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Survey on Helminth Parasites Associated With Human Fingernails among Primary School Pupils in Batagarawa Local Government Area, Katsina State, Nigeria

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Abstract

ABSTRACT

Helminth parasitic infections have become a global public health concern and their burden is much higher among children of school age, especially in tropical and sub-tropical developing countries. In primary schools environments, children have proven to be more susceptible for acquiring helminth parasites through fingernails. This present study investigated intestinal parasites associated with the fingernails of primary school pupils in Batagarawa Local Government, Katsina State, Nigeria. It was conducted from 15 August to 10 December 2017.Subjects(**n**=146) Swab samples were obtained from 146 subjects and put into a clean sterile container containing normal saline.A drop of the mixture was transferred to the centre of the scrupulously cleaned grease free slide using sterile plastic Pasteur pipettes and carefully covered with a cover slip, avoiding air bubbles and over floatation. Direct microscopic examination of the samples for ova/eggs of helminths and/or cysts of other protozoan parasites was done.Out of the 146 specimens, 68 (45.9%) were positive for one or moreparasites. Theparasitesidentified with single infection were *Ascaris lumbricoides*, *Taenia species*,*Trichuris trichiura*, *Hookworm*and *Enterobious vermicularis*. For the mixed infection we have 04 (6.0%)*Taenia spp* + *A. lumbricoides* and 02 (3.0%)*Hookworm* + *E. Vermicularis*,*A. lumbricoides*31 (46.3%) was found to be the most prevalent parasite followed by *Trichuris trichuria*11(14.9%),*Taenia species*, 10 (14.9%),*Hookworm*07 (10.4%)and *Enterobious vermicularis*03 (4.5%). Chi Square analysis showed statistically significance between gender versus infection and age versus infection (P<0.05). There is a need for health education campaignsto create awareness about health and hygiene to the pupils and to the parents.

Key words: Intestinal parasites, parasitic diseases, prevalence, primary schools children.

INTRODUCTION

Intestinal parasitic infections have become a global public health concern and their burden is much higher among children of school age, especially in tropical and sub-tropical developing countries. The consequences of intestinal parasitic infections among children include; stunted growth, iron deficiency anaemia, reduced haemoglobin, malaise, reduced physical activity, vitamin A deficiency, impaired cognitive functions and poor learning ability (Elkins*et al.*, 1986; Houwelling*et al.*, 2003).About 3.5 billion people around the world are estimated to be infected with intestinal parasites, while about 450 million become ill as a result of intestinal parasitic infections (WHO, 2012). From 1998 to 2002, an average of 1329 food borne disease outbreaks were reported to the Nigeria Centre for Disease control and prevention (NCDC) each year (Luka*et al.*, 2000). Intestinal parasitic infections caused by soil transmitted helminths are widely spread and are among the ten most common infections in the world (WHO, 2010). Intestinal parasites have a cosmopolitan distribution. However, their endemicity depends on factors such as, socio-demographic variables associated with poverty such as reduced access to adequate sanitation, portable water and healthcare as well as the prevailing climatic and environmental conditions (Adebayo and Dipeola, 1984; Etim and Akpan, 1999). Local customs such as the use of human and animal fertilizers are also contributing factors.

Intestinal parasites adhere to fingers, fruits, vegetables, instruments, door handles, money, poor hygiene and contact with feces (Ayeh – Kumi *et al.*, 2009). They can also be transmitted by flies (WHO, 1987). However, theiradherence to fingernails are salient sources of infection (Adeyeba and Akinlabi, 2002). Hence, the presence of intestinal parasites in the fingernails is an indication of one of the routes of transmission of the parasite, it is a pointer to the presence of an active infection or a source of parasitic infection. It is also an indication of poor personal hygiene associated with children from rural areas. Such children present a potent source of transmission to the larger community through sharing of common equipments in school, playing with one another and outright

autoinoculation by means of finger biting and sucking, common among children of such age.

In developing countries, intestinal parasites have been known to cause significant morbidity and mortality. Therefore, the faecal-oral route is significant in the transmission of parasitic infections to humans through poor personal hygiene. When the soil became contaminated, the eggs in the soil can be transferred onto vegetables, door handles etc and then on to the hands from where it can be transferred to the mouth (Embil *et al.*, 1984; Albonico*et al.*, 2002).

This present studies aimed to investigate intestinal parasites eggs associated with the fingernails of primary school pupils in Batagarawa Local Government, Katsina state, Nigeria.

