Epidemiology of Intestinal Polyparasitism among Primary School Pupils in Awe, Awe Local Government Area, Nasarawa State, Nigeria

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ABSTRACT

Fecal samples were collected from 389 school children 200 (76.9%) boys and 189 (80.8%) girls and were examined by using direct smear, formalin-ether administration techniques socio-economic personal hygiene, environmental and demographic information were collected by using self-administered questionnaire. The overall 389 (78.7) of the children were found to be infected by at least one parasite species. Of this, 12.2 % had multiple parasites. The overall prevalence infections were *Trichuris trachiura* (0.20%), *Ascaris lumbricoides* (48.6%), Hookworm (5.3%), *Entamoeba histolytica* (6.3%), *Entamoeba coli* (5.7%) and *Ascaria lumbricoides* + *E. histolytica* (7.5%). Parasitic infections between males and females showed significant differences in all the sexes ($P<0.01$). The percentage prevalence of *Ascaria lumbricoides* was high in children between 7 – 8 years and ≥12 years. For other intestinal parasites, no specific age relationship was established among the children. Findings from this study showed that using an unsafe water supply as a source for drinking water, presence of other family members infected with intestinal parasitic infections (IPI), not washing vegetables before competition, absence of toilet in the house, not wearing shoes when outside, not cutting nails periodically and not washing hands before eating were significant risk factors associated with intestinal multiple parasites among these pupils.

Keywords: Intestinal parasites, infection, Primary school children, Awe.

INTRODUCTION

Parasitic infestation greatly affects the health and socio-economic status of individuals and communities. They weaken the individuals and made them unable to do gainful activities due to infestations. Furthermore, anaemic persons are anaemia, they succumb easily to many infections also to develop the serious disease and eventually become poor mothers and child since they are generally weak (WHO, 2002).

In humans, intestinal parasites are often spread by poor hygiene related to faeces, contact with animals or poorly cooked food containing parasites. The major groups of parasites include protozoans and parasitic worms (Helminthes). These protozoans including *Cryptosporidium*, *microsporidium* and *Isospora*, *Entamoeba histolytica*, *Balatidium coli*, *Giardia lambiae* etc, each of these parasites can cause, infection at the same time. Intestinal helminthic parasite, are worms

that are found in the body lumens of the gut of animal (Agbolade *et al.,* 2004). These intestinal parasites are amongst the most prevalent human infections affecting approximately one-quarter of the world's populations, mainly school children due to their poor hygienic nature or poor sanitary conditions coupled with their voracious eating habits (WHO, 2002).

Human, get the parasites through the mouth from uncooked or unwashed hand, food, contaminated water or hands or by skin contact with larva infected soil. There is general acceptance that severe intestinal parasite is likely to result in failure and poor growth in children (Crompton and Nesheim, 2002), vitamin A deficiency (Al-Mekhlafi *et al.*, 2010), iron deficiency anaemia (Faustini, *et al.,* 2006) and poor educational performance (Haque *et al.,* 2003). Recent studies highlighted the impact of polyparasitism on the host immunity and showed that intestinal parasites are associated with higher infections related to infection with a single parasite (Shokhana, *et al.,* 2004, Gibson *et al.,* 2011).

In some persons, intestinal parasites do not cause any symptom or they display some symptoms include cramping, abdominal pain, coughing bloating and diarrhea. In more serious cases skin-itching, fever, nausea, vomiting or bloody stools may occur. However, because many parasitic infections especially those of helminthes are usually asymptomatic or produce only mild symptoms, they are often neglected until serious complications or chromic clinical symptoms appear (WHO, 2002).

In Nigeria many intervention schemes which were attempted to control these infections did not yield many successes, many are still heavily infected particularly children (Ijagbone and Olagunju, 2006). Because of the negative socio-economic impact of these parasitic infections on infected humans, efforts would be made to reduce their epidemiological state among pupils. The

study was, therefore, carried out to determine the prevalence of the intestinal parasitic infections and to investigate its associated risk factors among Awe school children.

