

Evaluation of the anti-atherogenic potential of chrysin in Wistar rats

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Abstract Hypercholesterolemia is one of the major risk factors that precipitate coronary heart disease and atherosclerosis. Oxidative stress is believed to contribute to the pathogenesis of hypercholesterolemic atherosclerosis; hence, various antioxidant compounds are being evaluated for potential anti-atherogenic effects. In the present study, the putative anti-atherogenic and antioxidant efficacy of a flavonoid, chrysin, was evaluated in an experimental model of atherosclerosis. In male, albino Wistar rats fed an atherogenic diet for 45 days and treated with saline, significantly higher mean levels of serum lipid profile parameters (total cholesterol, triglycerides, low-density, and very low-density lipoprotein cholesterol), lower mean levels of high-density lipoprotein cholesterol and higher mean serum levels of hepatic marker enzymes (aspartate aminotransferase, alanine aminotransferase, alkaline phosphatase, and lactate dehydrogenase) were observed when compared with the levels in rats fed a control diet. In addition, significantly lower mean hepatic levels of lipoprotein lipase, 3-hydroxy-3-methylglutaryl-coenzyme A (HMG-CoA) reductase, antioxidant enzymes (catalase, superoxide dismutase, and glutathione peroxidase) and non-enzymatic antioxidants (reduced glutathione, and vitamins C and E), and a significantly higher mean level of hepatic malondialdehyde (MDA) were noted in comparison to the values in control rats. In atherogenic diet-fed rats that received chrysin

orally (200 mg/kg b.wt) for 15 days, starting 30 days after the start of the atherogenic diet, significantly lower mean serum levels of lipid profile parameters (except for HDL-cholesterol which was elevated), hepatic marker enzymes, and significantly higher mean hepatic levels of LPL, HMG-CoA reductase, enzymatic, and non-enzymatic antioxidants and significantly lower mean levels of hepatic MDA were noted, compared to the values in atherogenic diet-fed, saline-treated rats. Histopathological studies appeared to suggest the protective effect of chrysin on the hepatic tissue and aorta of atherosclerotic rats. These results suggest that chrysin has anti-atherogenic potential in an experimental setting.

Keywords Atherosclerosis · Oxidative stress · Chrysin · Atherogenic diet · Antioxidant

Introduction

Atherosclerosis and its complications continue to be a major cause of death worldwide [1]. Epidemiological studies have shown a positive correlation between the incidence of coronary heart disease (CHD) and levels of blood cholesterol. The regulation of intracellular cholesterol metabolism, which is an important factor in control of the blood cholesterol level, depends on two key enzymes, namely, 3-hydroxy-3-methylglutaryl-coenzyme A (HMG-CoA) reductase and lipoprotein lipase (LPL). HMG-CoA reductase is the major enzyme catalyzing a rate-limiting step in the cholesterol biosynthetic sequence from acetyl CoA to cholesterol [2]; LPL is responsible for the hydrolysis of dietary triglycerides into low-density lipoprotein (LDL), which has been implicated in the development of atherosclerosis [3].

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