Journal of Biology, Agriculture and Healthcare
ISSN 2224-3208 (Paper) ISSN 2225-093X (Online)
Vol.3, No.14, 2013

Diarrhea and Intestinal Parasites among HIV Infected Patients in Baringo, Kenya

Cornelius K. Kipyegen[1]., Robert S. Shivairo[2]., Rose O. Odhiambo[3]
1. Department of Biological Science, P. O. Box 536, Egerton University, Kenya,
2. Department of Clinical Studies, P. O. Box 536, Egerton University, Kenya
3. Department of Biological Science, P. O. Box 536, Egerton University, Kenya
*Email of the Corresponding author: shivairo2000@yahoo.com

Abstract
Intestinal parasitic infection is one of the health threats in HIV positive patients especially in the developing countries and often presents clinically as diarrhea which further worsens the health status of the HIV patient who are already immunocompromised. This study was carried out to determine the association of intestinal parasites with diarrhea among HIV infected patients in Baringo County, Kenya. A cross-sectional study was carried out at the Baringo District hospital, AMPATH clinic. The ethical approval of the study was obtained from the Moi Teaching and Referral Hospital and Moi University Institutional Research and Ethical Committee (IREC). A total of 285 stool specimen of confirmed HIV infected patients was collected for laboratory screening for intestinal parasites. Chi-square (χ^2) statistical analysis was used to test level of significance at P = 0.05 using SPSS. A prevalence of 50.9% of intestinal parasites was recorded. There was an association ($p<0.05$) between intestinal parasitic infection and diarrhea, frequency of passing stool and stool consistency. Patients with diarrhea had a prevalence of 86.75% of intestinal parasitic infection. Parasites identified were *Entamoeba histolytica/dispar* (58.3%), *Giardia lamblia* (16.55%), *Ascaris lumbricoides* (8.6%), *Entamoeba coli* (5.96%), *Taenia saginata* (5.28%), *Trichuris trichuria* (1.98%), *Enterobius vermicularis* (1.97%) and hookworm (1.32%). Improving the quality of life of HIV infected patients can be achieved by early diagnosis for the intestinal parasites, often under-estimated in their role of causing morbidity.
Keywords: Prevalence, Intestinal parasites, HIV, Diarrhea, Kenya.

INTRODUCTION

Globally, the number of people living with HIV in 2008 was estimated to be 33.4 million, with 2.7 million of new infections (NASCOP, 2008). HIV/AIDS is an epidemic that has become a major threat in the African continent and accounts for 67% of infection worldwide (WHO, 2002; NASCOP, 2008). In Kenya, the highest rates of HIV/AIDS infection were initially concentrated in marginalized and special risk groups, and for more than a decade Kenya has faced a mixed HIV/AIDS epidemic with new infections occurring in both the general population and vulnerable, high-risk groups. Kenya AID Indicator Survey (KAIS) estimates a prevalence of 7.8 percent among 15-49 year olds individuals (NASCOP, 2008).

Gastrointestinal symptoms, especially diarrhea are the commonest presentation of AIDS in Africa (Ibrahim *et al.*, 2007). Diarrhea remains a leading cause of morbidity and mortality in the developing world and accounts for over 50 million deaths globally (Alakpa & Fagbenro-Beyioku, 2002) and has been ranked third among diseases responsible for human mortality in the world (WHO, 1998). It occurs in 30 to 60 percent of North American and European patients and almost 90% of AIDS patients in developing countries (Grohmann *et al.*, 1993; Oguntibeju, 2006; Uppal *et al.*, 2009). In HIV infected patients, progressive decline in their immunological responses makes them extremely susceptible to a variety of common and opportunistic infections (Kumar *et al.*, 2002; Rossit *et al.*, 2009). Various microorganisms have been isolated from HIV-infected patients with chronic diarrhea either singly or in combinations (Alakpa & Fagbenro-Beyioku, 2002; Ibrahim *et al.*, 2007).

The aim of this study was to establish the association of intestinal parasites and diarrhea among HIV patients in Baringo, Kenya. The findings will be useful for implementation of the prevention of intestinal parasitic diseases hence improvement of the quality of life of HIV infected patients.

2.0 MATERIALS AND METHODS

2.1 Study Area

Baringo District is in Rift Valley province; it covers approximately an area of 8,655 Km^2. It is divided into three agro-ecological zones namely the highlands, midlands and lowlands. The highlands rise to an average of 2,000 meters above the sea level with annual average rainfall of 1,200mm, and annual average temperature of about 25 ^oC. The midlands are inhabited by the agro-pastoralists; this zone is endowed with the three rivers in the district namely the Perkerra, Molo and Kerio Rivers. The lowlands have an average altitude of about 700 meters above the sea level and most of it is rangeland and temperatures are above 32 ^oC, and the average rainfall of 600mm. Settlement patterns in the district are determined by climatic condition and economic opportunity of the area.

