HELMINTHES INFECTION AMONG PUPILS OF SEVEN PRIMARY SCHOOLS IN TAMBURAWA, DAWAKIN-KUDU LOCAL GOVERNMENT, KANO STATE NIGERIA.

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ABSTRACT

A study of the prevalence of intestinal infection was conducted among pupils in seven primary schools in Tamburawa, Dawakin Kudu Local Government Area of Kano State, between June, 2016 to January, 2017. Of the 560 samples collected and examined 420 (76.07%) were positive for single or multiple infections. The prevalence of occurrence of each parasite encountered in the study was 142 (25.4%) had *Hookworm*, 89 (15.9%) *Schistosomamansoni*, 77 (13.75%), *Entameoeba coli*, 48 (8.57%) *Ascaris species*, 36 (6.4%) *Taenia species*, 17 (3.04%) *Trichuristrichiura*, 11 (1.96%) *Enterobiusvermicularis* and *Entamoebahistolytica* had 6 (1.07%). The prevalence of the infection was significantly higher among males than females ($p < 0.05$). Children in the age group 10 – 12 years had highest prevalence (87.1%) of Intestinal infections and those between the ages of 4 – 6 years had (69.8%) the least infection. Those children who defecate in bush were more likely to be infected than those who use modern toilet facility ($R = 0.6$). Analysis of the responses from the questionnaire shows that parents occupation, civil servant (odd ratio = 4.381) and business (odd ratio = 3.147) shows a strong relationship between prevalence of the disease and risk factor in the research area. Walking with bare foot (odd ratio = 2.142) especially in areas where the soil is dump and moist throughout the year exposed the subject to infection. Hand washing activities (odd ratio = 3.71) have statistical significant effect on the prevalence of the infection. Personal hygiene, public health enlightenment programme should be encouraged particularly among school age children.

Keywords: Helminthes, *Hookworm*, *Schistosomamansoni*, *Entameoeba coli*, *Ascaris species*, *Taenia species*, *Trichuristrichiura*,*Enterobiusvermicularis*, *Entamoebahistolytica*, Children.

INTRODUCTION

The soil-transmitted helminthes (STH) are group of parasitic nematode worms that cause human infection through contact with parasite eggs or larvae that thrive in worm and moist soil of the world's tropical and sub-tropical countries (Ukoli, 1997; Steven *et al*., 2003; WHO, 2004). Soil-transmitted helminthes refer to the intestinal worms infecting humans and are transmitted through contaminated soil. Example of such helminthes includes: *ascarislumbricoides* (sometimes called roundworm). Whipworms *(trichuristrichiura)*, and hookworm *(Ancylostoma, duodenale and Necatoramericanus)* (Abdullahi and abdulazeez. 2000). A large part of the world's population is infected with one or more of these soil-transmitted helminthes: approximately 807-1,121 million with *Ascaris*, approximately 604-795 million with whipworm and approximately 576-740 million with hookworm (Adeyeba and 2002).

Soil-transmitted helminthes infection is found mainly in areas with warm and moist climates where sanitation and hygiene are poor, including temperature zones, during warmer months. These STHS are considered Neglected Tropical Diseases (NTDs) because they infect tremendous disability and suffering yet can be controlled or eliminated (Albonico*el al*., 1999).

Soil-transmitted helminthes live in the intestine and their eggs are passed in the faeces of infected persons. If an infected person defecates outside (near bushes, in a garden, or field) or if the faeces of an infected person are used as fertilizer, eggs are deposited on soil. Ascaris and hookworm eggs become infective as they mature in soil (Akogun, 2012). People are infected with Ascaris and whipworm when eggs are ingested. This can happen when hands or fingers that have contaminated dirt on them are put in the mouth or by consuming vegetables and fruits that have not been carefully washed, cooked or peeled (Adeyeba and Tijjani, 2012). Hookworm eggs are not infected; they hatch in soil, releasing larvae (immature worms) that mature into a form that can penetrate the skin of humans. Hookworm infection is transmitted primarily by walking barefooted on contaminated soil. One kind of hookworm *Ancylostomaduodenale*, can also be transmitted through the ingestion of larvae (Okon and Okun, 2001).

