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Fruits Consumption Pattern and its Implication on Parasite Transmission in Yenagoa Metropolis, Nigeria

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Abstract

The identification of the source of contamination and the knowledge of the fruit-eating habits among the human population are basic prerequisite for estimating the implication of foodborne diseases. This study was undertaken to assess the fruits consumption habit and its implications on parasite transmission in Yenagoa metropolis during July-September, 2017. Descriptive study design was adopted to determine the fruit consumption pattern among 50 individuals who were presented at randomly selected fruit vendors in Yenagoa metropolis. A total of 400 fruits were bought randomly from ten fruit vendors and transported immediately to the Microbiology Laboratory, Niger Delta University, Amassoma for microscopic analysis. The experimental procedures and identification of parasites followed standard techniques. Parasites were identified microscopically using 10X and 40X objectives. One hundred percent of the total respondents accepted that they are used to eating fruits. Apple accounted for (36%) of the most preferred fruit consumed. The percentages of people, who always wash their fruits before eating, wash fruits with water and salt before eating and those who do not wash their fruits before eating are 52%, 18% and 30% respectively. Out of the forty fruits examined for parasites infestation from among Carrot, Tomato, Garden egg and Pepper, 8(20%) were infested with parasites. Five (5) species of parasites were recovered from the fruits. The fruits in the order of parasites infestation are a carrot (51.22%), Tomato (36.6%), Garden egg (17.1%), pepper (0.0%). The differences were not significant (χ^2=0.0148; df=3 P>0.05). Parasites in the order of occurrence are *Entamoeba histolytica* (58.5%), *Ancyclostoma duodenale* 4(14.6%), *Ascaris lumbricoides*7(17.1%) *Trichuris trichura* 5(12.2%) and *Strongyloides stercoralis* (2.44%) The differences were significant (χ^2=0.0148; df=3 P<0.05).

Keywords: Fruits; Consumption; Parasites; Transmission; Yenagoa

Introduction

Background of the study

Fruitsare fleshy seed-associated part of the plant. They play a major role in the nutritional value of human diet in many undeveloped countries like Nigeria where the socio-economic condition of the people is poor [1]. They are good sources of mineral elements such as iron, vitamin C, Vitamin B12, Niacin, and Riboflavin. High intake of fruits and vegetables can prevent chronic diseases such as heart diseases and certain types of cancer [2]. It is also associated with an increase in all birth size parameters [3,4]. Fruits such as orange, carrot, garden egg, and tomato have the highest antioxidant value [5].

Ethnic consumption pattern of fruits has been a major source of fruit borne parasitic infection [6]. Raw fruits are transport host and agents of transmission of most parasitic protozoans and helminths [7]. They are potential sources of a human parasitic infection contracted during production, harvesting, collection, transport and preparation or processing of food.

Parasitic infections account for 25% of the 60 million deaths in the world [8]. Over 300 species of parasitic worms and >70 species of protozoan parasites in human were acquired from food, raw fruits, water,and animals [9]. Foodborne parasitic infections are responsible for a high incidence of dysentery, chronic colitis, anemia, intestinal obstruction, physical and mental development retardation and weakened immune system in children [10]. The intestinal parasites that constitute major contaminants of fruits are *Ascaris lumbricoides*, *Ancylostoma duodenale*,*Trichuris trichura*, *Strongyloides stercoralis*, *Enterobius verminicularis*, *Taenia solium*[11-14] Studies have also shown that fruits consumption pattern especially the ones that are eaten raw has a strong correlation with the transmission of parasitic infection [15,16] and plays an important epidemiological role in the transmission of parasitic diseases [17]. It is evident that most of the fruits purchased at markets in different regions were contaminated with helminthes eggs as well as protozoan oocysts [18]. Unfortunately, the publicity of the insanitary habits of not washing fruits properly before eating has received little attention in Bayelsa State. The identification of the sources of contamination and the knowledge of the fruit-eating habits among the human population are basic pre-requisites for estimating the implication of foodborne diseases. This study is aimed at assessing the consumption pattern of fruits and the risk of parasitic infection in some part of Bayelsa State. The result of this study shall regulate the activities of fruits handlers.

Materials and Methods

Study area

This study was conducted in Yenagoa metropolis (4°53′N and 5°17′E) the capital city of Bayelsa State and also the headquarter of Yenagoa municipal.

Study design

The study adopted a survey and descriptive study design to determine the fruit consumption pattern and its implication on the transmission of intestinal parasites during July-September 2017.

Sample and sampling technique: The study population comprises of all individuals in Yenagoa metropolis, Bayelsa State. The samples were all individuals who showed interest in filling the questionnaires.

Research instrument: The instrument used for data collection is a self-structured questionnaire tag: The fruits consumption pattern in Bayelsa State. Each questionnaire comprised of two sections; A and B.Section A contained demographic information of respondents. Section B contains items that elicit the response in individuals.

The validity of the research instrument: The research instrument were corrected and validated okay by an expert in measurement and evaluation to have satisfied the purpose for which the research was designed.

