Global Journal of Medical research
Volume 11 Issue 1 Version 1.0 May 2011
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 0975-5888

Parasitic Contamination of Fresh Vegetables Sold in Jos Markets

By Ojemudia Theophilus Idahosa
National Veterinary Research Institute (NVRI), Vom, Plateau State, Nigeria

Abstracts - Common vegetables brought for sale in market within Jos South Local Government Area of Plateau State were screened for human parasites in Federal College of Veterinary and Medical Laboratory Technology (FCVMLT), Vom, Plateau State. Four hundred (400) samples of eight different vegetable types such as cabbage, lettuce, carrot, spinach, pumpkin, garden egg, tomatoes, and waterleaf were obtained in five different markets of the Local Government Area and screened using centrifugation method. Cysts, ova and larvae of intestinal protozoa, cestodes and nematodes were recovered. 225 (56.25%) of the samples were positive for different species of parasites. 5 (2.0%) were cysts of Entamoeba coli, 10 (4.0%) were Entamoiba histolytica, 2 (0.8%) were Hymenolepis nana, 5 (2.%) were Trichuris trichiura, 6 (2.4%) were Ascaris lumbricoides, 70 (28.2%) were Hookworm species and 150 (60.4%) were Strongyloides stercoralis. S. stercoralis with 60.4% of the positive cases has the highest occurrence, while H.nana with0.8% has the least occurrence. The study also showed that water-leaf with 90% infection rates has the highest parasitic load, while garden egg with 15% has the least load of parasites. Lettuce was found tohave the highest multiple parasitic contamination of six (6), were as carrot and garden egg had the least multiple parasites of two (2). None of the vegetables had single parasitic contamination. In view of these findings there is an indication that human parasites can be acquired through the consumption of thesevegetables, especially when not properly and hygienically prepare before consumption.

Keywords: *Vegetables, Markets, Parasites, Infection, centrifugation.*

GJMR-B Classification: *WC 900*

Strictly as per the compliance and regulations of:

Parasitic Contamination of Fresh Vegetables Sold in Jos Markets.

Ojemudia Theophilus Idahosa

Abstract : Common vegetables brought for sale in market within Jos South Local Government Area of Plateau State were screened for human parasites in Federal College of Veterinary and Medical Laboratory Technology (FCVMLT), Vom, Plateau State. Four hundred (400) samples of eight different vegetable types such as cabbage, lettuce, carrot, spinach, pumpkin, garden egg, tomatoes, and waterleaf were obtained in five different markets of the Local Government Area and screened using centrifugation method. Cysts, ova and larvae of intestinal protozoa, cestodes and nematodes were recovered. 225 (56.25%) of the samples were positive for different species of parasites. 5 (2.0%) were cysts of *Entamoeba coli*, 10 (4.0%) were *Entamoiba histolytica*, 2 (0.8%) were *Hymenolepis nana*, 5 (2.0%) were *Trichuris trichiura*, 6 (2.4%) were *Ascaris lumbricoides*, 70 (28.2%) were Hookworm species and 150 (60.4%) were *Strongyloides stercoralis*. *S. stercoralis* with 60.4% of the positive cases has the highest occurrence, while *H.nana* with 0.8% has the least occurrence. The study also showed that water-leaf with 90% infection rates has the highest parasitic load, while garden egg with 15% has the least load of parasites. Lettuce was found to have the highest multiple parasitic contamination of six (6), were as carrot and garden egg had the least multiple parasites of two (2). None of the vegetables had single parasitic contamination. In view of these findings there is an indication that human parasites can be acquired through the consumption of these vegetables, especially when not properly and hygienically prepare before consumption

Keywords: *Vegetables, Markets, Parasites, Infection, centrifugation.*

I. Introduction

Vegetables are essential for good hearth, and they form a major component of human diet in every family. They are vital energy contributors that are depended upon by all levels of human as food supplement or nutrient (Duckworth *et al*, 1996). They substantially improve food quality and have high water content as seen in lettuce and cabbage. Many vegetables are good sources of vitamin C, carotene and mineral elements such as iron, and vitamins including thiamine (Vitamin B12), Niacin and Riboflavin. (Frazier and West hoff, 1998).

The cultivation of vegetables in many parts of the word has been amplified with the application of fertilizer and or manure. In Africa, the transmission of intestinal parasitic infection has been considered to increase successfully due to the frequent use of untreated human or animal dung as manure in cultivation by the local farmers, which serves as a source of enhancement of zoonotic parasitic infection. (Luka et al.,2000). Consumption of raw or unhygienically prepared vegetables such as cabbage (*Brassica deracea)*, lettuce, okra, garden egg (*Sdanum macropium*), cucumber, carrot (*Daurus carota*), water leaf (*Talinum trangulare*), pumpkin (*Telfairia*), spinach, tomatoes (*Lycoperisicon esculentum*), etc, is considered to be a risk factor for human parasitic infections (Chessbrough, 1991).

