

RESEARCH ARTICLE

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Intestinal Parasite Infestation in HIV Infected Patients in Tertiary Care Center

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Abstract

Every year, the number of people living with HIV rises as a consequence of advanced infections and the positive effects of highly active antiretroviral therapy (HAART). Gastrointestinal involvement is common, with 90% of patients seeking treatment for gastrointestinal problems as their HIV infection progresses. Nonetheless, identifying and characterization of infectious agents is important for patient management by excluding a clinical diagnosis and determining appropriate treatment, as well as determining public healthcare policy for true pathogen prevalence and yielding epidemiological risk factors for specific infections. The aim of this study is to evaluate the prevalence of symptomatic or asymptomatic intestinal parasitic infection among HIV or AIDS patients. For this study with 80 HIV seropositive patients being recruited from various wards and the Integrated Counseling and Testing Center (ICTC) affiliated to the microbiology department. Patients with acute and chronic diarrhea with abdominal disorder were taken as symptomatic whereas patients without these clinical complaints and who came for routine investigations were taken as asymptomatic. Firstly stool samples were analyzed by macroscopically for the presence of mucus, blood, larvae, segments of tapeworm and adult worms. The consistencies of stool were also recorded such as formed, watery or soft or loose with odor and color. It was examined microscopically after macroscopically for protozoan cysts and trophozoites, helminthic ova and larvae, as wet mount preparation by saline and iodine preparation as well as formal ether concentrated. For the detection of intestinal coccidian parasites, smears were prepared from stool samples and a modified Ziel-Nelseen (MZN) stain was also performed. Stool samples with the detection of parasites were informed for treatment. The prevalence of intestinal parasite was 23.75% with asymptomatic and symptomatic groups having a prevalence of 16.98% and 37.04% respectively. Out of total patients, 56.25% were male and 43.75% were female. Among the male patients, 11 (13.75%) were positive for an intestinal parasitic infection and 8 (10%) were positive among females. The age distribution data revealed that the age group 21-40 years old had the highest number of intestinal parasites, followed by 41-60, 61-80, and 0-20 years old. The most intestinal parasites were found in the young and middle-aged

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patients, according to this study. Different parasites were identified as *Entamoeba histolytica*, *Taenia species*, *Ascaris lumbricoides*, *Cryptosporidium parvum* and *Isospora* with one protozoan, two coccidian parasites and two helminthes. The most common parasite was *Taenia species* 6 (7.5%) followed by *Entamoeba histolytica* 5 (6.3%) and *Cryptosporidium parvum* 5 (6.3%). Intestinal parasitic infection is not uncommon in HIV seropositive patients. This study underscores the need for early diagnosis and treatment of these intestinal parasites in both symptomatic and asymptomatic HIV patients.

Keywords: HIV/AIDS, parasites, infection

INTRODUCTION

Globally Human Immuno-Deficiency Virus / Acquired Immune Deficiency Syndrome (HIV/AIDS) is a type of common health problem¹. Superimposed infection, caused by a defect in immunity, is one of the most serious health issues among HIV-positive people².

Every year, the number of people living with HIV rises as a consequence of advance infections and the positive effects of highly active antiretroviral therapy (HAART)³. Since the onset of AIDS, clinical changes affecting the gastrointestinal system have been common, particularly diarrhoea caused by parasite infections⁴. Many studies showed that intestinal parasites such as *Entamoeba histolytica/dispar*, *Giardia lamblia*, *Cryptosporidium species*, *Cyclospora cayetanensis*, *Isospora belli* and *Strongyloides stercoralis* are accountable for 60–80% of infestations⁵. These parasitic infections play a significant role in HIV/AIDS pathogenesis and diarrhoeal disease accept as an important role up to 50% in developing countries⁶. Many studies have shown the impact of socioeconomic status and cultural issues on the onset of intestinal parasite infection in the general population and HIV-positive patients in particular³. Immunosuppression caused by HIV infection encourages the occurrence of many opportunistic diseases that cause high mortality, with gastroenteritis occupying a prominent position^{7,8}. Gastrointestinal association is common, with 90% of patients seeking treatment for gastrointestinal problems as their HIV infection progresses⁹. Nonetheless, identifying and characterization of infectious agents is important for patient management by excluding a clinical diagnosis and determining appropriate treatment, as well as determining public healthcare policy

