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EXAMINATION OF FINGERNAIL CONTENTS FOR THE PRESENCE OF OVA/CYSTS OF INTESTINAL PARASITES FROM PUPILS ATTENDING PLATEAU STATE POLYTECHNIC BARKIN LADI HEIPANG CAMPUS STAFF PRIMARY SCHOOL

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ABSTRACT

Intestinal parasitic infections among primary school-age children in developing countries, including Nigeria, are an escalating public health issue. These parasites, often transmitted via the oral-faecal route, are a leading cause of diarrhoea. This study focused on examining the fingernail contents of students at Plateau State Polytechnic (PSP) Staff School in Heipang, Barkin Ladi, Plateau State, Nigeria. A total of 100 fingernail samples were analyzed microscopically for the presence of parasite ova/cysts. The investigation revealed that 71% of the pupils harboured at least one type of parasite cyst/ova, resulting in a 98.69% prevalence rate. The most commonly detected parasites were *Schistosoma mansoni* and *Ancylostoma duodenale*, each found in 17% of the samples. This was followed by *Ascaris lumbricoides*, detected in 14% of the cases. Gender analysis showed that 78% of male children tested positive for various parasite cysts/ova, while 64% of female pupils were affected. Age-related analysis indicated that children aged 11-15 had an 80% prevalence rate, those aged 1-5 had a 66.67% prevalence, and children aged 6-10 had a 64.30% prevalence rate. The presence of fingernail parasites in primary school children can lead to chronic infections, negatively impacting their health, nutrition, cognitive development, and educational success. Regular cleaning and trimming of fingernails, along with consistent hand hygiene practices, are essential measures to reduce the risk of parasitic transmission among primary school pupils.

Keywords: Parasite, Cyst/ova, Finger Nails, Pupil, Soil

INTRODUCTION

The transmition of intestinal parasitic infection through the feacal-oral route among children attending public schools in most developing countries is increasingly becoming a public health concern (Jameel *et al.,* 2017). Consequently, Gupta *et al*. (2020) asserted that such parasitic infections could results in diarrhea, malnutrition, abnormal physical growth, anaemia and in severe cases death may occur as a result of extreme dehydration.

Tadesse *et al*. (2019) submitted that parasitic infections due to intestinal helminthes and protozoan parasites are among the most prevalent infections among school age children in tropical countries resulting in substantial morbidity and mortality, iron deficiency, anemia, growth retardation, and other physical and mental health related problems. Furthermore, Gupta *et al*. (2020), Tadesse *et al*. (2019), Jameel *et al*. (2017) & Ghani *et al*. (2016), identified indices such as lower socioeconomic status, poor personal hygiene, poor nutrition, low literacy rate; overcrowding, use of untreated human/animal feaces as fertilizers and warm and humid environmental conditions as some of the major associated risk factors contributing to the high prevalence of intestinal parasitic infection in sub Saharan Africa.

Yahaya & Tukur, (2017) are of the view that parasitic diseases remain among the most predominant and serious health problems with extremely high prevalence rates among children attending public schools. These parasites compete on available nutrients from children they infect, therefore hindering their physical development. Furthermore, intestinal parasites destroy tissues and organs of their host, they also cause diarrhea, abdominal pain, anaemia, ulcers, intestinal obstruction beside other health challenges which could result in slow cognitive development and reduced learning among children (Mahmud *et al*., 2020).

Studies (Centers for Disease Control and Prevention, 2020, Yahaya &Tukur, 2017, Mengist *et al*., 2018) have shown that unkept or dirty finger nails especially among school-aged children could harbor parasites cyst/ova. Thus, soils contaminated with helminthes could aid the transmission of parasites including *Ascaris lumbricoides*, *Trichuris trichiura* and hookworms among others through the oral fecal route (Ghani *et al*., 2016). Tadesse *et al*. (2019) noted that the most common intestinal helminthes in tropical countries include soil-transmitted nematodes, namely round worm (*Ascaris lumbricoides*), whipworms (*Trichuristrichiura*), hookworms (*Necator americanus, Ancylostoma duodenale*), tapeworms (*Taenia* spp and *Hymenolepis* spp) and flukes.

