EVALUATION OF ANTIDIABETIC AND ANTIOXIDANT ACTIVITY OF TAMARINDUS INDICA FOR NIDDM IN RATS

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Abstract of Part A

*Tamarindus indica* L. has been in use for a long time in Asian food and traditional medicine for different diseases including diabetes and obesity. However, the molecular mechanisms of these effects have not been fully understood. In view of the multidimensional activity of tamarind seeds due to their having high levels of polyphenols and flavonoids, we hypothesized that the insulin mimetic effect of HPLC standardized aqueous tamarind seed extract (TSE) might increase glucose uptake through improvement in the expression of genes of the glucose transporter (GLUT) family and sterol regulatory element binding proteins-1c (SREBP-1c) mRNA in the liver. Daily oral administration of TSE to streptozotocin (STZ 90 mg/kg i/p) induced type 2 diabetic male Wistar rats at different doses (120 and 240 mg/kg BW) for 4 weeks showed positive correlation with intracellular calcium and insulin release in isolated Islets of Langerhans. TSE supplementation significantly improved the GLUT-2 protein and SREBP-1c mRNA expression in the liver and GLUT-4 protein and mRNA expression in the skeletal muscles of diabetic rats. The elevated levels of serum nitric oxide (NO), glycosylated hemoglobin (HbA1c) and tumor necrosis factor alpha (TNF-α) decreased after TSE administration. Immunohistochemical findings revealed that TSE abrogated STZ-induced apoptosis and increased β-cell neogenesis, indicating its effect on Islets and β-cell mass. The proadiponectin action of TSE in addition to non competitive inhibition of α-glucosidase activity was devoid of any effect on pancreatic GLP-1 mRNA. These findings revealed the molecular mechanisms involved in antidiabetic action of TSE beside its pronounced effect on GI dysfunctions. The GI functions assessed in terms of gastric emptying and small intestinal transit rate by phenol red and activated charcoal method exhibited significant increase in emptying without any effect on intestinal transit rate after TSE treatment. In conclusion, it was found that the antidiabetic effect of TSE on STZ-induced diabetes resulted from complex mechanisms of β-cell neogenesis, calcium handling, and GLUT-2, GLUT-4, and SREBP-1c. These findings show the scope for formulating a new herbal drug for diabetes therapy.
Abstract of Part B

Hypertension, one of the most prevalent cardiovascular diseases, has been widely linked to insulin resistance and compensatory hyperinsulinemia. The objectives of the present investigation were to evaluate the therapeutic efficacy of TSE in STZ induced diabetic hypertension superimposed by deoxycorticosterone salt (DOCA) in unilateral nephrectomised rats. Diabetic hypertension was produced by administration of single dose of STZ (90 mg/kg, i. p.) to 2 day old neonatal rat followed by unilateral nephrectomy and DOCA injection (40 mg/kg once a week; s.c; for 4 weeks) after 6 weeks of diabetic screening. Graded doses of TSE (120 and 240 mg/kg) treatment for 4 weeks showed a significant reduction in blood pressure BP (systolic, diastolic, and mean), heart rate, serum low density lipoproteins (LDL), cholesterol and improvement in high density lipoproteins (HDL) levels. TSE significantly increased antioxidant enzyme level of superoxide dismutase (SOD), catalase, and glutathione. The extract significantly decreased elevated levels of serum nitric oxide (NO) in diabetic hypertensive rats. In conclusion, the data in present study reveals that TSE posses moderate antihypertensive action in conjunction to antihyperglycemic activity.