

In vitro activity of almond skin polyphenols for scavenging free radicals and inducing quinone reductase.

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Abstract:

Observational studies and clinical trials suggest nut intake, including almonds, is associated with an enhancement in antioxidant defense and a reduction in the risk of cancer and cardiovascular disease. Almond skins are rich in polyphenols (ASP) that may contribute to these putative benefits. To assess their potential mechanisms of action, we tested the in vitro effect of ASP extracted with methanol (M) or a gastrointestinal juice mimic (GI) alone or in combination with vitamins C (VC) or E (VE) (1-10 $\mu\text{mol/L}$) on scavenging free radicals and inducing quinone reductase (QR). Flavonoid profiles from ASP-M and -GI extracts were different from one another. ASP-GI was more potent in scavenging HOCl and ONOO- radicals than ASP-M. In contrast, ASP-M increased and ASP-GI decreased QR activity in Hepa1c1c7 cells. Adding VC or VE to ASP produced a combination- and dose-dependent action on radical scavenging and QR induction. In comparison to their independent actions, ASP-M plus VC were less potent in scavenging DPPH, HOCl, ONOO-, and O₂ - •. However, the interaction between ASP-GI plus VC promoted their radical scavenging activity. Combining ASP-M plus VC resulted in a synergistic interaction, inducing QR activity, but ASP-GI plus VC had an antagonistic effect. On the basis of their total phenolic content, the measures of total antioxidant activity of ASP-M and -GI were comparable. Thus, in vitro, ASP act as antioxidants and induce QR activity, but these actions are dependent upon their dose, method of extraction, and interaction with antioxidant vitamins.