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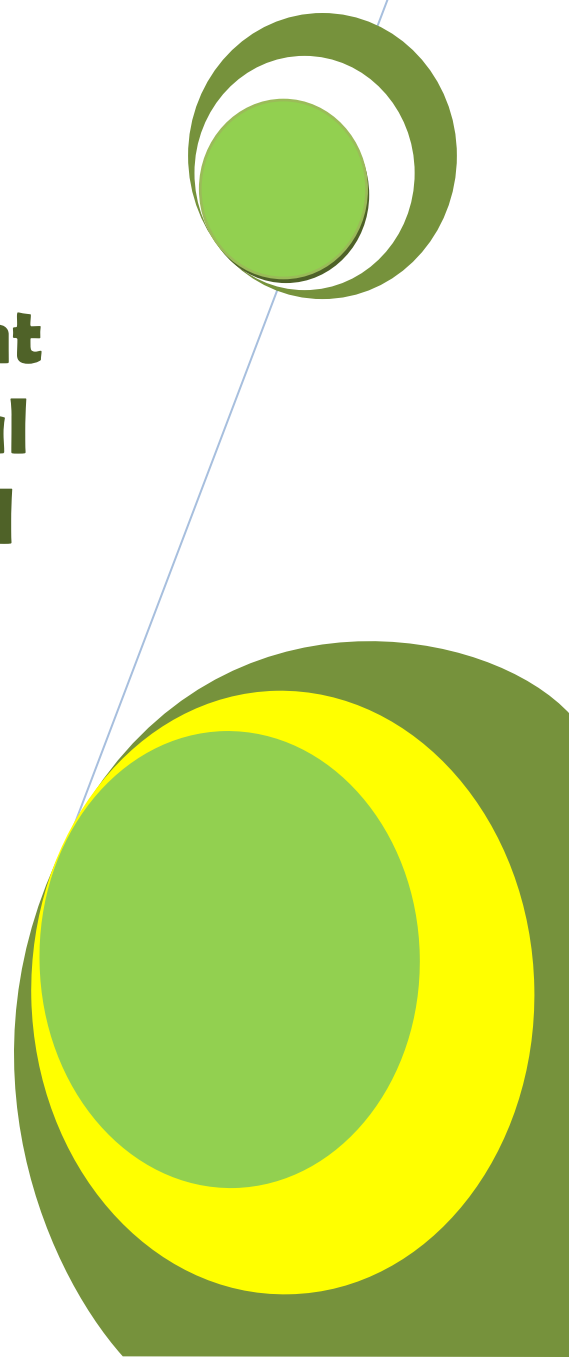
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Consumption of Uncooked Fermented *pentaclethramacrophylla Bent* (Ugba) and its Bacteriological effects in the Gastrointestinal Tract System of Male Albino Wistar Rats

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ABSTRACT

Various reasons have been suggested by concerned researchers why *P. macrophyllabenth* should be consumed by subjects. This research is geared towards knowing the bacteriological effect of consuming fermented *Pentaclethra macrophyllabenth* in the gastrointestinal region of male albino wistar rats. Thirty male albino rats were randomly selected weighing (200-250g) for the study. They were divided into three groups, Group A, B and C each containing 10 rats. Group A served as control group, Group B received uncooked fermented *P. macrophyllabenth*, rat pellet and water ad libitum, Group C received cooked *P. macrophyllabenth*, rat pellet and water ad libitum.

Swab samples were collected from the oral cavity and intestinal region of the rats and the percentage of bacteria loads in these sites of gastrointestinal tracts were evaluated. It was observed from the result of the study that of all the microbes identified in fermenting *P. macrophyllabenth*, such as micrococcus specie, staphylococcus species, bacillus specie, proteus specie, pseudomonas specie and lactobacillus specie, *Staphylococcus aureus* occurred more in percentages (70%) in the intestinal regions of rats fed with uncooked fermented *P. macrophyllabenth* and also in the intestinal region of those fed with cooked fermented *P. macrophyllabenth* (40%). Bacillus species occurred more in the oral cavity of rats fed with uncooked *P. macrophyllabenth* (80%), followed by *Staphylococcus aureus* (60%). If virulent bacteria eventually escape digestive enzymes and heat in the gut system can get to the urinary system during defecation causing infection of the urinary system.

Key Words: Bacteria, gastrointestinal tract, *P. macrophyllabenth*, wistar rats.

