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Prevalence of Urinary Schistosomiasis among School Age Children among People of Mubi Metropolis, Adamawa State, Nigeria

Yakubu M. S[1].

[1]**Department of Biological Science and Technology, Federal Polytechnic Mubi, Adamawa State Nigeria**
Corresponding Author: yaksmohd11@gmail.com

ABSTRACT

Schistosomiasis is a neglected tropical disease transmitted through water, particularly affects urinary systems and second to malaria in parasitic infections. This study focused on determining the occurrence of urinary schistosomiasis among school-aged children in Mubi metropolis. Mubi is located between latitudes 10°32'N and 10°11'N, and longitudes 13°12'E to 13°35'E. Mubi served as the study location where 343 urine samples were collected from six primary schools: Mubi 1, Kolere, Kabang, Wuro Patuji, Lokuwa 1, and Shuware primary school, Adamawa state. These samples underwent analysis for Schistosoma haematobium eggs using concentration techniques. Additionally, structured questionnaires are used to gather data on perceptions of urinary schistosomiasis. Chi-square tests were utilized to determine the occurrence of urinary schistosomiasis across different geographical locations. Out of 343 samples analyzed, 76 (22.2%) tested positive for urinary schistosomiasis, while 267 (77.8%) were negative. Kolere Primary School exhibited the highest prevalence at 5.2%, followed by Mubi 1 Primary School at 5.2%, and Kabang Primary School with the lowest prevalence at 0.6%. Children aged 11-12 years showed the highest prevalence (11.4%), followed by 7-8 years (5.5%) and 9-10 years (5.2%). Females had a higher prevalence (11.4%) compared to males (10.8%). The study highlights high transmission rates among school-aged children due to water-related activities and unhygienic behaviors exacerbated by inadequate access to clean water. Sustainable interventions should prioritize basic health education, regular mass treatment programs, and improved living standards including enhanced access to clean water. These measures are crucial in mitigating schistosomiasis infections, especially among children in the study area.

Keywords: Schistosomiasis, Mubi, Infection, Schistosoma haematobium, Questionnaires

INTRODUCTION

Schistosomiasis is the most common water-borne disease and a Neglected Tropical Disease (NTD) [1]. It is also the most lethal NTD, infecting an estimated 140 million people each year with over 90% of cases in Sub-Saharan Africa [2]. [3], found that the primarily affects rural poor and some disadvantaged urban groups. The egg of a parasite leaves the human body through urine. The eggs hatch in fresh water and infect the intermediate host, an aquatic snail [4]. The cercarias develop within the snails and are then released into the water to infect new human hosts. When a man comes into contact with cercaria during water contact activities in infected water, he becomes infected [5]. Human water-related activities can be categorized into three main groups: economic activities such as fishing, irrigation, and agricultural practices; household tasks including laundry and fetching drinking water; and recreational activities like bathing and swimming. These activities exhibit varying daily and seasonal patterns, each posing potential risks of exposure to waterborne illnesses [6]. Diagnosing schistosomiasis typically involves assessing clinical symptoms and identifying a morbidity indicator such as microhematuria for *S. haematobium* infection. Other diagnostic approaches include ultrasonography to detect specific clinical alterations, measuring specific cellular immune responses, and employing immunohistochemistry to demonstrate schistosome antigens (immunodiagnosis) [7]. The World Health Assembly (WHA) endorsed preventive chemotherapy through the

distribution of Praziquantel (PZQ) tablets primarily to school-aged children from 2001 to 2006 [8]. This initiative also extended to adults in regions with moderate to high prevalence and individuals at occupational risk. The goal by 2010 was to reduce morbidity due to schistosomiasis. However, Nigeria faced significant challenges, as only 4% of the population had access to PZQ distribution [8].

METHODOLOGY

Population size

A total of 343 urine samples was randomly gathered and analysed from school-age children reaching six primary schools in Mubi metropolis, specifically: Mubi 1, Kolere, Kabang, Wuro Patuji, Lokuwa 1, and Shuware Primary School in Adamawa State.

Administration of questionnaire

A well-designed questionnaire was used to gather information, including details such as gender, age, and family size, educational attainment, and family income level. The questionnaire also covered aspects related to personal hygiene, environmental sanitation, sources of drinking water, domestic water usage, and water contact activities Treatment Practices Among people of Mubi Metropolis, Adamawa state.