Reliability of research instrument: The questionnaires were first pilot tested among 10 individuals in Sagbama. The scores were analyzed using Spearman rank correlation coefficient. The correlation was positive (r=0.66) and confirmed to be reliable.

Method of data collection: A total of 50 individuals were selected based on acceptance. The willful individual issued a copy of the questionnaire to fill. All the questionnaires were retrieved and used for the data analyses.

Collection of fruit samples: Fruits used in this study were Tomato, Carrot, garden egg and Pepper. A total of 400 fruits were picked randomly from ten (10) stands in Tombia junction open market. Forty of each kind of fruits were bought and collected in a clean plastic paper and labeled accordingly. The fruits were transported immediately to the Microbiology Laboratory, Niger Delta University, Amassoma for microscopic analysis.

Microscopic examination of samples: The experimental procedures followed a standard technique in Arora, 2010.Each fruit were washed thoroughly in an equal volume of distilled water into a clean flask. The preparation was filtered through wet gauze into a clean one-liter conical flask to remove debris. The elution of eggs and cysts of parasites from the fruits was done using a concentration method as described by Cheesebrough (15). Each preparation were dispensed into clean centrifuge tubes and centrifuged at 1500 rpm for 5minutes.The supernatant was discarded into a disinfectant jar and the sediment was mixed with a few drops of Lugol iodine. A drop was applied on the center of a clean grease-free slide, and covered with slip. The slide was examined under the microscope for parasites using 10X and 40X objectives. Identification of parasite followed pictorial key in Arora [8].

Method of data analyses

Data was cross-checked for correctness before analysis. Data was entered to Microsoft office excel 2007. Both descriptive and inferential statistical procedures were utilized. Descriptive statistics involves simple percentage. Significant differences between parasites and fruits type was determined using Chi-square at 0.05 level of confidence.

Results and Analysis

Demographic information

Out of the fifty (50) questionnaires retrieved, male respondent, accounted for 62.00% while female accounted for 38.00%. Percentages of the single, married and devoiced are 72.00%, 26.00%,and 2.00% respectively. The occupational group were students (64%), trader (18%),civil servants(12%) and Artisans (6%).Details demographic information is shown inTable 1.

Variables	Frequency	Percentages
Sex		
Male	31	62
Female	19	38
Age(yrs)		
10-12	2	4
13-15	7	14
16-18	10	20
19-21	12	24
22-24	7	14
25-27	5	10
28-30	2	4
31-33	2	4
34-36	3	6
37above		
Marital status		
Single	36	72
Married	13	26
Divorced	1	2
Occupation		
Civil servant	6	12
Trader	9	18
Artisan	3	6
Students	32	64
Source: Survey data, 2017		

Table 1: Demographic information of respondents.

Fruits consumption patterns

One hundred percent of the total respondents accepted that they are used to eating fruits. Apple accounted for (36%) of the preferred fruit consumed. Fifty-four percent of the respondents accepted that the source of their fruit was from table stores while 32% had their fruits from open market; 58% bought fruits in partly covered vessels and 40% had fruits from the open shade. More respondents (54%)

sometimes eat their fruits immediately at the spot while 34% always eat it at the spot. Fifty-twopercent (52%) always wash their fruits before eating, 18%wash with water and salt before eating it while 30% do not bother washing their fruits before eating. More people (58%) had seen life organism on the fruits during eating (Table 2).

Variables	Frequency	Percentages
like eating fruits	50	100
Preferredfruits		
A	9	18
B	4	8
C	6	12
D	1	2
E	18	36
F	8	10
G	4	8
Displaying of fruits in the market		
sealed	3	6
partly covered	29	58
open air	20	40
Where fruits are bought		
supermarket	7	14
table shop	27	54
open air	16	32
Eating fruits at a spot		
Never	11	22
Always	12	24
sometimes	27	54
What you do before eating fruits		
Wash with water	26	52
wash with water and salt	9	18
Do not wash	15	30
A=Orange, B=Mango, C=Pineapple, E=Apple D=Guava, F=Garden egg,G=Tomato		
Source: Field Survey, 2017		

Table 2: Fruits consumption patterns.

Prevalence of parasites infested fruits

Forty fruits were examined for parasites infestation. The fruits are Carrot, Tomato, Garden egg,and Pepper. Out of the 40 fruits examined, 8(20%) were infested with parasites. Forty-one parasites in 5 species were recovered from the fruits. The fruits in the order of parasites infestation are a carrot (51.22%), Tomato (36.6%), Garden egg (17.1%), pepper (0.0%). The differences were not significant (χ^2=0.0148; df=3 P>0.05) Table 3.

Fruit	No. examined	No. (%) of parasites infested fruits	No. (%) of parasite recovered
Carrot	10	4(40)	21(51.22)
Tomato	10	2(20)	15(36.59)
Garden egg	10	2(20)	7(17.07)
Pepper	10	0(0)	0(0)
Total	**40**	**8(20)**	**41**

Table 3: Prevalence of parasites infested fruits.