MATERIALS AND METHODS

Study Area

This study was conducted in Batagarawa Local Government Area of Katsina state. Batagarawa Local Government is largely dominated by Hausa People. The town of Batagarawa serves as the headquarters of the local government area as well as the capital of Mallamawa district of Katsina emirate. The local Government was established in the year 1991. It covers a total land area of 433Km^2 and has a total population of 184,575 people according to the 2006 census figures. The Local government of Batagarawa lies between Latitude 12°54'N and Longitude 7°37'E (Wikipedia, 2016).

Sampling Area

The sampling was done on the pupils of Babbar ruga primary school. The village of Babbar Ruga is located about 3Kilometres along Katsina-Batsari road. The school is situated adjacent to the famous Babbar Ruga VVF (Vesico Vaginal Fistula) Hospital and opposite the Companion FM radio station.

Ethical approval

Informed consent was obtained from the Local Government Education Secretary, the Headmistress of the sampled school and the selected children after thorough discussion and explanation of the aim and objectives of the study. The children were informed that participation is voluntary and that any participant who loose interest can withdraw at any point in time.

Sampling and Sample size

A simple random sampling technique was applied in data collection for the purpose of this survey. The sample size adopted for this study was 146 pupils comprising both male and female pupils. This number gives an adequate representation of the pupils enrolled in the school.

Sample collection

Personal data of each child like, age, gender, family size and education level of parents or guardians was obtained with the aid of a structured questionnaire. Swab samples were obtained from the fingernails of pupils. The nails swabbed were put into a clean sterile container containing normal saline. Fingernails clipping were collected from both hands of each participant using sterile nail cutters and were placed in labelled containers which also contain one drop of normal saline.

Laboratory analysis

A drop of the mixture of the swabbed sample with normal saline was transferred using sterile plastic Pasteur pipettes to the centre of the scrupulously cleaned grease free slide and carefully covered with a cover slip, avoiding air bubbles and over floatation. Direct microscopic examination of the samples for ova/eggs of helminths and/or cysts of other protozoan parasites was then done using the x10 and x40 objective lenses. For the nail clippings, each sampled clip was immersed in 10% potassium hydroxide solution for 24 hours and subsequently centrifuged for 5 minutes at 2500rpm. The supernatant was then discarded while the sediment of each specimen was stained with lugol's iodine and eosin and subsequently examined under microscope using x10 and x40 objectives. Eggs/ova and cysts of parasites were identified using reference plates by Cheesbrough, (1998).

RESULTS

Analysis of the socio-demographic indices among the children revealed that majority (52.7%) of the studied subject were males (Table 1). Similarly, majority (67.1%) of the children that participated in the survey were aged 6-10 years. In terms of the education status of the children parents, the result showed that more than half (57.5%) of their Fathers had formal education of at least a primary school certificate, while only 26.7% of their mothers were educated. In terms of occupation of the parents, the data from the survey showed that half of their fathers were peasant farmers, 28.8% were civil servants and 21.2% were businessmen. In terms of mother occupation, the findings showed that 74.4% of the mothers were full time housewives, 17.8% were petty traders, while 7.5% were civil servants. Further findings from the data obtained indicated that almost all the children participated (92.5%) and (97.9%) were of the habit of eating food with hands and they washed the hands before and after eating respectively.

Table 1: Socio-demographic characteristics of Babbar Ruga Primary School Pupils in Batagarawa Local Government, Katsina State.

Characteristic	Frequency	%
Gender		
Males	77	52.7
Females	69	47.3
Age group		
6-10 years	98	67.1
11-15 years	48	32.9
Father's education level		
At least 6 years formal education	84	57.5
No formal education	62	42.5
Mother's education level		
At least 6 years formal education	39	26.7
No formal education	107	73.3
Father's occupation		
Civil service	42	28.8
Farming	73	50.0
Business	31	21.2
Mother's Occupation		
Housewife	109	74.7
Civil service	11	7.5
Business	26	17.8
Eating food with fingers		
Yes	135	92.5
No	11	7.5
Hand washing before/after eating		
Yes	143	97.9
No	3	2.1

The data from the survey indicated that parasitic infection associated with the fingernails is prevalent among the study subjects (Table 2). Out of the grand total of 146 children that participated in the survey, 67 were found to be positive for various parasite species. Analysis by gender indicated that the males (55.84%) were more infected than the females (34.78%), however, the differences was statistically significant (P<0.05). Moreover, analysis by age group (Table 3) revealed that, although the children of the age group11-15 years were more infected (64.6%) than those aged 6-10 years (36.7%), the differences was also statistically significant (P<0.05). Graph Pad Prism Software Version 7.04 was used for the statistical analysis.

