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ORIGINAL ARTICLE

Prevalence and Factors for Urinary Schistosomiasis Acquisition Among HIV Positive Women Living in Lower Moshi, Tanzania: A Cross Sectional, Hospital Based Study

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ABSTRACT

Background: Schistosomiasis is a neglected tropical disease endemic in sub-Saharan Africa and remains a major public health concern in rural farming communities. In women of reproductive age, infection is associated with significant morbidity and may increase susceptibility to HIV infection, making co-infection an important health challenge in endemic settings such as Tanzania. However, limited data exist on its burden and determinants among HIV positive women. This study assessed the prevalence and associated factors of schistosomiasis among HIV positive women in Moshi, Tanzania.
Methodology: A hospital based cross sectional study was conducted in Moshi from April to June 2021 among 260 HIV positive women aged 18 years to 49 years attending Care and Treatment Clinics. Systematic sampling was used. Urine samples were examined for Schistosoma haematobium eggs using the membrane filtration technique. Data were analysed using chi-square tests and logistic regression, with multivariate analysis used to control for confounding factors. A P value of less than .05 was considered statistically significant.
Results: A total of 260 HIV positive women were enrolled in the study. Most participants were aged 31years to 40 years 120 (46.2%) and had primary education 206 (79.2%). The overall prevalence of schistosomiasis was 13 (5%). The infection was slightly less common among women aged less than 30 years 2 (15.4%). In multivariate logistic regression analysis, previous history of schistosomiasis infection was strongly associated with current infection (AOR=40.0, 95% CI: 6.5–240.0, P<.001). Use of river water for domestic purposes was also significantly associated with infection (AOR=5.8, 95% CI: 1.2–26.0, P=.02). In addition, frequent contact with dam/pond water was independently associated with schistosomiasis infection (AOR=2.5, 95% CI: 1.0–6.5, P=.04).
Conclusion: Schistosomiasis remains present among HIV positive women in Lower Moshi, although at a low prevalence. Environmental exposure, particularly contact with unsafe and stagnant water sources, together with a history of previous infection, were the main predictors of infection. The findings highlight the need for integrated control strategies targeting both schistosomiasis and HIV in high-risk rural populations, alongside improved access to safe water and sustained health education.

BACKGROUND

Schistosomiasis is a chronic parasitic disease caused by blood flukes of the genus *Schistosoma* and remains one of the most important neglected tropical diseases globally.[1,2] It affects over 250 million people worldwide, with the highest burden in sub-Saharan Africa, where poverty, inadequate sanitation, limited access to clean water, and frequent contact with contaminated freshwater sustain transmission.[3] The disease is closely associated with rural and agricultural communities, where activities such as irrigation farming, washing, bathing, and fishing increase exposure to infectious cercariae released from freshwater snails.[1] Among the different species, *Schistosoma haematobium* is particularly important because it causes urogenital schistosomiasis, which is associated with hematuria, bladder pathology, and reproductive tract complications. In women, genital schistosomiasis has gained increasing attention due to its potential to cause chronic inflammation and lesions in the genital tract, which may have long term consequences on reproductive health.[4–6]

More importantly, emerging evidence suggests that schistosomiasis, especially female genital schistosomiasis, may increase susceptibility to HIV infection by disrupting mucosal barriers and promoting chronic inflammation that facilitates viral entry.[7,8] However, some studies have reported conflicting findings regarding this association, indicating that the relationship is not yet fully understood.[9]

The co-endemicity of schistosomiasis and HIV in sub-Saharan Africa creates a endemic situation, where the interaction between the two diseases contributes to increased morbidity and complicates disease control efforts.[7] HIV infection may also influence the course of schistosomiasis by impairing immune responses, potentially increasing susceptibility and altering disease severity.[9] Despite this, integrated approaches addressing both conditions remain limited in many endemic settings.

In Tanzania, schistosomiasis remains a significant public health problem, particularly in regions with irrigation schemes and extensive freshwater exposure. Although mass drug administration of praziquantel has been implemented as the main control strategy, transmission persists in hotspot areas and among high risk populations.[1,10] Current control programs have largely focused on school aged children, leaving gaps in surveillance and intervention among adults, particularly women of reproductive age who continue to face regular exposure through domestic and occupational water related activities.[10]

HIV positive women represent a particularly vulnerable group due to potential immunosuppression and increased exposure to overlapping risk environments.[9] However, there is limited evidence on the burden and determinants of schistosomiasis in this population in Tanzania, especially in Moshi Rural, where environmental conditions favour transmission. Strengthening knowledge in this area is essential for guiding targeted interventions and improving integrated disease control strategies.

