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Intestinal Parasitic among Children with Less Than Fifteen Years Old in the Rural Neighbourhoods of Saurimo, Province of Lunda-Sul, Angola

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Abstract

Background: Intestinal parasites are among the most common pathogens found in humans. Helminths and protozoa which colonize the intestine constitute an important public health problem in the world. Considering that more than half of the world population is infected by enteroparasites, with high prevalence among the poorest, this research aimed to investigate parasitological indicators among children under fifteen years of age in the rural community of Saurimo, Angola. The research had an individualized, observational and cross-sectional design, in the year of 2012. **Material and methods:** 721 stool samples were examined and preserved in Merthiolate-iodine-formaldehyde solution (MIF). Laboratory tests were performed by coproscopic method. **Results:** 308 helminth, eggs or protozoan cysts were found, corresponding to the prevalence coefficient (PC) of 42.7%. Among them, 229 were positive for helminths (PC = 31.8%) and 118 for protozoa (PC = 16.4%). Monospecific parasitism was identified in 241 (PC = 33.4%) and polyparasitism in 67 (PC = 9.3%). *Ascaris lumbricoides* was the most frequent species with 158 cases, with dominance coefficient (DC) of 51.3%. Among protozoal infections, the most common species was *Entamoeba coli*, in 101 cases (DC = 32.8%),

whereas parasitism by *Entamoeba histolytica/dispar* was found in 16 cases (DC = 5.2%). The age group between two and five years old was the class with the highest incidence, with 144 cases, dominance coefficient (DC) of 46.8%. Cases of simultaneous parasitism by two or more species occurred in 62 samples (PC = 8.6%, DC = 20.1%), and simultaneity by three species occurred in five cases (PC = 0.7%, DC = 1.6%). The results were the basis for proper counselling and intervention. **Conclusions**: The study revealed the need for orientation of government measures and educational partners to improve the living conditions of the community of Saurimo, Angola.

Subject Areas

Parasitology

Keywords

Intestinal Parasites, Helminths, Protozoan, Angola

1. Introduction

Intestinal parasites are among the most common pathogens found in humans. Helminths and protozoa that colonize the intestine constitute an important public health problem in the world. Parasitoses occur in all age ranges, however they are more common in children and this fact is related to the immunity of each individual [1] [2]. Parasitic diseases have a vast geographical distribution, both in rural and urban areas, with variable intensity depending on the environment and the parasite species involved. In endemic areas, the morbidity of such diseases is associated with the intensity and chronicity of the infection. These parasitic diseases are generally closely related to sociodemographic and environmental factors, mainly infrastructure problems, lack of basic sanitation, precarious socioeconomic conditions, unavailability of drinking water, poor nutritional status, among other health support features [3] [4] [5]. Young adults are also parasitized and morbidity depends on the species of the parasite, and may interfere with the nutritional status and physical development of the infected, with the decrease of the intellectuality as one of the effects, which reflects in low school performance [6] [7] [8]. The enteroparasites may be asymptomatic, show some clinical manifestations, or present typical characteristic signs [9]. When parasites occur isolated, they generally do not have high lethality. However, some isolated or associated infections can affect nutritional balance, induce intestinal bleeding, compete for micronutrient uptake and/or induce nutrient malabsorption, or even lead to the need of surgical interventions as in cases of rectal prolapse, obstruction and intestinal abscess. As a result of the scavenging action, iron deficiency anemia can occur, which in adults can cause a decrease in reproductive capacity [10]. A frame of this problem that bothers the world population can be evidenced by the World Health Organization (WHO) study,