Soil-transmitted infections are among the most common infections worldwide and affect the poorest and most deprived communities. They are transmitted by eggs present in human faeces which in turn contaminate soil area where sanitation is poor (Tarafder*el al*., 2010). The main species that infect people are the roundworm (*Ascarislumbricoides*), the whipworm (*Trichuristrichiura)* and hookworms (*Necatoramericanus*and *Ancylostomaduodenale*).

It is estimated that almost two millions people are infected with one or more of these soil-transmitted helminthes, accounting for up to 40% of the global morbidity from infectious disease exclusive of malaria (Bubdy, 1995). The greatest numbers of soil-transmitted helminthes infections occur in tropical and subtropical regions of Asia, especially China, India and Southeast Asia, as well as Sub-Sahara Africa. Of the 1-2 billion of soil transmitted helminthes infections worldwide, approximately 300 million infections result in severe morbidity, which are associated with the heaviest worm burdens (Bundy, 1988). The public health importance of STH infection ranked highest in morbidity rate among school aged children who often present much heavy worms because of their vulnerability to nutritional deficiency (Leykun,2001). These infections have been shown to impact negatively on the physical fitness and cognitive performance of the pupils. Intestinal obstruction anemia, malnutrition, dysentery syndrome, fever, dehydration, vomiting and colitis are the major complication associated with STH infections (Chigozie *et al., 2007*). STH infections affect most frequently children developing countries and associated with poor growth, reduce physical activity and impaired learning ability (Adamu *et al.*, 1994).

According to WHO (1994) more than 1.5 billion people or 24% of the world's population are infected with soil-transmitted helminthes infections worldwide. Infections are widely distributed in tropical and subtropical areas, with the greatest numbers occurring in Sub-Sahara Africa, the Americas, China and East Asia. Over 270 million preschool age children and over 600 million school age children live in areas where these parasites are intensively transmitted, and are need of treatment and preventive interventions (WHO, 1998). A total of 89.9 million African school-aged are infected with any species of soil transmitted helminthes and 40% of infections are concentrated in Nigeria, the Democratic Republic of Congo, South Africa and Tanzania (Brooker *et al.,* 2009).

In Nigeria, a considerable amount of human and animal wastes are discharged into the soil daily leading to the contamination of the soil with STH eggs and larvae (Ahmed *el al., 2002*). Infections may be direct or indirect through the faecal-oral route. Observation in Zaria, Northern Nigeria showed that 70% of the soil samples collected in a school compound was contaminated with faeces (Nock *el al., 2007*).

In Nigeria, a lot of work has been carried out over the years in different parts of the country on the prevalence of intestinal helminthes and its associated diseases among many groups of people. (Ahned *et al., 2003*) reported that 30.8% of students in Katsina were infected with at least one intestinal helminthes. Also prevalence of intestinal helminthes in some patients in Zaria has been reported to be 1.67% for *Strongyloidsstercoralis* only and 62.7% of other helminthes (Abdullahi and Abdulazeez, 2000). However, little is known about the infection status of intestinal helminthes among primary school children in Tamburawa, Dawakin-kudu Local Government Area, Kano State. This study aimed to survey the prevalence of intestinal infections among pupils in primary schools of the Local Education Authority (LEA) in Dawakin kudu Educational district.

MATERIALS AND METHODS

3.1. Study area: The study was carried out in Tamburawa, Dawakin Kudu Local Government Area of Kano State which was named after the Gadar-Tamburawa River. Dawakin Kudu is located in the south-eastern part of Kano state. This local government lies between latitude 11°00′N to 12°00′N and longitude 8°00′E to 8°44′E and mean altitude of

486.5′M above sea level. Dawakin Kudu shares boundary with Kumbotso Local Government to the North West, Gezawa Local Government to the north east, Warawa Local Government to the east, Wudil Local Government Area to the south east, Bunkure Local Government Area to south and Kura Local Government Area to the south west. Dawakin Kudu Local Government Area falls within Kano central as well as Sudan savanna agro-ecological zone of Nigeria (Katama *et al.,* 2010). The climate of the area is described as tropical climate, which is characterized by two distinct seasons, the dry season and rainy season with temperature that is hot during the dry season and cool during the rainy season, from November to February the cold dry hamarttan wind blows across the district. Generally the rains start in April and end in October. The area has tropical grassland (savannah). The people of this area are Hausa and Fulani and most of them are farmers, mostly cultivating crops like; Sorghum, Millet, Groundnuts, Cowpea and Maize. Seven Primary Schools were visited namely; Tamburawa central Primary School, Gurjiya Primary School, Tudun Bayero Primary School, Fagi Primary School, Daginawa Primary School,

