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Parasitic infestation of vegetables in abraka, Delta State, Nigeria

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Abstract

Millions of people suffer from parasitic infections and this continues to pose a threat to public health worldwide. Thus, there is need to safeguard the general health and minimize the outbreak of vegetable diseases. A total of 200 vegetable samples namely, carrot, spring onion, cucumber and green pepper were purchased from Abraka market. The vegetables were examined using wet mount and the Formalin Ethyl Acetate Sedimentation Techniques for parasitic infestation. Our results revealed that 37.5% of the vegetables were infested. Carrot 30 (60.0%) followed by spring onion 27 (54.0%), green pepper and cucumber 9(18.0%) respectively. The parasite species recovered from the vegetables, was highest in *Ascaris lumbricoides* 39 (19.5%), followed by *Entamoeba histolytica* and *Strongyloides stercoralis* 12(6.0%) each, Hookworm 8(4.0%) and *Entamoeba coli* 4(2.0%) respectively. This study has shown a significant difference in vegetables infested by parasites.

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Introduction

Vegetable is a essential necessities of every individual (Glenn *et al.,* 2012) and main constituents of healthy diet (Matini *et al.,* 2016). They are important sources of ascorbic acid, thiamine, niacin, riboflavin, mineral elements such as iron (Franzier and Westhoff, 1995), phytochemicals especially antioxidants, dietary fiber (Slavin and Loyld, 2012); Darkwa and Darkwa, 2013). Vegetables provide energy for humans (Pam *et al.,* 2015) and have high water contents (Frazier and Westhoff, 1995).

Asides the potential health benefits, they are vehicles of intestinal parasites (Robertson and Gjerde, 2001; Ezartpour *et al.,* 2013). Uncooked vegetables transmit these infectious diseases because of their complex surface and porosity which encourages the parasites (Kniel *et al.,* 2002). Human consumption is the important way of transmitting infections especially parasitic organisms. This has lead to increase in food borne illness (Nyarango *et al.,* 2008), malnutrition in children (Haque, 2007), thus resulting to disease and death (Glenn *et al.,* 2012). Over 60% is a source of pathogens (Adegbola, 2007) which has promote huge widespread outbreak of diseases in both developing and industrialized countries. This provides further evidence that vegetables habouring parasites like protozoan cyts, oocysts, helminth ova and larva to humans are key to infections (Adanir and Tasci, 2013; Adenusi *et al.,* 2015; Fallah *et al.,* 2016; Rostami *et al.,* 2016). Countries such as Turkey, Saudi Arabia, Vietnam, Nigeria and India have conducted a number of different studies to investigate vegetable parasites. Their results showed that infestation in these countries are 6%, 16%, 26%, 36% and 44% respectively (Kozan *et al.,* 2005; Damen *et al.,* 2007; Uga *et al.,* 2009).

In previous years, various studies to have been conducted to investigate the parasite contaminating vegetables. However, there have been no recorded data on the infestation on vegetables in Abraka, Delta State; Therefore, this study becomes imperative in Abraka so as to enlighten and reduce the menace of parasitic in this community.

Materials and methods

Study area

An experimental study conducted in Abraka. The town Abraka is a clan among the 25 Urhobo kingdoms. It lies on the latitude 5°44'446N and longitude 6°7'43E with population of 32,029 and mostly known as the main campus of the University. Abraka's wet season run through six to seven months while the remaining parts of the year forms the dry season. It experiences the harmattan between the months of November and February.

Sample Collection

Two hundred (200) vegetable samples of fifty samples each namely, carrot, spring onion, cucumber, and green pepper were purchased from vendors in Abraka main market randomly. The vegetables were kept in separate clean polythene bag and properly labelled. It was transported to Microbiology laboratory for immediate parasitological analysis.

Vegetable samples examination

Each of the fresh vegetables was washed by vigorous shaking in 150ml normal saline as described by Abu Odeh (2018). The washing solution was left to settle and then the supernatant discarded. The sediment was dispensed into centrifuge tubes, spanned and deposits examined microscopically (Malann and Tim, 2016).

Formalin-Ethyl Acetate Sedimentation Technique

About 9ml of 10% formalin was added to the sediment obtained from washing of the vegetables and mixed thoroughly and stoppered to close the tube. The mixture was mixed for 30 seconds. The tubes were centrifuged at 1500rpm. Four layers were formed in the tube. The stopper was removed and the top layers discarded leaving the sediment. The sediment was viewed under the microscope (Garcia, 2007; Ziebig, 2013).

