EVALUATION OF GASTRIC ANTI-INFLAMMATORY ACTIVITY OF TANNINS FROM EUROPEAN CHESTNUT FRUITS (CASTANEA SATIVA MILL.): KERNEL FOR NUTRITION AND RIND FOR PHYTOTHERAPY

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Chestnut fruit (Castanea sativa Mill.) is a popular food, consumed as fresh, frozen, roasted, and as ingredient of typical cakes or sweets, including marron glacé (Barbosa et al., 2007). The fruit is a good source of essential dietary nutrients and minerals (de Vasconcelos et al., 2010), contains low amount of fat (Borges et al., 2007), and is gluten free. Chestnut tree is a rich source of phenolic compounds; in particular, bark contain high levels of both condensed and hydrolysable tannins (Comandini et al., 2014). Tannins have a traditional use for gastric inflammation and are stable at the physiological conditions of the stomach (Rios et al., 2002), but only few studies investigated their content in chestnut fruits. These molecules exert anti-bacterial effect against H. pylori (de Jesus et al., 2012), the main aetiological agent of gastritis, and H. pylori infection is characterized by a high release of IL-8 from gastric epithelial cells (Shimada et al., 1998).

The present study aimed to evaluate the possible gastric anti-inflammatory activity of chestnut fruits, evaluating their tannins composition as well.

The hydro-alcoholic extracts from fruits of five cultivars of Castanea sativa Mill., Venegon, Verdesa, Paié, Pilisce and Russirö, were tested on TNFα-induced IL-8 release in human gastric epithelial cells; cultivars were selected in collaboration with “Consorzio Castanicoltori di Brinzio, Orino e Castello Cabiaglio” in the context of the interregional project "I Castagneti dell'Insubria". Three of the five cultivars, Venegon, Verdesa and Paié, inhibited IL-8 release in our cellular model. Venegon extract showed an IC50 of 4.04 μg/mL and this activity was only partially affected by an in vitro simulated gastric digestion (IC50 of 7.31 μg/mL after digestion). The comparison of Venegon extracts from two consecutive crop years revealed no significant differences in the biological activity.

Isolated pericarp, episperm and endosperm from Venegon chestnuts were prepared to further investigate which part of chestnut was mostly responsible for the observed effect. Pericarp and endosperm inhibited IL-8 release with IC50 of 0.90 and 0.63 μg/mL, respectively, while endosperm was inactive up to 100 μg/mL, the highest concentration tested.

Experiments handled on Venegon flour, industrially prepared by rind exclusion (pericarp and endosperm), confirmed this evidence: flour extract was inactive up to 100 μg/mL, on the contrary, extract obtained from wasted rind inhibited IL-8 release (IC50 0.59 μg/mL). In vitro gastric digestion slightly influenced the IL-8 inhibitory activity (IC50 of 0.67 μg/mL).

Qualitative and quantitative assays confirmed the presence of condensed tannins in the extracts of pericarp (150,2 mg/g) and episperm (651,4 mg/g), but not in the endosperm, thus suggesting an important role for these class of molecules on the observed activity.

This study demonstrates an anti-inflammatory effect of chestnuts at gastric level underlining important differences between cultivars. The inhibitory activity was concentrated in the fruit rind, thus excluding the kernel, the most consumed and edible part. Considering the possible modifications of organoleptic properties and the need for additional studies, the enrichment of chestnut flour with episperm could be proposed in the future as a new functional food in the context of gastric health.

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