Cibtech Journal of Bio-Protocols ISSN: 2319–3840 (Online)
An Online International Journal Available at http://www.cibtech.org/cjbp.htm
2012 Vol. 1 (1) May-August 2012, pp.37-43/Omowaye and Falola

Research Article

PREVALENCE OF HELMINTHIC AND PROTOZOAL CYST AND OVA ON VEGETABLES AND FRUITS SOLD IN MIDDLE-BELT NIGERIA

***Omowaye OS and Falola OO**
**Department of Biological Science, Kogi State UniversityAnyigba, Nigeria*
**Author for Correspondence*

ABSTRACT

In the course of a study of parasitic infections by cyst and ova on fruits and vegetable sold in middle-belt Nigeria, three different major public markets was selected. Six different fruits and vegetables total to 2426 samples were examined.

Data obtained were statistically analyzed using chi-squre (x^2) for the level of significance difference where appropriate. Of the 1755 fruits examined, 4.3% were positive for parasites ova and 2.5% for cysts. Of the 761 vegetyables examined, 4.6% were positive for parasites ova and 2.8% for cysts.The contamination rate of protozoan cyst and ova found are Giardia lamblia (2.61%) Entamoebs histolytica (0.66%). The difference was not statistically significant ($p>0.05$).Cases of contamination rate of protozoan cyst and ova were small compared to helminthic contamination.However helminths such as strongylodies stercoralis Trichiuris trachura and Ascaris lumbricoides were predominant in that order. The public health implication on the subjects is discussed. Through washing of all fruits and vegetables with clean water prior to consumption is recommended.

Key Words: *Contamination, Parasites,Vegetables, Fruits*

INTRODUCTION

Raw fruits and vegetables grown close to the soil may be contaminated with various food borne pathogens. Various factors contribute to increase in diseases associated with raw fruits and vegetables. They include globalization of food supply. Introduction of pathogens into new geographical areas through import, use of untreated waste water and manure as fertilizers for crop production, irrigation and various agronomic practices, level of hygiene of food handlers etc. Continued use of untreated wastewater and manure as fertilizer for the production of fruits and vegetables is a major contributing factor to contamination that causes numerous food-borne disease outbreaks. (James *and Ogochukwu* 2006).

Contaminations can occur on the field or orchards during harvesting, transporting, processing distribution and marketing or in the home. Also during post harvest handling including at points of preparation by street vendors, food service establishments and most irrigation water. Worldwide, parasites infect millions of people. In some regions, there are a major cause of childhood diarrhoea and stunting of growth and cause significant economic losses related to human health and to agriculture. The contamination of vegetables by parasites has long been established. Amongst the classes incriminated are Protozoa, Cestodes, Trematodes and Nematodes (Kogi et al., 1991, Umeche, 1991, and Okoronkwo, 2000)

This current research is therefore necessary to ascertain the prevalence and types of parasites found on vegetables and fruits in the study areas, and this will enable proffering solution to the consumers.

Study Area

The study areas covered are Anyigba (in Dekina Local Government Area), Bassa (in Bassa Local Government Area) and Dekina (in Dekina Local Government Area) of Kogi State.

Anyigba is located in the North-Eastern part of Egume Township. It lies approximately between longitude 7o36'N and latitude 7^o12'E and is bordered to the south by Ojikpadala, to the North by Odu-Iyale and to the west by Ogbabede township. It is densely populated and is a university township, residential as well as commercial centre.

Table 1: The Distribution of Helminths Cysts, Ova/Larvae on Fruits and Vegetables in the Study Areas

