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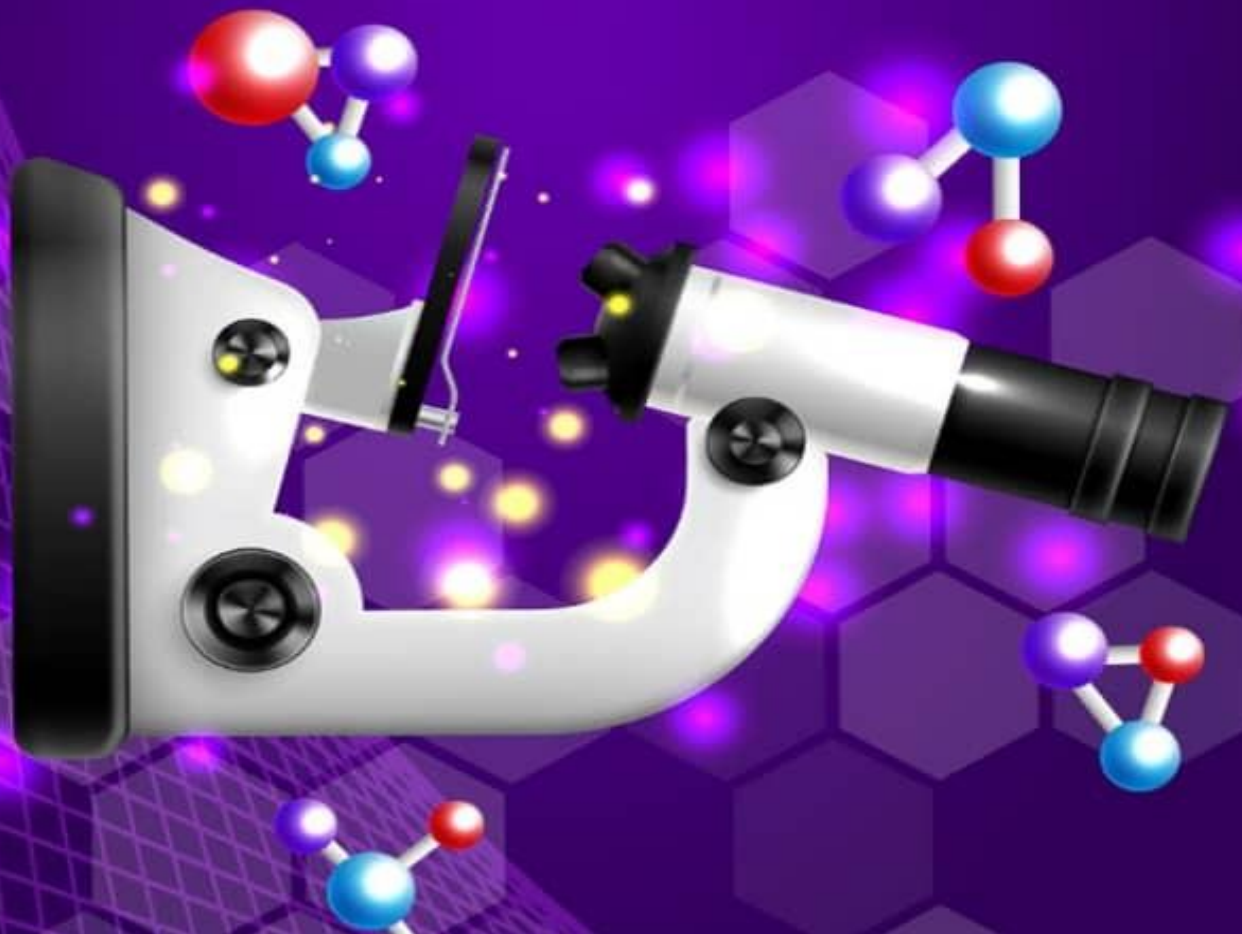


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PREVALENCE OF INTESTINAL PARASITES IN VEGETABLES CONSUMED IN SOME SELECTED MARKET IN OWERRI METROPOLIS, IMO STATE, NIGERIA

