

**ENTEROPARASITES
IN PATIENTS WITH
AIDS AND/OR HTLV
HOSPITALIZED IN
MACEIÓ, ALAGOAS
STATE, BRAZIL**

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Abstract: **Introduction:** Acquired immunodeficiency syndrome (AIDS) caused by HIV and infection by the human T-lymphotropic virus (HTLV) provokes immunological deficiencies that expose infected individuals to opportunistic diseases. Intestinal parasites are among the frequent complications in this population. **Objectives:** determine the frequency of parasitic infections in patients with AIDS and/or HTLV in a referral hospital for infectious diseases in Maceió, Brazil. **Methodology:** quantitative cross-sectional study conducted with patients hospitalized between 2018 and 2021. Coproparasitological tests were performed with the fecal samples provided by the participants. Concomitantly, a questionnaire was applied to obtain a sociodemographic characterization of the sample and identify the risk factors for parasitic infections. The questionnaire was organized with dependent variables between parasite-infected and non-infected individuals. The results were analyzed statistically using Fisher's exact test at a 5% significance level ($p < 0.05$). **Results:** The sample consisted of 123 participants, 32 of whom were infected by intestinal parasites. The most frequent were the protozoa *Entamoeba histolytica/dispar* (18%) and *Endolimax nana* (16%) and the opportunistic *Cystoisospora belli* (10%); among the helminths is the family Ancylostomatidae (12%) and *Strongyloides stercoralis* (8%). With respect to the independent variables analyzed, rural municipalities of the state, adobe brick dwellings and diarrheic stools were statistically significant. **Conclusions:** The results obtained in the present study demonstrate the importance of implementing routine diagnosis of enteroparasites for patients with AIDS and other immunodeficiency diseases, using techniques to detect opportunistic parasites, which may lead the patient to severe clinical disorders or death, when not duly

diagnosed and treated.

Keywords: Acquired immunodeficiency syndrome; Human T Lymphotropic Virus 1; Human T Lymphotropic Virus 2; Opportunistic Infections; Parasitic diseases.

INTRODUCTION

The acquired immunodeficiency syndrome (AIDS) caused by the HIV virus is currently considered a pandemic. Around 1 million cases were detected in Brazil between 1980 and June 2018. AIDS is characterized as infection by the virus, high viral load, immunological deficiency, especially of TCD4+ cells, and may trigger neoplasias and opportunistic infections¹⁸.

Another immunological syndrome can be provoked by the human T-lymphotropic virus (HTLV), which is globally distributed, with around 5 to 10 million infected persons. Transmission occurs sexually, hematogenically and through breastfeeding. The following areas are highly endemic: Southeastern Japan, the Caribbean, parts of South America, Sub-Saharan Africa, and regions of the Middle East. In addition, the virus is more prevalent in women and at advanced ages².

Among the opportunistic infections that may affect these groups of immunocompromised patients, intestinal parasites stand out for the challenge they pose to the health systems of developing countries, such as Brazil. Controlling these parasites requires widely available sanitation, access to safe drinking water and relatively adequate personal and domestic hygiene. In addition, understanding the extent of intestinal parasite infections in a community is a determining factor for planning efficient intervention programs^{26,5}.

As such, coproparasitological examinations are important tools that should be frequently prescribed for immunocompromised patients in order to identify opportunistic agents or

ensure a cure criterion for intestinal parasites, which may lead to severe clinical disorders in immunocompromised individuals²³.

A survey of the scientific literature reveals a lack of data on the study of intestinal parasites in immunocompromised patients in Alagoas state, which, along with the trend to greater notification of AIDS and/or HTLV cases when compared to the national average, prompted this study.

Thus, the aim of the present study was to determine the prevalence of parasitic infections in patients with AIDS and/or HTLV hospitalized in a referral institution for infectious diseases in Alagoas, Brazil.

