

# Microbiological spectrum of diarrhea in HIV infected patients – a cross-sectional study from a rural cohort population of coastal South India

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## ABSTRACT

Diarrheal diseases continue to play a major role in the lives of the HIV positive people impacting negatively on the quality of life. Currently only a few studies on intestinal parasites and diarrhea in HIV patients are available from South India. We took up this study to evaluate the prevalence of such infections in HIV patients and to emphasize the importance of stool examination for parasites. A total of 73 stool samples from HIV patients with diarrhea (Jan 2012 – Dec 2012) were processed according to the standard protocol. Of the total 73 cases, 65.75% were with chronic diarrhea and the remaining 34.24% presented with acute diarrhea. Of the 32 (43.83%) intestinal pathogens isolated, 27 (84.37%) were coccidian parasites and the remaining were bacterial agents. Knowledge about the different pattern of pathogens can often guide appropriate therapy to HIV patients. There is an urgent need to interpret the scientific findings into sustainable prevention programs and improve public health policy.

**Keywords:** Coccidian parasites, diarrhea, enteric pathogens, HIV/AIDS.

## INTRODUCTION

Human immunodeficiency virus (HIV) is the most devastating plague facing us in this 21<sup>st</sup> century. Currently 2.27 million people are infected with HIV with an estimated adult prevalence rate of 0.31% in India alone.<sup>[1]</sup> Diarrheal diseases continue to play a major role in the lives of the HIV positive people impacting negatively on the quality of life and causing significant morbidity and mortality. The etiology of diarrhea in AIDS is multifactorial. The infectious etiological agents include both opportunistic agents that consistently cause severe, chronic or frequent gastrointestinal disease and non-opportunistic agents that usually cause

acute, treatable diarrheal illness. There is no specific combination of intestinal pathogens in HIV-associated diarrhea, and the etiological agents vary from patient to patient and from country to country depending on the geographical distribution, endemicity, seasonal variation of the enteric pathogens, and also on the immune status of the patient.<sup>[2]</sup> Opportunistic infections lead to frequent morbidity and mortality which shortens the life span of people with HIV infections and requires expensive treatments which is a burden for a developing country like India. A routine diagnostic workup including direct microscopy, fecal cultures, and serological tests to detect specific antigen and/or specific antibody is needed for each patient as most of these infectious agents are treatable. We took up this study at a teaching hospital in coastal part of South India catering to patients from Kerala and the northern districts of Karnataka to evaluate the prevalence of such infections in HIV patients in our set-up and to emphasize the importance of stool examination for the detection of coccidian parasites.

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## MATERIALS AND METHODS

### Study design and patient selection

A cross-sectional study was conducted from January 2012 to December 2012 on HIV-infected patients in order to determine the prevalence of intestinal pathogens. All the tests were done after due patient consent and in accordance with the institutional ethical guidelines. Stool samples from HIV positive patients with diarrhea were collected in sterile containers for microscopy of parasites and culture of bacterial enteric pathogens.

### Specimen processing

Routine stool microscopy of saline and iodine preparations was examined for intestinal parasites along with concentration technique. Smears stained with modified acid fast stain and trichrome stain from each specimen was examined for coccidian parasites. The isolation and identification of enteric pathogens were done according to the standard protocol and confirmed by serotyping. Antimicrobial susceptibility

testing of bacterial pathogens were done according to CLSI guidelines.<sup>[3,4]</sup> Patients' clinic-demographic details which include age, sex, presenting clinical history and underlying illness were noted wherever applicable.

### Statistical methods

Statistical analysis was done using descriptive statistics.

## RESULTS

A total of 73 patients with retroviral illness were examined for the presence of enteric pathogens in the present study. The preponderant age group affected from HIV was 31-40 years (39.7%) followed by age group 41-50 (32.8%) with 56 males and 17 females. Of the total 73 patients, 48 (65.7%) patients presented with chronic diarrhea and the remaining 25 (34.2%) with acute diarrhea. A total of 32 (43.8%) intestinal pathogens were detected from the 73 samples. Among the enteric bacterial pathogens, *Aeromonas hydrophila* was the commonest (80%) followed by *Vibrio cholerae* O1 (20%).

