INFLUENCE OF URINARY SCHISTOSOMIASIS ON NUTRITIONAL STATUS IN AL-MAJIRI (DISCIPLES) IN KAWO DISTRICT OF KADUNA METROPOLIS, KADUNA STATE-NIGERIA

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ABSTRACT

A study on the influence of urinary schistosomiasis on nutritional status in Al-majiri was carried out to document the status of the disease and their nutritional status in Kawo District of Kaduna metropolis. Urine samples were taken from 360 Al-Majiris and analysed using the sedimentation method. Structured Knowledge, Attitude and Practice questionnaires were used determined age and water contact-related activities were administered and anthropometric measurements were to determine the nutritional status. A prevalence of 44.2% was recorded with mean intensity of 45.32 eggs/10ml of urine. The highest prevalence was recorded in the 10-14 age group while the lowest was recorded in the 20-24 age group. The age and water contact-related prevalence study revealed urinary schistosomiasis is greatly influenced by age and water contact. 30.8% of the respondent perceived Urinary schistosomiasis as a form of yellow fever. Body Mass Index (BMI) revealed that 63.3% of those infected are severely malnourished, BMI indicates a strong relation ($P<0.05$) between urinary schistosomiasis and malnutrition. It is suggested that in order to prevent urinary schistosomiasis, provision of portable drinking water, prevention of widespread wadding in pod water, adequate personal hygiene, improved nutrition and treatment of an infected persons to lessen the likelihood of water pollution should be encouraged.

KEYWORDS: *Al-Majiri, Urinary schistosomiasis, Schistosoma haematobium, Nutritional status.*

1.0 INTRODUCTION

Urinary schistosomiasis is caused by the blood fluke, *Schistosoma haematobium* (Darraj, 2022). The disease, which causes chronic ill-health, is endemic in most African countries. It is second only to malaria among the tropical diseases of man and the most devastating prevalent parasitic disease in the world, being a major source of morbidity and mortality for developing countries in Africa (Dawet *et al,* 2012). It is associated with water development projects such as dams and irrigation schemes which provide suitable breeding sites for the snail intermediate host *Bulinus* species and people went to such waters to swim, wash and drink get infected (Chala and Torben, 2018).

An estimated 236.6 million people worldwide may be at risk of schistosomiasis as agricultural, domestic and recreational activities expose them to contaminated water bodies. (W.H.O, 2022). The disease occurs in 51 countries in Africa, South America and Asia, and about 90% live in sub-Saharan Africa (W.H.O, 2022).

Schistosoma haematobium is responsible for cases of urinary schistosomiasis. The disease is characterized by hydronephrosis and renal failure, genital ulcers and other lesions, Poor reproductive health including sexual dysfunction and infertility. The most important are anaemia chronic inflammation and iron deficiency anaemia, stunted growth and malnutrition among children, fatigue and diminished physical fitness and impaired cognitive development among children (Ezeamana *et al.*, 2018).

The word Al-Majiri is derived from the Arabic word 'Al-Muhajirun' migrant (Yushau *et al.,* 2013). In the Hausa land of northern Nigeria, Al-Majiri can be described as a person who primarily is a pupil or student in Qur'anic school who begs for assistance on the street and from house to house in order to cater for his daily sustenance. Al-majiri system was not dependent on the state. The students were at liberty to acquire vocational and occupational skills in between their Islamic lesson and were involved in farming, fishing mansory, trade and small businesses. These leads to numerous health problems. Lack of access to bathing, and toilet facilities in their schools and medical care further stress their poor health condition (Mohammed *et al*., 2015).

The lifestyle of Al-Majiri in relation to Fishing, bathing and swimming in rivers, migration to endemic areas for farming, and inadequate hygiene are all factors that can lead to increased transmission of schistosomiasis. The study aims at documenting the influence of urinary schistosomiasis on the nutritional status of Al-Majiri in Kawo District area of Kaduna metropolis, Nigeria.

2.0 MATERIALS AND METHODS

2.1 Study area

The study was conducted in Kawo district of Kaduna metropolis, Kaduna State Nigeria. Kawo district comprises of the following settlements: Kawo, Rafinguza Badarawa and Unguwan Dosa. These places are dominated mostly by civil servants and traders from the Hausa tribe which contributes immensely to the number of Al-Majiri pupils in the area (Figure 1). The State is located in the northwest geopolitical zone of Nigeria and lies between $10^{o}20^{1}$N and 10.33^{o}N and latitudes $7^{o}45^{1}$E and 7.75^{o}E. The vegetation is characteristic of the Guinea savannah type with a distinct wet and dry seasons. Kaduna shares borders with katsina and Zamfara states to the North, Plateau and Bauchi states to the East, Nasarawa state and Federal Capital Territory to the South and Niger state to the West.