Jameel (2017) stated that some common parasites that can easily infect children through dirty fingernails includes *Enterobius vermicularis* (pinworm), *Hymenolepis nana* (dwarf tapeworm), *Ascaris lumbricoides* (roundworm), *Trichuris trichiura* (whipworm), *Entamoeba histolytica, Giardia lamblia (*Klohe *et al*., 2021).

Gupta *et al*., (2020) stated that a cross-sectional study conducted in Nepal, on the prevalence of intestinal parasitosis among school children was 33%, with *Giardia lamblia* being the most prevalent (15.4%). Other parasites encountered in the studies were *Entamoeba histolytica*, *Ascaris lumbricoides*, and *Hymenolepis nana*. The study also found that the presence of intestinal parasites was statistically significant with family income, hand-washing habit, type of drinking water, and availability of a toilet facility at home.

Similar investigations conducted in Nigeria found that the prevalence of intestinal helminthiasis among primary school children in the Akpor area of Port Harcourt, Nigeria was significantly high with hookworm (42.7%) and ascariasis (16.0%) being the most prevalent parasites.

Scott and Litin (2022) and Hosea *et al*. (2019) stated that the World Health Organization (WHO) estimated that about 270 million pre-school and over 600 million school children in the third world countries live in areas where helminth parasites are endemic and are easily transmitted. Furthermore, the CDC (2018) and Mengist, (2018) submitted that keeping fingernails short and clean helps prevent the accumulation of dirt and parasites. Long nails can harbour eggs or cysts of intestinal parasites, which can then be ingested when children touch their mouths or food. The CDC (2018) and Mengist, (2018) encouraged children to wash their hands thoroughly after using the restroom, before eating, and after playing outdoors to significantly reduce the risk of transmission. Therefore, this study was aimed at investigating the presence of parasite cyst/ova from finger nail content among pupils attending PSP Staff School, Heipang in Barkin Ladi LGA of Plateau State Nigeria.

MATERIALS AND METHODS

Study Area

Plateau State Polytechnic Staff School is located in the main campus of Plateau State Polytechnic Heipang, Barkin Ladi. The total population of the school is 209 pupils at the time of sampling comprising the nursery and primary sections.

Ethical Consideration

Ethical consideration before embarking on the study as approved by the Polytechnic Clinic ethical committee. Permission was sought from the authorities of the school after educating them on the significance of the study. Parental consent of participating pupils were also sought.

Sample Collection

The method as described by Yahaya and Tukur (2017) was adopted in sample collection. Briefly, a total of 100 samples were randomly collected from 50 male and 50 female pupils. Samples of fingernail contents were collected from both hands of each pupil using a sterile toothpick, after which the dirt was transferred into a labelled self-locked eppendorf centrifuge tube containing normal saline. The samples were thereafter taken to the Microbiology Laboratory of Plateau State Polytechnic Barkin Ladi and stored at 4^0C for analysis within 24 hours.

Laboratory Examination of Samples

Stored samples were centrifuged at 5000 rpm for 5minutes and the supernatant carefully discarded. The sediment was carefully placed on a clean grease free slide with the aid of a dropper pipette and thereafter covered with a drop of iodine solution and further covered with a cover slip and observed under the compound microscope using 10X and then 40X magnifications. The eggs/cyst of parasites were identified with the aid of a parasitological colour atlas.

RESULTS AND DISCUSSION

Results

Results of microscopic examination of the finger nail contents of pupils attending Plateau State Polytechnic Primary School indicated the presence of various intestinal parasite cyst/ova which cut across different age groups and sex of the pupils as presented in Figures 1- 3 below. The parasites cyst/ova with the highest prevalence were *Schistosoma mansoni and Ancylostoma duodenale* with 17 out of 100 pupil harbouring the parasite cyst/ova in their finger nails in each case representing 23.29% prevalence. This was closely followed by *Ascais lumbricoides* with 14 cases out of 100 (19.72). The overall prevalence of parasite cyst/ova in the finger nails of the pupil examined was 98.69 % which is statistically significant ($P < 0.05$).

