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Prevalence of Schistosomiasis and Associated Risks Factors among Patients with Urinary Tract Infection Attending Specialist Hospital Bauchi

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Abstract

Background: Schistosomiasis, a parasitic disease caused by Schistosoma species, remains a significant public health concern in many developing regions, including Bauchi, Nigeria. This study aims to assess the prevalence of schistosomiasis and identify associated risk factors among patients with urinary tract infections (UTIs) attending the Specialist Hospital Bauchi.

Methods: A cross-sectional study was conducted involving patients presenting UTI symptoms at the Specialist Hospital Bauchi. Urine samples were collected and analyzed for *Schistosoma haematobium* eggs using microscopy. Demographic and clinical data were obtained through structured questionnaires to identify potential risk factors for schistosomiasis, including water contact activities, sanitation practices, and socio-economic status.

Results: Out of the total patients screened, a significant proportion tested positive for *Schistosoma haematobium*, indicating a notable prevalence of schistosomiasis among UTI patients. The study shows a prevalence of *Schistosomiasis* in the study area to be 7.0%. The high prevalence of the infection was observed in males 71.4% over females 28.6%. The study also revealed the highest prevalence of up to 50% of the infection in the participants aged 11-20 years. Statistical analysis revealed several risk factors strongly associated with schistosomiasis, including frequent contact with contaminated water sources, poor sanitation facilities, and lower socio-economic status.

Conclusion: The study highlights a high prevalence of schistosomiasis among UTI patients in Bauchi, underscoring the need for integrated disease management and prevention strategies. Public health interventions focusing on improving water sanitation, health education, and targeted treatment programs are essential to reduce the burden of schistosomiasis in this region. These findings can stimulate further research and policy development aimed at controlling this neglected tropical disease.

Keywords: *Schistosomiasis, Risk factors, Urinary tract infections (UTIs), Public health, Prevalence*

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Introduction

Schistosomiasis is highly prevalent and neglected tropical diseases especially in tropical and subtropical regions of Africa, Latin America and Asia which is significantly associated with morbidity and mortality (Mohammed et al., 2023). Schistosomiasis as a major health problem has significantly impacted negatively on socioeconomic wellbeing in areas whare control and sanitation effort are inadequate and the majority of population are impoverished (Riffenburgh et al., 1997). Globally there is relatively high prevalence of schistosomiasis in the developing countries, with recent estimated indices of 799 million people at risk of infection, and 85% of this population from Africa. Over 200million people across 74 countries were infected with the disease with over 100million people developing the disease (Salem & Mahfouz, 2012)

Many African countries including Nigeria are greatly burden with this disease with millions of individuals suffering from schistosomiasis (Person et al., 2016). Africa was known to accommodate at least 90% of people infected with schistosomiasis and are requiring treatment (Homsana et al., 2020). Children aged 5-17 years have the highest risk of infection in most developing countries (Johansson & Cohen, 1997).

The disease is caused by two know parasites, *Schistosoma mansoni* and *S. haematobium*. The outcome of *Schistosomiasis* varies dramatically, and it ranges from mild to severe damage of kidneys and /or bladder. The clinical presentation is terminal hematuria, associated usually with increased frequency of micturition and dysuria (Abol-Enein, 2008).

The fact that large epidemiological differences exist between countries, this therefore necessitate each country adopting an approache suitable for the management of the disease. However, the scope for eliminating Schistosomiasis in other countries is promising, the Peoples' Republic of China, Brazil, Egypt, Morocco and Oman among others, the situation in Sub-Saharan Africa is different despite the continent habouring over 90% of the disease in the world (Bergquist & Gray, 2019).

Factors that significantly increase the risk of *Schistosomiasis* infection are personal hygiene and high frequency of contact with water in an endemic (Bajiro *et al*., 2016). In addition to that, poor sanitation, bathing and swimming in dams and rivers or crossing rivers on the way to school barefooted, use of unprotected water sources to watering the vegetable garden are the also associated with the infection (Nyati-Jokomo *et al*., 2017).

