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NUTRITIVE VALUE OF THE SCLEROTIA OF *PLEUROTUS TUBERREGIUM*: A MUSHROOM

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ABSTRACT
Edible mushrooms have been found to contain valuable nutrients as shown in various research works. This aim of this study is to evaluate the nutritive value of an edible mushroom (Pleurotus *tuberregium*) sclerotia which is commonly used as a soup thickener. The proximate values (Crude protein, Crude fat, crude fibre, Ash, Moisture and Carbohydrate) and mineral composition (Potassium, Calcium, Magnesium, Iron, Zinc, Copper and Magnesium) of the sclerotia of *Pleurotus tuberregium* were analysed. The results of analysis showed that *Pleurotus tuberregium* is a good source of carbohydrate with an average value of 85.81g/100g on dry weight basis. The crude fibre content was higher than the crude protein content with average values of 9.29g/100g and 3.53g/100g respectively. Of the minerals analysed, K, Ca and Mg were significantly higher than the other elements with average values of 3.74g/100g, 1.28g/100g and 1.12g/100g respectively. *Pleurotus tuberregium* can be said to be a good source of dietary macro-elements (K and Mg) essential for preventing osteoporosis, reducing kidney stones, etc. The carbohydrate, fibre and protein content of *Pleurotus tuberregium* indicate that it is a healthy source of nutrients and as such can be included in diets of especially diabetic individuals.

Keywords: *Pleurotus tuberregium,* Carbohydrate, diet, Crude protein, minerals, potassium, mushroom.

INTRODUCTION

The nutritive content of a food source determines its viability for use or inclusion in a diet. Over the years, wild edible mushrooms are becoming more and more important in human diet due to their nutritional (Manzi *et al.,* 1999; Reis *et al.,* 2012 & Ekute, 2018) and therapeutic characteristics (Manzi *et al.,* 2001; Sanmee *et al.,* 2003 & Jonathan and Fasidi, 2005). *Pleurotus tuberregium* is a *Pleurotus* sp having both a sclerotia and a mycelium belonging to the Basidiomycota in the Kingdom Fungi. "Ero Usu" as *Pleurotus tuberregium* is called by the South-eastern people of Nigeria is generally used as a soup thickener particularly in making melon soup when melon seeds are expensive. Okwulehie and Ogoke (2013) asserted that some rural dwellers in Nigeria use the sclerotia of *Pleurotus tuberregium* in preparing a local snack called melon cake. This mushroom has also served as an alternative source of income to some rural dwellers in the South east and the Middle Belt regions of Nigeria. Several researches have shown that edible mushrooms are highly rich in carbohydrates, proteins, minerals, crude fibre and vitamins (Barros et al., 2007; Ikewuchi and Ikewuchi, 2008; Amadi *et al*., 2014; Ekute, 2018). In the western world, mushrooms are consumed as delicacies due to its aroma and texture (Kalac, 2009) and also as an alternative to meat. The low fat content of edible mushrooms also makes them very suitable for preventing ailments such as hypertension, hypercholesterolemia and cancer.

Individuals consuming *Pleurotus tuberregium* may be doing so based on the fact that it thickens their soup or sets their cake without knowing that there are other very important components of the mushroom they are benefitting from. Evaluating the proximate and mineral content of this mushroom will help in bridging the gap in the knowledge of its consumers and of course create an awareness of its nutritive value thereby encouraging its production on a wide scale and consumption by everyone. This is the thrust of this study.

MATERIALS AND METHODS

Sample Preparation

Fresh *Pleurotus tuberregium* sclerotia were purchased from Oyingbo market in Lagos state and identified at the Biotechnology department of the Federal Institute of Industrial Research, Oshodi (FIIRO). The brown-black part of the sclerotia (outer part) was peeled off, chopped in pieces and dried at a temperature of 50^0C. After drying, it was grinded to powder with a Corona hand milling machine and then stored in polyethylene containers prior to analysis.

Sample Analysis

The already prepared mushroom sample was analysed based on procedure earlier described by Ekute, 2018 based on Association of Official Chemists (AOAC, 2006) standard procedures. The carbohydrate, crude fibre, protein, ash, moisture and mineral content of *Pleurotus tuberregium* were determined in this study. Mineral analysis was performed as described by Masamba and Kasambo-Mwale, 2010 as follows; 2.5g of the mushroom powder was weighed into 250mL dry conical flask and wetted afterwards with few drops of distilled water. 50ml nitric acid was then added and the flask with its contents heated for 40mins in a fume hood. Thereafter, 20mL $HClO_4$ was added and heated again until white fumes appeared. Upon cooling, 50 mL distilled water was added and subsequently transferred to a 250mL standard flask and made up to the mark with distilled water. Digested samples were analysed for Fe, Zn, Cu, Mg, Ca, K and Mn levels using UNICAM 939 AAS. All determinations were done in triplicates.

RESULTS

The results of the proximate analysis of the sclerotia of *Pleurotus tuberregium* are presented in Table 1. All results are expressed as mean ± standard deviation and reported on dry weight basis. The most abundant component of *Pleurotus tuberregium* is carbohydrate with an average value of 85.81g/100g followed by crude fibre and crude protein with average values of 9.30g/100g

and 3.53g/100g on dry weight respectively. It had an appreciable moisture content of 10.02g/100g on dry weight basis. However, the crude fat content is almost insignificant with an average value of 0.11g/100g. Table 2 shows the average levels of the mineral composition of *Pleurotus tuberregium*. Of the seven minerals analysed, Potassium had the highest concentration with an average value of 3.743g/100g followed by Calcium (1.28g/100g) and Magnesium (1.12g/100g). Copper had the least concentration of 0.0017g/100g.

