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Prevalence of Intestinal Helmnth Infections among Two Selected Public Primary Schools in Bauchi Metropolis

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ABSTRACT

Intestinal helminths are globally endemic, affecting the health, growth and development of children worldwide. This study was carried out between November and December 2015 in order to determine the prevalence of intestinal helminths among two selected public primary schools in Bauchi Local Government Area, Bauchi State, Nigeria. Stool samples were collected from 110 pupils (64 and 46 from Kofarfada and Kobi primary schools, respectively) and analyzed using direct smear and formol-ether concentration technique. The results showed that, there was no significant difference (P>0.05) in the prevalence of intestinal helminths among the schools sampled. Kofarfada primary school had the highest prevalence for *Ascaris lumbricoides* (6.3%), Hookworm (3.1%) and *Schistosoma mansoni* (1.6%) while the least percentage prevalence of *A. lumbricoides* and Hookworm occurred in Kobi primary school with (2.2%) both. Similarly, there was no significant difference (P>0.05) in the prevalence of these parasites among the age groups, with age group 5 to 8 years highly infected with *A. lumbricoides* (7.0%) and Hookworm (3.5%) while 9 to 12 age group had the least prevalence of *A. lumbricoides* and Hookworm with (1.9%) both. *Trichuris trichiura* and *Schistosoma mansoni* was absent in stool samples of 5 to 8 age group but present in 9 to 12 age group with (1.9%) both. The male pupils had the highest prevalence of infection (10.3%) compared with female pupils (7.7%), although the difference was not significant (P>0.05). The study showed that intestinal helminthiasis was independent of age and sex. Even though the infection has low level, control measures such as chemotherapy, provision of adequate social amenities (toilets, portable drinking water, etc.), improved sanitation and personal hygiene as well as continues health education should be the focus of government and non-governmental health institutions in Nigeria for complete eradication of these parasites.

Key words: Prevalence, Intestinal helminth, Infection, Primary Schools, Bauchi and Metropolis.
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INTRODUCTION

Intestinal helminth infections are among the most common infections occurring throughout the developing world (Agbolade et al., 2004). Annually, between 500 million and 1 billion people are estimated to be infected (WHO, 2010). Intestinal parasites are highly prevalent causing serious health problem in the tropics (WHO, 2010). The parasites are among the most prevalent human parasite affecting approximately one quarter of the world's population mainly children due to their voracious feeding habit which are obvious predisposing factors in developing world (WHO, 2002). The most common intestinal helminths of human throughout

Nigeria are *Ascaris lumbricoides*, *Trichuris trichiura*, *Ancylotoma duodenale* and *Necator americanus* (hookworm), *Strongyloides stercoralis* and *Schistosoma mansoni*. Others that have been reported but not very common include *Taenia spp* (*T*. *solium* and *T*. *saginata*), *Hymenolepis nana*, *Dicrocoelium traspes* and *Enterobius vermicularis* (WHO, 2009).There are an estimated 280 million hookworm infected children, 478 million with Ascarisis and 347 million with Trichuriasis in the world (Yammi et al , 2011).

In sub-Saharan Africa alone, there 41 million hookworm infected school age children (Albonico et al., 2003). Several reports on the survey of human gastrointestinal helminth parasites indicated high prevalence rates of infections among Nigeria children. These include reports by Etim et al ., (2002), Luka et al. (2000), Idris,(1988), Agbolade et al. (2004) and Roberts et al. (2009). In Nigeria, intestinal helminth infections have continue to prevail because of low level of living standards, poor environmental sanitation and ignorance of simple health promoting behaviors (Nwosu, 1991; Udonsi, 1984).Worm transmission is also enhanced by poor socioeconomic status, deficiencies in sanitary facilities, improper disposal of human faeces, insufficient supplies of potable water, poor personal hygiene and lack of education (WHO, 2002). School age children (0 to 15 years) are one of the groups at high risk for intestinal parasitic infections because they harbor heavy intestinal parasites and they are the group responsible for contaminating the environment and transmitting these infections (Albonico et al., 2002). The prevalence of these helminths varies not only from one locality to the other, but also among individuals and socioeconomic status of parents. Children of low income group parents have the highest prevalence of infection (Opara et al., 2007).