Materials and Methods

Study Area

The study was conducted at Specialist Hospital Bauchi; the hospital is a semi-autonomous but is being supervised by the ministry of health which is responsible for the co-ordination of health matters in the State. The hospital provides health care for many individuals from urban/rural setting of the in the state, and it is a referral center for patients from all over northeast region

Study design

Cross-sectional study was undertaken between December, 2023 and March, 2024 urinary tract infected patients to determine the prevalence of urinary Schistosomiasis infection among patients attending Bauchi state specialist hospital Bauchi. The inclusion criteria for this study include; all respondent were patients attending specialist hospital Bauchi who give consent to participate in the study while the exclusion criteria consist patients who declined to participate in the study.

Sample size

The study sample size was determined with the Cochrane formula (Nale et al., 2007), with a prevalence estimate of 2.5% (Bassey & Umar, 2006).

$N = Z^2 p (1 - p)/d$

Where Z=1.96, p=2.5% (0.025) is the prevalence expected according to a previous study, d is the precision or margin of the error (5%, d=0.5), and N is the sample size. A minimum sample of 37.44 was calculated. However, the sample size calculated was adjusted to 200 as the baseline sample size of our study to avoid bias in the selection of the patients.

Sample /Data collection

Urine samples collected from 200 patients in the study area was analyzed to detect *S. haematobium* eggs. The collection of urine samples has taken place between 10 am and 2 pm, using 30 ml universal screw-capped sample bottle when the excretion is usually maximal (Bigwan et al., 2012). The urine samples were labeled accordingly and taken to the department of microbiology laboratory Bauchi state university Gadau for analysis. Socio-demographic characteristics of the study participant was determine using questionnaire and the risk factors such as sex, age, swimming in the river, source of clean water, socio economic status, environmental sanitation, pain during urination, and personal hygiene.

Sample processing

A centrifugation and sedimentation technique was used to analyze the samples (Evans et al., 2013). 10 ml of urine was allowed to sediment for 1 h, it was centrifuged at 2000 rpm for 2 min. A drop of sediment was placed on a clean glass slide and covered with a coverslip after the supernatant was discarded. Microscopically, the sediment was examined with × 10 and × 40 objectives. Urine samples containing *S. haematobium* eggs were classified as positive, whereas those without schistosome eggs were considered negative (Olorunlana, 2022). In addition, Schistosomiasis rapid test kits were purchase for detection of the parasites in case where microscope fails to identified.

Ethical clearance

Ethical approval was obtained from the Ethical Committees of the Bauchi State Ministry of health and that of specialist Hospital before data and sample collection from patients. Consent was sought from all study participants.

Data Analysis

All collected information were imported into Microsoft Excel 2019 and analyzed in SPSS version 24. The associations between the dependent and independent variables were evaluated with Chi-square, bivariate, and multiple logistic regression analyses. The strength of the association was determined with the odds ratio (OR) with a 95% confidence interval. P values less than 0.05 was considered statistically significant.

Results

Socio-demographic characteristics and prevalence of schistosomiasis

The result from the study showed that the incidence of urinary schistosomiasis among the patients with urinary tract infections attending specialist hospital Bauchi was 7%. Out of the 200 participant in the study, 94 (47%) were male, while 106 (53%) were females, as shown in Table 1. Urinary schistosomiasis infection was higher among male patients (10.6%) than females (3.8%). However, the observed

differences in the urinary schistosomiasis prevalence to sex were not statistically significant ($\chi 2 = 3.61$, df = 1, p = 0.058). In terms of age, 102 patients were between the age group of 11-20, 56 between the age group of 31-40 years, and 42 between the age group of 21 to 30 were enrolled in the present study. The highest urinary schistosomiasis infection was found among the 21-30 age group (9.5%), followed by the 11-20 age group (6.9%) and 31 and above age group (5.4%). Meanwhile, urinary schistosomiasis infection was not detected at age group 0 – 10 years. However, the result showed no significant difference within the age groups ($\chi^2=0.646$, df=3, p=0.724) (Table 1).

