PARASITIC CONTAMINATION OF VEGETABLES SOLD AT HAYIN DANMANI MARKET IN KADUNA METROPOLIS, KADUNA STATE, NIGERIA.

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ABSTRACT

Vegetables commonly sold at Hayin Danmani market in Kaduna Metropolis were screened for possible contamination by intestinal parasites. A total of 106 samples of nine different varieties of vegetables were purchased and examined via sedimentation centrifugation method between January to May 2016. Overall results shows 66 (62.3%) vegetables were contaminated with various stages of intestinal parasites. The prevalence of parasitic contamination recorded were: Lettuce (*Lactuca sativa*) 12(85.7%), Cabbage (*Brassica oleracae*) 12(85.7%), Tomatoes (*Lycopersicum esculentum*) 4 (33.3%) , Green Onion (*Allium cepa*%) 6(50.0), Cucumber (*Cucumus sativa*) 8(6.7%), Roselle leaves (*Hibiscus sabdariffa*) 7(58.3%), Carrot (*Daucus carota*) 6 (60.0%), Spinach (*Spinacia oleracae*) 7(70.0%) and Jute leaves (*Corchorus olitorius*) 4(40.0%). Consumption of such vegetables without adequate washing may be a source of transmission of intestinal parasites and may play a major role in the epidemiology of intestinal parasites.

KEYWORDS: Vegetables, Intestinal parasites, Eggs/cysts, Contamination, Hayin Danmani.

1. INTRODUCTION

Vegetables are important constituent of human diet due to their nutritional and medicinal value. Consumption of raw vegetables serves as a great sources of vitamins, dietary fiber, and minerals, in addition they are vital sources of energy (Alade *et al*., 2013; Mohammed *et al*, 2016). Regular consumption of vegetables have been associated with a reduced risk of cardiovascular diseases, stroke and certain cancers (Mohammed *et al*, 2016).

Although, vegetables are consumed either raw or lightly cooked their mode of preparation varies (Damen *et al.,* 2007). Consumption of raw or lightly cooked vegetables have been shown to favour the likelihood of food borne infections that are transmitted via faecal-oral-route (Mohammed *et al*, 2016).

In Nigeria, vegetables are grown all year round particularly in northern Nigeria. During dry season, water from diverse sources are utilised for irrigation and this may result to contamination of such farm products by intestinal parasites (Damen *et al.,* 2007; Uga *et al*., 2009). Vegetables may be contaminated by intestinal parasites due to continual use of improperly treated manure, poor hygiene practice during production, processing equipments, transport and handling among others (Alade *et al*., 2013).

Intestinal parasites are prevalent in areas with poor hygiene and sanitation particularly in the developing areas (Tefera *et al.*, 2014). An estimated 3.5 billion are still affected by intestinal parasites world wide (Abu-Madi *et al*., 2016). Studies conducted in different areas have reported the occurrence of intestinal parasites stages on vegetables (Damen *et al.,* 2007; Tefera *et al.*, 2014; Enjmann *et al.,* 2016). In Nigeria, studies conducted in different parts have shown that fresh vegetables were contaminated by intestinal parasites (Damen *et al.,* 2007; Ogunleye and Babatunde, 2010; Dauda *et al.,* 2011).Consumption of raw contaminated vegetables without adequate washing may act as a vehicle for the transmission of intestinal parasites (Tefera *et al.*, 2014). This may play a major role in the epidemiology of intestinal parasitic infection. There is need to examine fresh vegetables sold in different markets over time period, this will enable understanding their level of parasitic contamination and the public health importance of consumption of such vegetables without adequate washing. This study was therefore carried out to screen vegetables sold in Hayin Danmani vegetable market in Kaduna Metropolis for possible contamination by intestinal parasites.

2. MATERIALS AND METHODS

2.1 Study Area

The study was conducted in Hayin Danmani market. Hayin Danmani is a settlement in Kaduna Metropolis sharing border with Rigasa, it is situated on latitude 10°52'34'' and longitude 7°40'16'' in Igabi Local Government Area of Kaduna State. Igabi Local Government Area is covering an area of 3,727km2 and a population of 430,753 according to 2006 National Census (NPC, 2006). It has a savannah like climate with an average annual rainfall of 80mm and is concentrated by 6 month of rainfall from May-September. The weather is characterize by seasonality of wet and dry season determined by the duration of interplay of the dominant air masses ; wet tropical maritime and dry continental air masses .

Hayin Danman stream flows toward Rigasa and subsequently discharge into river Kaduna. The stream serves as a major point of discharge of waste water emanating from diverse sources including domestic effluents. The stream water was utilised by farmers for irrigation during dry season. Most of the vegetable sold at the Hayin Danmani vegetable market are brought from the farmers inhabitant of Hayin Danmani.

2.2 Sample Collection .

Samples of nine varieties of vegetables namely: Lettuce (*Lactuca sativa*), Cabbage (*Brassica oleracae*), Tomatoes (*Lycopersicum esculentum*), Green Onion (*Allium cepa*), Cucumber (*Cucumus sativa*), Roselle leaves (*Hibiscus sabdariffa*), Carrot (*Daucus carota*), Spinach (*Spinacia oleracae*) and Jute leaves (*Corchorus olitorius*) were purchased from the market on eight different time between January to May 2016 directly from farmers that brought vegetables to the market. These vegetable samples were collected using separate sterile polyethene bags and transported to laboratory department of biological sciences Nigerian Defence Academy Kaduna for analysis.

