Antihyperglycemic action of isoferulic acid in streptozocine-induced diabetic rats

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Abstract

Wistar rats with streptozotocin-induced diabetes (STZ-diabetic rats), which is similar to human insulin-dependent diabetic mellitus (IDDM), were employed to investigate the antihyperglycemic action of isoferulic acid.A single intravenous injection of isoferulic acid decreased the plasma glucose in a dose-dependent manner in the STZ-diabetic rats. Repeated intravenous administration of STZ-diabetic rats with isoferulic acid (5.0mgkg−1) also resulted in the lowering of plasma glucose after one day.Stimulatory effects of isoferulic acid on the glucose uptake and glycogen synthesis in soleus muscles isolated from STZ-diabetic rats were also obtained indicating an increase of glucose utilization following isoferulic acid treatment which was not dependent on insulin.The mRNA level of glucose transporter subtype 4 form (GLUT4) in soleus muscle was raised by isoferulic acid after repeated treatment for 1 day in STZ-diabetic rats. Similar repeated treatment with isoferulic acid reversed the elevated mRNA level of phosphoenolpyruvate carboxykinase (PEPCK) in liver of STZ-diabetic rats to the normal level. However, expression of GLUT4 and PEPCK genes in nondiabetic rats were not influenced by similar treatment with isoferulic acid.These results suggest that isoferulic acid can inhibit hepatic gluconeogenesis and/or increase the glucose utilization in peripheral tissue to lower plasma glucose in diabetic rats lacking insulin.