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Evaluation of Alpha-Glucosidase Inhibitory Activity of *Vinca rosea*

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Diabetes mellitus (DM) has developed into serious health problem worldwide. á-glucosidase inhibitors are used in management of Type II Diabetes mellitus. Medicinal plants are known to be effective in treating various diseases and disorders. *Catharanthus roseus* belonging to family Apocyanaceae is very well known for its anticancer property. The present study was aimed to compare the alpha glucosidase inhibitory effect of leaves and flowers extracts of *Vinca rosea* by an in-vitro assay. Methanolic extracts were obtained using Soxhlet apparatus. Yeast alpha glucosidase was used as the enzyme source. Acarbose was used as the reference drug. The % inhibition was calculated. The results proved that both leaves and flowers extract of *Vinca rosea* possess α-glucosidase inhibitor activity. The leaf extract (57.87%)showed a better activity when compared to flower extracts(48.31%). The result supports *Vinca rosea* a potential source in treating Diabetes mellitus.

Keywords: Diabetes mellitus, α-glucosidase, Apocyanaceae, Catharanthusroseus,Acarbose, and Anticancer.

Diabetes mellitus (DM) is one of the major health issues worldwide and its increasing trend is expected to be doubled by 2030[1]. International Diabetes Federation (IDF), states that the prevalence of Diabetes mellitus is more common among developing countries where people take high-calorie food in their diets and lack of physical exercises[1]. The onset of Diabetes mellitus differs from individual to individual, but middle aged groups are always at higher risk. Type II Diabetes mellitus is more common and exhibits approximately 90%–95% of all cases[2]. Type II diabetes mellitus is caused by the decreased production of insulin bythe pancreatic β-cells or due to excessive assimilation of glucose which leads to insulin resistance resulting inhyperglycaemia[3, 4]. Chronic hyperglycaemia can lead to several microvascular and macrovascular complications.

α-Glucosidase is an enzyme which is responsible for the conversion of complex carbohydrates into glucose. The α-Glucosidase inhibitors acts by delaying the breakdown of complex carbohydrates into glucose and reduces its absorption rate from the gut which results in reduction of postprandial blood sugar level[5]. This therapeutic approach has been recommended by the Third Asia-Pacific Region Diabetes Treatment Guidelines as the first-line of treatment for lowering postprandial hyperglycaemia[6].

Although commercially available α-Glucosidase inhibitors like Voglibose and Acarbose are used effectively in controlling blood glucose levels, they have been associated with serious gastrointestinal side effects. Therefore, there is a need to search for an alternative that can exhibit α-Glucosidase inhibitory activity without side effects[7].

Medicinal plants have been used since ages to treat various ailments.*Vinca rosea* (C. roseus) Linn, commonly known as Madagascar periwinkle is a flowering herb that belongs to Apocynaceae family. They contain dimeric alkaloids, Vincristine and vinblastine that are used as anticancer drugs, while roots have ajmalicine and serpentine which is used to treat hypertension[8]. The leaves are used traditionally to control diabetes worldwide, including India. Earlier studies on laboratory animals have reported that the leaf extracts possess a very good antihyperglycemic and hypotensive activity. Leaf juice of the plant was noted to reduce blood glucose in alloxan induced diabetic rabbits. Leaves and twigs have been reported to reduce blood glucose level in alloxan induced diabetic rats[9]. Apart from this the plant is also used in treating malaria and sore throat. Literature shows that these plants are used in the regulation of menstrual cycles and as euphoriant[10].

The present study was aimed to compare the alpha glucosidase inhibitory activity of methanolic extract of leaves and flowers of *Catharanthus roseus.*

MATERIALS AND METHODS

Chemicals

α-Glucosidase was purchased from Sigma-Aldrich, Bangalore.

Plant materials

The plant parts were identified and authenticated by Department of Botany, National Institute of Siddha-Chennai.

Extraction of plant material[11]

The Leaves and flowers were removed separately, air dried under shade, powdered and stored in an airtight container. The powdered material was extracted with methanol (80%) by the process of soxhlation. The filtrate was concentrated at reduced pressure by rotary flash vacuum evaporator.