Fruits & Vegetables	Study Areas					
	Anyigba		**Bassa**		**Dekina**	
FRUITS	**Total Examined**	**No. (%) (+ve)**	**Total Examined**	**No. (%) (+ve)**	**Total Examined**	**No. (%) (+ve)**
Citrus Sinesis (Orange)	61	6(9.84)	15	0(0)	21	6(28.57)
Salanium melangena (Egg plant))	87	1(1.15)	141	12(8.51)	120	7(5.83)
Musa Sapietum (Banana)	149	26(1.75)	133	1(0.75)	51	6(11.76)
Abelmoschus esculentus (Okros)	120	2(1.673)	174	10(5.75)	120	10(8.33)
Lycopersium escalentum (Tomato)	50	4(8.00)	100	10(10.00)	101	6(6.94)
Piper nigrum (Black Pepper)	83	26(31.33)	68	13(19.12)	161	41(25.47)
VEGETABLE						
Allium cepa (Onion))	51	1(1. 96)	40	11(27.5)	100	7(7.00)
Telferira occidentals (Pumpkin Leaf	30	1(3.33)	30	0(0)	30	1(33.33)
Vernonia Species (Bitter leaf)	30	1(3.33)	30	13(43.33)	30	26(86.67)
Amaranthus cruentus (Green Vegetable	50	1(2.00)	50	- (0)	50	2(4.00)
Teinum trangulane (Water leaf)	50	0(0)	50	6(12)	50	4(8.00)
Corchorus olitorus (jute leaf}	-		30	0(0)	- -----	
TOTAL	761	70(72.89)	861	75(153.96)	834	116(225.9)

N.B. Number in Brackets indicate percent positive

Research Article

Table 2: The Distribution of Protozoan Cysts, Ova/Larvae on Fruits and Vegetables in the Study Areas

Fruits & Vegetables	Anyigba		Bass		Dekina	
FRUITS	**Total Examined**	**No. (+ve) (%)**	**Total Examined**	**No. (+ve) (%)**	**Total Examined**	**No. (+ve) (%)**
Citrus sinesis (Orange)	61	5(8.10)	15	6(40.00)	21	0(0)
Salanium melangena (Egg plant))	87	20(2.30)	141	0(0)	120	0(0)
Musa sapietum (Banana)	149	3(2.01)	133	7(5.26)	51	0(0)
Abelmoschus esculentus (Okros)	120	0(0)	174	5(2.87)	120	0(0)
Lycopersium escalentum (Tomato)	50	1(2.00)	100	0(0)	101	1(0.99)
Piper nigrum (Black Pepper)	83	1(1.21)	68	0(0)	161	1(0.62)
VEGETABLE						
Allium cepa (Onion))	51	1(1. 96)	40	30(0)	100	5(5.00)
Telferira occidentals (Pumpkin Leaf	30	1(3.33)	30	6(20:00)	30	0(0)
Vernonia Species (Bitter leaf)	30	0(0)	30	0(0)	30	5(16.67)
Amaranthus cruentus (Green Vegetable	50	1(2.00)	50	0(0)	50	0(0)
Teinum trangulane (Water leaf)	50	1(2.00)	50	0(0)	50	6(1.20)
Corchorus olitorus (jute leaf)		-	30	0(0)		- (0)
TOTAL	761	34(24.91)	861	24(68.13)	834	18(24.48)

Table 3: Showing Detection of Helminth Cysts, Ova/Larvae on Fruits and Vegetables in the Study Areas

Study Area	Total Examined	No. Positive	Odd Ratio (OR)	95% Cl on Odd, Ratio
Anyigba	761	78	0.61	0.096-0.096
Bassa	811	87	1.16	0.004-0.018
Dekina	834	132	0.51	0.007-0.023
Total	2406	227	.2.28	0.106-0.137

The market where the research is carried out is located at heart of the town itself. The markets operate on every five days and quite a number of people within the L.G.A. and environs patronize the market to make purchases.

Bassa Local Government having a population of 404,777 as at 1991 census projection for 2004 Simon Shaba Abu (2004) is situated along longitude 6^0 36'E and 7^0 30 'E and latitude 7^0 30' E and $8'05^0$ N and is bounded the east by Oganenigwu, on the west by Adavi, on the north by Ijumu L.G.A. and on the south by Dekina L.G.A. The local government is not very large compared to Dekina L.G.A. A great number of activities usually associated with most of the township go on in the local government. The sanitary condition of the environment is extremely poor, because majority of the inhabitants are farmers, artisan workers and traders. Farmlands are used as toilets, as there are few public and even private toilet systems in some areas. Some fishing activity also goes on there and at the end of the days work, the farmers take their bath at the banks of the river and wash their produce before taking to the market.

