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Phylogenetic analysis and protective effects of thymol and its chromatographic fractions from a novel wild mushroom in combating oxidative stress

M. Subbulakshmi^a, Sugapriya Dhanasekaran^{b,*}, S. Abirami^c, M. Kannan^d,
R. Palaniappan^e, Divya Venugopal^b

^a Department of Microbiology, K. R. College of Arts and Science, Kovilpatti, Tamil Nadu, India

^b Department of Medical Laboratory Sciences, College of Applied Medical Sciences, Prince Sattam Bin Abdulaziz University, Wadi Al Dawaser, Saudi Arabia

^c Department of Microbiology, Kamaraj College, Thoothukudi, Tamil Nadu, India

^d Research Department of Zoology, V.H.N. Senthikumara Nadar College (Autonomous) Virudhunagar, Tamil Nadu, India

^e Research Department of Computer Science, V.H.N. Senthikumara Nadar College (Autonomous) Virudhunagar, Tamil Nadu, India

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ABSTRACT

Mushrooms are good sources of phytochemicals that have antioxidant and anti-proliferative effects. This study identified a unique isoform of 18S rRNA gene (864 bp) from a novel wild mushroom (SMK-1) (GenBank accession number: SUB3267363). Thin layer chromatographic (TLC) profiling of the methanolic extract of the dried mushroom fruiting bodies of SMK-1 revealed the presence of phenolic and flavonoid fractions with retention factor (R_f) values of 0.955 and 0.927 respectively. The GC/MS chromatograms of the SMK-1 methanolic extract identified the main bioactive compound was phenol, 5-methyl-2-(1-methylethyl) (74.00%) (thymol). The radical scavenging activity for the flavonoid fraction was greater than the phenolic fractions (R_f -phenolics fractions > R_f -flavonoid fractions) with the antioxidant activity more than that of standard ascorbic acid. Also, the phenolic and flavonoid fractions of SMK-1 expressed cytotoxic effects in HeLa cells with IC_{50} values ranging from 5 μ g/mL to 80 μ g/mL in a dose-dependent manner. This present research highlights the presence of high thymol concentration in a novel wild mushroom that has antioxidant and anti-proliferative potential with therapeutic benefits. The application of thymol natural products from novel mushroom SMK-1 as nutrition supplements could inhibit oxidative stress triggered by numerous pathologies that may pave the way to develop a new therapeutic natural drug.

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1. Introduction

In recent years, consumption of wild mushrooms has risen globally, increasing their earning potential and economic contribution by around two billion dollars [1]. Mushrooms are non-timber forest goods that are significant for both their pharmacological and nutritional values. They are sources of several pharmacologically

active molecules that can improve to strengthen the immune function and defend against carcinogenic substances [2]. A recent study has found that mushrooms contain bioactive compounds that have innumerable therapeutic benefits such as immune-modulation, antitumor and chronic bronchitis improvement [3].

Several types of mushrooms are nutritious and edible, providing vitamins, carbohydrates, protein, amino acids, minerals and bioactive substances [4]. *Gloeophyllum sepiarium* (Rusty gilled polypore) is an inedible wood-decay fungus but possesses medicinal properties and grows on coniferous trees in small, dark brown/green brackets [5]. A study reported that largest edible basidiomycete mushroom, *Agaricus bisporus*, belonging to the genus *Agaricaceae* has a delicious taste with much more nutritional benefits and has been used in the food industry for its very strong aroma or flavoring taste [6]. A balanced

* Correspondence authors at: Department of Medical Laboratory Sciences, College of Applied Medical Sciences, Prince Sattam Bin Abdulaziz University, Wadi Al Dawaser, Saudi Arabia.

E-mail address: sughaphd@yahoo.com (S. Dhanasekaran)

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