Determination Of Yeast Alpha Glucosidase Inhibitor Activity[12]

The yeast alpha glucosidase was dissolved in 100 mM phosphate buffer pH 6.8 and was used as the enzyme source. P-Nitrophenyl-α-D-glucopyranoside was used as the substrate. Acarbose was used as the Standard drug for alpha glucosidase inhibitor. Plant extracts were used in the concentration ranging from 20-200 µg/ml. Different concentrations of leaf and flower extracts of *Vinca rosea* and Acarbose (0.025, 0.05, 0.1, 0.15, 0.2 mg/ml)was mixed with 320 µl of 100 mM phosphate buffer. The mixture was incubated at 30 °C for 5 minutes. 3 ml of 50 mM sodium hydroxide was added to the mixture and the absorbance was read at 410 nm using spectrophotometer. The control samples were prepared without adding any plant extracts.The % inhibition was calculated according to the formula.

Inhibition (%) = [Absorbance (control) - Absorbance (extract)/ Absorbance (control)] X 100

RESULTS AND DISCUSSION

Diabetes mellitus is a well-known metabolic disorder, which is characterized by an elevated blood glucose level. The reason for this condition is either due to the loss of production of insulin by the pancreas or reduced response by the cells to the produced insulin or both. Controlling the postprandial hyperglycaemiais of prime importance in management of Type II

Table 1. α-Glucosidase inhibitory effects of methanolic extract of leaves and flowers of *Vinca rosea* and Acarbose

Concentration mg/ml	% α- Glucosidase Inhibition		
	Flower Extract	Leaf Extract	Acarbose
0.025	7.30±3.2	9.55±3.0	20.22±3.1
0.05	18.54±3.1	24.72±3.0	32.02±3.1
0.1	29.78±3.0	34.27±2.8	40.45±3.0
0.15	35.96±3.3	42.70±3.1	50.00±3.6
0.2	48.31±3.2	57.87±3.3	62.36±3.1

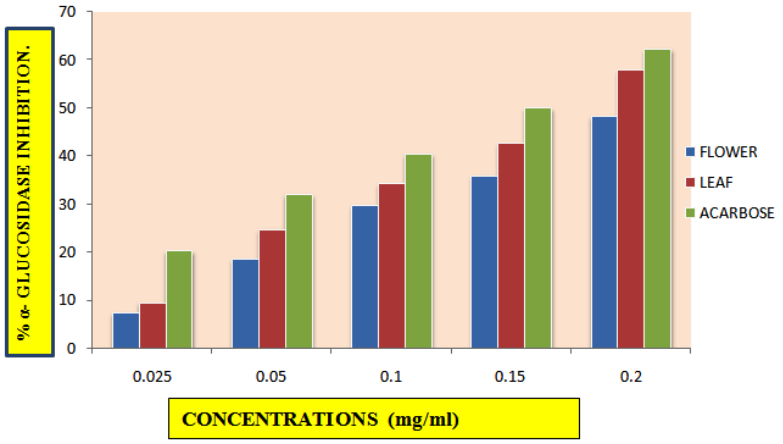

Fig. 1. Percentage α-Glucosidase inhibitory effects of methanolic extract of leaves and flowers of *Vinca rosea* and Acarbose.

Diabetes mellitus. α-Glucosidase plays a vital role in digestion of complex carbohydrate to glucose, hence its inhibition is considered as one of the targets for managing postprandial hyperglycaemia. Acarbose has α-glucosidase and α-amylase inhibitory activity but known to cause side effects such as bloating, flatulence and diarrhoea[13].

The use of herbal drugs in treating Diabetes mellitus and its complications, is growing globally.In the present study, inhibitory activity of methanolic extracts of leaves and flowers of *Vinca rosea* on yeast alpha glucosidase was investigated. The results are given in Table 1. Percentage of α-glucosidase inhibition bythe leaves and flowers extract were plotted in comparison with Acarbose (Fig.1). All the extracts showed a concentration-dependent inhibition of α-glucosidase. The standard drug Acarbose showed highest α-glucosidase inhibition (62.36%) followed by leaf (57.87%) and flower (48.31%) extract respectively at their highest concentrations tested.

CONCLUSION

The results of the present study showed that methanolic leaves and flowers extract of *Vinca rosea* possess α-glucosidase inhibitor activitywhich may be useful in management of Type II Diabetes mellitus. The leaves extract showed a better activity when compared to flowers extract. However these effects need to be confirmed by testing these extracts of *Vinca rosea* in different in- *vivo* models before developing into a new antidiabetic agents.

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