which in 1999 estimated that there may be 1,380,000,000 people in the world parasitized by *Ascaris lumbricoides*, which 250,000,000 are sick; 1,250,000,000 people are parasitized by hookworms (151,000,000 sick); have 45,500,000 cases of trichinosis, 1,700,000 cases of onchocerciasis. From a medical and social point of view, these parasites constitute an important public health problem, both by constantly interfering with host lives and the welfare of part of the population, as well as causing considerable economic losses with medical assistance, productivity or incapacitation for work. Helminths and protozoa also attack the human body and may be responsible for gastroenteritis, such as that induced by *Entamoeba histolytica*, including death, as cited by the WHO in 1997, with 48,000,000 cases and about 70,000 deaths. Since 1980, with the AIDS epidemic, amebiasis, toxoplasmosis, bacteriosis and viral infections have taken on greater importance as pathogens and lethal agents among immunocompromised patients [7] [9]. Parasitic infections are considered as indicators of a country's socioeconomic development and, in Angola, the Human Development Index (HDI) ranks 150th in a list of 188 countries (UNDP-2015). Elevated levels of monoparasitism and polyparasitism associated with low nutrient levels may compromise the proper development of individuals and predispose to a non-selectivity of food consumption, increasing the nutrition problem. These factors trigger, in addition to the direct problems, other indirect ones that are manifested in the corporal underdevelopment, intellectual yield, with delay in the school performance [7]. According to the United Nations, the life expectancy in Angola at birth for men is 54.0 years and for women of 50.9 years, and to the present, without considering gender, 45.8 years (United Nations World Population Prospects: 2015 revision), the next to the last place in a rank of 183 nations. The low life expectancy may be partly attributed to the effect of early parasitic infections in the Angolan population. Considering the importance of the pathogenesis attributed to the etiological agents of enteroparasitoses, this study aimed to investigate the incidence of enteroparasites in the infant population of Saurimo, Province of Lunda-Sul, Angola.

2. Methods

The research has an individualized, observational and cross-sectional design, conducted in six districts of the city of Saurimo, province of Lunda-Sul, Angola, in the year of 2012. Individuals of the age group from less than one year old to fifteen years old participated in this research, characterizing a representative sample of that community.

The situation of health services in the province of Lunda-Sul is unsatisfactory, with lacking of staff and health services infrastructure. There are in the province eighteen doctors of various specialties, five of them are Angolans and thirteen foreigners, all of them working at the city of Saurimo. There is also a senior diagnostic technician and 351 nurses, 290 working at the city of Saurimo. It is estimated that 151,571 people live in this city, where there is difficulty access to

drinking water and the basic sanitation system is deficient, especially in rural areas.

The request of the coproscopies and the orientation about the collection of the fecal samples was carried out by the physicians who attend the community. Stool aliquots were obtained from 721 children aged from less than one year up to fifteen years old. The aliquots were stored in Merthiolate-Iodine-Formaldehyde solution (MIF) and sent to the Provincial Laboratory of Saurimo for processing by the coproscopic method of Hoffman *et al.* [11]. For the diagnosis and to calculate the frequency of protozoal cysts, eggs and helminth larvae, two sediment preparations were used between slide and coverslip for each sample. The results were analysed by descriptive and analytical statistics with calculations of health indicators according to Serra-Freire [12], with evaluation of the differences between genders and age groups using Mann-Whitney *U* test, binominal test, and Chi-square test.

The research project, ethical considerations and the study protocol were approved by the Provincial Health Authority of Lunda-Sul (Direção Provincial de Saúde de Lunda-Sul DPSLS). The protocol and the importance of the research were explained to the parents or guardians of the examined children and those who consented were asked to sign or thumbprint the written informed consent form.

3. Results

721 children of both genders residents in six rural neighborhoods of Saurimo were investigated. Quantitatively the districts were represented by: 76 sample units of Saipupu (10.54%); 111 of Sambaia (15.39%); 111 of Luenda (15.39%); 209 Muandonji (28.99%); 100 of Caxita (13.87%) and 114 of Chacaxima (15.81%). The study universe was compound by 346 boys and 375 girls, divided in four age groups for statistical analysis: less than two years old; from two to five years old; from six to 10 years old, and from 11 to 15 years old, ranges used for indicators of parasitism. The variable age was rounded in years approaching less than six months for low, and equal or more than six months up.

Of the 721 feces samples examined, 308 were positive for enteroparasites, corresponding to the prevalence coefficient (PC) of 42.7%. The differences in the numbers of sample units were minimized by the use of relative values of parasitism in each neighbourhood studied, and did not compromise the research design and statistical comparison among them (**Table 1**).

