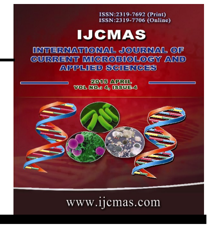

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Original Research Article

Intestinal Parasitosis among HIV Positive Patients Accessing Healthcare in a Medical Centre in Norhtern Nigeria

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A B S T R A C T

Intestinal parasitic infections (IPIs) in HIV positive individuals has been widely reported to play an important role in HIV progression. However, there is dearth of published reports on the study of IPIs in such individuals in this part of Nigeria. This was therefore a baseline survey of the prevalence of IPIs among HIV positive individuals in central Nigeria. A total of 200 consenting HIV positive individuals were recruited for the study. Stool specimens from them were analysed for the presence of enteric parasites using wet mount and formol-ether concentration methods. The overall prevalence of infection was 88.5% with 11 types of parasites detected. IPIs that occurred with a prevalence of ≤20% include *Entamoeba histolytica*, *Ascaris lumbriccides*, *Ancylostoma duodenales*, *Taenia* spp and *Strongyloides stercoralis*. Helminth infections were more common (51.5%) than protozoan infections (37%) and there were more single (64.5%) than mixed infections (23%). Prevalence of IPIs was associated with gender and being on HAART or not. This study reported a very high burden of IPIs among HIV infected individuals. It is therefore recommended that routine screening for enteric parasites be included in the healthcare management of HIV positive people.

Keywords

Intestinal parasitic infection, HIV, HAART, HAART naïve, helminthes , protozoa

Introduction

The human immunodeficiency virus (HIV) infection has continued to pose a lot of challenges to global health. About 4.5 million infected people live in Nigeria (Tyodugh *et al.,* 2012). The infection is known to have altered both epidemiology and outcome of opportunistic parasiticinfections hitherto known as one of the most significant causes of illness in developing countries (Tian *et al.,* 2012).

Parasitic infections reported as the hallmark of AIDS (Ramakrishnan *et al.,* 2007) have also been reported to have no significant difference in prevalence between HIV positive and HIV negative individuals (Berenji *et al.,* 2012; Yosefi *et al.,* 2012). In fact, Poka and associates posited that the prevalence of these parasites has more to do with sanitary status and living conditions than immune status (Poka *et al.,* 2012).

However, they are known to cause chronic diarrhea among the former (Prasetyo, 2010; Babatunde *et al.*, 2010) with dehydration, weight loss, malabsorption and anorexia (Kurniawan *et al.*, 2009; Babatunde *et al.*, 2010). Some may even be disseminated to organs like the bronchia, bile and liver ducts where they produce specific symptoms in the affected organ (Kurniawan *et al.*, 2009). However, it has been noted that the immune system is involved in modifying the establishment of infection, controlling established diseases, limiting the severity and dissemination of disease and clearance of the parasite (Djeiyep et al., 2014). More worrisome is the assertion that parasitic infections are also involved in the progression of HIV infection by engaging the immune system while it is already contending with the virus (Kipyegen et al., 2012).

Parasites frequently encountered include *Cryptosporidia spp*, *Isospora belli*, *Microsporidia*s pp, *Entamoeba histolytica*, *Giardia intestinalis*, *Trichuristrichura*, *Ascaris lumbricoides*, hookworm and *Strongyloides stercoralis* (Akinbo *et al.*, 2010). Some studies have reported the use of combination antiretroviral therapy to reduce their prevalence (Pavie *et al.*, 2012) while others reported their ability to affect the therapy with a consequent increase in viral replication and progression to AIDS (Ramakrishan *et al.*, 2007; Tian *et al.*, 2012).

Materials and Methods

Study Area and Population

A cross sectional study was carried out in a Sexually Transmitted Clinic of a Federal Medical Centre in North Central Nigeria. The site was selected for its convenience to the researchers in terms of location. The study participants were people of both sexes infected with HIV, on highly active antiretroviral therapy(HAART) and HAART naïve aged 18-50 years, that consented to participate in the study. Their sociodemographic information was obtained by use of a structured questionnaire.

