

Comparative effect of quercetin and rutin on α -amylase, α -glucosidase, and some pro-oxidant-induced lipid peroxidation in rat pancreas

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Abstract

This study was designed to investigate the effect of quercetin, its glycosylated conjugate rutin and various combinations of the two flavonoids on carbohydrate-hydrolyzing enzymes associated with type 2 diabetes (α -amylase and α -glucosidase) in a bid to understand the possible mechanisms of action by which quercetin and rutin could be used in the prevention/management of the degenerative condition. The aim of this study is to investigate the effect of quercetin, rutin, and various combinations of the two flavonoids on α -amylase and α -glucosidase activities and the ability of the flavonoids to inhibit some pro-oxidants-induced lipid peroxidation in rat pancreas. The effect of the flavonoids on α -amylase and α -glucosidase activities as well as pro-oxidant (Fe^{2+} and SNP)-induced lipid peroxidation in rats' pancreas homogenates was investigated. Rutin ($\text{IC}_{50} = 0.048 \mu\text{M}$) exhibited a significantly ($P < 0.05$) higher inhibition of Fe^{2+} -induced lipid peroxidation than quercetin ($\text{IC}_{50} = 0.075 \mu\text{M}$). Furthermore, rutin had a stronger inhibition of α -amylase ($\text{IC}_{50} = 0.043 \mu\text{M}$) and α -glucosidase ($\text{IC}_{50} = 0.037 \mu\text{M}$) activities than quercetin [α -amylase ($\text{IC}_{50} = 0.061 \mu\text{M}$); α -glucosidase ($\text{IC}_{50} = 0.038 \mu\text{M}$)]. A combination of 25 % quercetin and 75 % rutin showed the strongest inhibition ($P < 0.05$) of α -amylase activity ($\text{IC}_{50} = 313.87 \mu\text{g/L}$) while 100 % quercetin showed the least inhibition of α -amylase ($\text{IC}_{50} = 507.61 \mu\text{g/L}$) activity and same trend was followed for α -glucosidase activity. This study revealed that glycosylation increased the inhibitory ability of quercetin on key enzymes linked to type 2 diabetes (α -amylase and α -glucosidase), and combination of quercetin and rutin had higher synergistic inhibitory abilities on the enzymes than the individual flavonoids, suggesting that a combination of food sources rich in these flavonoids could be very effective in the management/prevention of type 2 diabetes.

Keywords : Quercetin, Rutin, α -amylase, α -glucosidase, Lipid peroxidation, Glycosylation

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