MATERIALS AND METHODS

Study Area

This research was carried out in Awe Local Government Area of Nasarawa State Nigeria. Awe is located in the southern part of Nasarawa State on latitude 8^{o} 31^{o} N and longitude 7^{o} 31^{o} E. Its location linked Awe and Keana Local Government Area in the East and West respectively. The mean monthly temperature in this area ranges between 30^{o}C in March and 25^{o}C December. The mean annual rainfall is about 1270 – 1540mm received over six to seven months (April – October) of the rain season, with five months of dry season. The main socio-economic activities of the people are farming, trading and some are in public services.

Figure 1: Map of Nasarawa State showing study area

Study Design

The study on intestinal polyparasitism was carried out over a period of four months (February to May 2018). The participants are school children between the age of 6 and 13 years in Awe west, Awe east, Awe central and Isilamiyya primary school of Awe Local Government Area, from which we randomly selected 123 children per school. The 494 children (247 boys and 247 girls) were all given registration number on a card which they enclosed with their stool samples in disposable polythene bags supplied to them. The fresh faecal samples were put in the refrigerator and immediately transported to the general hospital laboratory in Awe for examination.

Microscopy Examination of Stool Sample

Freshly voided stool samples were examined for blood, colour, consistency and mucus. Smear was used for the analysis of the faecal sample for parasites. The diagnosis was based on the identification of the characteristics protozoan cysts and helminthes ova with a compound microscope using x_{10} and x_{40} objective (Cheesbrough, 1992).

The fecal samples for direct smear were washed prior the concentration procedure saline and iodine preparation were made from the deposit on a clean grease-free slide and examined for cysts and helminthes ova with a compound microscope using x_{10} and x_{40} objectives.

The result was analyzed using sample percentage and SPSS 16.0 package to compare the prevalence of infection. The difference were considered to be statistically significant when the P-value obtained was less than 0.01.

Simple Size Calculated

$$Ss = \frac{Z^2 \times (p) \times (1 - R)}{C^2}$$

Where Z = value (e.g 1.96 for 95% confidence level)

P = percentage picking a choice in decimal = 0.5)

C = Confidence interval, express as decimal e.g 0.04

RESULTS

A total of 494 fresh fecal samples were collected from pupils between the ages of 6 – 13 years. This consisted of 260 boys and 234 girls from the four primary schools in Awe town. The total fecal samples, 389 (78.7%) were infected, 200 (76.9%) boys and 189 (80.8%) girls were infected. Table 1 shows the occurrence of intestinal helminthes infection according to sex, being higher in girls than boys.

Table 2 states the prevalence rate of infection based on age with the percentage prevalence of infection was high with (82.0%) in pupils between 8 – 9 years of age and decreased with (74.59%) in pupils between ≥12 years of age.

Table 3 showed the prevalence rate of *Entamoeba histohytica* 31 (6.3%), *Entamoeba coli* 28 (5.66%), *Ascaris lumbricoide* 240 (48.6%), trichiuristrichuria 1(0.2%), hookworm 26 (5.3%), and mixed infection are *Ascaris lumbricoides* and *Entamoeba histolytica* recorded 37 (7.5%) in the study. The pupils t-test analysis of the parasitic infection between the boys and girls recorded a significant difference between the sexes ($P<0.01$).

