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Evaluation of Bacterial Contaminants of over Riped Pear (*Dacryodes edulis*) and Their Effect in the Gastrointestinal System of Children.

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ABSTRACT

Dacryodes edulis **exists as a fruit tree native to Africa, sometimes called Ube. (Igbo, Nigeria) or African bush pear.**

The occasional outbreak of diarrhea as a result of gastrointestinal infection among children of age 8 months to 2 years necessitated this study. Evaluation of bacterial contaminants in over riped pear (*Dacryodes edulis)* and their effect in the gastrointestinal system of children was investigated using thirty (30) children within the age range of 8 months to 2 years. The investigation was carried out using swab sticks to collect samples from over riped pears (50 samples) and also isolation of bacteria and fungi from children who had loose or watery stool after ingestion of over riped pears.

The samples from over riped *Dacryodes edulis* and infected children were cultured in Sabouraud agar, Nutrient agar and MacConkey agar. They were left to incubate for 24-48 hours. Many methods were adopted in identification of various bacteria and micro flora contaminants with their colonies counted.

Results indicated that yeast organisms predominated, while other organisms such as *Staph. epidermidis,* aerobic mesophiles and *Staphylococcus mirabilis* were also present. It could be deduced that these bacterial and fungi contaminants could be responsible for watery stool and gastrointestinal disorder in some of the children.

INTRODUCTION

The occasional outbreak of food poisons after consuming fruits has necessitated this study. Microorganisms are generally regarded as living forms that are microscopic in size (Cruishank, 1973) and relatively simple usually unicellular in structure. The diameter of the smallest body that can be resolved and seen clearly with the naked eye is about 100nm. Little children are ignorant of the existence of this bacteria especially those living in underdeveloped world such as ours. Seeing adults consume fruits empowers their curiosity to eat the fruit regardless. Fruits and vegetables have been discovered by the early man as an additional source of vitamins in their body. Man does not only consume fruits but believe that it contributes to his healing and survival in his environment. Most edible fruits have sweet taste, attractive aroma and quality nutritional properties (Aguoru *et al*, 2015).

Bacteria are microscopic unicellular organisms which can be classified into the following type of cell; the ovoid or spheroid called coccus, the rod or cylindrical bacillus, the curved vibro, the spiral shaped spirillium and coil shaped spirochetes. The coccus (plural cocci) size 0.5-1.0µm in diameter. Cocci generally have one axis approximately equal to any other axis. Sometimes the cell is thickened (giving rise to a kidney shaped cell) or distorted in some way as to depart from the spherical shape example in Streptococci.

Catherine and Frédéric(2010),reported that some transmitted disease might be from the silk worm which are commensals that constitute the normal flora of the healthy body, however, Oguwike *et al* (2018) reported that these organisms live on the skin and on the mucous membrane of the upper respiratory tract, the intestine, female genitals. They obtain nourishment from the secretions and food residues. This normal flora is also observed to exist as contaminants on the surface of over ripe pear.

Since normally they do not invade the tissues, they are generally harmless, though under certain conditions when the body defenses are impaired. They may invade the tissues and cause disease, thus acting as opportunistic pathogens, while the true pathogens are adapted to overcoming the normal defenses of the body and establish their growth in the tissues producing poisonous substances or toxins often causing damage to the tissues and thus the manifestation of disease.

Dacryodes edulis is an evergreen tree attaining a height of 18-40metres in the forest but not exceeding 12metres in plantations. The fruit is an elliptical drupe which varies in length from 4 to 12cm. the skin of the fruit is dark blue or violet, whereas the flesh is pale to light green.

The tree flowers at the beginning of the rainy season bears fruit during 2 to 5 months after flowering. There are two variants of *Dacryodes edulis*: *Dacryodes edulis var. edulis* and *Dacryodes edulis var. parvicarpa*. The fruit of *Dacryodes edulis var. edulis* is larger and the tree has stout ascending branches. *Dacryodes edulis var. parvicarpa* has smaller fruit and slender dropping branches.

Medicinal Uses of *Dacryodes edulis* (ube):

The tree is found useful in the traditional herbal medicine of some African countries to treat various alignment such as wounds, skin diseases, dysentery and fever. The extracts and secondary metabolites have been found to show antimicrobial and antioxidant activities. A wide range of chemicals constituents such as terpenes, flavonoids, tannins, alkaloids, and saponins have been isolated from the plant. Our major aim in this study is to evaluate the bacterial contaminants on the surface of over riped *Dacryodes edulis* (pear) and their effect in the gastrointestinal system of children. Most times, children pick the over riped pears and clean them with their bare hand and lick them without proper washing or boiling indirectly introducing the contaminants into the Gut system resulting to different manifestation of gastrointestinal ailments.