The burden of disease associated with worm infections is enormous.

The impacts of helminthias is on the individual include: malnutrition, anorexia, interference with absorption and macronutrient fluid and electrolyte losses particularly in the heavily parasitized individuals (Eye et al., 1998; Stephenson et al., 1980). Other negative impacts include: impaired physical development and poor cognitive performance of school age children (Dickson et al., 2003), iron deficiency anaemia, cerebral cysticercosis resulting to epilepsy and intestinal obstruction which eventually leads to death (Noke, 1996). The interactions between the traits of the parasites, the host and the environment elicit a chain reaction. Man manipulates and pollutes the environment through unsanitary habits and practices. The environment in turn becomes conducive for the development, transmission and dissemination of the parasites. The parasite invades and injures the host resulting to morbidity, mortality, diminished productivity, heavy socioeconomic burden and exorbitant cost of medical care (WHO, 2009). Parasitic helminth infections are of significant public health problems in many developing countries, more than 3.5 billion people worldwide are currently infected with one or more species of intestinal helminth parasites (Crompton, 1999). In view of the negative socioeconomic impact of these parasitic infections on children, there is a need for the development of good preventive and control measures adaptable for the tropics. This cannot be done effectively without baseline data on the occurrence of parasitic infections in a particular area. The occurrence of intestinal helminth infections among primary school children in Nigeria, particularly in Bauchi Local Government area of Bauchi State which is largely unreported was our concern. Thus, the result of this study will be useful to both researchers and health authorities in diagnosis, planning and implementing control measures for intestinal helminth infections in the area.

MATERIALS AND METHODS

Study Area

The study was carried out in two public primary schools randomly selected within Bauchi metropolis namely; Kofarfada Primary School, located along the Emirs' Drive and Kobi Primary School, located along Kobi Street, Bauchi Local Government Area, Bauchi State.

Sample Collection

The study focused on primary school pupils aged between 5 to 12 years. A total of 110 stool samples were collected. At the beginning of the investigation, the names, ages and sexes of the selected pupils were recorded. A wide mouthed, transparent specimen containers labeled with pupils serial number were given to pupils in the selected schools at the dismissal of school and asked to take the containers home and return them the next morning with freshly voided stool samples. Prior to the distribution of the containers, a proper orientation has been made on how to collect the samples. A fresh early morning stool samples were collected and transported to the school by each pupil. The samples (not more than 15 per day) were received between 8 to 9 am and transported to the laboratory immediately for processing. Although about 22 of the pupils failed to bring their samples. Diagnosis was based on identification of the characteristics helminthes ova using characteristics outline by Cheesbrough (2002).

Sample Processing

On reaching the laboratory, the samples were arranged on the work bench and examined macroscopically.

Table 1. Prevalence of intestinal helminths among the school children sampled.

Parasites	Number examined	Number infected	Prevalence (%)
A. lumbricoides	110	5	4.6
Hookworm	110	3	2.7
T. trichiura	110	1	0.9
S. mansoni	110	1	0.9
Total	110	10	9.1

Table 2. Prevalence of intestinal helminths among the two schools.

Schools	No. examined	*A. lumbricoides* (%)	Hookworm (%)	*T. trichiura* (%)	*S. mansoni* (%)	Grand total (%)
K/fada	64	4(6.3)	2(3.1)	0(0.0)	1(1.6)	7(10.9)
Kobi	46	1(2.2)	1(2.2)	1(2.2)	0(0.0)	3 (6.5)
Total	110	5(4.6)	(2.7)	1(0.9)	1(0.9)	10 (9.1)

Macroscopy

Preliminary macroscopic examination of samples was carried out to determine the colour, consistency or texture as well as the presence of blood, mucus, pus and or worms in the samples.

