

Cerebroprotective Effect of Zhachong Shisanwei Pills and Coicis Semen on Rats with Traumatic Brain Injury through Regulation of the ERK Pathway

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SUMMARY: Zhachong shisanwei pills (ZSP) and the Chinese herb Coicis Semen (CS) were both traditionally used in the clinical treatment of brain injury. The aim of the study was to test the cerebroprotective effect of ZSP and CS on rats with traumatic brain injury. Male Sprague-Dawley rats were divided into normal, sham surgery, control, ZPS and CS groups. A hydraulic impact device was used to induce traumatic brain injury (TBI) models. ZSP or CS were used immediately after the rat is successfully created and therapy is performed once a day. The rats were sacrificed and their brain was removed after 48 h treatment. The brain water content and neurobehavioral assessment were measured for TBI. Immunohistochemistry, RT-PCR and Western blot analysis were used for the effect of ZPS or CS on ERK Pathway. The survival rates increase significantly and the survival time is apparently extended in ZSP or CS treatment groups. The brain water contents were remarkably higher in the control group while treatment with ZPS or CS significantly reduced the water content. Finally, compared with the control group, treatment groups showed a significant increase in neurobehavioral scores. ERK1, p38MAPK, AQP4 and MMP9 gene expression/protein levels were significantly increased in the injured brain tissue cortex in the control group but ZSP or CS treatment significantly reduced these levels. ZPS or CS can improve the neurological function rating scores of rats following a TBI. Their cerebroprotective effect was probably realized through the regulation of the ERK pathway.

RESUMEN: Las píldoras Zhachong shisanwei (ZSP) y la hierba china Coicis Semen (CS) se usaban tradicionalmente en el tratamiento clínico de la lesión cerebral. El objetivo del estudio fue probar el efecto cerebroprotector de ZSP y CS en ratas con lesión cerebral traumática. Ratas macho Sprague-Dawley se dividieron en grupos normales, cirugía simulada, control, ZPS y CS. Se utilizó un dispositivo de impacto hidráulico para inducir modelos de lesiones cerebrales traumáticas (TBI). Se usaron ZSP o CS inmediatamente después de crear con éxito la rata y la terapia se realiza una vez al día. Las ratas se sacrificaron y se extrajo su cerebro después de 48 h de tratamiento. Se midió el contenido de agua cerebral y la evaluación neuroconductual para TBI. Se usaron inmunohistoquímica, RT-PCR y análisis de

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transferencia Western para determinar el efecto de ZPS o CS en ERK Pathway. Las tasas de supervivencia aumentan significativamente y el tiempo de supervivencia aparentemente se extiende en los grupos de tratamiento con ZSP o CS. El contenido de agua del cerebro fue notablemente mayor en el grupo de control, mientras que el tratamiento con ZPS o CS redujo significativamente el contenido de agua. Finalmente, en comparación con el grupo de control, los grupos de tratamiento mostraron un aumento significativo en las puntuaciones neuroconductuales. Los niveles de proteína/expresión génica de ERK1, p38MAPK, AQP4 y MMP9 aumentaron significativamente en la corteza del tejido cerebral lesionado en el grupo de control, pero el tratamiento con ZSP o CS redujo significativamente estos niveles. ZPS o CS pueden mejorar las puntuaciones de calificación de la función neurológica de las ratas después de una TBI. Su efecto cerebroprotector probablemente se realizó a través de la regulación de la vía ERK.
