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A Study of Public Health Risks Associated with the Consumption of Dates Fruits (Dobino: *Phoenix dactylifera*) in some Selected Markets in Gwagwalada Area Council, FCT, Abuja

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ABSTRACT: This study was carried out to determine the Parasitological assessment of the common Dates (Dobino: *Phoenix dactylifera*) sold in Gwagwalada Area Council. One hundred (100) dry Date fruits each was purchased from three different markets in Gwagwalada Area Council. A total of 300 fruits were acquired. Each of the fruits was washed in 5ml normal saline and standard laboratory technique was employed to concentrate the parasites in the water. Sediments were placed on a glass slide and observed microscopically using x10 and x40 objective lens, for possible parasite ova. From the 300 date Fruits examined, 35 were contaminated with ova of parasites. 19 of the dates (54%) harbored soil transmitted helminths while 16 (46%) contained other parasites. Identified geohelminths include ova of *Ascaris lumbricoides, Trichuris trichiura* and *Ancylostoma duodenale. Ascaris lumbricoides* was the most prevalent parasite encountered and was statistically significant ($p<0.05$) across the study area. Fruits are very beneficial to health and their consumption has been recommended in daily diets. The consequences of human infection with soil transmitted helminths (geohelminths) are of major health concern in developing countries. The transmission of such helminths is promoted by poor sanitation and personal hygiene such as insanitary handling of fruits and vegetables. Therefore, proper hygienic policies should be adopted.

Keywords: Parasitological, dates, assessment, edible fruit, geohelminths

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INTRODUCTION

Fruits are the fleshy sections of plants that can be consumed whole, mashed or sliced. They would be appropriate for both retail and ceremonial situations and their intake contribute to a healthy living. *Phoenix dactylifera* (Date or Date palm) belongs to the *Pheonix* genus. It is widely grown by people because of its sweetness and edibleness. Date fruit is produced by the date palm. Dates are generally oval and cylindrical in shape, with mostly diameter of 2-3 cm (0.79 – 1.18 inches) and length of 3 – 7 cm. The color of the ripe date is deep red to deep yellow, and that varies according to varieties. Surrounded in the external fleshy part of the Date fruit is a single seed of length around 2-2.5 cm (0.79 – 0.98 inches) and of thickness 6 – 8 mm (0.24 – 0.31 inces) (Randy, 2016).

Date fruit is one of the fruits commonly eaten in Nigeria. It is a one-seeded fruit, commonly called 'Balha' in Arabic, 'Dobino' in Hausa, 'Ojo' in Yoruba and 'Kharek' in India. The Date fruit (technically called a drupe) contains a hard, seed-bearing pit or endocarp. Pollinated Dates

are harvested from September to December. Because all Dates on a tree may not mature at the same time, they are handpicked several times during the fall from bunches on the trees. This ensures that the Dates are picked at their peak level of sugar content and flavor. In some parts of the world growers cut entire bunches (like bananas) and allow them to ripen in warm rooms away from the trees, although hand-picked Dates are considered the best. Since pollination and picking requires many repeat visits by workers to the crowns of the palms, large trees have permanent ladders attached to the main trunks.

Dates have been the staple food and chief source of wealth in the irrigated deserts. It is a sugar-rich food with invigorating effect, and is useful in cases of fatigue. Because of its richness in sugars, vitamins and minerals (including iron), they are particularly beneficial to adolescents, youth athletes, pregnant and lactating mothers. Egypt, Iran and Iraq are the major places where Date fruit are being imported into Nigeria.

However, in some years ago, the Nigerian Television Authority (Morning News Express, November 20th, 2018) showed that a plantation and nursery of Dates established by the Ministry of Agriculture, Dutse, Jigawa State, Nigeria were thriving. In Nigeria's cities, towns, and villages, fresh fruits and vegetables are abundantly available (Wedajo and Kadire, 2019). Date fruit are becoming increasingly popular in Nigeria and other developing countries. Around the world, government and privately financed health institutes and organizations are pushing people to eat more vegetables and fresh fruits. They can be used in the kitchen to improve the quality of soup and other African meals for a healthy lifestyle (Erhirhie *et al*., 2020).

