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α-Glucosidase enzyme inhibitory activity and anti-hyperglycemic activity of *Caryota urens* L. (Kithul) treacle

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Caryota urens L. (Kithul) treacle has been used in Sri Lanka as a source of natural sweetener for many centuries. In Sri Lanka, there is a belief that the treacle and jaggery made out of Kithul can even be consumed by diabetic people unlike cane sugar and other treacles. However, this property has not been scientifically tested and this study evaluates the effect of consumption of Kithul treacle on blood glucose in terms of *in vitro* α-glucosidase enzyme inhibitory activity (a key enzyme involved in carbohydrate metabolism) and *in vivo* anti-hyperglycemic activity using rats.

Freeze dried Kithul treacle samples (n=12) at five different concentrations (2.0, 5.0, 7.5, 10.0 and 20.0 mg/ml) were used in *in vitro* α-glucosidase enzyme inhibition assay and Acarbose was used as the positive control. Sugar composition of bulk treacle sample that was used in *in vivo* experiments was analyzed and a sugar mixture with similar composition to bulk treacle was prepared and used as the control. Overnight (16 h) fasted rats were randomly divided into 6 groups (7 rats/group) and three groups were orally administered with treacle and the other three groups with sugar mixture at three different doses (2.75, 3.75 and 4.75 g/ kg body wt). Blood was collected from tail and blood glucose was measured at 0, 30, 60 and 120 min using Randox glucose oxidase kit. Effect of 2.75 g/kg body wt. dose on random blood glucose was also studied.

The *In vitro* results demonstrated dose dependent α-glucosidase enzyme inhibitory activity (0.5±2.3, 10.2±0.5, 15.6±0.8, 20.3±1.7 and 29.0±1.1 % respectively) with IC_{50} of 32.4±1.5 mg/ml (Acarbose 0.57 ±0.02 µg/ml). From *in vivo* results, the treacle fed group showed significantly lower rise in postprandial blood glucose at 30 and 60 min (123±3.2 & 116.3±7.5 mg/dl respectively), compared to the control (138.0±4.6 & 135.8±2.9 mg/dl respectively) at 2.75 g/kg dose. Similar results were observed for other two doses. Reduction in Incremental Area Under the Curve (IAUC) of treacle fed group compared to the control at 2.75, 3.75 and 4.75 g/ kg body wt were 46, 26 and 16 % respectively. Reduction in IAUC of random blood glucose of treacle fed group compared to control was 46 %. These data collectively show that *C. urens* treacle posses marked anti-hyperglycemic activity.
This is the first scientific study on anti-hyperglycemic activity of *C. urens* treacle. It is concluded that, *Caryota urens* treacle posses marked anti-hyperglycemic activity *in vivo* and α-glucosidase inhibition activity *in vitro*.

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