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Original Research Article

Preliminary optimization of a Chinese herbal medicine formula based on the neuroprotective effects in a rat model of rotenone-induced Parkinson's disease

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ABSTRACT

OBJECTIVE: The main objective of this study was to preliminarily determine the optimum formulation of a Chinese herbal formula that may have neuroprotective effects against rotenone-induced Parkinson's disease (PD).

METHODS: Seven recipes were made from Dihuang (DH, *Rehmannia glutinosa* Libosch), Roucongong (RCR, *Cistanche deserticola* Y.C.Ma), Niuxi (NX, *Achyranthes bidentata* Bl.) and Shanzhuyu (SZY, *Cornus officinalis* Sieb. et Zucc) in different proportions, according to the principles of uniform design (4 factors 7 levels). Tyrosine hydroxylase (TH)-positive neurons in substantia nigra pars compacta (SNpc) were detected by immunohistochemistry and rotenone-exposure days necessary to induce PD symptoms were recorded. To probe one likely mechanism of the formulas, echinacoside (ECH) concentrations of all seven recipes were determined by high-performance liquid chromatography and related to number of TH-positive neurons.

RESULTS: The data showed that recipe 4 (DH:RCR:SZY:NX = 1:1:1:1) and recipe 7 (DH:RCR:SZY:NX = 7:5:3:1) partially reversed rotenone-induced death of TH-positive neurons in the SNpc and significantly increased rotenone-exposed days compared with model group. Pharmacologically, there was not a strong correlation between ECH concentration and TH-positive neurons.

CONCLUSION: The investigated formulations of Chinese herbs had neuroprotective effects against PD models, and the neuroprotective effects were weakly related to the proportion of key herbs. However the neuroprotective effects of the formula may not result from a single active constituent.

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