

Antioxidant, antibacterial, and anticandidal activities of an aquatic plant: duckweed (*Lemna minor* L. Lemnaceae)

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Received: 12.06.2008

Abstract: Duckweed (*Lemna minor* L. Lemnaceae) is a widespread, free-floating aquatic macrophyte, a source of food for waterfowl and a shelter for small aquatic invertebrates. It grows quickly and reproduces faster than other vascular plants. The objective of this study was to determine the antioxidant, antiradical, antimicrobial, and anticandidal activities of duckweed using different in vitro methodologies. For evaluation of antioxidant and antiradical activities, 2,2'-azino-bis(3-ethylbenzthiazoline-6-sulfonic acid) (ABTS^{•+}) radical scavenging, 1,1-diphenyl-2-picryl-hydrazyl (DPPH) free radical scavenging, total antioxidant activity by ferric thiocyanate, total reducing power by potassium ferricyanide reduction method, superoxide anion radical scavenging, hydrogen peroxide scavenging, and ferrous ions chelating activities were calculated. In addition, α -tocopherol and trolox (a water-soluble analogue of tocopherol), butylated hydroxyanisole (BHA), and butylated hydroxytoluene (BHT) were used as the reference antioxidant compounds. At the 45 $\mu\text{g mL}^{-1}$ concentrations of lyophilized water extract (WELM) and ethanol extract (EELM), showed 100% and 94.2% inhibition, respectively, on lipid peroxidation of linoleic acid emulsion. On the other hand, BHA, BHT, α -tocopherol, and trolox demonstrated inhibition of 92.2%, 99.6%, 84.6%, and 95.6%, respectively, on peroxidation of linoleic acid emulsion at the same concentration. In addition, the total phenolics and flavonoids in WELM and EELM were determined as gallic acid and quercetin equivalents, respectively. Furthermore, an important goal of this study was to determine the inhibitory effects of WELM and EELM against 21 bacteria and 4 fungi yeast species by using the disk-diffusion method. In our results, it was observed that WELM and EELM had an antibacterial effect against *Staphylococcus epidermidis*, *Staphylococcus saprophyticus*, *Staphylococcus warneri*, *Citrobacter freundii*, *Citrobacter koseri*, *Neisseria lactamica*, *Neisseria sicca*, *Micrococcus luteus*, *Bacillus cereus*, *Bacillus subtilis*, and *Streptococcus pneumoniae*, and an anticandidal effect against *Candida parapsilosis* and *Candida glabrata*. Consequently, this plant is a promising source of natural food antioxidants.

Key words: Duckweed, *Lemna minor*, antioxidant activity, antimicrobial activity, radical scavenging

