

Invitro antidiabetic activity of palmyra sprout extract

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ABSTRACT--*Borassus flabellifer* commonly named as Asian palmyra palm, belongs to the family of Arecaceae. It is used for the manufacture of toddy (alcoholic beverages) or boiled down to give jaggery, molasses vinegar and sugar etc. Many surveys as depicted that the plant has been traditionally used as a stimulant, antidote, anti-inflammatory, wound healing, antihelmintic, analgesic, antipyretic, antidiabetic and so on. Diabetes mellitus is a metabolic disease that is characterized by hypo and hyperglycemia. To identify the α -Amylase and α -Glucosidase activity of palmyra sprout extract. The *Borassus flabellifer* is commercially purchased. It was then used for α -amylase and α -glucosidase activity. Alpha amylase activity is performed by Bhutkar and Bhise, 2012 and alpha glucosidase activity is performed by Abideen S and Vijaya Sankar M, 2015. The study highlighted the ability of *Borassus flabellifer* (Palmyra sprout) extract successfully reducing the effect of diabetes in invitro by α -amylase and α -glucosidase activity. Hence, natural α -amylase and α -glucosidase inhibitors from *Borassus flabellifer* can be used as an effective therapy for treating postprandial hyperglycemia with minimal or with no side effects.

Keywords--*Borassus flabellifer*, diabetes mellitus, alpha amylase activity, alpha glucosidase activity.

I. INTRODUCTION

Borassus flabellifer commonly named as Asian palmyra palm, belongs to the family of Arecaceae, is an invasive plant that is found to be grown in South and Southeast Asia. Palmyra palm is a horticultural and oldest domesticated fruit crop due to its importance of fruit and palm sugar production ^[1]. Almost all parts of the plant are being used locally. It is a massive dioecious monocotyledonous plant that has a single stem reaching up to the height of 30m and fan-shaped leaves spanning 1-3m in diameter. It takes a period of 12-20 years to reach maturity and to produce the first inflorescence ^[2]. The products of Palmyra palm are syrup, sap and cake ^[3]. It is used for the manufacture of toddy (alcoholic beverages) or boiled down to lend jaggery, molasses vinegar, sugar etc ^[4]. Many surveys as depicted that the plant has been traditionally used as a stimulant, antidote, anti-inflammatory, wound healing, antihelmintic, analgesic, antipyretic, antidiabetic and so on. The plant fruits are considered as a good source of Vitamin C, Vitamin A, mineral and fibres and are utilized as stomachic, laxative, sedative and its extract is naturally used for skin diseases, fever, haemorrhages, dyspepsia, hyperdipsia and for general debility. The ripe palmyra pulp promotes the preparation of toffee that is not only commercially but also extremely palatable organoleptically. The methanolic extract of *Borassus flabellifer* male flower is found to have immunosuppressive property and also helps to inhibit the serum glucose levels. Natural fibres of *Borassus flabellifer* can be used for

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replacing synthetic fibres in composite field and thus pens opportunities for developing natural fibre composite that supports *go green and back to nature concept* ^[5]. Damarane triterpenoid 1, that is isolated from palmyra palm seed coat inhibits tumor necrosis factor- α and as antiproliferative and anticancer activity in pancreatic cancer cell line ^[6]. Diabetes mellitus is a metabolic disorder that is a serious threat to health across the world. Changes in the daily norms and lifestyle are the main causes of DM. All types of diabetes mellitus are categorized by hyperglycemia that is caused due to insufficient hormone secretion or hormone action. It is caused by certain defects in the secretion or in the action of insulin or both ^[7]. The chronic hyperglycemia of diabetes is related with the dysfunction, long-term damage and failure of different organs specifically the eyes, nerves, heart, kidneys and blood vessels ^[8]. Type 1 diabetes mellitus is caused by the destruction of β cells by autoreactive immune cells. Type 2 diabetes mellitus is complex as it encounters the aged people, since the pancreatic β cells are failed to produce insulin to meet the metabolic demands of the body. Myocardial infarction dyslipidemia, hypertension, stroke are some vascular consequences of diabetes mellitus. The present study states the invitro activity of *Borassus flabellifer* extract against α -amylase and α -glucosidase (antidiabetic).

II. MATERIALS AND METHODS

Palmyra sprout is commercially purchased and is made into extract. The extract is then used for the alpha amylase and alpha glucosidase activity.

III. ALPHA AMYLASE ASSAY

Alpha amylase inhibition was determined by quantifying the amount of maltose liberated during the experiment. The method reported by Bhutkar and Bhise has been followed (**Bhutkar and Bhise, 2012**). Different concentrations of extract (10, 20, 30, 40 and 50 μ l) was pre-incubated with 100 μ l of α -amylase solution (1U/mL) at room temperature for 30 minutes. 100 μ l of 96 mM (3,5- dinitrosalicylic acid solution) DNSA reagent was added to it to stop the reaction and the solution was heated in a water bath for 5 minutes. Control was maintained at a pH value of 6.9. Readings are measured at 540 nm. The experiment was performed in triplicate. Acarbose was used as a positive control ^[9].