Table 1: Prevalence of intestinal parasite according to sex

Schools	Male			Female			Total		
	No. examine	No. infection	% prevalence	No. examine	No. infection	% prevalence	No. examine	No. infection	% prevalence
Awe central pri. sch.	102	93	91.17%	90	88	97.77	192	18	94.3%
Awe south pri. Sch.	54	39	70.32%	52	43	82.69	106	82	77.4%
Sangari pri. Sch.	52	37	71.15%	48	37	77.08	100	74	74%
Emirs palace pri sch.	52	31	59.61%	44	21	47.72	96	52	54.2%
Total	260	200	76.92	234	189	80.76	494	389	78.7%

Table 2: Prevalence of intestinal parasite infection among primary school pupils by age

Age (years)	No examine	No infected	% prevalence
6 – 7	124	101	81.5%
8 – 9	128	105	82.0%
10 – 11	120	92	76.7%

>12	122	91	74.6%
Total	494	389	78.7%

Table 3: Frequency of species of intestinal parasites among pupils

Species	No. examine	No. positive	% positive
Entamoeba histolytica	494	31	6.3%
Entamoeba coli	494	28	5.7%
Ascaris lumbricoides	494	240	48.6%
Trichuris trichuria	494	1	0.2%
Hookworm	494	26	5.3%
Co-infection			
Ascaris lumbricoides + *Entamoeba lustolytica*	494	37	7.5%
Total	2964	363	12.2%

DISCUSSION

Intestinal parasitic infestation remains major health problems globally particularly among rural children in developing nations. The common intestinal parasites recorded in this research include hookworm, *Trichuris trichuria*, *Ascaris lumbricoides*, *Entamoeba histolytica*. The infection rate of the intestinal parasites in a primary school in Awe town showed that there was consistently higher infection among the 494 school children examined. The participating children were positive for at least one parasite species with *Ascaris lumbricoides* infection is the most common (48.6%) in these children, followed by *Entamoeba lustolytica* (6.3%), *E. coli* (5.7%) and hookworm (5.3%) infection, which was in disagree to the findings made among school children in a study by World Health Organization (WHO, 2002). On the other hand, the prevalence in this study was higher compared to the findings of (Chukwuma, *et al*., 2009) who showed a prevalence of 13 (5.9%) among primary school children in Anambra State, Nigeria, this was due to poor hygienic conditions of the school environment. The result of this study is also in agreement with the prevalence recorded by (Omah, *et al.*, 2014) who showed a prevalence of 286 (29.2%).

This study has revealed that parasitic infestation increased progressively with age pupils aged between 6 – 7 had (81.5%), 8 – 9 (82.0%), 10 – 11 (76.7%) and >12 (74.6%). This could be due

to a random selection of pupils for the treatment of parasitic infection. The infestation of hookworm was 5.3%, this could be due to the poor toilet facilities. The pupils were found defecating in their backyard and around the school premises thereby littering the environment with faecal matters which were likely to contain intestinal parasites including hookworm ova. The children most often move bare footed in their environment exposing themselves to infect with infective hookworm larva.

Generally, this prevalence has been contributed by several authors, to improper hygiene, poor sanitation and agricultural habits, the physical and chemical composition of the soil and degree of human exposure (Ugbomoiko, *et al.*, 2006). In this research, female pupils had the highest prevalence of (97.8%) compare to their male counterpart with about (91.2%). There was no significant difference observed in infection among the gender group (P>0.05). The risk of eating soil (geophagy), licking of fingers and drinking well or stagnant water were significantly high risks for *A. lumbricoides* and *T. trichiura* infection and hookworm which was only associated with walking bare footed.

CONCLUSION

The findings from this research revealed that *Entamoeba histolytica, Ascaris lumbricoides, Trichuris trichiura,* Hookworm were more common in Awe, Nasarawa State, Nigeria. This was due to the poor state of hygiene and high rate of carriers among the school children.

RECOMMENDATIONS

1. Screening, deworming and improved sanitation by provision of modern toilet facilities,
2. Health education by enlightenment campaigns, school-based health programme would go a long way in reducing infections.

3. Government and private hospitals should ensure modern diagnostic equipment's for intensive and reliable test for diseases.

Ethical approval and consent

The protocol for this study was approved by the local education authority and the primary schools intended to be used. The approval was on an agreement that participants anonymity must be maintained and good laboratory practices quality control ensured and every finding would be treated with the utmost confidentiality and for this research only. Participants were fully informed on their right to withdraw without any constraints.

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