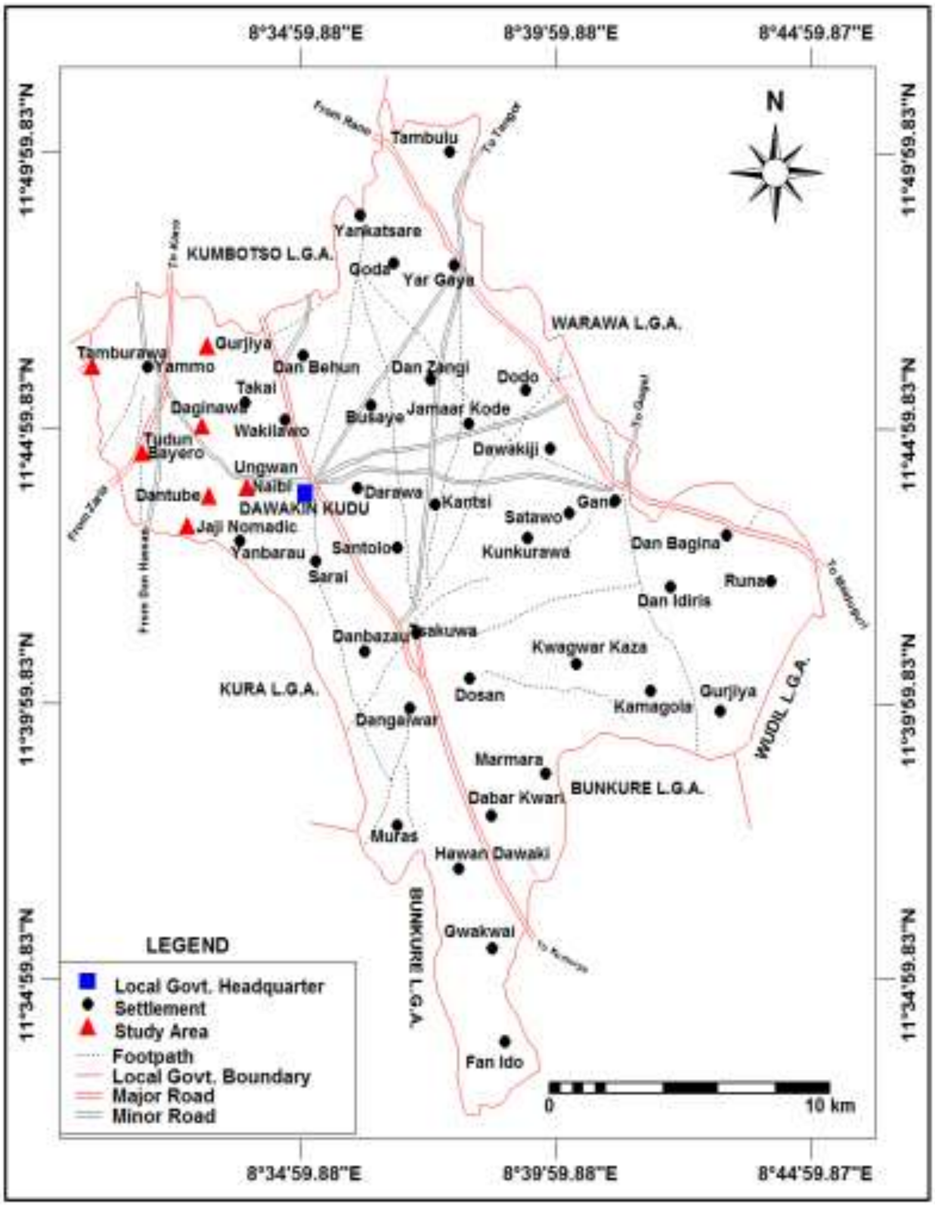

Figure 7: Dawakin Kudu Local Government Area Showing the Study Areas

Source: Adopted and Modified from Dawakin Kudu Local Government Area Map 2013

Study population

The study population consisted of seven registered primary school children of ages between 6 to 15 years because they form most accessible age group and most vulnerable to STH infection community. A questionnaire were administered to survey the pupils data such as age, type of toilet available, sex, hand washing habit, water sources, and occupation of parents or guardians. Ethical approval for the study was granted by the Educational Secretary of Dawakin-Kudu educational district, in addition, head and school teachers. Those who refused to give consent were excluded from the study.