2.2 Research Design

This was a cross-sectional survey that involved interviewing of the HIV/AIDS patients using structured questionnaires and also laboratory analysis of stool specimen from the respondents. The structured questionnaire enabled the acquisition of information of the participants. Detailed clinical information on frequency, duration and any history of diarrhea from patients with diarrhea was recorded. The laboratory analysis was carried out by stool analysis using microscopy, to diagnose for intestinal parasitic infections.

2.3 Study population

HIV infected patients who were registered clients of Academic Model Providing Access to Healthcare (AMPATH) clinic at Baringo District Hospital were participants for the research study. The study population consisted of 285 HIV infected individuals of the age one year and above. The inclusion criteria were: patients must be HIV-positive and those with and without signs of diarrhea, willing to participate in the study and had ability to comprehend the importance of the study. The exclusion criteria were: those on specific anthelminthics or who had any treatment for intestinal parasitism in the last two weeks preceding specimen collection and those who had antacid, in the last two weeks preceding specimen collection were all excluded from the study.

2.4 Ethical Considerations and Treatment

Informed consent was sought from the participants after informing them about the importance of the study. For those of age below 18 years, consent was obtained from their parents/guardians before recruiting into the study. The ethical approval of the study was obtained from the Moi Teaching and Referral Hospital and Moi University Institutional Research and Ethical Committee (IREC). All HIV patients with positive stool analysis were appropriately treated free of charge.

2.5 Specimen Collection and processing

Stool specimens were collected using a clean wide mouth specimen container from male and female patients attending hospital for clinical treatment. Freshly voided stool specimens were collected, processed and examined microscopically as saline wet mount to detect motile trophozoites, larva and cysts of the parasites (Gillespie & Hawkey, 1995). Also, Formol-ether concentration was performed and modified cold Zeihl-Neelsen (ZN) was used to detect coccidian species (WHO, 2004).

2.6 Data analysis

The data obtained from questionnaires was analyzed using the statistical software SPSS version 11.5, where frequency, cross-tabulation and Chi-square were carried out. Chi-square test was used to determine the statistical significance between diarrhea and intestinal parasitic infection where P-value less than 0.05 means that the results were statistically significant and vice-versa.

3.0RESULTS

The overall prevalence of intestinal parasites among HIV patients was 50.9%. The distribution of intestinal parasites among HIV patients with respect to diarrhea status (Table 1) shows that intestinal parasites were prevalent (86.75%) among those who had diarrhea. The most prevalent intestinal parasites were the *Entamoeba histolytica/dispar* (58.28%), followed by *Giardia lamblia* (16.55%). The helminth with higher prevalence was *Ascaris lumbricoides* (8.6%) with Hookworm (1.32%) being the least. The results from this study therefore suggest that having diarrhea had a significant association ($P<0.05$) with intestinal infections (Table 2). The frequency of intestinal parasites detected was 151, where out of 145 individuals who had parasitic infection, six of them had multiple infections (Table 3).

There was a significant difference between intestinal parasitic infection ($P<0.05$) and stool consistency (Table 2). Majority of the HIV patients (57.2%) had loose stool and this were the most infected (40%) with intestinal parasites. Those who had watery stools were all harboring intestinal parasites. Majority of the cyst and ova were found in loose stool. In watery stool, only protozoan cyst of *E. histolytica/dispar* and *G. lamblia* were predominant. *E. vermicularis* were present in loose stool only.

There was a significant association between the frequency an individual passes out stool per day and intestinal parasitic infection ($P<0.05$), indicating that patients who passes stool more than three times per day were more likely to be harboring intestinal parasites having recorded high infection of 21.4%.

On the nature of parasitic infection 86.2% had single parasitism and 3.4% had multiple infections which were recorded exclusively among those who had diarrhea (Table 3).

The most prevalent intestinal parasites in the age group 20-39 years were protozoans represented by *E. histolytica/dispar*, *Giardia lamblia* and *Entamoeba coli* while among the helminth species, *A. lumbricoides* predominates followed by Taenia species (Table 1). The age group 40-59 years was dominated by *E. histolytica/dispar* followed by *Giardia lamblia*, Taenia species and *Entamoeba coli.* Both Hookworm and *Enterobium vermicularis* recorded among the age group 40-59 years were absent in 20-39 years age group. Although females recorded a higher parasitic load than males, they had fewer number of parasite species. Both Hookworm and *T. trichiuria* were absent in females but detected in males.

