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Urinary Schistosomiasis Prevalence, Water Contact Activities, and Morbidity Indicators in Sankwala Community, Cross River, South-South Nigeria

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Abstract
Urinary schistosomiasis is a predominant parasitic disease that is waterborne, ranking second behind malaria, especially among the rural populace, which is of public health significance in both tropical and subtropical regions of the world. This study aimed to determine the prevalence of urinary schistosomiasis, water contact activities, and morbidity indicators in Cross River, south-south Nigeria. Four locations were selected in the Sankwala community, and six hundred and twenty (620) participants were enrolled in the study using simple random sampling techniques. The prevalence rate was determined to be 37.06%. The test strip (combi 9) was used to determine the haematuria and proteinuria of the specimen. The results of participants whose activities or other engagements exposed them to contact with water ranged from 56.50% to 91.00%. Control measures involve the implementation of mass-targeted chemotherapy, the provision of adequate pipe-borne water, and health education in the studied community.

Keywords: Cross River, Morbidity Indicators, Urinary Schistosomiasis, Sankwala, Water Contact.

Introduction

Urinary schistosomiasis is a predominant parasitic disease that is waterborne, ranking second behind malaria, especially among the rural populace, which is of public health significance in both tropical and subtropical regions of the world (Sector et al., 2014). The disease is known to cause over 56% of bladder cancer and affects over 20 million people worldwide (Ezeh et al., 2019). 50–600 million people are also known to be exposed, with the disease more prevalent in Africa, Asia, and South America. In Sankwala, there is a lack of potable water, and water is one of the essential elements that is used for various domestic, economic, and agricultural activities (Shashie et al., 2015). The people also engaged in the making of local food from millet and corn, which they most enjoyed as drinks for refreshment. These activities predispose people to *Schistosoma haematobium* infection. Some factors increase the endemicity of urinary schistosomiasis, such as population increase, rapid urbanization, poor sanitation, increased population, and water contact occupations (Colley et al., 2014). The most prevalent people are school-age children due to their habit of playing with water, which predisposes them to schistosomiasis (Klohe et al., 2021), while adults in rural communities become infected either through freshwater fishing or agriculture activities (Dirisu & Goodhead, 2016). According to the WHO, the disease is endemic in Nigeria and is considered among the most neglected tropical diseases (NTDS) in the world (WHO, 2016). It is seen as a disease of children, and adequate attention is not given to them. The disease can be controlled using an integrated approach that is targeted at using combined-based chemotherapy the provision of pipe-borne water, which is completely lacking in the study community, the provision of adequate toilet facilities, sanitation, and health education to encourage the populace to seek treatment in hospitals and to reduce exposure to potential transmission sites (Oyeyemi et al., 2020, 2018). Therefore, this study determined the prevalence of urinary schistosomiasis, water contact activities, and morbidity indicators in Cross River, south-south Nigeria.

Materials and Methods

Study area: Sankwala is a community that is fast-growing in Cross River State, judging from its increase in population from about 8,000 in 1999 to over 15,000 people now. The people are homogeneous in their habitation and speak a common dialect, which is understood by all in the community (Akeh et al., 2010). It is situated in the northern senatorial district of the state. About 400km from Calabar, the capital city of the state, Sankwala was a

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typical rural community until recently, when it was made the political capital of the Obanliku Local Government Area. The area has a firmly uniform temperature all year round, except at the ranch resort, where a temperate climate is observed due to its high altitude. The maximum temperature is around 32–35 °C and is observed between March and April, while the minimum value is 22 °C, which occurs in August, and 18 °C around December.

Inclusion and Exclusion: The inclusion criteria were Sankwala residents who signed a consent form. The exclusion criteria were Sankwala residents who declined to offer consent to the study.

Sample size determination: The sample size was determined from the following formula: $n = \frac{Z^2P(1-P)}{d^2}$:
n = sample size, Z = statistic matching to the level of confidence, P = anticipated prevalence obtained from the pilot study, and d = precision, which agrees with the effect size (Pourhoseingholi et al., 2013), which gives a total of 620 participants who were chosen through a simple random sampling process so that every individual within the study setting has equal chances of being included in the study (Berger & Zhang, 2005).