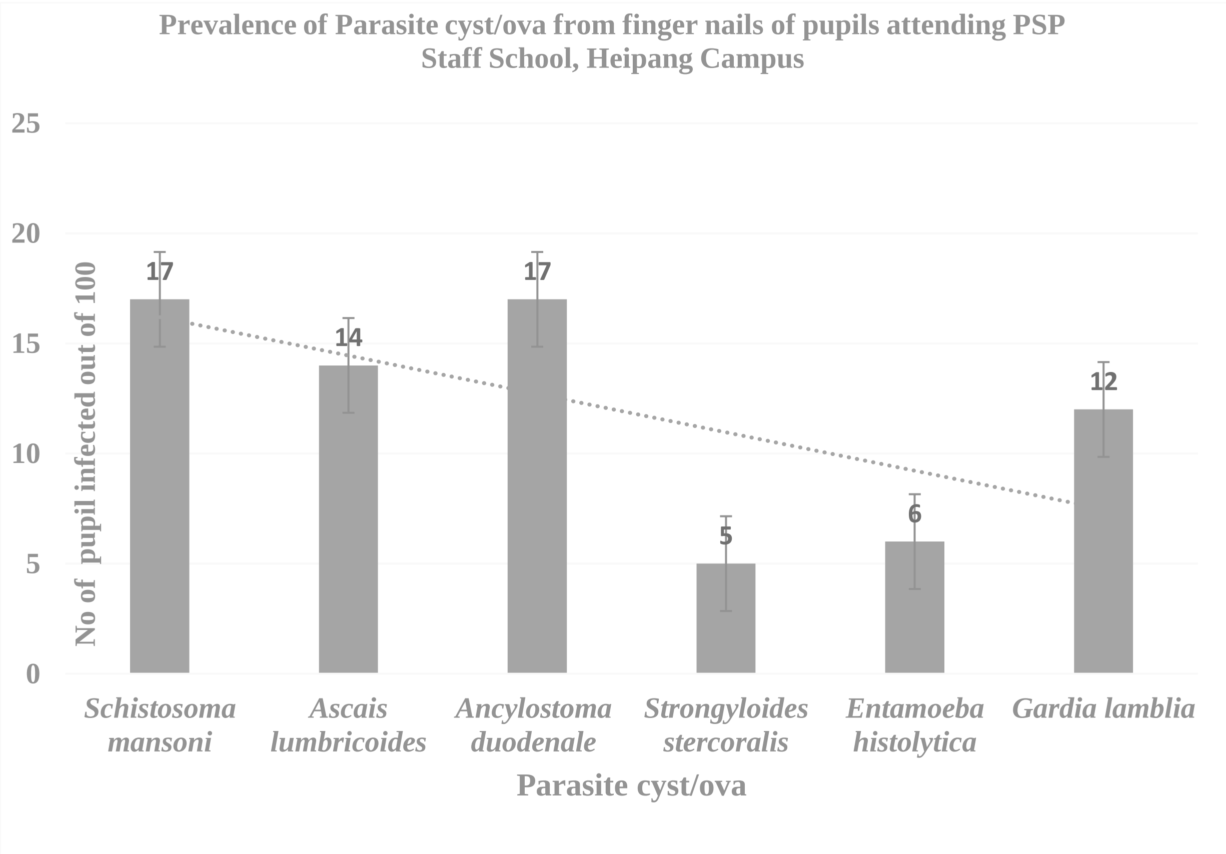

Figure 1: Bar Chat Showing Prevalence of Parasites' cyst/ova in the Finger Nails of Pupils of PSP Staff Primary School

