



STUDIES ON BACTERIA ASSOCIATED WITH FERMENTED OIL BEAN SEED SOLD IN MARKETS IN PORT HARCOURT

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ABSTRACT

Bacteria associated with fermented Oil Bean Seed sold in markets in Port Harcourt was investigated. Samples were collected from Mile One (1) Market, Creek Road Market, Mile three (3) Market and Rumuokoro Market. Each was collected from the markets and plated on Macconkey and Nutrient agar and incubated at 37°C for 24 hours. Bacterial growth was observed on nutrient agar. Different bacterial identification procedures were used including biochemical tests for proper bacteria identification. The organisms isolated were *Staphylococcus aureus*, Bacillus species and *Escherichia coli*. The total bacterial count for sample in Mile One Market is 6.3×10^5 with *Escherichia coli* 2.4×10^5 , *Staphylococcus aureus* 3.2×10^5 and Bacillus 0.7×10^5 while the total bacterial count for sample in Creek Road Market is 5.3×10^5 with *Escherichia coli* 1.6×10^5 , *Staphylococcus aureus* 2.7×10^5 and Bacillus 1.0×10^5 and the total bacterial count for sample in Mile Three Market is 6.0×10^5 with *Escherichia coli* 2.1×10^5 , *Staphylococcus aureus* 2.2×10^5 and Bacillus 1.7×10^5 . The total bacterial count for sample in Rumuokoro Market is 5.0×10^5 with *Escherichia coli* 2.2×10^5 , *Staphylococcus aureus* 2.4×10^5 and for Bacillus 0.4×10^5 . The high bacteria count observed in this study might be attributed to environmental factors, which include exposure of the foods to air, type of water used in processing of the food, post production operations and personal hygiene of the food-handlers all these renders them as vehicles for food-borne infection. Adequate carefulness and good personal hygiene is therefore advised when processing oil beans seed both for private and commercial purposes to avoid or reduce the outbreak of food borne infections.

KEY WORD: oil bean seed, bacteria, market, food-borne infection.

INTRODUCTION

African Oil Bean Seed (Ugba) food, rich in protein is obtained by a solid state fermentation of the seeds of African oil bean tree, it is a popular food delicacy in Nigeria especially among the Ibo ethnic group where it serves as snack, side dish or as a food condiment. It is an essential food item for various traditional ceremonies where it is mixed for various traditional ceremonies with slices of boiled stock fish (Ugbana Okpoloko) garnished with vegetables and consumed by all socio economic class.^[1]

Practically all the food we purchase or grow be it fruit, vegetable, meat, cereal, home-made drinks, juices and dairy products harbour a variety of microorganisms.^[2]

This is not surprising when one considers that bacteria are ubiquitous and are especially plentiful in soil and air and could easily contaminate foods. Food can be viewed as a fertile ecosystem in which these organisms vie for their nutrients.^[2] Micro-organisms on foods are not always undesirable because sometimes their growth results in a more pleasant taste or texture. Food

manufacturers purposely encourage sonic microorganisms to flourish and produce desired flavors in some foods. However, contamination and growth of pathogens such as *Staphylococcus aureus*, *Salmonella species*, *Bacillus specie*, *Clostridium species*, *Vibrio cholerae* and *Escherichia coli* can result in perceptible changes in the quality of food. According to Murray^[3] such foods can transmit a wide range of diseases in a condition termed food infection, where the food serves as a vehicle for the transfer of the pathogen to the consumer, in which the pathogens grow and cause disease. Another condition that might arise is food intoxication, where the pathogens grow in the food and produce toxins that can affect the consumer.^[4]

The occurrence of bacteria in food has always been attributed to several factors, which include contamination through water, soil, food processing equipment, food contact with surfaces and most importantly food-handlers.^[5,6]

Improper handling of food is responsible for most cases of food-borne diseases and intoxication, including improper preparation and storage temperatures, and gross contamination due to poor personal hygiene.^[7] When food-handlers do not practice proper personal hygiene or correct food preparation, they may become vehicles for microorganisms, through their hands, mouth, and skin among others.^[8]

In developing countries SUCH as Nigeria, there are serious concerns about sanitation of ready-to-eat foods, particularly as potable water is seldom available at preparation venues and fast food stands and also most food-handlers lack basic knowledge of proper personal and environmental hygiene. It is in view of this that this study was conducted to isolate bacteria associated with fermented Oil Bean Seed sold in parts of Port-Harcourt, to identify isolated bacteria and to assess the level of bacterial found on Oil Bean Seed and to determine the percentage occurrence of isolated bacteria.

MATERIALS AND METHODS

STUDY LOCATION

The study was conducted in Port Harcourt metropolis. Port Harcourt is the Capital of Rivers State, Nigeria. It lies along the Bonny River and is located in the Niger Delta.

Specimen Collection: Samples were collected from four (4) markets within Port Harcourt metropolis in Rivers State. These markets are Mile 1 market, Creek Road market, Mile 3 market and Rumuokoro market.

Samples were collected from vendors of Oil Bean Seed in the different market. Each of the samples were put in a sterile sample collection bottles and neatly labelled for easy identification and was then sent to the laboratory for microbiological analysis.

