Original Research Article

Epidemiology of Coccidian Parasites in HIV Patients of Northern Uganda

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ABSTRACT

Aim: The epidemiology of coccidian parasites in HIV patients of sub Saharan Uganda is poorly understood. The aim of the study was to determine the epidemiology of coccidian parasites and their associated risk factors. This was a cross sectional study carried out in Arua district in West Nile region of Northern Uganda for a period of five months.

Materials and methods: Participants in the study included HIV positive patients presenting with diarrhea. A total of 111 patients were included and classified into children, adults and elderly. A structured questionnaire was administered and stool samples were obtained using sterile stool containers and laboratory analysis was carried out using modified ZN technique. Ethical clearance was acquired and the consent of the patients was sought.

Results and discussion: Coccidian prevalence of 5.4% in HIV patients was shown and the most prevalent coccidian species that were identified included *Cryptosporidium parvum* (3.6%) and *Isospora belli* (1.8%) and these were most prevalent in females (5.7%). The major risk factors associated were shown to be mainly consumption of water from tap and bore hole. Community lifestyle patterns are major contributing factors to the epidemiology of the condition. HIV patients on septrin® and drinking boiled water were shown to have a low prevalence of coccidian parasites i.e. 1.9% and 2.6% respectively probably due to the increased immunity compared to HIV patients not on therapy. Patients taking septrin® and boiling water were shown to be associated ($P < 0.05$) with low infections.

Conclusion and recommendations: The study further highlighted the importance to control secondary infections in HIV patients regardless of age and social status especially in HIV patients living in rural communities.

Keywords: "Coccidia in Humans," "Coccidia in HIV patients," "Coccidia risk factors," "Cryptosporidium in Uganda," "Diarrhea in HIV patients."

1. INTRODUCTION

Coccidian parasitic infections have altered the epidemiology and outcome of Human immunodeficiency virus (HIV) patients in sub-Saharan Africa [1]. Diarrhea has been identified as a major presenting complaints in HIV-infected patients. Because of the delayed diagnosis of these pathogens in HIV infected patients, the patients usually take medication without prescription from clinicians as well as local medications for treatment of signs and symptoms, therefore the disease is not treated especially in sub Saharan Uganda due to the liberalization of the medical drug industry and poorly regulated herbal therapies [1] [2] [3]. The epidemiology of coccidian parasites in HIV patients of sub Saharan origin is poorly understood. In a recent study in Ethiopia, prevalence of gastro intestinal parasites was shown to range between 18% - 40%. Infection with Cryptosporidium spp was found to be associated with lowered immunity and the major risk factors were absence of toilets, water source and poor standards of living [4]. In a previous study in Ethiopia the prevalence of *Cryptosporidium parvum* (*C. parvum*) and *Isospora belli* (*I. belli*) were shown to be 20.8% and 7.9% respectively in HIV patients [5].

A recent study in Kenya has shown a prevalence of 50.9% of enteric parasites which were waterborne. The major risk factors identified in the study were; place of residence, agro-ecological, water source, family size, location, reliability, treatment and diarrheal status probably due to poor environmental sanitation and personal hygiene, food and individual contamination probably due to poor management and care of HIV patients [6]. Contamination of water with coccidian spp has been reported national water storage facilities [7]. Infection rates are highest in children living in sub-Saharan Africa and clinical cases are expected to be higher than reported due to limited infrastructure and research in the region [8] [9]. The current control strategies are towards community drug delivery of anti-helminthic drugs against intestinal parasites but there is none against coccidian parasites [3]. Stimulating research and development in rural communities through support of clinical trials to improve treatment, in addition to securing and increasing drug availability, needs governmental funding and resources that do not presently exist in most sub Saharan health care facilities [9].

Coccidian parasites are well recognized and account for about 20% of diarrheal episodes in children in developing countries and up to 9% of episodes in developed settings and causes a considerable amount of diarrheal illness in young farm animals worldwide [2]. Sporadic outbreaks among children in developed countries have been reported due to fecal-oral transmission [1]. Epidemiological variations have been observed in the socioeconomic and geographical effects of the distribution of coccidian parasites in humans that may influence the sources and routes of transmission. The study was carried out to highlight the importance of screening for intestinal coccidian parasites among HIV patients and also to emphasize the necessity of increasing awareness among clinicians regarding the occurrence and management of these parasites in the region.

