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# COMPARATIVE STUDY OF *SCHISTOSOMA HEAMATOBIUM* BETWEEN KUDOGI AND DOKOMBA VILLAGES IN LAVUN LOCAL GOVERNMENT OF NIGER STATE, NIGERIA

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**ABSTRACT**

Urinary schistosomiasis is a human disease cause by trematodes (fluke) of genus schistosoma and species *Schistosoma heamatobium*. The prevalence study of urinary schistosomiasis was carried out to determine the incidence of the organism between the two villages of Lavun local government area of Niger state. A total of 259 urine samples were collected from the two villages of which 78 are from Dokomba and 181 are from Kudogi. Sedimentation technique was used for laboratory analysis of the urine samples. Sediment from each sample was placed on a clean slide and observed under light microscope. The overall prevalence percentage of *Schistosoma heamatobium* in both villages is 66.9%. The prevalence percentage from the two villages shows slight differences, that is 67.9% from Dokomba and 66.4% from Kudogi. The result also shows that Dokomba account for 55% of the eggs from the infected participant while Kudogi account for 44.8%. The gender analysis shows that male are more infected from the two villages with a prevalence percentage of 67.4% and that of female is 65.2. 80% of the eggs are from male while only 19.9% are from female. The study revealed that participant within the age group of 6-11 has higher prevalence of 72.9 and intensity of 50% and closely followed by age group of 12-19 with 70.9% prevalence and 23.2% intensity. The age group 20-35 has lowest prevalence of 56.4% while age group 36 and above have least intensity. From the prevalence percentage, the study revealed high incidence of the pathogens in the two villages with Dokomba slightly account for higher percentages hence the need for mass chemotherapy and provision of social amenities in the two villages.

**Keywords:** Urinary schistosomiasis, Dokomba, Kudogi, Comparative and Prevalence.

## INTRODUCTION

Schistosomiasis is a chronic and debilitating neglected tropical disease that is caused by water-borne digenetic trematodes of the genus *Schistosoma*. The five medically important species are *Schistosoma haematobium, S. mansoni, S. japonicum, S. mekongi and S. intercalatum* (Abe *et al.,* 2018). The first three are the most relevant from a global health perspective. Adult male and female schistosomes reside in the blood system, specifically the vesical venous plexus of the bladder (*S. haematobium*) or mesenteric vessels of the gastrointestinal tract (*S. mansoni and S. japonicum*).At these sites, mated female worms lay eggs, which are expelled via urine or feces, respectively, into the environment (Nation *et al.,* 2020).The disease is still a major public health problem in about 77 developing countries. Recent estimates indicate that 779 million people are at the risk of infection, and 85% of them are in Africa (Dawaki *et al*., 2016). Approximately 207 million individuals in 74 countries are infected with schistosomiasis, and 120 million of these people developed the disease. Thirty-one African countries including Sudan have the great burden of this disease, and millions of individuals have been suffering from schistosomiasis (Hotetz and Kamath, 2009). Africa houses at least 90% of infected people requiring schistosomiasis treatment. In developing countries, children aged 5–17 years possess the highest risk of infection and are the most infected group (Herman *et al*., 2017). Urinary schistosomiasis is caused by a species of schistosome i.e. *Schistosoma haematobium* (Dawaki *et al*., 2016). Nigeria is reported to have the greatest number of schistosome infection worldwide with 29 million people infected and about 101 million people are at risk of infection (Hotetz *et al*., 2012).

The associated factors of schistosome incidence include low socioeconomic status, lack of clean water supply, lack of basic infrastructure, relatively low quality of housing, poor waste management and poor environmental sanitation. Agricultural and recreational activities such as fishing, farming and swimming also pre-disposes individual to infection (Khalid *et. al*., 2018). Occurrence and even expansion of schistosomiasis foci in peri-urban and urban settings have increasingly been observed. Rural–urban migration in low- and middle-income countries and in turn, rapid and unplanned urbanization is implicated in explaining these observations. About 90% of this increase in urban populations is projected to take place in Africa and Asia including countries affected most by schistosomiasis (Klohe *et al* 2021).
Clinical manifestations of the infection are dermatitis or swimmer's itch which may occur in response to cercarial skin penetration (Nicolls *et al.,* 2018).However, newly infected patients are often asymptomatic (Miller and Wilson, 2015). Common symptoms are urinary frequency, urgency, dysuria and end-stream hematuria. Of these symptoms, terminal hematuria may be the most feasible and is often the basis for epidemiologic diagnosis. Iron deficiency anemia may be exacerbated by co-morbidity with other endemic tropical diseases, such as plasmodiasis and helminthiasis. A substantial amount of iron is sequestered by vitelline cells for the formation of the parasite eggshell (Jones *et al.,* 2017). Schistosome can be control by provision of portable water, high environmental sanitation, reduce contact with infested water, mass chemotherapy and snail control (Daniel *et al.,* 2015).

