

Profile of intestinal parasitic infections in human immunodeficiency virus/acquired immunodeficiency syndrome patients in Northeast India

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Abstract

Introduction: Diarrhea is one of the major complications occurring in over 90% of human immunodeficiency virus (HIV)-infected individuals in developing countries. Coccidian group of parasitic infections remain the standout opportunistic pathogens in many parts of the world. **Aim:** The objective was to understand the profile of diarrheagenic parasites in HIV/AIDS patients along with analysis of the changing trends in the profile of parasitic diarrhea with special context to coccidian parasitic infections. **Methodology:** A cross-sectional study was performed at "ID CENTRE FOR NORTHEAST," Shillong, from January 2014 to October 2017. Stool samples collected were observed microscopically for parasites both on direct and concentrated stool samples under $\times 10$ and $\times 40$ magnification. Modified acid-fast staining was used for the detection of coccidian parasites. All statistical analyses were performed using IBM SPSS software, Version 24.0. **Results:** The prevalence of intestinal parasitic infections was 40.99%, coccidian parasitic infection accounted for 85.13% of total intestinal parasitic infections. *Cryptosporidium parvum* was the most common cause of diarrhea (70.64%), followed by *Cystoisospora belli* (23.81%) and *Cyclospora* spp. (5.55%). Trend analysis of coccidian etiology during the study revealed a significant rise in the positivity of *Cryptosporidium* spp. and a decrease in the *Cystoisosporiasis belli* infection. The common noncoccidian parasites identified include hookworm (8.1%) followed by *Ascaris lumbricoides* (4.7%). **Conclusion:** The magnitude of parasitic infections is considerably high among the HIV/AIDS patients in Northeast India, and it is essential for screening and periodic monitoring of all the HIV patients for coccidian parasites by stool microscopy.

Key words: HIV and intestinal parasites, HIV in Northeast India, trends in coccidian parasitic infections

INTRODUCTION

With the emergence of human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS) worldwide, a group of human opportunistic pathogens has come into prominence.^[1] Intestinal parasites, especially the opportunistic pathogens, are the common cause of morbidity and mortality, with chronic diarrhea being the most common clinical presentation.^[2,3] Reports indicate that diarrhea occurs in 30%–60% of AIDS patients in developed countries and in about 90% of AIDS patients in developing

countries.^[4] Common parasites associated with diarrhea in HIV-infected persons are, either well-established enteric pathogens, e.g., *Entamoeba histolytica*, *Giardia lamblia*, and *Strongyloides stercoralis* or an opportunistic pathogen, e.g., *Cryptosporidium*, *Isospora*, *Cyclospora*, and *Microsporidia*.^[5,6]

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In India, it is a well-known fact that parasitic diarrheal diseases in HIV/AIDS patients is on the rise in the past three decades owing to numerous studies done on it. Although the Northeast India is the highest contributor of HIV/AIDS cases, not many studies are done to explore the prevalence of opportunistic intestinal infections in such patients.^[7]

In view of this, the present study is done to understand the profile of diarrheagenic parasites in these patients along with analysis of the trends in the prevalence of these organisms in the past 4 years.

METHODOLOGY

A descriptive cross-sectional study was done from January 2014 to October 2017, at the ID Center, Shillong, which provides clinical care to around 2000 registered HIV patients of entire Northeast India. A total of 361 patients were enrolled in the study as per the inclusion criteria. HIV patients who had not received any antibiotic and antiprotozoal drugs in the past 3 weeks and having acute, chronic, or intermittent diarrhea were included in the present study.

Sample collection

Stool samples were collected in clean wide-mouthed, leak-proof plastic containers from each patient and observed macroscopically for consistency, presence of mucus, pus, blood, adult worms and their segments, and helminthic larvae. Microscopy was done on both direct and concentrated samples under $\times 10$ and $\times 40$ magnification, and formol-ether sedimentation technique was used to concentrate the parasitic ova and cysts. To detect the intestinal coccidian parasites, smears prepared from stool samples were stained with modified acid-fast method with 1% acid-alcohol as decolorizer.