Materials and Methods

Experimental design:

Ripening of Pear (*Dacryodes edulis):*

Fifty (50) fruits of *Dacryodes edulis* were bought from Orie market in Enugu state Nigeria. They were washed with clean water, poured into a basket and covered with sack to keep them warm. They were allowed to stay for 10 days so as to soften and be contaminated with moulds and bacteria that may grow in over ripe fruits. Swab sticks were used to pick swab samples for culturing.

The Subjects:

Thirty children (8 months to 2years) were allowed to consume the pears as the contaminants may be safe and will not pose serious danger to their health while ten (10) children were given fresh neatly washed pears to eat for 3 days.

Bacteriological Methods:

Swab samples were collected from the over riped pears and from stool samples of infants who complained of gassy stomach, running stool and other unspecific stomach disturbances.

The swab samples were cultured in blood agar and nutrient agar media by method of culturing

techniques as described by Baker and Silverton 1998. The samples were allowed to stay in anaerobic condition for 24-48hrs before reading out and examining the isolated organisms.

- Catalase and coagulase tests were done using the procedure described by Baker et al, 1998.
- Gram staining test was carried out using the procedure described by Baker et al, 1998.

Detection of organisms in *Dacryodes edulis*

- Yeast cells of fungi origin were identified by plating the samples in sabouraud agar.
- Aerobic mesophilic bacteria: Samples were further diluted in sterile tap water and volume of 0.1ml of appropriate dilutions were spread-plated in duplicates on pre- dried surfaces of plate count agar (Pc:Merk).colonies were counted after incubation at 30 to 32^{0}c for 48-72hrs.
- Staphylococci: To identify *Staphylococcus aureus*, appropriate dilutions were spread-plated in duplicate plates of manitol salt agar (Oxford) and incubated at 30-32^{0}c for 48-72hrs. Ten colonies from countable plates were picked and slide and tube coagulase tests were done (Baker and Silverton 1998).
- Blood agar and Cystine Lactose Electrolyte Deficient (CLED) Agar plates were used to culture stool samples of 16 children out of the 30 children who complained of running stomach pain after ingestion of the over riped pears.
- Stool analysis was carried out as described in Guide to Human parasitology (Crewe, 1977).

RESULTS: The results obtained from this research work were represented in histogram.