Dekina is located in the north-eastern part of Odu-Iyale township. It lies approximately between longitude $6^{0\ 36'E}$ and latitude 7^0 30'E and is bordered to the west by Ofu township, to the north by Bassa L.G.A. and to the south-east by Ankpa township. It is the headquarter home-town of Dekina L.G.A. the largest L.G.A. in Nigeria in term of land mass. It is sparsely populated and is residential and majority of the dwellers are local farmers and traders. There are old houses, most of which do not have soaker way pits and so the body wastes of the residents are discharged directly into the drain. The same drain or river, sellers of fruits, vegetables and crops wash them before taking them straight to the markets.

There are several ways in which parasitic infections are diagnosed in the laboratory:

Sample Collection

The fruits and vegetables were bought from the trader in these three markets the 006 to 11.00 hours in the morning. Fruits include *Carica papaya* (pawpaw), *Musa sapientum* (banana), *Lycopersieum esculentum* (tomato) and Citrus sinensis (orange). The vegetables are *Amarathanthus cruentus* (Green vegetable), *Telferiria occidentalis* (pumpkin leave), *Talinum triangulare* (water leaf) and jute leaf (*Corchorus olitoris*). The fruits and vegetables were collected into sterile, labelled polythene bags and transported to the laboratory for examination for helminth ova and larvae within 6 hours of collection.

Sample Processing

100g of each type of fruits and vegetable were washed in 360ml of distilled water. Each suspension was strained through a piece of double layered sieve, which filtered off coarse sandy particles but allowed the passage of helminth ova, cyst and larvae. The filtrate was centrifuged at 2500 rpm for one minute. The supernatants were poured off from the different tubes to leave only the sediment. The sediment from each tube was checked for helminth ova, cyst and larvae by the concentration technique as described by Cheesbrough(1998) was used for the identification of the ova and larvae observed.

Statistical Analysis

Chi-square (x^2) test was used to determine whether any relationship exists between geohelminthic ova/larvae and contamination of different fruits and vegetables, type of produce and location of markets.

As described by cheesbrough (1998), Umeche (1991) and Okwor, (2002) 100g of each type of fruits and vegetables will be washed in 360ml of distilled water. Each suspension will be strained through a piece of double layered sieve which filtered off coarse sandy particles but will allow the passage of helminth ova and larvae. The filtrate will be centrifuged at 2500mp for one minute. The supernatants will be poured off

from the different tubes to leave only the sediment. The sediment from each tube is checked for helminth ova and larvae by the concentration technique as described by cheesbrough will be used for the identification of ova and larvae observed.

RESULTS

Six different varieties of fruits comprising *Musa Sapietum* {banana}, *Lycoperscum esculentum* {tomato}, *Citrus sinensis* {orange}, *Salanaum melongena* {egg plant} *Abelomschus esculentus* (Okro) and *Piper nigrum* (pepper) were collected from markets.

Overall, a total of 1755 fruits varieties were examined see table 11.

Six different species of vegetables comprising *Amaranthus craentus* {green vegetables}, *Tellferira occidentalis* {pumpkin leaf}, *Teinum trangulare* {water leaf}, *vernoma* species {Bitter leaf}, *Allium cepa* {Onion}, and *Corchorus olitorus* (jute leaf) were collected from markets. Overall, a total of 671 vegetables species were examined.

Bassa market was considered the highest helmiths detection. It was more than two times more contaminated with helmiths cyst, ova and larvae compare to Dekina market in Dekina Local Government. (OR = 1.16, 95% CL=0. 003, 0.001). (Table 3)

The most contaminated source of protozoans was the Bassa market. When compare to Anyigba market, the level of contamination was more than two times. (OR = 1.17, 95% CL = 0.048)

DISCUSSIONS

The detection of helminth and protozoan cysts, ova/ larvae on fruits and vegetables in the three study areas, has a significant public health implication. Since occurrence of oocyst was not associated with seasonality and turbidity.Lorenza Putignani and Donato Menichella (2010), some of the vegetables and fruits are processed and eaten uncooked which could lead to infection and disease especially when served to the public.