The World Health Organization has set a roadmap aiming to eliminate schistosomiasis as a public health problem by 2030.[11,12] Achieving this goal requires expanding control efforts beyond school-based programs to include all at-risk populations, including HIV positive women. Therefore, this study aimed to determine the prevalence and associated factors of schistosomiasis among HIV positive women in Moshi Rural, Tanzania, to provide evidence that can inform integrated and targeted control strategies.

MATERIALS AND METHODS

Study Design and Time

This was a hospital based cross sectional study conducted among HIV positive women attending selected Care and Treatment Clinics (CTCs) in Lower Moshi, Kilimanjaro Region, Tanzania. Data collection was carried out over a period of four months, from April to July 2021.

Study Area

The study was conducted in Lower Moshi, Kilimanjaro Region, Tanzania, an area that is predominantly rural, with agriculture serving as the main source of income for most inhabitants. The area is characterised by extensive irrigation schemes and vegetation resembling savannah grassland, which may contribute to the transmission of water-related diseases such as schistosomiasis. The elevation of the study area ranges from 700 to 950 meters above sea level. The region experiences a bimodal rainfall pattern, with long rains occurring from March to June and short rains from October to November, conditions that influence water contact activities and the ecology of schistosomiasis transmission. The study was specifically conducted at Pasua Health Centre and Tanganyika Planting Company (TPC) Hospital. These health facilities were purposively selected because they serve a large number of HIV-positive patients attending CTCs, making them appropriate sites for recruiting sufficient study participants.[13,14]

Study Population

The study population comprised HIV positive women aged 18 years to 49 years attending selected CTCs in Lower Moshi during the study period. This group was chosen because women in the reproductive age group are at increased risk of exposure to schistosomiasis due to socio-behavioral, environmental, and occupational factors, as well as their ongoing vulnerability related to HIV infection. The population included all eligible women who were registered and receiving HIV care and treatment services at the selected health facilities during the time of the study, regardless of their duration on antiretroviral therapy (ART) or clinical stage of HIV infection.

Eligibility Criteria

The study included HIV positive women aged 18 years to 49 years attending the selected CTCs in Lower Moshi during the study period. Participants were eligible if they were confirmed HIV positive, registered at the clinic, willing to participate, and provided written informed consent. Women who were mentally and physically able to respond to the questionnaire were also included. HIV positive women who were severely ill at the time of data collection and unable to participate in the interview were excluded, as well as those who declined to give informed consent or were not available during the study period. In addition, participants with incomplete questionnaire responses or missing clinical data were excluded from the final analysis to ensure data completeness and quality.

Population Sampling and Sample Size Estimation

The study population consisted of HIV positive women aged 18 years to 49 years attending the CTC at the selected health facilities in Lower Moshi. A systematic sampling technique was employed to select study participants. The sampling interval was determined based on the average number of HIV positive women attending the clinic during the study period and the required sample size. Every fourth eligible participant attending the clinic was selected for enrolment after the first participant was chosen randomly. Recruitment continued daily until the required sample size was attained.

With the 95% confidence interval, margin error of 10% and assuming that 50% of HIV positive women have schistosomiasis, the estimated sample size was 236 participants. To account for possible non-response and incomplete data, an additional 10% was added, resulting in a final sample size of 260 participants.

Data Collection

Data collection was conducted using a structured interviewer-administered questionnaire developed to obtain comprehensive information relevant to the study objectives. The questionnaire was initially prepared in English and later translated into Kiswahili, the local language commonly spoken by the study participants, to ensure clarity and understanding during interviews. The

Kiswahili version was reviewed by bilingual researchers to confirm consistency with the original English version. Interviews were conducted in a private setting at the CTC by trained research assistants and healthcare personnel to maintain confidentiality and minimize information bias. Before the actual study, the questionnaire was pre-tested among a small number of participants from a population with similar characteristics to assess the clarity, relevance, and appropriateness of the questions. Feedback obtained during the pre-test was used to revise and improve the questionnaire before the commencement of data collection.