The distribution of the individuals by gender was: 375 (52.0%) female and 346 (48.0%) male. The possibility of the gender influencing the results of the incidence by age classes was confirmed ($p < 0.05$), but there was no influence of this character on the dominance coefficients of enteroparasitism (**Table 2**). However, the age of the inhabitants influenced the dominance coefficient of parasitic infections (**Table 2**).

The division of the individuals into four classes of age groups considered the

Table 1. Comparison of the incidence by intestinal parasitoses in 721 residents aged between less than one to fifteen years old, inhabitants of the Catoca Mining Company, in the period between January and June 2012, considering the districts of the city of Saurimo, Angola, by chi-square test, and considering the host gender by Mann-Whitney test.

Neighbourhoods of Saurimo	Host		Total
	Male	Female	
Caxita	50.0% (25/50)^{A}	42.0% (21/50)^{B}	46.0% (46/100)^{ab}
Chacaxima	63.0% (29/46)^{A}	41.2% (28/68)^{B}	50.0% (57/114)^{a}
Luenda	41.8% (28/67)^{A}	40.9% (18/44)^{A}	41.4% (46/111)^{b}
Muandonji	42.6% (43/101)^{A}	35.2% (38/108)^{B}	38.8% (81/209)^{c}
Saipupu	47.1% (16/34)^{A}	33.3% (14/42)^{B}	39.5% (30/76)^{bc}
Sambaia	50.9% (28/55)^{A}	35.7% (20/56)^{B}	43.2% (48/111)^{b}
Mann-Whitney test	$Z(U) = 2.8022 > p_{5\%} = 0.0025^{*}$		$\aleph^2$ (chi^2) = 2.435 (p = 0.7863)^{NS}

OBS.: Exponents with equal capital letters on the same line indicate a non-significant difference between the prevalence coefficients; with unequal letters indicate significant difference ($p < 0.05$). Equal lowercase letters in the same column indicate non-significant difference with 5% chance of error; unequal letters indicate significant difference ($p < 0.05$).

Table 2. Composition of sample units by gender and age group of inhabitants around Catoca Mining Society, in neighborhoods of Saurimo, Angola, residents of Caxita, Chacaxima, Luenda, Muandonji, Sambaia, and Saipupu, in the period between January and June of 2012, by the binomial test for study of the enteroparasitaria fauna.

Age class	Male		Female		Total	
	n°	DC(%)	n°	DC(%)	n°	DC(%)
<2 years	59	17.1^{A}	58	15.5^{A}	117	16.2^{a}
2 - 5	142	41.0^{A}	157	41.8^{A}	299	41.5^{b}
6 - 10	104	30.1^{A}	112	29.9^{A}	216	30.0^{c}
11 - 15	41	11.8^{A}	48	12.8^{A}	89	12.3^{a}
Total	346	100	375	100	721	100

Obs.: Exponents with capital letters on the same line indicate a non-significant difference at the 5% level between the dominance coefficients (CD). Exponents with equal lowercase letters in the same column indicate non-significant differences between incidents; with unequal letters indicate significant difference ($p < 0.05$).

relation of the parents with their children, so the amplitude of the first two classes, whose children required more care, are greater than the amplitudes of the last two classes. The comparison between the incidences of parasitism by age class showed that there was influence of these also on the prevalence coefficient of enteropasitism (Table 3).

The values of the relative frequencies of host intestinal parasitism by age class differ significantly between three classes for the significance level of 5%. It is possible to affirm that the host age interferes with the parasitism and that parasitism is smaller in children under two years old (CP = 9.40%), and higher in the

Table 3. Comparison of the incidence of intestinal parasitoses in 721 residents between the ages from less than one year to 15 years old, inhabitants around Catoca Mining Company, in neighbourhoods of Saurimo, Angola, in the period between January and June 2012, considering four age classes of hosts, by the binomial test.