Sample collection was done only once. Results were tabulated in Microsoft Excel sheet and analyzed using IBM Corp. Released 2016. IBM SPSS Statistics for Windows, Version 24.0. Armonk, NY: IBM Corp.

RESULTS

Of the 361 patients enrolled, 218 were male and 143 were female. Age group of the patients was ranging from 11 to 60 years. Maximum numbers of patients were in age group of 21–30 years followed by 31–40 years in both sexes.

Parasitic cause was attributed in 40.99% of cases ($n = 148$). Coccidian parasites accounted for 85.13% of these parasitic infections and remaining 14.87% were due to noncoccidian parasites. Of the coccidian parasites, *Cryptosporidium parvum* was found to be the most common cause [Table 1 and Figure 1].

A gradual year-wise increase in the incidence of coccidian parasitic infection was observed, with *C. parvum* being the most common cause (70.64%) and *Cyclospora* spp. being the least common (5.55%) [Figure 2]. Analysis of trends of prevalence of various coccidian parasites shows a rise in the prevalence of *C. parvum* infection and sudden decrease in *Cystoisospora* infection [Figure 3].

DISCUSSION

Continued progression of AIDS pandemic and its association with intestinal parasitic infections is now a serious concern in India, especially Northeast India which is the worst affected and least explored.^[8,9]

In these patients, enteric infections occur with increased frequency, and some of these are more likely to be persistent, severe, recurrent, and associated with extraintestinal manifestations.^[6]

The decrease in immunity by attack on the immune system, especially the cluster of differentiation (CD4+ T-cells) component, macrophages, and defect in the production of immunoglobulin A increases susceptibility to these parasites.^[2,10]

Our study shows the prevalence of parasitic infections to be 40.99%. It is in concordance with the prevalence rates in different parts of India within the past two decades [Table 2].^[11-14] In our study, the most common parasite was *C. parvum* and was found in 60.13% of cases, Anand *et al.* from Manipur in 1996 reported the prevalence of *Cryptosporidium* as 46.6%.^[15] There is an increase in 14.47% of cases in the past two decades in Northeast India. *Cryptosporidium* was found to be the etiological agent of diarrhea in 10%–20% of patients with AIDS worldwide.^[6] Biological factors that impact the epidemiology of *Cryptosporidium* include their low infective dose (10–100 oocysts), ubiquitous nature, small (4–5 μm) size, environmentally and chemically resistant sporulated/infectious oocysts when passed. Due

Table 1: Pathogens associated with diarrhea in the study group

Associated pathogens	n (%)
Parasites	148 (40.99)
Coccidian parasites (n=126)	
<i>Cryptosporidium parvum</i>	89
<i>Cystoisospora belli</i>	30
<i>Cyclospora</i>	7
Noncoccidian parasites (n=22)	
<i>Ascaris lumbricoides</i>	7
Hookworm	12
<i>Giardia lamblia</i>	1
<i>Entamoeba histolytica</i>	2
Bacteria	89 (24.65)
Undiagnosed	124 (34.36)

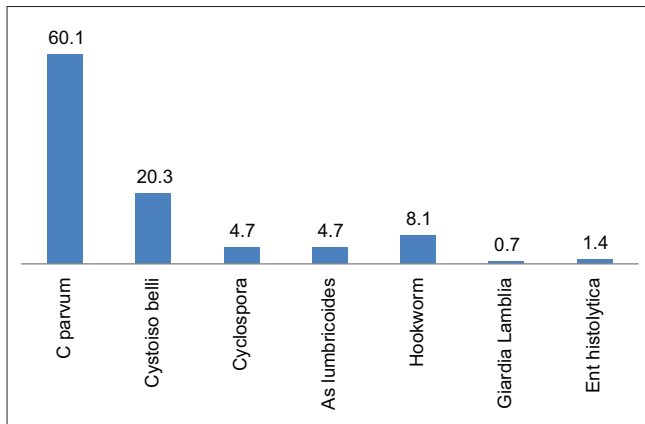


Figure 1: Parasites causing diarrhea in the study group (in percentage)