2.2 Ethical permission

Ethical clearance was obtained from Kaduna state ministry of health. A written informed consent form was signed by the parents of the eligible student at the beginning of the study for approval and cooperation. Students could withdraw from the study at any time without obligation.

2.3 Pre-survey visit

Because of socio-cultural, religious and political reasons, there was a visit to the Qur'anic schools to enlighten the Al-Majiri children and their teachers on the benefits and importance of the study, although participation in the study however was voluntary.

2.4 Sample size

Sample size was determine based on the formula used by liverworth (2005), the sample size was calculated as follows: $n=\frac{z2pq}{d2}$ at 95% confident interval. Where n = sample size, z = standard normal deviation at 95% confident interval (1.96), p = proportion of the population estimated from previous studies, q = 1- p, d = tolerable error (0.05).

2.5 Sample collection

Three hundred and sixty urine samples were collected from Al-Majiri children selected by systematic random sampling technique. Each of the participants was given a clean, dry screwed capped container carrying an identification number and was guided on when and how to collect their urine samples. Urine was collected between 10 am and 12 noon to ensure maximum excretion of egg (Cheesbrough, 2009). Samples collected were taken to the Department of Biological Science laboratory, Nigerian Defence Academy for parasitological analysis.

Laboratory analysis of urine samples was carried out to determine the presence of *Schistosoma haematobium* eggs using sedimentation method described by Cheesbrough (2006). Each urine sample was mixed thoroughly with a glass rod and 10ml was transferred using 10ml syringe into centrifuge tube and centrifuged at 2000rpm for 5 minutes at room temperature. The supernatant was discarded and sediment was transferred to a microscope glass slide and covered with a cover slip. Examination of the entire sediment was done microscopically using the x10 and x40 objectives. Eggs with terminal spine characteristic of *Schistosoma haematobium* were counted for each positive sample and the result was reported as the number of eggs/10ml of urine (Cheesbrough, 2009).

2.6 Anthropometric measurement

Anthropometric measurements such as height and weight were made following internationally accepted techniques (WHO, 1995). Weight was measured using a digital floor scale, and standing height was measured with a wall-mounted stadiometer. Body Mass Index was calculated using the standard formula as weight in kilograms, divided by height in meters squared (Kg/m^2) (CDC, 2012).

$$BMI=\frac{\text{Weight (kg)}}{\text{Height (m2)}}$$

2.7 Administration of questionnaire

A structured questionnaire was administered to the compliant for their age, hobby, perception and water contact activities. The questionnaire was interpreted in their local dialect (Hausa language) for ease of understanding and each participants was given an identification number which also corresponds to the individual whose urine was collecte

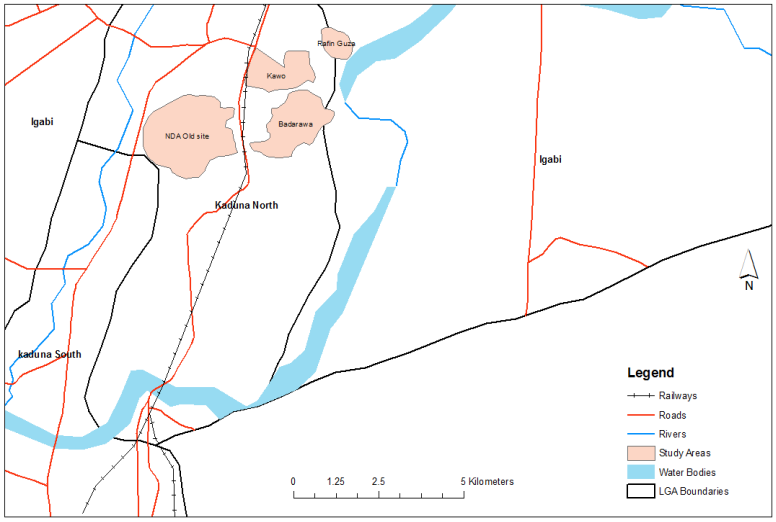

Figure 1: Sketch Map of Kaduna state showing the study area.

3.0 RESULTS

Out of the 360 urine samples examined for *S. haematobium* eggs, 159 (44.17%) were found to be positive as shown in Table 1. The table also shows the prevalence of *S. haematobium* infection among the different schools surveyed. Although the schools are all located in the same district (Kawo), there is a significant difference ($P<0.05$) in prevalence of urinary schistosomiasis among the Al-Majiri of these schools.