Exclusion Criteria : Patients on antiparasitic therapy or that had been on it in the past 6 months.

Sample Collection

A single fresh stool sample was collected from each consenting participant. A clean wide-mouthed plastic universal container was provided to each participant for the collection and submission of the fecal sample. Samples were transported to the laboratory of the Department of Zoology, Nasarawa State University, Keffi for laboratory investigation. Each sample was examined using both wet mount and formalin-ether concentration methods and parasites were identified according to Chessbrough (1987). The samples were collected from April 2011 through August 2011.

Wet Mount (Direct Microscopy): A drop of normal saline was placed on a grease-free clean slide. Using an applicator stick, a portion of the stool sample was transferred to the saline and emulsified. This was covered with a cover slip and viewed microscopically for the presence of ova, larvae and cysts of intestinal parasites (using 40x magnification).

Formalin-ether Concentration: A portion of each fresh stool was processed as described by Ritchie (1948) with some modification. Using an applicator stick, each stool sample was placed in a clean 15ml conical centrifuge tube containing 7ml of

10% formalin and mixed thoroughly. The resultant suspension was filtered through a sieve into a beaker and the debris discarded. The filtrate was poured back into the tube and 3ml of 99.5% diethylether was added to it, shaken and centrifuged at 2000rpm for 3 minutes. The supernatant was discarded, the sediment stained with iodine, put on a slide and covered with a cover slip. The slide was examined under the microscope (40x magnification).

Ethical Approval

This study was conducted wth the approval of the protocol by the Ethical Committee on Health Research involving humans of the Federal Medical Centre, Keffi, Nasarawa State, Nigeria. Informed consent was obtained from all the participants.

Statistical Analysis

All data from this study were analyzed using descriptive statistical analysis. A comparison of the frequency was analysed using the Chi- square test and a P value of ≤ 0.05 was considered statistically significant.

Results and Discussion

A total of 200 consenting HIV-seropositive participants were screened for intestinal parasitic infection(IPI). Of these, 60 (30%) were males and 140 (70%) females. They were all aged between 20-50 years. The overall prevalence of intestinal parasitic infection was 88.5% with helminth infection being more prevalent (51.5%) than protozoan infection (37.0%) The most prevalent intestinal parasite was *Ascaris lumbricoides*(13.5%) and the least was *Trichuristrichura*(1.5%) (Table 1).

Infection was reported in 83% of those on highly active antiretroviral therapy (HAART) and 94% of those that were HAART-naïve. Similarly there were more single infections (72.9%) than multiple infections (27.1%) with more of the latter occurring among those that were HAART naïve (Table 2).

With respect to sociodemographic factors (Table 3) IPIs were found to be more prevalent among males than females ($p<0.05$). In the bivariate analysis, age, occupation, marital status and source of domestic water of participants did not show any significant association with prevalence of IPIs(Table 4).

This study reported 88.5% prevalence of IPIs among HIV-positive study participants. The preponderance of IPIs supports the fact that in tropical countries including Nigeria the climate supports the survival of the ova of most intestinal helminths and cysts of protozoa (Abaver *et al.*, 2011). This study population has the highest prevalence of IPIs so far publishedfor a study in Nigeria although it is closely followed by 87.8% earlierreported in Ilorin (Bamidele et al., 2010). Lower values reported in Nigeria include 15.3% from Benin (Akinbo *et al.*, 2010) 5.3% from Benin among patients on HAART (Akinbo and Omoriege, 2011), 34.5% (Abubakar *et al.*, 2008), 58% (Yahaya *et al.*, 2013) and 11.4% (Jegede *et al.*, 2014) from Kano. Other reports include 41.5% from Mkar, Benue state (Tyodugh *et al.*, 2012), 22.7% from Abuja (Abaver *et al.*, 2011), 24.0% from Toto (Abaver *et al.*, 2012), 29.6% from Nnewi (Ekejindu *et al.*, 2010), 33.8% from Lagos (Sanyaolu *et al.*, 2011) and 77.4% coccidioparasites in Mabu (Djeiyep *et al.*, 2014). The prevalence of infections in this study is also higher than reports of similar studies from other countries where 67% was reported in North-East Iran (Berenji *et al.*, 2010), 84.3% for Jakarta (Kurniawan *et al.*, 2009), 50.9%

from Kenya (Kipyegen *et al.,* 2012), 37.9% from Malaysia (Asma *et al.,* 2011), 53.0% from Dakar (Sow *et al.*, 2012) and 81.5% from Equatorial Guinea (Roka *et al.,* 2012).

