Influence of the interaction between hydroxytyrosol and triterpenes on the neuroprotective effect of extra virgin olive oil

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The neuroprotective effect of extra virgin olive oil (EVOO) is well known, mainly due to the antioxidant action of its phenolic components, among which hydroxytyrosol (HTy) stands out. Recently, importance has been given to the presence of triterpenic derivatives (oleanolic, maslinic and ursolic acid) (TTp).

The aim of the study was to assess the neuroprotective effect of an EVOO rich in TTp+HTy, compared to an EVOO rich in Hty, in an experimental model of diabetes mellitus, using a hypoxia-reoxygenation model in brain slices. On the other hand, to assess the possible interaction between HTy and TTp in this neuroprotective effect.

Ex vivo experiments. Streptozotocin-diabetic rats (10 rats/group), followed up for 2 months, were used. Groups: non-diabetic controls (NDR), control diabetic rats (DR) and DR treated with 0.5 ml/kg/day of HTy-rich EVOO (destoned olives -AOVE-HTy-) or HTy+TTp-rich EVOO (destoned and dehydrated olives -AOVE-HTy+TTp-).

In vitro experiments. Brain slices from healthy rats, incubating TTp and HTy in the same proportion contained in both types of EVOO were analysed.

Brain slices were subjected to a hypoxia-reoxygenation model and cell death (LDH) and oxidative and nitrosative stress variables were determined.

The DR group produced 128% more LDH than NDR, 136% more lipid peroxides, 141% more peroxynitrites and 64% less glutathione. The administration of EVOO-HTy reduced lipid peroxides by 75% and EVOO-HTy+TTp by 82%, peroxynitrite production by 36% and 57%, respectively, and glutathione production by 20% and 47%, respectively. In all variables, the effect of EVOO-HTy+TTp was significantly higher, the only difference between the two EVOOs being the TTp content.

In the in vitro experiments, the compounds used inhibited LDH production in a concentration-dependent manner, showing an IC50 of 17.7±0.5 µM for HTy and 17.3±0.8 µM for TTp; when HTy was incubated in the presence of a concentration of TTp that only inhibited LDH production by 16%, the IC50 of HTy was reduced to 5.2±0.07 µM. A similar behaviour was observed when analysing the production of lipid peroxides and glutathione.

In conclusion, there is a positive interaction between HTy and TTp, in the same proportion in an EVOO rich in HTy and one rich in HTy+TTp, which may explain the greater ex vivo neuroprotective effect found for the latter in the experiments in diabetic rats.

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