

Role of Contaminated Fruits in the Transmission of Intestinal Parasites in Khartoum Central Market-Khartoum State

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Abstract: Fruits play an important role in transmission of parasitic diseases to human in Khartoum. So, increasing consumer awareness about the risks factors associated with consumption of raw fruits is very important. Education on food hygiene should be strengthened to change unhealthy dietary habits and ensure safe daily food consumption. This study was conducted at Khartoum central market, in Khartoum state-Sudan to detect the parasitic contamination of fruits. Microscopic examination of the samples was carried out after washing the fruits by formal saline and then examining the sediment after centrifugation using wet preparation. A total of 233 samples of fruits were collected randomly, with six types of fruits included (apple, banana, mango, orange, grape and guava), during the period from December 2017 to April 2017. Among the 233 samples, forty three 43 (18.5%) samples were positive for intestinal parasites. Among positive samples, banana and apple were found to have the highest parasitic prevalence. The parasites identified were insects, *S. stercoralis*, *E. coli*, *E. histolytica*, *Taenia spp*, *Ascaris*, *Schistosoma*, *H. diminuta* and Hook worms. The results showed that Insects were the most prevalent as they were detected in 11 samples.

Keywords—Fruits; Khartoum; Parasite; insect;

1. INTRODUCTION

Fruits are good sources of vitamins, minerals which aid our bodies to function properly. An important nutritional value of fruits is its antioxidant contents such as polyphenolic flavonoids, vitamin-C, and anthocyanins [1]. These compounds, protected human body from oxidant stress, diseases, and cancer. Fruits such as orange, tomato have the highest antioxidant value (Halvosen et al 2002)[2]. Eating fruits daily is recommended to reduce risks for diseases like cardiovascular disease and cancer (Heimendinger, et al 1996) (Krauss RM, et al 2000) [3,4].

Parasites are living organisms which receive nourishment and shelter from other organisms (host) where they live [5]. Parasitic diseases is one of the major public health problem all over the world with high degree of morbidity and mortality, according to WHO parasites are one of the leading cause of death after HIV/AIDS and Tuberculosis [6]. One out of ten living persons suffers from one or more seven major tropical diseases of which five are parasitic in nature (Alli J.A., et al. 2011)[7]. *Cryptosporidium*, *Cyclospora*, *Giardia*, *Entamoeba histolytica*, *Entamoeba coli*, and *Ascaris lumbricoides* are considered to be the most common parasitic contamination of fruits and vegetables (Tefera, et al.2014)[8]. Protozoan parasites are capable of causing food-borne diseases, and some protozoan infections lead to serious health

and economic issues in many developing and developed countries (Pepper, et al.2011)[9]. Infection with fruits-transmitted parasites occurs due to consumption of contaminated fruits [10]. Fruits can be contaminated as a result of various associated factors related to planting, such as while they are still on the field, harvesting, transportation, storage, market chain, and even at home (Idahosa, 2011)[11]. Vegetables and fruits particularly those eaten raw and without peeling can be agent of transmission of protozoa and helminthes (Porter, et al.1990)[12].

2. Materials and methods:

2.1 Study design:

This is a cross sectional study.

2.2 Study area and study period:

The study was conducted in Khartoum state during period from February 2017 to April 2017. Fruits samples were collected from Khartoum central market.

2.3 Study samples:

The fruits used in this study were apple, banana, mango, orange, grape and guava.

2.4 Sample size:

A total of 233 samples were collected, fruits were picked randomly from the market to obtain qualitative estimation of parasitic contamination of these fruits.

3. Methods

3.1 Collection of fruits sample:

Six types of fruits used in the study including *Ananus comosus* (apple), *Musa spp* (banana), *Mangifera indica* (mango), *Citrus sinensis* (orange), grape (vitaceae) and guava (myrtaceae) were randomly collected from the central market of Khartoum during two months. Each sample was placed in a labeled plastic bag.

3.2 Concentration technique with formal saline:

The samples were washed in 10% formal saline, each sample was soaked and washed in 30ml of the washing saline for detaching the parasitic stages (ova, larvae, oocysts and cysts) of protozoan and helminthes parasites which then was allowed to stand for 24 hours, then 15 ml of the sediment was centrifuged at 3000 rpm for 5 minutes using 15 ml falcon tubes, then the sediment was prepared for microscopically examination. The samples were examined under light microscope (10X and 40X), and the parasitic stage identified according to (Soulsby, 1982) [13].

