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Geohelminth eggs in market soils in Benin-City, Nigeria

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ABSTRACT: A survey of soil transmitted helminthes (STH) in different markets of Benin City was carried out using the test-tube floatation method. A total of three hundred (300) samples from different sections of the markets were examined and 82 (27.33%) samples had various geohelminth eggs. The parasite prevalence rates were *Ascaris lumbricoides* (30.99%), *Necator americanus* (20.25%), *Trichuris trichuria* (16.12%), *Strongyloides stercoralis* (10.33%). The prevalence of these helminth eggs is attributed to indiscriminate disposal of faeces and refuse in and around the markets. The study re-emphasizes the need for public health enlightenment especially amongst women. In addition, the government should enforce proper waste disposal strategies and provision of public toilets in market places. This will go a long way to reduce or control helminth infections.

Key Words: Helminth parasites; Geohelminths; *Ascaris lumbricoides; Necator americanus; Strongyloides stercoralis; Trichuris trichuria*.

Introduction

Geohelminths are a group of helminth parasites which spend an essential part of their life-cycle in the soil. Fertilized eggs deposited in the soil develop rapidly and may reach the infective stage in a few weeks, depending on environmental conditions.

Infective eggs are thereafter transferred from soil to food. Such as vegetables, fruits and water, then into hands and finally the mouth.

Different species of soil transmitted helminthes infect humans especially in the tropics and sub-tropic, and some also occur in the developed world. The most common of the geo-helminths include *Ascans lumbricoides* (round worm). *Trichuris trichuria* (whip worm), *Necator americanus* and *Ancylostana duodenale* (hook-worm).

The WHO estimates that almost 2 billion people are infected with one or more of these soil transmitted helminthes according for up to 40% of the global morbidity from infectious diseases, exclusive of malaria.

These infections are prevalent in tropical and sub-tropical regions of Asia, especially China, India and sub-saharan Africa. Many studies in Nigeria have shown the prevalence of geohelminths to be high (Ogbe *et al*., 2002, Nock, *et al*., 2003, Fasunyi, 1983).

Epidemiological factors such as poor sanitation, poor personal hygiene, indiscriminate disposal of excreta, the use of night soil as soil fertilizer in the vegetable farms are important in the transmission of

geohelminths from one host to another and from the environment to a host. The objective of this study is to investigate the prevalence of geohelminth eggs in soils of market places in Benin City in order to ascertain the extent of soil contamination since exposed food items sold in the markets could become contaminated when they come in contact with market soils.

Soil – transmitted helminth (STH) infections are endemic in communities where poor environmental sanitation and poor personal hygiene are prevalent as found in the majority of developing countries.

In Nigeria, a considerable amount of human and animal waste is discharged into the soil daily, leading to the seeding of the soil with pathogenic organisms including geohelminth eggs and larvae (Fashuyi, 1983, Nock *et al*., 2003, Ogbe *et al*., 2002). Eggs in soil become the main source of infection, infection may be direct or indirect through secondary sources such as food, water, vegetables and fruits. Eggs and larvae of geohelminths may adhere to vegetables and fruits and then readily distributed in food markets.

Ascaris eggs were present on 1178 of 2750 items of vegetables sold in 40 Tokyo shops in Japan (Kobayashi, 1980). It has been observed that areas where raw sewage is used for agricultural irrigation that there is significantly higher prevalence of geohelminth like *Ascaris* and *Trichuris* infections when compared to areas where this was not a common practice. It also been observed that women are at a higher risk of geohelminthiasis when compared to men.

Geohelminth eggs in vegetables sold in the markets have been reported by Eneanya and Njom (2003) in Enugu state, Nigeria. They observed the contamination by helminthes of some, fruits and vegetables sold in markets in Nigeria with the vegetables being more contaminated than the fruits. The contamination of the fruits and vegetables occur in the farms and markets as they make contact with the soils.

Materials and Methods

Study Area

The study was conducted in three (3) local government areas in Benin City, capital of Edo State. Benin City lies between Latitude 6°17,N and Longitude 5°55, and 5°41,E. It lies in the rainforest and is characterized by an annual rainfall of 1850mm – 2445mm. The climate is tropical with a temperature range of between 29.0°C – 36.5°C.

The topography of Benin City is flat with few hills to the East and North East. There are two distinct tropical seasons; rainy season)April – October) and dry season (November – march). The soil is invariably compact laterite which becomes flooded after heavy rains.

Five markets located in Benin City were randomly selected for this study. Some of these markets have latrines although many were poorly maintained and so had sewage runoffs.

Collection and Examination of Soil Sample

Three hundred soil samples were collected from sections where leafy vegetables, fruits, meat, fish, livestock were sold in the markets and some areas around the latrines of these five markets within the months of August and October, 2004.

Using a clean garden trowel, about 10g of topsoil (a depth of about 2cm) was scooped into clean black polythene and labeled and then, taken to the laboratory for analysis. The test tube floatation method was adopted with saturated solution of sodium chlroride (NaCl) used as the floatation solution.

