ORIGINAL RESEARCH

**Intestinal Schistosomiasis among some inhabitants of Bassa Local Government area of Plateau State, Central Nigeria**

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**Abstract**

Human schistomiasis is endemic and still remains a public health problem in Nigeria. Most reported cases of the disease have focused mainly on the urinary form with the intestinal form less reported.Thus, 600 fresh stool samples from consenting individuals in Bassa Local Government Area of Plateau State an endermic foci of schistosomiasis were collected and assayed for the presence of S. mansoni eggs by the saline thick stool smear technique. Prevalence of infection between ages and gender were tested using Chi-square ($x^{2})$ while one-way analysis of variance (ANOVA) was used in analyzing data relating to occupation. Association between infection and occupation was assessed by the independent student t-test.

Infection was significantly higher in younger than older individuals (P<0.05). There were no significant differences in infection bwtween the gender. However there was significant associatuion between infection and occupation of volunteers (P<0.05). Freshwater snails occurring in the area were sampled using a scoop net and pair of forceps. Three snail species namely *Bulinus globosus*, *Biomphalria pfeifferi* and *Lymnae natalensis* were encountered. *Bulinus* and *Biomphalaria* snails shed schistosome cercariae while *Lymnae* snails were not imfected. Intestinal Schistosomiasis is therefore also endemic in Bassa Local Government Area. Interventions by way of chemotherapy and mass awareness by Government and other Health Care givers are recommended to forestall spread of infection to other areas and curb the socio-economic and public health consequences.

Highlights:

* The status of Intestinal Schistosomiasis among some inhabitants of Bassa Local Government area of Plateau State north central Nigeria where such information is currently lacking is presented.
* Result suggests that Intestinal schistosomiasis is also endermic just like the urinary form of the diease in Plateau State.
* Mass public enlightenment as well as chemotherapy are suggested as intervention measures in order to forestall spread of the infection to other areas.

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1. **Introduction**

 Human schistosomiasis existing in two major forms, the urinary and intestinal has been known since antiquity. The disease is the second most common parasitic disease of man. An alarming 201 million cases (mainly urinary schistosomiasis) were estimated to occur in Africa accounting for more than 97% of the number of infections worldwide (Steinman *et al.,* 2006). Nigeria is one of the highly endemic countries with an estimated 11 million people infected with the disease (W.H.O., 2000). The disease is therefore of major public health importance.

 Factors like human migration, infrastructural development projects in agriculture, hydro-electricity and road projects continue to extend the disease to new areas as these projects increase the natural habitats of the snail intermediate hosts. Thus, there is continued increase in the prevalence as well as pattern of distribution of the scourge globally.

 In Nigeria, the vast majority of reports in literature tend to focus on the urinary form of the disease suggesting that it is probably more endemic in the country (Ukwandu and Bukbuk, 1996; Ofoeze *et al.,* 1997;Dakul *et al.,* 2001; Chidozie and Danian, 2005; Biu *et al.,* 2009;Sarkin-Fada *et al.,* 2009; Musa *et al.,* 2010; Morenikeji and Idowo, 2011; Balla *et al.,* 2015). Earlier, Ogunnowo (1990) had shown that intestinal schistosomiasis was of low endemicity in Nigeria. Since *Schistosoma mansoni,* the causative agent of intestinal schiotosomiasis is known to be more virulent than *S. haematobium,* more information regarding its occurrence and distribution in different parts of Nigeria is desirable. There is however, dearth of requisite information for most parts of Nigeria including Plateau State. Therefore, we report here the status of intestina schistosomiasis among inhabitants of Bassa Local Government Area of Plateau State, Central Nigeria.

**2. Materials and methods**

**2.1 The study area**

Bassa Local Government Area occupies a land mass of approximately 2,540km2 situated on latitude 804I – 9010I N and longitude 908 I – 9016 I E. The area is rocky and falls within the Guinea savannah vegetation zone of Nigeria. The area has numerous freshwater habitats like ponds, dams, streams, man-made lakes and irrigation channels. The area is predominantly rural with inadequate social amenities. Thus, inhabitants often depend on various streams, ponds and open wells for water. Owing to the scarcity of proper latrines, defecation and urination are often in the open or sometimes in running water.

**2.2 Ethical clearance**

Prior to sample collections, ethical clearance was obtained from the Health Department of Bassa Local Government Area, Plateau State for permission to conduct the study. Following approval, sample collection commenced with the administration of questionnaires.

**2.3 Administration of questionnaires**

 Structured questionnaires were administered to 600 people randomly selected in the Local Government Area so as to obtain information on age, gender, occupation, source of water, Volunteers who could write filled the questionnaires by themselves while interviews were conducted for those who could not write.

**2.4 Water contact activities**

 After a preliminary survey to identify sites frequented by the inhabitants was undertaken, three sites ( two streams and a dam) were selected for water contact study. Observations were carried out fortnightly between 6.00am to 6.00pm on each sampling occasion. The number of persons, approximate age, gender, type and duration of activity were recorded.

