International Journal of Sciences

Research Article Volume 6 – June 2017 (06)

Urogenital Schistosomiasis and Intestinal Parasitosis Coinfection among School Age Children in Adim Community, Nigeria

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ABSTRACT: The prevalence of urogenital schistosomiasis, intestinal parasitosis and their co-infection was carried out among the school age children in Adim Community from August to November, 2015. Urine and stool samples were collected from each of the subjects selected by simple random sampling method and processed using standard bacteriological and parasitological techniques. Of the 200 subjects examined, 42(21%) were infected with *Schistosoma haematobium*, 88(44%) with intestinal parasites and 21(10.5%) were co-infected. Subjects aged 5-10 years had the highest prevalence of infection (30%) with *S. haematobium*, while subjects' aged16-20 years had the highest prevalence of infection (80%) with intestinal parasites. The difference was statistically significant (p=0.001). Males recorded the highest prevalence of infection (30%) with *S. haematobium*, for intestinal parasites (50%) and for coinfection (15%) while females had (17.1%), (41.4%) and (8.5%) respectively and the difference was statistically significant (p=0.001). Hookworm (45.5%) had the highest frequency among the helminthes while *Entamoeba histolytica* (4.6%) was the only protozoan detected. This work confirmed a high prevalence of urogenital *schistosomiasis*, intestinal parasitosis and their co-infection among the school age children in Adim community.

Keywords: Urogenital Schistosomiasis, Intestinal Parasitosis, Co-Infections, School Age Children

Introduction

Intestinal parasitic diseases and urogenital schistosomiasis keep on constituting a noteworthy general wellbeing and formative test particularly among the school-matured youngsters in Nigeria. These contaminations have been represented as infections of neediness and underdevelopment since they have been connected to the absence of satisfactory unhygienic condition, provision of safe water and of uncalled for individual cleanliness (WHO, 2002a). These parasitic sicknesses deny the destitute individuals of good wellbeing, adding to financial insecurity and social minimization; and the needy individuals of immature countries encounter a cycle where under nourishment and rehashed contaminations prompt to a high bleakness from era to generation. These parasitic ailments deny the needy individuals of good wellbeing, adding to monetary flimsiness and social underestimation; and the needy individuals of immature countries encounter a cycle where under sustenance and rehashed diseases prompt to a high grimness from era to era (Mehraj *et al*., 2008). All around, two billion people are tainted with helminths, out of the greater parts living in asset poor settings (Noyer and Brandt, 1999; WHO, 2002). The event of helminthic diseases is related with financial, ecological and different variables like numbness of straightforward wellbeing advancing components and congestion, restricted access to clean water, tropical atmosphere and low elevation (WHO, 2002b). School-aged children are one of the groups at high risk for intestinal parasitic infections and these have detrimental effects on the survival, appetite, growth and physical fitness, school attendance and cognitive performance of school age children (Nokes & Bundy, 1993; Stephenson et al., 2000; de Silva et al., 1997; Hadidjaja et al., 1998). This study was at determining the prevalence of urogenital *schistosomiasis* and intestinal parasitosis and coinfection among the subjects in Adim community in Cross River State, Nigeria.

Published at: http://www.ijsciences.com/pub/issue/2017-06/
DOI: 10.18483/ijSci.1280; Online ISSN: 2305-3925; Print ISSN: 2410-4477

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MATERIALS AND METHODS

Study Area

This review was directed in Adim Community situated in Biase L. G. A. in C. R. State, Nigeria. Adim is an average rustic group found 110 kilometers toward the North of Calabar, the Cross River State capital. There is no pipe borne water in the group and the occupants depend for the most part on three new water streams to be specific Ibeteuroma, Egboga and Ogamenah for their household, monetary and recreational exercises (Ejezie et al., 1991). The area is situated in the tropical rain forest belt with an average annual rainfall of 1500-2000 millimeters. The main occupations of the residents of this community include hunting, fishing and farming. The principle crops grown by the farmers are rice *(Oryza sativa*), yam *(Discorea prachincilis*) and cassava (*Manihot utilissima*). Also there are 3 nursery schools, 2 primary schools, 1 secondary school and 1 health center in the community.

Subjects and Ethical consideration

The target population was children between 5 and 20 years. The consent and ethical approval were sought and obtained from the school authority and the ethical committee of the Cross River State Ministry of Health. The Onun of Adim (village head) was briefed on the significance of the study and the level of involvement of the communities before its commencement. The procedures, significant benefits, and the harmless nature of the study were also explained to all the people in the community.

