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# PREVALENCE OF *Schistosoma haematobium* INFECTION AMONG SCHOOL-AGED CHILDREN IN AFIKPO NORTH LOCAL GOVERNMENT AREA, EBONYI STATE, NIGERIA

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## Abstract

The present study aimed at evaluating the prevalence of *Schistosoma haematobium* among school children of ages 5 to 16 years in Afikpo North L.G.A. of Ebonyi State, Nigeria. The study was carried out between February 2016 and January 2017. Urine samples were analyzed in the laboratory using the sedimentation and centrifugation technique. Of 504 persons (250 males and 254 females) that were randomly selected and screened for *S. haematobium* infection, 20 (3.97 %) were found to be infected. The intensity of infection was greater in males (n=12; 2.38 %) than in the females (n =8; 1.59 %). The sex of an individual was not statistically associated with the prevalence of *S. haematobium*. The highest prevalence rate of *S. haematobium* was recorded in the age bracket of 14 -16 yrs. 7 (1.39 %) while the least prevalent was recorded among the 5 – 7 yrs.[2] (0.40 %). There is no significant relationship between the age and the prevalence of *S. haematobium* (p> 0.05). No case of infection was found in the pupils using boreholes and rain water. The highest prevalence with respect to the source of water was in pupils using the stream 15(2.98%). There was a significant relationship between the source of water and the prevalence of *S. haematobium*. Additionally, there was no significant relationship between occupation of the parents and the prevalence of *S. haematobium* (p> 0.05). The results reveal that the prevalence of *S. haematobium* is not location specific, but there is a need to integrate the control of snails to reduce the prevalence of *S. haematobium* in Afikpo North L.G.A. Ebonyi State.

**Keywords:** Afikpo, Ebonyi, Nigeria**,** prevalence, *Schistosoma haematobium*, school age

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## 1. Introduction

Schistosomiasis water borne parasitic disease caused by the digenetic blood fluke, *Schistosoma*, and is known to be the second most endemic parasitic disease of epidemiological and public health concern in tropical and sub-tropical countries (Hotez & Kamath, 2009). Three of the common endemic species are *Schistosoma haematobium*, *Schistosoma mansoni* and *Schistosoma japonicum* which are known to cause severe morbidity and mortality in many rural resource poor communities that lack basic amenities. Globally, it has been reported that about 779 million people are at risk of infection with 249 million being infected. The majority of the disease burden is carried by sub-Saharan Africa where it has been found that about 224 million persons suffer from malignant effects of the disease with a death toll of 280,000 in the year 2015 (WHO, 2016). Urinary schistosomiasis, caused by S. haematobium is an important public health problem in Nigeria (Ukpai & Ezeike, 2002; Eyo et al., 2012; Amaechi, 2014; Ivoke et al., 2014; Adulugba & Omudu, 2015) where the infection causes considerable morbidity in the population where it occurs. The worms are known to reside in the venous plexus of the urinary bladder and the pelvic organs where ova deposition in and around the urinary tract results into inflammation and lesions. Usually, this culminates into morbidity of the affected individual (Eyo et al., 2012; Amaechi, 2014). People engaged in water related activities such as fishing and farming are mostly affected by this infection since they are in constant contact with Planorbid fresh water snails of the genus *Bulinus* found around water sources . It has been reported that school-aged children, adolescents and young adults experience quite a large burden of schistosomiasis which usually have both immediate and long term consequences ranging from poor physical and psychosocial development, growth and education (Hotez & Kamath, 2009;Dawaki et al., 2016). In Nigeria, there is data on urinary schistosomiasis in the different geopolitical zones. However in Ebonyi states, there is little published data on S. haematobium infection in parts of the state (Nworie et al., 2012; Ivokeet al., 2014) .This study was therefore aimed at ascertaining the current prevalence of urinary schistosomiasis among school age children in Afikpo North Local Government Area (L.G.A). The information so obtained will assist in planning appropriate and cost effective control measures in the study area.

