ANTIOXIDATIVE POTENTIAL OF SELECTED EDIBLE WILD MUSHROOMS FROM SABAH

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ABSTRACT

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The objectives of the present study were to evaluate the *in vitro* antioxidant properties of four species of edible wild mushrooms namely, *Pleurotus porrigens*, *Schizophyllum commune*, *Hygrocybe conica*, and *Lentinus ciliatus*; optimization of the extraction conditions for antioxidant activity of the mushrooms; identification of the potent antioxidative components from the selected mushrooms; and the evaluation of the oxidative stability of cooking oil supplemented with selected mushroom extracts. The antioxidant properties of edible wild mushrooms were evaluated using 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging ability, 2,2'-azino-bis(3-ethylbenzothiazoline-6-sulfonic acid) (ABTS) radical cation inhibition, ferric reducing antioxidant power (FRAP), and β-carotene-linoleate bleaching (β-CB). Total phenolic content (TPC) was determined using Folin-Ciocalteu's method. Response surface methodology (RSM) was employed to optimize the extraction time and temperature of *P. porrigens* and *S. commune* for the maximal yields of antioxidant activity. Fractionation by means of column chromatography was carried out and the identification of major antioxidative components was performed by liquid chromatography-mass spectrometry analysis. The oxidative stability of sunflower oil was determined by peroxide value, iodine value, p-anisidine value, and thiobarbituric acid-reactive substances. Results showed that *P. porrigens* had significantly higher ($p < 0.05$) DPPH radical scavenging ability and FRAP than that of butylated hydroxyanisole (BHA), while *S. commune* showed comparable DPPH radical scavenging ability and ABTS radical cation inhibition with BHA. Total phenolic content was found in a descending order of *P. porrigens* > *L. ciliatus* = *P. ostreatus* > *H. conica* = *S. commune*. Positive correlations were found between TPC and DPPH; ABTS; FRAP; and β-CB, respectively, indicating that the presence of phenolic compounds contribute to the antioxidant activities of the edible wild mushrooms. The optimized extraction time and temperature of *P. porrigens* and *S. commune* were 315.5 min and 37.4°C; and 213.2 min and 41.5°C, respectively. The values obtained experimentally agreed well with the predicted values, indicating the suitability of respective RSM models for maximal yields of antioxidant activity. Both sub-fraction (SF)-III of *P. porrigens* and *S. commune* showed consistently higher DPPH radical scavenging ability, FRAP, and TPC with two flavones glucosides, namely luteolin 7-*O*-β-glucoside and apigenin 7-*O*-β-glucoside were identified in both SF-III. The sunflower oils supplemented with *P. porrigens* and *S. commune* extracts were found to be able to prolong the shelf-life between 1 and 2 years by retarding the formations of primary and secondary oxidation products, and reducing losses of polyunsaturated fatty acids. In conclusion, the selected edible wild mushrooms showed promising antioxidant activity, and luteolin 7-*O*-β-glucoside and apigenin 7-*O*-β-glucoside were identified in SF-III of *P. porrigens* and *S. commune*. Thus, edible wild mushrooms from Sabah can be promoted as antioxidant-rich foods as well as potential sources of natural antioxidants for food industry application.