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PREVALENCE OF INTESTINAL HELMINTH INFECTIONS AMONG SCHOOL AGED CHILDREN IN ELELE, SOUTH-SOUTH NIGERIA

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ABSTRACT

A study on the prevalence of intestinal helminth infections, using stool samples of 396 school children comprising of 198 each male and female randomly selected from 50 households, was conducted in Elele, South-South Nigeria, between March and June, 2013. Their basic information like sex, age and drinking water source were collected using a self-administered questionnaire. The prevalence of intestinal helminth infection varied significantly among males (6.57%) and females (3.4%). Prevalence also varied significantly among various age groups, with age group 7-9 having highest infection of *Trichuris trichiura* (2.25%) while age group 4-6 had higher prevalence of *Strongyloides stercoralis* and *Taenia* sp. (1.65%). Children within age group 1-3 years had highest prevalence of *Ascaris lumbricoides* (2.38%) and finally children within age group 10-12 were with the highest prevalence rate of hookworm (1.96%). Similarly the people who drink stream water had higher prevalence values i.e. 2.27, 3.03, 3.03 and 1.52% for *S. stercoralis, A. lumbricoides, Taenia* sp. and hookworms, respectively. *T. trichiura* was absent in people who drink stream water while those who drink Sachet or table water had prevalence rate of 1.52%.

Key words: Children, helminths, Nigeria, parasites, prevalence

INTRODUCTION

Intestinal helminth infections are the most common infections that occur throughout the developing world (Agbolade *et al.,* 2004). Between 500 million to one billion people are estimated to be infected annually (Ekpenyong and Eyo, 2008). Worldwide estimates indicate that there are 280 million hookworm infected children, 478 million infected with *Ascaris lumbricoides* and 347 million infected with *Trichuris trichiura* (Michael *et al.,* 1997). The problem of parasitic diseases is compounded by socio-economic factors like illiteracy, poverty, poor sanitation, overcrowding, proximity with animals and lack of clean drinking water as well as socio-cultural practices in food sourcing and consumption (Chharba and Singla 2009). In sub-Saharan Africa alone, there are 41 million hookworm-infected school-age children (Albonico *et al.,* 2002). In Nigeria, the occurrence of human intestinal helminthiasis is high (Agbolade, *et al.,* 2007; Ekpo *et al.,* 2008). Ugbomoiko *et al.* (2009) reported an overall prevalence of ascariasis in 60% school-aged children in a certain community in southern Nigeria. Intestinal worm infections thrive in communities without better housing, sanitation, water supplies, health care, education and low income. In Nigeria, intestinal

helminth infections continue to prevail because of low living standards, poor environmental sanitation, and ignorance of simple health-promoting behaviour (Sufiyan *et al.,* 2011). The burden of disease associated with worm infection is enormous. School-age children (1-15 year age) harbour heavy intestinal parasites and thus are a good study group. This is the group most responsible for contaminating the environment and transmitting these infections (Albonico *et al.,* 2002). In view of the negative socio-economic 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 base-line data on the occurrence of parasitic infections in a particular area. The occurrence of intestinal helminth infections among school-aged children in Ikwere LGA of Rivers State, particularly in Elele, which is largely unreported, was our concern. Thus, the results of this study will be useful to both researchers and health authorities in diagnosis, planning and implementing control programmes for intestinal helminth infections in the area.

MATERIALS AND METHODS

Study area

The study was carried out in Elele, a town located in the South-South part of Nigeria with an average temperature of 26^{o}C. With a population of about 24,000 (NPC, 2006), the town is located in tropical rain forest of southern part of Nigeria with annual rainfall of about 1400-2000 mm along the longitude 6^{o}49'E and latitude 6^{o}19' North. The climate in Elele is characterized by two main seasons *viz.*, raining season (March to November with two peaks in July and September) and dry season (December to February). The rainy season is associated with the prevalence of moisture laden maritime South West trade wind from the Atlantic ocean. This season is also known for heavy thunder storms in this area. The dry season is influenced by dry wind blowing from the Mediterranean sea across Sahara desert and down to southern Nigeria. This also causes harmattan which produces the dry season in Elele and its environment (Brooker and Michael, 2000).

