

## Mangiferin from *Salacia chinensis* prevents oxidative stress and protects pancreatic $\beta$ -cells in streptozotocin-induced diabetic rats

### Abstract

Oxidative stress in diabetic tissues is a consequence of free radical accumulation with concurrently impaired natural antioxidants status and results in oxidative tissue damage. The present study investigated the protective effects of mangiferin against pancreatic  $\beta$ -cell damage and on the antioxidant defense systems in streptozotocin (STZ)-induced diabetic rats. Diabetes was experimentally induced by a single intraperitoneal injection of STZ. Oxidative stress biomarkers such as tissue malondialdehyde, hydroperoxides, reduced glutathione (GSH) content, and nonenzymatic antioxidants were measured. Biochemical observations were further substantiated with histological examination and ultrastructural studies in the pancreas of diabetic, glibenclamide and mangiferin-treated diabetic rats (dosage of 40 mg/kg body weight daily for 30 days). Oral administration of mangiferin and glibenclamide to diabetic rats significantly decreased the level of blood glucose and increased levels of insulin. Additionally, mangiferin treatment significantly modulated the pancreatic nonenzymatic antioxidants status (vitamin C, vitamin E, ceruloplasmin, and reduced GSH content) and other oxidative stress biomarkers. The histoarchitecture of diabetic rats showed degenerated pancreas with lower  $\beta$ -cell counts, but mangiferin treatment effectively regenerated insulin secreting islet cells. The electron microscopic study revealed damaged nuclear envelope and mitochondria and fewer secretory granules in pancreas of diabetic rats; however, mangiferin treatment nearly normalized pancreatic architecture. The present findings suggest that mangiferin treatment exerts a therapeutic protective nature in diabetes by decreasing oxidative stress and protecting against pancreatic  $\beta$ -cell damage, which may be attributable to its antioxidative properties.

**Keyword:** Mangiferin; Oxidative stress; Diabetes mellitus; *Salacia chinensis*; Pancreas;  $\beta$ -Cells; Streptozotocin-induced