International Journal of Medicinal Mushrooms, Vol. 7 (2005)

Hypocholesterolemic Effect of the Oyster Mushroom, *Pleurotus ostreatus* (Jacq.:Fr.) P. Kumm. and Its Isolated Polysaccharides

Ayman S. Daba

Mubarak City for Scientific Research and Technology Applications, Genetic Engineering and Biotechnology Research Institute (GEBRI), Medical Biotechnology Dept., New Borg El-Arab City, Universities District, Alexandria-Egypt; email: adaba1@yahoo.com

Unfavorable developments in the incidence of hypercholesterolemia (high cholesterol) and clinical complications related to atherosclerosis throughout the industrialized world makes the search for natural substances with hypocholesterolemic effects highly important. The role of dietary fiber in lipid metabolism and athergensis has been extensively studied; however, the focus has been on the fibers of vegetable, fruit, and cereal origin. Mushrooms contain high fiber content, sterols, proteins, and microelements. These, along with their low caloric content, makes mushrooms ideal for a nutrition program aimed at the prevention of cardiovascular disease.

This work has been carried out to investigate the hypocholesterolemic effect of oyster mushroom *Pleurotus ostreatus* (Jacq.: Fr.) P. Kumm. and its ethanolic extract on hamsters fed a hyperlipidemic diet. The chemical analysis of the oyster mushroom indicates that the fruit bodies contain 54% carbohydrate, 16% protein, and 6% lipid along with lower concentrations of many other chemical substances. The physicochemical properties of the mushrooms and their extracts were extensively investigated. The molecular weight of the active fraction of the mushroom ethanolic extract was 304 kilodaltons. The NMR spectra indicated that the extract is glucan in nature. In order to investigate the hypocholesterolemic effect of the mushrooms, it was decided to evaluate the effect of this fungus on several biochemical criteria associated with atherosclerosis and coronary heart disease. The hamster model was chosen because its cholesterol metabolism has been found to be clearly similar to that of humans. The present work revealed that the addition of mushrooms to the diet did not affect the intake of other foods or the final body weight of the hamsters. Results showed a significant decrease in the tested serum and liver lipid parameters in hyperlipidemic hamsters given mushroom fruit bodies and their extract. The effect of mushroom ethanolic extract on acyl-CoA—cholesterol actyltransferase (ACAT) activity, apolipoprotein content, and phospholipid profile—were studied. Results indicated that mushroom ethanolic extract reduced cholesterol absorption.

Our data confirm the importance of ACAT for the absorption of dietary cholesterol in hamsters. The lethal dose value of ethanolic mushroom extract administered in hamsters was 660 mg/kg body weight. Estimation of enzymes representing liver function and glucose concentration was done in this study to illustrate if there were any side effects due to administration of mushroom extract to these hyperlipidemic hamsters. The hypocholesterolemic effect of mushroom ethanolic extract was less pronounced than the effect of a diet containing whole oyster mushroom. Similarly, the favorable redistribution of cholesterol in lipoproteins was less evident in the group given mushroom ethanolic extract compared to a diet containing whole mushroom.

This indicates that the ethanol does not extract all hypocholesterolemic substances present in oyster mushrooms. Histological studies on arteries from different groups showed much thickened artery walls in hamsters fed a hyperlipidemic diet. The thickening of the wall was partially prevented by using mushroom extract.

In conclusion, the favorable hypolipidemic activities of oyster mushrooms, as evidenced by the decrease in lipid parameters and the ACAT inhibition in animal models, show that further investigation is warranted. This is an area under investigation by a number of laboratories. There is an implicit role suggested for this drug class as therapy for coronary artery and other atherosclerotic diseases in humans.