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Kaempferol, a dietary flavonoid improves glucose homeostasis in streptozotocin diabetic tissues by altering glycolytic and gluconeogenic enzymes: A possible role of insulin

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Abstract

Diabetes mellitus is life threatening endocrine disorder with high morbidity and mortality, which is featured by persistent high blood glucose levels due to defect in the insulin secretion, insulin action or both. Extreme high blood glucose levels associated with diabetes leads to various organ dysfunction particularly nervous system, eye, cardiovascular system and kidney. Kaempferol is a dietary bioflavonoid that is common in plant-derived foods and used in traditional medicine. In this study, we proposed to study the effects of kaempferol on carbohydrate metabolic enzymes in streptozotocin diabetic rats. Diabetes was stimulated in male albino rats (Wistar strains) of 180–200 g via intraperitoneal streptozotocin injection (40 mg/kg). Plasma glucose, insulin, hemoglobin (Hb) and glycated hemoglobin (HbA1c), Glycogen, and carbohydrate metabolic enzymes such as glucokinase, glucose 6-phosphatase, fructose 1,6-bisphosphatase and glucose-6-phosphate dehydrogenase and hepatic marker enzymes, such as aspartate aminotransferase (AST), alanine aminotransferase (ALT), alkaline phosphatase (ALP) and gammaglutamyl transferase (γ-GGT) in normal and streptozotocin-diabetic rats were altered in diabetic rats. Administration of three different doses of kaempferol (50, 100 and 200 mg/BW) or glibenclamide disolved in dimethyl sulfoxide (DMSO), to different groups of diabetic rats were done for 45 days. Kaempferol prevented the above changes and improved towards normalcy. No significant effect was observed in normal rats treated with kaempferol (200 mg/kg/body weight). The above biochemical findings were confirmed with histological study of pancreas and liver. Thus, our results show that kaempferol at 100 mg/kg of body weight possesses a potential antihyperglycemic effect that is comparable with glibenclamide.

Biography

Dr. Khalid S. Al-Numair is currently a Professor of Community Nutrition Science and Policy in the College of Applied Medical Sciences, King Saud University. He obtained his PhD in Community and Applied Nutrition from the University of Nebraska, USA He is a member of the Scientific Council at King Saud University, resides on several permanent committees and serves as consultant for the King Abdullah Ben Abdul-Aziz Research Chair for Food Security. Dr. Khalid is also the recipient of several distinguished awards including the Prince Bandar Ben Sultan Al-Saud Academic Excellence Award for doctoral degree in 2004 and the King Saud University Outstanding Research Award in 2012. The primary focus of his research is nutrition and phytochemicals on health diseases. He has published more than 50 articles in peer-reviewed international journals and currently serves as an editorial board member and reviewer in reputed publications.