Quantitative data from the study were employed using appropriate descriptive and inferential statistics based on the data's type and distribution. The community leader, school management, parents, and all study participants gave their consent before enrollment in the study. The students were given orientation about the importance of the study to themselves and their entire community. Four locations were selected for this study to represent the geographical spread of the area. The areas are the central primary school, which is the only community school in the area; Godbye Secondary Commercial School; Sankwala Community Secondary School; and some areas within the community (Ipale). Schoolchildren and children found at home between the ages of 5 and 16 years and adult volunteers were screened. Pupils from primary schools and students from secondary schools systematically queued up according to their height in both primary and secondary schools and were given universal containers for urine collection. The adults were also given universal containers for urine collection after being assigned codes, including records of their age and sex, and the data were confidentially treated. A clean, universal container was used to collect the urine between 10:00 a.m. and 2:00 p.m. The urine samples were then examined macroscopically, biochemically, and microscopically following the procedure described by Omonijo et al. (2013) and Pugh et al. (1980).

The urine specimens were examined for visible haematuria and other abnormalities. For the biochemical examination, the urine specimen was examined following the procedures by Mott et al. (1985). The content of the preserved urine specimen was poured into a filtration system holding a Whatman No. 1 filter paper shaped into a funnel shape. The universal container holding the urine sample was rinsed with distilled water in the filtration system and left to stand for 24 hours to completely filter. The *Schistosoma haematurium* eggs were then counted (Mott, 1983).

Results

Table 1 and Table 2 give a broad picture of the prevalence, intensity, and morbidity indicators of infection among subjects in the studied locations. 620 urine specimens were examined, and the prevalence of urinary schistosomiasis was 37.06%. Subjects aged 5-7, 8-10, and 11-13 years accounted for a prevalence of 40.00%, 38.52%, and 52.24%, respectively. However, the prevalence declined in subjects between 14 and 15 years and older. The mean haematuria among all the subjects studied was 38.81 ery/µl of urine. The highest value of 84.35 ery/µl was seen in subjects aged between 11-13 years, while values declined in subjects aged 14 years and above. The mean value for proteinuria for all subjects studied was 35.44 mg/dl, and the distribution pattern was like that of haematuria. Table 3 gives the percentages of water contact activities of subjects in Sankwala. For bathing (stream), we had a prevalence of 56.50%; for washing clothes, we had a prevalence of 82.75%; for fetching drinking water, we had a prevalence of 91.00%; for household washing, we had a prevalence of 85.50%; and for swimming, we had a prevalence of 70.00%.

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Table 1: Prevalence of urinary schistosomiasis in Sankwala

Age (yrs)	No. examined (n=620)	No. infected	% of infection
5-7	31 (5.00)	12	40.00
8-10	135 (21.77)	52	38.52
11-13	212 (34.19)	111	52.34
14-16	115 (18.55)	33	28.70
17-19	54 (8.71)	13	24.07
20-22	43 (6.94)	9	28.93
23 & above	30 (4.83)	5	17.24
Total	620	236	37.06

Table 2: Distribution of morbidity indicators of the studied population

Age (yrs)	No. infected n=620	Mean haematuria Ery/µl	Mean proteinuria Mg/100ml	Intensity of infection (ova/10ml urine) Light	Heavy
5-7	31 (5.00)	47.55	40.11	10 (1.61)	02 (0.32)
8-10	135 (21.77)	70.96	55.86	42 (6.77)	10 (1.63)
11-13	212 (34.19)	84.35	72.27	74 (11.94)	37 (5.97)
14-16	115 (18.55)	27.59	36.41	24 (3.87)	9 (1.45)
17-19	54 (8.71)	25.72	24.29	13 (2.09)	-
20-22	43 (6.94)	13.14	3.20	9 (1.45)	-
23 & above	30 (4.84)	4.04	2.02	5 (0.81)	-
Total	620	39.05	33.45	177 (25.29)	58 (8.29)