Statistical Analysis

Data obtained was analysed using SPSS software version 9.0 for window (SPSS) Inc. Descriptive

statistics and Chi-square was done with variation of significant difference at P<0.05.

Results

Out of 200 vegetables sampled, 75 (37.5%) was infested with parasites. Carrot 30 (60.0%) followed by spring onion 27 (54.0%), green pepper and cumcumber 9(18.0%) each respectively. There was a significant increase vegetable infestation (P<0.05) (Table 1).

The parasite species recovered from the vegetables, was highest in *Ascaris lumbricoides* 39 (19.5%), followed by *Entamoeba histolytica* and *Strongyloides stercoralis* 12(6.0%) each, Hookworm 8(4.0%) and *Entamoeba coli* 4(2.0%) respectively (Table 2).

Table I. Distribution of parasites on the vegetables.

Vegetables	No. examined	No. positive (%)	No. negative (%)	X^2	P-value
Spring onion	50	27(54.0)	23(46.0)	32.832	0.00001
Carrot	50	30(60.0)	20(40.0)		
Green pepper	50	9(18.0)	41(82.0)		
Cucumber	50	9(18.0)	41(82.0)		
Total	200	75(37.5)	125(62.5)		

Table II. Distribution of parasites recovered on different vegetables.

Parasites recovered	Spring onion (n=50)	Carrot (n=50)	Green pepper (n=50)	Cucumber (n=50)	Total (n=200)	Prevalence (%)
Asacaris lumbricoides	15 (30.0%)	17 (34,0%)	3 (6.0%)	4 (8.0%)	39	19.5
Entamoeba histolytica	6 (12.0%)	0,0	5 (10%)	1 (2.0%)	12	6.0
Hookworm	3 (6.0%)	5 (10.0%)	0.0	0.0	8	4.0
Strongyloides stercoralis	3 (6.0%)	8 (16.0%)	1 (2.0%)	0.0	12	6.0
Entamoeba coli	0.0	0.0	0.0	4 (8.0%)	4	2.0

Discussion

This study revealed that 37.5% samples of vegetables purchased from Abraka main market was infested with one or more intestinal parasites thus suggesting environmental pollution of human and animal faeces as earlier opined by Gibson (1994). This is similar to the findings of Lawal *et al.* (2015) and Said *et al.* (2012) who reported 35.27% and 31.7% in Zaira metropolis, Nigeria and Alexandria, Egypt respectively. In contrast, findings of Dankwa *et al.* (2018), Esboei *et al.* (2017), Hailemeskel *et al.* (2018) and Ojemudia (2011) recorded a higher percentage of 52.4%, 60.0%, 63.4%, and 53.3% in Ghana, Iran, Ethiopia and Northern Nigeria respectively. However, a lower percentage of 15.5% was reported by Saki *et al.* (2012) when compared to our findings.

The higher prevalence rates observed by other workers could be as a result of variation in various factors such as; variation in season, type of fertilizer, types of sample and sample size examined; Laboratory technique, shape and surface of vegetables and geographical location. There is a high significant difference at P<0.05 exist between parasites and the vegetables.

Our study further showed that *Ascaris lumbricoides* was the most prevalent parasite recorded 19.5%. This is inconsonance with the studies of Glenn *et al.* (2012) in Manila, Philippines who reported 19.5%. however, Tafera *et al.* (2014), Dankwa *et al.* (2018) and Ojemudia *et al.* (2011) recorded prevalence of 6.7%, 7.9% and 2.4% respectively which is low compared to the value reported in our study. This may be accounted for by geographical differences and season variation.

The least prevalent species of parasite observed in our work was *Entomoeba coli* which is in consonance with the findings of Glenn *et al.* (2012), Matini *et al.* (2016), Dankwa *et al.* (2018) and Ojemudia (2011) who in their work also recovered *Entamoeba coli.* However, *Entamoeba coli* are non-pathogenic intestinal parasite which is an indicator of contamination by faecal material. Thus, the findings of this study supported the assertion of Adeyeba and Essiet (2002) who stated that the tropical nature of Nigeria foster the increased growth and spread of parasitic infections. Our finding indicates that the vegetables in Abraka main market were infested with parasites. Obviously, this calls for enforcement proper sanitation in market places and creation of public awareness on the potential health risk associated with improper washing of vegetables before consumption.

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