Sample Size Determination

Information is very scarce on the prevalence on soil-transmitted helminths infection among primary school pupils in Kano State. A projected prevalence rate of 40% based on the previous study of Michael *et al.* (2012) was used to determine the sample size. The sample size was determined according to Daniel (1999). The advantage of this formula over other formulae is to get an optimum or adequate sample size because unnecessarily large sample is not cost-effective. In some circumstances it is unethical (Daniel, 1999).

Selection of schools and children

A random sampling method was used to select the primary schools. Schools selected are those located close to each other and to the ponds and/or river of Tamburawa, where transmission of Helminth may be high. Communities surrounding the selected schools are mainly involved in subsistence farming of corn, maize, cotton, millet, sweat potatoes, rice cassava and vegetables. They also practice small scale animal husbandry (cattle, goat, sheep and chicken). Few people have small scale businesses. Because of close proximity to the river, communities also practice fishing and also obtain water for most of their domestic needs from the river. Seven primary schools were selected namely Tamburawa, Gurjiya, Tudun Bayero, Fagi nomadic, Daginawa, Dantube and Unguwan- Na'ibi. The schools selected were located within a distance of 1 to 3 kilometer from GadarTamburawa River under Dawakin kudu Local Education Authority (DKLEA). In each primary school, all children in primary one and Early Child Center (ECC) classes were randomly selected.

Ethical considerations

Before commencement of the research, the researcher conducted meetings with Education Secretary (ES), leaders and head teachers of all selected villages during which the objectives of the study was explained. The village leaders convened village meetings during which sensitization of the communities was carried out. During these meetings, the objectives of the study including the study procedures to be followed, samples to be taken, study benefits and potential risks and discomforts were explained. Informed consent for children to participate in the study was sought from parents and legal guardians after they have been clearly informed about the study. This investigation commenced by first reaching out to the heads of the seven schools explaining the objectives, possible outcome and benefits of the research. Consents were obtained from the heads of the schools, parents and their class teachers. Children were informed of their right to refuse to participate in the study and to withdraw at any time during the study without jeopardizing their right.

Collection of Samples

All pupils that consented to the study were enrolled by collection of their survey bio-data within the months of June to December, 2016. Children that have received anti-helminthic drugs (randomly and infrequently distributed by State and Local Government Authority) within the past three months in all the schools were excluded from the study. A labeled sterile universal plastic bottle with pupil's serial number and bio-data was given to each pupil. They were then given sample collection instruction that was done in the local language of the pupils for understanding. These samples were preserved using 10% formalin and taken to the Parasitology laboratory of Biological Sciences Department, Bayero University, Kano, as soon as received in a carton.

Questionnaire

A questionnaire was administered to each of the selected pupils to obtain information from them on the following: Class, age, sex, whether hands were washed after using toilet, whether fruits and vegetables were washed before eating, source of drinking water, water contact activities parent's occupation and possession of pets at home as well as method of waste disposal.

Inclusion criteria

1. Primary schools in Tamburawa village close to each other and close to the ponds or river.
2. In each selected school, pupils in primary one and Early Child Center (ECC) classes were included in the study.

3.6.3 Exclusion criteria

1. Children whose parents or legal guardians did not provide informed consent.
2. Children who received treatment or dewormed before the period of study.

Laboratory Analysis of Samples

Microscopic examination was done on each sample as soon as they reached the laboratory using Formol-Ether Concentrations Technique. This method has the advantage of removing lipid and colloidal materials to yield clear sediment (Murray *et al.,* 2009). In addition, the presence of formalin preserves eggs, larvae and cysts so that the material can be examined hours or even days later. This was used to assess the diarrhoeic condition of the sample. Particular attention was paid to watery, loose or formed stools including presence of mucus and blood in stool. Wet preparation of each sample was done using normal saline and examined immediately. Ridley modified Formal ether concentration technique (Cheesbrough, 1987) was used to improve on the recovery of the ova and larvae of helminth parasites from the samples that were missed in wet preparation. The sediments were examined by placing one drop each on the centre of the slide covered with cover-slip and parasites were identified as previously described (NCCLS, 2009). The eggs and larvae count was done in Formal ether concentration technique by weighing 1g faeces. The entire preparation was examined and eggs found were counted, which gave the number of eggs per gram of faeces.

