عنوان مقاله:

Metabolomics analysis reveals a protective effect of hydroxycitric acid on calcium oxalate-induced kidney injury

محل انتشار:

مجله علوم پایه پزشکی ایران, دوره 27, شماره 10 (سال: 1403)

تعداد صفحات اصل مقاله: 8

نویسندگان:

Pei Cao - Department of Pharmacy, The Second Hospital of Hebei Medical University, Shijiazhuang, ۰۵۰۰۵۱, P. R. China

Yaqian Li - Department of Pharmacy, The Second Hospital of Hebei Medical University, Shijiazhuang, ۰۵۰۰۵۱, P. R. China

Zhiqing Zhang - Department of Pharmacy, The Second Hospital of Hebei Medical University, Shijiazhuang, ۰۵۰۰۵۱, P. R. China

خلاصه مقاله:

Objective(s): Prior research has indicated that hydroxycitric acid (HCA) can impede the formation of calcium oxalate (CaOx) crystals, yet the specific mechanisms underlying its therapeutic effects remain unclear. In this study, we delved into the protective effects of HCA against glyoxylate-induced renal stones in rats and sought to elucidate the underlying metabolic pathways.Materials and Methods: Forty rats were randomly assigned to five groups: control group, model group, L-HCA-treated group, M-HCA-treated group, and H-HCA-treated group. Von Kossa staining was conducted on renal sections, and blood urea nitrogen and serum creatinine were determined by biochemical analysis. Meanwhile, body weight and urine volume were also measured. We subjected urine samples from the rats to analysis using ultra-performance liquid chromatography-quadrupole time-of-flight mass spectrometry. Next, we employed a metabolomic approach to scrutinize the metabolic profiles of each group.Results: HCA significantly reduced blood urea nitrogen and serum creatinine, and increased body weight and urine volume. It also reduced CaOx crystal deposition. A total of ۲۴ metabolites, exhibiting a significant reversal pattern following HCA administration, were identified as urine biomarkers indicative of HCA's preventive effects against CaOx crystal-induced renal injury. These metabolites are primarily associated with glycine, serine, and threonine metabolism; phenylalanine metabolism; tricarboxylic acid cycle; taurine and hypotaurine metabolism; and tryptophan metabolism.Conclusion: It was demonstrated that HCA has a protective effect against CaOx crystal-induced kidney injury in rats by modulating various metabolic pathways. Additionally, results suggest that HCA holds promise as a potential clinical therapeutic drug for both the prevention and treatment of renal stones.

کلمات کلیدی:

Calcium oxalate, Hydroxycitric acid, Metabolomics, Renal injury, UHPLC-Q-TOF-MS/MS