

Improving effect of hydrolyzed rice bran on diabetic rats given high-carbohydrate feed

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[Objective] We have shown that diabetic rats given high-carbohydrate feed for a short period of time had the typical diabetic symptoms of excessive eating, excessive drinking, polyuria, hyperglycemia, and marked body weight loss as compared with those given low-carbohydrate feed. We have also shown that the carbohydrate to lipid energy ratio of feed has an effect on carbohydrate metabolism as well as protein metabolism. This study evaluated the effect of hydrolyzed rice bran (HRB) on plasma lipid, oral glucose tolerance test, and protein metabolism in diabetic rats given a high-carbohydrate diet, as the basal feed, and HRB. [Methods] Twelve-week old male Wistar rats were intraperitoneally administered streptozocin at 40mg/kg body weight and then raised for six days to produce a diabetic rat model. The experimental basal feed was a high-carbohydrate diet with a protein:lipid:carbohydrate energy ratio of 15:9:76. The rats were allowed free access to the feed and water. The diabetic model rats were divided into two groups, i.e. HRB treatment and control groups. The HRB treatment group was given orally a HRB solution at 75mg/kg and the control group given water every day for 18 days, using a feeding tube. In addition to measurements of body weight, feed intake, water consumption, urine volume and urinary glucose concentration, oral glucose tolerance tests were performed during the study period. On Day 19, the rats were fasted overnight, and the blood and liver were sampled without anesthesia. The blood sample was used in the determination of plasma total cholesterol, triglycerides, free fatty acids, insulin, glucose, and BUN and the liver sample was used in the determination of liver arginase activity. [Results] Compared with the control group, the HRB treatment group had significantly decreased liver arginase activity, blood glucose levels 30 minutes after glucose challenge and plasma total cholesterol concentrations. The fasting blood glucose, plasma free fatty acid and BUN concentrations also tended to decrease. No difference was observed in the other parameters between the groups. [Conclusions] HRB treatment inhibits the increase in blood glucose and total cholesterol levels and the degradation of body protein. HRB has been shown to improve the disease state in a short time even in rats given high-carbohydrate feed that worsens diabetes mellitus, suggesting that HRB is effective for diabetes mellitus.