**2.5 Stool collections and treatment**

Stool samples were collected from 600 volunteers randomly selected from among the inhabitants in wide-mouthed/screw capped plastic containers and fixed in 10% formol saline solution. Each sample was appropriately labeled indicating serial number, age and gender of volunteers.. Faecal samples were then brought to the laboratory of the Department of Biological Sciences, Abubakar Tafawa Balewa University, Bauchi, Nigeria and examined by the saline thick stool smear technique.

**2.6 Snail survey and cercarial infectivity**

 A snail survey using long handle metal scoop net and pairs of plastic forceps was conducted in some of the freshwater habitats in the area. Snails captured were brought to the laboratory and examined for infection by the shedding method as described by Madsen (1985). Cercariae harvested as well as snails captured were identified on the basis of morphological characteristics in accordance with standard keys of Frandsen and Christensen (1984) and Brown (1994) respectively.

**2.7 Statistical Analysis**

Prevalence of schistosomes with respect to age and gender were analyzed by use of chi-square test (X2), while one way analysis of variance (ANOVA) was employed in analyzing data with respect to occupation. The p-value level of significance was assigned at P<0.05. The association between infection and occupation was assessed with student independent t-test. All analysis were done using the SPSS/PC+ computer software version 21.

**3 Results**

Of the 600 stool specimens examined 95(15.8%) were positive for *S. mansoni* eggs. The age and gender related prevalence of infection is shown in Table 1. This indicates that infection was higher among age group 5-10 years and the least prevalence was recorded among those aged 45 – 50 years . No infection was recorded among older persons aged 50 years and beyond. Thus, infection was observed to be significantly higher in lower age groups than older individuals (P<0.05). More females, 56(16.5%) were infected with schistosomes than males 39(15.0%) in the study area. This seeming difference was however statistically insignificant (P>0.05).

Table 1: Prevalence of intestinal schistosomiasis in relation to age and gender of some residents of Bassa Local Government Area of Plateau State, North Central Nigeria.

|  |  |
| --- | --- |
| Age Group(Years) | Gender |
| Males | Females  |
| No. Exam. | No. +ve | Prev (%) | No. Exam. | No. +ve | Prev (%) |
| 5 – 10 | 18 | 8 | 44.4 | 17 | 5 | 28.6 |
| 10 – 15  | 21 | 3 | 14.3 | 15 | 6 | 41.8 |
| 15 – 20  | 48 | 13 | 27.1 | 36 | 8 | 22.2 |
| 20 – 25  | 38 | 8 | 21.1 | 31 | 6 | 19.4 |
| 25 – 30  | 20 | 1 | 5.0 | 52 | 8 | 15.4 |
| 30 – 35 | 20 | 2 | 10.0 | 51 | 8 | 15.7 |
| 35 – 40 | 32 | 2 | 6.3 | 35 | 5 | 15.3 |
| 40 – 45  | 20 | 2 | 10.0 | 46 | 6 | 13.0 |
| 45 – 50 | 21 | 1 | 4.6 | 45 | 4 | 8.9 |
| 50 and above | 25 | 0 | 0.0 | 12 | 0 | 0.0 |
| **Total** | 260 | 39 | 15.0 | 340 | 56 | 16.5 |

The prevalence of infection in relation to occupation of volunteers is indicated in Table 2.

Primary school pupils and students at the junior secondary schools were more infected, followed by farmers/fishermen while government workers were the least infected. These differences were statistically significant (P<0.05). There was also significant association between farming/fishing activity and infectivity.

Table 2: Prevalence of intestinal schistosomiasis in relation to occupation of volunteers in Bassa, Local Government Area of Plateau State , North Central Nigeria.

|  |  |  |  |
| --- | --- | --- | --- |
| Occupation  | No. Exam  | No. Infected  | Prevalence (% ) |
| Farmers/ Fishermen  | 56  | 15  | 26.7  |
| Civil Servant  | 189  | 16 | 8.5  |
| Traders  | 58  | 4 | 6.9  |
| Students  | 92 | 29 | 31.5  |
| Pupils  | 55 | 23 | 41.8 |
| Unemployed Housewives  | 121 | 16 | 13.2  |
| Applicants/Pensioners  | 29 | 4 | 13.8 |
| Total  | 600 | 93 | 15.5 |

. Analysis of water contact activities of respondents presented in Table 3, showed that those engaged in washing/laundry were significantly more infected followed by farmers/fishermen and those who swam or bathed in that descending order (P<0.05). Those who fetched water for commercial purposes for building constructions were not infected.

Table 3: Prevalence of of intestinal schistosomiasis in relation to water contact activities of volunteers in Bassa Local Government Area, Plateau State, North Central Nigeria

|  |  |  |  |
| --- | --- | --- | --- |
| Water contact Activities  | No. Exam  | No. Infected  | Prevalence(% ) |
| Bathing/ Swimming  | 208 | 39 | 18.8 |
| Water for Commercial Purposes  | 3 | 0 | 0 |
| Water for domestic use  | 203 | 36 | 17.7 |
| Washing/Laundry  | 51 | 31 | 60.8 |
| Farming/Fishing  | 73 | 27 | 36.9 |
| No. Contact with water body  | 62 | 9 | 14.5 |

 Data on the snail survey revealed three freshwater snail species including *Biomphalaria pfeifferi, Bulinus globosus* and *Lymnaea natalensis.* Data on total number of snails recovered as well as those carrying patent infection is presented in Table 4. On the whole more *B.globosus* occurred with corresponding higher numbers of infected individuals (43.9%) than *B.pfeifferi* withonly 17.2% of them infected*. Lymnaea natalensis* was the least occurring snail recovered but did not shed cercaria.