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Abstract

Vegetables are very essential in human diet providing dietary fibre, vitamins and minerals. A study was carried out to determine the prevalence of intestinal parasites in vegetables consumed in some selected market Ekeonunwa market, Relief market, Amakohia market, Egbeda market in Owerri metropolis, Imo State. A total of three hundred and twenty samples of spinach, cabbage, lettuce, carrot, green beans, green peppers, garden egg and tomatoes were collected. Forty samples per each vegetable type were collected in the study, while ten samples per vegetable were collected from every quadrant (market). The presence of helminthes parasites in the vegetable were determined using floatation, sedimentation and microscopy methods. One hundred questionnaire were administered to 100 vegetable marketers in order to evaluate hygienic practices during sourcing, transportation and retailing of vegetables. In all, 29(9.06%) vegetables were contaminated with one parasite or the other, consisting of strongyle egg 5(1.56%), Taenia egg 4(1.25%), Nematode larvae 17(5.31%), Ancyloestoma egg 1(0.31%) and Ascaris lumbricoides egg 2(0.62%). Based on the type of vegetable, cabbage and lettuce each had 5(12.5%) parasites, while carrot and green beans had 2(5.0%) and 17(42.5%) respectively. Ekeonunwa market recorded the highest contamination of 9(11.25%) parasite, followed by Relief Market 7(8.75%), Amakohia Market (Orie Onumiri Market) 5(6.25%) while Egbeada Market (Rochase Market) had least contamination rate of 8(10.0%). There was no statistically significant association between parasites isolation and the market location. The study revealed that raw vegetables as sold in market could be potential sources of transmission for intestinal parasites in this study and consumers of raw vegetables could be at risk of infection.

Introduction

Vegetable play a very important role in the diets of human beings. They are great sources of vitamins, minerals and dietary fibres.. Consumption of vegetables could prevent risk of cardiopascular diseases, stroke and certain cancers. The consumption of raw vegetables such as salad, could serve as a long tradition of eating most vegetables raw or partially cooked may therefore easily serve as potential risk factor for human parasitic infection. Vegetables from markets are often contaminated by eggs. Of human intestinal nematodes where human and animal faeces are extensively used as fertilizers and reused waste water. The indirect reserve of river water contains a substantial percentage of municipal refuse and sewage. This practice is growing prominence in Nigeria as a result of the growing cost of mineral, fertilizer and high demand for vegetables. In developing countries, because of inadequate or non existing systems for routine diagnosis and monitoring or reporting for many of the food borne pathogens, most outbreaks caused by contaminated vegetables go undetected and the incidence of their occurrence in food is underestimated. The consumption of raw and improperly washed vegetable is a major way in which human pathogen are transmitted, poor hygiene practices related to the planting, harvesting, packing, transportation and storage of vegetables can become easily contaminated with parasites.

Materials and Methods

Study Area:

This study was carried out in Owerri Metropolis, Imo State. Imo State has an estimating land area of 5,530km³ and estimated population of 3,934,899 million people according to 2006 national census. It is situated between latitude 4° 45'N and 7° 15'N and longitude 6° 50' E and 7° 25' E. There is a distinct rainy and dry season with most of the rainfall (1,99mm to 2,200mm) occurring between March and October. The average relative humidity is about 75% which is highest during the average season with average annual temperature above 20°C. The beautiful vegetation is typical tropical rainforest.

Study Design

The study is divided into two segments. The first is field survey, while the second part is questionnaire administration.

Study Population

A total of three hundred and twenty samples of vegetables were collected from four different markets which are Ekeonunwa market, Relief market, Amakohia (Orie Onumiri market), Egbeada market (Rochase market).

Ethical Consideration

The study was approved by the Imo State Ministry of Health and the Zoology Department of Animal and Environmental Biology, Imo State University Owerri, Nigeria.

Collection and Method of Sample Analysis

A total of three hundred and twenty samples were collected consisting of eighty per quadrant. Out of the eighty samples collected per quadrant, forty were washed, while the remaining forty were unwashed.

Also, forty samples of each vegetable type were collected consisting of twenty washed and twenty unwashed during the study. Similarly, ten samples from each vegetable type were collected per every quadrant (market). Vegetable sampled included, Spinach (spinacia oleracea), cabbage (Brassica oleracea) and lettuce (Lactuca sativa) which were obtained in small bunch of about 200 grams per individual sample, whereas carrot (Daucus carota), green beans (string beans), green pepper (capsicum annum), garden egg (solanun melongena) and tomatoes salanum copersicum) were collected intact. About 5-25 pieces of carrot, green beans, green pepper, garden egg and tomatoes were collected as individual sample. All samples were obtained from retailers at point of sales and packaged in a well labeled polythene bags and transported immediately to Department of Animal and Environmental Biology where they processed.

