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The Prevalence of Intestinal Parasites on Fruits Sold in Markets Around Gwagwalada Area Council, F.C.T, Abuja

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Keywords

Prevalence, Fruits, Intestinal Parasites, Markets, Contamination

The prevalence of intestinal parasites on fruits sold in markets around Gwagwalada Area Council, Federal Capital Territory- Abuja was studied. Five different types of fruits were sampled from three markets (Zuba, Gwagwalada and Dobi) in Gwagwalada Area Council. A total of 600 samples were examined for intestinal parasites using sedimentation method. 252 (42%) of the 600 fruits were positive for intestinal parasites microscopically. Among these fruits, pineapple had the highest number of intestinal parasites which was 82 (68.3%) and the lowest was banana 33 (27.5%). Parasites found were ova of *Ascaris lumbricoides* (22.6%), cysts of *Entameaba histolytica* (22.2%), eggs of Hookworm (21%), eggs of *Enterobius vermicularis* (9.9%), larvae of *Strongyloides stercoralis* (8.3%), cysts of *Giardia lamblia* (7.9%), eggs of *Clonorchis sinensis* (5.6%) and eggs of *Hymenolepis nana* (2.4%). Data were subjected to analysis of variance (ANOVA) and it showed that there was significant difference ($P<0.05$) on the prevalence of the parasites on the five types of fruits sampled. In conclusion the result from this research shows high contamination levels of fruits with intestinal parasites from three different markets in Gwagwalada, indicating presence of a great risk of acquiring intestinal parasite infections by eating improperly washed fruits.

Introduction

Fruit in a common sense and language normally means the fleshy seed-associated structures of a plant that are sweet and edible in the raw state, such as apples, oranges, grapes, water melons, cucumber banana. Fruits and vegetables are good sources of mineral elements such as iron, and vitamins, including vitamin C, Vitamin B12, Niacin and Riboflavin. For their nutritive value, man has been utilizing fresh fruits for the production of varieties of consumable like juices, jams, beverages, and wines or eaten directly as food. Fruits play major role in the nutritional livelihood of human population especially in undeveloped country like Nigeria where there is poor socio-economic condition (Adeboye and Adedayo, 2008). Unfortunately, people do not wash the fruits properly before eating. Eating unclean, raw, or undercooked fruits and vegetables is one of the means by which the transmission of intestinal parasitic infections is propagated. Market fruits are often contaminated by the eggs of human intestinal nematodes where human and animal faeces are extensively used as fertilizer and reused waste water (Alli *et al.*, 2011). Great risk for contamination of food with parasites also occurs during farm operation and their dissemination during food processing due to increase interest in organic farming.

Intestinal parasites are one of the most common infections in human especially in tropical and sub-tropical countries. Out of 60 million deaths in the world; more than 25% are accounted to parasites (Arora and Arora, 2008). It has been estimated that human harbors about 300 species of parasites worms and over 70 species of protozoa and some of these parasites may have been acquired from food especially raw fruits, water and animals (Alli *et al.,* 2011). Parasitic infections are associated with a high incidence of dysentery, chronic colitis, anaemia, intestinal obstruction and for children, it consumes nutrients, weaken the immune system and as well retard physical and mental development. Furthermore, it also leads to intrauterine growth retardation, prematurity and low birth weight among newborns born to infected mothers (Adeboye and Adedayo, 2008; Ezeamama *et al*., 2005)

The major way of selecting the appropriate intervention steps to reduce population to pathogenic microorganism on fruits is to identify sources of contamination and ecology of the pathogens as it is affected by processing practices. Therefore the general objectives of this work was to assess the prevalence of intestinal parasites on some fruits sold in markets around Gwagwalada Area Council, FCT-Abuja, identifying the fruit with the greater risk of parasitic infection, market that indicate high level of contamination.

Materials and Methods

Study Area

The study was carried out in Gwagwalada Area Council of Federal Capital Territory (Abuja) Nigeria. Gwagwalada is one of the six Area Councils of the Federal Capital Territory of Nigeria together with Abaji, Abuja Municipal, Bwari, Kuje, and Kwali; the FCT also includes the City of Abuja. It is the second largest area council in FCT after Abuja Municipal Area Council (AMAC). Gwagwalada Area Council consists of Gwagwalada town and five traditional communities namely Paiko, Zuba, Gwako, Ibwa and Dobi. It has an area of 1,043 km2 and a population of 157,770 at the 2006 census. It is situated along Abuja – Lokoja road, about 55km Southwest of the Abuja City Centre, between Latitudes 8° 55′ N to 9° 77′ N and Longitude 7° 04′ E to 12° 07′ E. The annual temperature is between 19°C – 38°C and amean total annual rainfall of approximately 1,650mm with raining season starting fully from May to October while dry season starts from November to April (Ishaya and Grace, 2007).