Due to hampered control program of schistosomiasis in Nigeria(Dawaki *et al*.,2016), the incidence of the parasites can be

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found in all the state of the federation and particularly Niger state with many riverine communities hence the need for this study to provide baseline information on the current status of the disease for future control program.

## MATERIALS AND METHODS

### Study area

The study was conducted in two villages of low land communities of Lavun Local Government Area of Niger State, North Central Nigeria. The communities are Dokomba and Kudogi. The villages are located between latitude 9$^0$24N and longitude 5$^0$70E, the area has a tropical climate with mean annual rainfall of 122.7mm with highest rain recorded in the month of July (226.3mm) and September (248.8mm). Distinct two seasons of raining and drying is observed between May –-October and November –-April respectively(Abubakar, 2017). The vegetation is mainly guinea savanna. The low land use to be flooded with water during raining season in addition to river Lavun that passes through the area which compel the majority of the inhabitants to rice farming and fishing . The socio-economic standard of the people is low, majority being illiterate, income is low and infrastructural facilities like general hospital are lacking and primary school as the only educational institution in all the communities with each having a pipe borehole. The major sources of water are river Lavun use for washing and other domestic's purposes.

The consent of the participant was verbally sorted through the two village heads and not through the local government.

All the people that are resident in the two villages for more than three weeks and have not taken any antihelminthic drug within the period are included while those that had stay for less than three weeks were exempted. Inclusive and exclusive criteria

### Sample collection

Each consented individual was given a sterile urine sample bottle for collection of urine sample. The participants were instructed to ensure the inclusion of terminal urine in the sample and were also asked to do that within the hours of 10:00am and 12:00noon when *schistosome haematobium* eggs are at peak of coming out from patients (Coulibaly *et al.,* 2018) The containers were labelled with sex, age and number of each participant. The samples were immediately preserved with a drop of formalin on each before being transported to the laboratory for examination.

### Examination and processing

The urine samples were physically observed and the colours were noted to presumed hematuria. Chemical examination was also carry out on each sample with the help of medi test combin 9 to ascertain the hematuria, protenuria, bilirubin, glucose etc. Microscopically, 10mL of urine was poured into a clean centrifuge tube, shake thoroughly and centrifuge at 500rpm for 5 minutes. The supernatant was discarded and the sediment was used on slide for microscopic examination, using light compound microscope of x10 objective lens. The eggs were identified as having elliptical shape with terminal spine.

### Statistical Analysis

The data obtained were subjected to statistical packages for social sciences and chi square was used to determine differences of two parameters. All level of significance were set as $p<0.05$. Tables were presented using MS word.

## RESULTS

The study has a total of 209 participants of which 140 are positive of *Schistosoma heamatobium* i.e. 66.9% prevalence. 78 and 131 participants from Dokomba and Kudogi recorded 67.9% and 66.4% prevalence respectively. The gender result has 110 to be infected from163 male examined while 30 from 46 of female are positive. The age analysis present the following prevalence percentage; 61.7,72.9,70.9,56.4 and 65 for 1-5,6-11,12-19,20-35 and 36 and above respectively. Intensity result shows that Dokomba accounted for 55% of the eggs while 44.8% is for Kudogi. The intensity revealed 80% for male and 20% for female. 1316 eggs recorded is distributed among the age group as follow; 163, 657,307,118,72 for 1-5, 6-11, 12-19,20-35 and36 and above respectively.