Sample Processing:

All samples were processed as previously describe. The x10 and x 40 objective were used for microscopic examination. Microscopic identification of helminth eggs and larvae in samples was performed according to floatation, the sediments obtained were examined under microscope.

Data Analysis

Data obtained was subjected to a simple statistical analysis.

Results

Table 1 presents the prevalence of helminth parasites on vegetables in Owerri, Imo State, based on types. In all, 29(9.06%) vegetables were positive for one parasite or the other, consisting of strongyle egg 5(1.56%), Taenia egg 4(1.25%), nematode larvae 17(5.31%) Ancylostoma egg 1(0.31%) and A. lumbricoids egg 2(0.62%), while four vegetable types were contaminated with parasites 5(12.5%) each of cabbage and lettuce, 2(5.0%) carrot and 17 (42.5%) green beans. These parasites differed significantly ($X^2 = 171.940$, $P = 0.00$) based on vegetable type.

The result of the prevalence of parasite species on vegetables sold in Owerri metropolis based on market location is presented in table 2. Ekeonunwa market had the highest prevalence of 9(11.25%), followed by Relief market 7(8.75%), Amakohia market (Ori Onumiri market) 5(6.25%), while Egbeada market (Rochas market had the least contamination of 8(10.0%). There was no association between parasites isolation and the market location ($X^2 = 10.811$, $P = 0.766$).

Furthermore, 18 of the contaminated vegetables were unwashed table 3.

However, there was no statistically significant association between the isolation of parasites and washing status of vegetable prior to sale ($X^2 = 9.680$, $P = 0.085$).

Ninety seven percent of the respondent sourced their vegetables from Owerri metropolis, while 88% used water only without antiseptic in washing their vegetable prior to sales. Equally, 72% relied on vendors for water supply used in washing vegetable, while only 25% had access to borehole water. Sixty eight of respondents admitted washing each vegetable type in a separate basin, while only 7% washed all vegetable types in a single basin. 71% of the duration of stay of vegetable as with marketers is mostly less than two days. Only 29% had between 2 and 5 days. Furthermore, 76% admitted not washing their hand before handling vegetables, while 8% seldom do. Ninety nine (99%) do not wear hand glove before dispersing vegetable to their customers. On the method of storage of unsold vegetables, 54% normally cover their vegetable in containers during storage, while only 5% leave them uncovered on table. Equally, 83% do not cover their vegetable during sales, while only 4% do. 69% of the floor status of most selling points is damp but not cemented, but 25% of the floor was dusty. Ninety one (91%) of the marketers conveyed their vegetables from markets in bags table 4. Three 3% admitted transporting vegetables uncovered and tied with rope.

Table 1: Prevalence of Helminth Parasites on Vegetable in Owerri Metropolis, Imo State based on types

Parasite	No (%) Positive								
	Spinach (n=40)	Cabbage (n=40)	Lettuce (n=40)	Carrot (n=40)	Green Beans (n=40)	Pumpkin leaf (n=40)	Garden Egg (n=40)	Tomatoes (n=40)	Total (n=320)
Strongyl egg	0(0.0)	1(2.5)	2(5.0)	2(5.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	5(1.56) ^a
Taenia egg	0(0.0)	3(7.5)	1(1.25)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	4(1.25) ^a
Nematode	0(0.0)	0(0.0)	0(0.0)	0(0.0)	17(12.5)	0(0.0)	0(0.0)	0(0.0)	17(5.31) ^b
Ancylostoma	0(0.0)	1(2.5)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	1(0.31) ^c
Lumbricoides egg	0(0.0)	0(0.0)	2(5.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	2(0.62) ^c
Total	0(0.0)	5(12.) ^a	5(12.5) ^a	2(5.0) ^a	17(4.25) ^c	0(0.0)	0(0.0)	0(0.0)	29(9.06)

Different superscripts in columns and rows differed significantly ($P < 0.05$).

