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Anti-platelet and anti-inflammatory properties of an ethanol-water red grape pomace extract

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Abstract

Previous reports support that wine contains a mixture of micro-constituents in a proper quality and quantity that possess cardio-protective effect partly through Platelet-Activating Factor (PAF) inhibition. Grape pomace (GP) is a source of wine-like micro-constituents that may be a suitable alternative in food fortification. Limited data exist concerning their effects on thrombosis and inflammation. Therefore, the purpose of this study was to examine a grape pomace extract regarding its anti-platelet and anti-inflammatory properties. GP from four red grape varieties were extracted with 80% ethanol (GP:solvent 1:5w/v). The extract's total phenolic compounds were evaluated and the phenolic profile was performed by Ultrahigh-Performance-Liquid-Chromatography coupled to Mass-Spectrometry and the determination of fatty acids profile was performed by Gas-Chromatography. The extract's anti-platelet properties were tested in healthy volunteers' platelet rich plasma by the light transmittance method, against three agonists: PAF, ADP and TRAP. The results expressed as IC_{50} values (μg of extract that cause 50% inhibition of aggregation) and EC_{50} values (agonist concentration that causes 50% of the maximum aggregation) in the extract's presence and absence. Concerning the extract's anti-inflammatory properties, peripheral blood mononuclear cells from healthy volunteers were pre-incubated with different extract concentrations, which were tested for their effect on cell viability, for 1 h and then stimulated with LPS for 4 h. Secretion of IL-1β and TNF-a was measured and normalized with the total cell protein. Phenolic compounds were calculated at 8.79 ± 1.17 mg gallic acid per g of GP. The most abundant ones were catechin, epicatechin and quercetin at 202.9 ± 6.9, 84.8 ± 1.5 and 83.7 ± 3.5μg per g of GP respectively. Out of the 18 fatty acids detected, the most abundant ones were palmitic, oleic, linoleic, and linolenic acid at 28.7 ± 0.1, 11.4 ± 0.01, 32.5 ± 0.07, 12.7 ± 0.005 g per 100 g of fat. The extract's IC_{50} was calculated at 162.1 ± 66.9, 181.2 ± 82.3 and 156.3 ± 97.5μg against PAF, ADP and TRAP, respectively. The EC_{50} values in the presence of 150μg extract were increased (lower platelet aggregation sensitivity) approximately at 100%, 45% and 13% against PAF, ADP and TRAP respectively, compared to EC_{50} values in the absence of extract. The presence of 500 and 1000μg/mL of extract reduced LPS-induced TNF-a secretion at approximately 38.2% ($p = 0.04$) and 6.0% ($p < 0.000$), respectively. Potent anti-platelet and anti-inflammatory properties are combined in a grape pomace extract. The use of its bioactive micro-constituents is likely to lead to the production of functional foods with cardioprotective properties.

Conflict of Interest

There is no conflict of interest