for true pathogen prevalence and yielding epidemiological risk factors for specific infections¹⁰. In 2012, the National AIDS Response resulted in the treatment of 2,212 patients in seven facilities with antiretroviral therapy (ART)¹¹. The association between intestinal parasite infections and several nutritional markers has been demonstrated in numerous studies involving nutritional status, infection prevalence and intensity¹². The clinical spectrum of these parasitic protozoa infections ranges from asymptomatic infection to severe infection with chronic diarrhoea, dehydration, and mal-absorption, especially in HIV positive patients¹³. Such co-infections have more severe clinical signs and are more difficult to treat as compared to parasite infections in otherwise healthy people¹⁴. Due to the high prevalence of parasitic intestinal diseases in people living with HIV or AIDS, many of which are opportunistic in nature and have a severe impact on patients, new research is needed to investigate the relationship between these infections and their immune responses, as well as the nutritional effects of these diseases in this population³. In this study we aim to determine the prevalence of intestinal parasite infection in HIV seropositive patients.

MATERIAL AND METHODS

This research was carried out in the parasitological section of laboratory in the department of microbiology at CCMC, Bhilai; Durg district of Chhattisgarh state situated in Central East India. This cross-sectional study was carried on HIV patients who visit in hospitals from November 2017 to November 2020 after obtaining institutional ethical clearance. HIV seropositive patients were randomly selected for this study irrespective of whether they were symptomatic

or asymptomatic. A sample size of 80 was used based on an ongoing larger work of PhD theses for which this study forms a part of.

Eighty(80) HIV seropositive patients were recruited from various wards and the Integrated Counseling and Testing Center (ICTC) affiliated to the microbiology department. Detail data of patients were obtained from the patients as well as from the medical record department (MRD) during the study period. After giving consent, from all symptomatic and asymptomatic HIV patients stool sample were collected. Each patient's stools were collected in a clean, dry, leak-proof, tight-lidded plastic container. Aside from obtaining the sample, the patient's name, age, sex, occupation, history of clinical manifestations, such as diarrhoea, and antibiotic and antiparasitic drug treatment history were all noted. Stool sample was process as per the standard protocol for detection of parasites by Macroscopic Examination, Microscopic Examination and Concentration technique as Formal ether concentration¹⁵.

Firstly stool sample were analyzed by macroscopically for presence of mucus, blood, larvae, segments of tapeworm and adult worms. The consistencies of stool were also recorded such as formed, watery or soft or loose with odor and color.

In the microscopic examination after macroscopically, Saline and Iodine wet mount were performed for the presence of parasitic cysts, trophozoites and ova or larva as well as formal ether concentrated were also perform and examined microscopically. Modified Ziehl-Neelsen (MZN) stain was also done for detection and identification of intestinal coccidians like *Cryptosporidium parvum* and *Isospora belli*¹⁵. Stool sample with detection of parasites were informed for treatment.

RESULT

A total of 80 stool samples were collected and tested for intestinal parasite infection in HIV-positive patients. Out of 80 HIV seropositive patients, 53 were asymptomatic and 27 were symptomatic patients. The prevalence of intestinal parasite in the study subjects was 23.75% while it was 16.98% and 37.04% in the asymptomatic and symptomatic subjects respectively (Table 1).

Among 80 HIV seropositive patients,

56.25% were male and 43.75% were female. Among the male patients, 11 (13.75%) were positive for intestinal parasitic infection and 8 (10%) were positive among females (Table 2). The positivity ratio between male and female is 1: 1.375.