Water, fiber, vitamins, sugar, proteins, and phytochemicals are all beneficial to human health. Their high cellulose and fiber content also helps to regulate the digestive tract. International organizations such as the Food and Agricultural Organization (FAO), the Centers for Disease Control and Prevention (CDC), and the World Health Organization (WHO) have all recommended for increased fruit and vegetable consumption (Mahmoud, 2019). Nigeria has a temperate climate with four distinct seasons, making it possible to grow a wide variety of fruits and vegetables. They're also inexpensive, simple to use, and widely available to the general public (Ehimemen *et al*., 2019).

Aside from the health and economic benefits of Date fruit, contamination by human pathogens after they have been consumed raw is a major concern. Date fruits are prone to microbiological, chemical, and physical contamination since they are frequently grown in an open setting. On Date fruit, viruses, bacteria, fungi, and other microorganisms can all be found as sources of nutrients. As a result, they are regarded to be effective at transmitting human diseases. Date fruit can contain protozoan cysts called oocysts, according to a recent study. It is shocking that these fruits aren't washed before consumption. Furthermore, most sellers are not educated or knowledgeable on personal and public hygiene because such products are exposed to contaminated air (air-borne infections), unclean workplaces, and packaging materials (Ezenska and Amuzie, 2021).

However, if care is not taken, this cheap source of vitamins, minerals and sugar could lead to poorer health if ingested with ova or larvae of geohelminths and this could lead to more serious health consequences. When Date fruit come into contact with sewage or contaminated water, bacteria such as *Salmonella* spp, *Shigella* spp, *Campylobacter* spp, and *Escherichia coli* can infect them. The majority of fungus is known to be common environmental contaminants. As a result, they are not unusual in any way. Because certain fungi are known to produce spores, naked fruits are easily infected. Previously, fungi such as *Rhizopus Stolonifer, Saccharomyces cerevisiae, Aspergillus niger, Aspergillus flavus, Cephalosporium,* and *Penicillium* were isolated from some naked fruits sold around the country (Ewenzka and Amuzie, 2021).

Gwagwalada residents are well-known for eating Date fruit without washing them. Furthermore, the area lacks sufficient water, which is necessary to wash fruits before they are sold to market buyers. The water source used to wash these fruits is usually suspect, as both the water and the water container appear to be unclean. Because there are no food inspectors to conduct quality checks on the fruits, the harvesting, processing, storage, and handling of these fruits. Fruits sellers in Gwagwalada do not always follow hygienic.

MATERIALS AND METHODS

Study area

Gwagwalada is a suburb of the Federal Capital Territory, Abuja. It is situated along Abuja-Lokoja road at about 55 kilometers away from FCT and centrally located between latitudes 80 55' N and 90 00'N and longitudes 70 00' E and 70 04 E' (Figure 1). Gwagwalada area council was created in 1988 alongside three other areas councils in the Federal Capital Territory (FCT) by the ministry of Federal Capital Territory (MFCT).With a population of about 157,770 at the 2006 census, the region covers a total landmass of about 65 km^2out of the 8,000 $km^2$of the total FCT land mass and located at the center of very fertile area with abundance of grasses.

The area is bordered by Kuje Area Council to the East, Abaji Area Council to the West, Kwali Area Council to the South and Abuja Municipal Area to the Northeast and to the North by Suleja Local Government Area of Niger State.

