The Zoologist Vol. 7: 96-101 (2009)

GEOHELMINTH CONTAMINATION OF SOME COMMON FRUITS AND VEGETABLES SOLD IN ONITSHA URBAN, SOUTH-EAST, NIGERIA

***Ekwunife, C. A. and Akolisa, I. C.**
Department of Parasitology & Entomology, Nnamdi Azikiwe University, Awka, Anambra state, Nigeria.

Abstract
The level of contamination by helminths of some common fruits and vegetables sold in Onitsha markets was assessed between February and May, 2008. Fruits and vegetables were bought directly from rural farmers between the hours of 07:00 and 09:00hrs. Separately, each fruit and about 200gram of each type of vegetable was carefully washed in 200ml of distilled water. Formol-ether concentration technique was employed to concentrate the parasites. Fruits examined include *Carica papaya* (pawpaw), *Chrysophilum albidum* (local apple), *Psidium guajava* (guava), *Lycopersicum esculentum* (tomato); while vegetables examined were *Amaranthus cruentus* (green), *Telfaira occidentalis* (fluted pumpkin), *Talinium triangulare* (water leaf) and *Solanum macrocarpon* (garden egg leaves). Encountered parasites include; *Ascaris lumbricoides, Ancylostoma sp., Trichuris trichiura* eggs and larvae of *Strongyloides stercoralis* (also dog parasite). *Ascaris lumbricoides* (66.1%) was mostly encountered. Vegetables haboured more parasites (86.2%) than fruits (13.8%) and the difference was statistically significant ($p<0.05$). *Talinium triangulare* (water leaf) recorded the highest contamination rate of 27.7% while the fruit *Carica papaya* (pawpaw) haboured no parasite. *Entamoeba histolytica* was common in all the samples. Thorough washing of all fruits and vegetables before consumption is recommended among others.

Key words: Geohelminths, contamination, fruits, vegetables

Introduction

Soil transmitted helminths are referred to as geohelminths. These helminths complete a part of their life cycle in the soil after being extruded along with faeces. The most important soil transmitted helminths are *Ascaris lumbricoides, Trichuris trichiura, Ancylostoma sp., Toxocara canis* and *Toxocara catis* of dogs and cats respectively (WHO, 1987). Many studies in Nigeria have shown high prevalence of geohelminths among humans and their environment (Ejezie, 1981; Umoh *et al.*, 2001; Eneanya and Njom, 2003). The prevalence of these parasites are promoted by several epidemiological factors such as poor sanitation, poor personal hygiene, irrigation and various agricultural practices such as the use of night soil as fertilizer in the farm (Ejezie, 1981). Soils polluted with faecal materials are instrumental in the transmission of geohelminths. Here, fertilized eggs deposited in the soil develop rapidly to

***Corresponding author:**
E-mail: drchye@yahoo.com,

infective stage, depending on environmental conditions. Eggs are then transferred from soil to vegetables, to hands and finally to the mouth.

Fruits and leafy vegetables are common sources of vitamins, minerals and proteins, because they are relatively cheap. Many families depend on them to complement the protein intake from meat as the cost of meat has gone beyond the reach of many families in developing countries like Nigeria. However, if care is not taken, these cheap sources of vitamins, minerals and proteins could lead to poorer health if fruits and vegetables are ingested with ova or larvae of geohelminths. This could lead to more serious consequences. Reports on the pathological and other effects of these geohelminths abound (Ejezie, 1981; Ukoli, 1984; Stephenson, 1987; Haling, 1993; Umoh *et al.*, 2001; Asinobi *et al.*, 2007).

The vegetables and fruits brought to Onitsha urban (the study area) for sales are from rural areas. In such rural areas, most families and farmers still defeacate in the bushes around their houses and when at the farm, hence the standard of their personal hygiene are usually low.

This study was therefore carried out to determine the level of contamination of fruits and vegetables sold in Onitsha urban and to highlight the need for proper waste disposal facilities in the Onitsha area.

Materials and method

Study area

Onitsha is a large commercial city in Anambra State, Southeasterm, Nigeria. It is in Onitsha South Local Government Area, within latitude 6° 05'N and longitude 7° 05'. Onitsha is densely populated by people of different socio-economic status. The town is associated with River Niger, which flows down from The Futajalon Mountains. The climate is tropical with an average yearly rainfall of 2000mm, mean temperatures of 27.6°C in the wet season and 32°C in the hot season (Atlas, 1989).

Onitsha being a commercial center has so many markets. The Onitsha Main Market is acclaimed to be the largest in West Africa. Daily markets where food stuff are sold include Ose, Ochanja and Nkpor (a suburb of Onitsha) markets.