Table 1: Socio-demographic features of the prevalence of schistosomiasis infection among patients according to sex and age

Variables	Frequency (%)	No. Positive (%)	No. Negative (%)	χ^2	p-value
Sex					
Males	94 (47.0)	10 (10.6)	84 (89.4)	3.606	0.058
Females	106 (53.0)	4 (3.8)	102 (96.2)		
Age					
0-10	0	0 (0)	0 (0)	0.646	0.724
11-20	102	7 (6.9)	95 (93.1)		
21-30	42	4 (9.5)	38 (90.5)		
31-40	56	3 (5.4)	53 (94.6)		

Associated risk factors for urinary schistosomiasis

Of the 200 patients, 32 (16.0%) had the habit of swimming, while 68 (34.0%) had a clean water source. Of the study participants, 50 (25.0%) had a good socioeconomic system, 76 (38.0%) had proper environmental sanitation, and 46 (23.0%) of the patients used to have good personal hygiene, as shown in Table 2. Patients that swims had the highest prevalence rate of schistosomiasis (37.5%) compared to others. The analysis of the risk factors such as swimming and good personal hygiene were significantly associated with the infection ($p<0.05$) (Table 2).

Table 2: Frequency of risk factors associated with urinary schistosomiasis infection among patients attending Specialist hospital

Risk factors	Frequency	No. Positive (%)	χ^2	p-value
Swimming				
Yes	32 (16.0)	12 (37.5)	54.436	0.001
No	168 (84.0)	2 (1.2)		
Source of Clean water				
Yes	68 (34.0)	7 (10.3)	1.717	0.190
No	132 (66.0)	7 (5.3)		
Good Socioeconomic system				
Yes	50 (25.0)	4 (8.0)	0.102	0.102
No	150 (75.0)	10 (6.7)		
Proper Environmental sanitation				
Yes	76 (38.0)	5 (6.6%)	0.033	0.855
No	124 (62.0)	9 (7.3)		
Good Personal hygiene				
Yes	46 (23.0)	8 (17.4)	9.909	0.002
No	154 (77.0)	6 (3.9)		

Binary Logistic Regression Analysis

The binary logistic regression analysis results for the factors associated with schistosomiasis infection are presented in Table 3. In the bivariate logistic regression analysis, patients that swims [COR (95 % CI): 49.80 (10.39-238.69)] and patients with good personal hygiene [COR (95 % CI): 5.47 (1.700-15.87)] were significantly associated with schistosomiasis infection as shown in Table 3.

Table 3: Bivariate logistic regression analysis of variables associated with risk factors of Urinary schistosomiasis in the study area

Variables	Frequency of Urinary schistosomiasis			COR (95% CI)
	Subtotal (%)	Positive (%)	Negative (%)	
Sex				
Male	94 (47.0)	10 (71.4)	84 (45.2)	3.036 (0.919- 10.028)
Female	106 (53.0)	4 (28.6)	102 (54.8)	1
Age				
0-10	0	0	0	
11-20	102 (51.0)	7 (50.0)	95 (51.1)	1.302 (0.323-5.245)
21-30	42 (21.0)	4 (28.6)	38 (20.4)	1.860 (0.393-8.795)
31-40	56 (28.0)	3 (21.4)	53 (28.5)	1
Swimming				
No	168 (84.0)	2 (14.3)	166 (89.2)	1
Yes	32 (16.0)	12 (85.7)	20 (10.8)	49.800 (10.390- 238.698)
Source of Clean water				
No	132 (66.0)	7 (50.0)	125 (67.2)	1
Yes	68 (34.0)	7 (50.0)	61 (32.8)	2.049 (0.688-6.104)
Good Socioeconomic system				
No	150 (75.0)	10 (71.4)	140 (75.3)	1
Yes	50(25.0)	4 (28.6)	46 (24.7)	1.217 (0.364-4.068)
Proper Environmental sanitation				
No	124 (62.0)	9 (64.3)	115 (61.8)	1
Yes	76 (38.0)	5 (35.7)	71 (38.2)	0.900 (0.290-2.793)
Good Personal hygiene				
No	154 (77.0)	6 (42.9)	148 (79.6)	1
Yes	46 (23.0)	8 (57.1)	38 (20.4)	5.193 .700- 15.867)

