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PREVALENCE OF URINARY SCHISTOSOMA AMONG POPULATION AGED 1-18 YEARS ATTENDING GUMEL GENERAL HOSPITAL, JIGAWA STATE OF NIGERIA

Umar Usman[1]*, Buhari Suraka[2], Abba Sabo[1], Aminu Tijjani[3], Hassan Muhammad[4], Hannatu Ibrahim[1], Usman Sanusi Ismail[5], Biliyaminu Ado[1], Ni'ima Bashir Ado[6]

[1] Department of Biology, School of Sciences, Jigawa State College of Education Gumel, Jigawa State - Nigeria.

[2] Department of Microbiology and Biotechnology , Faculty of Sciences , Federal University Dutse, Jigawa State - Nigeria.

[3] Department of Epidemiology and Disease Control , College of Health Sciences , Jigawa State Polytechnic, Dutse, Jigawa State - Nigeria.

[4]Department of Science Laboratory Technology, School of Science, Binyaminu Usman Polytechnic, Hadejia, Jigawa State - Nigeria.

[5]Centre for Advanced Medical Research and Training (CAMRET), Usman Danfodio University, Sokoto, Sokoto State - Nigeria.

[6] Department of Medical Laboratory Sciences, School of Health Sciences, Maryam Abacha American University of Nigeria, Kano State – Nigeria.

***Corresponding Author**:
Umar Usman
E-mail: umarusmankaz@gmail.com

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Abstract

Background: Schistosomiasis, caused by the parasitic worm Schistosoma haematobium, is a significant public health concern in Nigeria. Understanding the prevalence of this infection is crucial for implementing effective control measures. Thus, this study aimed to investigate the prevalence of Schistosoma haematobium among patients attending Gumel General Hospital in Jigawa State, Nigeria.

Aim: Determine the prevalence of Schistosoma haematobium infections among patients attending Gumel General Hospital.

Materials and Methods: A total of 120 urine samples were collected from patients at Gumel General Hospital. The collected urine samples were examined in the Biology laboratory of Jigawa State College of Education, Gumel. Physical and microscopic analyses were conducted using the filtration technique to identify Schistosoma infections.

Results: The microscopic examination revealed that males had a higher infection rate (2.5%) than females (1.6%). However, statistical analysis showed no significant difference between the infection rates in males and females. Notably,

the age group of 10-18 years recorded all positive cases in the study. The overall prevalence of 4.1% indicated that Schistosoma haematobium was less prevalent in the study area.

Conclusion: The study provided valuable insights into the prevalence of Schistosoma haematobium in Gumel, Jigawa State, Nigeria. The higher infection rate among males warrants attention, and further research should explore neighboring areas for a comprehensive understanding of the disease's distribution. Additionally, efforts should be made to diagnose and treat infected individuals promptly to prevent further spread of the infection.

Keywords: Bilharziasis; Gumel; Prevalence; Schistosomiasis; Urinary schistosoma

INTRODUCTION

Schistosomiasis, alternatively referred to as bilharziasis, is an overlooked tropical ailment triggered by parasitic worms belonging to the Schistosoma genus [1-3]. This condition is highly common and incapacitating, impacting a large number of individuals in tropical and subtropical areas around the globe. The disease primarily thrives in areas with inadequate access to safe drinking water, sanitation, and hygiene facilities, making it a significant public health concern in resource-limited communities [4]. Schistosomiasis is the second most common parasitic disease of epidemiological importance, reported in 76 tropical and subtropical nations, with 52 of them being endemic [1, 5]. Notably, it accounts for the most significant reduction in age-standardized years lived with disability (YLD) between 2006 and 2016 [6]. Estimating global schistosomiasis-related deaths is challenging due to inadequate diagnosis and documentation. However, reports suggest an annual range between 24,067 and 200,000 [1, 7].

Globally, schistosomiasis affects more than 200 million individuals, with about 800 million at risk of infection, and the majority, approximately 90%, living in Africa [8]. Within sub-Saharan Africa, the major culprits of human schistosomiasis are Schistosoma haematobium and Schistosoma mansoni, posing significant public health challenges [3]. Moreover, the overlapping range of both species in Africa increases the likelihood of co-infection [3, 9]. Furthermore, schistosomiasis cases in Nigeria are the highest in the world.