2.3 Sample Analysis

About 200g of each of the nine vegetable samples were washed separately in 200ml of normal saline for detaching the parasitic stage; cyst, oocysts, ova, and larvae of protozoa and helminthes parasites. The washing solution was left for overnight to sediment. After which 15ml of the sediment was sieve into a clean container in order to remove undesirable matters. The filtrate was transferred to a centrifuge tube and centrifuge at 3000 rpm for 5 minutes to concentrate the parasitic stages, the supernatants was discarded a drop of the sediment was place on slide, covered with a cover slip and examine under light microscope (Tefere *et al*, 2014). The eggs/cysts detected were identified base on morphological characteristics described by Cheesbrough (2005).

3. RESULTS.

A total of 106 samples of the nine varieties of vegetables collected were screened for possible presence of intestinal parasites. Out of this, intestinal parasitic stages comprising protozoan and helminthes were detected on 66 (62.3%) samples of the vegetables. The level of parasitic contamination of the affected vegetables shows that the vegetable samples harboured one or more parasitic stages, with lettuce (*Lactuca sativa*) and cabbage (*Brassica oleracae*) harbouring more parasites while tomatoes (*Lycopersicum esculentum*) harboured least parasites detected. Table 1 shows the varieties of vegetables examined and the different intestinal parasites detected in each vegetable sampled.

The various intestinal parasites associated with contamination of the examined vegetables and their frequency of occurrence was presented in Table 2. The most frequent intestinal parasites detected were *Entamoeba histolytica* and *A.lumbricoides* while the least detected were *Giardia lamblia* and *Trichiuris trichiura.*

Table 1: Intestinal Parasites Detected on the Vegetables Examined.

S/No	Vegetables	Number Examined	Number Positive (%)	Intestinal Parasites Detected Protozoan	Helminthes
1	Lettuce (*lactuca sativa*)	14	12(85.7)	*G. lamblia* *E. histolytica*	*A.lumbricoides, Trichiuris trichiura* Hookworms.
2	Cabbage(*Brassica* olerecae)	14	12(85.7)	*G.lambia* *E. histolytica*	*A.lumbricoides,* Hookworms.
3	Tomatoes(*Lycopersicum esculentum*)	12	4(33.3)	*E. histolytica*	*Trichiuris trichiura*
4	Green (*Allium cepa*)	12	6(50.0)	-	*A.lumbricoides,* Hookworms.
5	Cucumber(*Cucumus sativa*)	12	8(66.7)	*E. histolytica*	*A.lumbricoide*
6	Roselle leaves(*Hibiscus sabdariffa*)	12	7(58.3)	*E. histolytica*	*A.lumbricoides, Trichiuris trichiura* Hookworms.
7	Carrot (*Daucus carota*)	10	6(60.0)	*E. histolytica*	*A.lumbricoides,* Hookworms.
8	Spinach(*Spinacia oleracae*)	10	7(70.0)	*E. histolytica* *G. lambia*	*A.lumbricoides,* Hookworms.
9	Jute leaves (*Corchorus olitorius*)	10	4(40.0)	*E. histolytica*	*A.lumbricoides,* Hookworms.
	Total	**106**	**66(62.3%)**		

Table 2: Frequency of occurrence of the Various Intestinal Parasites Detected on the Vegetables.

S/NO	Intestinal Parasites Detected	Frequency of occurrence
1.	*Giardia lamblia*	4
2.	*Entamoeba histolytica*	8
3.	*Ascaris lumbricoides*	8
4.	*Trichiuris trichiura*	3
5.	Hookworms.	6
	Total	29

4.DISCUSSION

In this study, the fresh vegetables examined showed relatively high level of contamination with lettuce (*lactuca sativa*) and cabbage (*Brassica olerecea*) being heavily contaminated with protozoan cysts and helminthes eggs/ova. These vegetables are among the vegetables with uneven surfaces this may probable facilitate the attachment of parasitic stages, cyst, oocyst, egg/ova, similar trend was earlier observed by Damen *et al.*, (2007) Ogunleye and Babatunde (2010), Dauda *et al*, (2011) and Mohammed *et al*, (2016).

Parasitic detection was low in Tomatoes (*Lycopersicum esculentum*). These are vegetables with smooth surface which may reduce the rate of attachment of parasites. This findings was in line with the work of other workers (Damen *et al.*, 2007; Dauda *et al*, 2011; Tefere *et al*, 2014)

In the study, both protozoan cysts and helminthes eggs/ova were detected in the vegetables screened. In a related study Ogunleye and Babatunde (2010), Dauda *et al*, (2011); Tefera *et al.*,(2014) and Mohammed *et al*, (2016) also detected these intestinal parasites on vegetables.

The most predominant intestinal protozoan and helminth parasites detected in this study were *Entamoeba histolytica* and *Ascaris lumbricoides*. Previous studies also revealed the present of these parasites detected (Dauda *et al*, 2011; Tefera *et al.*, 2014). Intestinal parasites detected in this study are transmitted through faecal-oral-route. The detection of cysts and eggs/ ova of these parasites may probably be associated with the waste water that was used for irrigation.

Although, prevalence of intestinal parasitic infection was known to be high in areas with poor sanitation and substandard hygiene particularly in the developing countries (Tefera *et al.*, 2014), these parasites are transmitted via faecal-oral-route. Although parasitic contamination of vegetables may occur in a variety of ways, detection of intestinal parasites in different vegetables in Hayin Danmani market may be related to either contamination of soil or contamination of irrigation water, Adequate public health education on the need to wash fresh vegetables with salt water prior to

consumption will reduced the possible risk of transmission of intestinal parasites through consumption of contaminated vegetables.

COMPETING INTERESTS

Authors have no competing interest.

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