Table 3: Percentages of water contact activities of subjects in Sankwala

Age (yrs)	No. of Respondents n=400	Bathing (stream)	Washing clothes	Fetching drinking water	Household washing	Swimming
5-7	10 (2.5)	10 (2.50)	10 (2.50)	8 (2.00)	10 (2.50)	4 (1.00)
8-10	25 (6.25)	25 (6.25)	25 (6.25)	25 (6.25)	25 (6.25)	20 (5.00)
11-13	200 (50.00)	115 (28.75)	175 (43.75)	197 (49.25)	184 (46.00)	162 (40.50)
14-16	115 (28.75)	46 (11.5)	78 (19.50)	90 (22.50)	84 (21.00)	74 (18.5)
17-19	30 (7.50)	16 (4.00)	25 (6.25)	24 (6.00)	27 (6.75)	18 (4.50)
20-22	12 (3.00)	8 (2.00)	12 (3.00)	12 (3.00)	4 (1.00)	-
22 & above	8 (2.00)	6 (1.50)	6 (1.50)	8 (2.00)	8 (2.00)	2 (0.50)
Total	400	226 (56.50)	331 (82.75)	364 (91.00)	342 (85.50)	280 (70.00)

Discussion

The urinary schistosomiasis studied in the four selected locations had a prevalence rate of 236 (37.06%) out of the 620 urine samples collected and examined. This agrees with a study conducted in Owena, Ondo State, which had a prevalence of 37.7% (Folahan et al., 2021) and 37.9% in Cross River (Akeh et al., 2010). There are other variations, from Ogun State, Akinwale et al. (2010) had a prevalence of 54.6%; from Kano State, Oniya and Olofinye (2009) had 41.6%; and from Benue State, Houmsou et al. (2012) had 41.5%. Some studies found a lower prevalence of 8.7% in Kogi State (Ejima & Odaibo, 2010). Lower prevalence was also reported from other countries, such as Malawi (10.4%; Kapito-Tembe et al., 2009), while higher prevalence was reported from Zimbabwe (60%; Bourouwe et al., 2004) and Cameroun (50.8%) (Nkengazong et al., 2009). The infection rose from 5 years and peaked in subjects aged 11–13 years. The prevalence rate decreased drastically from 14 years and older. This observation was noted in the distribution of mean haematuria, mean proteinuria, and mean egg output in the different age groups.

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The percentage of subjects who accepted involvement in different water contact activities ranged from 56.50% to 91.00%. Activities such as domestic use and bathing are among the common water-contact activities undertaken by people in this community. A defined pattern of water contact activities in the different age groups was not established. This is because subjects varied in their purposes for using water, which could either be domestic or economic purposes (Ugbomoiko et al., 2010). According to the World Health Organization, ignorance, poor living conditions, a lack of proper sanitation, poverty, *a lack* of potable water supplies, and environmental factors in many rural communities contributed to the transmission of schistosomiasis in Nigeria (WHO, 2016).

Conclusion

The finding shows that Sankwala is endemic for urinary schistosomiasis. The high prevalence among school-age children, with prevalent water contact activities, underlines the significance of targeted interventions focusing on hygiene, access to clean water sources, and sanitation. The population in Sankwala is rapidly increasing, and people in this community depend on seasonal streams scattered all over the community. These are sites suspected to be responsible for the transmission of infection. Sankwala is the next town to the Obudu Ranch Resort, which attracts visitors and tourists daily. These visitors may, from time to time, stop over for sightseeing and lodging. Hence the need for an urgent intervention programme to eradicate the disease.

Recommendations

Based on the study of urinary schistosomiasis prevalence, water contact activities, and morbidity indicators in the Sankwala community, Cross River, South-South Nigeria, the following are recommended:

1. The government should provide potable water to the community; this will help minimize human contact with contaminated water sources.
2. An awareness campaign should be targeted at school-age children, with an emphasis on prevention and control measures.
3. There should be the involvement of community heads, stakeholders, and school authorities in disease control efforts.
4. There should be collaboration with government health agencies to include the urinary schistosomiasis programme in existing healthcare policies, both at the community and national level.

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Competing interests

None.

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