Age class	Sample units	Samples	
		Positives	Negatives
<2 anos	117	11 (PC = 9.40%)[a]	106
2 - 5	299	144 (PC = 48.16%)[b]	155
6 - 10	216	111 (PC = 51.39%)[c]	105
11 - 15	89	42 (PC = 47.19%)[b]	47
Total	721	308 (PC = 42.72%)	413

OBS.: Exponents with lower case letters indicate a non-significant difference with 5% chance of error; unequal letters indicate significant difference between PC = prevalence coefficient.

class from six to ten years old with CP = 41.5% (Table 3).

The analysis of the intestinal parasitism of the sample units according to the neighbourhood of origin, and considering the gender of the hosts for each neighbourhood, shows that there was local influence of gender on the incidence of parasitism, and that the districts differed in relation to the frequency of cases (Table 1). The relative frequency values of the intestinal parasitism of male hosts were higher than in female, with significant difference between them at the significance level of 5%. It is possible to affirm that the gender of the host is interfering in the dynamics of the parasitism, facilitating the access to the male hosts, allowing a greater infective possibility for the parasites, or increasing the sensitivity for the infection.

The analysis shows that the population of Chacaxima have differences of parasites biodiversity identity compared to Luenda and Muandonji; the populations of all other neighbourhoods have their own identity. From the results it is possible to admit that the neighbourhood of Chacaxima is an environment of greater emigration of the parasites of the region, with greater capacity of dispersion, while in others what dominates is the local dissemination of the parasites.

Parasitism cases were also analysed for the number of parasite species in each sample unit. Cases of parasitism by one species were considered, and cases of concomitant parasitism by two or three species of parasites were verified by stool examinations, evidencing that monospecific infection is commonest (Figure 1).

When considering the rate of parasites that infected the children, there were species of helminths, nematoids and cestodes, and of sarcodines and flagellates protozoan, such as enteroparasites. The binomial test for the influence of host gender on the rate of the parasite agent showed a non-significant difference ($p > 0.05$), demonstrating that the dominance coefficients for helminth infections and for enterozoa infections are similar in both genders (Table 4). However, when parasitism was compared by helminths and protozoa the difference was significant ($p < 0.05$), with protozoal infections being almost half of those caused by helminths.

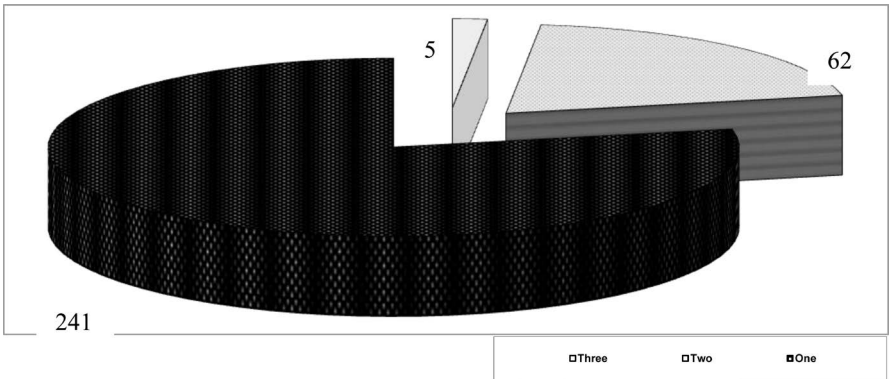

Figure 1. Cases of intestinal infections in 308 residents aged from less than one year to 15 years old, inhabitants around Catoca Mining Company, in neighbourhoods of Saurimo, Angola, in the period between January and June 2012, considering infection by one, two, or three species simultaneously, dominance coefficients of DC = 78.3%; DC = 20.1% and DC = 1.6%, respectively.

Table 4. Cases of intestinal infections by helminths and protozoa in 308 inhabitants with enteroparasites, aged between less than one to 15 years old, inhabitants around Catoca Mining Company, in neighbourhoods of Saurimo, Angola, during the period between January and June 2012, considering the dominance coefficients (DC), and prevalence coefficient (PC).

