米麩油及其成分γ - oryzanol 對第 2 型糖尿病大鼠胰島素抗性及脂質代謝的影響

The effects of rice bran oil and γ- oryzanol on insulin resistance and lipid metabolism in rats with type 2 diabetes mellitus

中文摘要

本次研究目的欲探討米麩油及其成分γ - oryzanol 對於第 2 型糖尿病大鼠胰島素抗性及脂質代謝之影響。實驗採用 32 隻 wistar 品系雄性大鼠，經由 streptozotozin（STZ）誘導成第 2 型糖尿病模式。實驗爲期 5 週，飲食以 AIN93-M 爲基礎，油脂由 4%修改爲 15%之高油飲食。實驗分爲四組:控制組（C）、米麩油組（RBO），棕櫚油組（PO）及棕櫚油添加γ - oryzanol 組（POO）。油脂分別使用大豆油、米麩油或棕櫚油。於第零週及第五週以腹腔注射葡萄糖耐受試驗評估胰島素敏感性，且於第五週採集實驗動物糞便。5 週後犧牲，分析項目包括：禁食血漿葡萄糖、胰島素、三酸甘油酯、總膽固醇、低密度脂蛋白膽固醇、高密度脂蛋白膽固醇、脂肪酸組成、葡萄糖及胰島素濃度曲線下面積；肝臟三酸甘油酯、總膽固醇、脂肪酸組成；糞便中性固醇及膽酸排出量。結果顯示，四週實驗後，RBO 組及 POO 組可改善胰島素抗性。在血脂的部份，RBO 組及 POO 組皆顯著降低低密度脂蛋白膽固醇濃度、增加高密度脂蛋白膽固醇濃度、降低總膽固醇/高密度脂蛋白膽固醇比值、降低三酸甘油酯濃度、降低游離脂肪酸濃度。肝臟脂質的部份，RBO 組及 POO 組顯著降低肝臟中三酸甘油酯及膽固醇含量。糞便中性固醇及膽固醇排出量的部份，RBO 組及 POO 組能增加其排出量。上述結果得知，米麩油及其成分γ - oryzanol 具有改善第 2 型糖尿病大鼠胰島素抗性及脂質代謝。

英文摘要

BACKGROUND AND METHODS: The prevalence of type 2 diabetes mellitus (T2DM) has dramatically increased in the last few years. Cardiovascular disease (CVD) is a major cause of mortality in patients with diabetes, and dyslipidemia is a major CVD risk factor. Rice bran oil is rich in γ- oryzanol, a compound from the unsaponifiable fraction, and has antioxidant and hypolipidemia properties. Palm oil accounts for 18.6% of the total world vegetable oil production, and is next only to soybean oil in terms of world production. The potential of palm oil to cause hyperlipidemia has been proposed, because it is low in polyunsaturated fat and high in saturated fat, predominantly palmitic acid. The aim of this study was to investigate the effects of rice bran oil and γ -oryzanol on insulin resistance and lipids metabolism in T2DM rats. Rats with streptozotocin/nicotinamide-induced T2DM were divided into control (soybean oil), RBO (rice bran oil), PO (palm oil), POO (palm oil plus γ-

oryzanol) groups fed cholesterol-free diets containing 15 g of oil per 100 g diet. RESULT: Of the four groups, the PO group had the highest plasma triglycerides concentration. The LDL-C concentration was higher in the PO group than the control and RBO groups. HDL-C concentration was higher in the RBO and POO groups than PO group. The TC/HDL-C ratio was lower in the RBO and POO groups than the control and PO groups. Hepatic total cholesterol concentration was lower in the RBO group than the control and PO groups, and hepatic triglycerides concentration was higher in the PO group than others group. Fecal neutral sterol and bile acid concentration was higher in the RBO and POO groups than control and PO groups. CONCLUSION: The rice bran oil diet significantly improved insulin resistance and lipid metabolism in rats with type 2 diabetes mellitus. γ- Oryzanol has a lipid lowering effect and can therefore improve hyperlipidemia due to ingestion of palm oil.