About 2g of each sample was placed in a test tube and distilled water was added. The soil was broken up, mixed and then stirred vigorously using a spatula for about one minute. The supernatant was decanted. The test-tube was refilled with water and the process was repeated until supernatant was clear.

Sufficient quantity of brine (floatation solution) was added to the test-tube. A cover slip was carefully placed over the top of the test-tube to make contact with the brine and allowed to stand for 10 to 20 minutes. The cover slip was then, carefully removed and the wet surface placed against the surface of a glass slide for microscopic examination. Eggs of geohelminths observed were identified by reference to Thienpont *et al*. (1979) and Soulsby (1982).

Results

Of the 300 samples examined from the five markets – New Benin, Ogida, Uselu, Oba and Ikpoba Hill markets, 82 (27.33%) samples were positive. A total of 242 helminth ova were recovered. The ova were those of *Ascaris lumbricoides* 75, (30.99%). *Trichuris trichuria* 39, (16.12%), *N. americanus* 49, (20.25%), *Strongyloides stercoralis* 25, 10.33%). *Toxocara canis* 12, (4.95%), *Heterakis sp.* 12, (4.95%), *Fasciola gigantica* 11, (4.5%), *Haemonchrus contortus* 11, (4.55%) and *Diphylidium caninum* 8, (3.31%), Fig. 1. Eggs of *Entamoeba hystolytica* and *E. coli* were also observed particularly in samples from toilet areas. Table 1 shows the prevalence of geohelminths in the five markets sampled.

Fig. 2 shows the prevalence of ova with respect to the sites of collection. The result shows slight contamination with geohelminth in meat and fish sections which could be accidental occurrence of these parasites (basically *Ascaris* and *Trichuris* eggs). Livestock sections were the most contaminated, with ova proportion of 35.95% (87) while fish section was the least contaminated with ova proportion of 1.65% (4).

The proportion of *Ascaris* ova recoveries 30.99% (75) and it emerged the most prevalent of all the geohelminths encountered, while *Diphylidium cannium* ova with 3.31% (8) proportion is the least prevalent and occurred exclusively in samples from dogs section (livestock section).

Discussion

This study showed that the prevalence of geohelminths eggs is fairly high in market soils in Benin City. *Ascaris lumbricoides, N. americanes* and *T. trichura* have the highest prevalence rate respectively. Given the fact that the adult stages of these worms reside in the intestine of man and domestic animals; the presence of the eggs in the soil is indicative of faecal pollution. This could be traced to the poor hygiene habits which is often associated with open air defecation and poor animal husbandry. In market where there were latrines, there was poor maintenance of the facility and so sewage runoff from the toilets further contaminate the soils.

The presence of helminth eggs in the soils is of public health significance since food items are at risk of contamination with these geohelminths.

There is therefore the need for increasing awareness for proper excreta and refuse disposal in our communities. The eggs of geohelminths observed in this study have been reported in several cities in Nigeria, this indicates wide epidemiological spread of these species.

Conclusion

Geohelminths are prevalent in Benin City. Effective health education should be re-emphasized and in the need for composing human night soil and animal dung before their use as fertilizers should be re-emphasized.

Proper handling of food items in market places should be advocated while good toilets should be built, and portable water should be provided in the markets and maintained by either the government or traders. The need to wash hands, fruits and vegetables thoroughly before eating should be emphasized.

Lastly indiscriminate disposal of faeces and refuse should be discouraged and accompanied by legislation and enforcement towards having and sustaining a clean and geohelminth-free environment.

References

Eneanya, C.I. and Njom, V.S. (2003). Geohelminths, contamination of some common fruits and vegetables in Enugu, South East Nigeria. Nig. J. Parasitol 24: 123-128.

Fashuyi, S.A. (1983). The prevalence of helminth eggs in human faeces deposited on the streets of Lagos. West African Medical Journal 2: 135-139.

Kobayashi, A. (1980). Studies on the mode of Ascaris infection in Japan. In collected papers on the control of soil-transmitted helminthiasis, Vol. 1, Tokyo: Asian Parasite Control Organization 109-118.

Table 1: Prevalence of geohelminth eggs recovered in the 5 markets surveyed.

