Original Article

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Enteropathogenic Infections in Human Immunodeficiency Virus Positive Patients in a Tertiary Care Center: A Clinicomicrobial Study

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Abstract

Background: Since the beginning of the human immunodeficiency virus (HIV) epidemic, opportunistic infections have been recognized as common complications of HIV infection. Intestinal opportunistic infections present commonly as diarrhea. Several species of protozoa and other bacterial infections have been associated with acute and chronic diarrhea in HIV-infected patients.

Aims: The objective of this study was to find out the prevalence and presentation of enteropathogenic infections in HIV-positive patients and to study the correlation between CD4 cell count and the prevalence of intestinal parasites.

Materials and Methods: A total of 100 consecutive HIV-positive patients were included in the study. All patients above 15 years of age who were positive for HIV by two rapid tests and ELISA were taken for the study. Stool samples were sent for the evaluation of parasites using wet saline method, wet iodine method, floatation technique, sedimentation technique, modified acid-fast staining, and stool culture.

Results: Out of 100 HIV positive cases, 72% were below the age group of 40. The age range varied from 25 to 55 years. Enteric pathogens were recovered from 65% of patients. *Cryptosporidium* was the most common pathogen isolated which was found in 50.76% of the patients. The other pathogens isolated were *Isospora belli* (4.62%), *Microsporidia* (1.54%), *Entamoeba histolytica* (4.62%), *Ancylostoma duodenale,* and *Escherichia coli* seen in 1.54% each. Mixed infections were seen in 35.38% of the patients. The prevalence of infections was high in patients with CD4 count <200/mm^3. Most of the patients with a lower CD4 count were symptomatic.

Conclusion: In our study, coccidian parasites were the most common gastrointestinal pathogens isolated. About 80% of the patients who harbored enteropathogens were symptomatic. Mixed infections were commonly seen in profoundly immunosuppressed patients. Patients with advanced illness were more symptomatic than those in the early stages.

Key words: *Cryptosporidium*, Enteropathogens, Human immunodeficiency virus

INTRODUCTION

Human immunodeficiency virus (HIV) infection is a major threat to the human population across the world though the incidence of HIV infection is falling globally. These patients suffer from various opportunistic infections, most commonly encountered being tuberculosis, candidiasis, *Pneumocystis jiroveci* pneumonia, and diarrhea due to various pathogens.[1] Studies indicate that diarrhea due to enteropathogenic infections occurs in 30-60% of HIV/acquired immune deficiency syndrome (AIDS) patients. Chronic diarrhea is responsible for considerable morbidity and mortality in such patients. Only few studies regarding the prevalence of intestinal opportunistic infections in HIV-infected patients are done in South India. This study was done to evaluate the prevalence of such infections in HIV patients in our setup and to ascertain the importance of stool examination for the detection of enteropathogens

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that AIDS in treatment, thereby decreasing the morbidity and mortality due to opportunistic gastrointestinal infections.

MATERIALS AND METHODS

The study was conducted in the Department of Dermatology-Venereology, Government Rajaji Hospital, Madurai, Tamil Nadu, India. A total of 100 patients were included in the study irrespective of the symptomatology, CD4 count, and anti-retroviral therapy status. Patients older than 15 years of age who were positive for HIV by two rapid tests and ELISA were taken for the study. Socio-demographic and clinical data were collected. Routine blood, urine investigations, and CD4 count were done in all patients. Stool samples were collected in two containers, one containing glycerol phosphate buffer and other containing formol saline. The following methods were done for the evaluation of parasites – wet saline method, wet iodine method, floatation technique, sedimentation technique, modified acid-fast staining, and stool culture. Two smear preparations, one unstained preparation and another stained with Lugol's Iodine were made. Unstained preparation is specially useful for demonstration of actively motile forms of parasites like *Entamoeba histolytica*. Wet iodine mount helps in the visualization of the cysts of protozoa. Modified acid-fast staining was done to detect *Cryptosporidium* and *Isospora*. Staining for *Microsporidia* was done using strong trichrome stain. For enteric bacterial pathogens stool culture was done on nutrient agar and MacConkey agar plates.

OBSERVATIONS AND RESULTS

The following observations were made from the study. Out of the 100 patients 54 were males and 46 were females. Out of the male patients 66% were symptomatic and out of the female patients 54% were symptomatic (Table 1). The symptoms included diarrhea, vomiting, abdominal pain, flatulence, and dyspepsia. 72% of the patients were below the age group of 40. The age range was from 25 to 55 years (Table 2). In our study, we observed that 65% of the patients harbored enteric pathogens. *Cryptosporidium* was isolated in 50.76% of the patients, *Isospora belli* in 4.62%, *Microsporidia* in 1.54%, *E. histolytica* in 4.62%, *Ancylostoma duodenale* in 1.54%, and *Escherichia coli* in 1.54% of the patients. 35.38% of the patients had mixed infections (Table 3). The majority of enteric infections were observed in patients with CD4 < 200 and most of them were symptomatic (Table 4).