Analysis of Samples: One grain of each sample was aseptically cut into tiny sheets with the aid of a sharp knife and transferred into a clean test tube with the aid of sterile forceps. Thereafter, serial dilution was carried out using sterile distilled water as diluents. Each of the samples was then homogenized in 9ml of sterile distilled water. From each dilution, 0.1ml of appropriate dilution of 10^{-1} , 10^{-2} , 10^{-3} , 10^{-4} , 10^{-5} , etc.) was aseptically plated with the aid of a sterile pasture pipette using Nutrient agar method for total viable count of bacteria and was incubated for 24 hours at 37° C. After incubation, colonies that developed on the plates were counted to obtain total viable counts, Pure cultures of the isolates were obtained by subsequent sub-culturing on fresh agar plates, Nutrient agar, Macconkey agar, Blood agar, etc.

Identification of Isolate: Visible colonies on both nutrient agar plates was observed and identified based on specific features such as growth pattern, shape, elevation, surface area, edges, consistency, hemolysis and colour of colonies. Other biochemical test were also carried out for accurate identification like Catalase Test, Coagulase Test, Citrate Utilization Test, Indole Test.

RESULT

The result obtained from the analysis showed that the bacteria isolated include *Escherichia coli* 7(17.5%), *Staphylococcus Aureus* 8(20.0%) and *Bacillus* 4(10.0%). Viable count was highest in Site A (6.3×10^5 cfu/g), followed by Site C (6.0×10^5 cfu/g), Then Site B (5.3×10^5 cfu/g) and Site D (5.0×10^5 cfu/g). The most frequently encountered organism was *Staphylococcus aureus* (10.5×10^5 cfu/g), followed by *Escherichia coli* (8.3×10^5 cfu/g), and *Bacillus* (3.8×10^5 Cfu/g). As shown in table 1. below. There was no significant difference ($P > 0.05$) in the viable counts of the organisms isolated under 24 hours.

Table 1: Overall Bacterial Count from Different Sites

Bacterial Isolates	A Cfu/g	B Cfu/g	C Cfu/g	D Cfu/g	Total	Mean ()	Standard Deviation	P.Value
<i>Escherichia coli</i>	2.4×10^5	1.6×10^5	2.1×10^5	2.2×10^5	8.3×10^5	2.1×10^5	1.4×10^5	
<i>Staphylococcus Aureus</i>	3.2×10^5	2.7×10^5	2.2×10^5	2.4×10^5	10.5×10^5	2.6×10^5	1.6×10^5	
<i>Bacillus</i>	0.7×10^5	1.0×10^5	1.7×10^5	0.4×10^5	3.8×10^5	0.9×10^5	1.0×10^5	
Total	6.3×10^5	5.3×10^5	6.0×10^5	5.0×10^5	22.6×10^5	5.7×10^5	2.4×10^5	

Interpretation

A = Mile 1 Market
 B = Creek Road Market
 C = Mile 3 Market
 D = Rumuokoro Market
 cfu/g = Colony Forming Unit/Gram

DISCUSSION

All over the world, microbiological standards in hygiene are prerequisite for good health living, it is not uncommon however to observe shift in hygienic

practices that deviates from standards both in the developing and developed-world.

The findings from this research indicate that the organisms *Staphylococcus aureus*, *Escherichia coli* and *Bacillus* are the three major bacteria in African Oil Bean Seed from the Mile One (1), Creek Road, Mile Three (3) and Rumuokoro Markets of Port Harcourt.

The high bacteria count observed in this study might be attributed to factors such as the environment, which

include exposure of the foods to air, type of water used in processing of the food, post production operations and personal hygiene of the food-handlers^[6,2]

Most food-handlers do not practice good personal hygiene and do not follow good manufacturing practices, which could reduce the occurrence of SUCH bacteria in foods.^[6]

The occurrence of bacteria on the African Oil Bean Seed examined renders them as vehicles for food-borne infection, it must be born in mind that the number of samples collected was relatively small in global terms .Coagulase positive Staphylococcus isolated in this study is related to it that they are frequently found living on the skin or nose of human. Staphylococcus aureus causes a variety of suppurative (pus-forming) infections and toxins in humans. It causes superficial skin lesions such as boils, styes and furunculosis, more serious infection such as pneumonia, phlebitis, meningitis, mastitis arid urinary tract infections and deep seated infections such as Osteomyelitis and endocarditis, Staphylococcus aureus causes food poisoning within (4-6 hours) after ingestion contaminated food, by releasing enterotoxins into the food, and toxic shock syndrome by release of super antigens into the blood stream.^[9]

In Nigeria, an important consideration is the fact that most food-handlers practice good personal hygiene and good manufacturing practices because of continuous awareness and education by the relevant authorities concerned with food safety regulations and also the consumer's carefree attitude and gross poverty that makes people to sometimes eat whatever comes their way, whether hygienically safe or not.

Post-production contamination of ready-to-eat foods by environmental and human sources is a factor that tends to be overlooked here in Nigeria, but needs attention from researchers, authorities and consumers.

In conclusion, Adequate carefulness and good personal hygiene is therefore advised when processing oil beans seed both for private and commercial purposes to avoid or reduce the outbreak of food borne infections.

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