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Black Soybeans Show Acute and Chronic Liver Protective Functions against CCl4 Induced Liver Damage

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Abstract : Black soybeans contain high amount of antioxidants including polyphenols, anthocyanins and flavones. The protective function of black soybean against CCl4 (a strong oxidant) induced acute and chronic liver damage was investigated in vivo using SD rats or ICR mouse. The evaluation of CCl4 induced oxidative stress in the liver tissues included the measurements of the levels of alanine aminotransferase (ALT) and aspartate aminotransferase (AST), the concentration of thiobarbituric acid reactive substances (TBARS), the activities of antioxidant enzymes (superoxide dismutase SOD, catalase, and glutathione peroxidase GPx), as well as the level of histological lesion in the liver tissues. For chronic experiment, a decoction at the concentration of 100 or 1000 mg/kg of body weight, produced by baking black soybean at 130°C for 5 min and followed by immerging in 100°C hot water for 20 min, showed the inhibitory effect against CCl4 induced liver damage in SD rats. Hot-water extract (80 °C for 30 min) from un-preheated black soybean at the concentration of 200 mg/kg of body weight could not reduce ALT and AST levels in CCl4 treated SD rats, but the hot-water extract from preheated black soybean did enhance antioxidant enzymes activities, decline ALT and AST levels. Specially, the hot-water extract from the seed cost of black soybean had the highest liver protective function since it can reduce vacuolization and necrosis in the liver tissues. For acute experiment, the hot-water extracts from black soybean and the seed coat, as well as pure cyanidin-3-glucoside (C3G) could reduce ALT and AST levels of CCl4 induced ICR mouse. The decoction and hot-water extract from the seed coat of black soybean had higher total polyphenols, anthocyanins and flavones contents than those extracts from whole black soybean. Such results agreed with high liver protective function in the decoction and hot-water from the seed coat of black soybean. Black soybean showed protective function only after preheating process (baking at 130°C for 5 to 10 min) because preheating treatment damaged the cell wall and made the extraction of the antioxidants more effectively.

Keywords : black soybean, liver protective function, antioxidant, antioxidative stress
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