**Table 1**: Prevalence of Urinary Schistosomiasis in relation to the villages and sex

| Villages | Number examined | Number infected | % |
|---|---|---|---|
| Dokomba | 78 | 53 | 67.9 |
| Kudogi | 131 | 87 | 66.4 |
| Total | 209 | 140 | |
| Sex | | | |
| Male | 163 | 110 | 67.4 |
| Female | 46 | 30 | 65.2 |
| Total | 209 | 140 | |

**Table 2**: Prevalence of *Schistosome heamatobium* with respect to age group

| Age group | Number examined | Number infected | % |
|---|---|---|---|
| 1-5 | 34 | 21 | 61.7 |
| 6-11 | 85 | 62 | 72.9 |
| 12-19 | 31 | 22 | 70.9 |
| 20-35 | 39 | 22 | 56.4 |
| 36 above | 20 | 13 | 65 |
| Total | 209 | 140 | |

**Table 3**: Intensity of *Schistosome heamatobium* with respect to villages and gender

| Villages | Number of eggs | % |
|---|---|---|
| Dokomba | 726 | 55 |
| Kudogi | 590 | 44.8 |
| Total | 1316 | |
| Gender | | |
| Male | 1053 | 80 |
| Female | 263 | 20 |
| Total | 1316 | |

**Table 4**: Intensity of Schistosome heamatobium in relation to Age group

| Age group | Number of eggs | % |
|---|---|---|
| 1-5 | 163 | 12.3 |
| 6-11 | 657 | 50 |
| 12-19 | 306 | 23.2 |
| 20-35 | 118 | 9 |
| 36 above | 72 | 5.4 |
| Total | 1316 | |

## DISCUSSION

The results of the present study show that Dokomba and Kudogi villages are endemic of urinary schistosomiasis due to presences of water body in the two communities. The percentage prevalence of this study is 66.9% which is similar to 70.2% obtained in rural communities of Abeokuta, Nigeria by Ojurongbe *et al* (2014). The two results are slightly lower than 73.2% recorded in Senegal by (Bruno *et al*, 2015). The prevalence percentage between the two villages is insignificantly different, that is 67.9% and 66.4% for Dokomba and kudogi respectively. The insignificant different in their prevalence may be attributed to their proximity with each other, same habitat, same occupation and cultural setting. The gender different in prevalence shows that male with 67.4% are more infected than female with 65.2%, the difference in gender prevalence of the study is at variance to the earlier one reported in Sokoto by Singh and Muddasiru (2014) that schistosomiasis was more pronounced among male (79.59%) compared with the female participant (20.41%). This may not be far fetch from the facts that, the cultural setting of Sokoto people clearly defined the occupation of the sex unlike in the North Central where we have female involve in farming which can predispose them to infection. Khalid *et al*, (2018) in Khartoun , Sudan revealed equal infection rate of 50% for the two gender. In overall, the analysis of this study is in turn with results of many researchers where male are always more infected than the female irrespective of the percentage. The age group 6-11 account for the highest prevalence in the study with 72.9% and followed by age group 12-19 with 70.9%, these two result agreed to earlier study of Dawaki *et al.,* (2016) which presented 34.5% as the highest in his study for age group 11-20.Age group 1-5 and 36 above recorded 61.7% and 65%. The intensity analysis between the two villages revealed that Dokomba account for 55% while Kudogi recorded 44.8% and this corroborate the prevalence result, where the differences between the villages is not remarkable. A clear distinction of egg load between the two genders was obtained in the study with male having 80% of eggs and the remaining 20% for female. This is in line with Ezeagwuna *et al*. (2012) that reported 4.9% for male and 4.6% for female but also differ in terms of significance. The trend of intensity in age group also followed that of prevalence with age group 6-11recording 50% as the highest, followed by age group 12-19 with 23.2%. The age group 36 and above recorded the least intensity of 5.4% and that may be due to assertion of Gryseels *et al.* (2016), that the decline of intensity of infection among older people in some populations is due to a decreased contact with infected water. Physiologically, this may also be due to concomitant immunity as a result of long year's exposure to infection of those particular pathogens.

## Conclusion

The two communities are endemic of the parasite with Dokomba having higher prevalence percentage than Kudogi. The infection is not sex dependent. Age group 6-11 is more infected and had more load of eggs than any other age group.

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