These differences in prevalence might not be totally unconnected with attributes of the study area, the sensitivity of the method of parasitic determination, sample size, age of participants and stage of the disease among participants during the study. In fact, some authors have reported that this difference could even be attributed to seasonal variation in the time of study (Akinbo *et al.*, 2011b) and endemicity of respective parasites in the area of study (Kurniawan *et al.,* 2009; Ekejindu *et al.,* 2010).

Eleven different intestinal helminths and protozoa were identified in the stool of HIV-positive persons. These included in order of prevalence: *Ascaris lumbricoides*(13.5%), *Strongyloides stercoralis*(13.0%), *Taenia* spp (12.5%), *Ancylostoma duodunales* (11.0%), *Entamoeba histolytica* (10%), *Cyclospora*spp (7.5%), *Giardia lamblia* (6.0%), *Blastocystis hominis* (5.5%), *Crytosporidimum* spp (4.5%), *Isospora belli* (3.5%) and *Trichuris trichura* (1.5%). However, *Trichuris trichura* and *Isopora belli* were not detected in the stool of HAART naïve participants. This large number might have been possible because of the climatic advantage to the survival of several species of intestinal parasites in the environment. Such large numbers have also been reported in similar studies in Nigeria. Eleven species were reported in Ilorin (Babatunde *et al.,* 2010) and 8 species in Abuja (Abaver *et al.,* 2011) but a relatively lower case of only 4 species was recently reported in Kano (Jegede *et al.*, 2014).

On the whole, helminth infections were more prevalent than protozoan infections (51.5% vs 37.0%). This agrees with findings by Akinbo and coworkers in Benin city (Akinbo et al., 2012) but is in contrast to reports by Ekejindu *et al*. (2011) in Nigeria, Asma*et al*. (2011) in Malaysia and Ramakrishnan (2007) in India. However, this might be a reflection of parasitic endemicity as at the time of the studies. Also *Ascaris lumb ricoides* was found to be the most prevalent (13.5%) enteric parasite in this study population. A similar result was reported from Benin city (Akinbo *et al.*, 2010) and Kano (Jegede et al., 2014), but in Abuja it was *Entamoeba histolytica* (Abaver *etal*., 2011) and *Ancylostoma* spp in Toto (Abaver *et al.*, 2012).The presence of known pathogenic enteric parasites as well as some opportunistic ones in these already immunosuppressed participants is one of the reasons for the diarrhea they experience and in some cases with very fatal consequencies (Prasetyo, 2010).

The distribution of intestinal parasites stratified by HAART status showed a prevalence of single and multiple infections among those on HAART and HAART-naïve. But the prevalence of infection was significantly higher among those that were HAART naïve and this same group had more multiple infections with the parasites. Also the number of participants without any infection among those on HAART was twice the number of those without an infection that were HAART-naïve. In a study in Ethiopia, those that were HAART naïve were 8 times more likely to harbor enteric parasites than those on HAART(Missage *et al.,* 2013). Researchers have reported evidence that HAART is protective in parasitic infection by inhibiting their aspartylprotease and also reconstitution of the patients' immune system (Parie *et al.*, 2012; Missage *et al.,* 2013). The general high prevalence of infections among those on HAART might be as a result of the fact that many people are in the study area usually live in denial, attributing their illnesses to witchcraft. Consequently, therapy is usually started very late by which time they had been predisposed to opportunistic infections.

Furthermore, some researchers have reported the ability of parasitic infections to affect the action of combination antiretroviral therapy with a consequent increase in viral replications and progression to AIDS (Ramakrishnan *et al.*, 2007, Tian *et al.*, 2012). Paradoxically, Poka and associates (2012) posited that the presence of these parasites is more of a reflection of the sanitary status and living conditions than immune status (Poka *et al.*, 2012).