MATERIAL AND METHODS

This is a cross-sectional descriptive analytical study of patients admitted to a referral hospital for infectious diseases in Maceió, Alagoas state, Brazil, and diagnosed with AIDS and/or HTLV between August 2018 and March 2021. The study was approved by the Research Ethics Committee of the Alagoas State University of Health Sciences (UNCISAL) under protocol number CAAE: 70057017.2.00005011.

The participants or their legal representatives provided written informed consent. A questionnaire was used to collect information on sample characterization, life habits, socioeconomic profile and the presence of gastrointestinal clinical signs.

The following inclusion criteria were established: diagnosis of AIDS and/or HTLV and admitted to the referral hospital during the study period. The exclusion criteria were refusal to give informed written consent, not providing a fecal sample for coproparasitological analysis, absence of a legal guardian for patients with special needs, no knowledge of the diagnosis, death or transfer to another facility, and patients in isolation.

Sealed collectors were handed out for fecal collection (around 25 g). The samples were examined under an optical microscope using three parasitological examinations: Hoffman, Pons and Janer¹⁵, Baermann-Moraes¹⁹ and safranin – methylene blue⁹. Two slides were made for each method and read by two microscopists.

Analysis occurred at the Laboratory for Parasitic Infectious Diseases (LaDIP), located in UNCISAL's Gatto Falcão Research Pavillion 1b. The macroscopic state of the feces and the presence of intestinal parasites in the samples were assessed.

The dependent variable was the presence or not of parasites in the sample and the independent variables were age, gender, provenance, marital status, occupation, average monthly family income, education, food preparation area, type of drinking water, raw vegetable intake, fruit and vegetable preparation, meat intake, contact with animals, hand washing before meals, hand washing after going to the bathroom, water supply, trash disposal, type of dwelling, presence of gastrointestinal signs/symptoms, stool consistency and macroscopic findings of the sample.

The results were submitted to statistical analysis applying Fisher's exact test at a 5% significance level ($\alpha = 0.05$) and expressed in tables created using the SPSS 25.0 program. All the results were entered on the patients' medical charts and immediately sent to the infectious disease specialist in charge, so that treatment could be initiated as quickly as possible.

RESULTS

The sample was composed of 308 patients, 123 of whom remained after being submitted to the exclusion criteria, which are presented in Table 1. Hospital discharge before fecal collection and intestinal constipation were

the most frequent causes for the unavailability of fecal matter for coproparasitological examinations. No cases of HTLV infection were reported during the study.

A total of 32 (26%) of the 123 participants exhibited intestinal parasites in the fecal samples. Among the parasites, there was greater protozoan frequency when compared to the helminths.

Sample characterization, social profile, life habits, risk factors, macroscopic analysis of fecal matter and the presence of gastrointestinal signs and symptoms are depicted in Tables 3 and 4. These results are presented along with statistical analysis, comparing the data obtained from participants with and without parasites.

A significant p-value ($p < 0.05$) was found in the independent variables participant provenance, type of dwelling and stool consistency. Parasites were more prevalent in participants from inland areas than those residing in the state capital, in individuals living in adobe brick houses and in fecal samples with diarrheic consistency. The other independent variables were not statistically significant.

Reason	Absolute number	%
Hospital discharge	73	40
Intestinal constipation	38	21
Refusal to participate	36	19
Bedridden patient without a companion	26	14
Patient hospitalized in isolation	8	4
Psychiatric patient without a companion	4	2
Total	185	100

Table 1: Reasons distribution for exclusion of research participants

Parasites	Number of samples	%
Protozoa		
<i>Entamoeba histolytica/dispar</i>	7	18
<i>Endolimax nana</i>	6	16
<i>Cystoisospora belli</i>	4	10
<i>Entamoeba coli</i>	4	10
<i>Iodamoeba butschlii</i>	3	8
<i>Cryptosporidium sp.</i>	2	6
<i>Giardia lamblia</i>	1	2
Helminths		
Family Ancylostomatidae	5	12
<i>Schistosoma mansoni</i>	3	8
<i>Strongyloides stercoralis</i>	3	8
<i>Ascaris lumbricoides</i>	1	2

