

INTESTINAL PARASITIC INFECTIONS AMONG HIV-INFECTED CHILDREN IN MINNA, NIGERIA



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ABSTRACT

Intestinal parasitic infection which is one of the basic public health problems in tropical countries is uncommon among HIV – infected patients. These have been reported to be more frequent and severe among HIV infected children than their adult counterparts. This study was conducted to determine the prevalence of intestinal parasitosis among HIV/AIDS infected children attending Minna General Hospital, Niger State, North central Nigeria. Stool specimens from HIV/AIDS patients and HIV uninfected children (control group) were screened for intestinal parasites using Kato-Katz thick smear technique and modified Zeihl-Neelsen method. Out of 181 participants recruited among patients consulting at the hospital, 78 (43.1%) were HIV-infected and 103 (56.9%) were the control group. Out of the 78 HIV/AIDS patients, 21.8% (17/78) were positive for intestinal parasitic infection while only 7.8% (8/103) of their HIV negative counterparts were infected with intestinal parasites. The most common parasites identified among HIV-infected children were *Ascaris lumbricoides (28%), Entamoeba histolytica (28%), Giardia lamblia* (12%), *Trichuris trichiura* (4%), *Cryptosporidium species* (20%) and *Schistosma mansoni* (8%) compare with *Ascaris lumbricoides* (14%), *Entamoeba histolytica* (20%), *Trichuris trichiura* (2%) *and Schistoma mansoni* (8%) which were found among HIV uninfected children. Intestinal parasitic infection was significantly higher among participants with CD4 count lower than 200 µl/cell, with 39% prevalence rate of which most of them were asymptomatic. *Cryptosporidium* species which was the only identified opportunistic parasite was observed majorly among children with lower CD4 counts and its prevalence was significant at p < 0.05.

Keywords: HIV, Seropositive, Parasitosis, Children and Infection

INTRODUCTION

About 3.5 billion people are infected with parasites globally, out of whom; 450 million are suffering from its illnesses (Adamu and Petros, 2009). The prevalence of parasitic infection is high in Sub-Saharan Africa, where the majority of HIV/AIDS cases are found (Adamu and Petros, 2009). Intestinal parasitic infection is common among HIVinfected patients and more severe among HIV-infected children than their HIV-infected adult counterparts. Immunosuppression among HIV infected patients is main factor that makes HIV infected patients to be more susceptible to parasitic infections. The infection rate in developing countries is relatively higher because of an overlap between high prevalence of HIV, bacterial and parasitic infection. Moreover in the tropics, there is a consistent association between HIV infection and other diseases including malaria, tuberculosis and intestinal parasitosis (WHO, 1998). The incidence of parasitic infections have been reported up to 50% in developed countries while the prevalence have been reported to be up 95% in developing countries (Unaid, 2006). Parasitic infections are still common in many regions and populations across Africa and especially in Nigeria, it represent a great public health challenge. The prevalence rate of parasitic diseases in Nigeria between 2013 and 2014 varied throughout the country and the prevalence among targeted population was 6.4%. It has long been recognized that interactions between the HI virus and the host facilitate the colonization of the latter by other infective agents, including parasites which has a negatively impacts on the health status and outlook of people living with HIV/AIDS. With the progressing development of AIDS, especially once CD4+ T-lymphocyte counts have fallen below 200/mm³ (WHO, 2002), patients often become co-infected by viruses, bacteria or parasites. Such co-infections have been reported to be the proximate cause of death of AIDS patients (Adamu and Petros, 2009). However, compared to the international literature, few studies with an emphasis on

co-infections have been published in China. The majority of the available studies focused on co-infections with Mycobacterium tuberculosis and viral hepatitis. The high prevalence of certain opportunistic parasites among HIV positives has been reported. Such co-infections present with more severe clinical symptoms compared to parasitic infections of healthy people, and are more difficult to diagnosed and treat (Karp and Auwaerter, 2007). Parasitic and HIV co-infections are one of the neglected areas in HIV research in Nigeria. Although HIV infection has generally become a major public health concern and research in Nigeria and beyond. Even since the concerns regarding opportunistic parasite infections among HIV positives have been widely recognized, only few relevant field-epidemiological investigations have been reported in Nigeria (Nielson et al., 2007). Intestinal parasites are among the main causes of severe chronic diarrhea among HIV infected and uninfected children (Assefa et al., 2009). Coccidia (Cryptosporidium parvum, Isospora belli, Cyclospora spp.) and amoebae (Entamoeba histolytica, etc.) are the common intestinal protozoans in HIV-positive persons in many parts of the world (Ibrahim et al., 2007). This study was aimed at determining the prevalence of parasitic infections among HIV infected children.