The age-related prevalence of *S. haematobium* among the different age groups of Al-Majiri is presented in table 2. Significant difference ($P<0.05$) was found between age groups in relation to schistosome infection in Kawo district. The highest prevalence was found among 10-14years age group, followed by 5-9 years, 15-19 years and 20-24 age groups with the prevalence of 51.20%, 44.74%, 26.15% and 14.29% respectively. The intensity which is indicated by the mean egg count however was highest in 10-14 year age group with 92 egg/10ml of urine followed by 5-9 years group with 78 eggs/10ml of urine. Relatively lower egg count/g was recorded for 15-19 and 20-24 years age group.

Table 3 shows the stream-contact related prevalence of *S haematobium* among the Al-Majiri. The prevalence among those engage in different water-related activities shows a significant difference (P<0.05) with children engaged in bathing recording the highest prevalence of 82.9% followed by those that are engaged in washing 48%. Children engaged in irrigation farming (either as paid labour or unpaid labour) and fishing had prevalence of 25% each. No prevalence was recorded among Al-Majiri children who use such water as their main source of drinking water.

The perception of Al-Majiri on the causes of schistosomiasis is shown in Table 5. About 30.8% believed that it is caused by yellow fever, 26.4% by pile, and 12.8% by food poisoning while only 7.5% associated the infection to water contact activities.

The relationship between *S. haematobium* infection and the nutritional status of Al-Majiri based on body mass index (BMI) is presented in Figure 2. There is an inverse correlation (r = 0.988) between malnutrition and *S.haematobium* infection among the children surveyed.

Table 1. Distribution of *Schistosoma haematonium* infection in Kawo District of Kaduna Metropolis, Kaduna state, Nigeria.

School	No. examine	No. infected	Percentage infected
ASKK-1	69	14	20.3
ASKK-2	31	04	12.9
ASKK-3	75	30	40.0
ASKK-4	83	37	44.6
ASBK-5	102	74	75.5
Total	360	159	44.2

Probability=0.005
ASKK- Almajiri school Kawo Kaduna
ASBK- Almajiri school Badarawa Kaduna

Table 2. Age related prevalence of *Schistosoma haematobium* among Al-majiri children in Kaduna metropolis.

Age group (years)	Number Examined	Number infected	Percentage (%)	Mean egg count/10ml
5-9	76	34	44.74	78.11
10-14	209	107	51.20	92.12
15-19	65	17	26.15	30.50
20-24	7	1	14.29	26.00
Above 25	3	0	0.00	0.00
Total	360	159	44.17	45.35

Probability=0.005

Table 3. Table 3. Stream contact-related prevalence of *S. mansoni* among Al-Majiri children in Kawo-District, Kaduna metropolis, Kaduna State.

Purpose of water usage.	No examined	No infected	Occurrence rate (%)
Washing	50	24	48
Bathing	70	58	82.9
Drinking	11	0	0
Irrigation	117	41	35
Fishing	80	28	35
Crossing	32	8	25
Total	360	159	44.2

Chi-square =20.0
DF=5
Probability=0.001

Table 4. Perception Al-Majiri children on the causes of schistosomiasis.

Attributable cause of schistosomiasis	No. of respondant (%)
Yellow fever	112(30.8)
Water borne	27(7.5)
Malaria	42(11.7)
Evil spirit	38(10.6)
File	95(26.4)
Food poisoning	46(12.8)
Total	360(100)