Table 2: Frequency of intestinal parasites obtained through coproparasitological exams

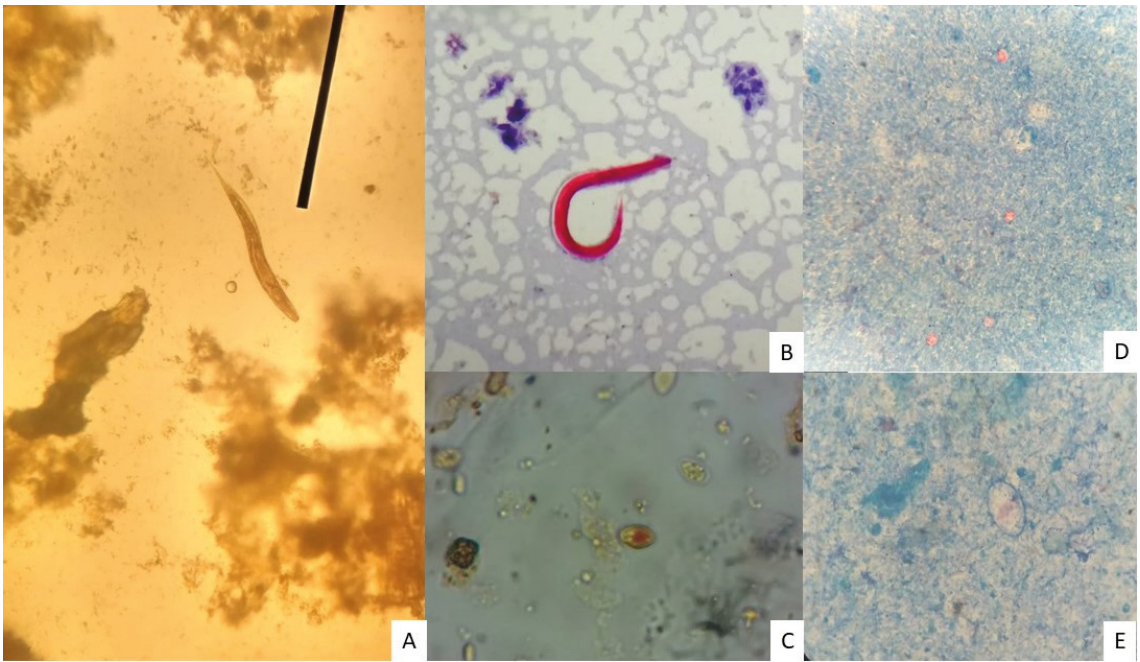


Figure 1: Enteroparasites visualized through optical microscopy.

Subtitle: (A, B): *Strongyloides stercoralis* larva. 40x magnification. (C): *Iodamoeba butschlii* cyst. 40x magnification. (D): *Cryptosporidium* sp. Magnification 100x. (E): *Cystoisospora belli* ocisto. Magnification 100x.

Variables	Category	Parasitized		Non- Parasitized		P Value
		Absolute number	%	Absolute number	%	
Gender	Female	14	43,8	40	44,0	0,676
	Male	17	53,1	50	54,9	
	Other	1	3,1	1	1,1	
Age range	<18	0	0	1	1,1	0,362
	18-24	0	0	6	6,6	
	25-29	2	6,2	17	18,7	
	30-34	4	12,5	9	9,9	
	35-39	9	28,1	21	23,1	
	40-44	4	12,5	10	11	
	45-49	6	18,8	5	5,5	
	50-54	6	18,8	14	15,4	
	55-60	1	3,1	7	7,7	
	>60	0	0	1	1,1	
County (AL)	Maceió	11	34,4	63,7	66	0,007
	Others	31	65,6	36,3	44	
Monthly income	Up to 2 minimum wages	32	100	87	95,6	0,678
	2-4 minimum wages	0	0	3	3,3	
	4-10 minimum wages	0	0	1	1,1	
	10-20 minimum wages	0	0	0	0	
	20 or more minimum wages	0	0	0	0	