Sample Collection

Five types of fruits including *Citrus sinensis* (sweet orange), *Musa* spp (banana), *Ananus comosus* (pineapple), *Citrillus lanatus* (water melon) and *Mangifera indica* (mango) were bought from three major markets (Zuba, Dobi and Gwagwalada) in Gwagwalada Area Council. Equal numbers of samples (120 each, totally 600 samples) were collected from the market. The samples were collected into a sterile polythene bags and transported to the Biology laboratory of the Department of Biological Sciences, University of Abuja for parasitological analysis. The study was conducted from June to July of 2015.

Sedimentation Method

20 samples of each fruits' surface were washed in 450ml of distilled water in a sterile beaker for each preparation. The water was left to settle for 30 minutes and then the settled water was decanted without disturbing the settled suspension and the decant water discarded. The suspension was strained through a sterile sieve to removed undesirable materials like sand. 15ml of 10% formalin was added to the filtrate. The solution formed from the addition of 10% formalin to the filtrate was stirred fervently and put into the centrifuge tube. The tube was then placed in a centrifuge and spun at 3000rpm for 5 minutes (Damen *et al.,* 2007). The resulting supernatant was decanted and discarded to leave only the sediment for laboratory analysis.

Laboratory Analysis

The sediments were tapped to mix and a drop was applied on the center of a clean glass slide and one drop of lugol's iodine was added. The glass slide was covered gently with coverslip to avoid air bubbles and over-flooding. The slide was then placed on a microscope for viewing. X10 and X40 objectives were used for viewing and the number of ova, larvae and cysts of the parasites were isolated, counted and recorded.

Identification of Parasites

The various cysts, eggs and larvae of the parasites were identified by their morphological characteristic such as the shapes and sizes of the eggs using Arora and Arora, (2010).

Statistical Analysis

The result obtained were analyzed using Analysis of Variance (ANOVA) for any significant differences on the prevalence of

intestinal parasites on fruits at P<0.05 level of significance.

Results

Total number and percentage contamination for fruits were 252 (42.0%) of 600 samples collected. Highest contamination was in pineapple 82 (68.3%) while the banana 33 (27.5%) had the lowest contamination (Table 1).

Table 1. *Percentage prevalence of intestinal parasites on some fruits sold in markets around Gwagwalada Area Council, FCT-Abuja.*

Fruits	Number Examined	Number Contaminated	Percentage (%) Contaminated
Watermelon	120	54	45.0%
Orange	120	34	28.3%
Mango	120	49	40.8%
Pineapple	120	82	68.3%
Banana	120	33	27.5%
Total	600	252	42.0%

Table 2 shows the prevalence of intestinal parasites contamination among fruits sampled with greater risk of infection. Pineapple recorded the highest prevalence of infection82 (68.3%). *Ascaris lumbricoides* 57 (9.5%) recorded the highest parasite prevalence while *Hymenolepis nana* 6 (1.0%) was the least.

Table 2. *The prevalence of intestinal parasites contamination among fruits sampled with greater risk of infection.*

	Watermelon	Orange	Mango	Pineapple	Banana	Total (%)
No. of Samples Examined	**120**	**120**	**120**	**120**	**120**	**600**
A. lumbricoides	14 (11.7%)	7 (5.8%)	8 (6.7%)	20 (16.7%)	8 (6.7%)	57 (9.5%)
S. stercoralis	4 (3.3%)	2 (1.7%)	6 (5.0%)	8 (6.7%)	1 (0.8%)	21 (3.5%)
Hookworm	10 (8.3%)	6 (5.0%)	11 (9.2%)	18 (15.0%)	8 (6.7%)	53 (8.8%)
E. histolytica	13 (10.8%)	8 (6.7%)	9 (7.5%)	19 (15.8%)	7 (5.8%)	56 (9.3%)
G. lamblia	5 (4.2%)	4 (3.3%)	4 (3.3%)	4 (3.3%)	3 (2.5%)	20 (3.3%)
E. vermicularis	5 (4.2%)	4 (3.3%)	7 (5.8%)	6 (5.0%)	3 (2.5%)	25 (4.2%)
C. sinensis	2 (1.7%)	1 (0.8%)	4 (3.3%)	4 (3.3%)	3 (2.5%)	14 (2.3%)
H. nana	1 (0.8%)	2 (1.7%)	0 (0.0%)	3 (2.5%)	0 (0.0%)	6 (1.0%)
Total	54 (45.0%)	34 (28.3%)	49 (40.8%)	82 (68.3%)	33 (27.5%)	252 (42.0%)

Discussion

Fruits constitute the essential part of our daily meals and serve as the rich sources of vitamins, minerals, protein, energy and can be very useful in treating malnutrition namely protein energy deficiencies. However, the daily consumed fruits and vegetables have been reported to be frequently contaminated with different helminth and protozoan parasites throughout the world. Fruits can become contaminated with microorganisms capable of causing human diseases while still on the plant in fields or orchards, or during harvesting, transport, processing, distribution and marketing, or in the home and are usually transmitted by contaminated water and spread by ineffective hygienic practice. The presence of intestinal parasite in fruits samples is suggestive of faecal contamination from man and or animal origin.