## 2. Material and Methods

### *2.1 Study area*

Through random selection 5 settlements situated near water bodies were selected for the study: They are; Amasiri, Ibii, Amogu Akpoha, Akpoha and Ezeke Amasiri. The schools included in this study were Ezeke Primary School Amasiri, Amata Primary School Akpoha, Community Secondary School Amasiri, Community primary school Ibii, and Modern Primary School Amogu Akpoha all in Afikpo North L.G.A. Afikpo North L.G.A has an area of 240km$^2$ and a population of 156,611 (NPC, 2006). The study area lies on latitude $5^0$ $53^0$ E and $5^0$ $55^0$ E and on longitude $7^0$ $57^0$ N. Geomorphologically, the area is composed of an alternation of high and low land with some of these low land occupied by surface water bodies. It is a rural area with climate and vegetation that is consistent with that of typical tropical rainforest region in Eastern Nigeria. It has annual rainfall of about 1500-2000mm. It has streams, rivers, lakes and springs and it has a dendrite drainage pattern. It is an agricultural community. The highest temperature occurs between March and April and the lowest in the peak of harmattan period (January). Wet and dry seasons are distinct in the area - wet season spans from March to October. The vegetation in the study area comprises mostly of perennial trees, grass, shrubs and climbers. The water bodies that are found

in the study area include Ohia located in Amasiri, Iyiogologo located in Akpoha, Ugwagwo Ezeke Eziukwu located in Amasiri, Uke ezego located in Ibii and Iyi Akpoha located in Amogu Akpoha. These streams serve the water needs of the surrounding settlements. However because of the proximity of these streams to human settlements, more human activities take place in these streams. The streams are used for various domestic, recreational and occupational purposes. In some areas the inhabitants dispose of their stools and urine indiscriminately, which are accumulated in water bodies in the study area. The inhabitants of Afikpo North are mainly farmers, practicing farming during both the rainy and dry season. Crops include rice, cassava, yam, vegetables, palm oil and cocoyam. Fishing, hunting and carpentry are also other forms of occupation in the rural communities. Some also engage in trading and civil service.

*2.2 Ethical consideration*

Permission was obtained from the Secretary of Education Management Board, Afikpo North Local Government Area of Ebonyi State to carry out the project which involved the collection of urine samples from students from the selected schools in Afikpo North Local Government, Ebonyi State, Nigeria. The respondents were officially informed prior to the samples being taken.

*2.3 Sample collection*

Bio-data collections were made using a questionnaire. Clean labeled sample bottles were issued to the subjects to collect urine between 1000 and 1400 hrs. The urine samples were taken immediately to the laboratory for analysis.

*2.4 Laboratory analysis of samples*

In the laboratory each urine sample was properly shaken and about 10 ml was transferred to a conical tube and centrifuged at 1000 r.p.m. for 5 minutes (Cheesbrough, 1998). The sediment (after discarding the supernatant) was transferred to a clean dry glass slide covered with a cover slip and the sediment was examined microscopically using a magnification of 10x with the condenser iris closed sufficiently to give contrast while 40x magnification was used for the identification of terminal spine eggs of *Schistisoma haematobium*.

*2.5 Statistical analysis*

The data collected were entered and analyzed using SPSS version 17.0 for windows software. Significant difference in the prevalence of infection by age and gender were determined using Chi-square test. Statistical significance was considered when P-value is less than 0.05.

## 3. Results

3.1 *School/ community related prevalence of urinary schistosomiasis*

Of the 504 persons screened for *Schistosoma haematobium* infection, 20 (3.97%) were found to be infected. The highest prevalence by school/community was recorded in community secondary Amasiri, where 7 (1.39%) persons were infected while the least was in the Modern primary school Amogu Akpoha (Table 1).

3.2 *Age related prevalence of urinary schistosomiasis*

Considering age, the 14-16 year age group recorded the highest prevalence (1.39 %), while the lowest was in the 5-7 year age group (0.40 %) (Table 2).

