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Profile of Intestinal Parasitic Infections Associated with Diarrhoea in HIV/AIDS Patients in a Tertiary Hospital in Zaria, Nigeria

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ABSTRACT [ENGLISH/ANGLAIS]

Intestinal parasitic infections are among the most chronic human infections globally. Some of the etiological agents are associated with diarrhea which is self-limiting in immuno-competent individuals but may be life-threatening and even fatal in immuno-compromised patients. Diarrheic stool specimens from HIV/AIDS patients and control groups were screened for intestinal parasitic infections using the direct wet mount and formol-ether sedimentation method. A total of 71 patients were enrolled in this study (51 HIV/AIDS positive cases and 20 HIV/AIDS negative controls). Out of the 51 cases and 20 control, 36 (70.6%) and 4 (20%) were respectively infected with one or more types of intestinal protozoa and/or helminthes. The overall prevalence rate was 70.6%. The parasites detected among HIV/AIDS patients were *Ascaris lumbricoides* (3.9%), *Ancylostoma duodenale* (1.96%), *Entamoeba histolytica* (7.8%), *Giardia lamblia* (3.9%), *Cryptosporidium parvum* (23.5%), *Isospora belli* (9.8%) and *Cyclospora cayetanensis* (23.5%). The diagnosis and treatment of emerging helminthic and coccidian parasites should be part of the routine screening for all HIV positive subjects.

Keywords: HIV/AIDS patients, emerging opportunistic pathogens, *Cryptosporidium parvum*, *Isospora belli*, *Cyclospora cayetanensis*

RÉSUMÉ [FRANÇAIS/FRENCH]

Les parasitoses intestinales sont parmi les infections les plus chroniques de l'homme dans le monde. Certains des agents étiologiques sont associés à une diarrhée qui est auto-limitation dans l'immuno-compétentes les individus, mais peut-être la vie en danger et même mortelle dans les patients immunodéprimés. Échantillons de selles diarrhéiques de patients VIH / SIDA et des groupes témoins ont été examinés pour les parasitoses intestinales en utilisant le montage direct par voie humide et la méthode de sédimentation formol-éther. Un total de 71 patients ont été inclus dans cette étude (51 contre le VIH / sida et 20 cas positifs au VIH / SIDA contrôles négatifs). Sur les 51 cas et 20 de contrôle, 36 (70,6%) et 4 (20%) ont été respectivement infectés par un ou plusieurs types de protozoaires intestinaux et / ou helminthes. Le taux global de prévalence était de 70,6%. Les parasites détectés parmi les patients VIH / SIDA étaient *Ascaris lumbricoides* (3,9%), *Ancylostoma duodenale* (1,96%), *Entamoeba histolytica* (7,8%), *Giardia lamblia* (3,9%), *Cryptosporidium parvum* (23,5%), *Isospora belli* (9,8%) et *Cyclospora cayetanensis* (23,5%). Le diagnostic et le traitement des parasites helminthes émergents et coccidies devrait faire partie de l'examen de routine pour tous les sujets VIH positifs.

Mots-clés: Patients VIH / SIDA, les nouveaux agents pathogènes opportunistes, *Cryptosporidium parvum*, *Isospora belli*, *Cyclospora cayetanensis*

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INTRODUCTION

Infections of the gastrointestinal tract are common in HIV/AIDS patients. Intestinal parasitic infections are among the leading causes of morbidity and mortality in patients infected with human immunodeficiency virus (HIV) and those with the clinical disease-AIDS [1]. These

parasitic infections are caused by coccidian parasites particularly *Cryptosporidium parvum*, *Isospora belli* and of *Giardia lamblia*, *Entamoeba histolytica*/*Entamoeba dispar* and microsporidia [2].

Diarrhoea occurs in HIV/AIDS patients in Africa. It is associated with pathogenic protozoa which constitute the

highest group of parasites known to be associated with diarrheal condition [3]). Chronic diarrhoea in such patients may affect the absorptive function of the small intestine and cause significant mortality [4]. The HIV is known to destroy the immune system resulting in opportunistic infections such as parasitic infections among others.

There are very few reports on intestinal parasitic infections particularly the emerging opportunistic pathogens such as *Cryptosporidium parvum*, *Isoospora belli*, *C. cayetanensis* among HIV/AIDS patients in Northern Nigeria [5, 6]. This study was thus carried out to determine the parasitic profile of stool specimens among HIV/AIDS patients in a tertiary referral hospital, Zaria, Nigeria.