2. MATERIAL AND METHODS

This was a cross sectional study carried out in Arua regional referral hospital in West Nile region of Northern Uganda for a period of five months (January to May 2013). Participants in the study included HIV positive patients presenting with diarrhea and excluded those without diarrhea. A total of 111 patients was used and classified into children (10-19 years), adults (20-39 years) and elderly (40-69 years). A structured questionnaire was administered and stool samples were obtained using sterile stool containers and laboratory analysis was carried out to identify the parasites using formal ether concentration technique and modified ZN. Briefly; 10 ml of 10% formol-saline was added to 2g of faeces in a centrifuge tube and stirred using an applicator stick filtered into a centrifuge tube. 3 ml of ether was added, mixed well centrifuged at 3,000 rpm for 5 minutes. The sediment was then re-suspended by tapping the bottom of the tube. Mixed well and transferred to a slide for microscopic examination under a cover slip and viewed under microscope x10 objective and the findings were recorded. A small portion of the stool sediment that was concentrated was taken and a smear made on a clean slide. The smear was allowed to air dry then fixed with absolute methanol. The smear was stained with strong carbol fuchsin for 30 minutes, decolorised with 1% acid alcohol and rinsed with water and counter stained with 0.1% methylene blue. The slides were viewed under x100 objective. Data was recorded as frequency and expressed as percentages. Descriptive analysis using SPSS version 20 was carried out to determine associations and a p-value < 0.05 was considered statistically significant.

3. RESULTS AND DISCUSSION

The study showed a Coccidian prevalence of 5.4% in HIV patients as shown in **Table 1.**

Table 1 Showing prevalence of Coccidian parasites in HIV patients.

Parameter	Frequency (%)	
	positive	Negative
HIV patients	6 (5.4)	105 (94.6)

The most prevalent coccidian species that were identified in HIV patients included *C. parvum* (3.6%) and *I. belli* (1.8%) as shown in **Table 2**.

Table 2 Showing Coccidian species prevalent in HIV patients

Species	Frequency (%)
C. parvum	(3.6)
I. belli	2 (1.8)

The distribution of the parasites was shown to be 5.7% in females and 4.9% in males. The risk factors associated with coccidian parasites in the study area were shown to be mainly from tap 12.9% and bore hole 2.7% as shown in **Table 3.**

Table 3 Showing descriptive statistics from the questionnaire

		Positive	Negative
Parameter	Variables		
		Frequency (%)	
Gender	Female	4 (5.7)	66 (94.3)
	Male	2 (4.9)	39 (95.1)
Age	Children	14 (100)	0 (0)
	Adults	4 (6.3)	59 (93.7)
	Elderly	2 (5.9)	32 (94.1)
Risk factors	Bore hole	2 (2.7)	72 (97.3)
	Tap	4 (12.9)	27 (87.1)
	River	0 (0)	2 (100)
	Community well	0 (0)	4 (100)
Water quality	Drink boiled water	1 (2.6)	38 (97.4)
	Drink raw water	5 (6.9)	67 (93.1)
Prophylaxis treatment	Taking septrin®	1 (1.9)	51 (98.1)
	Not taking septrin®	5 (8.5)	54 (91.5)

HIV patients on septrin® and drinking boiled water were shown to have a low prevalence of coccidian parasites i.e. 1.9% and 2.6% respectively. Further analysis showed ……..

The study showed a prevalence of 5.4% which is steadily increasing especially in HIV children and the most prevalent coccidian species was identified as *C. parvum* with most cases being in children as shown in **Table 1** and **Table 2**. A study in central Uganda revealed a prevalence of 25% in a population of over 1000 children suffering from diarrhea due to *C. Parvum* [10].