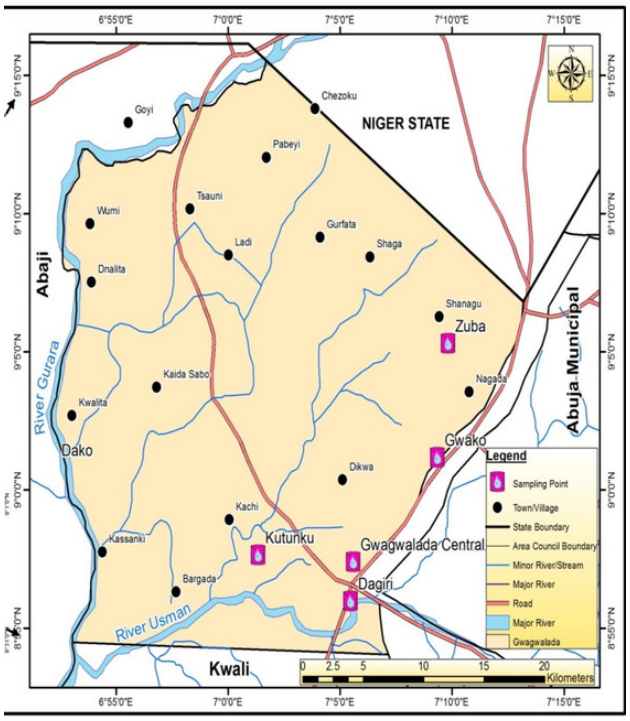

Figure 1: Map of Gwagwalada Town showing points of sample collection (Okpanachi, 2016).

Sample collection

A total of 300 date fruits samples were purchased from fruit sellers in Zuba Market, Gwako market and Gwagwalada Main Market (Plates 1-7). The samples of each were purchased from different sellers at different locations in each market. Plastic buckets with cover sterilized by dusting with cotton wool dipped in 75% ethanol were used to receive the samples from the sellers and taken to the laboratory for analysis.

Parasitological examination of the date fruits

Total of 300 fruits were acquired. Each of the Date fruit was put into a specimen bottle and was washed in 5ml normal saline. Daily ten (100) to fifteen (150) fruits were washed and processed. The fruit were shake well to ensure that as much material in the surface of the fruit as possible were discharged into the normal saline. Examination for protozoa parasites, the sedimentation and concentration method was used with the aid of a centrifuge (World Health Organization [WHO], 2013, Ramink, 2019).

The normal saline wash of each of the fruits samples obtained by washing the fruits in normal saline was sieved into test tubes using a fine mesh (mosquito net). The sieved contents were centrifuged and the supernatant fluid poured off.

The deposit was re-suspended in more saline and centrifuged again. This was repeated until the supernatant fluid was clear.

The deposit was than examined directly on a slide by covering a drop of the deposit with cover slip and examined under X10 and X40 objectives. To facilitate better visualization iodine (Dobell's iodine) preparation was done by adding a drop of Dobell's iodine in the saline preparation before examination under the microscope.

Concentration of eggs or larva of cysts

After each suspension was transferred to a clean labeled centrifuge tube, the filtrate was centrifuged at 2500rpm for one minute. Formol-ether Concentration Technique, as outlined by WHO (2021) and was used for further analysis of the sediments. After processing with formalin and ether and the supernatant decanted, the sediments were agitated to form suspension with the remaining fluid on the sides of the tube. A drop of the suspension was transferred into a clean slide for microscopic examination under a cover slip using the X10 and X40 objectives. The whole area under the cover slip was checked for eggs and larvae. The process was systematically repeated

Plate 1: Dates (Dobino) collected in the Study locations.

Plate 2: Contaminated Dates (Dobino) collected in the Study locations.

Plate 3: Date Tree in University of Abuja.

until the sediment in each centrifuge tube was examined. One drop of iodine solution was also included in the duplication preparations for the identification of cysts. Concentration is needed to quantify cysts of intestinal parasites.