Collection of urine sample

Each child received a sterilized, dried universal sample bottle with a lid, labeled to correspond with their assigned number on the questionnaire. Detailed instructions, including a demonstration, were provided to all participants on the proper method of urine collection to ensure the samples remained uncontaminated.

Preparation of Urine sample

The samples were collected using 20ml capacity universal bottles, with careful instructions provided to participants. All collections took place between 10:00 AM and 2:00 PM to coincide with the peak period of *Schistosoma haematobium* egg excretion [9],. Samples were securely packaged to prevent breakage and transported to the Parasitology Laboratory at the Department of Zoology, Adamawa State University, Mubi, for analysis.

Analysis of Urine Samples

The sample collected was first examined visually for colors of urine, analyze using diagnostic chemical reagent strip and urine filtration technique, and examined microscopically as described by [10].

Sedimentation technique for diagnosis of Schistosomes in urine

The process involved using a centrifuge machine. A fifteen-milliliter urine sample was placed in a conical tube and allowed to settle for one hour. The supernatant was then carefully removed using a syringe or decant. Alternatively, a 24-hour urine collection method can be employed, where the urine specimen is preserved by adding 1ml of concentrated hydrochloric acid and 2ml of bleach to every 10-20ml of urine [5].

Analysis of Data

A frequency distribution table was constructed, and the percentage of urinary was calculated. Chi-square ($\chi 2$) analysis was employed to assess associations in infection prevalence among participant groups, including sex, age-groups, and source of water supply, water contact activities, and occupation. Pearson's correlation analysis was used to examine relationships between schools, gender, age and other sources. Simple percentages were utilized to analyze responses from the structured questionnaire. Quantitative data derived from the questionnaire responses were coded for computerized analysis. SPSS version 20 was used for the data analysis.

Table 1 shows general prevalence of urinary schistosomiasis among school-age children in Mubi metropolis, Adamawa State

Result	Frequency	Percentage
Positive	76	22.2%
Negative	267	77.8%
Total	343	100%

α=0.05,

Table 2 shows Prevalence of urinary schistosomiasis among School age Children across different primary schools in Mubi metropolis

			Urine test Frequency (%)		
Parameter	**Respondents**	**Number Examined**	**Negative**	**Positive**	**Chi-Square**
School Location	Mubi 1 Primary School	58	42(12.2%)	16(4.7%)	**17.281**
	Lokuwa 2 Primary School	58	42(12.2%)	16(4.7%)	
	Shuware Primary School	53	40(11.7%)	13(3.8%)	
	Kolere Primary School	57	39(11.4%)	18(5.2%)	
	Wuro-Patogi Pri. School	59	48(14%)	11(3.2%)	
	Kabang Primary School	58	56(16.3%)	2(0.6%)	
	Total	343	267(77.8%)	76(22.2%)	

X^2_{tab} = 11.070, X^2_{cal} =17.281, α=0.05, DF=5

Table 3 shows Prevalence of urinary schistosomiasis among School age Children across different primary schools in Mubi metropolis in relation to age and Sex

Parameter	**Respondents**	**Number Examined**	**Negative**	**Positive**	**Chi-square**
Age	**7-8 years**	85	66(19.2%)	19(5.5%)	**0. 065**
	9-10 years	78	60(17.5%)	18(5.2%)	
	11-12 years	180	141(41.1%)	39(11.4%)	
	Total	343	267(77.8%)	76(22.2%)	
Sex	**Male**	201	164(47.8%)	37(10.8%)	**3.957**
	Female	142	103(30%)	39(11.4%)	
	Total	343	267(77.8%)	76(22.2%)	

For Age X^2_{tab} = 5.991, X^2_{cal} = 0.065. For sex X^2_{tab}=3.841, X^2_{cal}= 3.957.

