

Effect of *Pleurotus tuber Regium* (mushroom) Extract on the Biochemical Parameters of Wistar Albino Rats

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Abstract

Pleurotustuber regium and other species of edible mushrooms have been consumed as a component of human diet due to their nutritional values which contain essential nutrients and have gained importance because of their medicinal properties which includes antitumor, antigenotoxic, antihypertensive, antiinflammatory, antilipidaemic, antihyperglycaemic, antibacterial, antiviral, antifungal activities as well as immune-modulating agent. This study aims to determine the effect of ethanol and aqueous extract of *Pleurotus tuber regium* on the biochemical parameters in Wistar albino rats. Haematological and biochemical parameters were examined with the blood samples collected using the Abacus Junior Haematology Analyzer. The aqueous group showed reduced low-density lipoprotein (LDL), triglycerides (TG), high density lipoprotein (HDL) and Cholesterol (CHOL), but the ethanol group showed increased LDL, TG and CHOL values compared to the control group. There is increased amount of sodium ion (Na⁺), potassium ion (K⁺) and Urea, and decreased chloride ion (Cl⁻), bicarbonate ion (HCO₃⁻) and Creatinine (Cr) in the ethanol group. However, there is decrease Na⁺, K⁺, Cl⁻, Urea, HCO₃⁻ and Cr in the aqueous group. Though, the increase was not significant. The aqueous and ethanol extracts of *Pleurotus tuber regium* used in this study showed effects on the Albino Wistar rats, but the aqueous extract showed more beneficial effects than the ethanol extract. Therefore *Pleurotus tuber regium* extracts can be used as a prebiotic and probiotic material in the maintenance of weight.

Keywords: High Density Lipid, Low Density Lipid, Urea, *Pleurotus tuber regium*

INTRODUCTION

The term mushroom is defined according to Chang and Miles (1992), as a macrofungus with a distinctive fruiting body, which can either be hypogeous or epigeous, large enough to be seen with the naked eyes and to be picked by hand. Mushrooms of the genus *Pleurotus* are popular for their nutritional and medicinal properties have been extensively investigated for their anticancer and immune-modulating effects (Zeng *et al.*, 1994; Morris *et al.*, 2003; Wasser,

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2010). Reports have shown that they possess antibacterial, antitumor, antioxidant, antihypercholesteremic, anti-inflammatory, and hypoglycaemic (Zeng *et al.*, 1994; Refaie *et al.*, 2009; Morris *et al.*, 2011; Zhanget *al.*, 2011).

Medicinal mushrooms have found use either whole or as extracts in traditional therapies. There are many bioactive compounds that have been identified in mushroom extracts and are available for use as dietary supplements (Jyotikaet *al.*, 2013).

The phytochemical screening done by Ikewuchi and Ikewuchi(2008), revealed that *Pleurotus tuber regium* sclerotium is very rich in phytates and moderately rich in alkaloids, flavonoids, as well as polyphenols, polyketides, terpenes, steroids and tannins (Kalac, 2010; Yaltiraket *al.*, 2009).

P. tuber regium mushroom is used in treating asthma, underweight in babies, boils etc. (Dzomeku, 2009; Moteyet *al.*, 2015). It has also found use in the treatment of heart pains, persistent cough and anaemic conditions (Okhuoyaet *al.*, 1998; Sawyer, 1993) In traditional medical practice, *P. tuber regium* is used for the treatment of headaches, stomach ailments, cold, fever, smallpox, and high blood pressure and for weight gain in malnourished babies (Okhuoya and Okogba, 1994; Fasidi and Olorunmaiye, 1994; Alobo, 2003). The sclerotium is also ground with herbs of undisclosed identity fried with palm oil and administered orally to pregnant women to aid in the development of the foetus (Oso, 1977)

MATERIALS AND METHOD

The sclerotia of *Pleurotus tuber regium* were obtained from the New Benin market, in Edo State, Nigeria.

Experimental Animals

Fifteen (15) female albino Wistar rats weighing 129-239g, were used for the experiment. The animals were obtained from a private animal house in Abraka, Delta State and then acclimatized for 7 days and maintained on water and animal feed ad libitum.

Preparation of Extracts and Administration

The sclerotia of *P. tuber regium* were soaked in water for 10minutes and the bark shredded, and then air-dried and then grinded into powder and stored at room temperature. The powdered samples were soaked in distilled water (250g in 1500ml) and ethanol (300g in 1400ml) for 5days. The mixture was filtered and concentrated in a water-bath. The extract was dissolved in equivalent amount of solution to prepare 50mg/ml, which was administered to the rats orally with a sterilized cannula.

Animal sacrifice and sample collection

At the end of the period of treatment, the animals were sacrificed and blood samples collected according to the method described by McGrath *et al* (1997), and stored in EDTA and Heparin bottles for biochemical analyses.

