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Proportion of Urinary Schistosomiasis among HIV-Infected Subjects in Benin City, Nigeria

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Abstract

Objectives: This study aimed to determine the prevalence of urinary schistosomiasis, and the effect of CD4+ T cell counts and demographics on its prevalence among HIV-positive patients in Benin City, Nigeria.

Methods: Urine and blood samples were collected from 2000 HIV-positive subjects. A wet preparation of the urine deposit was examined microscopically to identify ova of *Schistosoma haematobium*. The blood specimens were analyzed using the flow cytometry for CD4 + T-lymphocyte count.

Results: An overall prevalence rate of 0.3% was reported. Gender and CD4 count <200 cells/μL did not affect the prevalence of urinary schistosomiasis, while HIV patients that were single had significantly higher prevalence of urinary schistosomiasis (p=0.002).

Conclusion: The prevalence of urinary schistosomiasis among HIV patients in Benin City is low. CD4+ count did not affect the prevalence of urinary schistosomiasis.

Keywords: HIV; *Schistosoma haematobium*.

Introduction

Schistosomiasis is a water-borne disease caused by the trematode *Schistosoma* and it constitutes one of the most important parasitic diseases of man.[1] *Schistosoma haematobium* alone constitutes a major public health problem in 44 African countries and is endemic in Nigeria.[2] Schistosomiasis is regarded as second only to malaria in its socio-economic and public health implications.[3] Up to 75% of women infected with urinary schistosomiasis often develop irreversible lesions in the vulva, vagina, cervix and uterus, creating a lasting entering point for HIV. The interaction of female genital schistosomiasis with contribution to HIV transmission was clearly described as early as 1995.[4] Schistosomiasis infection has been reported to increase the risk of HIV infection among women due to the fact that this parasite causes genital lesions and sandy patches.[5] While the presence of blood and leucocytosis in seminal fluid is expected to promote transmission of HIV infection.[4] Several studies on HIV prevalence have shown unexplained gender quotient disfavoring rural women,[6] with 1.3 to 6.4 HIV-infected women to every man. The highest HIV prevalence rates in Africa are found in urban and semi-urban areas,[6] while *Schistosoma haematobium* is usually a rural disease as it is transmitted in fresh water bodies where the intermediate host lives. Both diseases meet in migrating populations, travellers, commuting spouses and roadside villages.[7] There is little or no report on the prevalence of urinary schistosomiasis among HIV-positive patients in Benin City. Against this background, this study aimed to determine the prevalence of urinary schistosomiasis, effect of CD4+ count and demographics on the prevalence in Benin City, Nigeria.

Methods

The study was conducted at the University of Benin Teaching Hospital, Benin City, Edo State, Nigeria between August 2007 to August, 2009. A total of 2000 (668 males and 1332 females) HIV patients attending HIV clinics and 500 (209 males and 291 females) were recruited for this study. The age of the study subjects ranged from 21 to 70 years. Informed consent was obtained from each subject prior to specimen collection. The study was approved by the Ethical Committee of the University of Benin Teaching Hospital.

Urine and blood samples were collected from each patient. Urine samples were collected into screw-capped universal containers and processed as described by Nwosu *et al*.[8] Briefly, 10 ml of urine was transferred into a centrifuge tube and spun for 5 min at 5,000 rpm. The supernatant was discarded and a drop of the resuspended deposit was placed on a clean grease-free slide and covered with a cover slip and examined for the presence of ova of *Schistosoma haematobium*. The presence of ova of *S. haematobium* was taken as positive and its absence taken as negative. CD4+ T-lymphocyte count was determined using flow cytometry (Partec, Germany) following the manufacturer's instructions. Briefly, 20 μL of CD4 PE antibody and 20 μL of well mixed whole EDTA

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blood was placed in a Partec test tube, mixed gently and incubated in the dark for 15 mins at room temperature. The samples were mixed every 5 mins during incubation. Eight hundred microlitres of CD4 buffer was added and the sample mixed gently and $CD4^+$T cells counted automatically by the machine.

A structured questionnaire was used to obtain demographic information from the study subjects.

Statistical analysis

Data were analyzed using chi square (X^2) and odd ratio (OR) analysis. The statistical software INSTAT ® was used for the analysis.

Results

A total of 6 (0.3%) out of 2000 HIV-positive patients had urinary schistosomiasis (Table 1). Gender and $CD4^+$ count <200 cells/µl did not affect the prevalence of urinary schistosomiasis, (Table 1). Thus, occupation, level of education, source of water did not affect the prevalence of urinary schistosomiasis, while being single (unmarried) resulted in significantly higher prevalence of urinary schistosomiasis (p=0.002). (Table 1)

Table 1: Prevalence of urinary schistosomiasis in relation to sex, CD4 count and demographics.

