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Polysaccharide-rich extract of *Potentilla anserina* ameliorates nonalcoholic fatty liver disease in free fatty acid-induced HepG2 cells and high-fat/sugar diet-fed mice

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ABSTRACT

Potentilla anserina L. (PA) belongs to the Rosaceae family, is a common edible plant in the Qinghai-Tibet Plateau areas of China. This study elucidates the mechanism upon which crude polysaccharide of PA (PAP) on fat accumulation in HepG2 cells stimulated by oleic acid (OA) and high fat high sugar induced mice. The result revealed that PAP inhibited lipid accumulation in obese mice and ameliorated the degree of damage in OA-induced HepG2 cells. Specifically, compared to the control group, the TG and TC levels were decreased in cells and mice serum, the aspartate transaminase and alamine aminotransferase contents were declined in liver of obese mice by PAP treatment. The expressions of adipogenic genes of *SREBP-1c*, *C/EBPα*, *PPARγ*, and *FAS* were inhibited after PAP treatment. Moreover, PAP increased the mRNA levels of *CPT-1* and *PPARα*, which were involved in fatty acid oxidation. The present results indicated the PAP could alleviate the damage of liver associated with obesity and PAP treatment might provide a dietary therapeutic option for the treatment of hyperlipidemia.

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1. Introduction

Liver is the organ with the most vigorous lipid absorption and decomposition in the body, which is regarded as the central regulator of lipid metabolism. Liver cells can absorb free fatty acids from the blood or synthesize endogenously *de novo*, and they will ultimately be stored in lipid droplets as triglycerides. Excessive intake of lipids will break the normal lipid metabolism balance and cause lipid metabolism disorders in the body. The massive accumulation of lipid droplets in hepatocytes is an important marker of hepatic lipid metabolism disorders and chronic hepatic steatosis[1]. Hepatic steatosis occurs when lipid droplets accumulate excessively since hepatocytes do not have function to store them for a certain time. Steatosis act as the first step in the development of non-alcoholic fatty liver disease (NAFLD)[2], which could lead to many metabolic diseases in the human body, such as cardiovascular disease, chronic kidney disease, obesity, and type 2 diabetes[3-4]. Therefore, the solutions of reducing lipid accumulation to improve NAFLD have been attracting attention.

Potentilla anserina L. (PA) belongs to the Rosaceae family is a common edible plant in the Qinghai-Tibet Plateau areas of China. In traditional Chinese medicine, roots of this plant have been used to treat malnutrition, anemia, diarrhea, and haemorrhage[5]. The rhizomes of PA contain many active ingredients like carbohydrates,

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