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Urinary metabolomics study on effects of Rhodiola on Marathon Amateurs after Quantitative Exercise Load

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Objective To study the effect of Chinese medicine Rhodiola on oxidative stress injury in amateur marathon runners after quantitative exercise load (20 km) and explore its mechanism.
Methods Eight marathon amateurs were divided into four groups according to different test time, including before and after quantitative exercise load (group C and group CE), before and after quantitative exercise load after taking a month of the Rhodiola (group MC and group ME). The participants had serum superoxide dismutase (SOD), glutathione peroxidase (GSH-Px), total antioxidant capacity (T-AOC) and malondialdehyde (MDA), as well as myocardial enzyme index - creatine kinase (CK), lactate dehydrogenase (LDH), creatine kinase isoenzyme (CK-MB) and glutamic oxaline aminotransferase (AST/GOT) activity evaluated. In order to further explore the mechanism of action of Rhodiola, the urine was analyzed by ^{1}H-HMR metabonomics technique.
Results 1) Compared with group C, the activity of serum CK, LDH and AST/GOT of group CE increased significantly ($P<0.01$ or $P<0.05$), MDA content and SOD activity also increased significantly ($P<0.05$). A total of fifteen potential biomarkers were found in group CE, such as valine, lactic acid, 2-hydroxy isobutyric acid and so on ($P<0.05$ and VIP>1). 2) Compared with group CE, the activity of serum CK and AST/GOT and the content of MDA of group ME decreased significantly ($P<0.05$), eleven metabolites among the fifteen potential biomarkers reverted significantly ($P<0.01$ or $P<0.05$), which mainly involved in 4 metabolic pathways including alanine, aspartic acid and glutamic acid metabolism and so on.
Conclusions Rhodiola can enhance the antioxidant capacity and improve myocardial damage of marathon amateurs after quantitative exercise load, which may be due to increased synthesis and utilization of aminoacyl-tRNA and other amino acids.