Rate of enteroparasitism	Host (DC%)		Sum of cases	
	Male	Female	N°	PC (%)
Helminth	106 (65.0%)^{A}	97 (66.9%)^{A}	203	28.2^{a}
Protozoa	57 (35.0%)^{A}	48 (33.1%)^{A}	105	14.6^{b}
Total	163 (PC = 52.9%)	145 (PC = 47.1%)	308	42,7

Obs.: Exponents with equal capital letters on the same line indicate a non-significant difference at the 5% level between the dominance coefficients (DC). Exponents with lower case letters in the same column indicate a non-significant difference between the prevalence coefficients (PC); with unequal letters indicate significant difference ($p < 0.05$).

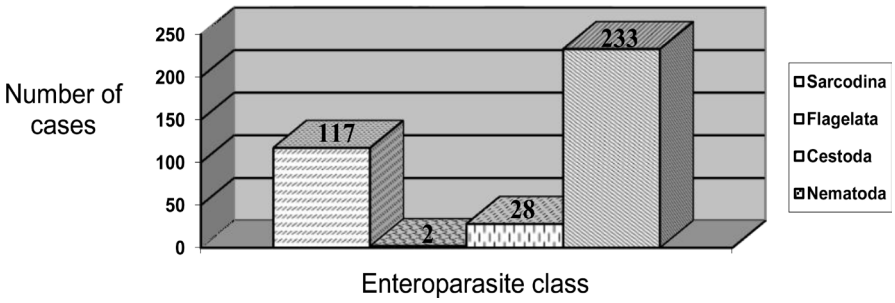

Figure 2. Cases of intestinal infections in 308 residents aged from less than one year to 15 years old, inhabitants around Catoca Mining Company, in neighborhoods of Saurimo, Angola in the period between January and June 2012, considering infection by helminths and protozoa.

Considering the diversity of enteroparasites found in the 308 cases of infected individuals, there were nematodes and cestodes, among the helminths, and sarcodinos and flagellates, among protozoa (**Figure 2**).

The analysis of parasite diversity by contingency, when considering both the host age class and the parasite species using the chi-square test, allows to infer that the dominance of *A. lumbricoides* infection is significantly higher among subjects with less than two years old ($p < 0.05$), and that these coefficients are equivalent among the other species (Table 5). For the other age classes, *A. lumbricoides* is also the most common species among enteroparasites. There was also an identity as a second dominant species in the four age classes of children, which was *E. coli*, but in the younger age class this dominance was equal to that of *E. histolytica/dispar*, which did not occur in the other classes (Table 5).

4. Discussion

Considering that the sample units were compound by asymptomatic children, the prevalence of 42.72% (Table 3), the incidence from 38.8% to 50% (Table 1) shows that these intestinal parasitoses have high endemicity in the region studied in Saurimo. Similar parasitic diversity was found in other African countries, with prevalence levels also expressive, as reported in Ethiopia by Fontie *et al.* [13] with PC = 71.3%, although research conducted in that same country by

Table 5. Cases of intestinal infections in 308 inhabitants aged between zero and fifteen years old, inhabitants around Catoca Mining Company, in neighbourhoods of Saurimo, Angola, in the period between January and June 2012, considering the diversity of species in trophic interaction with humans.

Infectious agent: Class, species	Age class (years)									
	<2		2 to 5		6 to 10		11 to 15		Total	
Nematode	n°	%	n°	%	n°	%	n°	%	n°	DC %
Ascaris lumbricoides	9	81.8	77	42.8	55	39.6	17	34.0	158	41.6[a]
Ancylostomidae	0	0	29	16.1	23	16.5	8	16.0	60	15.8[c]
Strongyloides stercoralis	0	0	4	2.2	5	3.6	1	2.0	10	2.6[e]
Enterobius vermicularis	0	0	1	0.6	4	2.9	0	0	5	1.3[e]
Cestoda										
Hymenolepis nana	0	0	14	7.8	10	7.2	4	8.0	28	7.4[d]
Flagelata										
Giardia lamblia	0	0	1	0.6	1	0.7	0	0	2	0.5[e]
Sarcodina										
Entamoeba coli	1	9.1	46	25.6	37	26.6	17	34.0	101	26.6[b]
Entamoeba histolytica/dispar	1	9.1	8	4.4	4	2.9	3	6.0	16	4.2[e]
Total of cases by age class	11	100	180	100	139	100	50	100	380	100
Total of age class/total of species	11	2.9	180	47.4	139	36.6	50	13.2	380	100

Obs.: Exponents with equal lowercase letters in the same column indicate a non-significant difference at the 5% level between the dominance coefficients (DC); exponents with different letters in the same column indicate a significant difference between DC ($p < 0.05$).

