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COMMON FUNGI AND BACTERIAL INVOLVED IN SPOILAGE OF FRESH FISH IN UTURU MARKET ISUIKWUATO LOCAL GOVERNMENT AREA ABIA STATE NIGERIA

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Abstract: **Spoilage of fresh and lightly preserved fish products is caused by microbial action. In terms of the microbiology of fresh fish and fish products with particular emphasis on identification of specific spoilage bacteria and the qualitative and quantitative biochemical indicators of spoilage. Shewanella putrefaciens and Pseudomonas spp. are the specific spoilage bacteria of iced fresh fish regardless of the origin of the fish. Modified atmosphere stored marine fish from temperate waters are spoiled by the CO2 resistant Photobacterium phosphoreum whereas Gram-positive bacteria are likely spoilers of CO2 packed fish from fresh or tropical waters. Fish products with high salt contents may spoil due to growth of halophilic bacteria (salted fish) or growth of anaerobic bacteria and yeasts (barrel salted fish). Whilst the spoilage of fresh and highly salted fish is well understood, much less is known about spoilage of lightly preserved fish products. It is concluded that the spoilage is probably caused by lactic acid bacteria, certain psychotrophic Enterobacteriaceae and/or Photobacterium phosphoreum. However, more work is needed in this area.**

Keywords: **Fish, Fish products, Spoilage association, Gram-positive bacteria, spoilage.**

1. INTRODUCTION

Fish has been one of the main foods for humans for many centuries and still constitutes an important part of the diet in most countries, as it become an increasingly important source of protein and other elements necessary for maintenance of healthy body (1). In Nigeria, the short supplies of animal protein with the increasing human population have raised the cost of animal protein to a level almost beyond the reach of the low income group (2). The resultant effect is a considerable increase in the demand for fish as an alternative source of animal protein in the face of the ever increasing population. It has also been reported that a physiologically abnormal state of pregnancy otherwise termed the pre-eclempsia pregnancy, have adverse effects in both function, as well as levels of blood fractions, especially when proten is detected in the urine of a pregnant woman (3). It is comparatively cheaper and highly acceptable with little or no religious bias, which gives it an advantage over pork or beef (1). Fishes are vertebrates, poikilotherms and live predominantly in water. Their bodies may be elongate, dorsoventrally, laterally compressed or rounded in cross section but recognizable into head, trunk and post anal tail. Fish are highly important in the development of Nigeria both economically and health wise (4). Fishes are prone to fungal contamination in the field, during harvest,

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transport, marking and with the consumer. Fish samples were surface disinfected incubated at room temperature for upto 14 days without supplement all media, and subsequently examined for mould and yeast growth. The most common moulds isolated were Botrytis cinerea, Rhizopus stolonifer, Alterneria alternata, Penicillium chrysogenum, Cladosporium sp., Fusarium oxysporum followed by the yeast isolates like Candida sp. The most common spoiling fungi were Alternaria alternata and Cladosporium sp. and less common fungal isolates were Penicillium sp., Trichoderma sp., Geotrichum sp. and Rhizopus sp. (5). In this present study, an attempt was made to isolate

The cultural morphology and biochemical reactions of the obtained isolates confirmed (9) and identify the spoilage causing microorganisms present in an Nigeria mackerel fish.

Study area

This research was done on fresh fish, gotten from three various selling points at Uturu market in Abia State, Nigeria.

Sample Collection

The sample was collected from sellers of different age bracket and from different selling points in Uturu Market. The sample collected was put in a sample collection sac and was labeled according to how they were collected which was taken to the laboratory for analysis.

Equipment and instrument used

The following equipment was used in this project research work. Bursen burner, electronic weighing balance, inoculation wire loop, spatula, test tube stand, cotton wool, foil, test tube, syringe, electronic microscope, masking tape, and conical flask.

Reagents and chemical used

Distilled water, peptone water, sabourand dextrose agar (SDA), lactophenol cotton blue stain.

Sterilization of materials

Conical flask, glass ware materials and measuring cylinder were sterilized by using hot air oven at the temperature of 160^0C after they were properly washed and dried, then the glassware was allowed to cool at room temperature before used.

Media preparation

The media used was Sabourand Dextrose Agar (SDA). The media used was gotten commercially in a powdered form. It was then prepared according to manufacturer's instructions.

2. METHOD OF INOCULATION

The sample was collected and smeared directly into the petri dish of sabourand dextrose agar SDA media. Where the plates was incubated at room temperature of 28^0C to 30^0c for 2-7 days.