Education	No schooling	15	46,9	22	24,2	0,125
	Incomplete elementary school	12	37,5	45	49,5	
	Incomplete high school	1	3,1	9	9,9	
	Complete high school	2	6,2	11	12,1	
	Incomplete higher education	0	0	2	2,2	
	Complete higher education	2	6,2	2	2,2	
Marital status	Single	24	75	58	63,7	0,672
	Married	6	18,8	21	23,1	
	Divorced	2	6,2	8	8,8	
	Widowed	0	0	4	4,4	

Table 3: Independent variables related to sociodemographic data according to the presence or absence of intestinal parasites

Variables	Category	Parasitized		Non- Parasitized		P Value
		Absolute number	%	Absolute number	%	
Meals preparation	At home	32	100	81	89	0,062
	Out of home	0	0	10	11	
Water used for drinking	Filtered	10	31,2	44	48,4	0,066
	Boiled	3	9,4	2	2,2	
	Unfiltered (faucet)	19	59,4	45	49,5	
Raw vegetables ingestion	Yes	28	87,5	79	86,8	1,000
	No	4	12,5	12	13,2	
Cleaning of vegetables	Washed in filtered / boiled water	3	9,4	5	5,5	0,716
	Washed in untreated water	14	43,8	36	39,6	
	Washed in water + vinegar / bleach	7	21,9	27	29,7	
	Not washed	8	25	23	25,3	
Beef ingestion	Yes	33	100	88	97,2	1,000
	No	0	0	2	2,2	
Pork ingestion	Yes	18	54,5	51	56,7	0,841
	No	15	45,5	39	43,3	
Goat meat ingestion	Yes	23	69,7	55	61,1	0,408
	No	10	30,3	35	38,9	
Chicken meat Ingestion	Yes	32	97	86	95,6	1,000
	No	1	3	4	4,4	
Fish meat ingestion	Yes	33	100	87	96,7	0,563
	No	0	0	3	3,3	
Cooking degree of the meats	Raw	0	0	0	0	1,000
	Rare	2	6,3	7	7,7	
	Medium	30	93,8	84	92,7	

Washing hands habit before eating	Yes	14	43,8	46	50,5	0,725
	No	18	56,2	45	49,5	
Washing hands habit after going to the bathroom	Yes	16	50	54	59,3	0,600
	No	16	50	37	40,7	
Presence of animals at home	Yes	4	12,5	16	17,6	0,589
	No	28	87,5	75	82,4	
Animal's species	Dog	4	12,5	7	7,7	0,145
	Cat	0	0	9	9,9	
	No animals	28	87,5	75	83,7	
Water supply	Public	20	62,5	68	74,7	0,254
	Well or cisterna	12	37,5	23	25,3	
Waste destination	Cesspool	18	56,2	50	54,9	0,810
	Public sewage	11	34,4	35	38,5	
	Open-air sewage	3	9,4	6	6,6	
Housing types	Masonry	24	75	91	100	0,000
	Adobe brick house	8	25	0	0	
	Other	0		0	0	
Gastrointestinal symptoms	Presents	21	65,6	56	61,5	0,832
	Absents	11	34,4	35	38,5	
Feces consistency	Non-diarrheic	19	59,6	76	83,5	0,007
	Diarrheic	13	40,4	15	16,5	
Feces macroscopy	Mucus	6	18,8	14	15,4	0,525
	Blood	1	3,1	1	1,1	
	None	25	78,1	76	83,5	

Table 4. Independent variables related to the lifestyle and macroscopic analysis of fecal material

DISCUSSION

The correlation between HIV infection and enteroparasites and other opportunistic infections is noteworthy in studies from developing countries. This concern may be justified by poor sanitation, high poverty levels and low access to education, given that these aspects are key factors in preventing and reducing these contagions^{10,4}. The present study addresses this issue by selecting a population of public health system users in Alagoas, treated at a state referral hospital for infectious and contagious diseases.

