

Comparative Pharmacokinetic Study of Four Active Ingredients in Normal and MCAO Rats after Oral Administration of *Gastrodia elata* Ultrafine Powder

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SUMMARY. *Gastrodia elata*, a medicinal herb in China, has mainly been used in the treatment of cerebral ischemic diseases. Moreover, *G. elata* ultrafine powder (GEUP) significantly ameliorates cerebral ischemia-reperfusion injury compared with that of its common powder. The aim of this study was to compare the pharmacokinetics of four active ingredients in GEUP in a rat model of middle cerebral artery occlusion (MCAO) compared to those in normal rats following orally administration of a GEUP suspension at a single dose of 3.6 g/kg. Plasma samples were collected at 14 different time points, and their contents were determined by UPLC-MS/MS. Subsequently, pharmacokinetic parameters were calculated and their differences were compared in normal and MCAO rats. The results showed that compared with that of the normal group, the AUC_{0-t} of gastrodin was significantly reduced, while the MRT_{0-t} was prolonged in MCAO rats. For parishin E, the MCAO rats had a higher AUC_{0-t} and longer MRT_{0-t}. Finally, while there was no significant difference in the AUC_{0-t} of parishin B or parishin C between the normal and MCAO groups, the t_{1/2} and MRT_{0-t} were significantly prolonged in the MCAO group. Therefore, MCAO pathological conditions may alter the pharmacokinetic behavior of GEUP.

RESUMEN. *Gastrodia elata*, una hierba medicinal de China, se ha utilizado principalmente en el tratamiento de enfermedades isquémicas cerebrales. Además, el polvo ultrafino de *G. elata* (GEUP) mejora significativamente la lesión de isquemia-reperfusión cerebral en comparación con la de su polvo común. El objetivo de este estudio fue comparar la farmacocinética de cuatro ingredientes activos en GEUP en un modelo de rata de oclusión de la arteria cerebral media (MCAO) en comparación con aquellos en ratas normales después de la administración oral de una suspensión de GEUP a una dosis única de 3.6 g/kg. Se recogieron muestras de plasma en 14 puntos de tiempo diferentes y su contenido se determinó mediante UPLC-MS/MS. Posteriormente, se calcularon los parámetros farmacocinéticos y se compararon sus diferencias en ratas normales y MCAO. Los resultados mostraron que, en comparación con el grupo normal, el AUC_{0-t} de gastrodina se redujo significativamente, mientras que el MRT_{0-t} se prolongó en ratas MCAO. Para parishina E, las ratas MCAO tenían un AUC_{0-t} más alto y un MRT_{0-t} más largo. Finalmente, aunque no hubo diferencias significativas en el AUC_{0-t} de parishina B o parishina C entre los grupos normal y MCAO, el t_{1/2} y MRT_{0-t} se prolongaron significativamente en el grupo MCAO. Por lo tanto, las condiciones patológicas de MCAO pueden alterar el comportamiento farmacocinético de GEUP.

KEY WORDS: cerebral ischemia reperfusion injury, comparative pharmacokinetics, *Gastrodia elata* ultrafine powder, gastrodin, UPLC-MS/MS.

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