Some of the fruits and vegetables are grown very close to the soil and prone to contamination, when eaten raw or uncooked. Beaver (1953) *Ascariasis and Gardiasis* diseases are among the commonest parasitic and infections in Bassa local Government with considerable morbidity in pregnant women, children and adults.

No helmith or protozoan cyst or ova were detected on *Corchorus olitoris* (jute leaf) examined probably because the smooth skins of the vegetable make it easy for the eggs to be washed off even with the slight washing which is usually done at the point harvest or prior to sale. Since the consumption of poorly washed vegetables is regarded as a major way for transmission of parasitic contamination. Wafa and AL-Megrin (2010)

In Anygba, *Solanium melongena* (egg plant) and *Piper nigrum* (peper) were the most contaminated because the leaf folds could retain some dirts which may not be easily remove by slight washing.Seo *et al* (1969) In Bassa, it was a case of *Lycopersicum esculentum* (tomatoes) and *solanium melongena* being the most contaminated table or ground. It was discovered that, the market environment is not hygenice enough and sanitary activities was too poor.

Dekina recorded a case of *Solanium melongena* (egg plant) and *Piper nigrum* (peper) as the most contaminated fruits. In all it was discovered that fruits were more contaminated than vegetables. The study has revealed a non-significant higher contamination rate of the fruits than the vegetables (P> 0. 05). This observation could be attributed to the fact that except orange and banana, the rest fruits considered were fruits- vegetable. And these were grown closer to the soil-when compared with the fruit, which are higher above the soil. This finding corroborates the work of kraft (1962). Which reported that the low growth height of vegetables above soil level predisposes them to contamination with geohelminth parasite ova during flooding and heavy rain splashing? Also, the leaf folds of vegetables could retain some *dirts* which may not be easily removed by slight washing. More still, the smooth skins of the *Corchrous olitoris* (jute leaf) and other less contaminated fruits make it easy for the ova and larvae to be washed off even with slight washing.

Allium cepa (onion) was the most contaminated of the vegetables (15.69%) followed by the *Telferira occidentialis* (pumpkin leaf) (6.67%) in Anyigba, in Bassa both vernonia species (Bitter leaf) (43.33%) and *Allium cepa* (32.5%) were the most contaminated among others. while in Dekina; *Vernonia* species (36.67%) and *Allium cepa* (15. 00%) were the most contaminated among other vegetables . the high contamination rates observed in these vegetables could be explained by their rough skins because the leaf folds could retain some dirts which may not be easily remove by slight washing by the sellers and street hawkers/ renders.

Citrus sinensis was the most contaminated of the fruits (40.0%) followed by *piper nigrum* (27.94%) and egg plant (29.89) were the highest among other fruits. The high contamination rates could be attributed to the fact that the shades provided by the orange trees create a conducive atmosphere for indiscriminate defecation by some infected inhabitants of the communities where these fruits were harvested. Consequently, the fruits are contaminated.

The major protozoa infection highest was that of *Entanoeba hisiolytica and G. lamblia.* This will result too many case of entamoebiasis and gardiasis in the study of areas. As reported that fresh vegetables can be agents of transmission of protozoan cysts helminths egg and larvae Amal Khalifa Abongrain *et al* (2009)

The finding revealed, that helmithic parasites cyst/oval is more than protozoan parasites cyst/ova. Hence the rate of infection with intestinal helminthes generally is high among people living in dirty environments.

Strongiloides stercoralis larvae, which can cause a chronic persistent infection in man especially in compromised hosts. Was detected on majority of the fruits. These are piper nigrum, *Musa saplientum, and Citrus sinesis and Allium cepa.*

The detection of *Ascaris. lumbricoiudes* on some fruit s may promote childhood malnutrition and referred childhood growth Haling (1993). Also Beaver (1953) had reported that among the geohelminths, *Ascaris lumbricoides* is the most frequently encountered because the eggs are highly persistent in the environment.