The fungal growth was examined daily as the morphology were recorded on daily basis. Each fungal colony observed was sub-cultured on a fresh media using spot inoculation technique to obtain a pure isolate. It was sub-cultured by picking a particular colony from the mixed cultured using a flamed wire loop and inoculated into the fresh media to get a pure and single isolate.

Identification of the isolates

The organism isolated was subjected to both macroscopic and microscopic characterization of each fungal isolate. This characterization was based on the physically observable characteristic like nature of growth, pigmentation, nature of reverse side of plate.

Morphological characteristics

The colony of the isolates in terms of colour, texture, rate of growth and nature of reserve side of plate were observed on the culture media after incubation period of the various isolates.

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Microscopy using lactophenol cotton blue

A drop of lacto phenol blue was dropped on a clean slide; a small portion of the growth from the culture was placed on the top of the fluid and teased thoroughly using two clean inoculation needles.

The specimen was then covered with a glass cover slide carefully to avoid air bubble, and then it was viewed under X10 and X40 objective.

3. RESULTS

Fungal isolates from the study of fresh fish sold in Uturu include, *Aspergillus sp, Penicillium sp, Rhizopus species*.

Table 3.1: Shows the morphological and staining properties of the isolates.

Table 3.2: Shows the prevalence of each species isolated from fresh fish sample *Aspergillus sp* was the most prevalent with percentage frequency of (40%) respectively and the least occurred isolated is Rhizopus species with percentage frequency of (25%) respectively and lastly penicillium species with (35%).

Table 3.1: Identification of fungal isolates from fresh fish

S/N	ISOLATES	MACROSCOPIC	MICROSCOPE
FA	*Aspergillus sp*	Black, powdery colony with white yellow edge, reverse side is deep white	Non-septate hyphae with conidia completely covering the coniciosphore
FB	*Rhizopus sp*	Wooly pink yellow reverse side is tan	Septate hyphae with blunt end and branches
FC	*Penicillium sp*	Velvety bluish colony reverse side is brown younger colony has bluish centre and white edge	Branched septate hyphae with long laidding end.

Table 3.2: Prevalence rate of isolates from fresh fish

ISOLATE	PREVALENCE (%)
Aspergillus sp	40
Penicillium sp	35
Rhizopus sp	25

4. DISCUSSION

From the analysis carried out on fresh fish 3 (three) fungal organism were isolated and identified. These isolates include; *Aspergillus* species, *Penicilium* species and *Rhizopus* species.

***Aspergillus Species*:** This mold is found in a condition where the temperate is optimum and growth requirement include, water activity of the substrate which is more likely to take place during Winter month.

Some disease associated with Aspergillus is farners lung, baker asthma and malt workers lung. The inhalation of conidia in *Aspergillus* can lead to several diseases.

Penicillium Species: This mold has a fruity odour. It is found in the soil of citrus plantation and barley plants, stored seeds of cereals, grapes, and fruit juices. It is one of the most important house molds.

Rhizopus Species: The spores rhizopus are found everywhere in the environment, injury in the head is pre-requisite for infection and development. It becomes severe in warm humid environment especially under irritation. I therefore agree with my work that the following fungi species, *Aspergillus* species, *Penicillium* species *Rhizopus* species can be found in dried fish which tallies with the work (6) which reported that certain species of Aspergillus produced toxic metabolites, while Mucor sp. could degrade the biochemical structure of proteins and lipids thereby altering its organoleptic property. The presence of Mucor sp, Penicillium sp., Aspergillus niger, Aspergillus flavus, Fusarium sp. and Rhizopus stolonifer in the fish sample is not surprising as they disperse in the form of spores which is abundant in the environment and can be introduced through dust and soil (7). Their presence in these food samples is of serious public health concern as these fungi have all been implicated with the production of mycotoxin (8).

5. CONCLUSION

In conclusion, contamination and fungal load of fresh fish products has been found as a result of several factors such as, poor freezing of the fish products, poor storage as well as the use of inadequate and inefficient refrigeration processing facilities.

Therefore the adoption of good freezing practices and the use of controlled temperature in preserving of the fish products are highly recommended as a public health concern.

6. RECOMMENDATION

Based on this result of my study the following recommendation is made;

1. Refrigeration is applied to inhibit the growth of microorganism
2. Fresh fish should be properly washed with warm water to kill or reduce spore forming organism
3. Fresh fish should be properly packaged and stored.
4. Fresh fish should be well handled during its process as this could reduce contamination
5. They should also be cooked before consumption.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

Conflicts of interest:

There is no Conflicts of interest.

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