Huruy *et al.* [14] found a prevalence ranging from 1.3% to 7.3% for different parasite species.

In Zambia, Siwila *et al.* [15] reported that the diversity of human enteroparasites was of six species with prevalence coefficient of 29%; Carvalho [16] reported PC = 52% and Days [17] found a PC = 73% of enteroparasites to the population of Cape Verde; Tyodugh *et al.* [18] calculated a PC = 51.4% for a population of Nigeria; Roka *et al.* [19] estimated a PC = 76.9% for the population of Guinea-Equatorial; Delgado *et al.* [20] found PC = 60.7% for people in Guinea-Bissau, Liao *et al.* [21] found PC = 64.7% in São Tomé and Príncipe, and Ali *et al.* [22] found PC = 86.2% among school going children in Asendabo, Ethiopia. In Angola, Cardoso [23] reported a CP = 50.4% of intestinal parasitism, which was practically confirmed in the research carried out with children in the city of Saurimo in Angola.

In Nepal, Jaiswal *et al.* [24] reported a PC = 36 among school going children of Damauli, Tanhun, where *Ascaris lumbricoides* was the commonest parasite isolated. The age class between 7 and 10 years old had a higher index of parasitism compared to the group of 11 to 13 years. In our research, the age classes from less than two years and from 11 to 15 years holds the higher rates of infection, probably because of different ambient conditions or cultural habits of these two countries.

The parasitic diversity found among the studied population of Saurimo was compound by eight species, five of helminths and three of protozoa, which differs from the results of Teklehoymanot [25], which found four protozoan species and five human helminth parasites in Ethiopia. In the same country, Dagnew *et al.* [26] cited that the parasite diversity had two protozoan species and four helminth species. The overall results show that in Africa human parasitism by helminths is more diverse than that caused by protozoa.

Of the species identified in Saurimo, the greatest dominance was *A. lumbricoides*, followed by *E. coli* (**Table 5**). Also in Angola, Cardoso [23] emphasized *A. lumbricoides* as the dominant species; this result was also observed in other countries like Nigeria [19], Zambia [15], Guinea-Bissau [20] and Nepal [24].

The main conditioning aspects which influences the enteroparasitoses incidence in the areas studied in Saurimo are the poor conditions of hygiene and lack of basic sanitation, as well as the low socioeconomic and educational levels of the population. These conditions have similarity with a research done in Brazil by Ferreira and Andrade [27], in which more than half of the pre-school children were parasitized. In Saurimo, the gender of the studied population had not influenced the dominance of the parasites, but the age class had influenced the indicator of the infections since the children under two years old and the teenagers with more than eleven were statistically similar in parasitism levels, with less parasitism than the age classes from two to five years old and six to ten years old (**Table 2**). However, when the prevalence coefficient is considered, the results are different, since these prevalences are statistically similar between the

classes of less than two years and from six to ten years, and classes from two to five years old with those of eleven to fifteen years old (**Table 3**). These data are not easily comparable to other researches because the various authors worked with different ranges of age classes.

Infection by one species was commonest than cases of simultaneous parasitism (**Figure 1**), and is more frequent in children with less than two years old, appearing to be a constant situation in Africa. According to Alves [28], among the major diseases with transmissible agents of higher expression in children in the age group from one to four years old, parasites represent 24.7% and according to Uchôa [29], children from zero to five years old are susceptible to infection by parasitoses due to precarious hygiene habits and the immaturity of the immune system.

The precarious conditions of basic sanitation expose the children to infection by different pathogens with fecal-oral dynamics, becoming frequent the cases of polyparasitism. Castro *et al.* [30] and Buschini *et al.* [31] found in school communities in different regions of Brazil respectively 10.8% and 26.7% of parasite association of intestinal parasites, a high level as found also found in children of the community of Saurimo, Angola.

