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Original Article

Age and Sex Distribution of Intestinal Parasitic Infection Among HIV Infected Subjects in Abeokuta, Nigeria

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Abstract
Intestinal parasitic infection has been a major source of disease in tropical countries especially among HIV patients. The distribution of intestinal parasite among two hundred and fifteen (215) subjects with mean age of 32 years, comprising of 35 HIV-seropositive and 180 HIV seronegative patients was carried out using microscopic method to examine their stool specimens for presence of trophozoites, ova, cysts, larvae and oocysts of intestinal parasites. Overall parasitic infection rate was 28.4%. Infection rate among HIV seropositve subjects (42.9%) was statistically higher than that among HIV seronegative subjects (25.6%) ($P<0.05$). Although helminths infection rate (31.4%) was higher than that of protozoa (20%) among HIV-seropositive subject, the difference was not statistically significant ($P>0.05$). There was no statistically significant difference in the parasitic infection between HIV-seropositive males and females and among the various age groups ($P>0.05$). Adequate treatment, proper health education and good hygiene will help in reducing intestinal parasitic infection.

Key Words: Intestinal Parasites, HIV, Nigeria

Introduction

Intestinal parasitic infections remain an important cause of morbidity and mortality in developing countries especially among paediatrics.[1, 2, 3] They are frequently transmitted by unhygienic habit such as direct transfer of ova or cysts from anal region to mouth, eating with unwashed hands or eating and drinking of contaminated food and drink.[1]

Human immunodeficiency virus (HIV) infection is a world wide problem in the present day with about 42 million people infected globally while sub-Saharan Africa accounted for more than half (29.4 million) of this number.[4] In Nigeria, infection rate range between 4.97%[5] and 5.8%.[4] One of the major health problems among HIV seropositive patients is superimposed infection due to the defect of immunity. Furthermore, intestinal parasitic infection, which is also one of the health problems in sub-Saharan Africa[6], is common in these patients. Gastrointestinal involvement in HIV/AIDS is almost universal, and significant disease occurs in 50-90% of patients while diarrhea can be a presenting manifestation or a life threatening complication in HIV patients sometimes during the course of the disease.[7] The etiology for such diarrhea could either be parasitic, bacterial, fungal,enteric virus or HIV itself.[8]

Several species of protozoa have been associated with acute and chronic diarrhea in HIV diseases. These include: *Cryptosporidium parvum*, *Isospora belli*, Microsporidia species, *Giardia intestinalis*, *Entamoeba histolytica*, *Cyclospora* species, *Blastocystis hominis* and *Dientamoeba fragilis*.[7] Nematode like *Strongyloides stercoralis* can also cause diarrhea and overwhelming infestation in patients with variety of immunosuppressive disorders

including HIV/AIDS.[9, 10] Other nematodes such as hookworms, *Opisthorchis veverrini* and *Ascaris lumbricoides* can also be seen in stool of HIV patients.[11] Severe helminthic infection, expressing either as more eggs/g in faeces or infestation simultaneously by several helminthes, correlated positively with the load of HIV particles in plasma[12] .This is because both progression of HIV infection to AIDS and helminth infections are associated with increased T helper cell 2 (Th2) cytokine production.[13] Helminths infection like ascariasis has also been shown to polarise the immune response in young adults to Th2, which should increase the risk of sexual transmission of HIV. Ascariasis also suppresses interleukin-2, a Th1 cytokine that can be used as a threatment for HIV/AIDS because it improves count of CD4 T cells and restores immune function substantially.[12]

Since the types of intestinal parasite infesting humans vary from different locality, this work is intended to determine the prevalence of intestinal parasites in HIV patients in Abeokuta, Nigeria.

Methods

Area of study

Abeokuta is the capital of Ogun state, Nigeria. It lies on latitude 7°15N and 3°25E. It is about 106 km north of Lagos and 81km southwest of Ibadan. It is located at an altitude of about 159m above sea level with a hot humid weather and an annual rainfall of 963.3mm.[14] It occupies an area of 57.35sq km with an estimated population of 3,740,843 according to the 1991 population census interim report.[15]

Sample Selection and Collection

Adult patients visiting one of the missionary hospitals were used for the research. Random sampling was carried out by selecting every third patients visiting the clinic. Two hundred and fifteen (215) patients (101 males and 114 females) with mean age of 32 years were finally selected.

