MICROBIOLOGICAL ASSESSMENT OF JEW'S EAR MUSHROOM *(AURICULARIA AURICULAR-JUDAE)* SOLD IN PORT HARCOURT, RIVERS STATE.

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Abstract: Microbiological assessment of *Auricularia auricular-judae* sold in three markets in Port Harcourt metropolis was carried out. Nine microbial genera were isolated and identified on the basis of their microbiological, morphological, biochemical and physiological characteristics. The heterotrophic bacterial counts ranged between 1.8 X 10^4 - 4.7 X 10^5 Cfu/g whereas the heterotrophic fungal counts ranged between 1.6 X 10^4 - 3 X $10^5$6fu/g. The bacterial isolates belong to five genera, *Bacillus, Staphylococcus, Micrococcus, Pseudomonas* and *Serratia* species. The fungal isolates belong to four genera, *Saccharomyces, Aspergillus, Fusarium* and *Penicillium* species. The results of this study show that the microbial counts on the Jew's ear mushroom obtained from Port Harcourt metropolis were higher than the recommended 0.1 X 10^5 Cfu/g limit of Commission on Microbiological Specification for Food (CMSF). This microbial load represents a potential health risk when the mushrooms are eaten raw or undercooked. Proper handling of the mushroom from the farm to the market and subsequently to the consumer is advised for food safety.

Keywords: Microbiological assessment, heterotrophic bacterial count, heterotrophic fungal counts, food safety.

Introduction

Mushrooms are fungi with umbrella-like fruiting bodies often generated from lignocellulosic waste materials, some of which are edible. Their nutritive qualities have made them a culinary delight in many parts of the world. Mushrooms are rich sources of fibre, proteins, vitamins and minerals such as calcium, potassium, iron, potassium and sodium (Caglarırmak, 2007; Patil *et al.*, 2010). For this reason they are used as food, food additives and food supplement. Mushrooms rank below animal meat in terms of the amount of crude protein, but well above most other foods, including milk, which is an animal product (Chang and Miles, 1989). Mushroom protein is adjudged superior in quality to animal and vegetable protein being an intermediate of the two and it has all the essential amino acids (Kurtzman, 1976,; Purkayastha and Nayak, 1981). Mushroom cultivation for medicine and consumption is on the increase and it should be encouraged in third world nations where most people cannot afford animal protein.

Auricularia auricular-judae is an edible mushroom also known as Jew's ear mushroom. The Western part of Nigeria (the Yorubas) identify it as "Olu-otiti" whereas the South-Eastern (Ibos) and South-Southern (Ikwerres) parts call it "Ero-nti" and "Erue-nsi" respectively, signifying its resemblance of the human ear. It has a soft jelly-like texture with a mild flavor and is used for mixed mushroom recipes (Conte *et al.*, 2008). The whole fruit body can be eaten and are best consumed at their early

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rowth stage, after a thorough cooking, ometimes taking comparatively long time cook (Hobbs and Christopher, 1995).

he aim of this study was to assess the icrobiological quality of the Jew's ear ushroom also known as *Auricularia uricular-judae*, an edible mushroom sold in ajor markets in Port Harcourt metropolis, an index to the dangers that may arise om their consumption.

laterials and Methods

mple collection

Samples were purchased from Mile Mile III and Choba markets, which are ajor markets in Port Harcourt metropolis, ivers State, Nigeria. The samples were llected using sterile zip polyethylene bags id transported to the Microbiology aboratory of the University of Port arcourt for analysis.

licrobiological analysis of sample

etermination of microbial load

The microbial loads of the ushroom were determined using the read plate method. 10g of mushroom mple was placed in sterile conical flask ntaining 90ml normal saline and agitated r a few seconds after pounding with erile mortar. 1ml of the resultant mixture as aseptically transferred to test tube ntaining 9mls of normal saline medium. ne dilution was continued serially until the h dilution was attained. An aliquot (0.1 l) of the dilutions was inoculated into a erile Potato Dextrose Agar (PDA) plates, cubated for 2 to 5 days at room mperature whereas the Nutrient Agar IA) plates were incubated at 37°C for 24-h. Following the methods outlined by gundana and Fagede (1982), a spread ate technique was employed by the use of bent glass rod to spread the diluted mple evenly over the surface of the agar, triplicates, before incubation. The number colonies was counted using colony unter. A mean of the counts from each plate was obtained and multiplied with the appropriate dilution factor to obtain the microbial loads as total colony forming units per gram (CFU/g) for bacteria and spore forming units (SFU/g) for fungal isolates.