With reference to socio-demographic parameters the bivariate analysis showed that gender was statistically associated with prevalence of parasitic infection ($p<0.05$). Infection was higher among males (91.7%) than females (87.1%). The reason for this is not very obvious but it could be as a result of males being usually more exposed to unsavory conditions during their daily chores that favour the infections. A similar observation was reported in a Kenyan ((Kipyegen et al., 2012). Conversely, the occupation of the participants did not significantly affect the prevalence of IPIs although it was arithmetically higher among students than any other group. Generally students in this study area prefare to leave campus and in search of cheap abodes, they usually have to contend with unhygienic environments. Moreover the study area is well known for its perennial water problem, they are therefore likely to eat food and drink water from any available source which more often than not are hygienic sources.

Table.1 Prevalence of intestinal parasitosis among HIV positive patients accessing healthcare in a Federal Medical Centre in Northern Nigeria.

Parasite	No. infected	Prevalence (%)
Protozoans (n=74)		37.0
Entamoeba histolytica	20	10.0
Giardia lamblia	12	6.0
Cryptosporidium spp	09	4.5
Isospora belli	07	3.5
*Cyclospora*spp	15	7.5
Blastocystishominis	11	5.5
Helminths (n=103)		51.5
Ascaris lumbricoides	27	13.5
Ancyclostomaduodenales	22	11.0
*Taenia*spp	25	12.5
Trichuristrichura	03	1.5
Strongyloides stercoralis	26	13.0
Total	177	88.5

Table.2 Prevalence of intestinal parasitosis in relation to HAART status among HIV positive Patients accessing healthcare in a Federal Medical Centre in Northern Nigeria.

		Type of infection		
HAART status	No. Examined	Single(%)	Multiple(%)	Nil(%)
On HAART	100	62(62)	21 (21)	17(17)
HAART naïve	100	67(67)	27 (27)	6(6)
Total	200	129(64.5)	48(24)	23(11.5)

Table.3 Prevalence of intestinal parasitosis in relation to sociodemographic factors among HIV positive patients accessing healthcare in a Federal Medical Centre in Northern Nigeria.

Sociodemographic factor	No. Screened	No. Infected(%)	P-value
Gender			< 0.05
Male	60	55(91.7)	
Female	140	122(87.1)	
Age (years)			> 0.05
< 20	01	01(100)	
21-30	107	96(89.7)	
31-40	82	71(86.6)	
41-50	10	09(90.0)	
Marital status			> 0.05
Married	87	78(89.6)	
Single	113	99(87.6)	
Occupation			> 0.05
Students	32	32(100)	
Civil servants	31	27(87.1)	
Farmers	35	31(88.6)	
Unemployed	102	87(85.3)	
Total	200	177(88.5)	

Table.4 Prevalence of intestinal parasitosis in relation to source of drinking water among HIV positive patients accessing healthcare in aFederal Medical Centre in Northern Nigeria.

Source of drinking water	No. Examined	No. Infected(%)
Tap	70	65(92.8)
Well	72	61(88.7)
Streams/River	6	6(100)
Borehole	52	45(86.5)
Total	200	177(88.5)

Likewise, a multivariate analysis of the source of water used by the participants and the prevalence of IPIs did not implicate any particular water source. In fact, the prevalence of IPIs was above 80% in all the types of domestic water sources. Generally most of the water used in this study area is untreated and people here are not in the habit of drinking boiled and filtered water. This could have been the likely reason for the high prevalence with each water source. Inadequate water availability could lead to poor hygiene practices with a consequent risk for parasitic infection. In a similar study, high infection rates was associated with lack of water treatment practices (Kipyegen).

A very high prevalence of intestinal parasitic infection was reported in this study(88.5%). Opportunistic and non-opportunistic parasites were identified although with varying degrees of prevalence. These findings require that early screening and treatment of IPIs in HIV –positive people should be entrenched in their healthcare services in order to improve the quality of their lives.

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