

Prevalence of Intestinal Parasites on Fruits Available in Ibadan Markets, Oyo State, Nigeria

^{1,3}J.A. Alli, ²GO Abolade, ¹A.F. Kolade, ¹A.O. Salako, ¹C.J. Mgbakor, ¹M.T. Ogundele, ²A.J. Oyewo and ¹M.O. Agboola

¹Department of Medical Microbiology and Parasitology, University College Hospital (UCH), Ibadan, Nigeria

²Medical Microbiology and Parasitology Unit, School of Medical Laboratory Science, University College Hospital (UCH), Ibadan, Nigeria

³Department of Medical Microbiology and Parasitology, Obafemi Awolowo College of Health Sciences, Olabisi Onabanjo University, Sagamu, Ogun State, Nigeria

Abstract: The study to determine the parasitological contamination of fruits was carried out in Ibadan Markets in Oyo State. Six different types of fruits were sampled from four different markets (Bodija, Agbeni, Beere and Oje) in Ibadan town. A total of 96 samples were examined for intestinal parasite using sedimentation and floatation methods. 34 (35.4%) of the 96 fruits were positive for intestinal parasites microscopically. Among these fruits, pineapple had the highest number of intestinal parasites which was 10 (62.5%) positive and the lowest was watermelon 2 (12.5%). Parasites implicated were ova of *Ascaris lumbricoides* (55.9%), ova of Hookworm (32.3%) and *Strongyloides stercoralis* (11.8%). There is no significant difference between the two methods ($t=0.096$, $P<0.05$). Results of the current study show high level of fruits contamination with intestinal parasites from four different markets in Ibadan, Oyo State suggesting existence of a great risk of acquiring intestinal parasites by eating improperly washed fruits.

Key words: Intestinal parasite % Fruits % Market

INTRODUCTION

Indigenous fruits are known to play major role in the nutritional livelihood of the Nigerian population especially in the rural area where there is poor socio-economic conditions [1]. Unfortunately, people do not wash them properly before eating. The climate and topography of South-West Nigeria are suitable for growth of these fruits throughout the year, using rain during wet season and irrigation during dry season. These two sources of water are highly polluted with human and animal faeces which represent high risk to farmers and consumers of fruit products. Market fruits are often contaminated by eggs of human intestinal nematodes where human and animal faeces are extensively used as fertilizer and reused waste water. This indirect reserve of river water contains a substantial percentage of municipal refuse and sewage. This practice is gaining prominence in Nigeria as a result of the growing cost of mineral fertilizer and high demand of basic fruits as a nutrient diet due to poor socio-economic conditions [2].

Epidemiological studies have indicated that areas of South-West Nigeria are characterized by endemic helminthic diseases in populations where raw untreated waste water is used for irrigated fruits and consumption of such waste irrigated fruits generally eaten unwashed and uncooked, may lead to parasitic infestations [2].

In this context of fruits and parasites, there is need for increase awareness with this increasing population, poor socio-economic conditions, urbanization and poor sanitation. Parasites are living organisms which receive nourishment and shelter from other organisms (host) where they live. Parasite is one of the "Nature Hangmen" because parasitic diseases continue to be a major public health problem all over the world with associated high degree of morbidity and mortality. According to WHO, parasites are one of the leading cause of death after HIV /AIDS and Tuberculosis. One out of ten living persons suffers from one or more seven major tropical diseases of which five are parasitic in nature [3].

Out of 60 million deaths in the world, more than 25th are accounted to parasites and with increasing population, urbanization, industrialization, poor socio-economic conditions and poor sanitation facilities in developing countries, deforestation, unplanned reforestation and climatic changes, some diseases which were previously unrecognized are emerging [3].

Ethnic eating habits, poverty, tourism to exotic areas and environmental degradation have led to emergence of food-borne parasitic infection [3]. It has been estimated that human harbors about 300 species of parasite worms and over 70 species of protozoa. Some of these parasites may have been acquired from food especially raw fruits, water and animals. Common food-borne parasites include three types of worms (Cestodes, Trematodes and Nematodes) and several protozoa [4]. Facilities in this developing country like Nigeria to improve the parasite potential effect on public and health care issue to economic consequences of people's productivity and agricultural loss are not readily available. Therefore the general objective of this work is to determine the prevalence of intestinal parasites on some fruits at Ibadan Markets.

MATERIALS AND METHODS

Study Area and Subjects: The study was carried out between February 2010 and July, 2010. Fruits were sampled from major markets in Ibadan, Oyo State where majority of the populace depend on the source to buy these products. Though there is poor drainage and sanitation characterized by the presence of refuse dump sites nearby. The parasitological survey of these products was carried out At University College Hospital Ibadan. These fruits were picked from our major markets in Ibadan, Oyo State. These markets were selected because majority of the farmers are from different locations within the state conveying their farm products which includes fruits, for sale in these markets.