Study design

The sequence of activities were followed: visiting the village head of Adim and the headmasters of the schools to brief them about the study, informing consent parents of pupils, administrating questionnaire, collecting and processing the urine and stool samples for parasitological survey.

Collection of Urine Samples

Two clean universal containers for collection of urine sample were issued to each subject selected for the study. The samples were collected between 10.00 am and 12.00 pm when maximum egg excretion occurs in the urinary bladder (Chem and Mott, 1989). The people were allowed to do a little exercise in order to get a maximum egg shield. Each bottle was labeled according to the code number of the subjects. Same number of subjects also submitted their stool samples.

Examination of Urine for Haematuria and Proteinuria

The appearance of the urine was observed and recorded as whether clear, cloudy, presence or absence of visible blood were observed and recorded accordingly. Heamaturia was detected soon after collection of urine sample using dipstick (Ames: Bayer Diagnostic Brussels, Belgium) (Inyang-Etoh et al., 2010). It was carefully dipped into the bottle containing the urine for 5 seconds. The resulting change in color of the strip was compared with the manufactures color chart to estimate the amount of blood in the urine. The same method was also used for the examination of proteinuria. Haematuria was reported as 5-10 ery/µl (+), 50ery/µl (++), 250ery/µl (+++). Proteinuria was reported as 10mg protein/dl indicating trace proteinuria 30mg/dl(+), 100mg/dl(++), and 500mg/dl(+++) (Inyang-Etoh et al., 2010).

Examination of Urine for Schistosoma haematobium Ova

An aliquot of 10ml of the urine was moved into a widespread compartment holding 5ml of 1% fluid arrangement of carbol fuchsin for recoloring and conservation of ova (Ejezie, et al., 1991). The examples were protected along these lines until the season of filtration. The adjusted filtration framework for the recognition of ova of Schistosoma haematobium was received for the review (Useh and Ejezie, 1999).

Diagnosis for intestinal parasites.

A. Diagnosis by macroscopy

The stool was examined for the appearance (colour), consistency, presence of blood, mucus and segments of adult worms.

B. Diagnosis by direct wet mount microscopic examinations were performed for detection of intestinal parasites;

A drop of saline was placed on one end of a clean grease free slide while a drop of iodine was placed on the other end leaving enough space at the edges to handle the slide. A small amount of faeces was then placed on the microscope slide using an applicator stick and mixed in the drop of saline and iodine respectively using the edge of a coverslip then covered with the coverslip. Finally the samples were examined microscopically using x10 and x40 objective lens with the iris condenser sufficiently closed to give good contrast. Careful attention was paid during the identification of the ova and larvae of intestinal parasites in the stool samples.

C. Diagnosis by formol ether concentration technique.

Procedure; Ten milliliters of 10% formalin was added to approximately 1g of stool in a universal container and stirred using an applicator stick until the suspension was slightly cloudy. A funnel with a gauze filter inside was placed into a centrifuge tube and the faecal suspension passed through the filter until 7ml were accumulated. The filter was then removed and discarded with the lumpy residues. Thereafter 3ml of ether was added to the filtrate and mixed well for one minute then centrifuged at 2000rpm for 2 minutes. The fatty plug (debris) was loosened using an applicator stick and the supernatant discarded by quickly inverting the centrifuge tube. The sediment was resuspended by tapping and a drop transferred to a clean grease free slide, covered with a coverslip and examined microscopically using x10 and x40 objective lens with the iris condenser sufficiently closed for identification of ova, cysts and larvae of intestinal parasites.

Data Analysis

Statistical analysis was carried out using SPPS version 16.0 for windows and Microsoft Excel Tool Pak. The Chi-squared (X^2) test was used to test for the difference in prevalence of infection according to the age and gender. ANOVA was used to compare more than two groups. The probability level at 0.05 was used.