Table 4 shows the awareness practices and toilet behavior across six Primary Schools in relation to Urinary schistosomiasis in Mubi metropolis, Adamawa State

Parameter	**Respondent**	**Number Examined**	**Negative**	**Positive**	**Chi-Square**
Have you been to the hospital because of blood in urine?	Yes	123	88(25.7)	35(10.2)	**4.410**
	No	220	179(52.2)	41(12.0)	
	Total	343	267(77.8)	76(22.2)	
Do you think having blood in the urine is a disease?	Yes	156	118(34.4)	38(11.1)	**0.804**
	No	187	149(43.4)	38(11.1)	
	Total	343	267(77.8)	76(22.2)	
Where did you normally defecate?	Bush	216	172(50.1)	44(12.8)	**1.080**
	Toilet	127	95(27.7)	32(9.3)	
	Total	343	267(77.8)	76(22.2)	
What type of toilet do you have at home?	Pit toilet	189	141(41.1)	48(14)	**2.561**
	Water system	154	126(36.7)	28(8.2)	
	Total	343	267(77.8)	76(22.2)	

RESULTS

The results in table 1 show that out of 343 samples analyzed, 76(22.2%) were positive for schistosomiasis while 267(77.8%) were negative. These results underscore the global concern over parasitic infections, particularly in areas with poor hygiene. The results in table 2 also shows the prevalence of urinary schistosomiasis varies across the six Primary Schools with Kolere and Mubi 1 Primary School having the highest prevalence at 5.2%, meanwhile for the Prevalence, Kabang Primary School has the lowest prevalence at 0.6%. The chi-square ratio for school location is 17.28, indicating a significant association between school location and urine test results. The results in table 3 also shows that Group 11-12 years recorded the highest Prevalence (11.4%) in this study, the Chi-square values are relatively low (0.065) for age, indicating that there is no significant association between age and the prevalence of urinary schistosomiasis in this study. Meanwhile the results in table 4 also show that a notable proportion of respondents (25.7%) reported visiting the hospital due to the presence of blood in their urine. This indicates recognition of the severity of the symptom and a proactive approach to seeking medical care. The chi-square value of 4.410 suggests a significant association between hospital visits for blood in urine and the prevalence of urinary schistosomiasis.

DISCUSSION

The findings indicates that 22.2% for urinary schistosomiasis among school-age children in Mubi metropolis, Adamawa State. It indicates a high infection rate of 94.75%. These results underscore the global concern over parasitic infections, particularly in areas with poor hygiene, This result agrees with the findings of [11] which says that the prevalence of of urinary schistosomiasis is 37.9% in Sankala rivers state, indicating a 94.75% percent infection rate.The prevalence of urinary schistosomiasis varies across the six Primary Schools with Kolere and Mubi 1 Primary School having the highest prevalence at 5.2%, meanwhile for the Prevalence, Kabang Primary School has the lowest prevalence at 0.6%. The chi-square ratio for school location is 17.28, indicating a significant association between school location and urine test results which is in agreement with the report of [12], who linked the disease's prevalence to a lack of health education and ignorance in Nigeria's Kebbi, Sokoto, and Zamfara states. This suggests that it is not uniform across all schools, and there could be factors related to school location influencing the prevalence. Age-Group 11-12 years that recorded the highest Prevalence (11.4%) in this study is in accordance with the work of [12], "high urinary schistosomiasis incidence among School-age children, adolescents and young adults". According to [13], "who reported age group ≤8, between 8-11 and 12-15 years old with intensity of 6.0%, 5.8% and 5.3% respectively". The Chi-square values are relatively low (0.065) for age, indicating that there is no significant association between age and the prevalence of urinary schistosomiasis in this study. A notable proportion of respondents (25.7%) reported visiting the hospital due to the presence of blood in their urine. This indicates recognition of the severity of the symptom and a proactive approach to seeking medical care. Respondents generally recognized blood in the urine as a disease, with 34.4% responding "Yes" to this perception. However, a significant proportion (43.4%) also responded "No," indicating potential variations in understanding or interpretation of the symptom. The chi-square value of 0.804 suggests no significant association between the perception of blood in urine as a disease and the prevalence of urinary schistosomiasis.

CONCLUSION

This study indicates a significant prevalence of *Schistosoma haematobium* in Mubi metropolis, Adamawa State, with an overall prevalence rate of 22.2% among school-age children. Kolere Primary School exhibited the highest prevalence at 18 cases (5.2%), whereas Kabang Primary School had the lowest at 2 cases (0.6%). Among age groups, the prevalence was higher in the 11-12 years, 9-10 years and 7-8 years groups. Female pupils showed a higher prevalence of *Schistosoma haematobium* compared to male. Factors such as unhygienic behaviors, specific environmental conditions, and socio-demographic factors were identified.

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