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MOLECULAR MECHANISMS OF THE ANTIDIABETIC EFFECT OF SMALL MOLECULE KAEMPFEROL

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Glucose regulation is altered in diabetes. The increase in the activity of the key enzymes that control glycogenolysis and primarily gluconeogenesis in the liver causes an increase in the rate of hepatic glucose production which is the main contributor to the development of hyperglycemia, in particular, fasting hyperglycemia. While the availability of novel drugs, techniques and surgical intervention has improved the survival rate of individuals with diabetes, the prevalence of diabetes is still rising. Therefore, the search for naturally occurring, low-cost and safe compounds that could control glucose homeostasis by modulating the activity of the key enzymes in glucose metabolism can be an effective strategy to treat or prevent diabetes. This study aimed to explore the efficacy of the antidiabetic potential of the flavonol kaempferol, extracted from Gingko Biloba, in diet-induced obese mice and insulin-deficient diabetic mice. The oral administration of kaempferol significantly improved blood glucose control through suppressing hepatic glucose production in obese mice. Also, kaempferol enhanced whole-body insulin sensitivity without altering body weight (BW) gain, food intake (FI), or adiposity of obese mice. In addition, kaempferol treatment increased Akt and hexokinase activity but decreased pyruvate carboxylase activity in the liver. In streptozotocin (STZ)-induced diabetic mice, the oral administration of kaempferol caused a significant amelioration of hyperglycemia and glucose intolerance. After 12 weeks of treatment, the percentage of overt diabetes in mice decreased to 77.8%. This kaempferol effect was associated with reduced hepatic glucose production and increased glucose oxidation in the muscle of diabetic mice, whereas BW, FI, body composition, or plasma insulin and glucagon levels were not affected. On the molecular level, kaempferol treatment restored hexokinase activity in the liver and skeletal muscle while reduced glycogenolysis and gluconeogenesis possibly via inhibiting pyruvate carboxylase in the liver. Overall, these findings suggest that kaempferol holds a great potential to treat diabetes by improving insulin sensitivity and suppressing hepatic glucose production.

Biography

Hana Alkhalidy has completed her PhD at the age of 33 from Virginia Tech University/US and now she is serving as an assistant professor of clinical nutrition at Jordan University of Science and Technology in Jordan. She was nominated to join honorable societies of biology and agriculture at Virginia Tech for distinguished academic achievements. Her research focuses on exploring the molecular mechanisms of the antidiabetic effects of naturally existing compounds. She is a member of the American Society of Nutrition and the Jordanian Agricultural Engineers Association. She has published more than 9 papers in reputed journals and has been serving as an editorial board member in two reputed journals.

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