Table 2: Prevalence of Helminth Parasite in Fingernails of Babbar Riga Primary School Pupils in Relation to Gender

Variable	No. Examined	No. contaminated	Prevalence (%)	*P*-value
Gender				
Males	77	43	55.8	0.011
Females	69	24	34.8	
Total	**146**	**67**	**29.6**	

Chi-square(X^2)=6.501; df=1; P value=0.0108

Table 3: Prevalence of Helminth parasite in fingernails of Babbar Riga Primary School Pupils in Relation to Age

Variable	No. Examined	No. contaminated	Prevalence (%)	*P*-value
Age Group				
6 – 10 years	98	36	36.7	0.002
11 – 15 years	48	31	64.6	
Total	**146**	**67**	**24.6**	

Chi-square(X^2)=10.06; df=1; P value=0.0015

A total number of 5 different species of parasites were isolated from the screened samples from the children (Table 4). The parasites isolated in single infections are; *Ascaris lumbricoides* (46.3%),*Trichuris trichiura* (14.9%)*Taenia* spp (14.8%),*Hookworm* (10.4%) and *Enterobious vermicularis* (4.5%). On the other hand, the parasites that occur in mixed infections were *Taenia* + *A. Lumbricoides* (6.0%) and Hookworm + *E. Vermicularis* (3.0%).

Table 4: Helminth Parasites Isolated from Fingernails of Babbar Ruga Primary School Pupils in Batagarawa Local Government in Single and Mixed Infection

Parasite species isolated	Occurrence (%)
i. Single infections	
Ascaris lumricoides	31 (46.3)
Trichuris trichiura	11 (14.9)
Taenia spp	10 (14.8)
Hookworm	07 (10.4)
E. vermicularis	03 (4.5%)
ii. Mixed infections	
Taenia spp + *A- lumbricoides*	04 (6.0)
Hookworm + *E. Vermicularis*	02 (3.0)
Total	**68 (45.9)**

DISCUSSION

Soil transmitted helminth infections represent a major public health problem in poor and developing countries and have constituted a universal burden which does not only depend on regional ecological condition but also on the development of the people (Ukpai and Ugwu, 2003).

The result of the parasitological survey of the children indicated that about half of them had contaminated fingernails by at least one important intestinal parasite namely; *Ascaris lumbricoides*, *Trichuris trichiura*,*Taenia* species, Hookworms and *Enterobious vermmicularis*. This result is similar with the findings of many previous researches from different parts of the country (Obiamiwe, 1977; Ejezie, 1981; Ayanwale *et al.*, 1982; Adeyeba and Dipeolu,1984; Wagbatsoma *et al.,* 2005). *A. lumbricoides* was the most prevalent helminth parasite encountered. It accounts for about 80 percent of all the infections among the study children. Our findings concurred with the findings of other similar studies in Nigeria (Udonsi, *et al.,* 1996; Ahmed *et al.,* 2003;Aminu, 2014). *Ascaris lumbricoides* is often said to be the most widespread of all the soil transmitted helminth parasites especially in Africa, China and some Latin American countries. *A. lumbricoides* eggs are believed to be highly resistant to temperature changes and other adverse conditions in the soil and hence could remain viable in the soil for months. Similarly, it is a common knowledge that female *A. lumbricoides* could lay thousands of eggs daily which could be spread in the soil via faeces.

The result from this survey also showed that the males harbored more parasites in their fingernails compared to their female counterparts. This agreed with the findings by Dyek, *et al.*, (2016). This could be attributed to the nature of the male child at growing age. They are more likely to be seen playing in the open ground and also many are fond of joining their parents to go to farms and gardens. Similarly, in the course of farming activities human excreta are usedas source of manure in the farms. Which might be a route for easy infection among the males. The age group 11-15 years was found to harbored more parasites in their fingernails than 6 – 10 years age group. This is not surprising as this age group is more energetic and more active; hence they tend to enjoy working in the farms assisting their parents. Similarly, this group is stronger to play rigorous games in the field. Furthermore, this age group leave their fingernails for quite long time without cutting as a result their fingernails become long and dirty.

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