Microscopy

A wet mount (direct method) and formal/ether concentration techniques were employed as described by Cheesbrough (2002). This technique was employed in order to concentrate the eggs of the parasite if present. Using an applicator stick, about 2 g of the sample was picked and transferred into centrifuge tube containing 4 ml of 10% formal saline and spun for 3 min at 300 RPM. The supernatant was decanted and to the deposit (sediment), another 4 ml of 10% formal saline was added and spun for 3 min at 300 RMP. About 1ml of ether was added to the suspension, mixed vigorously for about 10 s and centrifuged at 300 RMP for another 3 min. After centrifugation, four layers were then evident; the top layer of ether, a plug layer of faecal debris, a formalin layer and sediment at the bottom where the parasites concentrate. An applicator stick was used to loosen the layer of faecal debris by a spiral movement and the other top 3 layers were carefully poured off in single movement. Normal saline was added to the tube and mixed in order to have sufficient fluid to suspend the sediment. Using a disposable pipette, a drop of the suspension was transferred unto a clean grease-free microscope slide and covered with cover slip. The preparation was examined microscopically using x10 and x40 objectives (Cheesbrough, 2002).

Data Analysis

Differences in the prevalence of the infection between the ages and sexes were determined using the Chi square (X^2) test to analyze for any significant difference.

RESULTS

Prevalence of Intestinal Helminths among the School Children Sampled

The intestinal helminth parasites observed were *A. lumbricoides*, Hookworm, *T. trichiura* and *S. mansoni*. Out of the 110 school children examined, 5(4.6%) were infected with *A. lumbricoides*, 3(2.7%) with Hookworm and 1(0.9%) with *T. trichiura*. Other parasite found was *S. mansoni* with 1(0.9%). It can be seen that *A. lumbricoides* had the highest prevalence (4.6%) while *T. trichiura* and *S. mansoni* had the least prevalence (0.9%).(Table 1). There were significant differences in the prevalence of the helminths parasites ($P<0.05$).

Prevalence of Intestinal Helminths among the Two Schools

Of the 110 school children examined, 64 (58.2%) were from Kofarfada primary school while 46(41.8%) were from Kobi primary school. Kofarfada primary school had the highest prevalence for *A. lumbricoides* 4(6.3%) and Hookworm 2(3.1%) while Kobi primary school had the highest prevalence for *T. trichiura* 1(0.9%) (Table 2). There was no significant difference between the prevalence of infections among the schools ($P>0.05$).

Prevalence of Intestinal Helminths among the School Children According To Age

Ages of the children ranges between 5 to 12 years old. Children between 5 and 8 years had the highest prevalence of *A. lumbricoides* 4 (7.0%) and Hookworm infection 2(3.5%) while *T. trichiura* was most prevalent in

Table 3. Prevalence of intestinal helminths among the school children according to age.

Age group (Years)	No. examined	*A. lumbricoides* (%)	Hookworm (%)	*T. trichiura* (%)	*S. mansoni* (%)	Grand total (%)
5-8	57	4 (7.0)	2 (3.5)	0 (0.0)	0 (0.0)	6 (10.5)
9-12	53	1(1.9)	1 (1.9)	1 (1.9)	1 (1.9)	4 (7.5)
Total	110	5 (4.6)	3 (2.7)	1 (0.9)	1 (0.9)	10(9.1)

Table 4. Prevalence of intestinal helminths among the school children according to sex.

Sex	No. examined	*A. lumbricoides*	Hookworm	*T. trichiura*	*S. mansoni*	Grand total
Male	58	3 (5.2)	2 (3.5)	0(0.0)	1 (1.7)	6 (10.3)
Female	52	2 (3.9)	1 (1.9)	0(0.0)	1 (1.9)	4 (7.7)
Total	110	5 (4.6)	(2.7)	1(0.9)	1 (0.9)	10 (9.1)

the 9 to 12 age group with 1(1.9%) (Table 3). The differences between the different age groups were not significant (P>0.05).