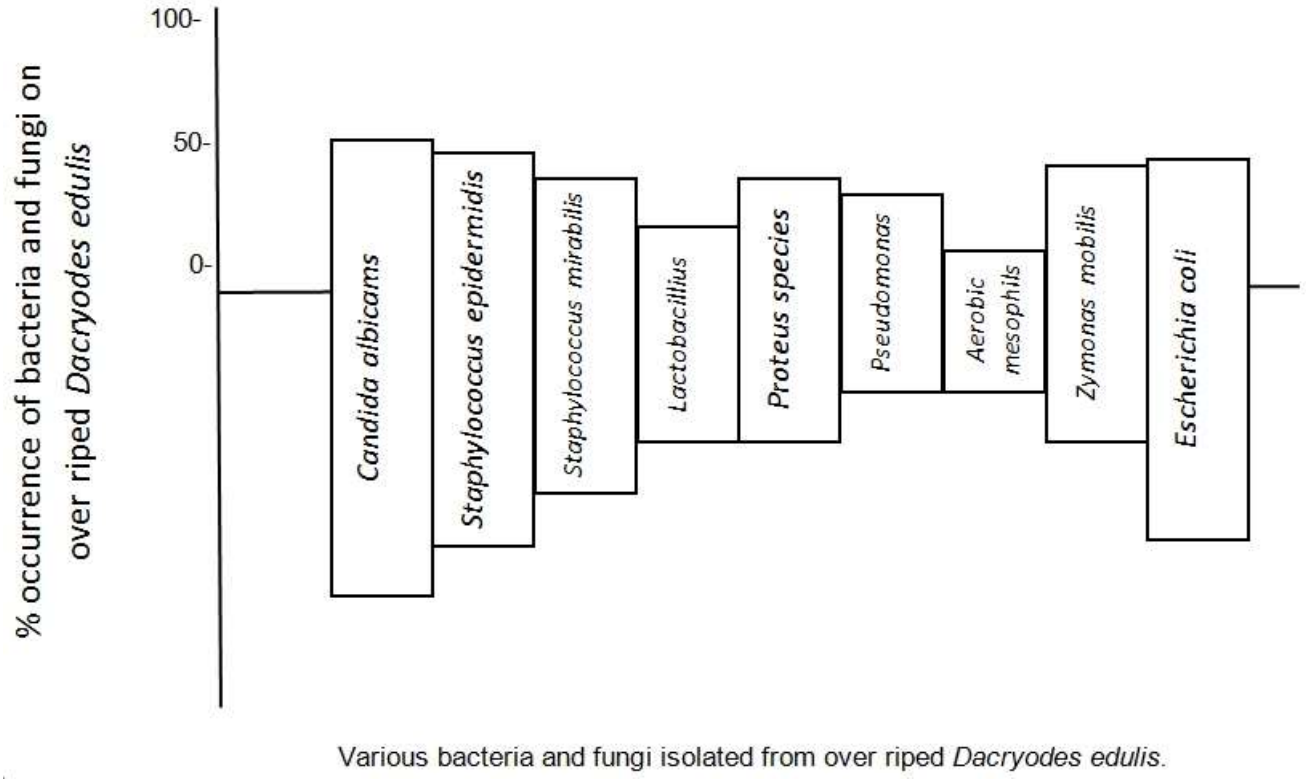

Fig 1: Indicates the histogram of various bacteria and fungi isolated from over riped *Dacryodes edulis.*

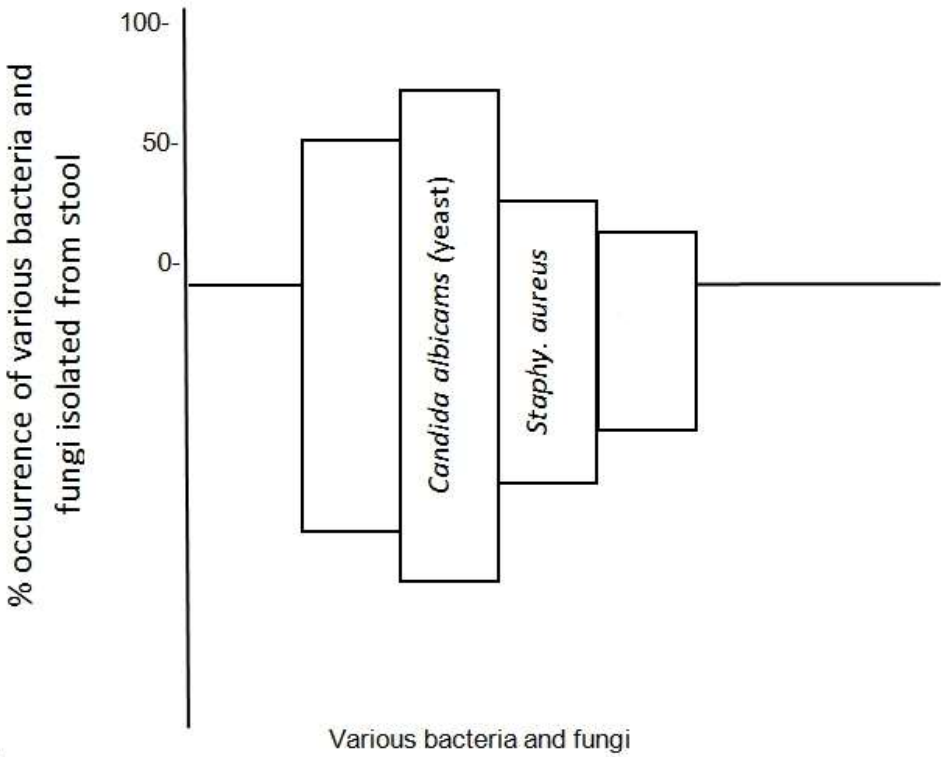

Fig 2: Shows various bacteria and fungi isolated from stool of children that consumed over riped *Dacryodes edulis.*