Another common helminthes was *trichuris trichura* on fruits majorly, which has been incriminated in growth stunting even in moderately severe infections.

Contamination refers in different markets show that Anyigba market had the highest rate of 15.07% followed by Dekina market with 11:93%. The differences in contamination of fruits and vegetables among the three markets could be attributed to population increase of local sellers bring their produce to Anyigba market. Majority of these produce are being brought from sources of poor sanitary conditions and weather of the areas, although the differences were not statistically significant. Dekina market the second highest and Anyigba the highest rate enjoys a cool environment and a temperature that favour parasite ova and larvae to thrive the temperature between 22^0C and 23^0C favours the development of *T. trichiura* as well as hookworm Spp.

The filthy environment and refuse heaps constitute means of contamination of fruits and vegetables even at the point of sale where these edible products are displayed. Flies can mechanically transfer parasites cyst and ova from dirt's to already display products.

CONCLUSIONS

This study has shown the potential risk of contracting helminth and protozoan infection through ingestion of unwashed, undercooked, raw/uncooked fruit and vegetables buy in the market.

These contaminations ranged from one factor to the other such as poor sanitary environment of the market, unhygienic transportation of the produce to market.

A well articulated health educational programmed with emphasis on personal and community responsibility a making the environment ecologically uncondusive from the breeding and spread of the vectors of the parasites could form a subject of preaching in the church.

Orientation and educational planning should be given to sellers and farmers of fruits and vegetables the need of sanitation and cleaning of their container to be free from parasitic contamination, formites to be sterilized

REFERENCES

Al-Megrin A and Wafa AI (2010). *International Journal of Tropical Medicine* **5(**2) 20-23.

Amal Khalifa Abougrain, Mohaamed Hadi Nahaisi, Nuri Sahli Madi Mohamed Mohamed Saied, Khalifa Sifaw Ghenghesh (2010). *Journal homepage; www.elsevier.com /locate/foodcont*

Beaver, Jung PC and Cupp EU (1983). Beaver PC (1953). *Control of Soil Transmitted Helminthes.* ***A*m J. Trop Protozoans, and Helminthes (1982).** In: *Biology and Class-Fication Clinical Parasitology* edited by Beaver, Jung PC and Cupp EU **9** 124-128.

Cheesbrought M (1998). Diseases In: District Laboratory Practice rin Tropical Countries Low Price Edition. Cheesbrough M (Edition). Cambridge University Press United Kingdom 185-300.

Haling T (1983). Ascariasis and Childhood Malnutrition. *Parasitology* **107** 125-136.

James IM and Ogochukwu O (2006). Food-borne disease outbreaks. *Journal of Environmental Health* **3** 2-3.

Kogi E, Umoh JU and Vajime CG (1991). Intestinal Parasites and Gastroenteritis among Patient Attending University Clinic Samaru Zaria Nigeria. *The Nigeria Journal of Parasitology* **12** 77-80.

Kraft AA, Synder HE and Walter HW (1962). Chemical and Biological hazards in food Lowa state University Press Ames 226.

Lorenza Putignani and Donato Menichella (2010). Interdisciplinaryy perspectives on Infection Diseases. Hindwi Publishing Corporation.

Okoronkwo MO (2000). Detection and Enumeration of Parasitic Eggs in Irrigated Vegetables and Salad Crops in Plateau State Nigeria. *Journal of Medical Laboratory Science* **9** 30-36.

Okwor KD (2002). Recovery of Ova and Cysts from the Vegetable and Fruits Sold in Tudun-Wada Zaria A Project Thesis Submitted to the Medical Laboratory Science Council of Nigeria.

Simon Shaba Abu (2004). The Niger migrant changing phases of Bassa Society Book Record on History of Bassa.

Seo BS, RM, HJ, LOH, IK and LEE SH (1969). Study on the status of helminthic infections in Korea. *Journal of Parasitology* **7** 53-70.

Umeche N (1991). Parasite Ova and Cysts on Fruits Sold in Calabar, Nigeria. *The Nigerian Journal of Parasitology* **12** 85-87.