People of Elele are predominantly farmers with large families (6-25 people per household) living in multi-family houses. Farming is the major economic activity in Elele with yam, cassava and maize as the main agricultural products. Several fresh water habitats intersect the town and members of the community depend on streams and rivers for their water related activities. Many of the inhabitants lack good toilet facilities, so urination and defecation are sometimes done in the surrounding bushes and water bodies.

Sample collection and examination

Between March and June 2013, a total number of 396 school aged children (198 each males and females) were randomly selected in Elele community. Their stool samples were collected using suitable sized, clean and dry containers. The data on sex, age the type of drinking water source for every child were collected using a self administered questionnaire. Stool samples that were not examined immediately were emulsified in 10% formal saline and stored. Stool samples were taken to the laboratory for parasitological examination to view for motile parasites, cysts and ova of the parasites. Samples were subjected to wet mount using saline and sedimentation technique (Cheesbrough, 2004). The number of pupils infected with intestinal helminths and the type of intestinal helminths observed were recorded. Eggs, larval forms and segments of helminths found were identified visually using Cheesbrough (2004).

Differences in the prevalence of infection between sexes were determined using χ^2 tests while the other data collected were subjected to analysis of variance differences using SPSS version 21.

RESULTS AND DISCUSSION

The overall prevalence rate of intestinal helminths infection among school-aged children in Elele community was 5.05% (Table 1). The study showed that *Ascaris lumbricoides* had the highest prevalence (1.52%) followed by *Taenia* sp. (1.26%) while *Trichuris trichiura*, *Strongyloides stercoralis* and hookworm had lowest prevalence (0.76% each) (Table 1). There was a significant difference ($p<0.05$) in the prevalence of these parasites. The study also revealed that males had significantly higher prevalence of parasitic infection (6.57%) than females (3.54%).

Table 1: Sex wise distribution and prevalence of intestinal helminth infections among school-aged children in Elele community, Rivers State

Sex	Children examined (No.)	Prevalence (%)					
		Trichuris trichiura	*Strongyloides stercoralis*	*Taenia* sp.	*Ascaris lumbricoides*	Hookworm	Total infection
Male	198	1.01	1.52	1.52	1.52	1.01	6.57*
Female	198	0.51	0.00	1.01	1.52	0.50	3.54
Total	396	0.76	0.76	1.26	1.52*	1.26	5.05

*indicates statistical significance for the total percentages of parasites found, while ^{n}represents significant difference for total percentage parasites seen among different sex at $P_{0.05}$.

The children between the age group 7-9 years had highest prevalence of *T. trichiura* (2.38%) while those within the ages 4-6 and 10-12 years had zero infection of *T. trichiura*. Children between the ages 4-6 years had highest prevalence for *S. stercoralis* (1.65%) while children in age groups 1-3 and 10-12 years had zero infection with *S. stercoralis* (Table 2). *Taenia* sp. was most prevalent in children between the ages 4-6 year (1.19%). Children between the ages 1-3 years had the highest prevalence of *A. lumbricoides* (2.38%) and finally those between the ages 10-12 years had highest hookworm infection (1.96%) while those between the ages 1-3 and 7-9 years had zero infection with hookworm (Table 2). The differences between them was statistically significant ($p<0.05$). This study also reported the prevalence of helminth infections among children with respect to their source of drinking water. It showed that the children who drink sachet or table water had the highest prevalent of *T. trichiura* (1.52%) and those that drink pipe-borne water had the prevalence of 0.76% while those that drink stream water had no infection with *T. trichiura* (Table 3). The differences between them was statistically significant ($p<0.05$). Examination revealed that the children who drink stream water had highest prevalence of *S. stercoralis*, *Taenia sp.*, *A. lumbricoide* and hookworm of 2.27, 3.03, 3.03 and 1.52%, respectively. Those who drink pipe-borne water and sachet water had zero infection of *S. stercoralis*. Also those who drink sachet water had zero infection with hookworm. The differences between them was statistically significant ($p<0.05$).