In this study HIV seropositive patient with age range from 0-80 years old were included with the mean age of 39.2±9.1 years old [Standard Deviation (SD) 13.84]. The age group 21-40 years old had the largest age distribution, while the age group 0-20 years old had the lowest. The age distribution data revealed that the age group 21-40 years old had the highest number of intestinal parasites, followed by 41-60, 61-80 and 0-20 years old. The most intestinal parasites were found in the young and middle-aged patients, according to this studied i.e. Between 21-40 years old age group. In the age group 0-20 years old and 61-80 years old only 2.5% of intestinal parasites were detected (Table 3).

Out of 80 samples 19 (23.75%) were diagnosed as parasitic infection. Different parasites were identified as *Entamoeba histolytica*, *Taenia* species, *Ascaris lumbricoides*, *Cryptosporidium parvum* and *Isospora* with one protozoan, two coccidian parasites and two helminthes. Most common parasite was *Taenia* species 6(7.5%) followed by *Entamoeba histolytica* 5 (6.3%) and *Cryptosporidium parvum* 5 (6.3%).

From the total number of patients, 26 were those patients with CD4⁺ T cell count less than 200 cells/μl followed by 19 were those patients with CD4⁺ T cell count 200–499 cells/μl and 35 were those patients with greater than or equal to 500 cells/μl. In this study among the patient with HIV-positive with CD4⁺ T cell count <200 cells/μl had higher possibility of infestation with intestinal parasitic as compared to those with CD4⁺ T cell count of 200–499 and those with CD4⁺ T cell count >500 (Table 4).

Table 1. Showing prevalence of Parasites in Asymptomatic and Symptomatic group

Group	Total	Positive	Percentage
Asymptomatic Group	53	9	16.98
Symptomatic Group	27	10	37.04
Total	80	19	23.75

Table 2. Distributions of HIV seropositive patients with positivity according to gender

Gender	Number of patient	Percentage	Number of positive	Percentage
Male	45	56.25	11	13.75
Female	35	43.75	8	10
Total	80	100	19	23.75

DISCUSSION

The advent and spread of AIDS is the biggest threat to public health in modern times. In today's world, HIV infection has become a major issue. Infection is prevalent in many parts of the world, including Southeast Asia. The link between intestinal parasite diseases and the AIDS pandemic is a critical concern¹⁶. In this study the prevalence rate of intestinal parasites was 23.75% among patients who have tested positive for HIV. The study done by Rodriguez-Perez EG et al¹⁷ from Mexico showed the prevalence rate of 69%, which was high when compared with this study. Another study conducted by Obateru OA et al⁵ in 2016 from Nigeria showed prevalence rate of intestinal parasites was 68.5% which was very high when compared to this study. Nkenfou CN et al¹⁸ from Cameroon reported the prevalence of intestinal parasitic infection of 59.52%. Teklemariam Z et al¹⁹ from Ethiopia reported the prevalence of intestinal parasitic infection rate of 33.7%, which was also showed higher than this study. Intestinal parasite infections have been observed in HIV-positive patients from various locations of India.

Gupta K et al²⁰ from New Delhi, India reported in HIV-positive patients, the prevalence of intestinal parasite infestation was found as 59.3% which was higher than this study. Mathur MK et al²¹ from Jamnagar, India also showed the prevalence rate of 50.36 %. Another study of Rao RP et al¹⁴ in 2015 from Mangalore, India reported 49% of parasitic infection in HIV seropositive patients. Kaniyarakkal V et al²² from South India (Kozhikode) reported 9% as prevalence of parasitic infection which was very less as compared to this study. A study conducted by Swathirajan CR et al²³ from Tamil Nadu, India intestinal parasite infections are common among HIV/AIDS patients was 23.4% which showed similar with this study. Another study of Ghoshal U et al²⁴ in Lucknow, Uttar Pradesh, India prevalence of intestinal parasitic infection was reported as 57.81%, which was also high when compared to this study. There is a discrepancy in the prevalence of intestinal parasitic infestations in HIV seropositive individuals when compared to studies conducted by different authors from India or elsewhere, which could be related to differences in geographical distribution of parasites, hygienic