The questionnaire consisted of three major sections. Section One collected socio-demographic information of the participants, including age, place of residence, marital status, occupation, education level, and other relevant background characteristics. These variables were important in describing the study population and assessing their possible association with schistosomiasis infection. Section Two focused on behavioral and environmental factors that may predispose participants to schistosomiasis infection. Information collected in this section included history and frequency of contact with freshwater bodies such as rivers, ponds, irrigation canals, and streams; domestic and occupational activities involving water contact, including farming, rice cultivation, washing clothes, bathing, fishing, and fetching water; source of water used for domestic purposes; use and availability of sanitation facilities such as toilets and latrines; and history of previous schistosomiasis infection or treatment. Additional information regarding personal hygiene and protective practices during water contact was also collected. Section Three included clinical and laboratory related information. Clinical data collected included HIV treatment history, duration since HIV diagnosis, use of ART, self-reported symptoms suggestive of schistosomiasis infection, such as abdominal pain, hematuria, dysuria, bloody stool, and fatigue, as well as a history of chronic illnesses. Laboratory investigation data included results of schistosomiasis diagnostic tests and other relevant clinical parameters obtained from participants' samples and medical records, where applicable.

Following enrollment and informed consent, biological samples were collected from participants using standard aseptic procedures. Laboratory investigations were conducted according to established standard operating procedures to ensure the reliability and accuracy of results. All completed questionnaires were reviewed daily by the principal investigator and supervisors to check for completeness, consistency, and accuracy before data entry and analysis. Unique identification codes were assigned to each participant to maintain confidentiality and facilitate linkage between questionnaire data and laboratory findings.

Laboratory Procedure

This study adopted laboratory procedures described by Poggensee et al. (2000) with slight operational adaptations.[15] Briefly, urine samples were collected from each participant on two consecutive days to increase the sensitivity of detection. The samples were properly labelled, stored under appropriate conditions, and transported to the laboratory for analysis immediately after collection. Each urine sample was examined for the presence of schistosome eggs using the trypan blue filtration technique. In this method, urine was filtered through a membrane filter to concentrate any parasite eggs present, after which the filter was examined microscopically for identification of schistosome ova. Quality control measures were applied throughout the process, including double reading of slides by experienced laboratory personnel to ensure accuracy and reliability of results. Genital schistosomiasis infection was assessed by examining crushed material under the microscope and quantifying the number of eggs per square millimetre of the sample. Participants were classified as positive (cases) if at least one schistosome egg was detected in any of the examined samples from the two consecutive days, while those with no detectable eggs in both samples were classified as negative.[15]

Data Analysis

Data were entered, cleaned, and analysed using the Statistical Package for Social Sciences (SPSS) version 25 (IBM Corp., Armonk, NY, USA). Descriptive statistical analyses were performed to summarise participants' demographic and clinical characteristics using frequencies and percentages for categorical variables. Chi-squared tests and Fisher's Exact tests were used to assess associations between categorical variables where appropriate. Binary logistic regression analysis was performed to determine factors associated with schistosomiasis infection among HIV-positive women. Variables with a p-value less than 0.05 in the univariate analysis were included in the multivariate logistic regression model to control for potential confounding factors. Adjusted odds ratios (AORs) with 95% confidence intervals (CIs) were calculated to measure the strength of associations. A *p*-value of less than .05 was considered statistically significant.

Ethics Approval

Ethical approval for this study was obtained from the Kilimanjaro Christian Medical University College Research Ethics Committee with ethical clearance number UG 15/2021. All study procedures and methods were conducted in accordance with relevant ethical guidelines and regulations. Written informed consent was obtained from all participants before enrolment in the study. To ensure confidentiality and privacy, each participant was assigned a unique identification code instead of personal identifiers during data collection and analysis. All information obtained from participants through questionnaires and laboratory investigations was kept confidential and used strictly for research purposes only.

RESULTS

Demographic Characteristics of the Study Population.

A total of 260 HIV positive women were included in the study. The majority of participants were aged 31 to 40 years, accounting for 46.2% of the study participants. Regarding marital status, most participants were married 100 (38.5%), followed by cohabiting 47 (18.1%). In terms of education level, the majority had primary education 206 (79.2%). Concerning occupation, most participants were engaged in farming activities 252 (96.9%), while a small proportion 8 (3.1%) were employed or involved in business activities. Regarding residence, the largest proportion of participants were from Pasua 95 (36.5%), followed by Mabogini 85 (32.7%) (Table 1).