Table 1: Proximate Composition of sclerotia of *Pleurotus tuberregium* (g/100g)

Parameter	Concentration[a]
Moisture	10.02 ± 0.34
Ash	1.27 ± 0.12
Crude Fibre	9.30 ± 0.27
Crude fat	0.11 ± 0.02
Crude protein	3.53 ± 0.04
Carbohydrate	85.81 ± 5.44

[a]**:** values are expressed as Mean (g/100g) ± standard deviation on dry weight basis, n = 3

Table 2: Level of Minerals in sclerotia of *Pleurotus tuberregium* (g/100g)

Parameter	Concentration[b]
Calcium	1.283 ± 0.096
Magnesium	1.121 ± 0.132
Potassium	3.743 ± 0.008
Manganese	0.003 ± 0.00005
Copper	0.0018 ± 0.00005
Zinc	0.0047 ± 0.0002
Iron	0.027 ± 0.002

[b]**:** values are expressed as Mean (g/100g) ± standard deviation on dry weight basis, n = 3

DISCUSSION

The results obtained for the proximate analysis of *Pleurotus tuberregium* showed that it is a good source of essential nutrients as it has significant amount of dietary carbohydrate, fibre and protein. The carbohydrate content of this specie of the *Pleurotus* sp is higher than those reported for *Pleurotus ostreatus* and *Pleurotus pulmonarius* (Egwim *et al*., 2011; Ekute, 2018). A lower carbohydrate value was also reported by Ikewuchi and Ikewuchi (2008). According to Diez and Alvarez (2001), a number of factors influence the nutritional composition of mushrooms. These factors include growing site, type of substrates, mushroom type, developmental stages and part of the fungal samples analysed. These could account for the discrepancies in values obtained in this research and those of some other researchers'. Carbohydrates are known to be responsible for energy production, energy storage, building macromolecules and assisting in lipid metabolism. The high carbohydrate content of *Pleurotus tuberregium*, makes it a healthy source of good carbohydrate especially for diabetic patients. The mushroom also had an appreciable amount of protein, fibre, moisture and ash with very little amount of fat. Protein content of mushrooms generally has been reported to be twice that of vegetables and four times that of oranges and significantly higher than that of wheat (Aletor, 1990; Fasidi, 1996; Okwulehie and Odunze, 2004). The amount of protein documented in this study was lower than those reported by Ikewuchi and Ikewuchi (2008) and Amadi *et al.* (2014) and. However, the crude fibre content was higher than those documented by these researchers'. The moisture content on dry weight basis is in agreement with those reported by Ikewuchi and Ikewuchi (2008) for *Pleurotus tuberregium* and Ekute, (2018) in an earlier work on *Pleurotus pulmonarius*. The results though are higher than those reported by Amadi *et al*. (2014).

Minerals are essential for metabolic reactions, transmission of nerve impulses, rigid bone formation and regulation of water and salt balance and so on. The results of this study show that *Pleurotus tuberregium* is a good source of essential minerals such as K, Ca and Mg. Potassium had the highest concentration than the other minerals analysed. Based on dietary requirement, a consumption of 100g of dry mushroom per day provides the necessary amount an adult needs for good health. A comparism of the K levels of some food sources with that of *Pleurotus tuberregium,* revealed that it has higher levels than tomato products (1.014g/100g), cooked beet greens (0.91g/100g), cooked soybeans (0.54/100g) and raw spinach (0.56g/100g). The Potassium levels in *Pleurotus tuberregium* are also higher than the values reported for *Auricularia polytricha, Lentinus subnudus, Termitomyces microcarpus* and some other mushrooms analysed by Gbolagade *et al*. (2006). Another prominent mineral in *Pleurotus tuberregium* is magnesium. Mg contributes to the structural development of bone and also plays a role in the active transport of calcium and potassium ions across cell membranes, a process that is crucial to nerve impulse conduction, muscle contraction and normal heart rhythm (Rude, 2012). The Recommended Dietary Allowances (RDA) for Magnesium for male and female adults is 420mg and 320mg respectively (IOM, 1997). Based on the findings of this study, a diet with approximately 34g *Pleurotus tuberregium* sclerotia will provide the required level of Mg for an adult. The Mg level in *Pleurotus tuberregium* is also higher than that of Beef, Broccoli, Apple, Carrot, Kidney Beans and Roasted Pumpkin. Calcium is another mineral essential for the prevention of Osteoporosis and the formation of strong bone and teeth. The RDA for Calcium for adult males and females is 1.0g (ABH, 2020). This thus means that serving a diet comprising of *Pleurotus tuberregium* sclerotia powder could enhance the amount of Calcium consumed by an individual. Pt had lower levels of Calcium than other calcium sources like poppy seeds and cheese but higher than that of yoghurt. Overall, *Pleurotus tuberregium* has the potential of providing sufficient minerals when included in foods to meet nutrient requirements of healthy individuals

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