Table 4: Snail species encountered in some fresh water bodies in parts of Bassa Local Government Area, Plateau state, Nigeria.

|  |  |
| --- | --- |
| Habitat type | Snail Species Encountered |
| *Bulinus globosus* | *Biomphalaria pfeifferi* | *Lymnaea natalensis* |
| No. Recovered | No.Infected (%) | No. Recovered | No.Infected (%) | No. Recovered | No. Infected (%) |
| Rukuba Dam | 957 | 468(48.9) | 311 | 52(16.7) | 121 | 0(0) |
| River Karami | 116 | 19(16.4) | 102 | 5(4.9) | 107 |  0(0) |
| River Nigell | 121 | 37(30.6) | 145 | 39(26.9) | 93  |  0(0) |
| Total | 1,194 | 524(43.9) | 558 | 96(17.2) | 321 |  0(0) |

1. **Discussion**

This investigation has shown that intestinal or mesenteric schistosomiasis is endemic in Bassa Local Government Area of Plateau State, North Central Nigeria. Although, the level of endemicity was low in comparison with reports from other parts of Plateau State (Akunfongwe *et al.,* 1996) as well as other parts of Nigeria (Pugh and Gilles, 1978; Adamu and Musa, 1998; Chidozie and Danian, 2005; Morenikeji and Idowu, 2011; Balla *et al.,* 2015). This low endemicity is nevertheless noteworthy since *Schistosoma mansoni* is known to be more virulent than *S. haematobium.* This, coupled with the fact that water conservation schemes for diverse purposes are on the increase in the area, such water bodies will continue to enhance local transmission with future consequences. Therefore, infection is likely to be on the increase with its attendant socio-economic effects unless mitigated.

 The age disparity in prevalence of infection observed in sampled population of Bassa Local Government Area in this study where infection was more in children appears to be consistent with many reports from elsewhere in Nigeria (Pugh and Gilles, 1978; Adeoye and Akabogu, 1996; Dakul *et al.,* 2001; Agere *et al.,* 2009; Balla *et al.,* 2015). Aside from factors of immunity, younger people are more prone to water related activities like playing, bathing and swimming in open water as well as swimming than older people. Thus, they tend to have more frequent contact with infested water with the schistosome cercariae, with higher degree of exposure for a longer period of time thereby enhancing acquisition of infection.

 It is interesting that more females than males were infected with intestinal schistosomes in the study area. The general trend of cases of intestinal schistosomiasis reported from other parts of Nigeria showed higher prevalence of infection among males owing to more frequent water contact and longer exposure time in those infested waters than females. The reason for the current observed disparity is not clear. However, it may be linked with an observation during the study of more women seen engaged in washing of domestic utensils and/or clothes in ponds and rivers than men thereby bringing them in frequent contact cercariae infested water. Women in the study area have also been observed executing tasks like building and farming which are activities exclusively for men elsewhere. This could have also contributed to the situation at hand by forcing them into frequent contact with the infested water.

The findings of this study in which children in the primary and junior secondary schools as well as farmers/fishermen were the most infected closely agrees with those of earlier workers (Ukwandu and Bukbuk, 1996; Dakul *et al.,* 2001; Agere *et al.,* 2009 Biu *et al.,* 2009; Sarkin-Fada *et al.,* 2009). Essentially, rural children in or out of school derive pleasure in bathing, swimming or just playing in water bodies around their homes/schools which may harbor infested snail intermediate hosts of schistosome parasites. Such activities are increased especially during the hot season when there is dire need to cool off the body. For this reason, children become exposed to infection. Similarly, dictates of occupation necessitates close and prolonged contact with sometimes infested water by farmers and fishermen alike thus predisposing them to high infections.

 Not all cases of infection with *S. mansoni* recorded in this study had been acquired locally. This is because interactions with soldiers having the infection and live in barracks located within the study area revealed that they could have acquired the infection before they were transferred to the area. Similarly, some Fulani inhabitants interviewed reported to have migrated from some other areas where they could have had the infections. These are undoubtedly typical examples of how human migration aid in the spread of schistosomiasis.

1. **Conclusion**

 It is evident from this study that intestinal schistosomiasis exists in Bassa Local Government Area of Plateau State, Central Nigeria. Therefore, there is need for an urgent intervention by Government and other health care givers to forestall its spread. A mass educational enlightenment campaign by both Plateau state Ministry of health and the Primary Health care Department of Bassa Local Government coupled with chemotherapy as well as provision of safe water supply will no doubt reduce transmission of schistosomiasis in the area.

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