3.3 Data analysis:

Data were analyzed using statistical package for the social sciences (SPSS program). A Pearson chi-square test was used to compare between the different prevalence of intestinal parasites among different categories. Frequencies and percentages tests were used.

4. Results:

Six different types of fresh fruits were tested from central Khartoum market. A total of 233 samples were examined for intestinal parasites. Forty three 43 (18.5%) of the 233 samples were positive for intestinal parasites. Among positive samples, banana and apple were found to have the highest parasitic prevalence, banana positive samples were 13(5.6%), apple positive samples were 10(4.3%), guava positive samples 7(3%), grape positive samples 6(2.6%), orange positive samples 2(0.9%), mango positive samples 5(2.1%) (Table 1).

The results showed that insect was the most prevalent as it was detected in 11 samples, followed by *S. stercoralis* which detected in 8 samples, whereas *E. coli* detected in 7 samples, and *E. histolytica* detected in 6 samples, *Taenia spp* and *A. lumbricoides* the both were seen in 3 positive samples, *Schistosoma spp* and *H. diminuta* both were detected in 2 samples, Hook worms only detected in one samples (Tables 2).

Table1: Distribution of intestinal parasites among fruits

Fruits		Result		Total
		positive	negative	
mango	Number of Examined	5	9	14
	%	2.1%	3.9%	6.0%
apple	Number of Examined	10	20	30
	%	4.3%	8.6%	12.9%
orange	Number of Examined	2	5	7
	%	.9%	2.1%	3.0%
banana	Number of Examined	13	23	36
	%	5.6%	9.9%	15.5%
guava	Number of Examined	7	5	12
	%	3.0%	2.1%	5.2%
grape	Number of Examined	6	128	134
	%	2.6%	54.9%	57.5%
Total	Number of Examined	43	190	233
	%	18.5%	81.5%	100.0%

Table 2: Distribution of intestinal parasites in relation to the

Fruits	<i>S. strongyloides</i>	<i>Taenia spp.</i>	<i>E. histolytica</i>	<i>E. coli</i>	<i>Ascaris</i>	<i>Schistosoma spp.</i>	<i>H. diminuta</i>	Hookworms	Insect	Total
Mango	0	1	0	1	0	1	0	0	2	5
Apple	1	0	2	1	2	0	1	1	2	10
Orange	0	0	0	0	0	0	1	0	1	2
Banana	2	2	2	1	0	1	0	0	5	13
Guava	3	0	2	1	1	0	0	0	0	7
Grape	2	0	0	3	0	0	0	0	1	6
Total		8	3	6	7	3	2	2	1	11

type of fruits

5. Discussion

Fruits play major role in the nutritional livelihood of human population especially in undeveloped country where there is poor socio-economic condition (Alli *et al.*, 2011)[14]. There has been an increase in number of reported cases of food borne illness linked to consuming fresh vegetables and fruits [15]

The present study examined 6 different types of daily consumed fruits. Several types of parasites were detected, that indicates that the consumption of fresh fruits plays an important role in transmission of parasites.

The study results highlighted the high rate of parasitic contamination in banana (13) (5.6%) and for apple it was (10) (4.3%) positive samples.

The results showed that insect was the most prevalent as it was detected in 11 samples, followed by *S. stercoralis* which was detected in 8 samples.

Some larvae have nematode features (rhabditifoid esophagus), but it was too small to be defined as *S. stercoralis* or Hook worm larvae.

Several researches that have been conducted from different parts of the world concluded that fruits can be effective agents for transmission of parasitic infection. A study of Yoila and Utitofon, (2015) Nigeria in which 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, Pineapple recorded the highest contamination (82) (68.3%) while banana recorded the least contamination (33) (27.5%)[16].

Another work carried out by Alli, et al. (2011) on the prevalence of intestinal parasites on fruits available in Ibadan markets were (34) (35.4%) and pineapple had the highest percentage of parasite contamination (62.5%)[14].

In another similar study of conducted by Uneke, (2007) in Abakaliki, reported that the 34 ova isolated from fruits, 30 were positive for pineapple [17].

Compared with the previous study, our study showed a different prevalence rates, probably due to geographical and socio-economic differences, type and number of samples tested, methods used for detection, type of water used in irrigation and post harvesting methods and use of sewage to clean the fruits play an important role in the epidemiology of transmission of the parasitic diseases.

6. Conclusion:

This study concluded the fact that fresh fruits play an important role in transmission of parasitic disease to human in Khartoum, and the consumption of fruits without proper washing is a way by which the transmission of these parasites is encouraged. This finding also sound warning the consumer, sellers in Khartoum being at high risk of infection with different parasitic diseases.

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