Direct Wet Smear Method

Steps:

1. A clean grease-free microscope slide was used and a drop of normal saline was placed in the middle of the left half and a drop of lugol iodine solution was added in the middle of the right half of the slide.
2. An applicator or wire loop was used to take a small portion of the stool from inside and also the surface of semi-solid stool and also from blood stained mucus portion of liquid stool.

3. The sample was mixed with the drop of saline and immediately covered with a cover slip.
4. Same was done for the iodine solution.
5. The preparation was examined under the microscope using x10 and x40 objectives.
Formalin-Ether Concentration according to NCCLS (2009)

Steps:
1. The faecal specimen was comminuting with sufficient water so that at least 10 to 12ml of strained suspension can be recovered, which will yield 0.5 to 1.0ml of centrifuged sediment.
2. The suspension was strain through two layers of gause or a stainless-steel-wire screen to remove particulate material.
3. The suspension was washed twice by centrifugation in a 15ml conical centrifuge tube (2minutes at 2000 rpm), with the supernatant being poured off.
4. After the second centrifugation, the faecal sediment was thoroughly mixed with 10ml of 10% formalin.
5. About 3ml ether was added to 10ml formalinized suspension and stopper with a cork shaken vigorously. The pent-up aerosol of ether was released carefully after shaking by loosening the stopper before the final centrifugation for 2 minutes.
6. An applicator stick was used to rim off the plug of debris and ether that was formed at the top of the tube. It was poured off as well as the supernatant leaving only the sediment in a small volume of formalin that drains back from the sides of the tube; the debris on the side of the tube was cleaned off with cotton swab.
7. Some of the sediments were removed with a pipette for examination under the microscope.

Data Analysis

Prevalence was calculated and expressed as percentage of positive cases over the number examined. Data from questionnaire were coded and ranked and analysed using SPSS version 13.0. Chi-square was used to compare significant differences in prevalence between the primary schools visited, male and female infection of the parasites, ages and risk factors. The odds ratio was used to determine association between infection and both gender and association between infection with risk factors. Significance was determined at $P \leq 0.05$ (95% confidence interval).

RESULTS

Prevalence of Intestinal Infection among Pupils in Seven Primary Schools of Tamburawa, Dawakin Kudu Local Government.

The prevalence of Intestinal Infections among pupils in seven primary schools of Tamburawa was presented in Table 1. Out of the five hundred and sixty (560) samples examined for the geohelminths infection, a total of four hundred and twenty six (426) indicating 76.1% infection was recorded with the highest prevalence rate recorded from Fagi Nomadic Primary

School with 93.8% prevalence, while the lowest prevalence was recorded from Tamburawa Central Primary School with the prevalence of 60.0%.

Statistically, there was highly significant difference at ($P \leq 0.05$) in the prevalence of geohelminths in Dawakin Kudu Local Government Area.

Prevalence by Species of Intestinal Infection among Pupils in Seven Primary Schools of Tamburawa, Dawakin-Kudu Local Government.

Table 2 showed prevalence of various types of parasites isolated and observed were Hookworm 142 (25.4%), *Schistosomamansoni*, 89 (15.9%), *Ascarislumbricoides* (8.6%), *Taeniasp* 36 (6.4%), *Trichuristrichiura* 17 (3.0), *Enterobiusvermicularis* 11(2.0%), *Entamoebahistolytica* 6 (1.1%). Hookworm had the highest prevalence (25.4%) while *Entamoebahistolytica* had the least (1.1%). The prevalence of Intestinal infections by species in the area was statistically different ($p \leq 0.05$) therefore, significant.

Double and multiple infections were observed among the pupils.

Table 1: Prevalence of Intestinal Infections among Pupils in Seven Primary Schools of Tamburawa, Dawakin-Kudu Local Government.

