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Prevalence of Intestinal Parasites in Vegetables on Sale in Oyigbo Local Government Area of Rivers State, Nigeria

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Abstract:- Prevalence of intestinal protozoa and helminthes parasites in vegetables on sale in Oyigbo Local Government Area of Rivers State of Nigeria was studied between September 2017 and October 2018 .A total of Two hundred (200) bunches of Ten (10) different vegetable varieties were sampled : Green vegetable , Bitter leaf , Water leaf , Fruited pumpkin leaf , Curry leaf , Cabbage , Garden egg leaf , Tomatoes , Carrot and Lettuce were purchased from 200 retailers across four major markets (50 retailer / market) within the L.G.A. The Markets were classified as rural and urban based on their geographical location and the vegetables were analyzed using sedimentation and Zinc sulphate centrifugation flotation technique for detection of helminthes egg and protozoa cyst .Green vegetable has the highest number of intestinal parasites contamination 23(23 %) and 39 (30%) in rural and urban markets and the lowest was cabbage 5 (15%) and 10 (7%) respectively. Parasites implicated were *Ascaris lumbricoides* (23.0%) and 18% *Trichuris trichuras* 18.9%,*Enterobious vermiclaris* 6.0% and 7.5%, *Entamoeba histolitica* 33% and 25% , *Girdia intestinalis* 7.0% and 12.0%, *Balantidum coli* 11.0%and 15.0% and *Entamoeba coli* 20% and 9% in rural and urban markets respectively. There is no significant difference between the prevalence of intestinal parasites contamination in rural and urban market vegetable except in bitter leaf , at P<0.05.The result of this study shows that there is high level of vegetables contamination with intestinal parasites from four different markets in Oyigbo Local Government , suggesting existence of greater risk of acquiring intestinal parasitic infections by eating improperly washed and processed vegetables. Therefore there is need for adequate public health enlightenment campaign within the Local Government Area.

Keyword:- *Protozoa, Helminthes, Parasite, Sedimentation, Zinc sulphate Flotation, Vegetable.*

I. INTRODUCTION

Indigenous fruits and vegetables play an important role in the nutritional component of Nigeria population especially in rural area where there is poor socio –economic condition (Alli, *et al.,*2011). Unfortunately, people do not process it well before eating (Samuel, 2001).The climate and geographical location of south - south , Nigeria are suitable for the cultivation of these vegetables throughout the year round , using rain water during the raining season and irrigation with river water during the dry season , which is highly polluted with human and animal faces , coupled with the use of human and animal waste as manure due to poor fertility of the soil which represent high risk of infection with protozoa and helminthes intestinal parasites to the farmers as well as the consumer of this vegetables . Market vegetables are often contaminated with egg and ova of intestinal nematodes and protozoa, where human and animal faeces are extensively used as fertilizer .This indirect use of river water contains a substantial percentage of municipal refuse and sewage (Demen, 2007). This practice is gaining prominence in Nigeria as a result of the growing cost of inorganic fertilizer and high demand of basic fruits and vegetables as a nutritional diet due to poor socio –economic condition (Demen ,2007). Epidemiological studies have indicated that area of south - south Nigeria characterized by endemic helminthes and protozoa diseased population patients due to waste water reused for irrigation of vegetables and consumption of such vegetables unwashed and precooked, may lead to infestation (Alli, *et al* 2011). Leafy vegetables are herbs including all vegetable leafy nature and of which the leaf and core is intended to be consumed raw, e.g. Lettuce, Cabbage, leafy herbs, Green vegetable, water leaf can be source of spread of intestinal parasitic diseases (FAO/WHO, 2005) . The role of leafy vegetables and herbs in disease outbreak is very important, especially when they are of a component of salad made up with a dressing and other foods that are equally suitable for transmission of the pathogen (Inabo, *et al* .,2011).

