. *Trop Parasitol.* 2012; 2:29-34.
- [22] Gupta M, Sinha M, Raizada N. Opportunistic, intestinal, protozoan and parasitic infections in HIV positive patients in Jamnagar, Gujarat. *SAARC J. Tuberc. Lung Dis. HIV/AIDS* 2008; v (1).
- [23] Shimelis A, Berhanu E, Girmay M, Zelalem A, Techalew S. Intestinal parasitic infections in relation to the HIV/AIDS status, diarrhea and the CD4 T-cell count *BMC Infectious Diseases.* 2009; 9:155.

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