

Fermentation of resistant rice starch produces propionate reducing serum and hepatic cholesterol in rats

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Abstract

This study was designed to investigate the effects of different proportions of rice starch and cornstarch on lipid metabolism in rats fed high dietary cholesterol. Male Wistar rats were fed a 10 g/100 g fat diet containing 1 g/100 g cholesterol with 0 (control diet), 15, 30, 45 or 63 g/100 g rice starch with an enzyme resistant starch concentration of 1.26, 1.39, 1.52, 1.65 or 1.80 g/100 g, respectively, for 4 wk. Groups fed diets with < 63 g/100 g rice starch were supplemented with cornstarch to 63 g/100 g. The two kinds of starch had different structures as seen using scanning electron microscopy (SEM). The rice starch was an aggregation (n = 20-60) of smaller granules (3-8 microm in diameter), whereas the cornstarch was composed of larger (5-15 microm in diameter), single granules. The compound rice starch (0.99 kg/L) was larger in size and denser in structure than cornstarch (0.63 kg/L). Serum total cholesterol concentrations in rats fed both the 45 and 63 g/100 g rice starch diets were significantly lower than in all other groups ($P < 0.05$). The serum propionate concentration in the rats fed 63 g/100 g rice starch diets was significantly higher than that of other groups. Hepatic triglyceride and total cholesterol concentrations in rats fed 63 g/100 g rice starch diets were significantly lower than in the control group. These results suggest that, because the compound rice starch was an aggregation of smaller granules, larger in size and denser in structure than cornstarch, it was digested more slowly and altered lipid metabolism. Resistant rice starch may be fermented to produce propionate, which reduces serum and hepatic cholesterol.