RESULTS

Table 1 shows the prevalence of urogenital *schistosomiasis* and intestinal parasites according to the age group of subjects examined. Children aged 5-10 years had the highest prevalence of *S. haematobium* infection (30%) while subjects aged 16-20 years recorded the least infection rate (0%) and the difference was statistically significant (X^2 = 31.2, (df)2, p=0.001). For the infection by intestinal parasites, subjects aged 16-20 years recorded the highest prevalence (80%) while subjects aged 11-15years had the lowest infection rate (41.3%). Of the 200 samples examined, 21(10.5%) subjects were co-infected with urogenital *schistosomiasis* and intestinal parasites. There was no statistically significant difference for age groups among the three diferent types of infections (F=0.459, df(259) p=0.632). The prevalence of infection according to the gender is shown in table 2. Higher prevalence was recorded in males for both the infections of *S. haematobium* (30%), intestinal parasites (50%) and for both infections (15%). Significant difference was detected in the prevalence of *S. haematobium* infection between the genders of the subjects (X^2 =3.841, (df)2, p=0.001) but no statistically significant difference was found in the prevalence of the three types of infections between the genders (F=0.186, df(259) p=0.666). Table 3 shows the distribution of parasites detected according to educational status of subject's parents. Subjects whose parents had Primary as their educational level had the highest prevalence rate of infection with *S. haematobiium* (29%), intestinal parasite (59%) and coinfection (14%) while those with tertiary level of education had the lowest levels of these infections (5%), (10%) and (5%) respectively. There was no statistically significant difference in the prevalence of the three types of infections according to level of education (F=1.793, df(259) p=0.169). Figure 1 shows the distribution of intestinal parasites detected. Among the helminthes, hookworm infection had the highest prevalence rate (45.5%) while *Trichuris trichiura* had the lowest (11.4%). Among the intestinal protozoan parasite only *Entamoeba histolytica* (4.6%) was detected.

Table 1: The prevalence of urogenital *Schistosomiasis* and intestinal parasites according to age of subjects examined

Age group (years)	No. examined	No. (%) infected with *S. haematobium*	No. (%) infected with intestinal parasite	No. (%) infected with both type of infections
5-10	40	12(30)	18(45)	6(15)
11-15	150	30(20)	62(41.3)	15(10)
16-20	10	0(0)	8(80)	0(0)
Total	200	42(21)	88(44)	21(10.5)

Table 2: The prevalence of urogenital *Schistosomiasis* and intestinal parasites according to gender of subjects examined.

Gender	No. Examined	No. (%) infected with *S. haem*	No. (%) infected with intestinal parasite	No. (%) infected with both type of infections
Female	140	24(17.1)	58(41.4)	12(8.5)
Male	60	18(30)	30(50)	9(15)
Total	200	42(21)	88(44)	21(10.5)

Table 3: Distribution of parasites detected according to educational status of subjects parents

Educational status	No. examined	No(%) infected with *S. haematobium*	No(%) infected with intestinal parasite	No(%) Infected with both type of infections
Tertiary	20	1(5)	2 (10)	1(5)
Secondary	80	12(15)	27(33.8)	6(7.5)
Primary	100	29(29)	59(59)	14(14)
Total	200	42(21)	88(44)	21(10.5)