The selected patients were given universal bottle each and were instructed too bring stool sample with it, and 2ml of venous blood was also collected from each patient on arrival to the laboratory with the stool sample.

Sample Analysis

The blood samples were screened for the presence of HIV antibody using latex aggregation method (Capillus HIV-1/HIV-2) as described by Cambridge Diagnostic Ireland Ltd. The stool samples were examined for presence of trophozoites, cysts, oocysts, larvae and ova of intestinal parasites using normal saline and iodine smear.[16] Formol ether concentration technique was used to detect cysts, oocysts, and ova while the modified Ziehl-Neelsen (ZN) staining technique was use to identify oocysts of coccidia.[17]

Results

Of the 215 subjects examined (35 HIV seropositive and 180 HIV seronegative), 61(28.4%) were infected with various types of intestinal parasites (Table 1).

Table 1: Intestinal parasitic infection by sex of subjects

	Males		Females		Total	
	No. examined	No. infected(%)	No. examined	No. infected(%)	No. examined	No. infected(%)
HIV seropotive	15	9(60)	20	6(30)	35	15(42.9)
HIV seronegative	86	18(20.9)	94	28(29.8)	180	46(25.6)
Total	101	27(26.7)	144	34(29.8)	215	61(28.4)

Infection among HIV seropositive subjects (42.9%) was statistically higher than that in HIV seronegative subjects (25.6%) ($P<0.05$). There was no statistically significant differences in the infection rate between HIV seropositive males and females and also between HIV seronegative males and females ($P>0.05$) (Table 1).

Helminthic infection was found to be statistically higher (17.2%) than protozoan infection (8.9%) among HIV seronegative subjects ($P<0.05$) whereas there were no significant differences between helminthic (31.4%) and protozoan (20%) infection among HIV seropositive subjects ($P>0.05$) (Table 2).

Table 2: Prevalence of helminths and protozoa in HIV positive and HIV negative subjects

	HIV Seropositive (n= 35)	HIV seronegative (n = 180)	Total (n=215)
Helminths	11(31.4)	31(17.2%)	42(19.5%)
Protozoa	7(20%)	16(8.9%)	23(10.7%)
Total	18(51.4%)	47(26.1%)	65(30.2)

Infection with *Giardia intestinalis* (2.9%) and *Cryptosporidium parvum* (5.7%) were statistically higher in HIV seropositive subjects (P< 0.05) (Table 3).

Table 3: Distribution of intestinal parasites in HIV positive and HIV negative subjects

Parasites	HIV positive (n= 35)	HIV negative (n= 180)	Total (n= 215)
Ascaris lumbricoides	7 (20%)	22 (12.2%)	29 (13.5%)
Ancylostoma duodenale	2 (5.7%)	6 (3.3%)	8 (3.7%)
Trichuris trichiura	1 (2.9%)	2 (1.1%)	3 (1.4%)
Strongyloides stercoralis	1 (2.9%)	1 (0.6%)	2 (0.9%)
Entamoeba histolytica	2 (5.7%)	9 (5%)	11 (5.1%)
Entamoeba coli	2 (5.7%)	7 (3.9%)	9 (4.2%)
Giardia intestinalis	1 (2.9%)	- (0%)	1 (0.5%)
Cryptosporidium parvum	2 (5.7%)	- (0%)	2 (0.9%)
Total	18 (51.4%)	47 (26.1%)	65 (30.2%)

There was no significant difference in the parasitic infection rate among the various age groups (P> 0.05) (Table 4).