Schistosomiasis in humans is brought about by five species of digenetic parasitic blood flukes, collectively known as Schistosoma. Among these species, S. haematobium, S. mansoni, and S. japonicum are the most prevalent, inflicting severe illness and fatalities in numerous rural communities [8]. Schistosomiasis of the urogenital tract is brought on by S. haematobium, whereas intestinal schistosomiasis is caused by S. mansoni [2]. Schistosoma haematobium is highly prevalent in impoverished rural communities, particularly in regions where fishing and agricultural activities are prominent. The risk of infection is significantly elevated due to factors such as

low literacy rates, poverty, inadequate hygiene practices, and deficient public infrastructure [10]. The most vulnerable population is school-aged children who engage in water-contact activities and come into contact with free-swimming cercariae that have been released from diseased freshwater snail species [3, 11]. When humans encounter water bodies contaminated with skin-penetrating cercariae, they become infected with this disease. The mature S. haematobium reside in the venules surrounding the pelvic organs, where they lay 20–200 eggs on a daily basis [4]. Bilharziasis is linked to several consequences, including hematuria and hydronephrosis, which can lead to bladder cancer. Conversely, the chronic intestinal form of the disease is characterized by hepatomegaly, splenomegaly, and progressive periportal fibrosis, resulting in portal hypertension, irregularities on the liver surface, esophageal varices, portal-systemic venous shunts, and hematemesis [3].

AIM OF THE STUDY

The aim of our study is to assess the prevalence of Urinary Schistosoma among the population aged 1-18 years attending Gumel General Hospital, Jigawa State, Nigeria.

Statement of the problem

Bilharziasis, the second most prevalent parasitic illness of epidemiological relevance, has been reported in 76 countries in the tropical and sub-tropical regions, out of which 52 are endemic [5, 8]. Approximately 800 million individuals are reportedly at risk of infection, and over 200 million people are already affected, with 90% of them living in Africa [9]. The disease constitutes a significant public health problem in Sub-Saharan Africa (SSA), including Nigeria [2]. The Northern section of the country is where this disease is most prevalent, with several areas distinguished by exceptionally high infection rates. These areas include Katsina, Kano, Jigawa, Zaria, Kaduna, Birnin Kebbi, and Argungu [12].

Despite having the highest number of affected individuals, bilharziasis is one of the most ignored tropical diseases in Nigeria [13]. Although the disease has been reported countrywide, ongoing surveys are required to assess its endemicity status and the impact of control or eradication programs aimed at achieving the global target of eradicating it as a public health problem [8]. Nonetheless, acquiring up-to-date data on the magnitude of the disease's impact is imperative for effective prioritization and monitoring of the infection [2].

Materials and Methods

Study Area

The present study was carried out at Gumel General Hospital, one of the five major general hospitals of Jigawa State built by the former Military Administrator of Kano State, Colonel Audu Bako (1924-1980).

Sample Collection

The participants received comprehensive instructions on the aseptic collection of their urine samples. As a result, a total of one hundred and twenty samples were gathered from hospital attendees using labeled, sterile, wide-mouthed, screw-capped plastic urine containers, each containing ten milliliters (10ml) of early-morning mid-stream catch urine samples from respondents aged 1–18 years. These urine samples were then transported to the Biology laboratory of Jigawa State College of Education, Gumel, for microscopic examination.

Sample Processing

Physical Observation

Every collected sample underwent a meticulous visual examination to identify any deviations in color from that of a normal urine sample obtained from a healthy individual. This process aimed to detect both macro or micro haematuria.

Centrifugation

After collection, the samples were gently agitated and transferred into clean centrifuge tubes. These tubes were then loaded into the centrifugation machine and centrifuged at a speed of 3,000 revolutions per minute (rev/min) for a duration of five minutes. Once the centrifugation process was complete, the machine was turned off, and the centrifuge tubes were carefully taken out. Next, the supernatants were poured off, leaving the sediment undisturbed.

Microscopic Examination

The sediment was more homogenous by tapping each centrifuge tube gently at the bottom. Few drops of each was placed onto grease-free glass slide with the aid of a clean pipette, covered with a cover slip carefully and then observed using two different objective lens (X10 and X40 objective).

Result

Table 1 results revealed that 120 respondents were participated in the present study out of which both males and females were 60(50%) each. The two age groups (01-09 and 10-18) were 60(50) each.