The water demand for the production of leafy vegetable is high and this often met by the use of water obtained directly from natural source such as river, lake or pond (FAO/WHO, 2003). In the dry region of the world, irrigation farming is practiced whereby water from these natural source or waste

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water from sewage treatment plant is diverted through channel to irrigate the vegetable (Demen *et al* ., 2007). Several microbial pathogenic parasites can be transmitted to human through the use of such contaminated water for irrigation of farm, among them are intestinal pathogens such as *Ascaris lumbricoides , Trichuris trichuras , Entamoeba histolitica ,Girdia lambia* and *Enterobius vermicularis* are found in raw and partially treated waste water (WHO, 2003, Inabo, *et al.,*2011).The inner leaves of certain vegetable may provide surface for microorganism and these can be particularly difficult to remove by routine cleaning practice , application of night soil ,untreated sewage ,sludge or effluent irrigation water containing untreated sewage to field and garden can result in contamination of vegetable with intestinal parasite (WHO, 2006).

Therefore in the context of vegetable and parasite, there is need for increase public awareness with the increasing population, poor socio- economic condition , urbanization , poor sanitation and poor soil fertility .Parasite are living organism which receive nourishment and shelter from other organism (host) where they live (Alli, *et al* 2001). Parasite is one of the nature Hangman because parasite disease continue to be a major public health problem all over the world with associated high degree of morbidity and mortality WHO (2006).According to WHO parasite is one of the leading cause of death after HIV/AID, Tuberculosis and Pneumonia also , one out of ten people suffer from one or more seven major tropical disease of which Five are of parasitic in nature such as Amoebiasis , Girdiasis , Enterobiasis ,Teaniasis and Ascariasis (Anora, *et al.,* 2008). Ethnic eating habit, poverty, tourism to exotic area and environmental degradation has led to emergence of food bone parasite infection (Mara and Caincross 1996). It has been estimated that human harbors about 300 species of parasitic helminthes and over 70 species of protozoa parasite. (Nyarago, et *al*., 2003). Some of these parasite may have been acquired from food especially raw vegetable, water and animals (Obiamiwe, 1991). Most common food borne parasite include three types of helminthes, Cestodes , Nematodes and Trematodes (Muoneke, 2003).and several protozoa especially flagellate and non flagellate type (Nmoris ,1996). In developing country like Nigeria especially the south –south part of the country where there is no availability to public health care, improve health care facility to reduce the parasite effect on public and it health care consequence on the people such as their productivity and agricultural loss .Therefore the aim of this study is to determine the profile of protozoa and helminthes infestation associated with vegetables on sale in oyigbo Local Government Area of Rivers State with specific objective of determining of the prevalence of intestinal parasite in vegetables on sale within the said Local Government Area of Rivers State of Nigeria.

II. MATERIALS AND METHODS

A. Study Area

This study was carried out between September 2017 and October 2018. Oyigbo is a major town in Oyigbo Local Government Area of River State of Nigeria characterized by rural and urban settlements. It is a Satellite town of Port Harcourt lying a few kilometer to the North East of the city with co- ordinate 4052 ‘ 14’N; 707’42’’E/4.878060N, 7.128330E with time zone of INAT(UTCH). Shell Petroleum Development Company (SPDC) operate an oil well in the L.G.A the people of Oyigbo are of Igbo extraction where majority of the populace depend on the source and open air market to buy vegetable product, through there is a poor drainage system and sanitation, characterized by presence of Rivers State Government refuse dump site near by one of the market.(Odimegwu,2008).

B. Sample Collection

A total of two hundred (200) bunches of ten (10) different vegetable varieties: Green vegetable, Bitter leaf, Water leaf, Fruited Pumpkin leaf, Curry leaf, Cabbage, Garden egg leaf, Tomatoes, Carrot, and Lettuce were sampled from 200 retailers across four (4) major Markets (50 retailer/Market) within the L.G.A. using simple random sampling technique. The names and location of the retailers were recorded to avoid double sampling. The markets are: Atata market ,Konkom market, Eke-Oyigbo market and Okro market, were classified as Rural (Okro and Konkom markets) and Urban (Atata and Eke- Oyigbo markets) based on their geographical location within the Local Government to obtain quantitative estimation of parasite contamination of the vegetables . The study design is a cross-sectional study.