The high prevalence of *A. lumbricoides* reported in this study could be attributed to the unhygienic habit of some children especially in developing area where some children have the habit

Table 2: Age distribution and prevalence of intestinal helminth infections among school-aged children in Elele community, Rivers State

Age (years)	Children examined (No.)	Prevalence (%)				
		Trichuris trichiura	*Strongyloides stercoralis*	*Taenia* sp.	*Ascaris lumbricoides*	Hookworm
1-3	84	1.19	0.00	1.19	2.38*	0.00
4-6	121	0.00	1.65*	1.65*	0.83	0.83
7-9	89	2.25*	1.12	1.12	2.25	0.00
10-12	102	0.00	0.00	0.98	0.98	1.96*
Total	396	0.76	0.76	1.26	1.52	0.76

*indicates statistical significance across the various age groups for different parasites at $P_{0.05}$

Table 3: Prevalence of helminth infections among school-age children in Elele community with respect to their drinking water sources

Drinking water Source	Children examined (No.)	Prevalence (%)				
		Trichuris trichiura	*Strongyloides stercoralis*	*Taenia* sp.	*Ascaris lumbricoides*	Hookworm
Pipe borne	132	0.76	0.00	0.76	1.52	0.76
Stream water	132	0.00	2.27*	3.03*	3.03*	1.52*
Sachet or table	132	1.52*	0.00	0.76	0.76	0.00
Total	396	0.76	0.76	1.26	1.77	0.76

*indicates statistical significance of various parasites with respects to the source of drinking water at $P_{0.05}$

of eating without properly cleaning their hands after playing in school. Ekpenyong and Eyo (2008) and Chukwuma *et al.* (2009) gave similar reports. Children in these categories also have the habit of picking and eating food like biscuits and sweets that fall on the ground during play.

Our findings showed that *T. trichiura* was more prevalent in children between the ages 7 and 9 years (Table 2). This concurs with the findings of Chukwuma *et al.* (2009) who reported more *T. trichiura* in children within the same age groups. *S. stercoralis* and *Taenia* sp., however, were more prevalent among the children of age group 4-6 years (Table 2) contrary to the reports of Widjana and Sutisna (2000) and Ndamukong *et al.* (2000) who reported that the worm burden of most intestinal helminth parasites increase as children moved to higher classes. It is understood that children within this age group are very active and have high tendencies of moving around, pick and eat most things and they lay their hands especially where there are little or no restrictions.

In present study, it was found that the children between age 1 and 3 years had highest prevalence of *A. lumbricoides* infections (Table 2) when compared with other age groups. This may be attributed to improperly developed immunity to parasitic infections at this age (Simon *et al.*, 2006). This observation was in line with those of Angyo *et al.* (1996) who recorded higher prevalence of parasite infections in younger children. This is not in the agreement with work of Ekpenyong and Eyo (2008) who found more *A. lumbricoides* in age little higher than what we got. Furthermore, older children (10-12 years old) had highest prevalence of hookworm (Table 2). This could be attributed to the changes in behaviour as one gets older (Mafiana *et al.*, 1998; Ekpenyong and Eyo, 2008).

As intestinal helminth infections are prevalent among children in Elele, the public health and economic implications of these findings should not be overlooked. Given the growing concern about the public health importance of intestinal helminth infections, chemotherapeutic control of intestinal helminth infections in children should also be undertaken especially in the rural areas.

Conclusion: As intestinal helminth infections are prevalent among the children in Elele, thus the public health and economic implications of these findings should not be overlooked. Given the growing concern about the public health importance of intestinal helminth infections, chemotherapeutic control of intestinal helminth infections in children should also be undertaken especially in the rural areas.

REFERENCES

Agbolade, O.M., Agu, N.C., Adesanya, O.O., Odejayi, A.O, Adigun, A.A, Adesanlu, E.B., Ogunleye, F.G., Sodimu, A.O., Adeshina, S.A., Bisiriyu, G.O., Omotoso, O.I. 2007. Intestinal helminthiases and schistosomiasis among school children in an urban center and some rural communities in southwest Nigeria. *Korean Journal of Parasitology;* **45**: 233-238.