The major risk factor associated with coccidian parasites in the study was consumption of raw drinking water from the bore hole and the taps **(Table 3).** Community lifestyle patterns such as poor hygiene, poor nutrition standards and challenges associated with preparation of safe drinking water such as scarcity of fuel (fire wood) and transport to collect fire wood from distant woods are responsible for the laziness amongst community members to prepare safe drinking water which is in agreement with a recent study [3]. Poor sanitation habits such as failure to clean water collecting jerricans over long periods of time is a major factor observed leading to contamination of water collected from bore holes in the communities [4]. Due to challenges of financing which is characteristic of sub-Saharan African local government, serving of water pipes is hardily carried out thus leading to sporadic leakages and contamination of the water [9]. This has subsequently led to increased episodes of infections in rural communities that are often forced to share the limited water sources especially in the dry seasons.

Patients actively on septrin® treatment were found to have a low prevalence probably due to the increased immunity compared to HIV patients not on therapy as shown in **Table 3.** Children are associated with a weak immunity and coupled with poor nutritional habits they are highly predisposed to secondary infections than adults [11] [12] [13]. Inferential analysis showed there existed a stronger relationship in drinking boiled water and septrin®. This would be due to the added advantage of boiled water where by the eggs and parasites are killed thus breaking the lifecycle. Patients on septrin® are sub clinically infected as they appear to have improved immunity against the parasites. Major constraints to the study included; small sample size and limited number of diagnostic tools used due to severe financial constraints.

4. CONCLUSION

The prevalence of coccidian parasites in HIV patients was shown to be >5% and the major risk factors identified were consumption of un-boiled water from the taps and bore holes. HIV patients on prophylactic treatment were shown to have an added advantage than those who were not. The study further highlighted the importance to control secondary infection in HIV patients regardless of age and social status.

Patients with HIV living in rural communities where it is difficult to access safe drinking water should be encouraged to take prophylactic treatments seriously. A further study should be conducted in the region using a wider array of diagnostic tools to determine the scale of diarrheal diseases in HIV patients.

CONSENT

I am a research student working on a research project to determine the prevalence of Intestinal coccidian parasites among HIV patients presenting with diarrhea. If you change your mind about participating during the course of the study, you have the right to withdraw

at any time. If there is anything that is not clear or you need further information, we shall be delighted to provide it.

Declaration of the patient

I have understood the purpose of the study, I realize that I may be contacted again if need be. I have read the information or it has been read to me. I have had the opportunity to ask questions about it and any questions that I have asked have been answered to my satisfaction. I consent voluntarily to participate as a subject in this study and I have the right to withdraw from the study at any time without any way affecting my health.

…… ……..

NAME/ SIGNATURE OF VOLUNTEER/ PATIENT **NAME/ SIGNATURE OF INVESTIGATOR**

ETHICAL APPROVAL

A copy of this research report was submitted to the Department of Medical Laboratory Sciences and MUST Research Ethical Committee for approval. Permission was sought from the hospital director, laboratory in-charge and head of HIV clinic Arua R.R Hospital. The purpose of this study including the procedure of specimen collection was explained to the participants. Consent of the patients was sought prior to recruitment for the study and the consent form was filled and signed by the patients. The consent form was translated into the local language and all participants/patients understood all the details of the study. Laboratory results of the patients were given to the clinicians concerned and all patients/participants were guided on how to get their results or any help from the hospital.