Markets	**Total No. of samples examined**	**Total No. (%) of positive samples**	**IDENTITY AND PREVALENCE OF EGGS**									**TOTAL**
			Ascaris lumbriocoides eggs	*Trichuris trichuria* eggs	*Necator americanus* eggs	*Strongyloides stercoralis* eggs	*Toxacaracanis* eggs	*Heterakis sp.* eggs	*Fasciola gigantica* eggs	*Haemonhus contortus* eggs	*Diphylidium caninum* eggs	
New Benin	60	18(30.0%)	18(7.5%)	5(2.1%)	10(4.1%)	5(2.1%)	3(1.2%)	1(0.4%)	3(1.2%)	3(1.2%)	2(0.8%)	50
Ogida	60	22(36.7%)	13(5.4%)	5(2.1%)	14(5.8%)	7(2.9%)	5(2.1%)	3(1.2%)	5(2.1%)	4(1.7%)	3(1.2%)	59
Uselu	60	16(26.7%)	14(5.8%)	10(4.1%)	6(2.5%)	3(1.2%)	0(0.0%)	3(1.2%)	0(0.0%)	1(0.4%)	0(0.0%)	37
Oba	60	12(20.0%)	16(6.6%)	7(2.9%)	5(2.1%)	6(2.5%)	0(0.0%)	3(1.2%)	0(0.0%)	0(0.0%)	0(0.0%)	37
Ikpoba Hill	60	14(23.3%)	14(5.8%)	12(4.9%)	14(5.8%)	4(1.7%)	4(1.7%)	2(0.8%)	3(1.2%)	3(1.3%)	3(1.2%)	59
Total	**300**	**82(27.3%)**	**75**	**39**	**49**	**25**	**12**	**12**	**11**	**11**	**8**	**242**

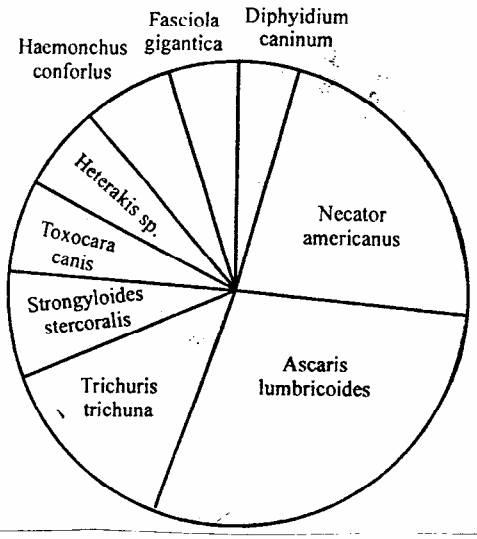

Fig. 1: Prevalence of Geohelminth eggs recovered in various markets.

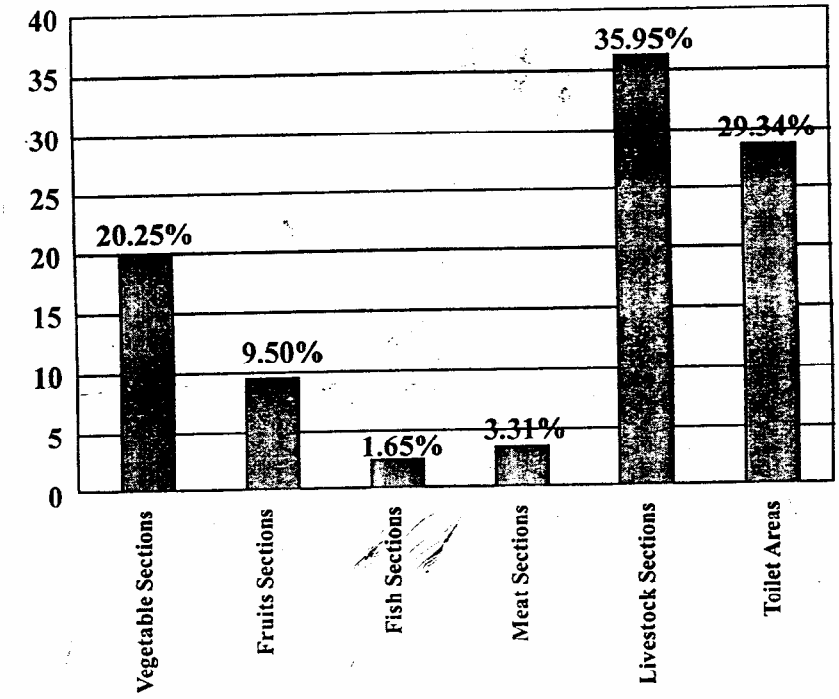

Fig. 2: Prevalence of Geohelminth eggs recovered in relation to site of collection in the markets.

Nock, I.H.; Duniya, D. and Galadima, M. (2003). Geohelminths eggs in the soil and stool of pupils in some primary schools in Samaru, Zaria. Nig. J. Parasitol; 24, 135-138.

Nock, I.H.; Duniya, D. and Galadima, M. (2003). Geohelminths eggs in the soil and stool of pupils in some primary schools in Samaru, Zaria. Nig. J. Parasitol: 24, 135-138.

Ogbe, M.G.; Edet, E.E. and Isichei, M.N. (2002). Intestinal helminth infections in primary school children in areas of operation in Shell Operation development Company of Nigeria (SPDC) Western Division in Delta State. Nig. J. Parasitol, 23: 3-10.

Soulsby, E.J.L. (1982). Helminthes, Arthropods and Protozoans of domesticated animals. Bailliers, Tindal and Casses. London (2nd edition, 824pp.

Thienpont, D.; Rochette, F. and Vanparijis, O.F.J. (1979). Diagnosising helminthiasis through corpological examination, Janssen Press, London, 187pp.