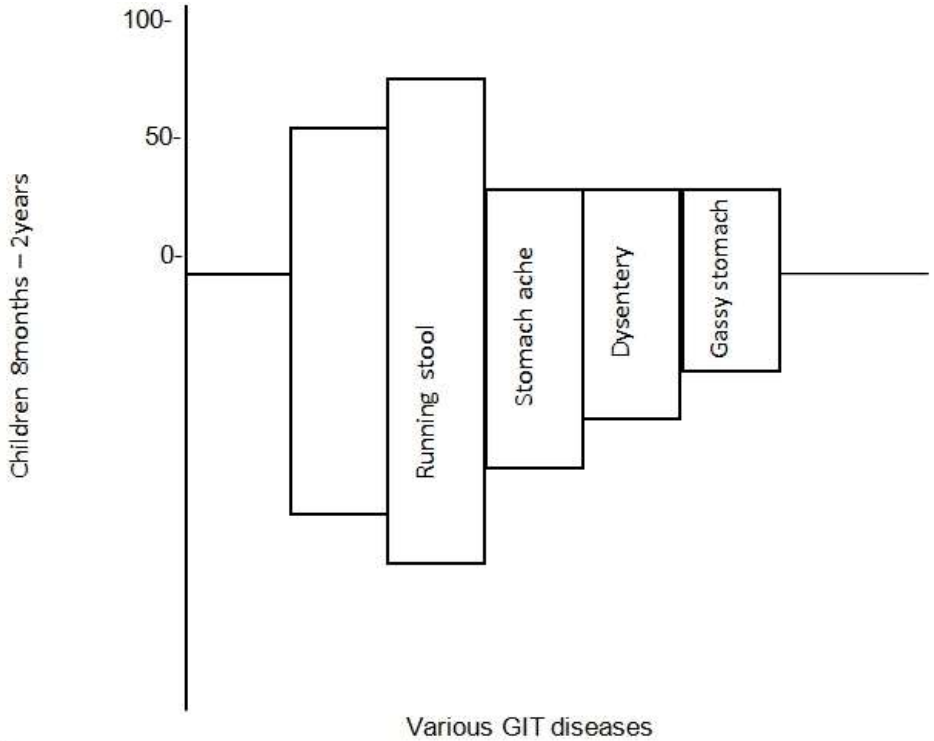

Fig 3: shows various GIT alignment shown by children that consumed over riped *Dacryodes edulis* within 24hrs of consumption.

DISCUSSION

Bacterial contaminants in over riped pear (*Dacryodes edulis)* and its effect in the gastrointestinal system of children have been evaluated.

The main use of *Dacryodes edulis* is its fruit which can be eaten either raw, cooked in salt water or roasted. Cooked flesh of the fruit has a texture similar to butter. The pulp contains 48% oil. The fat content of this fruit is much higher compared to fruits such as apple guava and pawpaw. It is also rich in vitamins. (NRC, 2008).

The organisms isolated in over riped pears include yeast cells (*Candida albican)*, *Staphylococcus epidermidis, Staphylococcus mirabilis,* lactobacillus, proteus specie, pseudomonas, aerobic mesophiles, *Zymonass mobilis* and *Escherichia coli*. The highest percentage organism isolated from *Dacryodes edulis* is yeast (Candida species) 80% in fig 1. The next in percentage occurrence is *Escherichia coli* (70%) followed by *staphylococcus epidermidis* (50%) and the least occurrence is aerobic mesophiles (20%).

On examination of the faecal samples of the children with prominent gastrointestinal disorder, yeast cells (*Candida albican)* occurred more in percentage, Fig 2. The next organism diagnosed was *Escherichia coli* bacteria (65%) followed by *Staphylococcus aureus* and *Pseudomonas specie* (30%).

The commonest gastrointestinal ailment complained by the children was running stool. It could be noticed that little children eat most of their fruits unwashed, hence they are exposed to gastrointestinal infection most often times. The children who ate the neatly washed over ripe pears for 3 days did not complain of any ailment.

Of the organisms incriminated in causing running stool in children of 2 years and below is *Candida albicans* (yeast) is the main culprit. It is regarded that *Candida albicans* is one of the microorganisms that commonly live in and on our bodies. It can be found in the gastrointestinal tract, the mouth and the vagina. *Candida albicans* is the most prevalent cause of fungal infections in people and when they get to the gastrointestinal tract through eating of unwashed fruits by children, it causes high multiplication within leading to running stool presenting as slimy greenish stool in children.

Escherichia coli (E. coli) is the next organism (fig2) isolated that has the next percentage occurrence in the stool of children. It is a bacteria that causes urinary tract infection in adults and children, but can still harm them when it gets into the bowel of little children, hence its involvement in watery stool and unspecific stomach disturbances.

Gassy stomach was seen as another common gastrointestinal disorder complained by children who ate the unwashed over ripe pear (fig 3).

It could be deduced from this work, bacteria and fungi present in over ripe *Dacryodes edulis* fruit, if eaten without proper hygienic treatment, can introduce germs into the body that will disorient the gastrointestinal system.

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