4.0 DISCUSSION

Results from this study revealed a high prevalence (50.9%) of intestinal parasites among HIV patients in Baringo, Kenya. Majority of the participants that had diarrhea were infected with intestinal parasites which could be attributed to associated with the HIV infection. The relationship between the two was significant (χ^2=76.624, df=1, p<0.05). In comparison with other studies, the high prevalence rate recorded in this study is similar to the findings of Ramakrishma (1999) in India and Ibrahim *et al.,* (2007) in Nigeria. The effects of intestinal parasitic infections include diarrhea due to their effects including malnutrition, intestinal obstruction and malabsorption especially during heavy parasitic infection. Also some intestinal helminths like *T. trichuria* could mount immune response that cause inflammatory eosinophilic reactions which can result in chronic diarrhea (Alakpa & Fagbenro-Beyioku, 2002) and this worsens the health status of HIV patients. Presence of intestinal parasites could also results to widespread destruction of absorptive epithelium and motility disorder leading to inefficiency of water absorption leading to diarrhea.

There was a significant association between the frequency with which an individual passes stool per day with intestinal parasitic infection (χ^2=39.829, df=1, P<0.05). This indicates that a patient who passes stool more than three times per day was more likely to be harboring intestinal parasites. Stool consistency also had a significant association with intestinal parasitic infection (χ^2=82.272, df=2, P<0.05). Though stool characteristics could be one of the clinical signs for the presence of intestinal parasitic infection, it is prudent to conduct stool analysis to confirm the exact causative agent especially in immunocompromised individuals. This is because diarrhea could be caused by several agents which include virus, bacteria, enteropathy, food and drug allergy (Ibrahim *et al.*, 2007). High intestinal parasitic infection was recorded in respondents aged between 20-39 years and 40 – 49 years and it is the category most infected with HIV in rural areas in Kenya (NASCOP, 2008; Ibrahim, 2007). These could be attributed to daily activities like farming and domestic work which expose them to high risk of parasitic infection due to constant soil and water contact. Females had higher parasitic load than male which attributable to household activities which expose them to water and contaminated soil most of the times more than men (Okwa, 2007).

Depending on the nature of infection, results from this study showed that majority of the HIV positive patients who were infected with intestinal single parasite with a prevalence of 86.2%. Patients who had diarrhea recorded 68.0%, while those without diarrhea had 18.2%, this is in consistent with a study carried out in Ethiopia (Fontanet *et al.*, 2000). Only six individuals had multiple infections giving prevalence of 3.4%. Multiple infection could be as a result of shared conditions for exposure, such as poor sanitation and climatic conditions, (Silva *et al.,* 2007), and also host factors (Nguhiu *et al.,* 2009), which in this case is the reduced immune response and malnutrition in the HIV patients hence are susceptible to intestinal parasitic infection. Majority of the single intestinal parasitic infection were *E. histolytica/dispar* and *G. lamblia* both transmitted through water which could have been contaminated with the cyst in the source of water or by poor handling due to poor environmental sanitation and personal hygiene. Patients who had intestinal parasitic infection were treated with albendazole and mebendazole, but those who were severely dehydrated given intravenous fluids in addition.

5.0 CONCLUSION

There was high prevalence of intestinal parasites among HIV patients with majority of infections associated with diarrhea. Therefore, the results from this study provide awareness among practicing physicians in HIV clinics of the importance of laboratory diagnosis of stools in order to confirm clinical signs when treating patients with diarrhea or any gastrointestinal ailments. Provision of public health education on personal hygiene, water and sanitation would go along way in reducing exposure to parasites.

ACKNOWLEDGEMENT

We thank all AMPATH, Kabarnet clinic staff for their support in recruiting the study participants and laboratory staff at Baringo District hospital for their assistance during stool examination. We also thank the staff of Research and Ethics Committee (IREC) of Moi University/Moi Teaching and Referral Hospital for their work.

REFERENCES

Alakpa, G. E & Fagbenro-Beyioku, A. F. (2002). *Cyclospora cayetanensis* and Intestinal Parasitic Profile in Stool Samples in Lagos, Nigeria. *Acta Protozoology*. 41: 221-227.

Fontanet, A. L., Sahlu, T., Rinke, de Wit T., Messele, T., Masho, W., Woldemichael, T., Yeneneh, H. & Coutinho, R. A. (2000). Epidemiology of infections with intestinal parasites and human immunodeficiency virus (HIV) among sugar-estate residents in Ethiopia. *Annals of Tropical Medicine and Parasitology*. 94: 269-278.

Gillespie, S. H. & Hawkey, P. M. (1995). *Medical parasitology.* A practical approach. First Edition. Oxford University press, New York.

Grohmann, G., Glass, R. I., Pereira, H. G., Monroe, S. S., Hightower, A. W., Weber, R. & Bryan, R. T. (1993).