**Table 1.** Prevalence of *Schistosoma haematobium* infection by schools/community in Afikpo North L.G.A. Ebonyi state

| Schools | Number examined | Number infected | % infected |
|---|---|---|---|
| **I.** | 108 | 5 | 0.99 |
| **II.** | 100 | 4 | 0.79 |
| **III.** | 125 | 7 | 1.39 |
| **IV.** | 90 | 3 | 0.60 |
| **V.** | 81 | 1 | 0.20 |
| Total | 504 | 20 | 3.97 |

$(X^2_{(4, 0.05)} = 2.681, P>0.05)$ Not Significant, P>0.05

Key: I. Amata Primary School Akpoha

II. Ezeke Primary School Amasiri

III. Community Secondary School Amasiri

IV. Community Primary School Ibii

V. Modern Primary School Amogu/Akpoha

**Table 2.** Distribution of *S. haematobium* infection according to age

| Age(Yrs) | Number examined | Number infected | % infection |
|---|---|---|---|
| **5-7** | 80 | 2 | 0.40 |
| **8-10** | 104 | 6 | 1.19 |
| **11-13** | 150 | 5 | 0.99 |
| **14-16** | 170 | 7 | 1.39 |
| Total | 504 | 20 | 3.97 |

$X^2_{(4, 0.05)} = 1.506$, P>0.05 Not Significant

**Table 3.** Distribution of *S. haematobium* with reference to sex

| Sex | Number examined | Number infected | % infected |
|---|---|---|---|
| **Male** | 250 | 12 | 2.38 |
| **Female** | 254 | 8 | 1.59 |
| Total | 504 | 20 | 3.97 |

$X^2_{(4, .05)} = .901$, p>.05 Not significant, p.> 05

3.3 *Sex related infection rate*

Sex related infection rate showed that males recorded higher prevalence rate 12 (2.38%) than the females 8(1.59%) (Table 3).

3.4 *Sources of water supply related infection rate*

Based on the responses to the questionnaire, the available sources of water supply included borehole, well, pond, stream and rain water. Participants who use streams as their source of water recorded the highest prevalence (2.98%). The next highest was among those who use ponds, where 3 of the 50 individuals screened (0.60%) were infected with *S. haematobium*. The individuals that make use of boreholes and rain water recorded no infection to *S. haematobium* (0%) (Table 4).

The results show that there exists a significant relationship between sources of water and the prevalence of *S. haematobium* ($X^2_{(4, .05)}$ =14.585, p<.05).This indicates that the source of water is associated with the prevalence of *S. haematobium*.

3.5 *Prevalence of urinary schistosomiasis in relation to occupation of parents*

The highest prevalence was recorded in students whose parents are farmers. Of the 300 individuals examined 13 (2.58%) were infected with urinary schistosomiasis. Students whose parents were involved in business were also infected 6 (1.19%). The least prevalence was recorded in students whose parents are civil servants i.e. only 1 student of the 40 that was screened (0.20%) (Table 5).

**Table 4.** Prevalence of *S. haematobium* infection according to sources of water supply

| Source of water | Number examined | Number infected | % infected |
|---|---|---|---|
| **Borehole** | 130 | 0 | 0 |
| **Well** | 90 | 2 | 0.40 |
| **Pond** | 50 | 3 | 0.60 |
| **Stream** | 200 | 15 | 2.98 |
| **Rain water** | 34 | 0 | 0 |
| Total | 504 | 20 | 3.97 |

$X^2_{(4, .05)}$ =14.585, p<0.05 Significant p<0.05

**Table 5.** Urinary Schistosomiasis infection in relation to occupation of the parents

| Occupation | Number examined | Number infected | % infected |
|---|---|---|---|
| **Civil Servant** | 40 | 1 | 0.20 |
| **Farming** | 300 | 13 | 2.58 |
| **Business** | 180 | 6 | 1.19 |
| Total | 504 | 20 | 3.97 |