Identification of bacterial isolates

Isolates were identified according to Aneja 2003 by cell and colony morphology, Gram staining, catalase test, motility test, oxidase, indole production, methyl red, Voges-proskauer, hydrogen sulphide production, starch hydrolysis and carbohydrate fermentation

Identification of fungal isolates

The fungal isolates were identified by examining both their macroscopic and microscopic characteristics. Macroscopic identification was done by visualizing surface and reverse pigments on PDA plates while microscopic characterization involved shape, color and structure of conidia, hyphae, conidiophores and conidial head. The fungal isolates were identified after staining them with lactophenol cotton blue, following the methods of Raper and Fennell (1987).

RESULTS

Microbiological quality of Jew's Ear mushrooms was accessed as shown in Tables 1 and 2. The total bacterial counts ranged from $1.8x10^4$- $4.7x10^5$ Cfu/g, while the total fungal counts ranged from $1.6x10^4$-$3.0x10^5$ sfu/g. Mushrooms obtained from Choba market had the highest microbial load (Table 1). The microbial isolates belong to four fungal genera: *Aspergillus* sp., *Fusarium* sp., *Saccharomyces* sp. and *Penicillium* sp.; and five bacterial genera: *Staphylococcus* sp., *Pseudomonas* sp., *Bacillus* sp., *Micrococcus* sp. and *Serratia* sp. (Table 2). The obtained microbial isolates varied with the different sites of sample isolation.

Table 1: Total Heterotrophic Bacterial and Fungal Counts

Sample designation	Bacterial counts (cfu/g)	Fungal counts (sfu/g)
M3M	1.8×10^4	1.6×10^4
M1M	1.1×10^5	9.2×10^4
CBM	4.7×10^5	3.0×10^5

M3M = Mile 3 market, M1M = Mile 1 market, CBM = Choba market

Table 2: Bacteria and Fungi isolated from Jew's Ear Mushrooms Sold in Port Harcourt

Sample designation	Bacterial isolates	Fungal isolates
M3M	*Staphylococcus* sp; *Pseudomonas* sp; *Bacillus* sp	*Aspergillus* sp; *Fusarium* sp
M1M	*Micrococcus* sp	*Saccharomyces* sp
CBM	*Serratia* sp	*Penicillium* sp

M3M = Mile 3 market, M1M = Mile 1 market, CBM = Choba market

Discussion

Results of microbiological assessment of ew's Ear mushroom revealed a high umber of microbial species. The presence f microorganisms could be as a result of ource of the samples. Okechukwu *et al.* 011) corroborated this claim in their ndings. The total heterotrophic bacterial nd fungal counts of mushrooms from Mile and Choba markets were higher than the $1x10^5$ Cfu/g recommended by the ommision of Microbiological Specification Food (CMSF, 1974). The mere presence microorganisms in food does not portend nger except if they are pathogenic and ir numbers large enough to initiate an ection.

Most food spoilage microorganisms harmless saprophytes. In this study, we nd that most of the isolates can be troyed by heat and as such would not be ch of a problem if the mushrooms are perly cooked before consumption. The sence of *Staphylococcus* sp in some of the ples is an indication of possible amination from human source since it be transmitted from person to product ugh contact. *Staphylococcus* sp can e food poisoning (Franzier and thoff, 1978). *Micrococcus* and *Bacillus* are mon soil genera and could find their to the mushroom during harvesting, porting or retailing of the product. Stanley *et al.* (2008) isolated *Micrococcus* sp and *Bacillus* sp from oyster mushroom grown on organic waste and suggested that the presence of *Micrococcus* sp and *Bacillus* sp could be a reflection of the environment under which they were cultivated. The *Bacillus* sp can form heat resistant spores that can survive above boiling point.

Pseudomonas sp are known members of the microflora of mushrooms. *Pseudomonas* sp can cause a mottled, brown discolouration of mushroom under low humidity. *Aspergillus* spores are prevalent in the atmosphere, settling on suitable surfaces for growth. Mushrooms carbohydrate can serve as substrate for microbial growth. *Saccharomyces* sp play an important role in fermentation of compost and mushrooms grow on compost.

Conclusion

The results of this study have established that mushrooms sold in markets in Port Harcourt contain pathogenic microorganisms. The habit of eating uncooked mushroom as medicine should be discouraged. Mushrooms meant for consumption must be properly washed with salt and cooked to reduce or destroy the microbial load.

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