Table 3. Distributions of HIV seropositive patients with positivity according to age

Age	Number of patient	Percentage	Number of positive	Percentage
0-20	2	2.5	2	2.5
21-40	48	60.0	12	15
41-60	23	28.8	3	3.75
61-80	7	8.8	2	2.5
Total	80	100.0	19	23.75

Table 4. Showing parasitic infection with associating CD4⁺ T cell count among HIV seropositive patients

CD4 ⁺ T Cell count (cells/ μ l)	N=80	Intestinal parasites N=19	Odd ratio (95% CI)	p-value
< 200	26	5		
200-499	19	6	0.317	0.0716
>500	35	8		

habits and personal hygiene. Other reasons for the disparity in prevalence could include various immunological status cases and different stool processing methods. Patients may be infected with various intestinal parasites as a result of poor sanitation.

In this study mean age was 39.2±9.1 years with the maximum age of 21-40 years which is similar to the study conducted by Rao RP et al¹⁴ and Swathirajan CR et al.²³ This may be due to the effect of ageing on weakened immune system that comes with status of HIV.

Male (13.75%) showed higher prevalence as compare to female (10%) which is comparable to the many studies as conducted by Swathirajan CR et al²³ and Gupta K et al²⁰. Various researches from various parts of India also revealed a larger proportion of males in the HIV-infected population. This male preponderance may be related to men's proclivity to relocate for job, as well as their increased exposure to promiscuous and risky sex²². In this study the most common parasite was *Taenia* spp followed by *Entamoeba histolytica*, *Cryptosporidium parvum* was found in 23.8% of HIV seropositive patients. Carried out with varying results, some have similar results while others different to the finding in our study. In Brazil, Amancio FA et al³ in the year 2012 showed *Entamoeba* was the most common parasite and followed by *Giardia lamblia*, *Blastocystis hominis*, *Endolimax nana* and *Ascaris lumbricoides*. In another study Obateru OA et al⁵ reported prevalence of *Cryptosporidium* spp (55.0%) as most common isolated parasite. Rao RP¹⁶ also reported *Cryptosporidium* spp as most common parasites followed by *Isospora belli*, *Cyclospora*, *Microsporidia*, *Entamoeba histolytica*, Hookworm. Swathirajan CR et al²³ showed *Cryptosporidium* as a most commonly observed parasites and followed by *Cystoisospora belli*, *Cyclospora* spp. Studies from various parts of the world indicate similar rates of incidence with major regional differences. All HIV-positive patients' stools should be extensively analysed to identify intestinal infections so that adequate management can be implemented. The study showed prevalence of intestinal parasites was highly significant in HIV-positive patients with CD4⁺T cell count < 200 cells/μl had high possibility of increased parasitic infection (P < 0.05) as compared to patients with

CD4⁺T cell count of >200. This report also showed as similar to many other study as carried out by Babatunde et al¹³, Assefa et al²⁵ and Wiwanitkit et al²⁶. Therefore, all these findings suggested that immunity plays an important role in the survival and development of intestinal parasites in HIV-positive individuals.

CONCLUSION

This study showed the prevalence of intestinal parasite was 23.75% with asymptomatic and symptomatic groups having a prevalence of 16.98% and 37.04% respectively. *Taenia* species was the most common parasite found in HIV patients followed by *Cryptosporidium parvum* and *Entamoeba histolytica*. The finding from our study underscores the need for early diagnosis and treatment of these intestinal parasites both in symptomatic and asymptomatic HIV patients as early as possible. This will aid clinicians in developing suitable patient treatment methods.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

AUTHORS' CONTRIBUTION

All authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

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None.

DATA AVAILABILITY

All datasets generated or analyzed during this study are included in the manuscript.

ETHICS STATEMENT

Not applicable.

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