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Effect of Zinc Deficiency on Zinc and Carbohydrate Metabolism in Genetically Diabetic (C57BL/KsJ Db+/Db+) and Non-Diabetic Original Strain (C57BL/KsJ) Mice

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Abstract: Our aim was to investigate the effect of low dietary zinc intake on zinc and carbohydrate metabolism in type II diabetes. Male, 4-5-week-old, genetically diabetic (C57BL/KsJdb+/db+) and nondiabetic original strain (C57BL/KsJ) mice were fed a diet containing 1 mg of Zn/kg (low zinc groups) or 54 mg of Zn/kg (control groups) for 27 days. Food intake and body weight gain were recorded regularly. On day 28, after an overnight fast, the animals were sacrificed and blood glucose, serum insulin concentrations, liver glycogen contents, and zinc levels in the femur and pancreas were determined. The consumption of the low zinc diet had only a minimal effect on the zinc status of the diabetic mice as indicated by growth rate, food intake and femur and pancreatic zinc concentrations. In fact, diabetic mice fed on the low zinc diet had a higher total food intake than those fed on the control diet. The low zinc diabetic mice also had higher fasting blood glucose and liver glycogen levels than their control counterparts. However the growth rate and femur zinc concentration of the original strain mice were affected by the low zinc diet. To conclude, the present study demonstrates an adverse effect of reduced dietary zinc intake on glucose utilization in the genetically diabetic mice, which occurred before any significant tissue zinc depletion became apparent and also showed that the original strain of mice was more susceptible to the low zinc diet than were the diabetic mice.

Key Words: Strain, zinc depletion, diabetic mice (C57BL/KsJdb+/db+), nondiabetic mice (C57BL/KsJ)

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