The cultivation of vegetables for commercial and domestic purposes in Nigeria is mostly carried out by peasant farmers depend on irrigation or natural rainfall (Luca, et al 2000). These vegetables though seasonal, are cultivated in the same piece of land every year. As a result of this continuous land usage there is depletion of nutrient hence the need for fertilizer or manure. Most farmers use untreated animals and human faeses as manure, which are known to contain various species of parasites that are of medical and veterinary importance. (Okoronkwo,1998). Indiscriminate faecal disposition in bushes, farm lands and even in present farms with a belief of enriching the lands is also a common practice by farmers and unlearned citizens. Some of the water bodies used for irrigation are also polluted with parasites infected excreta, that could lead to recycling of infection (Ayer, et al; 1992).

Altekruse, (1997), reported that the potential risks factors for human intestinal parasitic infection, viz; *Ascaris lumbericoides*, *Trichuris trichuria*, *Ancylostoma duodenale*, *Necator americanus*, *Balantidium coli*, *Giardia intestinalis*, *Blastocystic hominis* involve unhygienic associations with unhygienic environment.

II. Material and Methods

a) Study area

The study was conducted in Jos South Local Government Area of Plateau State during dry season; between February and April. Vegetable samples were collected from markets in the Local Government Area. Majority of the inhabitants of the area are peasant farmers and petty traders of low economic status. The watering of vegetable at this period is through irrigation. It is a common practice that majority of the farmers use human and animal manures to augment the

About: *Parasitology Department, Federal College of Veterinary and Medical Laboratory Technology (FCVMLT), National Veterinary Research Institute (NVRI), Vom, Plateau State, Nigeria.*

commercially processed fertilizer to limit their cost of farming.

b) Sample collection

The vegetables screened were cabbage *(Brassica oleracea),* lettuce (*Lactuva sativa*), carrot *(Daurus carota),* Garden egg *(Solanum macropium),* Tomatoes *(Lycoperisicon esculentum),* Pumpkin *(Telfairia),* water – leaf *(Talinum trangulare)* and spinach *(Ayer, et al; 1992).*

They were randomly collected in batches of 50 per markets in the L.G.A, and wrapped in clean polythene bags and labeled. A total of 400 samples of vegetables of the eight different types were assayed. The market places from where samples were collected include; Bukuru main market, Sabo-barki market, sukwa market, Vom market and Zawan market, all in Jos south LGA.

c) Screening procedure:

The screening of vegetable samples was carried out in the Parasitology Laboratory of the Federal College of Veterinary and Medical Laboratory Technology (FCVMLT), National Veterinary Research Institute, Vom, Plateau State.

The samples were washed with formol saline according to their batches in 100 ml round bottom clean plastic container. These were allowed to stand on the bench for one hour to allow time for proper sedimentation. The supernatant was discarded with a Pasteur pipette leaving about 15ml at the bottom. 10ml of the deposit mixture was transferred into a centrifuge tube and spun for five minutes at 3,000 rpm. The supernatant was decanted while the deposit was resuspended with 10% formal saline. This was centrifuged, the supernatant was decanted and the deposit was then transferred to a clean glass slide. A drop of iodine was added to stain the cysts, it was then covered with a cover slip avoiding air bubbles and over floating. 10* and 40* objectives were used for examination.

III. Results

Out of the 400 samples of the eight types of vegetables, 213 were positive for intestinal parasite with a percentage of 56.25. The parasites encountered include some species of protozoa, cestode and nematodes. The protozoa parasites are *Entamoeber histolytica* and *Entamoeber coli,* the cestode *is Hymenolepis nana,* and the nematodes are *Ascaris lumbricoides, Trichuris trichiura,* Hookworm and *Strongyloides stercoralis.*

Table 1, shows the intensity of contamination in different markets; the highest intensity of 61(76%) positive cases occurred in Sabobariki market, while the lowest intensity of 23(28.75%) occurred in Sukwa market. Table 11, shows the parasitic contamination of different vegetable; where Lettuce was found to have the highest poly-parasitic contamination of five species of parasites, whereas Garden egg and Carrot showed the least poly-parasitic contamination of two parasites. Table 111, shows the rate of infection of each vegetable sample. Water leaf shows the highest contamination rate of 90%, while garden egg is the least contaminated vegetable with a percentage of 30%. Figure 1: represent the frequency of occurrence of parasites; *Strongyloides stercoralis* has the highest occurrence while *Hymenolepis nana* shows the least occurrence on various vegetable types.

Out of 248 parasitic occurrences, 15 were protozoa, 233 were nematodes, while 1 was cestode. This work also revealed poly-parasitic contamination of some of the samples which makes them vehicles for multiple parasitic infections.