RESULTS

Data collected were analysed using descriptive statistics. Variation in contamination by type of parasite in Date fruits bought from markets under Gwagwalada Area Council was tested using chi-square test. Date fruits were sampled from the grocery unit in Zuba market, Gwako market, and Gwagwalada market. A total of 300 samples were collected for the fruits altogether from these various markets and was examined for parasitological contamination. The outcomes of the laboratory examinations were analyzed and presented in tables. Results showed that of the 300 Date fruits examined, 35 (100%) were contaminated with ova of parasites (Table 1). The highest number of parasite was isolated from date fruits bought from Zuba market. However this difference was not statistical significant ($\chi 2 = 0.597$, df=2, $p>0.05$). Of the contaminated 35 fruits, 19 (54%) haboured soil transmitted helminths while 16 (46%) contained other parasites. Twenty Date fruits each was purchased from three different markets (Zuba market, Gwako market, and Gwagwalada market) (Table 2). Ascaris lumbricoides was the most prominent geohelminths encountered while hookworm was the least prevalent geohelminths. The difference in the types of isolated geohelminths was significant ($\chi 2 = 26.71$, df=2, $p>0.05$). Other parasites isolated are shown in (Table 2).

Percentage rate of infestation of the fruits

To calculate the percentage of parasite present in each fruit:

$$\frac{\text{The total number of parasite present in each fruit}}{\text{The total number of fruit samples contaminated}} \times \frac{100}{1}$$