INTRODUCTION

From yuletide, man developed preference for the style of eating whatever food that is available for his wellbeing and survival. Fermentation of *P. macrophyllabenth* is a typical example of such foods.

The African oil bean, which is botanically known as *P. macrophyllabenth* is a tropical tree crop that belongs to the leguminosae family and the mimosoideae sub-family. Different Nigerian tribes have different names for the African oil bean, ugba or ukpaka (Igbo), Apará (Yoruba) and Ukana (Efik tribe). The African oil bean tree grows approximately 6 meters in girth and 21 meters in height. The tree is low branched with low wide buttresses and an open crown that allows light to penetrate under its canopy. The bark has a reddish-brown to gray colour with irregular patches that usually flakes off.

The tree trunk oozes out reddish orange colored fluid when cut and are equally buttressed and crooked (Agbogidi, 2010). The most widely used part of the African oil bean tree is the seeds, which are usually enclosed in a flat pods that tend to burst once matured, thereby distributing the seeds all over the area in which the tree covers.

Before the African oil bean seed (ukpaka) can be consumed, it must undergo fermentation process to eradicate any unwanted toxins. African oil bean seeds are excellent source of energy, protein, amino acids, phosphorus, magnesium, iron, vitamins, calcium, manganese and copper (Achinewu, 1982). It is also an excellent source of phytonutrients such as tannins, alkaloids, flavonoids, steroids, glycosides and saponins (Ikhuoria et al, 2006). Notwithstanding the high nutritional content of the African oil bean seeds, studies reveal that the fermentation process which they undergo before consumption usually eradicates most of these minerals and vitamins such as phosphorus (Enujiugha et al, 2005).

In Africa, majority of the fermented foods are produced at household level, and hygiene is a major concern (Olasupo et al, 2002, Gbadaga et al, 2008). The problem of occurrence and growth of pathogens in most of these fermented food products cannot be ruled out as the general hygienic conditions of the processors, the equipment used, water and other raw materials cannot be said to be free of potential pathogens. Our curiosity is geared towards knowing the effect of any bacteria involved in the fermentation of *P. macrophyllabenth* in the gut system and to know the highest bacteria occurrence and if their presence can be traced towards bacterial infections in the gut system. The gastrointestinal system is the avenue through which nutritive substances, vitamins, minerals and fluids enter the body (Oguwike, 2014). The digestive and absorptive functions of the gastrointestinal system depend on a variety of mechanisms that propel the food through the gastrointestinal tract, soften it and mix it with bile from the mucosal cells, salivary glands and pancreas. Gastrointestinal system or gut system can also be referred to as the alimentary system which constitutes a long tube that starts from mouth and ends at the anus. It is divided into five main parts namely mouth and pharynx, oesophagus, stomach, small intestine and large intestine (Oguwike 2014).

MATERIALS AND METHODS

Thirty ((30)male albino wistar rats weighing 200 __250g were selected for the study and kept in a metal cage with iron netting in a laboratory environment. They were kept under standard condition after allowing them to stay 21 days for acclimatization.

They were kept under standard condition of temperature ($23\pm 2^{\circ}$) and humidity, receiving 12h light (7.00a.m-7.00p.m). They were kept in wire meshed cages and fed with commercial rat pellets (Growers feed) and drinking water ad libitum. The animals were handled in accordance with national and institutional guidelines for the protection of the animals welfare for two weeks before starting the experiment.

Preparation of fermented *Pentaclethra macrophyllabenth*;

The oil bean seeds were bought from a local market around the university. The specie was identified and authenticated by a taxonomist in Biological science before being used. 150g of the oil bean seeds were boiled in a litre of tap water for 1hr 30mins. It was filtered, allowed to cool at room temperature. The hard shells were broken and the seeds removed, washed, cut, and sliced. They were then wrapped with washed plantain leaves.

They were left for one week to ferment properly. The fermented sliced seeds were blended using mortar and a pestle (Samuelson et al, 1992). They were soaked in water overnight in 500ml of distilled water and were administered 1.0ml to the test rats for 28days. Another portion of the blended seed was mixed in 500ml of distilled water and properly cooked, allowed to cool at room temperature, before being given to the animals.

