Determination of Anti-Diabetic Activity of Selected Medicinal Plants in Sri Lanka

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Running title – Anti-Diabetic Activity of Selected Medicinal Plants.

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Abstract

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Diabetes mellitus is one of the main chronic diseases currently affecting mankind. In type two diabetes mellitus, the post-prandial blood glucose level increases uncontrollably causing metabolic imbalances in the body. α-amylase and α-glucosidase are the two important enzymes, responsible for digestion of starch inside the body. Therefore, inhibition of these two enzymes can stop the increase of blood glucose level after a carbohydrate diet.

Treatment for diabetes without any side effects is still a challenge in medical research. Currently used anti-diabetic drugs can cause some side effects such as liver toxicity and adverse gastrointestinal symptoms. Because of this reason, natural anti-diabetic agents play an important role over synthetic anti-diabetic drugs. Hence, in recent years, medicinal plants have gained more attention on the effective management and treatment of diabetes mellitus. Herbal supplements can be used as an adjuvant or as favourable alternative therapy for diabetic condition.

The present study was designed to assess the *in vitro* anti-diabetic activity and responsible compounds for anti-diabetic activity of selected ten medicinal plants; Belimal *(Aegle marmelos)*, Iramusu *(Hamides musindicus)*, Ranawara *(Cassia auriculata*), Walkottamalli

(Scoparia dulcis), Nelli *(Phyllanthus emblica*), Rasakinda *(Tinospora cordifolia),* Polpala (*Aerva lanata),* Babila *(Sida rhombifolia),* Beligeta *(Aegle marmelos)* and Venivel *(Coscinium fenestratum),* which are extensively used in the Ayurveda medicine in Sri Lanka. Methanol crude extracts were used to evaluate the α-amylase and α-glucosidase enzyme inhibition activity. Among ten plants, Nelli, Ranawara, Iramusu, Belimal and Walkottamalli exhibited more than 90% of inhibition for α-amylase at 2000 ppm, whereas only Nelli, Ranawara and Iramusu displayed more than 90% inhibition for α-glucosidase at 2000 ppm. Hence, Nelli, Ranawara and Iramusu demonstrated more than 90% of inhibition for both enzyme assays at 2000 ppm. For α-amylase assay, IC_{50} values of Nelli, Ranawara, Iramusu, Belimal and Walkottamalli lie in the range of 21.57 µg/ml -580.19 µg/ml, where Nelli reported the lowest IC_{50} as 21.57±0.14 µg/ml. For alpha glucosidase assay, IC_{50} values of Nelli, Ranawara and Iramusu reported in the range of 16.42 µg/ml -109.60 µg/ml, where Nelli exhibited the lowest value as 16.42±0.23 µg/ml. Nelli, Ranawara and Iramusu were partitioned using hexane, dichloromethane and ethyl acetate. Each fraction was tested for enzyme inhibitory activity. For α-amylase and α-glucosidase enzyme assays ethyl acetate fraction showed highest inhibition in Nelli, Iramusu and Ranawara at 500 ppm. Hexane fraction of Nelli showed significant inhibition for α-amylase and α-glucosidase assays while the hexane fractions of Ranawara and Iramusu exhibited no inhibition for α-amylase and α-glucosidase assays. Therefore, both nonpolar and polar compounds could be responsible for enzyme inhibition activity of Nelli and only polar compounds could be responsible for enzyme inhibition activity of Ranawara and Iramusu.