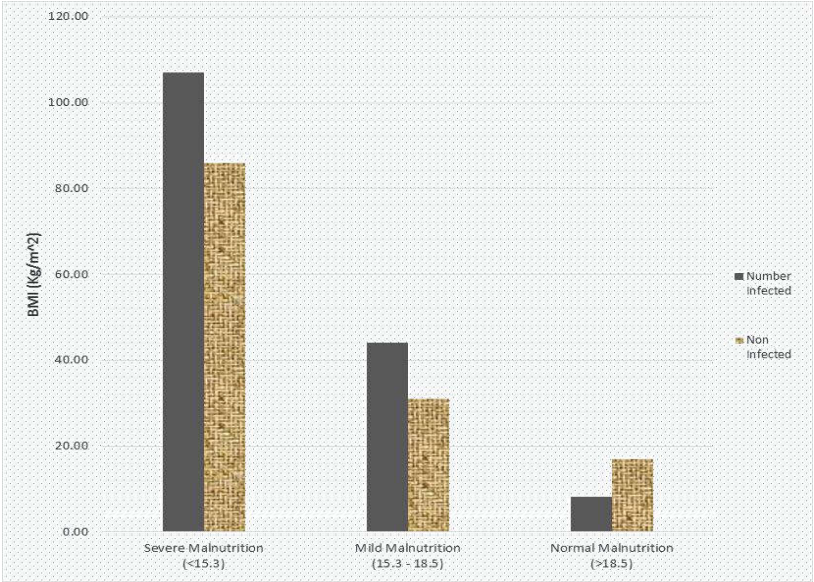

Figure II: nutritional status based on the body mass index (BMI) of infected and non infected Al-Majiri children in Kawo district, Kaduna State.

4.0 DISCUSSION

The investigation showed that urinary schistosomiasis is endemic in the study area. This conformed with a number of other findings (Norio et al., 2018; Otuneme *et al*., 2019). The reason for this lies in the continual contamination as they return to their various states and local governments especially during the raining season for farming, repeated exposure and hygienic habit of the Al-Majiri school children as most schools do not have toilets and bathrooms. The mean egg output of 45.32/10ml of urine observed in this study seems to be higher than the 3.3 eggs/10ml of urine reported by Grolimund *et al*., 2022 and 2.5 eggs/10ml of urine reported by Deribew *et al* (2022).

Based on infection according to age groups, the result showed that the age group 10-14 has the highest prevalence (51%). This could be attributed to their frequent visits to a contaminated water sources outside the metropolis in the quest to swim as well as farm during the rainy season when most of the students leave their schools to their villages for farming, This agreed with the observation of Awosu *et al*., 2020, Noriodo *et al*., (2018), observed that persons within the first two decades of life have the highest prevalence.. This is due to the fact that individuals in these age groups make frequent contact with water sources since they handle most domestic activities like washing and fetching water. Some of them take the liberty of bathing in such water. The activities increase with growth and maturity. Age group 15-19 and above make less contact with water and find alternative ways of recreating therefore less chance of being infected. The high excretion of eggs by the age group 10-14 may be attributed to the increase worm burden and high fecundity rate of *Schistosoma haematobium* conversely the decreased egg output in the older individuals may be due to the possible development of immunity common to schistosomiasis.

Water-related activities such as bathing, swimming, and irrigation among others are reported to enhance the risk of schistosome infection (Gbalegba *et al*., 2017: Angelo et al., 2018). The high prevalence of *S. haematobium* recorded among Al-Majiri who are engaged in irrigation farming, bathing and washing, therefore, are to be expected. Most of the streams within the district where such activities take place often serve as intakes of domestic wastes from houses; such wastes may contain both sewage and other household waste, thus contaminating such water bodies. Umar and Adamu (2004) reported high contamination of vegetables with helminth eggs and cysts from fadama farms that were irrigated with water from streams within Kaduna metropolis.

An association between parasitic infection and malnutrition has been reported (Haratipour *et al*., 2016). Parasites are known to depend on their host for nutrients and in the process deprive the host of essential nutrients needed for growth and development. The inverse relationship observed between body mass index (BMI) and urinary schistosomiasis is therefore not surprising. BMI which is a measure of malnutrition reflected severe malnutrition in Almijiri children infected with intestinal schistosomiasis. Although *S. haematobium* may not directly interfere with intestinal absorption as in most intestinal helminthosis, as a blood fluke it can cause iron deficiency anaemia through intestinal blood loss which results in a reduced amount of blood available to transport nutrients to all body organs.

The perception of causes of schistosomiasis among the children was generally incorrect and could reflect the general knowledge of the community about the infection. This could be associated with the failure of relevant government agencies and non-governmental agencies to carry out enlightenment campaigns at the community level that are most vulnerable to most neglected parasitic infections including schistosomiasis.

For the control of schistosomiasis to be effective, the need for the provision of basic amenities like portable drinking water, improved hygiene, and improved knowledge public enlightenment on the disease is very significant. The understanding of the mode of transmission of schistosomiasis among the Al-Majiri children appears to be very pitiable with only 7.5% of the respondents associating the infection to water contact. This insufficient perception of the cause of schistosomiasis by the Al-Majiri school children could be an interruption to schistosomiasis control in the state and the nation at large. Hence the need for stakeholders and relevant government health agencies to come to the aid of these less privileged and vulnerable children by educating them on the mode of transmission of schistosomiasis, giving them rich but relatively cost-effective feeding regime and administering free treatment to those infected through a mass treatment program.

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