TABLE 1: Demographic Characteristics of the Study Population (N=260)

Variables	Frequency (n)	Percentage (%)
Age group(years)		
<30	51	19.6
31-40	120	46.2
>41	89	34.2
Marital status		
Singles	30	11.5
Married	100	38.5
Divorced	39	15.0
Widow	44	16.9
Cohabiting	47	18.1
Education Level		
No formal education	22	8.5
Primary	206	79.2
Secondary	28	10.8
Advanced/college	4	1.5
Occupation status		
Farming activities	252	96.9
Employed/business	8	3.1
Residence		
Pasua	95	36.5
TPC	50	19.2
Mabogini	85	32.7
Arushachini	30	11.5

Distribution of Water Related and Clinical Variables Among Study Participants

Regarding, distribution of water-related practices and clinical history among the study participants. The majority of participants reported using latrines 256 (98.5%), while only 4 (1.5%) reported not using latrines. Regarding previous schistosomiasis infection, most participants 251 (96.5%) had no history of infection. In terms of reasons for water contact, the most common activity was agriculture 128 (49.2%), followed by fetching water 54 (20.8%). For domestic water sources, most participants used piped water 178 (68.5%), followed by well water 57 (21.9%). Regarding open water contact, the majority of participants reported exposure to river water 190 (73.1%), while smaller proportions reported contact with spring water 6 (2.3%) and pond water 2 (0.8%) (Table 2).

Prevalence of Schistosomiasis Among HIV Positive Women

Out of the total 260 participants enrolled in the study, 13 (5%) women tested positive for schistosomiasis, while the remaining 247 (95%) participants tested negative for the infection. (Figure 1).

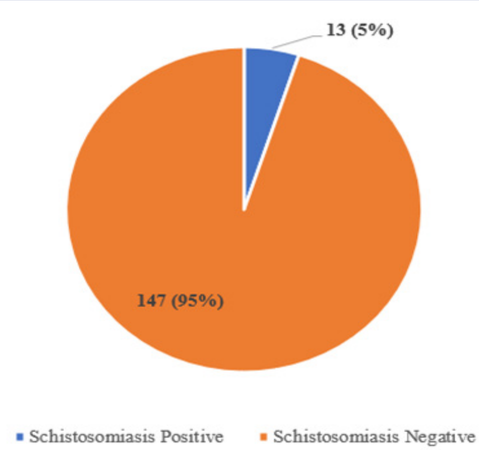
Distribution of Schistosomiasis Among HIV Positive Women

The distribution of schistosomiasis infection varied across socio-demographic and exposure-related variables among HIV positive women attending CTC in Lower Moshi. However, most socio-demographic factors showed no statistically significant association with infection. For age, schistosomiasis was more prevalent among those aged 31 to 40 years, 6 (46.2%), than among those above 41 years. Regarding marital status, prevalence was low among Divorced and singles 1 (7.7%). For education level, prevalence was highest among those with primary education 8 (61.5%). In terms of occupation, all positive cases occurred among unemployed participants 13 (100%). For residence, prevalence varied across sites: Pasua had the highest burden 5 (38.5%). Regarding latrine use, all infections were observed among participants who reported using latrines 13 (100%) (*P*=0.6).

TABLE 2: Distribution of Water Related and Clinical Variables Among Study Participants (N = 260)

Variables	Frequency (n)	Percentage (%)
Latrine use		
No	4	1.5
Yes	256	98.5
Previous infection		
No	251	96.5
Yes	9	3.5
Reason for water contact		
Agriculture	128	49.2
Fetching water	54	20.8
Swimming	21	8.1
Washing	47	18.1
Fishing	10	3.8
Domestic water source		
Piped water	178	68.5
River	17	6.5
Stream	8	3.1
Well	57	21.9
Open water contact		
River	190	73.1
Dam/Pond	62	23.8
Spring	6	2.3
Pond water	2	0.8

FIGURE 1: Prevalence of Schistosomiasis Among HIV Positive Women Attending CTC in Lower Moshi (N=260)



Participants with a previous infection had a markedly higher prevalence 8 (61.5%) compared to those without prior infection *P*<.01. For reasons of water contact, prevalence was highest among those involved in agriculture 8 (61.5%), followed by washing 3 (23.1%), although no statistically significant association was observed (*P*=.6). Regarding the water source for domestic use, infection was significantly associated with the source of water (*P*=.009). Higher prevalence was observed among piped water users 6 (46.2%). Finally, contact with open water sources was also significantly associated with infection (*P*= .04). Prevalence was higher among participants exposed to dam/pond water 8 (61.5%) compared to river users (Table 3).