DISCUSSION

Enteric pathogens are common opportunistic infections and are a major cause of morbidity and mortality in HIV-infected people. The prevalence of enteric pathogens shows wide geographic variations and their isolation carries importance while treating HIV patients especially in advanced stage of immunosuppression. In this study, enteric pathogens were isolated from 65% of patients. A study conducted by Mohandas *et al.*[2] showed only 30% prevalence of enteropathogens. The prevalence in relation to CD4 count or stage of the disease has not been mentioned in their study. The majority of our patients were in Stage III and IV of the disease, which account for the increased prevalence of enteric pathogens in our patients. Variations in socioeconomic status, personal hygiene, quality of water supply may also have a role in the disparity. The study conducted by Kumar *et al.*[3] at Chennai in 152 HIV-positive patients showed 34.21% of enteric parasites, which is also very low compared to our study. About 80% of our patients who harbored enteric pathogens had symptoms such as diarrhea, vomiting, nausea, belching, flatulence, and colicky abdominal pain. Diarrhea was the predominant symptom seen in all patients, a finding also recorded in other studies.

Table 1: Symptomatology and sex distribution

Gender	With symptoms	Without symptoms	Total
Males	36	18	54
Females	25	21	46
Total	61	39	100

Table 2: Age distribution

Age	Male	Female	Total
<30	6	12	18
31-40	27	26	53
41-50	20	6	26
>50	1	2	3

Table 3: Enteric pathogens in relation to symptoms

Enteropathogen	With gastrointestinal symptoms (%)	Without gastrointestinal symptoms (%)	Total in percentage
Cryptosporidium	27 (41.53)	6 (9.23)	50.76
Isospora	2 (3.08)	1 (1.54)	4.62
Microsporidia	1 (1.54)	-	1.54
Entamoeba histolytica	1 (1.54)	2 (3.08)	4.62
Ancylostoma duodenale	1 (1.54)	-	1.54
Escherichia coli	1 (1.54)	-	1.54
Mixed infections	19 (29.23)	4 (6.15)	35.38
Total	52 (80)	13 (20)	100

Table 4: Enteropathogens in relation to CD4 count

Pathogen	CD4<200		CD4=201-499		CD4>500	
	Symptomatic (%)	Asymptomatic (%)	Symptomatic (%)	Asymptomatic (%)	Symptomatic (%)	Asymptomatic (%)
Cryptosporidium	25 (38.45)	1 (1.54)	1 (1.54)	5 (7.69)	-	1 (1.54)
Isospora	2 (3.08)	-	-	1 (1.54)	-	-
Microsporidia	1 (1.54)	-	-	-	-	-
Entamoeba histolytica	1 (1.54)	1 (1.54)	-	-	-	1 (1.54)
Ancylostoma duodenale	1 (1.54)	-	-	-	-	-
Escherichia coli	1 (1.54)	-	-	-	-	-
Mixed infections	17 (26.14)	1 (1.54)	2 (3.08)	-	-	3 (4.62)

Gupta *et al.* showed in their study that 55.8% of patients were symptomatic, comparatively lower than that in our study. Out of the 100 patients screened, *Cryptosporidium* was the sole pathogen isolated in 33 patients, and in 21 patients, it was seen as a mixed infection. The prevalence as a sole isolate was 50.76%. The study done by Chakraborty *et al.*[4] showed a prevalence of 43% of cryptosporidial diarrhea in a sample size of 125. *Isospora* was found in only 4.62% of the patients, comparable with Mohandas *et al.* study but study done by Kumar *et al.* revealed a higher percentage (13.7%).[3] *E. coli* was the most common bacterial isolate and *Klebsiella* was seen in 2 patients of mixed infection. Mixed infections were noted in 23 (35.38%) patients. *Cryptosporidium* was the predominant pathogen isolated in the mixed infections. Out of these 23 patients, 18 (78.2%) had CD4 count <200. 82.6% of patients with mixed infections were symptomatic. These features signify the importance of immune system in clearing the enteric infections and that advanced immunosuppression provides a favorable environment for mixed infections. The majority of enteric infections were observed in patients with CD4 <200 and most of them were symptomatic.

CONCLUSION

There are wide geographic variations in the prevalence of enteropathogenic infections in HIV-infected people due to variations in socioeconomic conditions, literacy rates, hygiene practices, and availability of safe drinking water. In our study, 65% of our study population harbored an enteropathogen and coccidian parasites were the most common pathogens isolated.

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