$$\text{Zuba Market} = \frac{15}{35} \times \frac{100}{1} = 43\%$$

$$\text{Gwako Market} = \frac{12}{35} \times \frac{100}{1} = 34\%$$

$$\text{Gwagwalada Market} = \frac{8}{35} \times \frac{100}{1} = 23\%$$

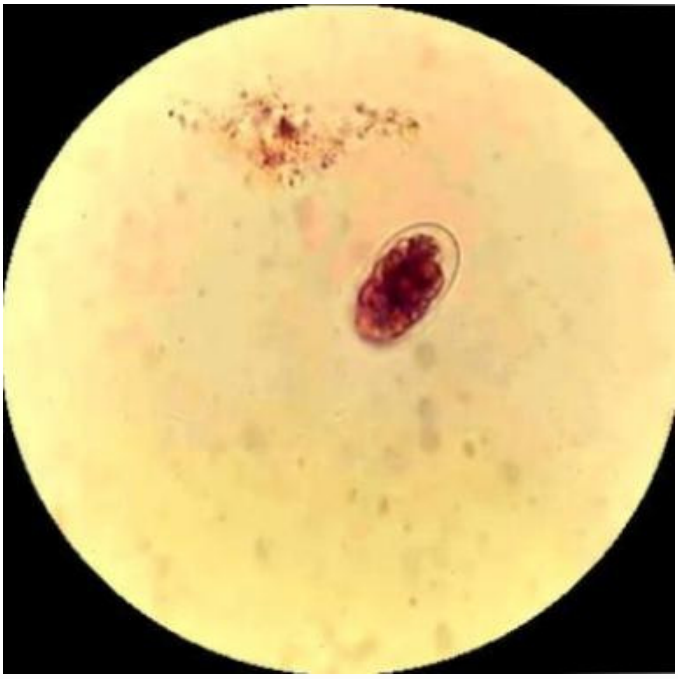

Plate 4*:* Ova of *Ascaris lumbricoides.*

Plate 5: *Ancyclostoma duodenale*

Plate 6: *Entamoeba hyistolitica.*

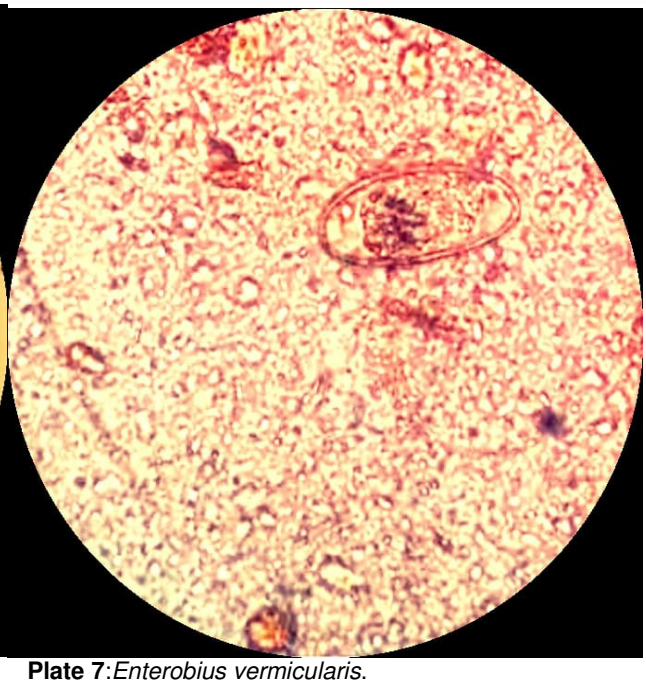

Plate 7:*Enterobius vermicularis.*

DISCUSSION

Findings show that some sweet date fruits enjoyed by Nigerians are predisposed to contamination by geohelminths. This is in line with Ezenwaka Chinonye O. and Amuzie Chidinma C.. (2021) who reported that *Ascaris. lumbricoides* occurred most frequently in common fruits and vegetables in Otuoke Ogbia Local Government Area, Bayelsa State . Such contaminated fruits have serious health implications.

Table 1: Distribution of geohelminths ova on Date fruits from different markets under Gwagwalada region.

Location	No. Examined	No. Contaminated	% Contaminated
Zuba Market	100	15	43
Gwako Market	100	12	34
Gwagwalada Market	100	8	23
Total	300	35	100

Table 2: Ova or cyst of parasites haboured on the date fruits from different markets under Gwagwalada region.

Parasites Present	No. of fruits contaminated (%)	Other parasites	No. of fruits contaminated (%)
Ascaris lumbricoides	10 (28)	*Entamoeba histolytica*	8(23)
Trichuris trichiura	6 (17)	*Giardia lamblia*	6(17)
Ancylostoma duodenale	3 (9)	*Enterobius vermicularis*	2 (6)
Total	19(54)		16(46)

The health implications of the encountered parasites have been reported (WHO, 2020). This study showed that fruits bought from different markets under Gwagwalada region were contaminated, with more contaminated fruits coming from Zuba market. The difference was however not significant at 5% level. Highest number of date fruits harbored the ova of *Ascaris lumbricoides*. This is in line with the documentation reported that The contamination could possibly be as a result of improper handling by both hawkers and buyers, who dip their hands into the fruit heaps in receptacles to select or taste the fruit before purchase. Various factors may influence the contamination of Date fruits and other fruits. Some of which are globalization of food supply resulting in the introduction of pathogens into new environment through importation of farm produce. Others include use of untreated waste water and manure as fertilizers for crop production, irrigation and various agronomics practices and habits of man. Contamination can also occur in the field or orchard during harvesting, transporting, processing, distribution, storing and marketing or even when fruits are handled under dirty environment without proper care. Generally, parasitic contamination of fruits is more prevalent in areas of inadequate sanitation, poor personal and public hygiene the high number of geohelminths ova isolated from date fruits in this work showed the level of parasites in our environment. Such parasites are transmitted through feces. Good hygiene such as washing such fruits is advocated.

Conclusion

Fruits are easily contaminated in Gwagwalada as a result of the processing, handling and storage processes. Date fruits happened to be one of the most parasitised fruits. In conclusion, irrigation farming and use of night soil for agricultural purposes in some parts of Gwagwalada may lead to parasitic contamination of fruits most especially with protozoan parasites.

Recommendations

It is recommended that fruits should be properly washed with clean water before being sold and consumers of such food inspectors should always inspect fruits sold by ensuring that fruits sold are sold in a clean environment while the processing and washing method should be of international standards.

Health education by health officers around our markets and motor parks, explaining the need of washing fruits especially Date fruits is very necessary.

There should be an enlightenment programme on the importance of selling and consuming Date fruits that are hygienic to not only the consumers but also the sellers.

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