

Influence of the extraction solvent on antioxidant activity of *Althaea officinalis* L. root extracts

Research Article

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Abstract: *Althaea officinalis* (Malvaceae) is a well-known plant that is widely distributed throughout the world. Aqueous and hydroalcoholic extracts from *A. officinalis* root are used mainly because of their antitussive and expectorant activity. It is well known that these activities are based on the polysaccharide composition, but little is known about the possible antioxidant activity of root extract. The present study evaluated antioxidant activity of root extracts prepared with different extraction solvents applying ABTS^{•+} (2,2'-azino-bis(3-ethylbenzothiazoline-6-sulphonic acid)), hypochlorous acid scavenging assay and iron-induced lipid peroxidation. The results showed that the extract prepared with water as extraction solvent did not possess antioxidant activity, whereas the extracts obtained using ethanol:water as extraction agent showed well pronounced antioxidant activity. In particular, the extracts obtained at low concentration of ethanol in the mixed solvent (50:50 and 70:30, v/v) showed higher scavenging activity for ABTS^{•+} radicals and hypochlorite ions than the extract obtained with the higher ethanol concentration (90:10, v/v). These results correlated very well with phenolic and flavonoid content of the extracts. The extracts did not show cytotoxic effect on human BV-173 leukemic cells but may have immunomodulating effects due to their antioxidant properties.

Keywords: *Althaea officinalis* • ABTS^{•+} • Hypochlorous acid scavenging assay • Lipid peroxidation • Total phenolic content • Total flavonoids

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1. Introduction

Althaea officinalis L. (genus *Althaea*) belongs to the botanical family *Malvaceae* and is widely distributed throughout the world. It is a perennial plant well-known for its healing properties since ancient time. The activity of various root extracts of *A. officinalis* against cough, throat irritation and inflammation of gastrointestinal mucosa has been described [1,2]. Syrups prepared by maceration of root (usually diluted with sucrose syrup) are used in many countries for the treatment of cough and inflammation of the mouth and pharynx. Other preparations of the plant include decoction and tea preparation [3]. Decoction is mainly administered for constipation [4], whereas infusion is used for bronchial

catarrh [5]. Infusions have been reported to be applied orally for treatment of asthma and as expectorant [6,7]. Comminuted herbal substance for tea preparation is applied to alleviate abdominal aches of digestive origin. Antibacterial activity of root extract and its incorporation in mouthwash for topical periodontal prophylactics has been also reported [8]. Other studies mentioned the potential use of root extract in topical formulation due to its wound healing effects [7]. The capacity of the *A. officinalis* extracts to soothe chapped skin and to reduce the inflammation is well established. Some studies have evaluated antioxidant activity of extracts prepared from dried plant and its flowers [9,10]. Although the above-ground parts displayed a mild antioxidant activity [9,10], the antioxidant activity

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