Published articles show that the most prevalent intestinal parasitoses in the world are ascaridiasis, trichuriasis, amebiasis and giardiasis. According to World Health Organization (1999), cited by Coura [7], there are 1,380,000,000 people with intestinal parasites worldwide, 250,000,000 of them developing the disease.

In Saurimo, Angola, helminths were more prevalent with PC = 31.8%, with emphasis on *A. lumbricoides* (PC = 41.6%) and nematode of the Ancilostomidae family (PC = 15.8%) (**Table 1**). *Enterobius vermicularis* was the species with fewer occurrences, which can be explained by the used technique, which is not indicated for the diagnosis of enterobiosis, although it can detect its presence in certain conditions [1].

The occurrence of protozoa was 16.4%, and in the male gender had higher frequency of cases (**Table 5**). *E. coli* was found in cystic forms (26.6%). As it is not pathogenic, its occurrence indicates pollution of the environment by human faeces and a greater possibility of children becoming infected, as well as it occurs in other countries. *E. histolytica/dispar* was identified as trophozoite (2.4%) and cystic form (1.8%), and was the more frequent pathogenic protozoa species (**Table 5**). The low prevalence of *G. lamblia* differs from results found in other countries such as Guinea-Bissau, where children from four to twelve years old had a 34.7% prevalence for *G. lamblia* [32]. In the Ivory Coast, there was 13.9% prevalence of this protozoon in children from six to twelve years old [33], and in Ethiopia it was 35.3% for children under 14 years old [34].

The research group led by Nguenfeu [35] studied intestinal parasitic infections in HIV-infected and non-HIV-infected patients in a region of low prevalence of this virus in the western region of Cameroon. They observed that the magnitudes of intestinal infections in developing regions of the world are associated

with poor diet, poor hygienic conditions and severe tropical diseases. The study was aimed to calculate the prevalence of intestinal parasites in patients infected with HIV and AIDS patients in the city of Dschang, Cameroon. Blood and stool samples from HIV-AIDS patients and of control patients were collected for the investigation of parasites and anti-HIV antibodies. Faecal samples were subjected to routine laboratory techniques and Ziehl-Neelsen staining for the identification of sporozoites. Among the 396 participants, 42 (10.6%) were HIV-AIDS positive patients and 30 of them were untreated, and the prevalence of intestinal parasites was 14.64%. Of the HIV-negative group, only 9.33% (33/354) of the patients were infected with: *Cryptosporidium parvum* (2.53%), *E. histolytica/dispar* (7.32%), *E. coli*, *G. lamblia* (0.25%), *Trichuris trichiura* (0.25%), *Strongyloides stercoralis* (0.25%). In the group infected with HIV: *C. parvum* (19.04%), *E. histolytica/dispar* (19.4%), *E. coli* (21.42%), *G. lamblia* (2.38%), *S. stercoralis* (0.25%) and *Taenia* spp. (0.25%) were found. Analyzing the results, comparing the percentages between the HIV-AIDS groups and the HIV-negative group, the rate was very high in the first group compared to the second. This type of research, associating HIV infection with enteroparasitoses has not yet been performed in the population of Saurimo, but considering the results found in children, it would be very important to develop a research with this approach in both adults and children infected with HIV.

5. Conclusion

From the analysis of the results, in Saurimo, Angola, the gender of the hosts from less than one year to fifteen years old did not influence the dominance of the parasites but had an influence on the prevalence. Monoparasitism is more frequent than polyparasitism among children. The diagnostic technique used has enough sensitivity for the diagnosis and allows medical intervention for the patient's treatment. Poor hygiene and lack of basic sanitation conditions are strong conditioning factors for intestinal parasitism. *Ascaris lumbricoides* was the dominant species, followed by *Entamoeba coli*. The results were the basis for an adequate orientation and medication intervention, revealing the need for reorientation of governmental and socio-educational measures to improve the living conditions of the community of Saurimo, Angola.

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