Table 4: Intestinal parasitic infection rate by age and sex of subjects

	Males		Females		Total	
Age range	No. examined	Positive for parasites	No. examined	Positive for parasites	No. examined	Positive for parasites
≤ 20	6	1 (16.7%)	7	2 (28.6%)	13	3 (23.1%)
21 – 30	40	12 (30%)	42	15 (37.7%)	82	27 (32.9%)
31 – 40	38	11 (28.9%)	42	10 (23.8%)	80	21 (26.3%)
41 – 50	16	3 (18.8%)	19	6 (31.6%)	35	9 (25.7%)
> 50	1	- (0%)	4	1 (25%)	5	1 (20%)
Total	101	27 (26.7%)	114	34 (29.8%)	215	61 (28.4%)

Discussion and Conclusions

Different factors contribute to the prevalence of intestinal parasites among a given population, the most important being environmental, parasitic and host factors.[16]

The overall prevalence of 28.4% recorded in this study is relatively low when compare to that from other parts of Nigeria. Awogun[3] observed a prevalence rate of 70.8% in Ilorin, northern Nigeria; while Oyerinde *et al.*[18] recorded prevalence rate of 89.5% in Lagos State, Nigeria. Awole *et al* [7] also reported a prevalence rate 44.8% among HIV infected patients in Ethiopia. The low rate recorded in this study may be due to public awareness and improvement of environmental sanitation. Another reason could be that since these patients are coming to clinic as a result of their illness, some of them would have been on chemotherapy. The infection rate is however in agreement with the low rate (33.6%) recorded by Agi[19] in Sagbana community of the Niger-Delta, Nigeria.

Result of our study also reveal a trend in the occurrence of specific parasites in HIV positive persons in Abeokuta, Nigeria. *Ascaris lumbricoides* (20%), *Ancylostoma duouenale* (5.7%) *Entamoeba histolytica* (5.7%) *Entamoeba coli* (5.7%) *Cryptosporidium parvum* (5.7%) were detected more frequently.These findings do not agree with those of Lindo et al [20] who reported *Trichuris trichiura* (21.1%), Hookworm (17.3), and *Strongyloides stercoralis* (7.7) from stool samples of HIV infected individuals in San Pedro Sula, Hunduras in Central America. The reason for these differences could be as a result of environmental and behavioral pattern of the people in these regions. In Abeokuta for instance, the environment, which is a tropical region favour the survival of ova of most intestinal helminths and cysts of protozoa. The people also have a habit of eating with bare hand which might have been contaminated with ova and/or cysts from the environment. However, majority of people in Honduras are low income earners [20], and it is possible that they walk bare-footed most time

which might predispose them to infection by filariform larvae.

Although, *Strongyloides stercoralis* can cause overwhelming infestation in HIV/AIDS [9,10], its detection among HIV patients in this study (2.9%) is in agreement with study from Addis Ababa (3.4%).[21]

The higher prevalence recorded among HIV seropositive patients could be as a result of low immune status of these patients. Immunocompromised individuals have been found to have a high infection rate of intestinal parasite.[16]

Although helminthic infection rate in this study was generally higher than that of protozoa, it is worthy to note that the differences though significant among HIV seronegative patients ($P < 0.05$), remain non significant among HIV seropositive patients ($P > 0.05$). The higher rate of helminths could be due to tropical climate, which favour survival of helminthes ova at the expense of protozoan cysts. While the non significant differences between helminths and protozoa among HIV seropositive could be as a result of the ability of protozoa to multiply faster in such individual due to low immunity. Protozoa are able to multiply easily within immunocompromised patients.[16]

Although *Cryptosporidium parvum* is among the opportunistic parasites commonly found in HIV patients, its detection in this study confirms this. However, the low prevalence of *Crytosporidium parvum* (5.7%) in this study as compared with report from other places like Cuba (11.9%)[22] and Ethiopia (11%)[7] could be due to methodological differences. It is also possible that patients examined in this study have a low contact with carriers of *C. parvum* such as cattle which is less common in this region of the country (Abeokuta, Southern Nigeria).

The effect of intestinal parasites such as *Cryptosporidium parvum, Cyclospora cayetanensis Isospora belli* and Microsporidia in HIV infected persons lead to increase in morbidity and mortality of such individuals.[20] The control of intestinal parasite therefore involve adequate treatment and proper health education, provision of adequate toilet facilities and pipe borne water so that the continually contaminating the environment with ova, cyst and larvae of parasite would be greatly reduced. Some of these control measures are appropriate education and deworming programmes, incorporation of poverty alleviation techniques and effective sanitation and supply of clean water.

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