C. Sample Analysis

- *Sedimentation Method*

From each of the bunches of the vegetables selected , 100g (30) leaves were plucked at random ,washed in 200ml of physiological saline solution in a plastic container for the remover of the parasite ova , Larva or cyst . The suspension was stirred and filtered through a sterile sieve to remove undesirable materials (Nyarago, *et al*., 2003).The filtrate was centrifuged at 1500rpm for 5min (Demen, *et al*.,2007) and the supernatant was discarded into a disinfectant jar .Thereafter the sediment was mixed and a drop was applied at the center of a clean grease free slide followed by a drop of lugou’s iodine using a sterile pasture pipette.Then a clean cover slip was placed gently on it to avoid air bubble and over flowing . The preparation was examined under microscope for parasite cyst and ova using x10 and 40x objective lens.

- *Flotation Method*

Also for each of the bunches of vegetables sampled 100g (30) leaves, were plucked at random and treated as above, the filtrate was centrifuge at 1500rpm for 5min (Inabo,2011) and the supernatant was discarded into a disinfectant jar. The

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sediment obtained were re-suspended in Zinc sulphate flotation fluid and re –centrifuged, then the flotation fluid was added to fill the test tube to the brim and a cover slip was super imposed on it and allowed to stay for about 30min. The cover slip was lifted gently and placed on grease free glass slide and examined under microscope using x10 and x40 objective lens. (Awan and Okeke ,2008).

➢ *Data Alalysis*

Numerical values were assigned such as 1 for Present and 0 for absent of cyst and ova of parasite in the vegetables sample examined. Data generated were analyzed using least square analysis of variance while parasites and vegetables were used as dependent variables. The significant of mean of all variables was separated using Duncan Multiple Range test. The model used is as written below.

Prevalence of parasite = Total number of positive case of the parasites in all the vegetables examined / Total number of examined vegetables

$Y_{1j} = \mu + \beta_1 + E_{1j}$

Where,

Y_{1j} = Positive case of parasites or infected vegetables

μ = Population mean

β_1 = Effect of i th market (I = Urban and rural)

E_{ij} = residual effect

III. RESULTS

Prevalence of intestinal helminthes and Protozoa parasites on vegetables examined

Table 1: Shows the ova of helminthes identified; *Ascaris lumbricoides* (24), *E.vermicularis* (10) and *Trichuris trichuras* (24) in the vegetable sample in urban markets.

Table 2: Shows that Twenty (20) Ova of *A.lumbricoides* and Five (5) eggs of *E.vermicularis* were detected in the rural markets while no positive case of *T.trichura* was observed in the examined vegetables

Table 3: Shows the Prevalence of protozoa cysts identified in Rural markets out of one hundred (100) bunches ,consisting of Ten (10)different vegetable varieties , 29, 6, 10 and 17 cyst of *E.histolitica* ,*G.intestinalis*, *Balantidum coli* and *Entamoeba coli* respectively were recorded from the sampled vegetables , Green vegetable and Lettuce were most common with protozoa parasites contamination.

Table 4: Revealed different levels of occurrence of cyst of protozoa parasites in urban markets vegetables ; *E.histolitica* (27), *G.intestinalis* (16), *B.coli*(15) and *E.coli* (12) respectively.

Table 5: The distribution of vegetable parasites contamination in rural and urban markets revealed that A.lumbricoides , *E.vamicularis, E.histolitica , G. intestinalis , Balantidum coli and E.coli* were not stastistically siginificant different in their prevelance in rural and urban markets vegetables examined .No case of *Trichuris trichura* was observed in the rural markets while 24 positive cases were detected in urban markets. Thus, there was a significant different between the level of contamination of vegetables in rural and urban markets in relation to *Trichuris trichura*.

Table 6: Revealed the parasite load on the examined vegetables in the urban markets compared to rural markets. Contamination was not detected in bitter leaf from rural markets while considerable number of positive case (23) were recorded in the bitter leaf sampled from urban markets hence there is significant difference between parasite load of bitter leaf from rural and urban markets. However, there was no case of parasite infestation on carrot and Tomatoes recorded from both rural and urban market vegetables.

