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## Scavenging capacity of strawberry tree (*Arbutus unedo* L.) leaves on free radicals

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### ABSTRACT

Despite strawberry tree (*Arbutus unedo* L.) leaves had a long use in traditional medicine due to its anti-septic, diuretic, astringent and depurative properties, the potential of their antioxidant activity are still lacking. Our study goals to assess the antioxidant and free radical scavenging potential of water, ethanol, methanol and diethyl ether extracts of *A. unedo* leaves. Total phenols content was achieved spectrophotometrically using Folin–Ciocalteu reagent with gallic acid as standard. Antioxidant activity was evaluated using three different methods: reducing power of iron (III)/ferricyanide complex assay, scavenging effect on DPPH (2,2-diphenyl-1-picrylhydrazyl) radicals and scavenging effect on superoxide radicals by using the PMS–NADH–nitroblue tetrazolium system. Ethanol extracts of *A. unedo* leaves were the highest in reducing power (IC<sub>50</sub> 232.7 µg/mL) and DPPH scavenging effect (IC<sub>50</sub> 63.2 µg/mL) followed by water extracts (with IC<sub>50</sub> of 287.7 and 73.7 µg/mL, respectively); whereas diethyl ether extracts were the lowest. In the scavenging on superoxide radical assay, methanol extracts obtained the best results (IC<sub>50</sub> 6.9 µg/mL). For all the methods tested the antioxidant activity was concentration dependent. In accordance with antioxidant activity, highest total phenols content were found in ethanol, followed by water, methanol and diethyl ether extract. The results indicated that *A. unedo* leaves are a potential source of natural antioxidants.

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### 1. Introduction

The importance of oxygen-derived free radicals, commonly named reactive oxygen species (ROS), in health and disease is now recognized by every branch of medicine and biological science. ROS are chemically reactive molecules that are derived from the successive reduction of molecular oxygen to H<sub>2</sub>O. They included free radicals, such as superoxide anion radicals (O<sub>2</sub><sup>-</sup>), hydroxyl radicals (HO<sup>•</sup>), and non-free-radical species, such as H<sub>2</sub>O<sub>2</sub>. Singlet oxygen (<sup>1</sup>O<sub>2</sub>) species are also forms of activated oxygen, among others (Aruoma, 1996a,b; Gülcin, 2007). The excessively produced ROS can injure cellular biomolecules such as proteins, carbohydrates, nucleic acids and lipids causing cellular and tissue damage (Aruoma, 1996a,b; Pulido et al., 2000). Overwhelming evidence indicates that ROS play a role in most major health problems of the industrialized world, including cardiovascular diseases, cancer, diabetes, neurological diseases, and atherosclerosis and are believed to be a major factor in aging (Finkel and Holbrook, 2000).

In recent years, the increasing interest around 'natural' products has encouraged the scientific community to obtain information about natural plant antioxidants and its importance in medicine, human nutrition and food industry (Liu and Ng, 2000; Wang, 2006). It has been demonstrated that plants contain many natural

antioxidants compounds such as carotenoids, vitamins, phenols, flavonoids, dietary glutathione, and endogenous metabolites (Larson, 1988); which have been identified as a free radical or active oxygen scavengers (Zheng and Wang, 2001). Therefore, an appropriate dose of antioxidants derived from plants in the human diet can help to avoid the risk of contracting diseases where ROS are involved in its pathogenesis. Taking the traditional application form of *Arbutus unedo* L. into consideration, phytochemicals contents and in particular their antioxidant activity, are of considerable interested to investigated from the point of view of its use as a potential therapeutic agent against a wide range of human disease. Also, provide new scientific information for the further development of modern herbal medicines.

*A. unedo*, the strawberry tree, belongs to the Ericaceae family, and it is native of the Mediterranean climate (Celikel et al., 2008). In Portugal, the strawberry tree is mainly implanted in the south, being however present throughout all of the country in a dispersed way (Pedro, 1994). This species have been traditionally used as food, by using the arbutus berries in the production of alcoholic beverages, jams, jellies and marmalades (Alarcão-e-Silva et al., 2001; Pallauf et al., 2008); and as phytopharmaceuticals. For example, the fruits are well known in folk medicine as antiseptic, diuretic, and laxative, while the leaves are used as astringent, diuretic, urinary anti-septic, antidiarrheal, depurative and more recently in the therapy of hypertension, diabetes and in the treatment of inflammatory diseases (Ziyyat et al., 1997; Ziyyat and

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