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The Prevalence and Health Implications of the OVA of Human Intestinal Helminth Parasites Isolated from Faeces Collected near Students' Hostels, Federal Polytechnic, Idah, Kogi State, Nigeria

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Abstract: A survey of the immediate environment of students' hostels of Federal Polytechnic, Idah was carried out between the months of July and August, 2007. A total of one hundred human faecal samples obtained from 10 sites were examined parasitologically for ova of gastrointestinal helminth parasites. Of the 10 sites, 80% were positive for helminth parasites including *Ascaris lumbricoides*, hookworm, tapeworm, *Schistosoma mansoni*, *Strongyloides stercoralis*, *Trichuris trichiura*, *Fasciola* species and *Enterobius vermicularis*. The highest prevalence of infection (22.0%) was exhibited by *A lumbricoides* with Geometric Mean Intensity (GMI) of infection of 7.75 eggs per gram of faeces (epg) while the least prevalence (3.0%) was recorded for *T. trichiura* with intensity of 3.02 epg. The prevalence of helminth ova differ significantly (p<0.05) with the trend as *A. lumbricoides*>Hookworm>Tapewortm>*S. stercoralis*>*E. vermicularis*>*Fasciola* species>*S. mansoni*>*T. trichiura.* An overall prevalence of single infection of 26.0% was recorded while mixed infection of 54.0% was recorded. The proportion of mixed infections recorded for *A. lumbricoides* and hookworm; *S. stercoralis* and Tapeworm; *A .lumbricoides* and *Fasciola* species; Tapeworm and *A. lumbricoides*etc. were 5.0, 5.0, 4.0 and 3.0% respectively. A combination of three parasites per subject was also recorded in various proportions. The study showed relatively high prevalence and intensity as well as diversity of helminth parasites among the students and/or staff (community) of Federal Polytechnic, Idah and these have serious implications for control. The control strategies and intervention have been discussed in this study.

Key words: Prevalence, intensity, faeces, ova, helminth, parasite

INTRODUCTION

Indiscriminate defaecation around human habitations has serious health implications. It has been established that such low standard of sanitation, hygiene and poor socio-economic conditions are predisposing factors to infections and reinfections with gastrointestinal helminths (Greenberg, 1971; Crosskey and Lane, 1993; Onwuliri *et al*., 1993). Several helminth parasites have been implicated in causing morbidity in the lives of people worldwide (Ruprah *et al*., 1986). About five species of gastrointestinal trematodes, namely; *Ascaris lumbricoides*, hookworms (Ancylostoma and Necator), *Trichuris trichiura*, *Strongyloides stercoralis* and *Enterobius vermicularis* are highly prevalent in Africa and can easily be contracted through poor sanitation (Ukoli, 1990).

The large roundworms cause 65,000 deaths worldwide. *Ascaris lumbricoides* is one of the most widespread parasitic infections in the world, affecting over one billion people. The global prevalence of human hookworm infection on the other hand is greater than all other helminthic infections put together and it is categorized among the three most important parasitic infections viz; malaria, schistosomiasis and trypanosomiasis (Roberts *et al*., 1981). Hookworms are responsible for 60, 000 deaths annually. Prevalent rates of other nematode worms like *S. stercoralis T. trichiura* and *E. vermicularis* in any region vary considerably depending on the sanitary status and species of the causative agents (CDC, 2004).

Both *Taenia solium* and *T. saginata* are worldwide in distribution. The fact that the larval form (cysticercus) of *Taenia* species causes cysticercosis which accounts for about 50% of seizures or epilepsies in victims especially during their adult lives, in endemic areas (Medina *et al*., 1990; Shorvon *et al*., 1990; Garcia *et al*., 1991) has led to recognizing the disease a public health problem in America, Africa and Asia where in the last two decades, different control measures have been evaluated (Gemmell *et al*., 1983).

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Approximately, 100 million cases of taeniasis are reported annually (CDC, 2004). Of this figure, 50 million are due to *T. saginata* while the other 50 million are *T. solium* related (CDC, 2004).