Biochemical studies

Biochemical analyses were carried out following manufacturer's instruction on reagent kits (RANDOX, GB). The parameters analysed include sodium ion, potassium ion, chloride ion, urea, creatinine, bicarbonate ion, cholesterol, high density lipoprotein, low density lipoprotein and triglycerides.

RESULT AND DISCUSSION

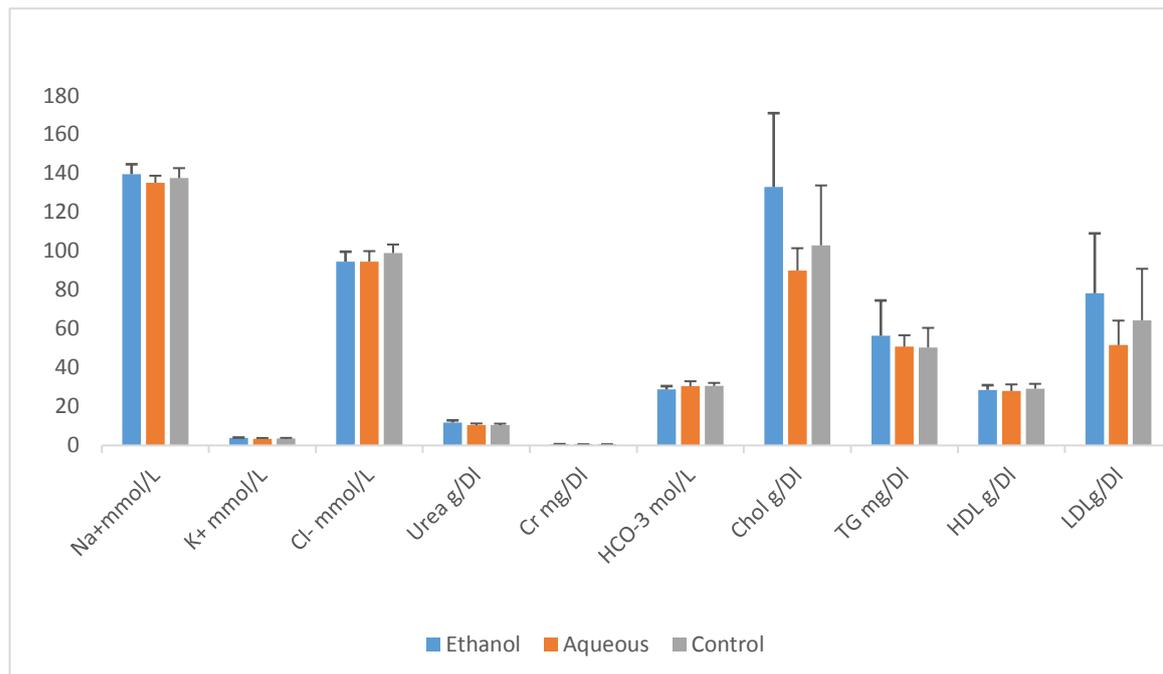


Figure 1: Biochemical Values of Wistar Rats Administered with Ethanol and Aqueous Extracts of *Pleurotus Tuber Regium*

From the results obtained as shown Fig. 1, there is no significant difference in Na⁺, K⁺ and Cl⁻ ion concentrations between the three groups and they all fall within the normal range which is 137-147mmol/L, 3.4-5.3mmol/L and 99-105mmol respectively.

The triglycerides in rats fed with ethanol extracts are within the normal value (40-160mg/dl) (National Cholesterol Education Programme Guidelines) as shown in Fig. 1, but higher than the group fed with aqueous extract and the group not fed with the mushroom extract. This is because there are evidences that indicated that bacteria enhance the absorption and storage of lipids (Sears, 2005). Triglyceride is the form in which the body store energy for later use. Hence the amount of triglycerides stored is based on the need of the animal.

The high density lipoprotein (HDL) is at the borderline of the normal value (>29mg/dl) which is 28.6±2.4mg/dl for the ethanol group, 28.0±3.4mg/dl for the aqueous group and 29.2±2.5mg/dl for the control group. There is a reduction in the HDL values for the rats fed with ethanol extract and aqueous extract compare to the control, although the values are at the borderline. This is the reason why the weight in these two groups is higher than those in the control group. There is a marginal increase in the Lower density lipoprotein (LDL) in the ethanol group (78.32±30.8mg/dl), which is higher than those in the aqueous and control groups. The HDL and LDL are factors that determine obesity or increase in weight of an animal. In obesity or increase in weight condition, there is lower HDL and higher LDL values, which is indicated in the rats fed with the ethanol extract of the mushroom with higher weights compared to the rats fed with the aqueous extract and those in the control group with lower weights in that order.

CONCLUSION

The aqueous and ethanol extracts of the mushroom has shown that it is of beneficial effects in maintaining a normal sodium, potassium, chloride, bicarbonate, urea, cholesterol and triglyceride, with significant effect on high density lipoprotein (HDL) and low density lipoprotein.

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