With a larger sample (n= 1253), Astudillo⁶

found a 22.98% prevalence of enteroparasites in seropositive individuals. This value is close to the frequency observed in the present study (26%). Other studies with similar methodology obtained intestinal parasite rates associated with HIV between 13.9% and 35.9%^{16,21,12,8,11,24}.

In a randomized study, Obateru²⁰ observed the prevalence of intestinal parasites in seropositive individuals and a control group of patients with HIV. He found higher prevalence in patients with HIV (68.5%) than in their non-HIV counterparts (49.2%). Enteroparasites pose an even greater risk to

the seropositive group with fewer than 350 TCD4+ cells/mm³²⁴.

One factor that demonstrates an advance in tackling opportunistic infections in patients with HIV is the effective implementation of antiretroviral therapy (ART). Thus, based on a sample of 500,000 HIV+ individuals, a decline in risks and an economic saving in the treatment of opportunistic infections was found after implementing ART¹⁷.

All the participants of this study were hospitalized with a diagnosis of AIDS, suggesting decompensation of the clinical picture, which may be explained by n/interference or absence of ART, which is available in the Brazilian public health system.

In addition to specialized care and effective therapy to control opportunistic infections in immunocompromised individuals, adequate sanitation and access to safe drinking water are also points of debate for improved determinants of health²⁶.

Around 1.6 million deaths worldwide are caused by poor sanitary and water management, 829,000 of which result from diarrhea²². Given the statistical significance of diarrhea for the presence of parasites in this and Vergaray's study²⁵, it can be inferred that a large portion of these deaths are triggered by parasitological processes that could be prevented by adequate sanitary management.

Diarrhea is an acute syndrome in 42% of seropositive patients in ART, with the chronic form reaching 58%. It is important to underscore that 49% of patients with diarrhea symptoms exhibited intestinal parasites as the underlying etiology¹⁶, corroborating the 40.4% obtained in the present study. Moreover, an HIV viral load between 10,001 and 100,000 is also a risk factor for diarrhea⁸.

The use of laboratory examinations (TCD4+ cell count and viral load) is substantial in the clinical management of seropositive patients, but demonstrates a number of barriers to their

access, given that most of the individuals of this study did not include these examinations on their medical charts, precluding detailed analysis of this variable in the sample.

The type of dwelling was statistically significant, resulting in a greater prevalence of parasites in those residing in adobe brick houses located in rural areas of Alagoas state, all distributed in the mesoregion of Eastern Alagoas. This shows a prevalence of infections in rural zones, which may be associated with both the sanitary infrastructure and agricultural activities⁷.

Entamoeba histolytica/dispar was found in 18% of the fecal samples analyzed. In individuals with HIV, *E. histolytica* is more prevalent, as determined by molecular tests³. In a study with a control group of individuals with and without HIV, *E. histolytica* infection was statistically significant, and present in 38% of seropositives¹.

Using the same variables, Gomes¹⁴ analyzed a population with HIV and/or HTLV treated at the same hospital as the present study in 2017-2018. Intestinal parasites were present in 39.5% of the study participants, the most frequent being the opportunistic parasite *Cryptosporidium* sp. (12.3%). None of the studies involved patients diagnosed with HTLV, suggesting possible underreporting, given the approximately 2.5 million cases in Brazil (GLORIA et al., 2015)¹³.

The results of this study show the importance of implementing enteroparasite diagnosis for patients with AIDS and other immunodeficiency diseases, using techniques to identify opportunistic parasites that can lead to severe clinical consequences or death when not duly diagnosed and treated.

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