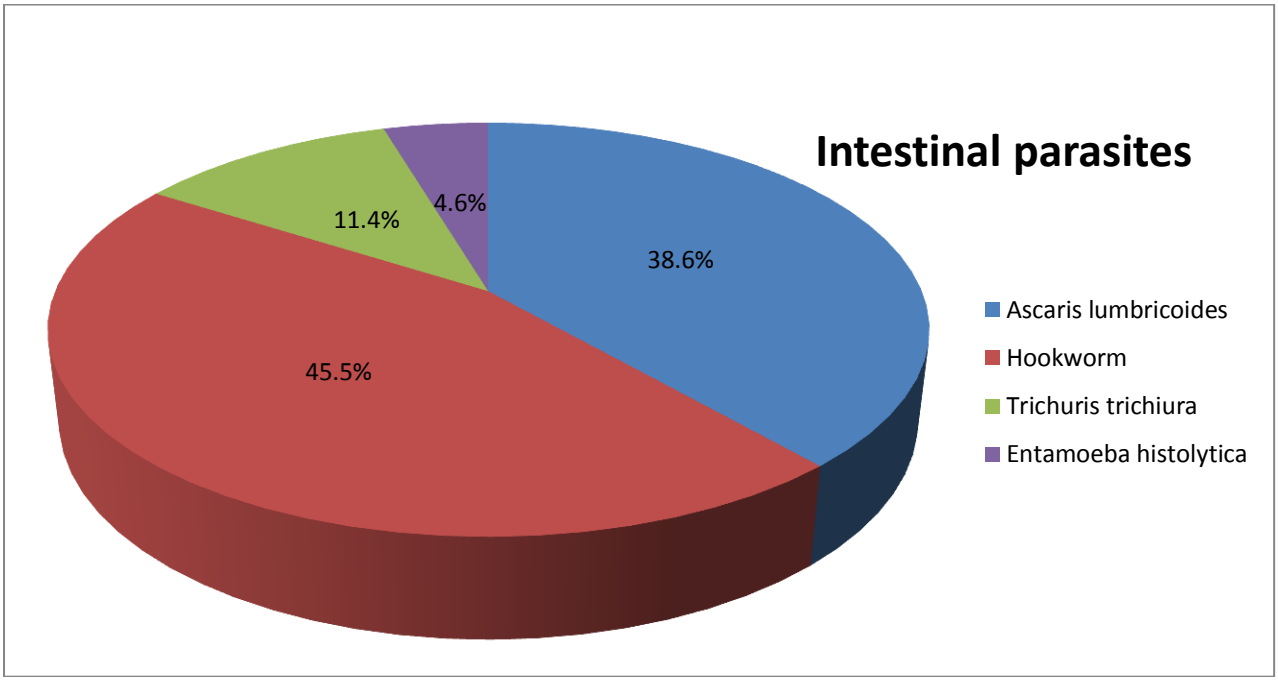

FIG. 1: Distribution of intestinal parasites detected

DISCUSSION

Urogenital shistosomiasis has been confirmed to be endemic in Adim community (Ejezie *et al.*, 1991 and Inyang-Etoh *et al.*, 2009). The cuurent prevalence of *S. haematobium* infection in school age children of 21% observed in this study shows a decreased prevalence rate compared to that of Ejezie *et al.*, 1991 and Inyang-Etoh *et al.*, 2009 who reported a prevalence rate as high as 43.2% and 38.5% respectively in this same study area. This high endemicity might be due to the fact that Urogenital shistosomiasis and intestinal parasitic infections have been described as diseases of poverty and underdevelopment because they have been linked to lack of adequate sanitation, lack of access to safe water and improper hygiene (WHO, 2002a). Several factors that might have contributed to the decreased in the present prevalence of urogenital *schistosomiasis* in the area include improvement in sanitation, safe water supply, awareness about the disease and repeated chemotherapy by several authors (Ejezie *et al.*, 1991 and Inyang-Etoh *et al.*, 2004 and Inyang-Etoh *et al.*, 2009).

In this study, female subjects were more infected than the males with a prevalence rate of 30% against 17.1% in males. The reason for the higher prevalence among the female is presumably due to higher water contact activities particularly in washing and bathing in cercariae-infested rivers. This is because in this part of the world females are more involved in domestic activities than their male counterpart. The age group 5-10 years had the highest prevalence of infection with *S. haematobium* (30%) while subjects aged 16-20 years recorded the highest prevalence of infection with intestinal parasites (80%) and co-infection (80%). This may probably be due to the fact that children in this age bracket are likely to ignore the awareness created about the disease while they continue with their water contact activities.

The prevalence of intestinal parasites was found to be 44%. Subjects of the oldest age group 16-20years

were significantly more infected with intestinal parasite 4(80%) particularly Hookworm and *Ascaris lumbricoides* than other age categories and female still recorded the highest percentage of infection. This may be due to higher level of exposure to the epidemiological factors that enhance susceptibility to the intestinal helminth infections. In other studies, soil transmitted helminth infection was higher among the youngest age categories (Uneke *et al*., 2007). This could be due to high level of soil contact activity and low personal hygiene. However, the age dependent patterns of infection prevalence are generally similar among the major helminthes species, exhibiting a rise in childhood to a relatively stable in adulthood (Naish *et al*., 2004).

This study further showed that four intestinal parasites were detected including *Ascaris lumbricoides*, *Trichuris trichiura*, Hookworm and *Entamoeba histolytica*. However, Hookworm and *Ascaris lumbricoides* occurred more frequently than the protozoan parasites. The protozoan parasite; *Entamoeba histolytica* was seen in two subjects only. The transmission of *Ascaris/Trichuris* infections are known generally to occur more in rural areas than in urban or semi-urban areas however, in urban slums, the transmission is probably related to poor sanitary conditions or contaminated water supplies and perhaps *Trichiuris* and other soil-transmitted helminthes cannot successfully complete their life cycle in the absence of a more soil rich rural environment and may be less adapted to conditions in urban or semi-urban areas for successful transmission (Mehraj *et al*., 2008).

Conclusion: It can be concluded that there has been a slight reduction in the prevalence of *Schistosoma haematobium* in the area and that children aged 5-10 years had the highest prevalence rate of the infection and female recorded the highest. From the result, children aged 15-20 years were co-infected with intestinal parasites and urogenital *schistosomiasis* and female still recorded the highest. The prevalence of co-infections has not shown to be gender related but more research works are required to elucidate this. It is hoped that the findings of the investigation will contribute to effective disease control planning and implementation in the area of study and others in Nigeria and other tropical countries with similar heavy burdens of infectious disease.

Conflict of interest: The authors declare that there is no conflict of interest regarding the publication of this work.

Acknowledgement: The authors are very grateful to the management and staff of Incopa Medical Laboratories for allowing the use of some of their equipments for this work.

Source of funding: This work was exclusively sponsored by the authors

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