TOXICITY STUDY (LD₅₀): The toxicity of the aqueous preparation in albino wistar rat was determined using Lorke's method. The procedure of determining the lethal dose is by increasing the concentration of the extracts administered into the rats (per body weight) in each group of eight (8) rats for five days. The doses used were 1000mg/kg, 1500mg/kg, 2000mg/kg, 2500mg/kg, 3000mg/kg, 4000mg/kg. The mortality rate was determined after 18hrs and analysed graphically.

Experimental design:

The thirty male albino wistar rats weighing 200-250g were selected and divided into three groups. Rats in group A (10) served as control, while those in group B (10) and C (10) served as experimental animals. The group A rats were fed with normal rat pellet and water ad libitum. Group B rats were given rat pellet in addition to the oral administration of 1.0ml (uncooked fermented UGBA) once daily while the group C rats received 1.0ml of cooked fermented *P. macrophyllabenth* aqueous solution daily added to their normal rat feed and water ad libitum for 28 days.

Bacteriological tests:

- Culture tests using blood agar and Mackonkey agar were done by the method described by Baker et al, 1998.
- Arabinose test as described by Turchetti, 1982.
- Indole test as described by Baker et al, 1998.
- Catalase test as described by Baker et al, 1998.
- Pigmentation test as described by Cowan and Street 1966.
- Manitol test is done by method described by Baker et al, 1998.

Collection of samples for analysis:

At the end of the 28 days of feeding on the extract, the animals were sacrificed. Sterile swab sticks were used to collect samples from their oral cavities (throat swab) and their intestines were sliced open for collection of samples with sterile swab sticks (intestinal swab). The samples from the rats that fed on both cooked and uncooked *P. macrophyllabenth* were cultured on agar plates, allowed to stay for 24hrs incubation and the bacteria growths were isolated. The different bacteria present in the different sites the of sample collection were distinguished using all the tests listed in the bacteriological tests. Their morphological and biochemical characteristics were distinguished (Enujiugh, 2009).

Statistical analysis:

The results got in this study were represented as histogram and graphs.