According to Raso *et al.* (2004), multiple infections and their relationship to self-reported morbidity is an important phenomenon but neglected. McKenzie (2005) observed that even though polyparasitism is common in the world, it is seldom acknowledged. This reviewer reported that at 7 of the 11 study sites, more than half of the sampled population harboured a polyparasitic infection. The present research was aimed at determining the prevalence of gastrointestinal helminth parasites in the faeces defaecated around the students' hostels of the Federal Polytechnic, Idah. The baseline data would no doubt, be useful for necessary intervention against the spread of the diseases caused by these parasites.

MATERIALS AND METHODS

The collection of faecal samples was carried out daily between 6.30 and 8.30 am from around the students' hostels about 100-200 m away from the school structures. The study was conducted between the months of July and August, 2007 and the study environment was arbitrarily divided into sites (A to J) from where 10 samples each of human faeces were collected at a time and parasitologically analysed for the presence of helminth ova. The study area was divided into 10 sites in order to obtain a wide coverage of the entire area and to forestall duplication of samples. To further reduce the chances of duplicating samples from the same individual, all faecal samples taken from each site were freshly deposited and might not have been more than twelve hours old (Fashuyi, 1983).

Analysis of faecal samples: With the aid of an applicator stick, 2 g of faeces was emulsified in 10 mL of water in a centrifuge tube. Formol-ether technique was employed for the analysis. By this method, 10 mL of formal saline and 3 mL of ether were added to the sample, thoroughly shaken and centrifuged at 2,000 revolutions per minutes for 2 min. Carefully, everything was poured off except the deposits at the bottom of the tube which was transferred to the plane slide and viewed under ×10 objective of the microscope. The ova of helminth parasites were systematically sought for based on identification technique described by Soulsby (1982).

Statistical analysis: The prevalence data of the different helminth ova encountered were subjected to Analysis of Variance (ANOVA), using Duncan (1955)'s multiple range test to separate difference in variables.

RESULTS AND DISCUSSION

The ova and/or larvae of eight helminth parasites, namely *Ascaris lumbricoides*, Hookworm (Ancylostoma/Necator), *Schistosoma mansoni*, *Taenia* sp. (Tapeworm), *Fasciola* sp., *Enterobius vermicularis*, *Trichuris trichiura* and *Strongyloides stercoralis* were encountered and recorded in 80 out of the 100 faecal samples examined. This gave an overall prevalence of 80.0% for the occurrence of helminth infection in the deposited faeces. *Ascaris lumbricoides* had the highest prevalence of 22.0% while *Trichuris trichiura* had the least prevalence of 3.0% (Table 1).

The prevalence of helminth ova in the faeces differed significantly ($p<0.05$) with the trend as *A. lumbricoides*> Hookworm>Tapeworm>*S. stercoralis*>*E. vermicularis*> *Fasciola* sp.>*S. mansoni*>*T. trichiura*. The overall geometric mean intensity (gmi) of infection of helminth-positive stools showed that *A. lumbricoides* exhibited the highest intensity of 7.75 eggs per gram (epg) while *T. trichiura* had the least intensity of infection of 3.0 (epg) (Table 1).

The prevalence (%) of single infection with six species of helminth parasites and double or triple mixed infections recorded in the stools are shown in Table 2. A total of 26 (26.0%) stool samples were positive for single helminth parasites, belonging to six species out of a total of eight species isolated and predominated by *A. lumbricoides* (11.0%). Mixed infection with two and three helminth combinations were also observed in 54 (54.0%) of the stools. The occurrence of a pair of hookworm/tapeworm and that of three species, viz *A. lumbricoides*/*S. stercoralis*/Tapeworm (*Taenia* sp.) predominated in each respective combination (Table 2).

The present study has demonstrated a relatively high prevalence of helminth ova in human faeces deposited around the students' hostel environments in Federal Polytechnic, Idah, Kogi State, Nigeria. It has also revealed high level of indiscriminate defaecation out of toilets onto the soil around human habitations as a determinant of human gastrointestinal helminth infections and transmission among the community. This was mostly observed in site A which was a few metres away from the male/female hostels.

