

IN VITRO ANTI-DIABETIC ACTIVITY OF *SOLANUM ERIANTHUM*

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Abstract

According to World Health Organization (WHO), 80% of the rural population in developing countries depends on traditional medicines to meet their primary health care needs. Traditional herbs have been used as pharmaceutical and dietary therapies for long times. A number of herbs and many relevant prescriptions have been screened and used for treating and preventing various ailments. Continuous usage of herbal medicine by a large proportion of the population in the developing countries is largely due to the fact that herbal medicines are more acceptable in these countries from their cultural and spiritual points of view and the high cost of western pharmaceuticals. The present study revealed that the hydroalcoholic extract of *S. erianthum* efficiently inhibits alpha-amylase enzymes *in vitro* in a dosage dependent manner when compared with the standard drug acarbose. Alpha-amylase is the key enzymes in the digestive organs, which catalyze the final step in the digestive process of carbohydrates.

Key Words: Medicinal plant, *S. erianthum*, Anti-diabetic, Medicinal plant.

INTRODUCTION

India is the herbal garden of the world and has been a source of medicinal plants with range of products, since antiquity man uses them in different way according to his needs, particularly as food and medicine. Among the entire flora 35,000 to 70,000 species have been used for medicinal purpose. The use of herbal medicines continues to expand rapidly across the world. Many people now take herbal medicines or herbal products for their health care in different national healthcare settings. Authentication and standardization are prerequisite steps while considering source materials for herbal formulation in any system of medicine.

MATERIALS AND METHODS

Alpha amylase inhibition – method

1. Acetate buffer (0.1 M) - 820.3mg sodium acetate and 18.7mg sodium chloride in 100 ml distilled Water
2. Iodine-iodide indicator - 635mg iodine and 1gm potassium iodide in 250 ml distilled water potato starch solution, alpha amylase solution and drug solution was prepared in acetate buffer.

Procedure

In alpha amylase inhibition method 1 ml substrate (potato starch (1% w/v)), 1 ml of drug solution (Acarbose standard drug and hydroalcohol extract) different concentrations were added to (such as 250, 500, 750 and 1000 µg/ml) 1 ml of alpha amylase enzyme (1% w/v) and 2 ml of acetate buffer (0.1 M, 7.2 pH). The above mixture was incubated for 1 hours. Then 0.1 ml iodine-iodide indicator was added in the mixture. Absorbance was taken at 565nm in UV-Visible spectroscopy (Kotowarooet *al.*, 2006 and Hamdan and Fatimai Saudi, 2010).

$$\text{Inhibition of alpha- amylase (\%)} = \frac{(\text{Abs sample} - \text{Abs control})}{\text{Abs sample}} \times 100$$

Where, Abs_{control} is the absorbance of the control reaction (containing all reagents except the test sample) and Abs_{sample} is the absorbance of the test sample.

Results and Discussion

Diabetes mellitus is the most common metabolic disorders (Bowling and Beal, 1995). A large number of drugs are used against diabetes but the complications of diabetes till persist to be a major problem among the world population. One of the therapeutic approaches for diabetes reduction of increased post prandial blood glucose level by the inhibiting digestive enzyme, alpha - amylase (Rhabasa-Lhoret and Chiasson, 2004). Acarbose is complex oligosaccharides which delay the digestion of carbohydrate by competitive inhibition of alpha-amylase (Davis and Granner, 2001). Recently, various efforts have been made to identify the compounds which act as efficient alpha-amylase inhibitors from *S. erianthum* for the treatment against diabetes.

