

Comparison of β -Cell Regenerative Potentials of Selected Sri Lankan Medicinal Plant Extracts in Alloxan-Induced Diabetic Rats

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Abstract : Triggering of β -cell regeneration is a recognized therapeutic strategy for the treatment of type 1 diabetes mellitus. One such approach to foster restoration and regeneration of β -cells is from exogenous natural extracts. The aim of the present study was to investigate and compare the β -cell regenerative potentials of the extracts of *Spondias pinnata* (Linn. f.) Kurz, *Coccinia grandis* (L.) Voigt and *Gmelina arborea* Roxb. in alloxan induced diabetic rats. Wistar rats were divided into six groups (n=6); healthy untreated rats, alloxan induced diabetic untreated rats (150 mg/kg, ip), diabetic rats receiving the extracts of *S. pinnata* (1.0 g/kg), *C. grandis* (0.75 g/kg), *G. arborea* (1.00 g/kg) and diabetic rats receiving glibenclamide (0.5 mg/kg) for 30 days. The assessment of selected biochemical parameters, histopathology and immunohistochemistry in the pancreatic tissue were done on the 30th day. The reduction in the percentage of HbA1C was in the decreasing order of *C. grandis* (35%), *G. arborea* (31%) and *S. pinnata* (29%) in alloxan induced diabetic rats ($p < 0.05$). The concentration of serum fructosamine, insulin and C-peptide were decreased significantly in a decreasing order of *C. grandis* (30%, 72%, 51%), *G. arborea* (25%, 44%, 44%) and *S. pinnata* (27%, 34%, 24%) in alloxan induced diabetic rats ($p < 0.05$). The extent of β -cell regeneration was in the decreasing order of *C. grandis*, *G. arborea*, *S. pinnata* reflected through the increased percentage of insulin secreting β -cells in alloxan induced diabetic rats. The extract of *C. grandis* produced the highest degree of β -cell regeneration demonstrated through an increase in the number of islets and percentage of the insulin secreting β -cells (75%) in the pancreas of diabetic rats ($p < 0.05$). Further the *C. grandis* extract produced a significant increase in mean profile diameter in small (118%), average (10%), and large (13%) islets as compared with diabetic control rats respectively. However, statistically significant increase in the islet profile diameter was shown only in average (2%) and large (5%) islets in the *G. arborea* extract treated rats and large islets (5%) in *S. pinnata* extract treated diabetic rats ($p < 0.05$). The β -cell regeneration potency was in the decreasing order of *C. grandis* (0.75 g/kg), *G. arborea* (1.00 g/kg) and *S. pinnata* (1.00 g/kg) in alloxan induced diabetic rats. The three plant extracts may be useful as natural agents of triggering the β -cell regeneration in the management of type 1 diabetes mellitus.

Keywords : alloxan-induced diabetic rats, β -cell regeneration, histopathology, immunohistochemistry

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