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Antioxidant activity and lipid profile of three seaweeds of Faro, Portugal

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Abstract Three seaweeds, *Codium fragile* (Suringar) Hariot, *Ulva lactuca* (Linn.) members and *Eisenia arborea* (Areschoug) (Phaeophyta) were assessed for their antioxidant activities and lipid profile. Antioxidant activities of methanolic and aqueous extracts were analyzed for DPPH free radical scavenging, FRAP, total antioxidant, ABTS radical cation decolorizing, reducing power, total flavonoid, and total phenolic contents. Methanolic extract of *E. arborea* was found to contain high phenolic and flavonoid contents with higher antioxidant activities in all assays studied. Aqueous extract of *E. arborea* was the next active extract, whereas both the extracts of *C. fragile* were not highly anti-oxidative in nature. The methanolic extract of *U. lactuca* possessed higher activity and higher phenolic content compared to aqueous counterparts. This suggests the potential uses of seaweeds as a source for natural bioactive compounds with more antioxidant activities. Among these three seaweeds, *E. arborea* was found to have higher activities and their lipid and chemical constituents were identified by GCMS and LCMS.

Keywords Antioxidant · *Codium fragile* · *Eisenia arborea* · Seaweeds · *Ulva lactuca*

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Introduction

Seaweeds have attracted the attention worldwide due to their commercial uses as fertilizers, nutraceuticals, alginate, agar, carrageenan, food, fine chemicals, and biofuels (Fornes et al. 2002; Van de Velde et al. 2002). The fact that some pigments, such as fucoxanthin, astaxanthin, carotenoid, and polyphenols such as phenolic acid, flavonoid, tannins were identified as the potential antioxidant compounds are widely distributed in seaweeds. They exhibit higher anti-oxidative activities as reported through various methods of reactive oxygen species scavenging activity and the inhibition of lipid peroxidation (Heo et al. 2005). The role of antioxidants is to inhibit the development of oxidative rancidity in fat-based foods because oxidation is a naturally occurring process within the human body; a balance with antioxidants must exist to maintain health. Seaweeds are consumed by almost all the countries from Asia, Africa, America, Australia, and the European Union. These produce a great variety of secondary metabolites characterized by a broad spectrum of biological behavior such as antibacterial and antioxidant capacities.

Free radicals and other reactive oxygen species (ROS) are generated continuously not only via normal physiological processes but also by external stimulations. Normal physiological processes need oxygen in order to carry out their operations as a resultant by-product, like ROS are produced within the human body. If these harmful factors accumulate in cell, tissue, and other vital organs of the body, then our body will be exposed to dangerous circumstances. Of the external stimulations, ROS can be induced by tobacco smoke, ionizing radiation, certain pollutants, organic solvents, and pesticides (Karawita et al. 2005). The ROS including superoxide ($O_2^{\cdot-}$), hydroxyl radical (HO·), and hydrogen peroxide (H_2O_2) have the