Observations and oral interview of the market women who deal on fruits and vegetables in Onitsha showed that these fruits and vegetables are brought into Onitsha by farmers at Otuocha, Obosi, Agulu, Ihiala, Oba and other small rural communities around Onitsha. They bring in these items for quick sales due to the large human population that reside in Onitsha. These items are mostly sold in the morning hours from 07:00 – 011:00hrs daily. Observations and oral interview also revealed that most rural farmers in the study area still use night soil as well as animal dung as fertilizer in the farm.

Sample collection and laboratory analysis

Fruits and leafy vegetables were purchased from these markets in the morning hours, between 07:00 and 09:00hrs, directly from the rural farmers. Fruit bought include *Carica papaya* (pawpaw), *Chrysophilum albidum* (local apple), *Lycopersicum esculentum* (tomato) and *Psidium guajava* (guava). The leafy vegetables were *Amaranthus cruentus* (green), *Telfeira occidentalis* (fluted pumpkin), *Talinuim triangulare* (water leaf) and *Solanum macrocarpon* (garden egg). The fruits and vegetables were transported in clean, labelled polythene bags to the Department of Parasitology and Entomology laboratory of Nnamdi Azikiwe University for examination.

About 200grams of each type of vegetable was carefully washed in 200ml of distilled water. Using clean basins, each fruit was washed in 200mls of distilled water. Each resulting

suspension was strained through a piece of double-layered cheesecloth, which filtered off sand particles but allowed the passage of helminth eggs and larvae. Each suspension was transferred to a clean specimen bottle and labeled. The filtrate was centrifuged at 2500rpm for one minute. Formol-ether Concentration Technique, as outlined by WHO (1991) and Ekwunife (2003) was employed for further analysis of the sediments. After processing with formalin and ether and the supernatant decanted, the sediments were agitated to form suspension with the remaining fluid on the sides of the tube. A drop of the suspension was transferred onto a clean slide for microscopic examination under a cover slip using the X10 and X40 objectives. The whole area under the cover slip was checked for eggs and larvae. The process was systematically repeated until the sediment in each centrifuge tube was exhausted.

Statistical analysis

Data collected were analysed using descriptive statistics. Variation in contamination by month was tested using chi-square while variation in contamination between vegetables and fruits was tested using Z score.

Results

Results showed that a total of 130 parasitic stages comprising 125 (77.7%) ova and 5 (22.3%) larva were encountered. The most frequently encountered ova was that of *A. lumbricoides*, 86(66.1%). Other encountered parasites are shown in Table 1. The vegetable *T. triangulare* recorded the highest contamination rate of 27.7%, while *S. marcrocarpon* (garden egg leaves) showed the least contamination among the vegetables. Among the fruits the *Chrysophilum albidum* (local apple), recorded the highest contamination of 8(6.2%) while *C. papaya* haboured no parasite (Table 1).

More parasites 33(28.9%), 34(29.8%) were recovered in February and March respectively than in the months of April 29 (25.4%) and May 17 (14.9%). This observed differences was not significant ($X^2_{cal} = 1.8$, $X^2_{tab} = 3.3$, df = 9, $p > 0.05$) (Table 2).

Vegetables haboured more parasites 114(86.2%) than fruits 16(13.8%) as shown in Tables 2 and 3. The Z score showed mean difference in contamination by vegetable and fruits. Thus the difference was significant ($Z_{tab} = 1.96$, $Z_{cal} = 3.01$, df = inf as $n_1 + n_2 = 30$, $p < 0.05$).

Discussion

Findings showed that our common vegetables are predisposed to contamination by geohelminths. Such contaminated vegetables and fruits have serious health implications, if eaten raw. Usually the garden egg fruits and leaves are eaten raw in local salad along with ingredients. Fruits like guava and *C. albidum* are often picked up from the ground when ripe and fallen. Such fruits are eaten, often after merely dusting-off the dirt with hands by most people. Health implications of the encountered parasites have been reported (Stephenson, 1987; Haling, 1993).

Table 1. Distribution of geohelminth ova and larvae recovered from the examined fruits and vegetables sold at Onitsha urban, Anambra State, Southeast, Nigeria

Vegetable /fruit	*A. lumbricoides* No. of ova	*T. trichiura* No. of ova (%)	*Ancylostoma sp.* No. of ova (%)	*S. stercoralis* No. of larvae (%)	Total (%) (%)
C. papaya	-	-	-	-	0(0)
C. albidum	7 (5.4)	-	1(0.8)	-	8(6.2)
P. guajava	4(3.1)	-	1(0.8)	-	5(3.8)
L. esculentus	3(2.3)	-	-	-	3(2.3)
A. cruentus	15(11.5)	5(3.8)	4(3.1)	2(1.5)	26(20.0)
T. occidentalis	16(12.3)	4(3.1)	6(4.6)	1(0.8)	27(20.8)
T. triangulare	23(19.2)	4(3.1)	8(6.2)	1(0.8)	36(27.7)
S. marcrocarpo	18(13.8)	2(1.5)	4(3.1)	1(0.8)	25(19.2)
Total	86(66.2)	15(11.5)	24(18.5)	5(3.8)	130(100)