% of inhibition was calculated using the formulae-

$$\% \text{ of inhibition} = \frac{C - T}{C} \times 100$$

Where, C=control, T=Test sample

Glucosidase inhibitory retardation assay:

The method reported by Abideen and Vijaya Sankar has been followed (**Abideen S and Vijaya Sankar M, 2015**). 1mL of nanoparticle solution was poured inside a dialysis membrane along with 2mL of 22mM of D-glucose solution in 0.15M NaCl. The dialysis membrane was tied at both the ends to prevent the release of incorporated fluid. The membrane was immersed in a beaker containing 40 mL of 0.15 M NaCl and 10mL of Milli-Q water. Control was maintained where the equal quantity of nanoparticle solution was replaced by Milli-Q water. The beaker was kept on an orbital shaker at room temperature and movement of glucose into external solution was

observed every half an hour for 3 hours. Glucose concentration (mg/mL) in the external solution was measured using standard glucose oxidation kit ^[10]

GDRI (glucose diffusion retardation index) was calculated using the below-mentioned formulae:

GDRI= $\frac{(100 - \text{glucose concentration in external solution in presence of extract})}{\text{glucose concentration in external solution without addition of extract}}$

IV. DISCUSSION AND RESULTS

The alpha amylase activity of the palmyra sprout extract is examined by the amount of maltose liberated during the experiment. This activity of the plant is compared with the control that is Acarbose. Figure 1 represents the percentage of inhibition of α -amylase activity. The percentage of inhibition increases simultaneously as the concentration of the extract is increased. The plant showed slight decrease in the percentage when compared with the control. The average percentage of difference between control and the test plant (Palmyra sprout extract) is 12.040%. Similarly, the alpha glucosidase activity of the plant extract is examined and is represented in Figure 2. This activity of the plant is compared with the control, Acarbose. The value of inhibition increases simultaneously with the increase in the concentration of the extract. When compared with the control, the plant extract displayed a slight decrease in the amount of inhibition. The average percentage of difference between the plant and the control is 15.836%.

Figure 1: α -amylase activity of Palmyra sprout extract compared with control

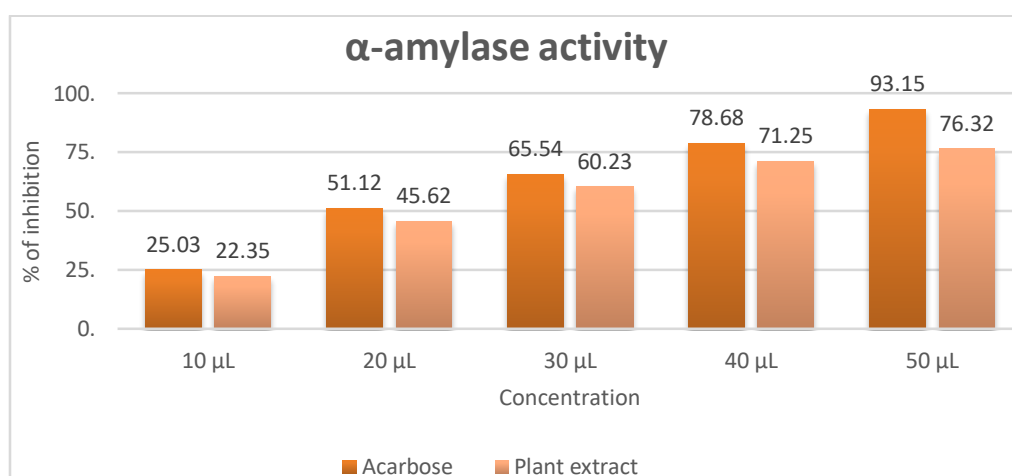
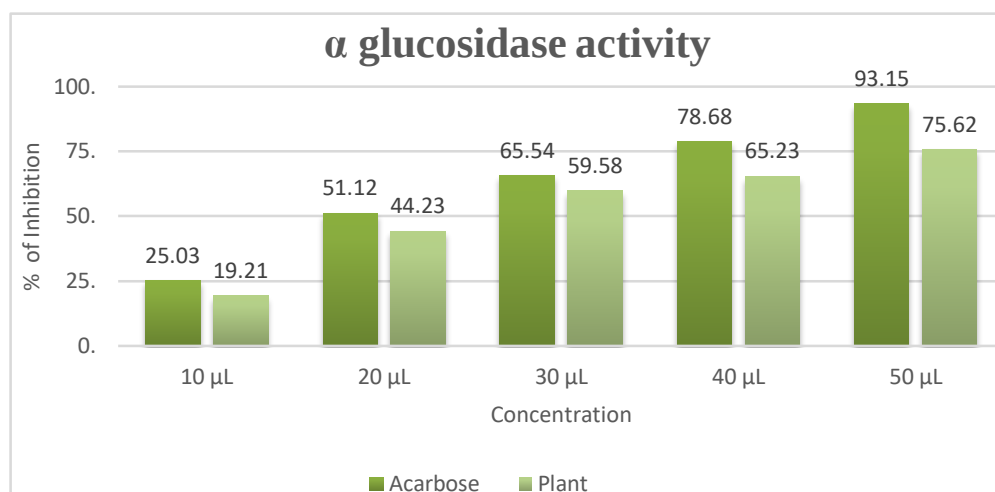


Figure 2: α -glucosidase activity of the plant extract and comparison with control



V. CONCLUSION

The study highlighted the ability of *Borassus flabellifer* (Palmyra sprout) extract successfully reducing the effect of diabetes in *invitro* by α -amylase and α -glucosidase activity. The presence of the bioactive components is responsible for their activity in diabetes condition. Hence, natural α -amylase and α -glucosidase inhibitors from *Borassus flabellifer* can be used as an effective therapy for treating postprandial hyperglycemia with minimal or with no side effects.

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