MATERIALS AND METHODS

Patients and Stool Specimen Collection

Seventy one (51 cases and 20 controls) patients attending the STD/HIV clinic of the Ahmadu Bello University Teaching Hospital (ABUTH), Shika, Nigeria were enrolled in the study. Biodata of the patients were obtained from the sample request forms (Age, sex and reason for visit). This was a cross-sectional study that commenced in August, 2007 and ended in September, 2007. Faecal specimens were obtained from these patients through the Department of Medical Microbiology, ABUTH, Shika, Nigeria. The consent of the patients was obtained through the ethical committee.

Examination of fecal Specimens for Parasitic Infections

The modified Ziehl-Neelsen staining technique [7, 8] was used after concentrating the faecal specimen. Identification of the emerging pathogens (*Cryptosporidium parvum*, *Cyclospora cayetanensis* and *Isoospora belli*) was done by using a colour Atlas of Parasitology [9] to check the size and shape of the oocysts after using Kinyoun's method.

RESULTS

Out of the 51 diarrhoeic stool specimens analysed, 36 (70.6%) HIV patients comprising of 33 (78.6%) females and 3(33.3%) males were infected (Table 1), while in the control group (HIV-negative subjects), one male infected. Females were more infected than males. The parasitic profile shows that parasitic protozoa were higher (n=33) among the HIV patients than the helminthic infections (Table 2).

The incidence rates among the helminthes were as follows: *Ascaris lumbricoides* (3.9%), *Ancylostoma duodenale* (1.96%) and the parasitic protozoa included *Entamoeba histolytica* (7.8%), *Giardia lamblia* (3.9%), *Cryptosporidium parvum* (23.5%), *Isoospora belli* (9.8%) and *Cyclospora cayetanensis* (23.5%) (Table 3).

The distribution of the intestinal parasites according to age among the patients is shown in Table 4. Human subjects in the 31 – 40 years age group had the highest infection rate of 22% (38/71).

Multiple infections were found among the cases studied (Table 5). *Cryptosporidium spp* and *Giardia lamblia* were found in 1(1.96%) out of the 51 cases studied. Additionally, two cases of *Cryptosporidium spp* were co-infected with *Cyclospora cayetanensis* (3.92%) and both subjects were HIV positive patients with chronic diarrhoea. Two cases (3.92%) had *Cryptosporidium parvum* and *Ancylostoma duodenale* while three (5.88%) had a combination of *Entamoeba histolytica* and *Cryptosporidium parvum* infections.

DISCUSSION

The overall prevalence rate of intestinal parasitic infection was 70.6%. This is higher than the earlier reported prevalence. They are 44.8% [10] among HIV infected patients in Ethiopia and 23.5% [11] However, the prevalence in this study was lower than the prevalence rate of 89.5% [12]. The differences in the prevalence could be due to study design.

Intestinal parasitic infections are among the leading causes of morbidity. Human Immunodeficiency Virus (HIV) Infection has been associated with chronic diarrhoea in a number of infected adult human subjects [13]. The aetiology for this diarrhoea could be due to parasites, bacteria, enteric virus or HIV. Result of this study also revealed a pattern in the occurrence of intestinal parasites. Higher occurrences of coccidian parasites (especially *Cryptosporidium parvum*) in HIV positive persons were observed than helminthic parasites. Reports on this fact have been documented in literature [6, 14].

Parasitic diseases such as cryptosporidiosis, isosporiosis, microsporidiosis and strongyloidiosis either singly or in different combinations have been documented in HIV/AIDS patients [15, 16, 17]. Multiple parasitic infections were more common in HIV/AIDS patients than in HIV sero negative controls in this study. This is agreement with other earlier reports [16]. It also indicates the establishment of parasitic infections in

immunocompromised patients as most of these parasites cause self-limiting diarrhoea in immunocompetent subjects.

Coccidian parasites are protozoans are opportunistic parasites causing emerging infections in the immunocompromised especially HIV/AIDS subjects [13, 18]. The parasites are transmitted to humans through contaminated water, food, and contact with infected animals and persons.

Cryptosporidium parvum is an opportunistic pathogen which parasitizes the intestinal mucosa leading to transient diarrhoea in healthy individuals [19]. However, in immunocompromised human subjects, asymptomatic parasite induced infection may be converted to life threatening disease. In the present study, the HIV and AIDS patients infected with *C. parvum* had severe weight loss and chronic diarrhoea.

