

The changes in endogenous metabolites in hyperlipidemic rats treated with herbal mixture containing lemon, apple cider, garlic, ginger, and honey

ABSTRACT

An herbal mixture composed of lemon, apple cider, garlic, ginger and honey as a polyphenolrich mixture (PRM) has been reported to contain hypolipidemic activity on human subjects and hyperlipidemic rats. However, the therapeutic effects of PRM on metabolites are not clearly understood. Therefore, this study aimed to provide new information on the causal impact of PRM on the endogenous metabolites, pathways and serum biochemistry. Serum samples of hyperlipidemic rats treated with PRM were subjected to biochemistry (lipid and liver profile) and hydroxymethylglutaryl- CoA enzyme reductase (HMG-CoA reductase) analyses. In contrast, the urine samples were subjected to urine metabolomics using ¹H NMR. The serum biochemistry revealed that PRM at 500 mg/kg (PRM-H) managed to lower the total cholesterol level and low-density lipoprotein (LDL-C) ($p < 0.05$) and reduce the HMG-CoA reductase activity. The pathway analysis from urine metabolomics reveals that PRM-H altered 17 pathways, with the TCA cycle having the highest impact (0.26). Results also showed the relationship between the serum biochemistry of LDL-C and HMG-CoA reductase and urine metabolites (trimethylamine-N-oxide, dimethylglycine, allantoin and succinate). The study's findings demonstrated the potential of PRM at 500 mg/kg as an anti hyperlipidemic by altering the TCA cycle, inhibiting HMG-CoA reductase and lowering the LDL-C in high cholesterol rats.

.Keyword: Herbal; Anti-hyperlipidemic; Urine metabolomics; Metabolites; Hydroxymethylglutaryl-CoA reductase