Prevalence of Intestinal Helminths among the School Children According To Sex

Both sexes were examined in this study of which 58 were males and 52 were females. Males examined were 58, 3(5.2%) had Ascariasis and 2(3.5%) had Hookworm infection while 52 females were examined, 2(3.9%) had Ascariasis, 1(1.9%) had Hookworm infection and 1(1.9%) had Trichuriasis. Table 4 shows that males had the highest prevalence of intestinal helminths. There were no significant differences between the sexes and prevalence of the infections (P>0.05).

DISCUSSION

The prevalence rates of intestinal parasites have been observed to vary considerably with altitude in different parts of the country (Yami, 2011). The study revealed an overall prevalence rate of (9.1%). *A. lumbricoides* infection accounted for the highest prevalence (4.6%), followed by Hookworm infection (2.7%) and *T. trichiura* (0.9%). This finding is in agreement with previous reports by Adeyeba and Akinlabi (2002), Ekpenyong and Eyo (2008) and Osazuwa et al. (2011). This is consistent with the earlier reports that intestinal helminthiasis caused by roundworms are common infections especially among rural Nigeria (Adeoye et al., 2007). The high prevalence of *A. lumbricoides* infection may be attributed to high level of unhygienic practices among the pupils which enhanced transmission and the fact that *A. lumbricoides* eggs can remain viable in the soil for many years. The prevalence of intestinal helminthes in the different schools was generally low. This is because the study was carried out during the dry season of the year, therefore not encouraging increased transmission because eggs development requires adequate moisture and shaded soil (Ukpai et al., 2003). Pupils in Kofarfada primary school had the highest prevalence of intestinal helminth infections than those in Kobi primary school. This may be due to poor sanitary practices in the school. The correlation of parasitic disease with poor environmental sanitation and unhygienic practices has been established (Crompton and Savioli, 2003). The difference in the prevalence rate of infection between the two schools was insignificant (P>0.05).

The study further indicates that younger children (5 to 8 age groups) had a higher prevalence of infection than older ones (9 to 12 age groups). Pupils in these age groups (5 to 8 years) often spend more of their leisure time outdoors, playing and or foraging in garbage dumps and eating discarded food remains on the street. They are also more in contact with sand and eat indiscriminately with unwashed hands. This is consistent with the findings observed in Kaduna and Abia States by Luka et al. (2000) and Ukpai et al. (2003), respectively. The prevalence of parasitic helminth infections among the different age groups was not significant (P>0.05). The prevalence of infection among male pupils was higher than their female counterparts. This could be attributed to the fact that males have fewer restrictions than the females whose leisure hours are strictly controlled. Males are often engaged in predisposing activities such as football, walking barefoot and also playing in streams or ponds. This is in line with the work of Ikon and Useh (1999) during an epidemiological study of intestinal helminths among pupils in urban and sub-urban communities in Nigeria but disagrees with the findings of Anosike et al. (2006), who reported a higher infection rate of 39.3% in females and 35% in males among residents of Naraguta, Central Nigeria. Akogun and Badaki (1988) also observed that Schistosomiasis affected more males than females in a settlement near Yola. Etim et al. (2002) obtained similar result in Biasie area of Cross River State.

Intestinal helminth infections are caused by ingesting the

cyst eggs or larval stages of the agent while drinking contaminated water, eating improperly washed or uncooked vegetables, or direct contaminated contact with water containing the infective stages, making it possible to penetrate the skin of humans (Fabiyi, 2001). *S. mamansoni* have been reported in humans from Adamawa, Kaduna, Niger and Benue states of Nigeria (Idris, 1988; Akogun and Badaki, 1988). Generally, poor environmental and personal hygiene, shortage of good water supply and indiscriminate defecationare among the factors that promote the survival and transmission of these parasites (Adeoye et al., 2007). The rates of the infections observed are of public health significance. The occurrence of intestinal parasites among primary school pupils can cause chronic infections which can negatively affect all aspect of children's health, nutrition, cognitive development, learning and educational access and achievement. The prevalence although low is directly related to the sanitary conditions and socioeconomic status. Thus, it is recommended that Good personal hygiene should be encouraged by both teachers and parents of children and mass deworming campaign should be carried out in schools especially those in rural areas. This will help and eventually reduce the cases of high prevalence of intestinal helminth infections.

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