Table 2. Monthly distribution of parasites recovered from the vegetables

Geohelminth	Months				Total
	February	March	April	May	
A. lumbricoides	20	21	19	12	72
T. trichiura	5	4	4	2	15
Ancylostoma sp.,	6	7	6	3	22
S. stercoralis	2	2	1	0	5
Total	33(28.9%)	34(29.8%)	29(25.4%)	17(14.9%)	114

Table 3. Monthly distribution of parasites recovered from the fruits

Geohelminth	Months				Total
	February	March	April	May	
A. lumbricoides	5	6	2	1	14
T. trichiura	0	0	0	0	0
Ancylostoma sp.,	2	0	0	0	2
S. stercoralis	0	0	0	0	0
Total	7	6	2	1	16

Eneanya and Njom (2003) have also reported that *A. lumbricoides* occur most frequently in common fruits and vegetables. The encountering of *S. stercoralis* deserves attention due to the fact that the parasite shows persistence in the environment and can also result to a zoonotic infection acquired from dogs. This species can cause a chronic persistent infection in man especially in compromised hosts (Liu and Weller, 1993).

That more parasites were recovered from the vegetables than the fruits could be due to the fact that fruit trees grow higher than the vegetables. It has been suggested that the low growth height of vegetables predispose them to contamination with geohelminth parasite stages during flooding and heavy rains splashes (Ayres *et al.*, 1980). This could also be the reason why *T. triangulare* which grow very close to the soil was the most contaminated. Due to the fact that vegetables are closer to the soil they also come in contact with contaminated water especially in sewage irrigation system.

The study has revealed the potential risk of contracting geohelminth infections through ingestion of unwashed fruits and improperly washed vegetables, especially those grown in environment where soil is polluted with faecal materials. Most rural farmers in the study area still use night soil as well as animal dung as fertilizer in the farm. Some still defecate in the bush around their houses and when at the farm. The risk may be more during dry season when vegetables need to be irrigated. Since both the fruits and vegetables were contaminated, consumers are advised to wash them properly before consumption. Thorough washing of these food items with salty water must be imbibed. Effective health education programmes should re-emphasize the need for composting of human night soil and animal dung before their use as fertilizers. Health education campaigns to emphasize the need for proper washing of vegetables is also necessary for hawkers of vegetable salad prepared with garden egg leaves.

References

Asinobi, C.O., Ibe, B.N., Nwoke, B.E.B., Ukaga, C.N., Nwankwo, C.F. (2007). Implications of malaria and intestinal parasitic co-infection among out-patients of a secondary health facility in Owerri, Nigeria. *Nig. J. Parasitol.*, 28(2):103-108.

Atlas of Anambra State of Nigeria (1989). Department of Land, Survey and Urban Development, Ministry of Works and Transport, Government Press Awka, pp.18.

Ayres, J.C., Mundt, J.O. and Sandine, W.E. (1980). *Microbiology of foods*. W.H. Freeman and Co. San Francisco. 198pp.

Ejezie, G.C. (1981). The parasitic diseases of school children in Lagos. *Acta. Tropica.*, 38: 79-84.

Ekwunife, C.A. (2003). *Diagnostic and Study Techniques in Schistosomiasis*. Klaax (Nig.) Ltd., Nigeria. 100pp.

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

Haling T. (1993). Ascariasis and childhood malnutrition. *Parasito.*, 107: 125-136.

Liu, L. and Weller, P.F. (1993). Srongyloidiasis and other intestinal nematode infections. *Infectious Diseases in Clinics of North America*, 7: 655-682.

Stephenson, L.S. (1987). *Impact of helminth infection on human nutrition.* Taylor and Francis, London, New York, Philadelphia, pp. 1-20.

Ukoli, F.M.A. (1984). *Introduction to Parasitology in Tropical Africa*. John Wiley and Sons Ltd. Chichester, 464pp.

Umoh, V.I., Okafo, C. and Galadima, M. (2001). Contamination by helminthes of vegetables

cultivated on land irrigated with urban waste water in Zaria and Kaduna, Nigeria. The Nig. J. Parasitol., 22(1&2): 95-104.

World Health Organization (1987). Ascariasis. W.H.O. Bulletin, 65: 579-588. N.C.

World Health Organization (1991). Basic laboratory methods in medical parasitology. W.H.O. Publications Geneva, 114pp.