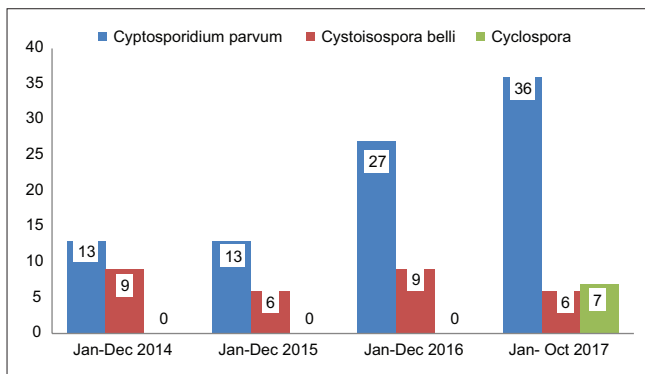


Figure 2: Prevalence of the coccidian parasitic infections in the study group

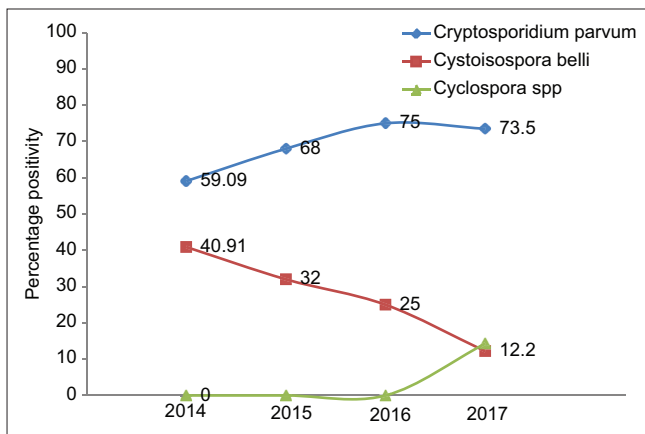


Figure 3: Analysis of trends of three common coccidian parasitic infections since 2014

to the lack of effective therapy for cryptosporidiosis and resistance to available drugs, the prognosis is poor in HIV/AIDS patients.^[1]

In our study, the prevalence of *Cystoisospora belli* infection was 20.29% which is very high compared to reports across various parts of India and the developing world, a study done by Swathirajan *et al.*^[16] at Chennai, South India, shows the prevalence of *C. belli* to be 60.9%.

Table 2: Prevalence of intestinal parasitic infections in HIV/AIDS patients in various parts of the country

Author	Place	Year	Isolation rate (%)
Prasad <i>et al.</i> ^[11]	Lucknow, India	1995-1998	50
Mohandas <i>et al.</i> ^[12]	Chandigarh, India	2002	30
Kumar <i>et al.</i> ^[13]	Chennai, India	2002	30.67
Mathur <i>et al.</i> ^[14]	Jamnagar, India	2009-2010	50.36
Rao ^[6]	Mangalore, India	2015	49
Present study	Shillong, India	2014-2017	40.99

The difference in the prevalence of intestinal parasitic infestations can be attributed to the difference in the geographical distribution of parasites, their personal hygiene, and sanitary habits.^[6]

CONCLUSION

The magnitude of parasitic infections is considerably high among the HIV/AIDS patients in Northeast India, and it is essential for screening and periodic monitoring of all the HIV-seropositive patients for coccidian parasites by stool microscopy. From patients' perspective, avoiding these infections relies on adhering to proper treatment regimens and maintaining good personal hygiene such as drinking boiled water, which may help in avoiding the risk of diarrheal disorders.^[16]

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Conflicts of interest

There are no conflicts of interest.

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