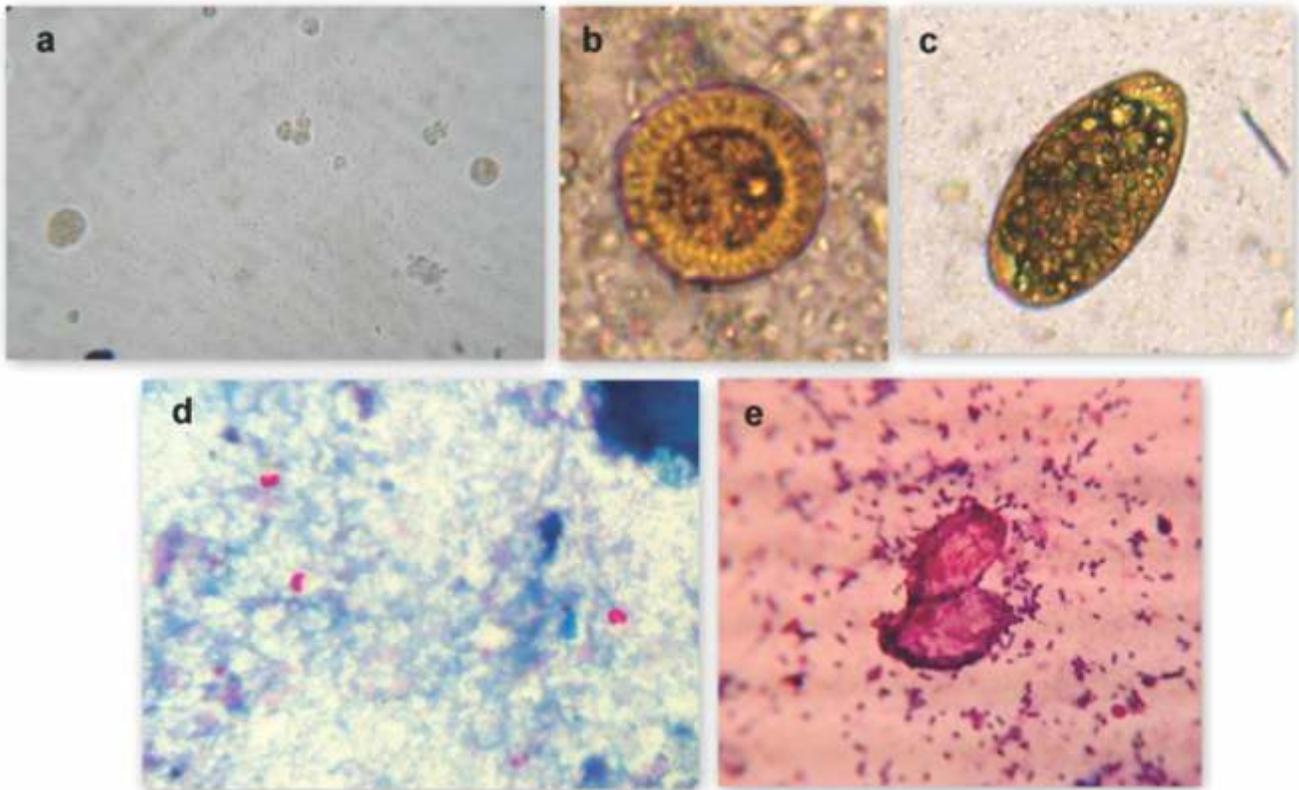


Fig.1:Wet mount and stained preparation of stool specimens showing different pathogens.

(a)*Entamoeba* species; (b) *Taenia* species; (c) *Fasciolopsis buski*; (d) *Cryptosporidium parvum* on modified ZN stain; (e) *Isospora belli* on modified ZN stain.

All the strains were susceptible to the routine antibiotics used. Among the coccidian parasites, there was preponderance of *Isospora belli* (29.6%) over that of *Cryptosporidium parvum* (14.8%). No *Microsporidium* and *Cyclospora* were reported in this study. Among the non-coccidian parasites, *Strongyloides stercoralis* (22.2%), *Ascaris lumbricoides* (14.8%) followed by *Entamoeba* species (11.1%) were found. *Fasciolopsis buski* and *Taenia* species were 3.70% each. The parasitic etiology of diarrhea was confirmed by the Centers for Disease Control and Prevention, Atlanta (Fig.1). Our study showed a case of co-infection of *Fasciolopsis buski* with *Taenia* species, this being the first case reported from South India from our Enteric Division. The CD4 count ranged from 7 to 496 cells/mm<sup>3</sup> which did not show any significant correlation with diarrhea.

## DISCUSSION

The HIV epidemic has resulted in a relatively large number of persons at high risk for developing infectious diarrhea, particularly due to organisms heretofore unrecognized or unusual of immunocompetent patients. Accurate understanding of the cause of diarrhea in a given setting is an onerous task that requires systematic monitoring of the various pathogens. The availability of a well equipped clinical Microbiology laboratory is a prerequisite to undertake such studies. Opportunistic infections constitute a major health problem in patients infected with HIV. Progressive destruction of immune system by chronic HIV infection leading to fall in the level of CD4 cells is known to be responsible for the occurrence of infections by a variety of opportunistic microorganisms.<sup>[5]</sup> This is also responsible for the recurrent, prolonged, intractable and severe nature of infection in HIV seropositive individuals. Karnataka is classified by the National AIDS Control Organization as one of the six HIV/AIDS high prevalence states in India.<sup>[6]</sup> The state has seen a steady increase in the number of HIV infected individuals during the last decade. Chronic diarrhea has been reported in up to 50% of the patients infected with HIV the causative pathogen of AIDS, in developed countries and up to 90% of those in developing countries.<sup>[7]</sup> The advent of Highly Active Antiretroviral Therapy (HAART) therapy has led to substantial improvement in the health and life expectancy of people living with HIV. This has led to an overall decrease in

opportunistic infections in areas of the world where HAART is readily available and more specifically, less people with advanced HIV immunocompromised (CD4 counts <200 cells/mm<sup>3</sup>) developing infective diarrhea.<sup>[8]</sup>

