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Phenolic Composition and Contribution of Individual Compounds to Antioxidant Activity of Malus domestica Borkh Fruit Cultivars

Authors : Raudone Lina, Raudonis Raimondas, Liaudanskas Mindaugas, Pukalskas Audrius, Viskelis Pranas, Janulis Valdimaras

Abstract : Human health fortification, its protection and disease prophylaxis are the main problems of the health care systems. Plant origin materials and their preparations are applied for the prevention of the common diseases. Oxidative stress takes part in the pathogenesis of many autoimmune, neurodegenerative, tumor and ageing processes. The antioxidants are able to protect the human body from the free radicals and to stop the progression of numerous chronic diseases. The research of plant origin materials is relevant for the search of natural antioxidants. A group of compounds that gained scientific attention due to antioxidant properties and effects on human health are phenolic compounds. Phenolic compounds are widely abundant in various parts of plants, i.e. leaves, stems, roots, flowers and fruits. Most commonly consumed fruits all over the world are apples. It is very important to analyze the antioxidant activity of apples as they are extensively used in the prevention of various diseases. The aim of this study was to determine the antioxidant profiles of Malus domestica Borkh fruit cultivars (Aldas, Auksis, Connel Red, Ligol, Lodel, Rajka) and to identify the phenolic compounds with potent contribution to antioxidant activity. Nineteen constituents were identified in apple cultivars using ultra high performance liquid chromatography coupled to quadruple and time-of-flight mass spectrometers (UPLC–QTOF–MS). Phytochemical profile was constituted of phenolic acids, procyanidins, quercetin derivatives and dihydrochalcones. Reducing and radical scavenging activities of individual constituents were determined using high performance liquid chromatography (HPLC) coupled to post-column FRAP and ABTS assay, respectively. Significant differences of total radical scavenging and reducing activity (expressed as trolox equivalents, TE µmol/g) were determined between the investigated cultivars. Chlorogenic acid and complex of procyanidins were the main contributors to antioxidant activity determining up to 35 % and 55 % of total TE values, respectively. Determined phenolic composition and antioxidant activity significantly depend on apple cultivars. It is important to determine the individual compounds that are significant for antioxidant activity and that could be investigated in vivo systems. The identification of the antioxidants provides information for the further research of standardized extracts that could be used for pharmaceutical preparations with specific phenolic traits.

Keywords : FRAP, ABTS, antioxidant, phenolic, apples, chlorogenic acid
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