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Homeostatic model assessment of three selected Sri Lankan medicinal plant extracts in diabetic rats

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Homeostasis model assessment of insulin resistance and β -cell functions (HOMA-IR and HOMA- β) is increasingly being recognized as an important tool to validate antidiabetic activity of natural products *in vivo*. The antihyperglycaemic activity of the bark extracts of *Gmelina arborea*, *Spondias pinnata*, leaf extract of *Coccinia grandis* in streptozotocin-induced diabetic rats has been reported by our research team. The present paper describes the HOMA-IR and HOMA- β of the above three extracts in diabetic rats to further validate their clinical usefulness in traditional medicine. Diabetes mellitus was induced to Wistar rats by streptozotocin (65 mg/kg, ip). Wistar rats were divided into six groups (n=6/group). The group 1 and group 2 served as healthy and diabetic untreated (control) groups, respectively. The diabetic rats of group 3, 4, 5 and 6 received the aqueous (refluxed, 4 h) bark extracts of *G. arborea* (1.00 g/kg) and *S. pinnata* (1.00 g/kg), leaf extract of *C. grandis* (0.75 g/kg) and glibenclamide (0.50 mg/kg) daily for 30 days, respectively. On the 30th day, blood was collected for the estimation of fasting serum concentrations of glucose and insulin. HOMA-IR and HOMA- β were calculated using the above parameters. The HOMA-IR and HOMA- β indices of the diabetic control rats were 3.74 and 11.63, respectively. The HOMA-IR index of the extracts of *G. arborea*, *S. pinnata*, *C. grandis* and glibenclamide treated diabetic rats were 3.11, 3.12, 3.33 and 2.64, respectively. In contrast, a statistically significant increment in HOMA- β index was found for the three plant extracts compared to diabetic control group (p<0.001) and the values were 38.67, 31.11 and 56.32 in the same order of plants. The results revealed that aqueous bark extracts of *G. arborea* and *S. pinnata* and leaf extract of *C. grandis* improved glucose homeostasis by reducing insulin resistance, predominantly by increasing β -cell functions though mimicking insulin secretion. Furthermore, results of the homeostatic model assessment of the three extracts further corroborated the published antihyperglycaemic and β -cell regenerative potentials of the three plant extracts *in vivo*.

Keywords: antidiabetic, homeostasis model assessment, medicinal plants