School Name	Number Examined	Infected	
		No	%
Tamburawa Central Primary School	80	48	60.0
Gurjiya Primary School	80	62	77.5
Tudun Bayero Primary School	80	67	83.8
Fagi Nomadic Primary School	80	75	93.8
Daginawa Primary School	80	56	70.0
Dantube Primary School	80	66	82.5
Unguwar Na'ibi Primary School	80	52	65.0
Total	**560**	**426**	**76.1**

Chi-square	**36.592**
Df	**6**
P value	**0.000**

Total	142 (25.4)	89 (15.9)	77 (13.8)	48 (8.6))	36 (6.4)	17 (3.0)	11 (2.0)	6 (1.1)	426 (100.0)
Chi-square	43.286	7.241	16.232	7.155	4.334	16.865	11.499	5.728	
Df	6	6	6	6	6	6	6	6	
p value	0.000	0.299	0.013	0.307	0.632	0.01	0.074	0.454	

Table 2: Prevalence by Species of Intestinal Infections among Pupils in Seven Primary Schools of Tamburawa, Dawakin-Kudu Local Government.

School	**Hookworm (%)**	***Schistosoma mansoni (%)***	***Entamoeba coli (%)***	***Ascaris lumbricoides (%)***	***Taenia* species (%)**	***Trichuris trichiura (%)***	***Enterobius vermicularis (%)***	***Entamoeba histolytica (%)***	**Total (%)**
Tamburawa Central Primary School	33 (41.3)	9 (11.3)	10 (12.5)	7 (8.8)	4 (5.0)	0 (0.0)	3 (3.8)	2 (2.5)	**68 (16.0)**
Gurjiya Primary School	22 (27.5)	11 (13.8)	9 (11.3)	5 (6.3)	7 (8.8)	0 (0.0)	0 (0.0)	2 (2.5)	**56 (13.1)**
Tudun Bayero Primary School	9 (11.3)	13 (16.3)	17 (21.3)	8 (10.0)	3 (3.8)	4 (5.0)	0 (0.0)	1 (1.3)	**55 (12.9)**
Fagi Nomadic Primary School	35 (43.8)	19 (23.8)	16 (20.0)	9 (11.3)	4 (5.0)	0 (0.0)	3 (3.8)	0 (0.0)	**86 (20.2)**
Daginawa Primary School	10 (12.5)	11 (13.8)	15 (18.8)	11 (13.8)	8 (10.0)	6 (7.5)	4 (5.0)	1 (1.3)	**66 (15.5)**
Dantube Primary School	14 (17.5)	16 (20.0)	5 (6.3)	3 (3.8)	6 (7.5)	5 (6.3)	0 (0.0)	0 (0.0)	**49 (11.5)**
Unguwar Na'ibi Primary School	19 (23.8)	10 (12.5)	5 (6.3)	5 (6.3)	4 (5.0)	2 (2.5)	1 (1.3)	0 (0.0)	**46 (10.8)**

Total	142 (25.4)	89 (15.9)	77 (13.8)	48 (8.6))	36 (6.4)	17 (3.0)	11 (2.0)	6 (1.1)	426 (100.0)
Chi-square	43.286	7.241	16.232	7.155	4.334	16.865	11.499	5.728	
Df	6	6	6	6	6	6	6	6	
p value	0.000	0.299	0.013	0.307	0.632	0.01	0.074	0.454	

Prevalence in Relation to Age of Intestinal Infections among Pupils in Seven Primary Schools of Tamburawa, Dawakin-Kudu Local Government.

The prevalence of geohelminths according to age group of the pupils was presented in Table 3. Infection was detected in all age groups. The 12-14 years group had the highest prevalence of 10.9%. The prevalence of the geohelminths infection was statistically significant when compared with the age of the pupils ($P \leq 0.05$).

Prevalence in Relation to Sex of Intestinal Infections among Pupils in Seven Primary Schools of Tamburawa, Dawakin-Kudu Local Government.

The prevalence of geohelminths in relation to gender was presented in Table 4. Out of the 560 samples examined, 267 pupils were males, while 159 were females. The highest prevalence of 9.8% was recorded among the females compared to a prevalence of 9.3% in the males. Statistically, the prevalence of geohelminths among males and females was significantly different ($P \leq 0.05$).

Prevalence of Intestinal Infections among Pupils in Seven Primary Schools of Tamburawa, Dawakin-Kudu Local Government in Relation to Risk Factors

Table 5 showed the prevalence of geohelminths in relation to some predisposing factors. High prevalence (69.2%) was recorded among pupils who use well water to 25% prevalence among those who use borehole. 73.2% prevalence was found among pupils that swim compared to the 14% prevalence of those that do not swim. 41.5% prevalence occasionally trim their nails compared to 43.6% prevalence recorded among those that do not trim their nails.

