In Vitro Availability of Hydroxytyrysol, Hydroxytyrosyl Acetate and Alkyl Hydroxytyrosyl Ethers

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In vitro availability of two natural antioxidant compounds present in virgin olive oil, hydroxytyrosol and hydroxytyrosyl acetate in comparison with a new series of hydroxytyrosyl ethers (methyl, ethyl, butyl and octyl hydroxytyrosyl ethers), synthesized from hydroxytyrosol, were evaluated by a simulated in vitro digestion procedure. The antioxidant activity of digested fractions before and after gastric and pancreatic digestion were tested by ferric reducing ability (FRAP) and free radical scavenging capacity (ABTS) assays. Results showed a high recovery of all studied compounds after gastric digestion, varying the percentage of loss from 0.1 % for hydroxytyrosol, 0.2% to 2.7% for hydroxytyrosyl ethers and 6.4% for hydroxytyrosyl acetate. However, these compounds showed lower stability after pancreatic-bile salts digestion, which percentage of recovery decreased significantly to 41.7% for hydroxytyrosyl acetate in comparison with hydroxytyrosol (64.5%) and hydroxytyrosyl ethers (58.9-63.8%), mainly due to the alkaline conditions of this step. The original antioxidant activity of these compounds decreased in keeping with their behavior observed above. After gastric digestion, hydroxytyrosyl acetate was hydrolyzed into free hydroxytyrosol (15%), while the rest of compounds did not suffer any change. However, hydroxytyrosol was converted to 3,4-dihydroxyphenyl acetic (DOPAC, 27.5%), while hydroxytyrosyl acetate was hydrolyzed to hydroxytyrosol (31.7%) and subsequently transformed into DOPAC (8%), after intestinal digestion. No transformation of hydroxytyrosyl ethers was detected after in vitro digestion. In general, these results showed an interesting in vitro stability and bioaccesibility for all studied compounds. Besides, these new synthetic hydroxytyrosyl ethers showed an enhanced chemical stability compared to hydrosytyrosyl acetate and similar bioaccessibility than hydroxytyrosol.