$X^2_{(4, .05)}$ = .372, p>.05 Not Significant

## 4. Discussion

Urinary schistosomiasis is known to be a public health threat in many developing countries. In Afikpo North L.G.A. Ebonyi state, a survey of Urinary Schistosomiasis among school children revealed the prevalence of urinary schistosomiasis though with a low endemicity of 3.97% .The overall prevalence in this present study is lower than that recorded by Nworie *et al*. (2012) in the same Local Government Area which was 9.8 %. A much higher prevalence (62 %) in the same Local Government Area was reported by Ivoke *et al.* (2014).The variation in prevalence is closely attributed to the fact that different communities were used in the different studies, leading to marked variations in the results obtained. The present study however was similar to the results (4.5 % prevalence) reported by Ingang-Etoh *et al*., 2009 for the Abini community of Cross River State. The low prevalence of urinary schistosomiasis in Afikpo North may be due to the fact that some of the settlements have an urban setting where basic amenities such as bore holes and toilet facilities are available. There is a reduction in visitation to water bodies that serve as breeding sites for *Schistosoma haematobium.* Sensitization and creation of awareness of the dangers of the infection has been conducted in most of the study areas. The highest prevalence was recorded in the Community Secondary School Amasiri located in Amasiri. The high prevalence is attributed to the proximity of a stream known as Ohia which serves as the water source in that community. Children visit the stream for recreational activities, washing of clothes, fetching of water etc. These children are more exposed because of the proximity of the breeding site, reiterating that proximity to the breeding sites of snails is an important determinant of the rates of infection. The other factors that might be responsible for the higher prevalence in the Community Secondary School Amasiri are the lack of information, sensitization, and poor sanitation. Debris is frequently dumped into water bodies and the lack of basic sanitation facilities result in the indiscriminate disposal of human wastes also into these waters. Children urinate while playing and swimming in the stream thereby passing the infective stage into the water bodies that harbour the snail which is the intermediate host. Pollution of the water body has been shown to be strongly associated with snail density. Exposure to cercariae - infested water is sufficient to affect transmission, even when the number of shedding snail is low (Opisa *et al.,* 2011). The lowest prevalence was recorded in the Modern Primary School Amogu, Akpoha Located in Amogu Akpoha community i.e. only 1 (0.20%). This might be attributed to the fact that the stream known as Iyi Akpoha is located far from the human settlement, so that visitation is reduced thereby reducing the risk factor. This pattern of infection of individuals in different locations of the study area is similar to that recorded by Uneke *et al*. (2007).

The prevalence of urinary Schistosomiasis was highest in the age group of 14-16 years. This may be since children in this age bracket were frequently involved in activities that bring them in contact with the sources of infection. Many species dependant factors related to the nature of contact (such as the frequency or total duration of contact, how much of the body is exposed and when) may contribute to the likelihood of encountering infective cercariae. This finding is consistent with those of other authors (Uneke *et al*., 2007; Nworie et *al*., 2012; Nwachukwu *et al*., 2015).The 14-16yrs age group also contaminates the streams with their urine which may contain the eggs of the parasites, so acting as a source of transmission of the disease (Nwachukwu *et al*., 2015). The results of this study unlike the result of some earlier studies show that the prevalence of the disease is not age dependent even though there was increase in the prevalence rate of ages from younger to

older students. Males recorded higher prevalence rate -12 students (2.38 %) than the females (1.59%) This observation agrees with earlier reports by Nworie *et al*., 2012 for urinary schistosomiasis in Afikpo North L.G.A Ebonyi State. Males are more infected since males are more involved in water related activities such as swimming, washing, bathing, hunting of snails and fishing, than the females. In relation to the sources of water supply no case of infection was found among children using boreholes and rain water. Participants whose streams are their source of water supply- 15 (2.98%), pond and wells 3(0.60%) and 2 (0.40%) respectively. These observations showed that the infection depends on the sources of water supply. It has been observed that transmission of schistosomiasis takes place where freshwater snail vectors are present and where there is contact between the population and infected water. Therefore, the recorded cases of infection among children using wells, ponds and streams may be due to the fact that these sources were contaminated with cercariae.

Occupation of the participant's parents played an important role in infection of *S. haematobium* cercariae. The trend of infection in relation to parental occupation of the students reveal that students whose parents took to farming recorded the highest infection (2.58%), which was closely followed by students whose parents were into business. The lowest prevalence was recorded in students whose parents are civil servants (0.20%). The higher prevalence of infection observed in students whose parents are farmers could be attributed to the fact that parents take the children to the farms with them. They probably fetch their drinking water from the streams and wash and bathe in streams or ponds on their way home. These categories of people have greater exposure to infection and as a result, constitute sources of infestation to the water bodies through which other groups may become infected. This observation of the prevalence of schistosomiasis is in agreement with findings of others (Nworie *et al.,* 2012; Amaechi, 2014; Adulugba & Omudu, 2015).