RESULTS

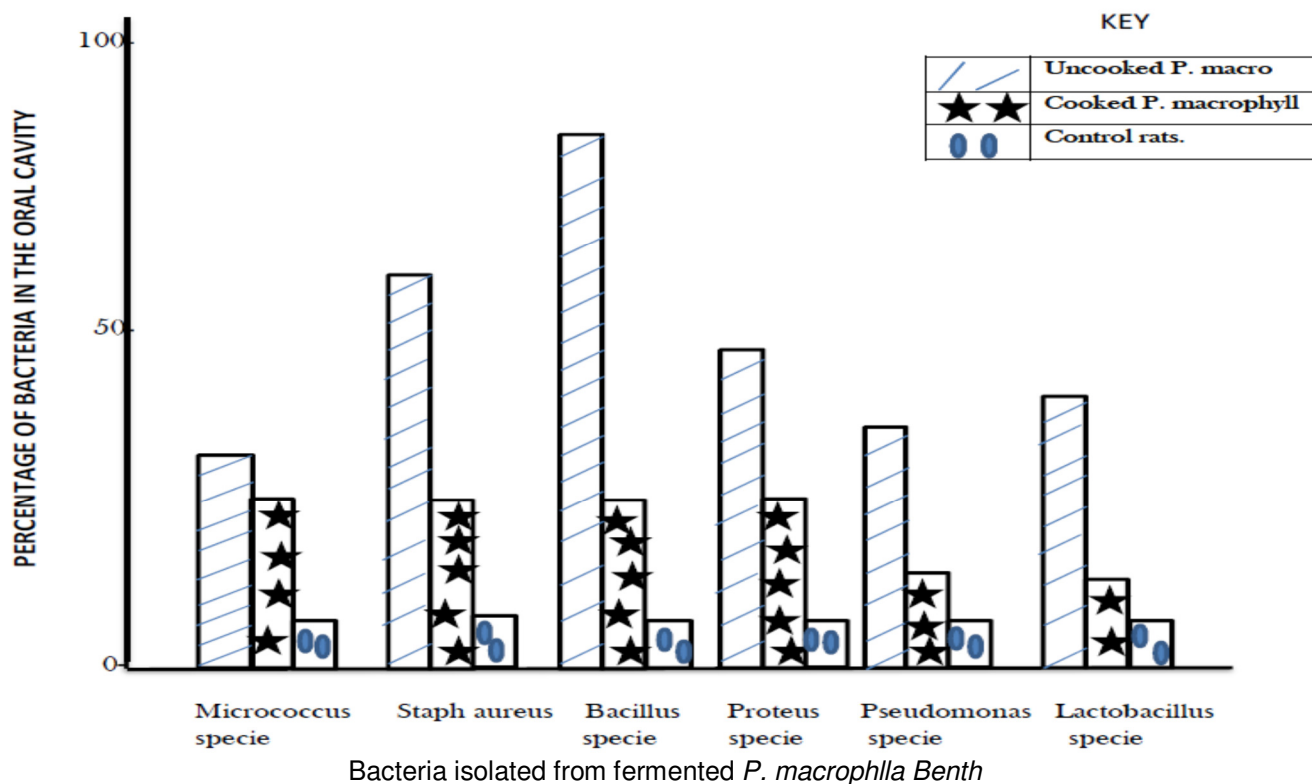


FIGURE 1: Histogram representing the percentage occurrence of bacteria in the oral cavity of rats fed with uncooked fermented *P. macrophyllabenth* and those fed with cooked fermented *P. macrophyllabenth* (Group C) for 28days.

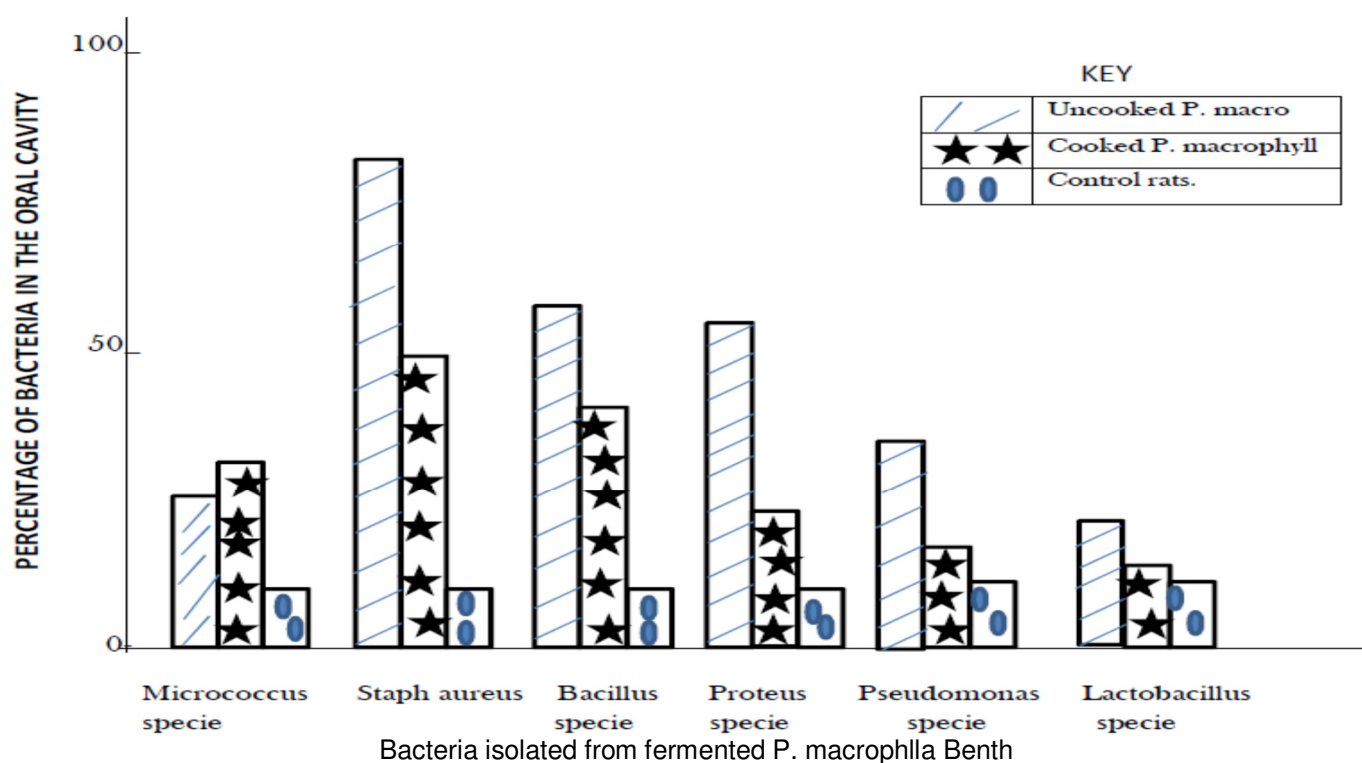
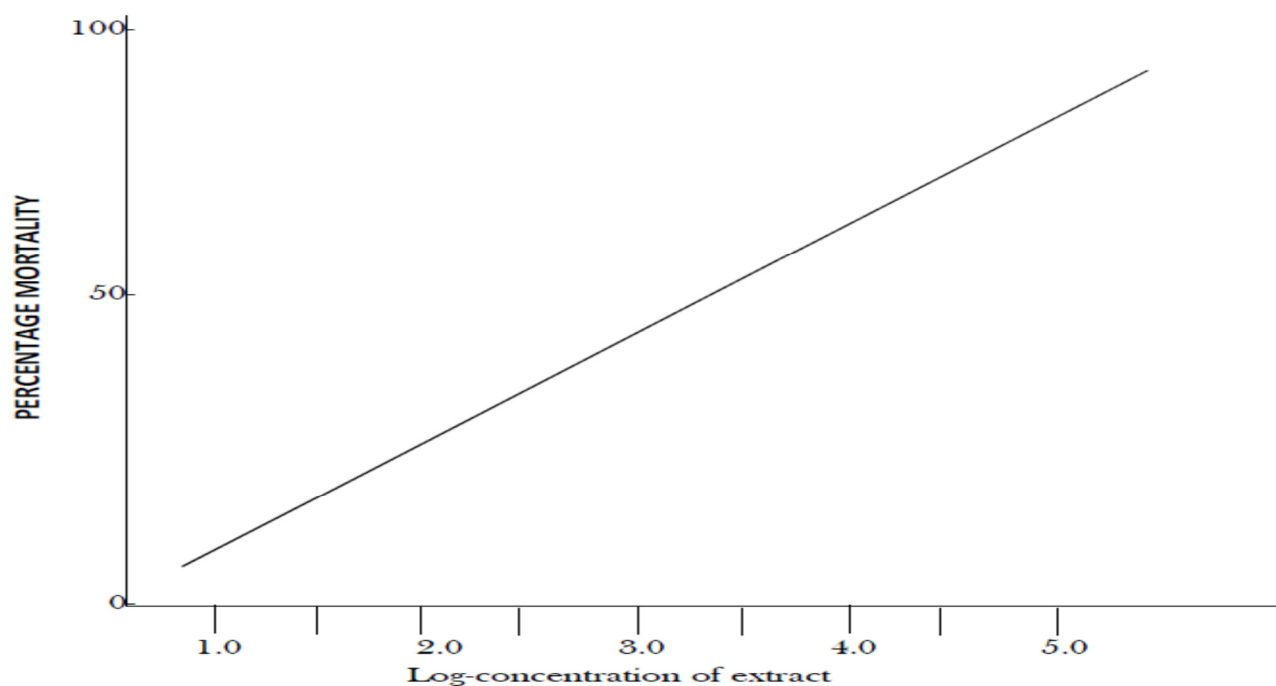