No commonly advised effective therapy for cryptosporidiosis. Recovery depends on boosting the immune system. Co-infections of *C. parvum* and geohelminths particularly *A. lumbricoides* and *A. duodenale* were observed in this study. Infection with helminthic parasites may be associated with chronic immune activation in HIV infection. This may be responsible for the increased susceptibility of HIV patients in developing countries where the burden of helminthic infections is high [20].

Infection of HIV-positive subjects with *C. parvum* was higher than for HIV-negative subjects. This has been documented many times [2,13, 14, 22]. Co-infections comprising of *C. parvum* and *C. cayetanensis* occurred more frequently in HIV patients. This observation was not seen in the control group. This similar finding has been reported [6, 13,22]. Also co-infections of *C. parvum* and geohelminths particularly *A. lumbricoides* and *A. duodenale* were observed.

Co-infections of coccidian parasites with other intestinal protozoa (*E.histolytica* and *Giardia lamblia*) were observed in this study. This agrees with similar findings [10, 14].

It is important to treat these opportunistic infections in HIV seropositive patients. There were higher incidences of intestinal parasitic infection in HIV positive patients than the HIV negative controls. This has been documented by other workers [13, 16].

Detection of emerging parasites in HIV/AIDS related diarrhoea was significantly higher than the conventional pathogens. This has been reported [13,23]. They were within the age group 31-40 years. This finding is in agreement with some authors [5]. This report also

supports the fact that females tend to respond to the call to know their HIV status than males. Coccidian infections predominated than helminthic infections. Similar report [19] agrees with our findings. The risk factor with coccidian infections was 0.03 times than that of helminth infections.

Table 1: This table shows sex distribution of HIV/AIDS patients (n= 51) and controls (n=20) at ABUTH, Shika, Nigeria

	Male (%)	Female (%)
HIV/AIDS Patients (n= 51)	33.3	78.6
Control(n=20)	10.0	30.0

% = % positive

Table 2: This table shows prevalence rates (%) of helminthes and coccidia in HIV/AIDS patients

Parasite	Study population	control	Total
Helminths	3	3	6
Coccidia	33	1	34
Total	36	4	40

Table 3: This table shows incidence rates of intestinal parasites on HIV/AIDS patients and controls in ABUTH, Shika, Nigeria

Parasite	HIV/AIDS patients (n=51)	Controls (n=20)	Total (n=71)
<i>Ancylostoma duodenale</i>	1(1.96)	2(10)	3(4.25)
<i>Ascaris lumbricoides</i>	2(3.9)	-	-
<i>Schistoma mansoni</i>	0(0)	1(5)	1(5)
<i>Entamoeba histolytica</i>	4(7.8)	-	4(5.6)
<i>Giardia lamblia</i>	2(3.9)	-	2(2.8)
<i>Cryptosporidium parvum</i>	12(23.5)	1(5)	13(18.3)
<i>Isospora belli</i>	5(9.8)	-	5(7.04)
<i>Cyclospora cayetanensis</i>	12(23.5)	-	12(16.9)
Total	30(70.6)	4(20)	42(59.2)

The effect of coccidian parasites such as *Cryptosporidium parvum*, *Isospora belli* *Cyclospora cayetanensis*, in immunocompromised subjects such as HIV infected persons lead to increase in morbidity and mortality of such individuals. Proper health education, provision of

adequate toilet facilities and pipe borne water and adequate treatment can be used as part of the preventive and control measures to reduce or eliminate these parasites from the environment.

Table 4: This table shows incidence rates of intestinal parasites by age and sex in HIV/AIDS patients and controls in ABUTH, Shika (August – September, 2007)

Age(Years)	HIV/AIDS patients	
	Male(NP)	Female (NP)
<10	0(0)	2(5.5)
10 – 20	0(0)	0(0)
21 – 30	1(1.96)	8(22.2)
31 – 40	2(3.92)	20(5.5)
41 – 50	1(1.96)	4(11.1)
>50	0(0)	2(5.5)
Total	4(21.1)	36(69.2)
	TNE=19	TNE=52

NP= Number and % Positive; TNE= Total Number Examined

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CONFLICT OF INTEREST

No conflict of interests was declared by authors.

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