Table 3: Prevalence in Relation to Age of Intestinal Infections among Pupils in Seven Primary Schools of Tamburawa, Dawakin-Kudu Local Government.

Parasite Identified	Number of Children Infected			
	6-8 Years (n=96)	9-11 Years (n=168)	12-14 Years (n=186)	15 Years and Above (n=110)
	Number (%)	Number (%)	Number (%)	Number (%)
Hookworm	27 (28.1)	43 (25.6)	51 (27.4)	21 (10.1)
Schistosoma mansoni	15 (15.6)	19 (11.3)	33 (17.7)	22 (20.0)
Entamoeba coli	12 (12.5)	24 (14.3)	27 (14.5)	14 (12.7)
Ascaris lumbricoides	9 (9.4)	15 (8.9)	21 (11.3)	3 (2.7)
Taenia species	4 (4.2)	8 (4.8)	16 (8.6)	8 (7.3)
Trichuris trichiura	0 (0.0)	2 (1.2)	7 (3.8)	8 (7.3)
Enterobius vermicularis	0 (0.0)	0 (0.0)	6 (3.2)	5 (4.5)
Entamoeba histolytica	0 (0.0)	5 (3.0)	1 (0.5)	0 (0.0)
Total	**67 (8.7)**	**116 (8.6)**	**162 (10.9)**	**81 (9.2)**
Chi-square	**82.921**	**107.333**	**106.842**	**50.351**
Df	7	7	7	7
p value	**0.000**	**0.000**	**0.000**	**0.000**

Table 4: Prevalence in Relation to Sex of Intestinal Infections among Pupils in Seven Primary Schools of Tamburawa, Dawakin-Kudu Local Government

Parasites Identified	Male (n=357) No (%)	Female (n=203) No (%)	Number of Children Infected (n=560)
Hookworm	88 (24.6)	54 (26.6)	142 (25.4)
Schistosoma mansoni	56 (15.7)	33 (16.3)	89 (15.9)
Entamoeba coli	48 (13.4)	29 (14.3)	77 (13.8)
Ascaris lumbricoides	32 (9.0)	16 (7.9)	48 (8.6)
Taenia species	18 (5.0)	18 (8.9)	36 (6.4)
Trichuris trichiura	13 (3.6)	4 (2.0)	17 (3.0)
Enterobius vermicularis	8 (2.2)	3 (1.5)	11 (2.0)
Entamoeba histolytica	4 (1.1)	2 (1.0)	6 (1.1)
Total	**267 (9.3)**	**159 (9.8)**	**426 (9.5)**
Chi-square	**194.014**	**127.997**	**319.083**
Df	**1**	**1**	**1**
p value	**0.000**	**0.000**	**0.000**

Conclusions

The 76.1% prevalence of the soil-transmitted helminths reported in this study indicated that geohelminths infection is highly endemic among primary school pupils in Tamburawa, Dawakin-kudu Local Government Area, Kano State. The infection was significantly influenced by location, species type, age, gender and risk factors.

Recommendations

Apart from confirming endemicity in the study area, the general prevalence of 76.1% is a cause for alarm, therefore, calls for regular survey in school children to determine the prevalence and intensity of infections so as to provide basis for effective treatment strategies and control programmes at national, regional and district levels (Andrade *et al.*, 2012).

Based on these findings, free medical tests and periodic de-worming of pupils with benzimidazoleantihelmintics, mebendazole, and albendazole should be carried and sustained to remove these infections in the primary schools. This is in line with WHO guidelines recommended periodic treatment rounds for groups with high intensity infections of 10% and above (WHO, 2013).

Efforts should be made to create better sanitary and toilet facilities in schools at all times to avoid indiscriminate defecation that could lead to the transmission of helminthic infections. The government, non-governmental agencies and private individuals should help in the provision of these social amenities to ensure total eradication of these diseases.

The teaching of health education in both public and private schools should be encouraged by the government. Also, children should be educated on the need to always observe good hygienic practices and behavioral activities both at school and homes.

Parents should teach their children about the dangers of playing in contaminated soil and walking barefooted. The prevalence of intestinal parasites in indiscriminately passed faeces in the area should be studied to establish the possible sources of the infection.

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