In human body, α -amylase is one of the key enzymes that breaks down starch to more simple sugars and increase the absorption rate of glucose. As a consequence, postprandial blood glucose level is increased. Slowing the digestion and breakdown of starch may have promising effects on insulin resistance and glycemic index control in people with diabetes mellitus. (Russell *et al.*, 2013). The *in vitro* alpha-amylase inhibitory studies demonstrated that hydroalcoholic extract of *S. erianthum* have anti diabetic activity. The percentage inhibitions of hydroalcoholic extract of *S. erianthum* and acarbose at 100, 250, 500, 750 and 1000 μ g/ml concentration have shown concentration dependent percentage inhibition (Table 1 and Figure 1). At a concentration of 100 μ g/ml of acarbose showed a minimum percentage inhibition 50.4% and a greater percentage inhibition of 80.9% at 1000 μ g/ml. At a concentration of 100 μ g/ml hydroalcoholic extract of *S. erianthum* showed a minimum percentage inhibition of 16.4% and a greater percentage inhibition of 60.3% is observed for 1000 μ g/ml. Therefore we can conclude that this hydroalcoholic extract of *S. erianthum* has moderate α -amylase inhibitory activity. The present results expose that the hydroalcoholic extract of *S. erianthum* efficiently inhibits alpha-amylase enzymes *in vitro* in a dosage dependent manner when compared with the standard drug acarbose. Alpha-amylase is the key enzymes in the digestive organs, which catalyze the final step in the digestive process of carbohydrates. Therefore, the inhibition of alpha-amylase may interrupt the release of d-glucose from dietary carbohydrates and which may consequently delay the process of absorption of glucose, resulting in reduced plasma glucose levels in postprandial. The alpha-amylase inhibitory activity is revealed by some of the phenolic compound isolated from *Cyperus rotundus* (Sayed *et al.*, 2008). In the present study, the phenolic compounds of the *S. erianthum* extract may probably have same the inhibitory effect on alpha-amylase. The results shows that the hydroalcoholic extract of *S. erianthum* have noteworthy activity as compared to acarbose.

Table. 1 Percentage inhibitions of hydroalcoholic leaf extract of *S. erianthum* and standard acarbose

S. No.	Concentration (μ g/ml)	Standard acarbose (μ g/ml)		Hydroalcohol extract (μ g/ml)	
		OD	% inhibition	OD	% inhibition
1	100	0.126	50.4%	0.041	16.4%
2	250	0.164	65.6%	0.105	42.0%
3	500	0.173	69.2%	0.158	52.8%
4	750	0.197	78.8%	0.176	59.6%
5	1000	0.283	80.9%	0.208	60.3%

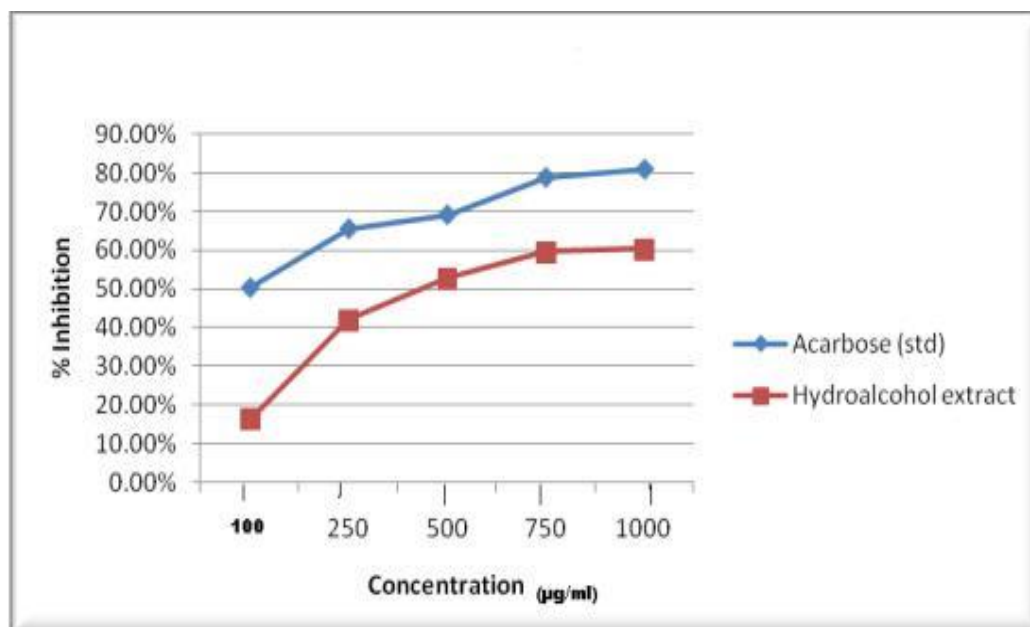


Figure: 1 *In vitro* Anti-diabetic activity in *S. erianthum*

Conclusions

In vitro anti diabetic activity of hydroalcoholic leaf extract of *S. erianthum* and standard acarbose at 100, 250, 500, 750 and 1000 µg/ml. showed dose dependent percentage inhibition. Standard acarbose showed a greater percentage inhibition of 80.9% and hydroalcoholic extract of *S. erianthum* showed 60.3% at 1000 µg/ml concentration. From this we can conclude that this hydroalcoholic extract of *S. erianthum* has moderate α -amylase inhibitory activity.

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