Sample Collection: The fruits used in the study were mango, oranges, water melon, pineapple, banana and cherry. Ninety-six samples of fruits were picked up to obtain qualitative estimation of parasitic contamination of these fruits.

Sample Analysis

Sedimentation Method: 250g samples of each fruits were washed in distilled water in a plastic container for the removal of the parasitic ova, larva or cysts. The suspension was strained through a sterile sieve to remove

undesirable materials [5]. The filtrate was centrifuged at 5000 rpm for 5 minutes [2] and the supernatant was discarded into the disinfectant jar. The sediment was mixed and a drop was applied on the centre of a clean grease-free slide, a clean cover slip was placed gently to avoid air bubbles and over-flooding. The preparation was examined under microscope for parasites using X10 and X40 objectives.

Floatation Method: 250g samples of each fruits were washed in distilled water in a plastic container for the removal of parasitic ova, larva or cysts. The suspension was strained through a sterile sieve to remove undesirable materials [5]. The filtrate was centrifuged at 5000 rpm for 5 minutes [2] and the supernatant was discarded into the disinfectant jar. The sediment obtained was re-suspended in zinc sulphate floatation fluid and re-centrifuged. The floatation fluid was added to fill to the brim and a cover slip was super-imposed on it. The cover slip was lifted and examined under microscope using X10 and X40 objectives [5].

RESULTS

Six different types of fruits were sampled from four different markets in Ibadan town. A total of 96 samples were examined for intestinal parasite. 34 (35.4%) of the 96 fruits were positive for intestinal parasites microscopically. Among these fruits, pineapple had the highest number of intestinal parasites which was 10(62.5%) positive and the lowest was watermelon 2(12.5%).

Table 1 shows the parasitic profile of each fruit sample examined in four markets. The highest prevalence of intestinal parasites was seen at Bodija and Oje markets while the lowest was from Beere and Agbeni markets.

Table 2 shows the prevalence of intestinal parasites on fruits from each market. Table 3 shows the frequency of parasites isolated on fruits in various markets. Table 4 shows the overall frequency of intestinal parasites isolated from 96 fruits from this study. The overall frequency of isolated parasites was *Ascaris lumbricoides* 19(55.9%), Ova of Hookworm 11(32.3%) and *Strongyloides stercoralis* 4(11.8%).

Table 5 shows the comparison between the two different methods employed i.e Sedimentation method and Floatation method using zinc sulphate (ZnSO₄) sedimentation technique recovered the highest number of parasites 28(86.9%) while floatation technique recovered only 6(13.1%), while Fig. 1 the t-test for sedimentation and floatation technique mean parasite count.

Table 1: Number of Fruit Samples Contaminated with Intestinal Parasites in Each Market

Fruits	Bodija Market	Oje Market	Agbeni Market	Beere Market	No. Examined	No. (%) Positive for intestinal parasites
Mango	4	4	4	4	16	7(43.75)
Cherry	4	4	4	4	16	7(43.75)
Pineapple	4	4	4	4	16	10(62.5)
Banana	4	4	4	4	16	3(18.75)
Orange	4	4	4	4	16	5(31.25)
Water-Melon	4	4	4	4	16	2(12.5)
Total	24	24	24	24	96	34(35.4)

Table 2: Prevalence of Intestinal Parasites on Fruits from Each Market

Fruits	Bodija Market		Oje Market		Agbeni Market		Beere Market	
	Number Examined	Number Positive	Number Examined	Number Positive	Number Examined	Number Positive	Number Examined	Number Positive
Mango	4	3	4	2	4	-----	4	2
Cherry	4	2	4	2	4	2	4	1
Pineapple	4	4	4	2	4	2	4	2
Banana	4	2	4	1	4	-----	4	-----
Orange	4	2	4	-----	4	1	4	1
Water melon	4	3	4	-----	4	-----	4	-----
Total	24	16	24	7	24	5	24	6
Percentage		66.7%		29.1%		20.8%		25%

Table 3: Frequency of Parasites Isolated on Fruits in Various Markets

Markets	Isolated parasites	Mango (%)	Cherry (%)	Pineapple (%)	Banana (%)	Orange (%)	Water-Melon (%)
Bodija Market	A	3(75)	1(25)		2(50)	2(50)	
	S			2(50)			
	H			2(50)			3(75)
Oje Market	A	1(25)	2(50)		1(25)		
	S						
	H	1(25)		2(50)			
Agbeni Market	A		2(50)			1(25)	
	S						
	H			2(50)			
Beere Market	A	2(50)	1(25)			1(25)	
	S			2(50)			
	H						