Table 1: Intensity *of contamination in different markets*

Markets	Number of vegetable types screened	Number contaminated	Percentage contamination
Bukuru	80	46	57.50%
Sabobariki	80	61	76.25%
Vom	80	37	46.25%
Zawan	80	58	72.50%
Sukwa	80	23	28.75%
Total	400	225	56.25%

Table 2 : Contamination on different vegetable

Parasites	C	L	C2	S	G egg	P	T	Wl
Entamoeba histolytica	+	+	-	-	+	-	+	-
Entamoeba coli	+	+	-	+	+	-	-	-
Hookworm	+	+	+	+	-	+	+	+
Ascaris lumbricoides	-	+	-	+	-	+	-	-
Strongyloides stercoralis	+	+	+	+	-	+	+	+
Trichuris trichiura	+	-	-	+	-	-	-	+
Hymenolepis nana	-	+	-	-	-	-	-	-

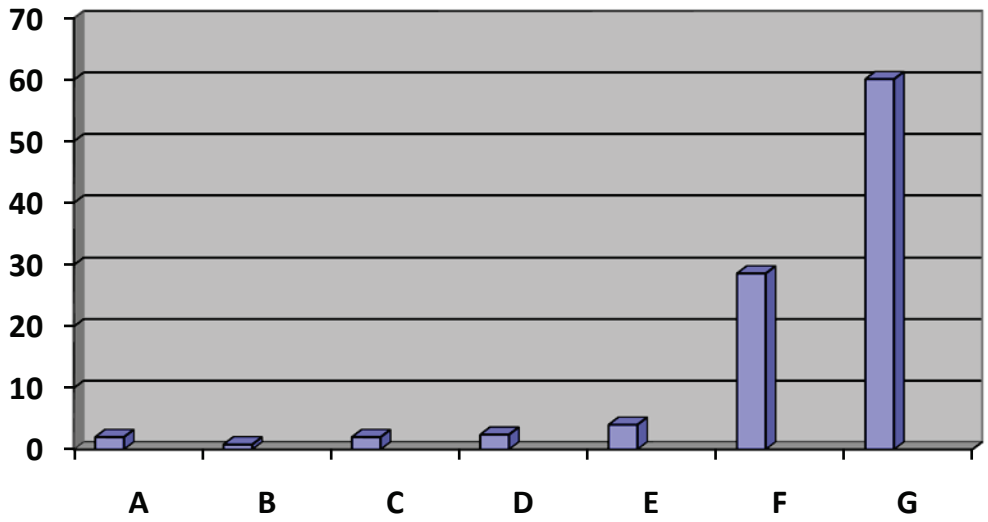
Key. C=Cabbage, L=Lettuce, C2=Carrot, S=Spinach, G=Garden egg, P=Pumpkin, T=Tomato, Wl= Waterleaf

Table 3 : Contamination rate

Types of vegetable	NE	NP and overall %	PS(%)
Cabbage	50	25(6.3)	50
Lettuce	50	30(7.5)	60
Carrot	50	20(5.0)	40
Spinach	50	40(10.0)	80
Garden egg	50	15(3.8)	30
Pumpkin	50	20(5.0)	40
Tomatoes	50	18(4.5)	36
Water leaf	50	45(11.3)	90
Total	400	213(53.3%)	426

NE: Number Examined. NP: Number Positive. PS: Positive Specificity
X/y*100/1. (Y= number of samples per specimen. X= number of positive cases)

Fig: 1: Frequency of occurrence



A: *Entamoeba col,* B: *Hymenolepes nana*, C: *Trichuris trichiura*, D: *Entamoeba histolytica*, E: *Ascaris lumbricoides* F: Hookworm, G: *Strongyloides stercoralis*,

IV. Discussionl

The presence of intestinal parasites in vegetable samples is suggestive of faecal contamination. The trend of parasitic infection in our society as reported through routine diagnosis is partly a factor of vegetables being sources of transmition. The following factors have contributed to the prevalence of parasitic infection and have also confirm the discovery by Heyneman Donald, (1995);

Hygienic status of the consumers and producers, vegetables being adequately harboring the infective forms of the parasites, the behavioral attitude of producers in application of untreated human and animal dung as manure leading to the transmition of zoonotic infection, the use of irrigation source which receives raw affluent from human or animal wastes.