Prevalence of intestinal parasites species recovered from fruits

Out of the 41 parasites counted in the 3 fruit types, 24 representing(58.5%) were *Entamoeba histolytica*, 4(14.6%) were *Ancyclostoma duodenale*, 7(17.1%) were *Ascaris lumbricoides*, 5(12.2%) were *Trichuris trichura* while 1(2.44) were *Strongyloides stercoralis*.The differences were significant(χ^2=0.0148; df=3 P<0.05) Table 4

There was variation in the distribution of the Parasite species across the infested fruits, althoughthe variation was not significant (χ^2=0.0148; df=3 P>0.05), Figure 1. The percentage of *Entomoeba histolytica*, *Ancyclostoma duodenale* and *Ascaris lumbricoides* in carrot, tomato and garden egg were; carrot (57.1%, 14.3%, 14.3%), tomato (53.3%,15.3%, 15.3%) and Garden egg (57.1%,14.3%,28.6%) respectively. *Trichuratrichuris* were associated with carrot and tomato (8.3%, 20.0%). *Strongyloides stercoralis* (4.8%) was recovered only in carrot.

Fruits	No. of parasites	Parasite species				
		E.H	AD	AL	TT	SS
Carrot	21	12(57.1)	3(14.3)	3(14.3)	2(8.3)	1(4.8)
Tamato	15	8(53.3)	2(15.3)	2(15.3)	3(20.0)	0(0)
Garden Egg	7	4(57.1)	1(14.3)	2(28.6)	0(0)	0(0)
Pepper	0	0(0)	0(0)	0(0)	0(0)	0(0)
Total	41	24(58.5)	6(14.6)	7(17.1)	5(12.2)	1(2.44)
E.H=*Entomoeba histolytica*AD=*Ancyclostoma duodenale* AL=*Ascaris lumbricoides*TT=*Trichura trichuris* SS=*Strongyloides stercoralis*						

Table 4: Prevalence of intestinal parasites species on fruits.

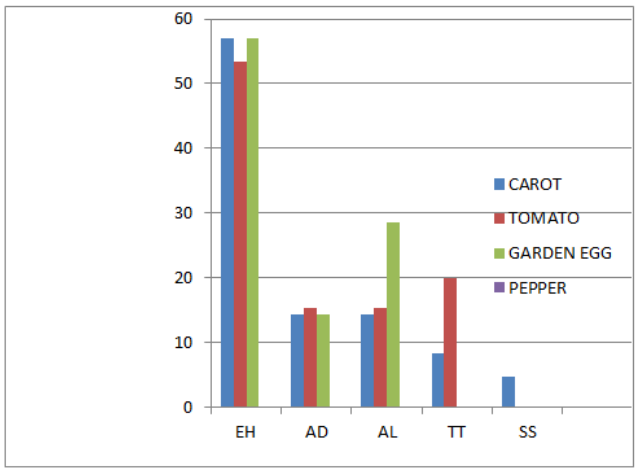

Figure 1: Prevalence of intestinal parasites species on fruits.

Discussion

The daily habits of fruits consumption have been the sources of helminths and protozoan parasites infection [19,20]. In this present study, all respondents admitted that they are used to eating fruits. This is an indication that fruit is an integral part of people's diet in the study location.

The fruit-eating habit in the study location was poor. More respondents eat their fruits immediately at the spot where it was bought. Only few cares to wash them before eating. This fruit-eating habit had been reported elsewhere [20,21]. Several fruits examined from the study were contaminated with different types of intestinal parasites. This is an indication that these fruits may be the major transport host for most intestinal parasites across the locality.

The rate of fruits contamination is control by several factors [10,22]. In this present study, the source of fruits contamination may not be unconnected with the exposure of fruit at close proximity to infestation agents. Out of the 400 fruits collected at random from different fruits stand, 20% were infested with five species of parasites. The fruit infested were a carrot (51.22%), Tomato (36.6%), Garden egg (17.1%). This agreed with [10] who highlighted that fruits are sources of infection in human.Forty-one (41) parasites were recovered from the fruits. Twenty four (24) representing (58.5%) were *Entamoeba histolytica* cyst, 4(14.6%) were the ova of *Ancyclostoma duodenale,* 7(17.1%) were *Ascaris lumbricoides*, 5(12.2%) were *Trichuris trichura* and 1(2.44%) were *Strongyloides stercoralis* larva. This report is consistent with study elsewhere [22-25].

The high parasite density in the fruits is an indication that the open markets may be at close proximity to refuse dump sites. The dump sites are sources of housefly propagation. Houseflies are known mechanical vectors that are responsible for the transmission of most foodborne parasite [8].

Conclusion

In this study, the risk of been infected with different species of intestinal parasites may be associated with fruits consumption habits. It is evident that those who engage in the attitude of not always washing their fruits by themselves before eating stand the greater risk of been infected with intestinal parasites. Although most sellers pretend to have washed the fruits, the high rates of fruits infestation in this study have highlighted the ignorance of both the seller and buyer about the epidemiology of intestinal parasites. This is because houseflies as one of the principal agent of contamination were not controlled at the open market.

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