The present study has attempted to determine the prevalence of intestinal parasites on some fruits sold at markets around Gwagwalada Area Council, FCT-Abuja. A total number of 600 fruits were examined, out of which 252 (42%) were positive for intestinal parasites which Pineapple recorded the highest contamination 82 (68.3%) while banana recorded the least contamination 33 (27.5%). This result is similar to the work carried out by Alli *et al.* (2011) on the prevalence of intestinal parasites on fruits available in Ibadan markets were 34 (35.4%) of fruits were positive for intestinal parasites and pineapple had the highest percentage of parasite contamination of 10 (62.5%). In another similar study Uneke (2004) in Abakaliki, reported that of the 34 ova isolated from fruits, 30 were positive for Pineapple. This is due to the uneven surface of pineapple fruit which make the parasitic eggs, larvae or cysts attached to the surface of the fruit more easily either in the farm or when washed with contaminated water. Fruits like banana recorded the least contamination with parasites from my result 33 (27.5%). This is due to the smooth skins of the fruits which makes it easy for the eggs, larvae or cysts of the parasites to be washed off even with the slight washing which is usually done at the point of harvest prior to sale.

In the overall, eight different types of parasites were isolated from 600 fruits sold around Gwagwalada, FCT-Abuja. They include eggs of *Ascaris lumbricoides* (22.6%), eggs of *Entamoeba histolytica* (22.2%), eggs of Hookworm (21.0%), eggs of

Enterobius vermicularis (9.9%), larvae of *Strongyloides stercoralis* (8.3%), cysts of *Giardia lamblia* (7.9%), eggs of *Clonorchis sinensis* (5.6%) and eggs of *Hymenolepis nana* (2.4%). In this study egg of *Ascaris lumbricoides* were the most frequently encountered parasites with a prevalence of 22.6%. This result is similar with the earlier reported of (33.30%) for *Ascaris lumbricoides* as the highest out of (51.60%) positive for parasites contamination on vegetables (Malann and Soso, 2012). However, the intestinal parasites isolated in this work differ from those isolated from other parts of Nigeria. Omowaye and Idachaba (2012) isolated larvae of *Strongyloides stercoralis* (12.60%), egg of *Enterobius vermicularis* (2.42%), eggs of *Clonorchis sinensis* (4.76%) and cysts of *Entamoeba histolytica* (0.62%) from fruits sample in Kogi. In Western part of Nigeria, Alli *et al*. (2011) isolated three different types of intestinal parasites from 96 fruits. These parasites include ova of *Ascaris lumbricoides* 19 (55.9%), ova of hookworm 11 (32.3%) and *Strongyloides stercoralis* (11.8%). In southwest Ethiopia Tefera*et al.* (2014) isolated larvae of *Strongyloides stercoralis* (21.9%), ova of *Toxocara* species (14.7%), *Cryptosporidium* species (12.8%), *Hymenolepis* nana (8.3%), *Gardia lamblia* (7.5%), *Ascaris lumbricoides* (6.7%), *Entamoeba histolytica*/*dispar* (5.3%), *Cyclospora* species (5.0%) and *Hymenolepis diminuta* (1.4%) from fruits and vegetables (Tefera *et al.,* 2014). Geographical location, type, and number of samples examined, methods used for detection of the intestinal parasites, type of water used for irrigation, and post-harvesting handling methods of vegetables are different from country to country and region to region. This could be the reason for variation in prevalence in different parts of world. Despite variation in isolated parasites, ova of *Ascaris lumbricoides* and ova of Hookworm were common to all fruits in all the studies, this could be due to the fact that these parasites can withstand a wide variety of adverse environmental conditions which could serve as an indication of water pollution as a result of indiscriminate defaecation resulting in pollution of water and farmlands (Damen *et al.*, 2007). However, there was significant difference ($P<0.05$) in the prevalence of intestinal parasites on type of fruits sampled.

Conclusion

In conclusion, the result from this research shows high contamination levels of fruits with intestinal parasites from three different markets in Gwagwalada, indicating presence of a great risk of acquiring intestinal parasite infections by eating improperly washed fruits. It is assumed that these contaminations ranged from one factor to the other such as contamination of soil by human and animal faeces, poor sanitary environment of the markets, and unhygienic transportation of the produce to the markets. The findings also sound warning both to the seller and the consumer or indiscriminate handler of such product with contamination.

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