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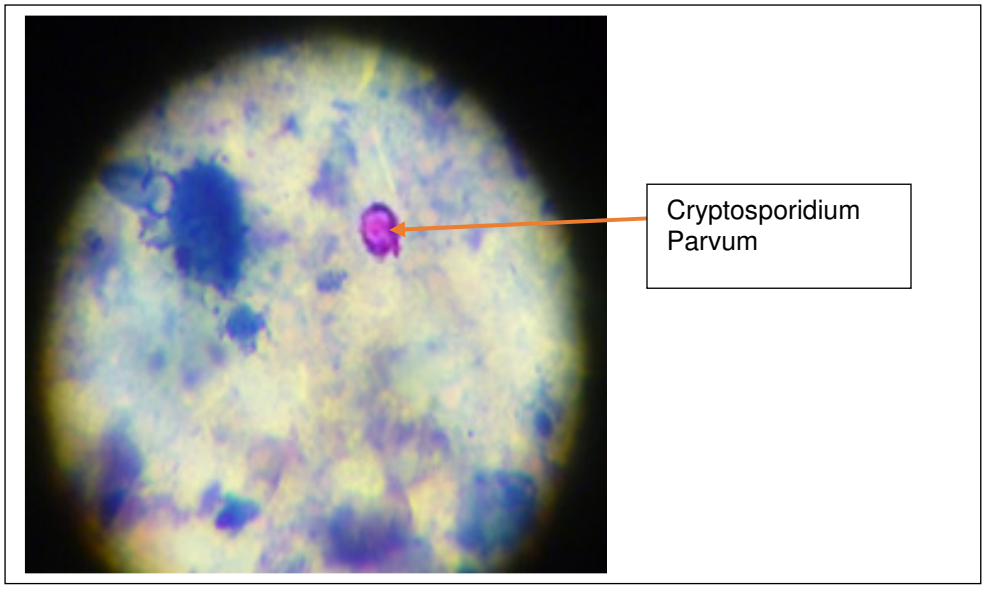
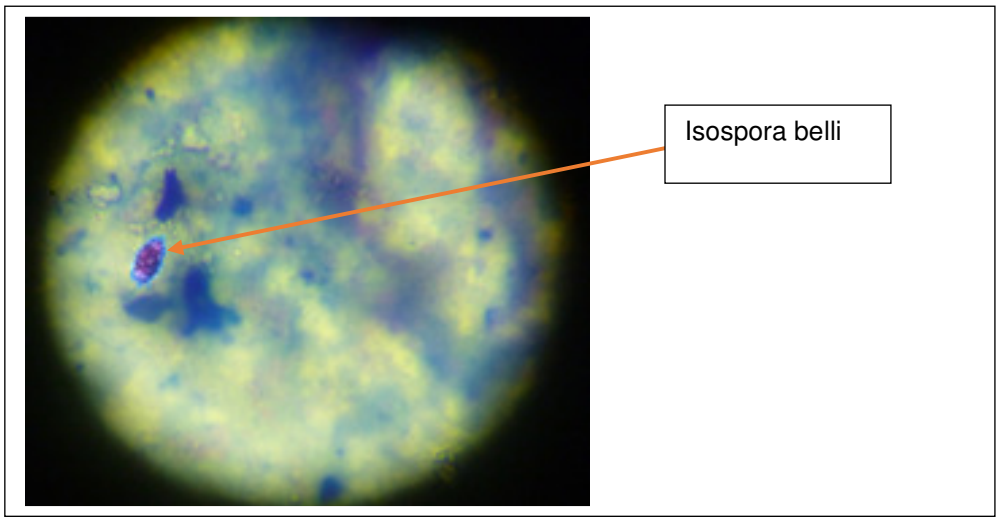
APPENDIX

Microscopic identification of the parasites





QUESTIONNAIRE

Now that you have accepted to be part of this study, may you avail the following information about yourself?

Patient´s identification code: ……

Date: ……

District: …….. Sub-county: ……village: …….

Sex: A. Female B. Male (tick one)

Age (years): ……

1. Do you know your HIV status? And if yes what is it?

A. Positive B. Negative

2. Do you have diarrhea? And if yes, how long have you had it?

……..

3. Do you take septrin® as prophylaxis treatment?

A. Yes B. No

4. Where do you get you water for domestic use?

A. Community well C. Bore hole

B. Tap D. Others specify …….

5. Do you boil drinking water at home?

A. Always C. Not at all

B. Some times

6. If you do not boil drinking water, can you briefly explain why?

……..

7. Do you clean the jerricans that you use for collecting water?

A. Yes B. No

8. If yes, how often do you clean the jerricans?

A. Daily B. Weekly C. Monthly D. Annually E. Others specify……

Client signature…… Researchers' signature…….