A-----Ova of *Ascaris lumbricoides*

S-----Larva of *Strongyloides stercoralis*

H-----Ova Hookworm

Table 4: Frequency of Isolated Intestinal Parasite

Parasites	Frequency of Isolation	Percentage
Ova of <i>Ascaris lumbricoides</i>	19	55.9%
Ova of Hookworm	11	32.3%
<i>Strongyloides stercoralis</i>	4	11.8%
Total	34	100

Table 5: Comparison of the Two Techniques Employed

Parasites	Sedimentation Method	Percentage	Floatation Method	Percentage
Ova of <i>Ascaris lumbricoides</i>	15	78.9%	4	21.1%
Ova of Hookworm	9	81.8%	2	18.2%
<i>Strongyloides stercoralis</i>	4	100%		0%
Total	28	86.9%	6	13.1%

Fig. 1: T- Test for Sedimentation and Floatation Technique Mean Parasite Count

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	Df	Sig. (2 tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
		Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower
Number of Parasites	Equal variances assumed	1.747	.257	2.168	4	.096	7.33333	3.38296	-2.05928	16.72595
	Equal variances not assumed			2.168	2.518	.136	7.33333	3.38296	-4.69642	19.36309

P-value<0.05 = significant

Since the P-value =0.096, it is not significant i.e, there is no significant difference between the two methods.

DISCUSSION

Food-borne parasitic infections have received little attention in developing countries. As a rule, these organisms contaminate fruits while still on the field and are usually transmitted by contaminated water and spread by ineffective hygienic practice [6].

A total number of 96 fruits were examined, out of which 34(35.4%) were positive for intestinal parasites and in which Pineapple recorded the highest number (62.5%) while Water melon recorded the least parasitic contamination (12.5%).

This result is similar to the study carried out by Damen *et al.* [2] in Jos, where 36% parasitic contamination was recorded. In another study carried out by Uneke, [7] in Abakaliki, reported that of the 34 ova isolated from fruits, 30 were positive for Pineapple.

Results from this study shows that Bodija market recorded the highest prevalence (66.7%), followed by Oje market (29.1%), Beere market had (25%) while Agbeni market recorded (20.8%). The high prevalence of contamination with parasites on fruits are due to the fact that these open markets were characterized by the presence of refuse dumping sites nearby, poor drainage, improper disposal of faeces of traders and poor hygienic practice. These products were brought in from rural areas around these markets. Three different types of parasites were isolated from 96 fruits collected from these markets. These parasites include Ova *Ascaris lumbricoides* 19(55.9%), Ova hookworm (32.3%) and *Strongyloides stercoralis* 4(11.8%). However, the intestinal parasites isolated from this study differ from those isolated from other parts of Nigeria. Damen *et al.* [2] isolated *Trichomonas hominis* (24.9%), Ova *Ascaris lumbricoides* (17.1%), Ova of Hookworm (19.8%), *Entamoeba histolytica* (14%), *Strongyloides stercoralis* (16.7),

Trichuris trichuria (5.1%) and *Hymenolepis nana* (2.4%) in Jos. Uneke isolated Ova of Hookworm (36.4%), Ova of *Ascaris lumbricoides* (54.2%) and *Trichuris trichuria* (9.3%) in Abakaliki, Ebonyi State [7].

Variation in the parasites recorded may be due to differences in the geographical location of the study. 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 as observed by Damen *et al.*, [2]. Faecal contamination of water sources used in crop irrigation is important sources of human infection, so contamination of fresh fruits are of greatest concern [8]. It was reported that in recent years, there has been an increase in the number of reported cases of food-borne illness linked with fresh fruits due to contamination arising as a consequence of treating soil with organic fertilizers such as manure, sewage sludge and from irrigation water. The consumption of raw fruits is a major way in the transmission of parasites of food-borne illness because consumers would want to retain natural taste and preserve heat labile nutrients to be derived from these fresh fruits [9, 10]. This in essence may increase food borne parasitic infections.

Comparing the two conventional techniques used in isolation of the parasites in this study, it was observed that sedimentation method had the highest recovery rate (86.9%) while floatation method is (13.1%) as shown in Table 4 which is in line with the study of Damen *et al.* [2] who had a recovery rate of 36% using sedimentation method although when subjected to statistical analysis there is no significant difference between the two methods (t =0.096, P<0.05) as shown in Fig. 1.

CONCLUSION

The result from this study shows high contamination level of fruits with intestinal parasites from four different markets in Ibadan, Oyo State suggesting existence of a great risk of acquiring intestinal parasitic infections by eating improperly washed fruits. It also confirms the use of any of the concentration method in recovering parasites.

RECOMMENDATION

Enlightenment programmes for the public on necessity of food sanitation and personal hygiene should be intensified. Government should build modern markets with all necessary modern amenities such as toilets, running tap water and good drainage to ensure good sanitary system in our markets. Government should also provide inorganic fertilizers at affordable rates to farmers in order to discourage the use of faeces as fertilizers.

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