Factors Associated with Schistosomiasis Among HIV Positive Women

In the multivariate model, most socio-demographic variables, including age, marital status, education level, occupation, residence, and latrine use, were not statistically significantly associated with schistosomiasis infection (*P*>.05). Regarding age, neither the age group 31–40 years nor those above 41 years showed a significant association with infection when compared to women aged below 30 years in both crude and adjusted analyses. Similarly, marital status, education level, occupation status, and place of residence did not show any independent association with schistosomiasis after adjustment for confounding factors. A history of previous schistosomiasis infection showed a strong and statistically significant association with current infection. Participants who reported a previous infection had significantly higher odds of being infected compared to those with no history of infection (AOR = 40.0, 95% CI: 6.5–240.0, *P*<.001), indicating a strong predictor of reinfection or persistent exposure. In terms of water related factors, the domestic water source was significantly associated with schistosomiasis infection. Participants who used river water had higher odds of infection compared to those using piped water (AOR = 5.8, 95% CI: 1.2–26.0, *P*=.02). Use of stream water also showed an increased risk, although this was not statistically significant after adjustment (AOR = 3.5, 95% CI: 0.8–16.0, *P*=.09). Similarly, frequent contact with open water sources was significantly associated with infection. Participants exposed to dam or pond water had higher odds of schistosomiasis compared to those mainly exposed to river water (AOR = 2.5, 95% CI: 1.0–6.5, *P*=.04). Other open water sources, such as springs and ponds, were not significantly associated with infection (Table 4).

TABLE 3: Prevalence of Schistosomiasis by Socio-demographic Factors (N=260)

Variables	N (%)	Schistosomiasis Positive n (%)	Schistosomiasis Negative n (%)	*P value*
Age				
<30	51 (19.6)	2 (15.4)	49 (19.8)	.9
31-40	120 (46.2)	6 (46.2)	114 (46.2)	
>41	89 (34.2)	5 (38.5)	84 (34.0)	
Marital status				
Single	30 (11.5)	1 (7.7)	29 (11.7)	.3
Married	100 (38.5)	4 (30.8)	96 (38.9)	
Divorced	39 (15.0)	1 (7.7)	38 (15.4)	
Widow	44 (16.9)	5 (38.5)	39 (15.8)	
Cohabiting	47 (18.1)	2 (15.4)	45 (18.2)	
Education Level				
No formal education	22 (8.5)	4 (30.8)	18 (7.3)	.3
Primary	206 (79.2)	8 (61.5)	198 (80.2)	
Secondary	28 (10.8)	1 (7.7)	27 (10.9)	
University/College	4 (1.5)	0 (0.0)	4 (1.6)	
Occupation status				
Unemployed	252 (96.9)	13 (100.0)	239 (96.8)	.4
Employed	8 (3.1)	0 (0.0)	8 (3.2)	
Residence				
Pasua	95 (36.5)	5 (38.5)	90 (36.4)	.5
TPC	50 (19.2)	2 (15.4)	48 (19.4)	
Mabogini	85 (32.7)	3 (23.1)	82 (33.2)	
Arusha chini	30 (11.5)	3 (23.1)	27 (10.9)	
Latrine use				
No	4 (1.5)	0 (0.0)	4 (1.6) 0.6	
Yes	256 (98.5)	13 (100.0)	243 (98.4)	
Previous infection				
No	251 (96.5)	5 (38.5)	246 (99.6)	<.01