Agbolade, O.M., Akinboye, D.O. and Awolaja, A. 2004. Intestinal helminthiasis and urinary schistosomiasis in some villages of Ijebu North, Ogun State, Nigeria. *African Journal of Biotechnology*, **3**: 206-209.

Albonico, M., Ramsan, M., Wright, V., Jape, K., Haji, H.J., Taylor, M., Savioli, L. and Bickle, Q. 2002. Soil-transmitted nematode infections and mebendazole treatment in Mafia Island school children. *Annals of Tropical Medicine and Parasitology*, **96**: 717-726.

Angyo, L.A., Pam, C.D. and Szlachetba. R. 1996. Clinical patterns and outcome in children with acute severe Plasmodium falciparum malaria at Jos University Teaching Hospital, Nigeria. *East African Medical Journal*, **73**: 823-826.

Brooker, S. and Michael, E. 2000. The potential of geographical information systems and remote sensing in the epidemiology and control of human helminth infections. *Advances in Parasitology*, **47**: 245-287.

Chhabra, M.B. and Singla, L.D. 2009. Food-borne parasitic zoonoses in India: Review of recent reports of human infections. *Journal of Veterinary Parasitology*, **23**: 103-110.

Cheesbrough, M. 2004. *District Laboratory Practices in Tropical Countries, Part 1*. Cambridge University Press, New York, USA.

Chukwuma, M.C., Ekejindu, I.M., Agbakoba, N.R., Ezeagwuna, D.A, Anaghalu, I.C. and Nwosu, D.C. 2009. The prevalence and risk factors of Geohelminth infections among primary school children in Ebenebe Town, Anambra State, Nigeria. *Middle-East Journal of Scientific Research*, **4:** 211-215.

Ekpenyong, E.A. and Eyo, J.E. 2008. Prevalence of intestinal helminths infections among schooling children in tropical semi-urban communities. *Animal Research International*, **5**: 804-810.

Ekpo, U.F., Odoemene, S.N., Mafiana, C.F. and Sam-Wobo, S.O. 2008. Helminthiasis and hygiene conditions of schools in Ikenne, Ogun State, Nigeria. *PLOS Neglected Tropical Disease*, **30**: 146-150.

Mafiana, C.F., Sodipe, M.B. and Koleoso, B.I. 1998. Soil transmitted helminth parasites of humans in a city in southwestern Nigeria. *Helminthologia*, **35**: 203-208.

Michael, E., Bundy, D.A., Hall, A., Savioli, L. and Montresor, A. 1997. This wormy world: Fifty years on the challenge of controlling common helminthiasis of humans today. *Parasitology Today*, **13**: 1-2.

Ndamukong, K.J., Ayuk, M.A., Dinga, J.S., Akenji, T.N. and Ndiforchu, V.A. 2000. The pattern of soil-transmitted nematode infections in primary school children of the Kumba Health District, South-West Cameroon. *African Journal of Health Science*, **7**: 103-106.

NPC. 2006. *Final Result of 2006 Population Census of Nigeria. Rivers State, Nigeria*. National Population Commission, Abuja, Nigeria.

Sufiyan, M.B., Sabitu, K. and Mande, A.T. 2011. Evaluation of the effectiveness of deworming and participatory hygiene education strategy in controlling anemia among children aged 6-15 years in Gadagau community, Giwa LGA, Kaduna, Nigeria. *Annals of African Medicine*, 10: 6-12.

Simon B., Archie C.A.C. and Don A.P.B. 2006. Global epidemiology, ecology and control of soil-transmitted helminth infections. *Advances in Parasitology*, 62: 221-261.

Ugbomoiko, U.S, Dalumo, V., Ofoezie, I.E. and Obiezue, R.N. 2009. Socio-environmental factors and ascariasis infection among school-aged children in Ilobu, Osun State, Nigeria. *Transactions of the Royal Society of Tropical Medicine and Hygiene*, **103:** 223-228.

Widjana, D.P. and P. Sutisna, 2000. Prevalence of soil-transmitted helminth infections in the rural population of Bali, Indonesia. *Southeast Asian Journal of Tropical Medicine and Public Health*, 31: 454-459.