METHODOLOGY

The study population included children attending paediatric out-patient department of general hospital Minna, Niger State and the participants were between the ages of two and sixteen years. Ethical clearance for this study was obtained from the Hospital Management Board Research Ethics Committee, Niger State and informed consent was also taken from the parents of the participants. The prevalence of intestinal parasites among HIV positive group and HIV negative individuals was taken as 42% and double proportion formula was applied to calculate the sample size which was 78 HIV positive and 103 HIV negative groups. A 5% non-response rate was added and the final calculated sample size was 181. Study participants were selected by simple random sampling techniques.

The children were majorly from the out - patient department of the pediatric ward of the general hospital. Patients presenting at the hospitals were encouraged to participate in the study. Patients were enrolled from November 2013 through February 2014.

Stool samples were collected in clean, wide opened mouth and tight covered container from each of the participants. Small pieces of labeled clean plastic sample container and wooden applicator sticks were distributed and the participants were instructed to bring sizable stool specimen of their own. Each stool specimen was initially assessed for consistency. The stool sample was initially examined microscopically directly in normal saline and iodine for motile parasites. The sample was preserved with 10% formalin and transported to the microbiology laboratory of Federal University of Technology, Minna. The stool samples were analyzed for parasitic infection and its density was determined using the Kato-Katz thick smear technique and modified Zeihl-Neelsen method (for detection of opportunistic parasites-Cryptosporidium species, and Isospora belli) (Fincham et al., 2003). The parasites were identified microscopically using the chart provided by Monica Cheesebrough. The most recent CD₄ T-cells counts of the participants were obtained from their ART fellow-up record in the hospital. Data were analyzed with Statistical Package for Social for Sciences (SPSS) version 11.0 statistical software. Chi square (x^2) test allowed us to compare the prevalence of intestinal parasites according to age and sex.

RESULTS

Prevalence of intestinal parasitic infection in relation to HIV status as shown in Table1 revealed that male participants had higher prevalence of intestinal parasitic infections than the female participants irrespective of their immune status. The HIV negative patients recorded a lower prevalence of intestinal parasites 7.8% (8/103) compared with higher prevalence observed among HIV positive patients 21.8% (17/78). The table also summarized that HIV infected patients were more likely to be infected with intestinal parasites than HIV non-infected patients (P<0.0001). With respect to sex (table1), 17/112 males were observed to be positive with intestinal parasites while 8/69 females were positive. Males were more likely to be infected with intestinal parasites than the female's counterpart with a P value of 0.05.

	HIV Infected						HIV Uninfected					
	Male			Female			Male			Female		
	No.	No.	%	No.	No.	%	No.	No.	%	No.	No.	%
	Examine	Positiv	Positiv	Examine	Positiv	Positiv	Examine	Positiv	Positiv	Examine	Positiv	Positiv
	d	e	e	d	e	e	d	e	e	d	e	e
2 - 3	2	0	0.00	9	1	11.11	13	2	6.50	11	0	0.00
4 - 5	5	3	60.00	2	1	50.00	7	0	0.00	7	1	14.29
6 - 7	5	2	40.00	1	0	0.00	12	0	0.00	8	0	0.00
8 - 9	7	1	14.29	5	0	0.00	6	2	33.33	1	0	0.00
10 –												
11	11	0	0.00	6	1	16.67	14	0	25.00	2	0	0.00
12 –												
13	6	1	16.67	8	2	25.50	8	2	66.67	2	1	50.00
14 –												
16	7	4	57.14	4	1	25.00	10	0	0.00	3	0	0.00
Total	43	11	25.58	35	6	23.81	69	6	25.71	34	2	13.33

Figure 1 shows that HIV-infected children had higher prevalence of parasites than the HIV uninfected children with the exception of *Giardia lamblia* and *Crytosporidium* species which were only identified among HIV infected children. Equal percentage prevalence of *Schistosoma mansoni* was observed among HIV infected and uninfected children.



Fig. 1. Frequency of Occurrence of Parasites in relation to HIV Status.

The prevalence of intestinal parasites in relation to CD4 count among HIV-infected children as shown in table 2 shows that HIV-infected children with CD4 count lower than 100 cells/µl were at higher risk of having intestinal parasitic infections than those with higher CD4 counts.

 Table 2: Prevalence of Intestinal Parasites in Relation to

 CD4 Count among HIV-Infected Children.