The 80% overall prevalence of helminth-positive stools recorded in this research is comparable to 90.2-96.3% reported by Fashuyi (1983) from Lagos, Nigeria. The lower prevalence in this study may be due to the lower population density in Idah than in Lagos metropolis. Again, the eight human infective helminth parasites encountered in this study, with the exception of *S. mansoni* and *Fasciola gigantica* are similar to those isolated by Onwuliri *et al.* (1993), more diversified than the three helminth parasites isolated by Fashuyi (1983). Some of the poor sanitary human behaviour that led to the

Table 1: Prevalence (%) and Intensity (Gmi) of Helminth eggs in each ten Human faecal samples obtained from sites around the Students' Hostels of Federal Polytechnic, Idah, and Kogi State

Sites	Samples No examined	*A. lumbricoides* (I) {II}(III)	Hookworm (I) (II) (III)	Tapeworm (I) (II) (III)	*Fasciola* sp. (I) (II) (III)	*S. mansoni* (I) (II) (III)	*S. stercoralis* (I) (II) (III)	*E. vermicularis* (I) (II) (III)
A	10	7 (70.0) 2.40	5 (50.0) 5.1	1 (10.0) 15.8	1 (10.0) 6.9	1 (10.0) 3.9	1 (10.0) 7.9	2 (20.0) 2.4
B	10	4 (40.0) 5.00	3 (30.0) 2.9	2 (20.0) 10.0	-	1 (10.0) 6.9	1 (10.0) 3.9	1 (10.0) 1.9
C	10	1 (10.0) 7.90	1 (10.0) 5.9	-	-	-	2 (20.0) 8.4	1 (10.0) 7.9
D	10	1 (10.0) 10.0	2 (20.0) 3.5	2 (20.0) 4.60	-	-	-	1 (10.0) 3.9
E	10	2 (20.0) 7.50	-	-	-	-	1 (10.0) 2.9	1 (10.0) 2.9
F	10	2 (20.0) 6.30	-	2 (20.0) 6.50	1 (10.0) 5.9	1 (10.0) 2.9	1 (10.0) 1.9	-
G	10	1 (10.0) 6.90	1 (10.0) 2.9	2 (20.0) 7.90	1 (10.0) 7.9	-	1 (10.0) 5.9	1 (10.0) 1.9
H	10	1 (10.0) 5.80	2 (20.0) 5.4	-	1 (10.0) 4.9	1 (10.0) 1.9	1 (10.0) 1.0	-
I	10	2 (20.0) 8.50	2 (20.0) 2.4	3 (30.0) 11.2	1 (10.0) 2.9	-	- - -	-
J	10	1 (10.0) 4.40	1 (10.0) 4.9	1 (10.0) 3.90	-	-	1 (10.0) 2.9	-
Total	100	22 (22.0) 7.80	17(17.0) 3.9	13 (13.0) 4.60	5 (5.0) 5.5	4 (4.0) 3.6	9 (9.0) 4.7	7 (7.0) 3.1

(I): No. +ve; (II): Prev. (%); (III): Gmi (epg)

Table 2: Number of positive cases and percentage prevalence of single infection (A) with six species of helminth parasites and (B) with mixed infections of the parasites

