

Mechanism of in Vitro Inhibition of Alpha-Amylase, Alpha-Glucosidase by Ethanolic Extracts of Polyalthia Longifolia, Its in Vitro Cytotoxicity on L6, Vero Cell-Lines and Influence of Glucose Uptake by Rat Hemi-Diaphragm

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Abstract : The bark of Polyalthia longifolia is used in ayurvedic system of medicine for the management of various ailments including diabetes mellitus. The bark of P. longifolia extracts was extracted using various polar and non-polar solvents and tested for inhibition of alpha-amylase and alpha-glucosidase among which the ethanolic extracts were found to be more potent. The ethanolic extracts of the bark were tested for the in vitro inhibition of alpha-amylase using starch as substrate and alpha-glucosidase using p-nitro phenyl alpha-D-gluco pyranoside as substrate to establish its in vitro antidiabetic effect. The mechanism of inhibition was determined by Dixon plot and Cornish-Bowden plot. The cytotoxic effect of the extract was tested on L6 and Vero cell-lines. The extract was partially purified by TLC. The individual effect of the ethanolic extract, TLC fractions and its combinatorial effect with insulin and glibenclamide on glucose uptake by rat hemi-diaphragm were studied. Results revealed that the ethanolic extracts of Polyalthia longifolia bark exhibited competitive inhibition of alpha-amylase and alpha-glucosidase. The extracts were also found not to be cytotoxic at the highest dose of 1 mg/mL. Glucose uptake study revealed that the extract alone and when combined with insulin, decreased the glucose uptake when compared to insulin control, however the purified TLC fractions exhibited significantly higher ($p < 0.05$) glucose uptake by the rat hemi-diaphragm when compared to insulin. The study shows various possible mechanism of in vitro antidiabetic effect of the P. longifolia bark.

Keywords : alpha-amylase, alpha-glucosidase, dixon, cornish-bowden, L6 , Vero cell-lines, glucose uptake, polyalthia longifolia bark, ethanolic extract, TLC fractions

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