	Number of positive cases		
Vegetables	Ascaris lumbricoides	Enterobius vermicularis	Trichuris trichura
Green vegetable	7	-	7
Bitter leaf	6	-	5
Water leaf	6	-	5
Fruited pumpkin	-	-	-
Curry leaf	-	5	-
Cabbage	5	5	-
Garden egg leaf	-	-	-
Tomatoes	-	-	-
Carrot	-	-	-
Lettuce	-	-	7
Total	24	10	24

Table 1: Prevalence of helminthes identified in urban markets

	Number of positive case		
Vegetables	Ascaris Lumbricoides	Enterobius vemicularis	Trichuris trichura
Green vegetable	5	-	-
Bitter leaf	-	-	-
Water leaf	5	-	-
Fruited pumpkin	-	5	-
Curry leaf	-	-	-
Cabbage	-	-	-
Garden egg leaf	5	-	-
Tomatoes	-	-	-
Carrot	-	-	-
Lettuce	5	-	-
Total	20	5	0

Table 2: Prevalence of helminthes parasite identified in rural markets vegetables

	Number of positive case			
Vegetables	Entamoeba histolitica	Gairdia intestinalis	Balantidium coli	Entamoeba coli
Green vegetable	10	5	5	5
Bitter leaf	-	5	-	7
Water leaf	5	6	5	5
Fruited pumpkin	7	-	-	-
Curry leaf	5	-	-	-
Cabbage	-	-	-	-
Garden egg leaf	-	-	-	-
Tomatoes	-	-	-	-
Carrot	-	-	-	-
Lettuce	-	-	-	-
Total	27	16	12	12

Table 3:- Prevalence of protozoa in urban markets vegetables

	Number of positive cases			
Vegetables	Entamoeba histolitica	Gairdia intestinalis	Balantidium coli	Entamoeba coli
Green vegetable	6	-	5	6
Bitter leaf	5	-	-	-
Water leaf	5	6	-	5
Fruited pumpkin	-	-	-	-
Curry leaf	-	-	-	6
Cabbage	5	-	-	-
Garden egg leaf	6	-	5	-
Tomatoes	-	-	-	-
Carrot	-	-	-	-
Lettuce	-	-	-	-
Total	29	6	10	17

Table 4: Prevalence of protozoa parasite identified in rural markets vegetables

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Parasites	Rural	%prevalence	urban	%prevalence	P- value
		Ascaris			
lumbricoides	20	23	24	18	0.759
Trichuris trichura	0	0	24	18.9	0.028
E.vermicularis	5	6	10	7.5	0.556
E. histolitica	29	33	27	20.5	1.0
Giardia intestinalis	6	7	16	12	0.338
B.coli	10	11	10	15	0.395
E .coli	17	20	12	9	1.0
		P- Value <0.05			

Table 5: Comparative Analysis of Prevalence of intestinal Parasite in Rural and Urban markets Vegetables Examined

Vegetables	Rural	% Prevalence	urban	% prevalence	P-value
Green vegetable	22	23	39	37	0.157
Fruited pumpkin	5	5	18	14	0.217
Water leaf	10	10	10	7	1.0
Bitter leaf	0	0	23	14	0.017
Curry leaf	6	6	5	7	0.057
Garden egg leaf	16	17	0	0	0.52
Lettuce	28	30	21	16	0.55
Carrot	-	-	-	-	-
Tomatoes	-	-	-	-	-
Cabbage	5	5	10	7	0.9
		P -value <0.05			

Table 6: Comparative analysis of contamination level of Rural and Urban markets vegetables with intestinal parasites

