Antimicrobial Properties of *Pleurotus Eryngii* and *Lentinus Edodes* Hydro-Alcoholic Extracts

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Abstract

Besides superior nutritional values mushrooms posed significant medicinal properties. Hydro-alcoholic extracts of several isolates of *Pleurotus eryngii* and *Lentinus edodes* mushroom species were investigated for their antimicrobial activities against pathogenic microorganisms with medicinal importance. Antimicrobial activities of the extracts were evaluated by the agar disk diffusion method. Results revealed that the 70% ethylic alcohol extracts have significant inhibitory activities against *Bacillus subtilis* var. *spizizinii*, *Escherichia coli* and *Staphylococcus aureus*. The results showed that the 70% ethanol extracts of *Pleurotus eryngii* and *Lentinus edodes* mushroom isolates may have biopharmaceutical potentiality.

Keywords: antimicrobial activity, hydro-alcoholic extracts, *Pleurotus eryngii*, *Lentinus edodes*

INTRODUCTION

Several medicinal mushrooms like *Lentinula* spp and *Pleurotus* spp. are rich sources of natural antibiotics. *Lentinula edodes* (shiitake) extract can improve the beneficial intestinal flora, reducing harmful effects of certain bacterial diseases and colon cancer formation. Many *P. eryngii* extracts perform a significant effect on anticancer, antiviral, hypolipidemic and immuno-stimulating activities through immune regulatory factors (Zhiming *et al.*, 2016). The research aims were to find natural products with antimicrobial activities which would be able to replace some synthetic antibiotics in the treatment of various infectious diseases. The objective of this work was to evaluate the antimicrobial activities of some isolates of *Pleurotus eryngii* and *Lentinus edodes* mushroom species against pathogenic microorganisms with medicinal importance.

MATERIALS AND METHODS

Four isolates of *Pleurotus eryngii* named Peg, Pe1, Pe2 and *P. eryngii* 2600, and four isolates of *Lentinus edodes* named Lem 51, Lem 52, Leb and

Les were tested for their antimicrobial properties. Extracts preparation was performed by using 2 ml 70% ethyl alcohol added to 1 g of dried mushroom sample. The hydro-alcoholic solutions were kept 18 days at the room temperature (~25°C). Antimicrobial activities of the extracts against *Candida albicans* ATCC10321, *Candida parapsilopsis* CBS604, *Escherichia coli* ATCC8739, *Staphylococcus aureus* ATCC6538, *Bacillus subtilis* var *spizizinii* ATCC6633, *Enterococcus faecalis* ATCC29212 and *Pseudomonas aeruginosa* ATCC9027 were screened by the agar disk diffusion method. Ethyl alcohol (70%) was used as negative control.

RESULTS AND DISCUSSION

After the incubation period and the occurrence of the inhibition zones the results revealed that the 70% ethylic alcohol mushroom extracts have significant inhibitory activities in particular against *Bacillus subtilis* subsp. *spizizinii*, *Escherichia coli* and *Staphylococcus aureus* bacteria. Between all samples tested *P. eryngii* Pe1 mushroom extract had strongly inhibitory effect on *Bacillus subtilis*

Figure 1. Antimicrobial activities of extracts against *Bacillus subtilis* subsp. *spizizinii*

1. *L. edodes* Lem 52; 2. *L. edodes* Lem 51; 3. *L. edodes* Leb; 4. *Lentinus edodes* Les; 5. *P. eryngii* Pe1; 6. *P. eryngii* Peg; 7. *P. eryngii* Pe2, M=control (70% alcohol).

subsp. *spizizinii* and promoted the formation of the largest inhibition zone (> 20 mm) (Fig. 1).

The data relating to the antimicrobial activities of the mushroom extracts is summarized in Table 1.

Reports of other researchers indicating that the antimicrobial activity may arise from the genetic structure of mushroom species, physical, biochemical constituents, chemical differences of mushroom extracts, solvents and test microorganisms (Akyuz *et al.*, 2010; Braga *et al.*, 2011).

CONCLUSION

The results of present investigation revealed that the ethanol extracts of some edible mushrooms isolates showed biopharmaceutical potentiality as antimicrobial agents against pathogenic microorganisms. Also, the mushroom extracts can be an effective natural product for food and pharmaceutical industrial applications.

Tab. 1. Antimicrobial activities of hydro-alcoholic extracts

Fungal extracts	Microorganism						
	<i>C. albicans</i>	<i>C. parapsilopsis</i>	<i>B. subtilis spizizinii</i>	<i>P. aeruginosa</i>	<i>E. coli</i>	<i>E. faecalis</i>	<i>S. aureus</i>
1	+	+	++	++	+	++	+
2	-	-	+	-	+	++	+
3	-	-	+	-	+	+	+
4	-	-	+	-	+	+	+
5	-	-	++++	-	+	+	+
6	-	-	+	-	+	-	+
7	-	-	+	-	++	-	+

Note: 1. *L. edodes* Lem 52; 2. *L. edodes* Lem 51; 3. *L. edodes* Leb; 4. *Lentinus edodes* Les; 5. *P. eryngii* Pe1; 6. *P. eryngii* Peg; 7. *P. eryngii* Pe2. Activities were classified according to the diameter of the inhibition zones around the disks containing 10µl/disk extract or control: +, <10 mm; ++, 10–15 mm; +++, 15–20 mm, +++, >20 mm; -, without activity.

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