The consumption of vegetables raw or undercooked is a way by which the transmition of these parasites is encouraged. This is true with the believe that the consumption of raw or undercooked vegetables give more nutrient. Hedberg C. W. (1994). In agreement to Chiodini P.L. (2001); Isolation of more than one parasite per sample in this work reflects the possibility of a poly feacal contamination of vegetables which most probably result to poly parasitic infection in man. The high occurrence of these parasites reflects a high level contamination and persistence of human infection. This is in agreement with the study of Gibson D. I. (1994), that the prevalence of intestinal parasites among a particular people is an attribute of environmental pollution by human feces. The life cycle of the parasites particularly the *Strongyloides stercoealis* which has both parasitic and free living state enhances the proliferation of larvae without the host (Feachem *et al*, 1983). The consumption of water-leaf with 90% occurrence is a risk factor as it is a common vehicle for transmision, particularly when the hygienic condition of the consumers is poor, WHO (1999). In contrast to Soni G. R and Nama H. S (1992) study, who reported that Hookworm (64.4%) and *T. trichiura* (23.36%) were the highest contaminating parasites in their area of study, this study reveals *Strongyloides stercoralis* (60.1%) and Hookworm (28.6%) as being the highest occurring parasites in this study area. However, the overall result is not an exact representation of the findings of previous researchers because the areas of study differ both in geographical location, climatic, environmental conditions, the general behavioral attitude to hygiene and the socio-economic activities of producers, sellers and consumers. The number of samples collected differs also, and consequently, the results differ variously.

V. Recommendation

Vegetable cannot be removed from human diet, but can be excluded from the cycle of transmission and dispersion of parasites. This can be achieved by mentainance of simple personal and environmental hygiene by sellers and consumers, avoid using untreated human and animal wastes as manure, soaking of vegetable for 10 minutes in vinegar or saturated salt solution which will plasmolize the parasites if present, cooking of vegetables adequately before serving them as meal, avoidance of indiscriminate defecation.

VI. Conclusion

It is obvious that vegetables consumed by people are quite often contaminated with parasites, more especially by intestinal parasites. This is an indication that humans are always at risk of infection especially as vegetables is naturally popular in the diet of people of all classes, Bean NH, (1990). These findings underscore the public health implication of vegetable farmers, sellers and consumers, being at high risk of infection with Strongyloidiasis, Ascariasis, Amoebiasis and a host of others. The high prevalence of parasitic infection among the public has led to increased funding for epidemiological surveillance, unwarranted financial stress on patients, incidence of hospital admission, increase in the demand of antihelminthic drugs, pressure on pharmaceutical industry to discover and develop a more potent antihelminthic drugs to curtail increase spreading of parasites, the risks of death and finally food insecurity in West Africa.

The campaign to eradicate parasitic infection must be intensified; this is the more reason world health organization has continued to call for global strategy in putting this menace under check (WHO, 1999).

Reference Références Referencias

1) Altekruse, S.F; Cohen, M. L and Swerdlow, D. L. (1997): Emerging food borne – diseases. Emerg infect Dis., 3: 285 – 293.
2) Ayer, R. M. et al (1992): Wastewater Reuse in Agriculture and Risk of Nematode infection. Parasitology today, Pp 8 (11): 32 – 35.
3) Bean NH, Goulding JS, et al (2000): Surveillance for food – borne disease outbreaks United States, 1998 – 1992. J. Food Prot. 60: 1265 – 1286.
4) Bean NH, Griffin PM (1990): Food-borne disease outbreaks in the united state, 19973 – 1987: Pathogens, vehicles and trends. J. Food Prot. 53:807 – 814.

5) Cheesebrough (1991): Medical parasitology. Medical lab manual for tropical countries vol 1, Pg 163 – 411.
6) Chiodini Pl (2001): Chemotherapy for patients with multiple parasite infection, parasitology 2001: p 22, 583 – 90.
7) Duckworth, R. B (1996): Farming systems for the production of fruits and vegetables. Fruits and vegetables oxford: Pergama press 48 – 62.
8) Frazier, W. C and Westhoff, D.C (1998): Food Microbiology. T. M. H. Edition. Pg 198 – 209.
9) Gibson, D. I., Bray, R. A. (1994): The Evolutionary Expansion and Host parasite relationship of the Digenea, Int. J. Parasitology 24: 12/13 – 26.
10) Hedberg, C.W., McDonald K.L., Osterhoim M. T. (1994): Changing epidemiology of food-borne disease S, A minesota perspective. Cin, infect .disease 18:671 – 682
11) Hayneman Donald (1995): Medical parasitology section, medical microbiology. Pg 315 – 339. Applelon and lange publishers.
12) Okoronkwo, M. O (1998): Intestinal parasites associated with human and animal waste stabilization. Ph.D Thesis, University of Jos, Nigeria.
13) Luca S. A., Ajugi I.,and Umuh J. U. (2000). Helminthosis among primary school Children. Jn of Parasitology. 21: 109-116.
14) Soni, G.R and Nama H.S (1992): Viability of Geohelminth eggs on foodstuff comparative physiology and ecology 6(4) Pp 289 – 292.
15) World Health Organization (1999): Surface decontamination of fruits and vegetable eaten raw. Food safety programme document Nov.1999 (P. 4–30).