Classes	Helminth parasite combination	No. of positive stools	Prevalence (%)
A	*Ascaris lumbricoides*	11	11
	Hookworm	2	2
	Schistosoma mansoni	1	1
	Tapeworm	9	9
	Fasciola gigantica	2	2
	Enterobius vermicularis	1	1
	Total	26	26
B	**Mixed infections**		
	A. lumbricoides, Hookworm	5	5
	A. lumbricoides, Tapeworm	2	2
	A. lumbricoides, *S. mansoni*	2	2
	A. lumbricoides, *S. stercoralis*	2	2
	S. stercoralis, Tapeworm	5	5
	Hookworm, *S. stercoralis*	2	2
	E. vermicularis S. stercoralis	2	2
	A. lumbricoides, *F. gigantica*	5	5
	S. mansoni, *F. gigantica*	1	1
	Hookworm, *S. stercoralis*	2	2
	Hookworm, Tapeworm	4	4
	Tapeworm, *A. lumbricoides*	3	3
	A. lumbricoides, *E. vermicularis*	3	3
	A. lumbricoides, *S. stercoralis*	2	2
	S mansoni, *S. stercoralis*	1	1
	T. trichiura, *S. mansoni*	1	1
	A. lumbricoides, *T. trichiura*	1	1
	Tapeworm, *S. stercoralis* *A. lumbricoides*	2	2
	A. lumbricoides, Hookworm, Tapeworm	2	2
	A. lumbricoides, Hookworm *S. stercoralis*	2	2
	E. vermicularis, *A. lumbricoides* Hookworm	2	2
	E. vermicularis, *S. stercoralis* *T. trichiura*	1	1
	E. vermicularis, *S. mansoni* *A. lumbricoides*	1	1
	Tapeworm, *A. lumbricoides* *F. gigantica*	1	1
	Total (100 stools examined)	54	54

relatively high prevalence of ova of water-borne (*S. mansoni*, *Fasciola* sp.) and soil-transmitted helminth parasites like hookworms and *S. stercoralis* in faeces include bathing or washing in water bodies contaminated with cercariae (*S. mansoni*), consumption of poorly cooked vegetables contaminated with infective metacercariae (*Fasciola* sp.) and walking bare-foot (hookworm and *S. stercoralis*). The larval forms of *S. mansoni* (cercariae), hookworms and *S. stercoralis* gain entry into human system through the skin. Besides, filthy behaviours such as leaving food items uncovered to be visited by house flies could promote easy transmission of ova/larvae of such helminths as *T. trichiura* and *Ancylostoma* sp. (hookworm) (Greenberg, 1971; Crosskey and Lane, 1993).

The distribution of the helminth parasites in faecal samples collected from the different sites differed significantly ($p<0.05$) in terms of individuals of the species and diversity. This, expectedly might be due to differences in population densities and filthy human activities in different parts of the environment or sites. Four sites which attracted high densities of people almost on a daily basis were A, B, I and D which revealed the greatest densities and diversity of helminth ova. This could be due to the fact that freshly defaecated stools were always available at these sites, being closer to the students' residence.

The contaminatory behaviour (defaecation) was mainly exhibited by male students for no female was encountered during the study period. This was probably because females were more restricted and had higher sense of shyness in defaecating in the open. Only 26.0% of the stools collected were positive for single type of helminth ova, while 54.0% were positive for mixed infection. The value of multiple infections (54.0%) obtained in the present research was comparatively lower than that of Crosskey and Lane (1993) who recorded 80% in Lagos in similar study. This difference could be attributed to differences in geographical distribution of the helminth parasites, sanitary behaviour and population densities of the people. Generally, the higher polyparasitism recorded in this research than single infection quite agrees with the observation by McKenzie (2005) that this phenomenon is common and worldwide.

CONCLUSION

The study showed relatively high prevalence and intensity as well as diversity of helminth parasites among the students and/or staff (community) of the Federal Polytechnic, Idah and these have serious implications for control.

RECOMMENDATIONS

These are following recommendations:

- It is highly recommended that persuasive health education through mass media, on the hazard associated with defaecation out of toilets and also the need to erect and maintain toilets in strategic locations for public utility be undertaken by the government at all levels
- The management of the Institution (FPI) should ensure that adequate toilet facilities are put in place to reduce indiscriminate defaecation out of toilets
- Provision of adequate health education on aetiology and mode of transmission of the various gastrointestinal helminth parasites
- Use of efficacious chemotherapy for regular deworming- government should make allocation and institute a body to implement this since the majority of the victims of these helminth infections are poor and cannot afford the cost of effective drugs

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