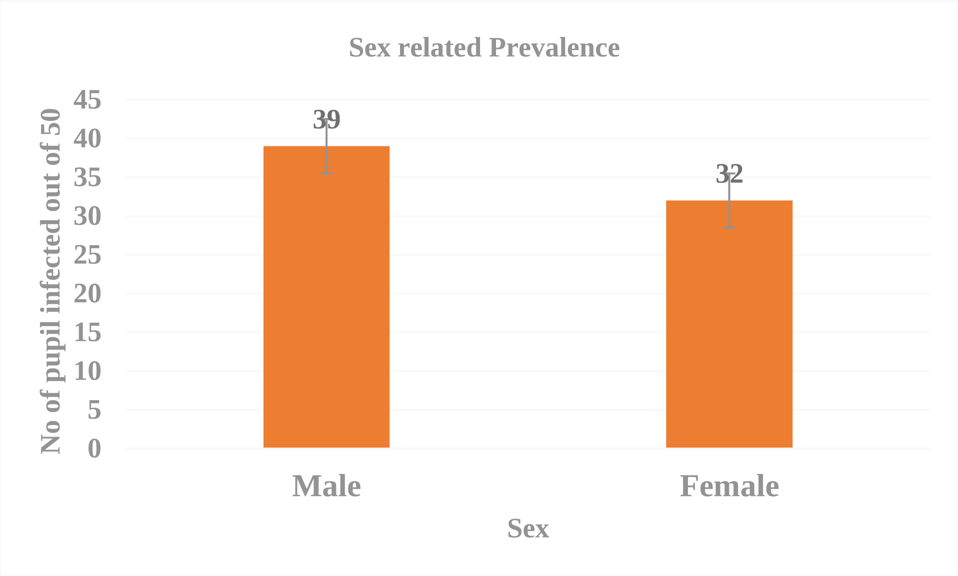

Figure 2: Sex Related Prevalence of Parasite cyst/ova from Finger Nails of Pupils Attending PSP Staff School, Heipang Campus

Figure 3 below presents the distribution of pupils examined for parasite cysts/ova across different age groups. Out of 100 children assessed, the majority were between 6–10 years (56 pupils), followed by those aged 1–5 years (39 pupils), while only a small number (5 pupils) were in the 11–15 years category.

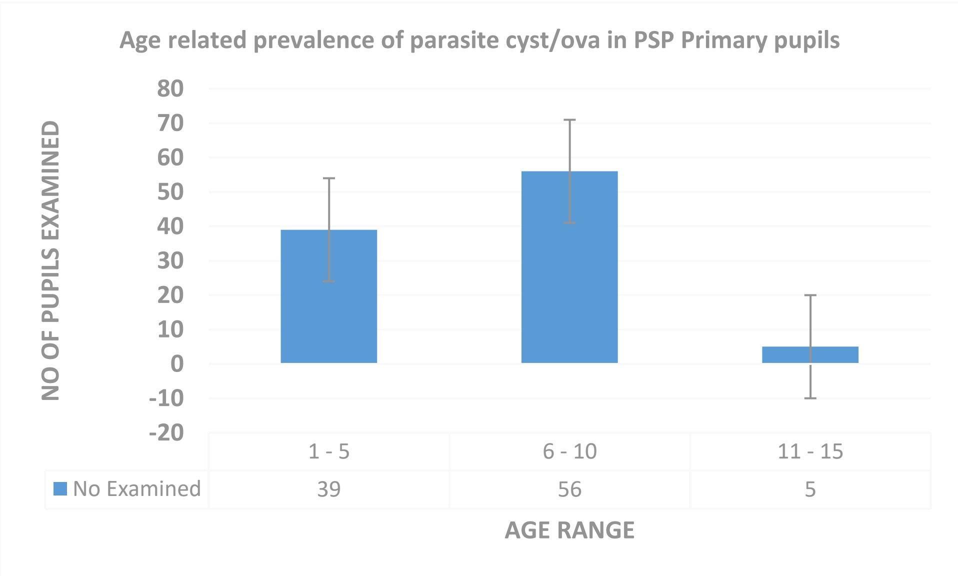

Figure 3: Age Related Prevalence of Intestinal Parasite cyst/ova in FAinger Nails of Pupils Attending PSP Staff School, Heipang Campus

Discussion

Results of analysis for the presence of parasite cysts/ova from the finger nail contents of 100 pupil reveals the presence of *Ascais lumbricoides*, *Schistosoma mansoni*, *Ancylostoma duodenale*, *Strongyloides stercoralis*, *Entamoeba histolytica* and *Gardia lamblia* as presented in Figure 1

Tedesse *et al.* (2019) analysed a total of 422 finger nail contents from primary school children attending Bamo no. 2 primary school, Adele town, East Arsi, Ethiopia and reported that 113 (27.1%) pupil were infected with at least one intestinal parasite or the other. The major helminthes identified were *A. lumbricoides* 50 (12.00%),*T. trichiura* (35 (8.4%), *Hymenolepsis nana* 13 (3.1%), and *Teania saginata* 12 (2.9%). On the other hand, the prevalence of protozoan identified were *Entamoeba histolytica* 43 (10.3%) and *Giardia lamblia* 31 (7.4%). Total prevalence of helminthic and protozoan infections were 110 (26.4%) and 74 (17.7%) respectively. Another study from Morang, a district of Saptari, Nepal reported 83.3% of stool Samples with helminth parasites in school children where *A. lumbricoides* (50.92%) was the most detected parasite followed by *Ancylostoma duodenale* (44.56%) and *Trichuris trichiura*, respectively (Yadav & Mahato, 2017).