Continue

TABLE 3: Continued

Variables	N (%)	Schistosomiasis Positive n (%)	Schistosomiasis Negative n (%)	*P value*
Yes	9 (3.5)	8 (61.5)	1 (0.4)	
Reason for contact with water				
Agriculture	128 (49.2)	8 (61.5)	120 (48.6)	.6
Fetching water	54 (20.8)	2 (15.4)	52 (21.1)	
Swimming	21 (8.1)	0 (0.0)	21 (8.5)	
Washing	47 (18.1)	3 (23.1)	44 (17.8)	
Fishing	10 (3.8)	0 (0.0)	10 (4.0)	
Water sources for domestic use				
Piped water	178 (68.5)	6 (46.2)	172 (69.6)	.009
River	17 (6.5)	3 (23.1)	14 (5.7)	
Stream	8 (3.1)	2 (15.4)	6 (2.4)	
Well	57 (21.9)	2 (15.4)	55 (22.3)	
Open water sources are frequently contacted.				
River	190 (73.1)	8 (61.5)	182 (73.7)	.04
Dam/Pond	62 (23.8)	5 (38.5)	57 (23.1)	
Spring	6 (2.3)	0 (0.0)	6 (2.4)	
Pond water	2 (0.8)	0 (0.0)	2 (0.8)	

Bolded=significant, $p<.05$

TABLE 4: Predictors of Schistosomiasis Among HIV Positive Women (N=260)

Variables	N (%)	COR (CI 95%)	*p value*	AOR (CI 95%)	*p value*
Age					
<30	51 (19.6)	1	—		
31-40	120 (46.2)	1.20 (0.25–5.80)	.81		
>41	89 (34.2)	1.40 (0.28–7.00)	.68		
Marital status					
Single	30 (11.5)	1	—		
Married	100 (38.5)	1.10 (0.10–5.00)	.90		
Divorced	39 (15.0)	0.80 (0.05–4.20)	.78		
Widow	44 (16.9)	2.20 (0.20–11.0)	.45		
Cohabiting	47 (18.1)	1.50 (0.12–8.00)	.70		
Education Level					
No formal education	22 (8.5) 1				
Primary	206 (79.2)	3.00 (0.80–11.5)	.09		
Secondary	28 (10.8)	1.20 (0.30–4.50)	.80		
University/College	4 (1.5)	0.90 (0.05–8.00)	.92		
Occupation status					
Unemployed	252 (96.9)	1			
Employed	8 (3.1)	1.60 (0.20–12.0)	.65		
Residence					
Pasua	95 (36.5)	1			
TPC	50 (19.2)	0.80 (0.20–3.20)	.75		
Mabogini	85 (32.7)	0.90 (0.25–3.40)	.88		
Arusha chini	30 (11.5)	2.10 (0.50–8.80)	.30		
Latrine use					
No	4 (1.5)	1			
Yes	256 (98.5)	0.60 (0.05–6.00)	.70		
Previous infection					
No	251 (96.5)	1		1	
Yes	9 (3.5)	45.0 (8.0–250.0)	**<.001**	40.0 (6.5–240.0)	**<.001**

Continue

TABLE 4: Continued

Variables	N (%)	COR (CI 95%)	*p value*	AOR (CI 95%)	*p value*
Reason for contact with water					
Agriculture	128 (49.2)	1			
Fetching water	54 (20.8)	0.90 (0.20–4.20)	.90		
Swimming	21 (8.1)	1.10 (0.10–10.0)	.92		
Washing	47 (18.1)	1.30 (0.30–5.50)	.75		
Fishing	10 (3.8)	0.80 (0.05–10.0)	.90		
Water sources for domestic use					
Piped water	178 (68.5)	1		1	
River	17 (6.5)	6.5 (1.5–28.0)	**.01**	5.8 (1.2–26.0)	**.02**
Stream	8 (3.1)	4.0 (0.9–18.0)	.07	3.5 (0.8–16.0)	.09
Well	57 (21.9)	1.2 (0.3–4.0)	.80	1.1 (0.3–3.8)	.85
Open water sources are frequently contacted.					
River	190 (73.1)	1		1	
Dam/Pond	62 (23.8)	2.8 (1.1–7.0)	**.03**	2.5 (1.0–6.5)	**.04**
Spring	6 (2.3)	0.9 (0.1–6.0)	.95	0.8 (0.1–5.5)	.90
Pond water	2 (0.8)	1.0 (0.1–9.0)	.99	0.9 (0.1–8.5)	.98

COR = crude odds ratio; AOR = adjusted odds ratio, Bolded=significant, *p*<0.05

DISCUSSION

This study assessed the prevalence and factors associated with schistosomiasis among HIV positive women attending Care and Treatment Clinics in Lower Moshi, Tanzania. The overall prevalence was 5%, indicating a relatively low but persistent level of infection in this population. The prevalence observed in this study is comparable to a previous hospital-based study conducted among HIV positive women in northern Tanzania, which also reported a prevalence of approximately 5%.[16] However, it is lower than findings from community based studies in endemic regions of Tanzania and sub-Saharan Africa, where prevalence among adults and high-risk groups has been reported to range from 10% to over 30% depending on location and diagnostic method.[17,18] The lower prevalence in the current study may be explained by the hospital-based design, where participants are more likely to have access to health services, including periodic deworming with praziquantel, compared to general community populations