Table 2: Prevalence of parasite species on vegetables based on market location

Market (n=8.0)	No (%) Positive					
	Strongle	Taenia	Nematode	Ancylostoma	Lumbricoides	Total (n=80)
Ekeonunwa Market	2(2.5)	0(0)	6(7.5)	0(0)	1(1.25)	9(11.25) ^a
Relief Market	0(0)	2(2.5)	4(5.0)	0(0)	1(1.25)	7(8.75) ^a
Amakohia (Orie Onumiri market)	1(1.25)	1(.25)	3(3.75)	0(0)	0(0)	5(6.25) ^a
Egbeada Market (Rochas Market)	2(2.5)	1(1.25)	4(5.0)	1(1.25)	0(0)	8(100) ^a
Total	5(1.56)	4(1.25)	17(5.31)	1(0.31)	2(0.625)	29(9.06)

Table 3: Prevalence of parasite species on vegetables based on washing status

Parasite	No (%) Positive		
	Washed (n=160)	Unwashed (n=160)	Total (n=320)
Strongle egg	2(1.25)	3(1.87)	5(1.88)
Taenia egg	0(0)	4(2.50)	4(2.50)
Nematode	8(5.0)	9(5.62)	17(5.31)

Ancylostoma eggs	0(0)	1(0.62)	1(0.31)
Lumbricoides	1(0.625)	1(0.62)	2(0.62)
Total	11(6.87)	18(11.25)	29(9.06)

Table 4: Responses of vegetable marketers (n=100) in Owerri metropolis to contents of the administered questionnaires

S/N	Variables	Responses					
1	Medium for washing	(a) Water n=88	(b) Water /detergent n=5	(c) Water / detergent and rinse n=2	(d) Salted water n=3	(e) Others c=2	0.036 ^a
2	Source of water	(a) Water board n=0	(b) Streams/ rivers and ponds	(c) vendors n=72	(d) boreholes n=23	(e) Others n=4	0.991 ^a
3.	Method of storage of unsold vegetable	(a) Uncovered in basin n=1	(b) Uncovered on table n=5	(c) Covered in a container n=54	(d) Others n=40		0.964 ^a
4.	Do you cover vegetables during sales	(a) Yes n=4	(b) No n=83	(c) Not always c=10	(d) Others d=3		0.640 ^c
5.	Floor status selling point	(a) Cemented n=4	(b) Not cemented but damp n=69	(c) Cemented with cracks c=0	(d) Dusty d=25	Others e=2	0.996 ^a
6.	Method of conveying vegetables from farm/dealer to market	(a) In bags covered n=9	(b) Tied with rope and uncovered b=3	(c) In basin and uncovered c=3	(d) Others specify d=3		0.995 ^a

Discussion

Soil transmitted helminthes (STH) are parasites that can easily contaminate vegetables, which could pose a public health risk when consumed. The study attempted to assess the level of contamination and prevalence of different soil transmitted helminth parasite from different vegetables sold in some selected markets in Owerri metropolis. In this study, five popularly consumed raw vegetables in Owerri metropolis were evaluated namely green pepper, lettuce, spinach, cabbage and fluted pumpkin leaf, lettuce was found to be the most contaminated of all

the vegetables. The results tend to agree with that reported and disagree with who reported fluted pumpkin and cabbage as the most contaminated. The degree of contamination of the environment with the eggs of animal parasites is associated with the frequency of occurrence of animals in a given area, which are the source of parasites, also their age and level of resistance. The reason could be due to the fact that the degree of contamination varies according to the shape and surface of vegetables. Green leafy vegetables such as lettuce has plenty of leaves with uneven surface and makes parasitic eggs, cysts and oocysts attached to the surface/inside of the vegetable more easily, either in the farm or when washed with contaminated water.

On the other hand, vegetables with smooth surface as cabbage, had the least prevalence because its smooth surface reduces the rate of parasitic attachment. Helminth parasites egg and larvae identified in this study include *A.lumbricoides*, hookworm, strongyle, nematode, *Taenia* and conforms with reports of *A.lumbricoides* was the most occurring STH parasite in lettuce. This result agree with who also detected *Ascoris* eggs in lettuce. The detection of STH parasite stages in vegetables is an indicative of the soil contamination with faecal contamination from human and or animal origin, as reported that excretion of parasite's egg by humans and animals is high in the warm season months. The presence of helminthes eggs indifferent vegetables may be related to either contamination of soil or contamination by polluted irrigating water.

Conclusion

The consumption of raw contaminated leafy vegetables by people could pose a health hazard. These findings underscore the public health implication of consumers of these vegetables being at high risk of infection with helminthes. The habit of eating raw vegetable like salad is commonly practiced in Owerri, hence, the findings of the present study are of public health importance requiring an appropriate intervention to prevent transmission of parasitic diseases that can be acquired through consumption of contaminated fruits and vegetables.

Recommendation

Vegetable sellers in all markets should wash the vegetables thoroughly with clean water before sale.

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