CD4 Count cell/µl	No. Examined	No. Positive	% Positive
<100	5	3	60.00
100 - 200	13	4	30.77
201 - 400	9	2	22.22
401 - 600	10	3	30.00
> 600	41	5	8.20
Total	78	17	21.8

DISCUSSION

Intestinal parasitic infection is one of the major causes of morbidity and mortality in HIV positive patients (Kumas and Anthania, 2002). The HIV-uninfected participants above five years of age would likely be infected with intestinal parasitic infections than their HIV-infected counterpart which shows that the younger participants are more likely to have intestinal parasitic infection. This could partly be as a result of greater exposure to the parasites due to increase in domestic activities, outdoor activities and school activities because this age group is considered as school age children. The higher frequency of occurrence of intestinal parasitic infections among younger HIV-infected participants could also be as a result of compromised immune system among the studied age group.

Several species of protozoa and other intestinal parasites have been associated with acute and chronic diarrhoea and even weight loss in HIV/AIDS patients. In this study, *Entamoeba histolytica* was the most frequently observed parasite among HIV-infected and un-infected participants and this implies that the mode of infection could probably be through contamination of food, fruits and vegetable by feacal contaminants. Therefore inadequate sanitation,

contribute to increase in infection rate. Giardia lamblia and Cryptosporidium spp. was found to be more predominant among HIV infected children. Cryptosporidium spp was regarded as opportunistic parasites which can only be found to be pathogenic among immune-compromised individual. The association between opportunistic parasitic infection and HIV was widely reported (Kipyegen et al., 2012). However, in this study, most of the parasites identified were non-opportunistic. The relationship between nonopportunistic parasite and HIV was not well established. Even though the defence against them might be damaged by HIV, the exposure to this parasites are likely to occur independent of HIV infection but heavier parasitic load might accumulate as well as experience of delayed clearance of parasite in individual with concurrent HIV induced (Amole et al., 2003)

unhygienic practices and indiscriminate use of toilet could

The prevalence of intestinal parasites was highly significant among those study participants with CD4 count lesser than 200 cells/µl in this study. This is consistent with other studies. The correlation of CD4 count with opportunistic parasites could not be assessed because of small number of individuals infected with Cryptosporidium species. However, the association of these two parasites with HIV positive persons, who have CD4 count lesser than 200 cells/µl, is reported in other studies (Naik *et al.*, 2012). Cryptosporidium species have been reported to cause severe chronic diarrhoea leading to electrolyte imbalance, mal-absorption, and profound weight loss among immunecompromised individual (Kipyegen *et al.*, 2012).

The most common parasites identified among HIV-infected children were Ascaris lumbricoides (28%), Entamoeba histolytica (28%), Giardia lamblia (12%), Trichuris trichiura (4%), Cryptosporidium species (20%) and Schistosoma mansoni (8%) compare with Ascaris lumbricoides (14%), Entamoeba histolytica (20%), Trichuris trichiura (2%) and Schistoma mansoni (8%) which were found among HIV uninfected children. Among the known opportunistic intestinal parasites, Cryptosporidium spp. was encountered with the frequency of 20% in HIV infected patients while only 0% was encountered in HIV negative group. These results are higher than those of (Alemu *et al.*, 2011) obtained in Douala- Cameroon where *C.* spp. was 7.4%, and those reported by (Mariam *et al.*, 2008). This result also agrees with several results on parasitic infections in other part of the country particularly on *Ascaris* which have been reported to be common throughout Nigeria. The overall prevalence of 13.8% agrees with 12.8% prevalence of parasitic infection reported from some state in the country but lower than 34.4% reported in 2003 in Benin City Nigeria. The correlation observed in the former could be because the study was conducted on children alone but the latter was on the general populace.

The male to female ratio of prevalence of intestinal parasitic infection shows that HIV infected and uninfected male participants are at higher risk of intestinal parasitic infection than female participants. This could be as a result of increase in outdoor activities among male participants than their female counterparts. This could as well increase their exposure to most of these parasites as most of the identified parasites enter their host through feacal-oral route.

CONCLUSION

The overall prevalence of intestinal parasites was 13.8% but 21.8% prevalence rate was observed in HIV infected patients. HIV positive individuals were observed to be more susceptible to parasitic co-infections and especially with *Cryptosporidium* spp. (20%) and *Gardia lamblia* than HIV negative children (0%). Improvement in diagnosis and a management treatment plan not only for the children but also for their parents and the entire family. This study also recommends that governments should continue their efforts in providing the rural populace with good quality water and proper personal hygiene should be encouraged.

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