Table 1: Age and sex information of the respondents

Age of the respondents	**Frequency**	**Percentage**
01 – 09	60	50
10 - 18	60	50
Total	120	100
Sex of the respondents	Frequency	Percentage
Male	60	50
Females	60	50
Total	120	100

The findings of physical analysis revealed a prevalence rate of 14(11.6) out of 120 samples collected. Males recorded highest number of positive samples with 11(9.2). Females recorded 03(2.5) positive cases. Age group 01-09 were 02(1.6) while 10-18 ware 12(10) (Table 2).

Table 3: Microscopic analysis of urine samples

Sex	**Positive (%)**	**Negative (%)**	**Total (%)**
Male	03(2.5)	57(47.5)	60(50)
Female	02(1.6)	58(48.3)	60(50)
Total	05(4.1)	115(95.8)	120(100)
Age group	**Positive (%)**	**Negative (%)**	**Total (%)**
01-09	00(00)	60(50)	60(50)
10-18	05(4.1)	55(45.8)	60(50)
Total	05(4.1)	115(95.8)	120(100)

Discussion

In the present study, both physical (visual observation for haematuria) and microscopic (sedimentation) methods were utilized. Visual observation aimed to detect any abnormal color changes in urine compared to normal samples from healthy individuals, aiding in the identification of macro or micro haematuria. Out of the 120 samples collected, the physical analysis revealed a prevalence rate of 14 cases (11.6%).

It is important to note that physical and chemical tests can be influenced by various factors beyond just urinary schistosomiasis [12]. These methods are commonly employed for mass screening of S. schistosomiasis due to their speed and ability to provide instant results. Moreover, they can identify individuals at risk of urogenital disease, not limited to schistosomiasis, making them valuable for epidemiological studies [14].

In the recent study, the microscopic test showed that out of 120 respondents who participated in the research, only 5 (4.1%) tested positive. Detecting eggs is often challenging, especially in cases of light infection [12, 15]. The results of this study strongly suggest the effectiveness of preventive and control measures. The infection rate was higher in males (3, 2.5%) compared to females (2, 1.6%). This discrepancy could be attributed to the findings of Bashir et al. [12], who suggested that young males engage in more activities such as swimming, fishing, and bathing, whereas young girls are typically kept at home to help with household chores and cooking. However, it's worth noting that various prevalence studies have reported different results.

These findings align with the works of other researchers, such as Boih et al. [1], Bashir et al. [12], Garcia and Bruckner [16], Sang et al. [17], Balogun et al. [18], and Gambo et al. [19], all of whom reported higher prevalence rates among males than females. Conversely, the present study's results contradict those of other researchers, such as Noriode et al. [8] and Noriode et al. [20], who found higher prevalence rates among females. Nevertheless, the statistical analysis conducted in this study revealed no significant difference between males and females.

Furthermore, all positive samples were recorded in the age group of 10-18, which aligns with the findings of several researchers such as Noriode et al. [8], Bashir et al. [20], Morenikeji et al. [21], Bichi et al. [22], AL-hussnaiy et al [23], and Ahmad et al. [24]. These studies reported a similar pattern of Schistosoma infections, with the highest incidence among teenagers who actively engaged in water contact activities in contaminated water, as observed in our study.

Conversely, our recent findings contradict the results of Boih et al. [1] and Abdelnaser et al. [25], who reported the highest prevalence in school-aged children under 10 years old and the lowest prevalence in participants aged 10 and above.

Conclusion

Based on the results of the microscopic

examination, only 5 (4.1%) urine samples tested positive, suggesting that the disease is relatively less common in the study location. Additionally, despite the presence of positive samples, it seems that the snail vectors in the area did not carry the infective stage of the parasite (cercariae).

Recommendation

Additional investigations are warranted, not only in nearby regions but also in the vicinity, to prevent the disease from spreading. It is essential to diagnose and treat infected individuals promptly. Regular surveys of snail intermediate hosts in water bodies should be conducted, and appropriate measures should be taken to eradicate them if detected.

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Ethical Clearance:

Ethical approval was obtained from the management of the hospital. Prior to sample collection, assent was obtained from the patients, parents/guidance of the children.

Funding: This research received no external funding.

Conflicts of Interest: The authors declare no conflict of interest.

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