In our study, predominance of male cases (56/73) when compared to females (17/73) was seen. Similar results were seen by other studies conducted on HIV-positive cases with diarrhea in India.<sup>[7]</sup> This may be due to migration to other places or various other social factors. The most common age group was 31-40 years. Similar results were obtained in a study from South India.<sup>[9]</sup>

Among the enteric pathogens isolated from patients with retroviral illness, 84.4% of enteric parasites were isolated, out of which *I. belli* (29.6%) was the most common coccidian parasite in HIV positive patients. This corresponds well with the other studies from South India.<sup>[5]</sup> Studies from North India<sup>[10]</sup> had found *Cryptosporidium* to be the most common parasite while the prevalence of *I. belli* was found to be much lower. The present study was also comparable with our previous data where a change in the pattern of prevalence of coccidian parasite from *Cryptosporidium* to *I. belli* in HIV infected individuals was seen.<sup>[11]</sup> No *Microsporidium* and *cyclospora* were detected from the stool samples in the present study whereas unusual parasites like *F. buski* causing diarrhea were found. Studies done in North India have reported heavy infestation of the parasite causing intestinal perforation.<sup>[10]</sup>

Among the bacterial enteric pathogens, only *Vibrio cholera* O1 and *Aeromonas* species were isolated from diarrheal stool samples of HIV patients. The role of these bacterial agents causing diarrhea in HIV patients remains uncertain. This may be due to its presentation as acute diarrhea which is self limiting in immunocompetent individuals or with those HIV infected with a higher CD4 counts. Appropriate antibacterial therapy must be initiated to prevent associated complications and mortality.

This study throws light on the prevalence of the microbial etiology of chronic diarrhea in HIV individuals in coastal South India with the commonest pathogen being the coccidian parasites. A detailed study with the correlation of CD4 counts with diarrhea (acute and chronic) will aid in elucidating the clinical

significance of diarrhea especially among individuals with retroviral illness. There is an urgent need to interpret the scientific findings into sustainable prevention programs and improve public health policy. Interventions aimed at preventing and treating HIV associated chronic diarrhea forms an integral component for maintaining and improving the living standards of those infected. More research on the effectiveness of less expensive interventions needs to be done in resource poor settings like India.

**CONFLICT OF INTEREST:** None

## REFERENCES

1. Attili SVS, Gulati AK, Singh VP, Varma DV, Rai M, Sundar S. Diarrhea, CD4 counts and enteric infections in a hospital-based cohort of HIV-infected patients around Varanasi, India. *BMC Infect Dis.* 2006;6:1-8.
2. Blanshard C, Francis N, Gazzard BG. Investigation of chronic diarrhoea in acquired immunodeficiency syndrome. A prospective study of 155 patients. *Gut.* 1996;39:824-32.
3. WHO manual. 2012. Available at [http://www.antimicrobialresistance.dk/data/images/protocols/gfn\\_biochem\\_final.pdf](http://www.antimicrobialresistance.dk/data/images/protocols/gfn_biochem_final.pdf).
4. Clinical and Laboratory Standards Institute. Performance Standards for Antimicrobial Susceptibility Testing. 23<sup>rd</sup> Informational Supplement, Document M100-S23, 2013;33.
5. Mukhopadhyaya A, Ramakrishna BS, Kang G, Pulimood AB, Mathan MM, Zachariah A *et al.* Enteric pathogens in Southern Indian HIV infected patients with and without diarrhoea. *Indian J Med Res.* 1999;109:85-9.
6. Becker ML, Cohen CR, Cheang M, Washington RG, Blanchard JF, Moses S. Diarrhoeal disease among HIV infected adults in Karnataka, India: Evaluation of risk factors and etiology. *Am J Trop Med Hyg.* 2007;76:718-22.
7. Jha AK, Uppal B, Chadha S, Bhalla P, Ghosh R, Aggarwal P, *et al.* Clinical and Microbiological Profile of HIV/AIDS Cases with Diarrhea in North India. *J Pathog.* 2012;2012:971958.
8. UNAIDS. Report on the global AIDS Epidemic. UNAIDS 2006: 16-43.
9. Ramakrishnan K, Shenbagarathai R, Uma A, Kavitha K, Rajendran R, Thirumalaikolundusubramanian P. Prevalence of intestinal parasitic infestation in HIV/AIDS patients with diarrhea in Madurai City, south India. *Jpn J Infect Dis.* 2007;60:209-10.
10. Sadraei J, Rivzi MA, Baveja UK. Diarrhea, CD4 cell counts and opportunistic protozoa in Indian HIV-infected patients. *Parasitol Res.* 2005;97:270-3.
11. Ballal M, Martena S, Chakraborty R, Shetty V. Emerging trends in the aetiology and antimicrobial susceptibility pattern of Enteric Pathogens in rural coastal India. *International Journal of Clinical Medicine.* 2014;5:425-32.