IV. DISCUSSION

Food borne parasitic infections have received little attention in developing country like Nigeria, (Alli, *et al* 2011,Kage, 1983).The greatest risk is associated with vegetables eaten raw and un washed. Therefore, these organisms contaminate the vegetables while still on the field and are usually transmitted by contaminated water and soil, then spread by ineffective hygienic practice (WHO, 2003). Fresh vegetable can be agent of transmission of protozoa cyst and helminthes egg and ova to human (Darayemi, et al ., 2008).Eggs of *A.lumbricoides* , *E.vermicularis* and *T.trichura* were detected as 24, 10,and 24 respectively from the vegetables examined in urban markets ,whereas 20,and 5 eggs of *Ascaris lumbricoides* and *E.vermicularis* respectively were detected in the vegetables sampled from rural markets .This result compared well with the report of (Inabo and Gana, 2011),which recorded73.3%, 23% and 13,3% for *A.lubricoides , T.trichura* and *hookworm* respectively. The highest prevalence of *A.lumbricoides* and *T.trichura* in urban markets vegetables in this study may be as a result of its thick covering of the egg which can withstand harsh environmental condition. Epidemiological studies have shown that where waste water is used to grow vegetables which are eaten raw, helminthes disease tend to become endemic in such communities (Shuval, *et a*l., 1986; Ortega, *et al* .,1997; Erickson,2010). Also from the result of this study ,it showed that *E.histolitica* has the highest prevalence 29(33%) and 27 (20.5%) in rural and urban markets vegetables examined ,followed by *Balantidium coli and E. coli* with 10(11%) and 17 (20%) in rural and 10(15%) and 20(12%) in urban markets respectively. This is in agreement with (Demen, *et al* ., 2007); which reported 36% parasitic protozoa contamination in market vegetables in Jos Nigeria. In other study carried out by (Unake ,2007) in Abakaliki Nigeria ,he reported that out of the 34 ova isolated from fruits, 30 were positive for pineapple . Furthermore, from the result of this study , it was observed that Green vegetable has the highest level of contamination with protozoa and helminthes parasites cyst and ova 22 and 39 followed by lettuce 28 and 21 in both rural and urban markets respectively. It was also observed that carrot and tomatoes had no protozoa and helminthes cyst and ova contamination in both rural and urban markets, this may be due to the fact that crop that have certain surface properties e.g. Hairy, sticky, cervices and rough among other characteristic, protect pathogen from exposure to radiation and make them more difficult to wash off with rain or dislodge during pool harvesting. Amoh, *et al*., 2005 reported that *Ascaris lumbricoides* formed the greater proportion of helminthes egg isolated from Lettuce leaf from Kumasi; his study is also in conformation with (Erdogual and Senner, 2005)work which found *Girdia* cyst in 10% of Lettuce sample examined Similarly, the result of this study shows that urban markets recorded the highest level of contamination and prevalence of both protozoa and helminthes; 92 cases were recorded in all the vegetables examined in rural market and 101 cases were also recorded in urban market .This is also in conformity with the previous report of (Alli,*et al* ., 2011) in which it was reported that Bodija market recorded the highest prevalence

(66.7%) followed by Oje market (29.1%), Bere market had (25%) while Agbeni market recorded (20.8%).Therefore, high prevalence of parasite contamination of vegetables recorded in urban markets vegetables in this study are due to the fact that these open markets are characterized by the presence of refuse dump site nearby the markets , poor drainage , improper disposal of waste by the traders and poor hygienic practice.

V. CONCLUSION

Based on the results of this study, it could be concluded that there is high level of contamination of vegetable with intestinal parasitic protozoa and helminthes from four different markets in Oyigbo Local Government Area of Rivers State suggesting existence of a greater risk of acquiring intestinal parasitic infections by eating improperly washed vegetables. The use of properly composed manure and properly treated irrigation spray water as well as pathogen free water for washing and for ice will minimize the risk of contamination of vegetables with parasitic pathogens.

RECOMMENDATION

There is need to inform the general public especially food vendors of the importance of proper washing and disinfection of raw vegetables before consumption. Government should build modern markets with all necessary amenities such as toilet, running tap water and good drainage system.Also, fertilizer should be supplied to the farmers at affordable rate in order to discourage the use of faeces and animal waste reused as a fertilizer. Public health enlightenment programme for the public on necessity of food sanitation and personal hygiene need to be intensified.

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