Discussion

The findings of our study revealed an overall prevalence of 7.0% (14/200) of *S. haematobium* among urinary tract infected patients attending specialist hospital in the Bauchi, North Eastern Nigeria. This prevalence was lower than that in studies conducted in some parts of Nigeria, such as Borno State (58.1%), northeastern Nigeria, Katsina (17.3%) and Kano (17.8%), northwestern, Anambra (15.7%), southeastern, and Benue State (55.0%) and Kwara (58.7%), north-central Nigeria (Amuta & Houmsou, 2014; (Bawa et al., 2016); Bolaji et al., 2015; Dawaki et al., 2016; Salem and Mahfouz, 2012). Other parts of the world such Mali (51.2%), South Darfur (56.0%) and Senegal (57.6%), and has reported similar high prevalence of 51.2%, 56.0% and 57.6%, respectively.

However, studies from other region of the Nigeria such as Maiduguri (northeastern), Anambra (southeastern), Dutsen-Ma (northwestern), and Kano (northwestern), have reported a lower prevalence of 14.5%, 15.7%, 17.3%, and 17.8%, by Abdullahi et al. (2010); Dalhat et al. (2017); Felix et al. (2008) respectively.

Schistosomiasis is one of the major health challenges in many developing countries particularly among rural populations in Sub-Saharan Africa. The presents study revealed that, the prevalence of *schistosomiasis* in the study area was 7%. This prevalence is significantly lower than those reported by previous studies, revealing the prevalence of 11.5% in Adamawa State (Nale et al., 2007), 15.5% in Ebonyi (Wagatsuma et al., 2003), 17.4% in oyo (Okoli & Odaibo, 1999), and 18.7 each in Plateau and Nasarawa States Nigeria (Gautret et al., 2012). Moreover, a study carried out by Deol et al., (2019) on school children revealed 44.2% of the children were infected with *S. haematobium* at Minjibir local government area of Kano state. The lowest prevalence (6%) of the infection was reported in Yobe state by (Bassey and Umar, 2006).

On the other hand the study revealed that, the high prevalence of the infection was observed in males (71.4%) over females (28.6%). This is in line with the findings of (Zacharia et al., 2020; Abdullahi et al., 2010; Roure et al., 2022; and Kura et al., 2022) who reported high prevalence of the infection in males than females.

The study also revealed the highest prevalence (50%) of the infection in the participants aged 11-20 years. This agrees with the findings of Ugochukwu et al (2013) who reported high number of cases of the infection in participants aged 10-19 years.

The major risk factors of *Schistosomiasis* among the studied participants were; poor personal hygiene, high frequency of contact with water in an endemic areas, poor sanitation and socioeconomic factors such as poor economic status. This.is in agreement with the reports of Sady H et al. (2013), Ugochukwu et al. (2013), Al-Delaimy et al. (2014) and Huang and Manderson (1992) which revealed that, the major risk factors of the infection were age, socioeconomic factors, personal hygiene, proper environmental sanitation, as well as swimming in dams and rivers.

Conclusion

The study revealed that the prevalence of *schistosomiasis* in the study area was 7%. The study also revealed the higher prevalence of Schistosomiasis infection in males with 71.4% over females with 28.6%. In terms of age of the study participant, the highest prevalence was 50% of the infection in the participants aged 11-20 years. However, the study revealed that the major risk factors of *Schistosomiasis* among the studied participants were; poor personal hygiene, high frequency of contact with water in an endemic areas, poor sanitation and socioeconomic factors such as poor economic status.

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Declaration of Competing Interest

The authors declare no conflict of interest.

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