Figure 2 is the result of sex related prevalence were out of the 50 male pupils examined 39 haboured different parasite cyst under their finger nails representing 78 % prevalence, while out of the 50 female pupils, 32 (64%) were contaminated with different parasites cyst/ova. This indicates that there is a higher prevalence of the cyst among male pupils ($P < 0.05$). Similar studies conducted by Chirdan *et al.* (2010) whom analyses 384 fingernail samples from children in different day care centers in Jos North, Plateau State, Nigeria indicated that 190 (49.2%) were male while 194 (50.8%) were female. Two hundred and twenty-three (57.8%) were found to have one or more intestinal parasites.

The outcome of this investigation is similar to the work carried out by Jameel *et al.* (2016) in Kurdistan Region were out of the 103 fingernail samples examined from children aged 6 to 12 years, 25.24% were contaminated with various parasites cyst. Other investigative works on parasites cyst/ova from finger nails of school children was that of Hosea *et al.* (2019) were out of the 200 finger nails samples among 4 primary school pupils in Markudi examined, 20 were infected with different parasites including *Ascaris lumbricoides*, *Ancylostoma duodenale* and *Strongyloides stercoralis*, with prevalence rates of 45%, 35%, 30% and 15% respectively.

Khanna *et al*. (2024) examined 253 school children in south India and identified intestinal parasites in 10 pupils out of the 253 (3.9%) with the highest incidence observed in the age group of 7–10 years (1.9%). The cysts of *Giardia lamblia* was the most prevalent (7.54%) followed by *Ascaris lumbricoides* and hookworm, each having a prevalence of 5.66% of the 253 students.

Intestinal parasitic infections particularly among primary age children in developing countries including Nigeria is increasingly becoming an issue of public health concern (Michael *et al*., 2017). Consequently, intestinal parasites are the leading cause of diarrhea which is transmitted through the oral- feacal route when children regularly play in contaminated soils, come into contact with infected toys/objects and also consume contaminated food with unwashed hands. Most of the diarrhoeal infections result in malnutrition, abnormal physical growth, and anaemia (Gupta *et al*., 2020).

Studies have shown that 60% (Wu & Lipner, 2020, Tedesse *et al.*, 2019 and Yahaya, & Tuku, 2017) of persons living in developing countries harbour intestinal parasites. In Nigeria the prevalence ranges from 12-60% (Yahaya, & Tuku, 2017) with rural areas having a higher prevalence. This high prevalence is as a result of several factors including lack of proper sanitation, indiscriminate open defecation, polluted water and climate suitability for parasite development and transmission (Chirdan *et al.,* 2010).

Close examination of the study site indicates that the environment at the time off this investigation was unkept and children defecate in the open very close to the playground. A number of the finger nails of pupils across all the age groups were not trimmed and appears to harbour dirt. An interaction with some randomly selected children they admitted to open defecation and eating food without washing their hands. These and many others as highlighted could promote the transmission of intestinal parasites among the pupils.

When children have untrimmed and dirty fingernails, they can easily pick up parasite eggs or cysts from contaminated surfaces. These parasites can then be ingested when the child touches their mouth or eats without washing their hands properly. Furthermore, untrimmed and contaminated fingernails can serve as a vehicle for transmitting parasites. When children touch contaminated surfaces or soil and then put their hands in their mouths, they risk ingesting parasite eggs or cysts. The occurrence of fingernail parasites among children in primary schools can cause chronic infections which can negatively affect all aspects of children's health, nutrition, cognitive development, learning and educational success and achievement.

CONCLUSION

The investigation revealed a high prevalence of fingernail parasites among pupils at Plateau State Polytechnic Staff School, highlighting a significant public health concern linked to poor sanitation and socio-economic conditions. To reduce transmission, strategies such as safe water provision, regular deworming, health education, hand hygiene, nail trimming, and wearing shoes are strongly recommended.

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