FIGURE 2: Histogram representing percentage occurrence of bacteria in the intestinal region of rats fed with uncooked *P. macrophyllabenth* (Grp B) and those fed with cooked fermented *P. macrophyllabenth* (Grp C) for 28 days.



The mortality dose (LD₅₀) of rats on extract of *P. macrophylla benth* is 2,600mg/kg.

FIGURE 3: Shows the Mortality dose (LD₅₀) of the rats on the extract of *P. macrophyllabenth* (oil bean) is 2,600mg/kg.

DISCUSSION

The study on the consumption of uncooked fermented *P. macrophyllabenth* and its bacteriological effects in the gut system of male albino wistar rats has been done. The organisms isolated included species of Micrococcus, Lactobacillus, Staphylococcus and Bacillus (Enejiugha, 2009). Others are proteus species and pseudomonas species. Their percentage occurrence in the various sites of the gut system was also evaluated Bacillus species microbes accumulated more (80%) in the oral region followed by staphylococcus aureus (60%) and then proteus species (50%). In Fig 1, among the group (Group C) that were fed with cooked fermented *P. macrophyllabenth* proteus specie occurred (35%) more in their oral cavity followed by Bacillus specie (30%) and *Staph aureus* (28%).

Staphylococcus aureus occurred more (70%) in the intestine of rats (Fig 2) that were fed with uncooked fermented *P. macrophyllabenth*. This is followed by Bacillus specie (60%), proteus specie (50%), pseudomonas specie (40%), then micrococcus species (20%).

Staphylococcus aureus also occurred more (40%) in the intestine of rats that were fed with cooked fermented *P. macrophyllabenth* (fig 2), followed by Bacillus specie (30%) and micrococcus specie (30%) and then proteus specie (15%) compared to their corresponding control that had the percentage occurrence of the microbes almost 3% in both fig 1 and 2. Heat by cooking the fermented *P. macrophyllabenth* and enzymes in the gastrointestinal tract must have played a role in reducing the bacteria load in the oral cavity and intestinal regions of the rats.

There is a possibility that virulent *Staphylococcus aureus*, proteus specie etc can escape destruction by enzymes present in the gut system and enter the urinary system during defecation and thereby causing urinary tract infection. This incident can possibly occur in female human beings that consume uncooked fermented *P. macrophyllabenth*. When the kidneys are infiltrated with bacteria such as *Staphylococcus aureus*, *Escherichia coli*, proteus specie, klebsiella specie pyelonephritis can occur (Oguwike et al, 2008). The invading infection affects the renal medulla before spreading to the cortical region of the nephron. According to Gillies (1973), the bacteria inflammation of the kidneys can show symptoms like loin tenderness, high fever and abnormal urinary sediments made up of red blood cells, white blood cells and bacteria.

The presence of these or any of the bacteria from uncooked fermented *P. macrophyllabenth* can overcome the immune system and cause gastrointestinal disorders such as Bacillary dysentery and unspecific stomach disturbances.

REFERENCES

- Achinewu S.C (1982). Composition and food potential of African oil beans (*P. macrophyllabenth*) and been (*Mucuna pruriens*). Journal of Food Science 47, p1736- 1739.
- Agbogidi and AYELO 2010. Germination of African oil beans (*P. macrophyllabenth*) seeds grown in crude oil polluted soil, Bioresearch bulletin, sapience research Labs, 3:147-148.
- Baker and Silvertown 1998. Microscopic examination of bacteria. Introduction to Medical Lab Technology 6th Edition. Butterworth-Heinemann publications, Linacre House, 225 Wildwood Avenue, Woburn MA 01801-2041.
- Enujiugha and Akanbi 2005. Compositional changes in African Oil bean seed (*P. macrophyllabenth*).seeds during thermal processing, Pakistan journal of Nutrition 4(1) pp 27-30.
- Enujiugha V.N (2009). Major Fermentative organisms in some Nigerian soup condiments. Pakistan Journal of Nutrition 8: 279-283.
- Gbadaga T.H, Samende B.K, Musuna C, Chibanda D (2008). The microbiological quality of informally vended foods. Food control 2008:19 829-832. Doi: 10.1016/j. Food count. 2007.07.016
- GILLIES R.R (1973). Urinary tract infection Medical microbiology. Twelfth Edition Vol. 1. Microbial infections 329-330.
- Ikhuoria E.U, Aiwonegbe A.E and Okoli R (2006). Characteristics and composition of African oil bean seed (*P. macrophyllabenth*). Chemtech journal 3 pp 309-310.
- Lorke D, (1973). A new approach to practical acute toxicity testing. Arch. Toxicol 54: 275-278.
- Oguwike F.N, Nneli R.O, Ndokuba P, Anyanwu G.E (2008). Leukocyte changes in adults with pyelonephritis in Enugu Nigeria. J. Biomed. Africa. Vol 6 No 1&2.
- Oguwike F.N (2014). Gastrointestinal tract system. Comprehensive Medical Physiology p71, published by Idealway Publishers 39 Abakpa Nike Road Enugu Nigeria.
- Olasupo N.A, Smith S.I, Akinsinde K.A (2002). Examination of Microbial status of selected indigenous fermented foods in Nigeria. J. Foods of p85-93.

- Samuelson G, Faraha M.H, Percleeson E (1992). Investigation of plants used in traditional medicine in Somalia. 11 Plants of the families combretae labiates. Journal of Ethnopharmacology 37(1)47-70.
- Turchett T (1982). Antagonism of some Bacillus species to a Rhizoctonia solani kuhn isolate and its effects in the germination of *Pinus nigra*. Arn. Seed. Eur. J. Pathol, 12:36-41.

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