Characteristics	No test	No infected	*p* value
Gender			**0.667**
Male	668	3 (0.45)	
Female	1332	3 (0.23)	
Total	2000	6 (0.30)	
CD4 count			**0.773**
<200 cells/µL	255	1 (0.40)	
³200 cells/µL	1745	5 (0.29)	
Clinical Manifestations			
Hematuria	0	0	
Fever	461	1	0.710
Joint pain	22	1	0.089
Rash	78	1	0.574
Cough	47	1	0.333
Weight loss	1107	4	0.883
Nausea	74	0	0.631
Vomiting	2	0	0.938
Educational background			**0.679**
None	57	0	
Primary	287	1 (0.04)	
Secondary	1281	5 (0.4)	
Tertiary	334	0	
Marital status			**0.002**
Single	74	2 (2.67)	
Married	1897	4 (0.21)	
Divorced	22	0	
Widowed	6	0	
Occupation			**0.748**
Civil servant	221	0	
Businessmen/women	169	1(0.59)	
Security	16	0	
Artisan	427	3(0.70)	
Trader	1055	2(0.19)	
Farmer	15	0	
Housewife	62	0	
Student	35	0	
Source of water			**0.890**
Pipe borne	34	0	
Bore hole	1811	6(0.33)	
Well/Rain	133	0	
Stream/River	22	0	

Discussion

Schistosomiasis remains a burden in Africa and a major health problem in developing countries especially the rural communities.[8] In many regions of the world, both schistosomiasis and HIV are endemic, resulting in patients harboring co-infections.[9] The overall prevalence rate of 0.30% is lower than that observed in other studies. Ndhlovu *et al.*[10] observed a prevalence rate of 33% in Zimbabwe, while Kallestrup *et al.*[11] recorded a prevalence rate of 26.3% in a rural community in Zimbabwe among a population of HIV-infected patients. Okwori and Alao reported a prevalence of 20% among AIDS patients in Otukpo, Nigeria.[12] The difference in this current study and that of other authors may be due to locations as urinary schistosomiasis is not common in this locality as 500 HIV sero-negative individuals (controls) were negative for urinary schistosomiasis (data not shown) and that the positive cases may have come from migrating population. Our institution is the South regional centre for the President's Emergency Plan for AIDS Relief (PEPFAR) and the Institute for Human Virology, Nigeria (IHVN) and we receive HIV patients from many southern states of the country. It is important to note that studies with higher prevalence were conducted in rural settings,[10,11] as against ours was conducted in an urban setting.

The prevalence of urinary schistosomiasis did not differ significantly (p=0.667) between both genders. This observation had been noted earlier.[13] However, Okwori and Alao reported a significant prevalence in relation to gender. The reason may be due to few numbers of positive cases of schistosomiasis.[12] The prevalence of urinary schistosomiasis did not differ significantly (p=0.773) between HIV-positive patients with CD4 count < 200 cells/µl (0.40%) and those with $CD4^+$ count 200 cells/µl (0.29%). The primary defenses against urinary tract infection of which urinary schistosomiasis is one are; low pH, high urine urea concentration and osmolality.[14] These three antibacterial properties of urine are not controlled by $CD4^+$ lymphocyte. This

may explain the result in this study.

The clinical manifestation noted in this study did not also affect the prevalence of urinary schistosomiasis (p>0.05). Hematuria, which is a strong indication of urinary schistosomiasis was not observed in this study. However, it raises the question of whether or not hematuria should still be used as a clinical diagnostic criterion among HIV-positive patients. Educational background did not affect the prevalence of urinary schistosomiasis in this study (p=0.679), a finding inconsistent with a previous report.[8] This observation in this study may have been due to small number of positive cases. The effect of marital status on the prevalence of urinary schistosomiasis shows that singles have significantly higher prevalence (p=0.002). This may be due to the fact that singles are more likely to visit streams where they may come into contact with cercaria of schistosome. In this study, occupation did not affect the prevalence of urinary schistosomiasis, although the reason for this is unclear. However, Nwosu *et al.*[8] and Okoli and Iwuala,[15] reported a relationship between the prevalence of schistosomiasis and occupation. The source of water did not affect the prevalence of urinary schistosomiasis in this study, as all infected persons had borehole as their source of water. This is an unlikely source for the transmission of urinary schistosomiasis, and may cast doubts on the accuracy of information given in the questionnaire.

Conclusion

Overall, we observed a prevalence of 0.30% of urinary schistosomiasis among HIV-positive patients. Gender did not affect the prevalence of urinary schistosomiasis. CD4 count <200 cells/µl did not result in higher prevalence of urinary schistosomiasis among HIV-infected patients while the prevalence was higher among unmarried HIV patients. However, there is still need for further studies to clarify these findings.

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