Enteric Viruses and Diarrhea in HIV-infected patients. *New England Journal of Medicine*. 329: 14-20.
Ibrahim, A. K., Ikeh, E. I., Malu, A. O., Okeke, E. N. & Damen, J. G. (2007). Intestinal Parasitosis In Human Immunodeficiency Virus (HIV) Infected Adults with Chronic Diarrhoea At Jos University Teaching Hospital, Nigeria. *The Internet Journal of Parasitic Diseases.* 2: 1559-4629.
Kumar, S. S., Ananthan, S. & Lakshmi, P. (2002). Intestinal parasitic infection in HIV infected patients with diarrhoea in Chennai. *Indian Journal of Medical Microbiology*. 20: 88-91.
NASCOP (National AIDS and STI Control Programme), Ministry of Health, Kenya. (2008). *Kenya AIDS Indicator Survey 2007: Preliminary Report.* Nairobi, Kenya. Available online: (*http://www.aidskenya.org*).
Nguhiu, P. N., Kariuki, H. C., Magambo, J. K., Kimani, G., Mwatha, J. K., Muchiri, E., Dunne, D. W.,Vennervald, B. J. & Mkoji, G. M. (2009). Intestinal polyparasitism in a rural Kenyan community. *East Africa Medical Journal.* 86:272-8.
Oguntibeju, O. O. (2006). Prevalence of intestinal parasites in HIV-positive/AIDS patients in South Africa. *Malaysian Journal of Medical Sciences*, 13: 68-73.
Okwa O. O. (2007). Tropical Parasitic Diseases and Women. *Annals of African Medicine.* **6***:157 – 163.*
Ramakrishna, B. S. (1999). Prevalence of intestinal pathogens in HIV patients with diarrhea: Implication for treatment. *Indian Journal of Pediatric*. 66: 85-91.
Rossit, A. R.; Gonçalves, A. C; Franco, C. & Machado, R. L. (2009). Etiological agents of diarrhea in patients infected by the human immunodeficiency. *Review. Institute of Medicine of tropic. South Paulo.* 51: 59-65.
Silva. R. C. R., Barreto. M. L., Assis. A. M. O., Santana. M. L. P., Isabel M. Parraga. I. M., Reis.M. G, & Blanton. R. E. (2007). The Relative Influence of Polyparasitism, environment, and Host Factors on Schistosome Infection. The American Society of Tropical Medicine and Hygiene. 77: 672-675.
Uppal, B., Kashyap, B. & Bhalla, P. (2009). A study of enteric pathogens in HIV/AIDS from a tertiary care hospital. *Indian Journal of Community Medicine*. 34: 237-242.
World Health Organisation. (2002). Reducing risk, promoting health life. In: *The World Health Reports 2002*. WHO Geneva, Switzerland.
World Health Organisation. (2004). *Training Manual on Diagnosis of Intestinal Parasites*: Tutor's Guide. Schistosomiasis and intestinal Parasites Unit Division of Control of Tropical Diseases. *WHO/CTD/SIP/98.2 CD-Rom*. pp. 11-21.

Table 1. Distribution of intestinal parasites among HIV patients

Parasitic agent	Diarrhea status		Total
	Positive	Negative	
Entamoeba histolytica	78(51.66)	10(6.62)	88(58.28)
Giardia lamblia	24(15.89)	1(0.66)	25(16.55)
Ascaris lumbricoides	11(7.28)	2(1.32)	13(8.6)
Entamoeba coli	7(4.64)	2(1.32)	9(5.96)
Taenia spp	5(3.31)	3(1.97)	8(5.28)
Trichuris trichuria	2(1.32)	1(0.66)	3(1.98)
Enterobius vermicularis	3(1.97)	0(.0)	3(1.97)
Hookworm	1(0.66)	1(0.66)	2(1.32)
Total	131(86.75)	20(13.25)	151(100)

χ^2=76.624, df=1, P<0.0001

Table 2. Parasitic infection and stool characteristics of HIV patients

Characteristics	Parasitic infection status		Total
	No (%) Infected	No (%) Uninfected	
Consistency			
Formed	20 (7%)	91 (31.0%)	111 (38.9%)
Loose	114 (40%)	49 (17.2%)	163 (57.2%)
Watery	11 (3.9%)	0 (.0%)	11 (3.9%)
Total	145 (50.9%)	140 (49.1%)	285 (100%)
χ^2=82.272, df=2, p=0.0001			
Frequency passing stool/day			
< 2 time/day	84 (29.5%)	127 (44.6%)	211(74%)
> 2 times/day	62 (21.4%)	13 (4.6%)	74 (26%)
Total	145 (50.9%)	140 (49.1%)	285 (100%)
χ^2=39.829, df=1, p=0.0001			

Table 3. Nature of parasitic infection and diarrheal status of the HIV positive patients

			Nature of infection			
Diarrheal Status:	**Frequency**	**Percent**	**Single**	**%**	**multiple**	**%**
Positive	175	61.4	119	68.0	6	3.4
Negative	110	38.6	20	18.2	0	0.0
Total	285	100.0	139	86.2	6	3.4