## 5. Conclusion

Based on the findings of this study, it is evident that the prevalence of *S. haematobium* infections among school aged children in some communities in Afikpo north Local Government Area is relatively low. Therefore, efforts should be intensified to maintain levels below the threshold and eradicate urinary schistosomiasis in the study area.

### References


Adulugba, A.O., Omudu, E.A. (2015) Epidemiological studies on some parasitological and ecological aspects of schistosomiasis in Agatu, Benue State, Nigeria*, Nigerian Journal of Parasitology* **36(1)**:38-43.

Amaechi, E.C. (2014) Urinary schistosomiasis among school age children in some rural communities of Abia State, south eastern Nigeria, *Animal Research International* **11(2)**:1953-1957.

Cheesbrough, M. (1998) *District Laboratory Practice for Tropical Countries*, Part 1, Cambridge University Press U.K. Pp. 191-200.

Dawaki, S., Al-Meklafi, H.M., Ithoi, I., Ibrahim, J., Abdulsalam, A.M., Ahmed, A., Sady, H.,Atroosh,W.M., Al-Areeqi, M.A., Elyana, F.N., Nasr, N.A., Surin, J. (2016) Prevalence and risk factors of schistosomiasis among hausa communities in Kano State, Nigeria, *The Revista do Instituto de Medicina Tropical de Sao Paulo* **58**:54.

Eyo, J.E., Onyishi, G.C., Okafor, F.C. (2012) Urinary schistosomiasis among pregnant women in some endemic tropical semi-urban communities of Anambra State, Nigeria, *Tropical Biomedicine* **29(4**):575-579.

Hotez, P.J., and Kamath, A. (2009) .Neglected tropical diseases in sub-Saharan Africa: review of their prevalence, distribution and disease burden*, PLoS Neglected Tropical Diseases* **3(8):**e412.

Ingang-Etoh, P.C., Essien, U.C., Amama, U.C., Useh, M.F. (2009) Prevalence of urinary schistosomiasis among school children in Ukwelo-Obudu and Abini communities in Cross River State, Nigeria, *Port Harcourt Medical Journal* **3(3)**.

Ivoke, N,Ivoke, O.N.,Nwani, C.D., Ekeh, F.N., Asogwa, C.N., Atama, C.I., Eyo, J.E. (2014) Prevalence and transmission dynamics of *Schistosoma haematobium* infection in a rural community of south-western Ebonyi State, Nigeria, *Tropical Biomedicine* **31(1)**:77-88.

NPC (2006) Report of the 2006 National Census Exercise. National Population Commission (NPC), Bulletin, Abuja.

Nwachukwu, P.C., Avoadja, D.A., Nwosu, D.C., Ajero, C.M.U., Nwanjo, H.U., Obeagu, E.I., Nnorom, R.M., Okpara, K.E.,Kanu, S.N (2015) Index of Potential Contamination for Urinary Schistosomiasis in Afikpo North L.G.A. Ebonyi State, Nigeria, *European Journal of Biomedical and Pharmaceutical Sciences* **2(1)**:439-450.

Nworie,O., Nya,O., Anyim, C., Okoli, C.S., Okonkwo, E.C. (2012) Prevalence of Urinary Schistosomiasis among Primary School Children in Afikpo North Local Government Area of Ebonyi State, *Annals of Biological Research* **3(8)**:3894-3897.

Ukpai, O.M., Ezeike, A.C. (2002) the prevalence of urinary schistosomiasis among primary school children in Aguata LGA, Anambra State, Nigeria, *Nigerian Journal of Parasitology* **23**:139-144.

Uneke J.C., Oyibo, P.G., Ugwuoru, C. D. C., Arinzechukwu, P. N., Iloegbunam, and R.O. (2007) Urinary Schistosomiasis Among School Age Children in Ebonyi State, Nigeria, *Internet Journal of Laboratory Medicine* **2(1):**1-14.

WHO (2016) WHO Schistosomiasis fact sheet.http://www.who.int/mediacentre/factsheets/fs115/en.2016