In this study, no statistically significant association was observed between schistosomiasis infection and socio-demographic factors, including age, marital status, education level, occupation, residence, and latrine use. This finding is consistent with studies conducted in endemic regions of Tanzania and Uganda, which have shown that demographic factors alone are weak predictors of schistosomiasis infection after controlling for exposure related variables.[19,20] This suggests that in endemic rural settings, behavioral and environmental exposures outweigh socio-economic differences in determining infection risk.

In contrast, some studies have reported significant associations between younger age and higher infection rates, particularly among adolescents and young adults, due to increased water contact activities such as swimming and domestic chores.[21] The absence of such an association in the current study may be due to the relatively homogeneous exposure pattern among adult HIVpositive women in farming communities, where water contact is frequent across all age groups.

A previous history of schistosomiasis infection was the strongest predictor of current infection in this study (AOR = 40.0, *P*<.001). This finding indicates either reinfection or persistent exposure to infested water sources. Similar findings have been documented in longitudinal studies, where individuals previously infected with schistosomiasis remain at high risk of reinfection due to continuous contact with contaminated freshwater bodies.[22] This highlights the chronic nature of schistosomiasis transmission in endemic communities and suggests that treatment alone, without environmental control, is insufficient to interrupt transmission cycles.

Water-related exposures were also significantly associated with infection in this study. Participants who used river water for domestic purposes had significantly higher odds of infection (AOR=5.8, *P*=.02). Similarly, frequent contact with dam or pond water was independently associated with infection (AOR=2.5, *P*=.04). These findings are consistent with extensive evidence showing that freshwater bodies serve as the primary transmission sites for schistosomiasis due to the presence of infected Biomphalaria or Bulinus snails that release cercariae into water.[2,18] Studies from Tanzania have also reported significantly higher infection rates among individuals using rivers, streams, and irrigation canals for domestic and occupational activities.[17]

The significant association between dam/pond contact and infection further supports the role of stagnant water bodies in sustaining transmission. Dams and ponds provide ideal habitats for snail intermediate hosts, leading to higher cercarial density and increased infection risk among individuals engaging in washing, bathing, or agricultural activities in these environments.[23] Similar observations have been reported in studies from irrigation schemes in northern Tanzania and Egypt, where dam-associated transmission hotspots have been identified as major contributors to persistent infection.[24,25] Generally, the findings of this study indicate that environmental exposure rather than socio-demographic characteristics primarily drive schistosomiasis transmission among HIV positive women in Lower Moshi. The strong association with previous infection and water contact behaviors emphasises the need for integrated control strategies that go beyond periodic deworming.

Strengths and Limitations

This study provides important evidence on schistosomiasis among HIV positive women in a rural endemic setting, a population that is often underrepresented in research. The use of laboratory confirmed diagnosis through urine microscopy improved the reliability of infection detection, while systematic sampling reduced selection bias and enhanced the representativeness of clinic attendees. Additionally, the application of multivariate logistic regression allowed adjustment for confounding factors, strengthening the validity of the identified associations. However, the cross-sectional design limits causal inference, and the use of single urine samples may have underestimated the true prevalence due to intermittent egg excretion. Being a hospital-based study may also limit generalizability to the wider community, and self-reported behavioural data may be subject to recall bias. Furthermore, the small number of positive cases may have reduced statistical power for some associations.

CONCLUSION

This study demonstrates that schistosomiasis persists among HIV positive women in Lower Moshi, with an overall prevalence of 5%. Although the burden is relatively low, infection remains an important public health concern in this high-risk population. Multivariate analysis identified previous history of schistosomiasis infection, use of unsafe water sources (river water), and contact with dam or pond water as the main independent predictors of infection. These findings highlight that environmental exposure, rather than socio-demographic factors, plays a central role in sustaining transmission. Strengthening access to safe water, improving sanitation, and integrating schistosomiasis prevention and control measures within HIV care services are essential to reduce infection and prevent reinfection in endemic rural communities.

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