Research Article

The Antiproliferative Activity of Sclerotia of Lignosus rhinocerus (Tiger Milk Mushroom)

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Lignosus rhinocerus, the tiger milk mushroom, is one of the most important medicinal mushrooms used by the indigenous people of Southeast Asia and China. It has been used to treat breast cancer. A cold water extract (LR-CW) prepared from the sclerotia of L. rhinocerus cultivar was found to exhibit antiproliferative activity against human breast carcinoma (MCF-7) and human lung carcinoma (A549), with IC50 of 96.7 μg/mL and 466.7 μg/mL, respectively. In comparison, LR-CW did not show significant cytotoxicity against the two corresponding human normal cells, 184B5 (human breast cell) and NL 20 (human lung cell). DNA fragmentation studies suggested that the cytotoxic action of LR-CW against cancer cells is mediated by apoptosis. Sephadex G-50 gel filtration fractionation of LR-CW yielded a high-molecular-weight and a low-molecular-weight fraction. The high-molecular-weight fraction contains mainly carbohydrate (68.7%) and small amount of protein (3.6%), whereas the low-molecular-weight fraction contains 31% carbohydrate and was devoid of protein. Only the high-molecular-weight fraction exhibited antiproliferative activity against cancer cells, with IC50 of 70.0 μg/mL and 76.7 μg/mL, respectively. Thus, the cytotoxic action of the LR-CW is due to the high-molecular-weight fraction, either the proteins or protein-carbohydrate complex.

1. Introduction

Mushroom has been consumed by many societies throughout the world due to its tastiness, high nutritional values, and pharmacological properties [1, 2]. It is well established that mushroom extracts contain a wide variety of compounds such as polysaccharides, protein, fibre, lectins, and polyphenols, each of which may have its own pharmacological effects [3]. Many mushrooms or their extracts can be used as therapeutic agents, and they are generally known as medicinal mushrooms.

Lignosus rhinocerus, the tiger milk mushroom, belongs to the Polyporaceae family and is one of the most important medicinal mushrooms used by natives in Southeast Asia and southern China. In Malaysia, the mushroom is also known locally as “cendawan susu rimau”—literary “mushroom of tiger’s milk.” It is widely used by the indigenous communities in peninsular Malaysia to treat a variety of diseases, including breast cancer, fever, cough, asthma, food poisoning, and as a general tonic. The mushroom indeed is the most popular medicinal mushrooms used by the Malaysia indigenous populations [4]. In China, L. rhinocerus sclerotium is an expensive folk medicine used by traditional Chinese physicians to treat liver cancer, chronic hepatitis, and gastric ulcers [5]. The sclerotium of L. rhinocerus is the part with medicinal value. There are, however, very few studies on the pharmacological activities of the mushroom due mainly to its limited supply. The mushroom proved very difficult to cultivate and, until recently, was only available by collection from the jungle. Recently, Tan [6] reported successful cultivation of the mushroom in agar, solid, and spawn medium with good yield, thus making it possible to obtain large quantity for investigation and therapeutic purpose.

Lai et al. [7] was the first to investigate the antiproliferative effects of the sclerotial polysaccharides of the mushroom. The mushroom they used for investigation was termed Polyporus rhinocerus Cooke (Aphylloporomycetidae), which is actually synonym of Lignosus rhinocerus. They found that