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α - Amylase and α - Glucosidase Activity of Mimosa Pudica. Linn Flowers

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ABSTRACT

Objective: In vitro analysis of the anti-diabetic effect of various extracts of the medicinal plant Mimosa pudica. Methods: Extracts of the plants were prepared by cold percolation. They were then tested for inhibition of α-amylase activity and α-glucosidase activity. Results: Inhibition of amylase and glucosidase enzymes involved in digestion of carbohydrates can significantly decrease the post prandial increase of blood glucose after a mixed carbohydrate diet and therefore can be an important strategy in management of blood glucose. The hydroethanol extract of Mimosa pudica flowers showed strong inhibition of α-amylase and α-glucosidase. Conclusions: The findings indicate that all the extract of the plant possess antidiabetic properties too varying degrees. They can be used to develop natural drugs which may be used in lieu of commonly used strong allopathic drugs which possess a number of harmful side effects.

KEYWORDS invitro anti diabetic, Mimosa pudica,α -glucosidase, α-amylase enzymes.

INTRODUCTION:

Diabetes is one of the major causes of premature death worldwide. Every ten second a person dies from diabetes related causes mainly from cardiovascular complications. In 2007, diabetes caused 3.5 million deaths globally. Diabetes affects mainly the developing countries like India. Indeed, India presently has the largest number of diabetic patients in the world and has been infamously dubbed as the 'diabetic capital of the world'. Diabetes mellitus is epidemic in India as a result of societal influence and changing lifestyles. Diabetes has been known in India for centuries as 'a disease of rich man' but now spread among all masses.

Fig.1.Mimosa pudica

Mimosa pudica L. (Mimosaceae) is a common plant in moist waste ground, lawns, open plantations and weedy thickets(Fig.1). It is native from Middle America and now widely distributed in all tropical areas. Mimosa pudica Linn locally known as chuimui (Eng: Touch me not) in Malwa region, India, is traditionally used as an agent for birth control among rural people. This creeping perennial herb has been mentioned as a tribal medicine all over India. Traditionally M.pudica is used in the treatment of headache, migraine, insomnia, diarrhea, dysentery, fever, piles and fistula. Roots in the form of decoction are used to treat urinary complaints and in diseases arising from corrupt blood and bile. The paste of the leaves is applied to glandular swelling and dressing for sinus. Only few pharmacological studies have been reported on flowers of M.pudica like anti-inflammatory and anticonvulsant activity. In traditional practice of Malwa region leaves of this plant has been used to control swelling and dressing of wounds. The claim that the anti-diabetic activity of M. pudica leaves is speculative and has not yet been documented. In the present study an attempt has been made to evaluate the anti-Diabetic efficacy of M. pudica flowers in In vitro models.

MATERIALS AND METHODS:

Plant Collection & Identification:

Fresh flowers were collected from Noombal village,Thiruvallur district. The flowers and plants were authenticated by Prof. Dr. Jayaraman. Director, Plant Anatomy Research Institute, Tambaram, Chennai.

Preparation of Seed Extract:

The plant materials were air-dried at room temperature (26°C) for two weeks, after which it was ground to a uniform powder. The powdered (100gm) was extracted three times by cold percolation method with 300 ml of Hexane, acetone and hydro ethanol at room temperature for 72 hrs the filtrates were concentrated under reduced pressure at 40°C and stored in refrigerator at 2-8°C for use in subsequent experiments.

Invitro Antidiabetic Effect:

Alpha- Amylase Inhibition Assay Procedure:

Alpha-amylase activity can be measured in-vitro by hydrolysis of starch in presence of α-amylase enzyme. This process was quantified by using iodine, which gives blue colour with starch. The reduced intensity of blue colour indicates the enzyme-induced hydrolysis of starch in to monosaccharides.

α-Amylase was premixed with the M.pudica flower extracts at various concentrations (20-100 µg/ml) and 0.5% starch solution was added at 37°C for 5 min to start the reaction and terminated by addition of 2 ml of 3,5-dinitrosalicylic acid (Holecheck et al. 1982). The reaction mixture was heated for 15 min at 100°C and diluted with 10 ml of distilled water in an ice bath α-Amylase activity was determined by measuring spectrum at 540 nm and IC50 value was measured.

Inhibition of Alpha-Glucosidase Enzyme:

The inhibitory activity was determined by incubating a solution of starch substrate (2% w/v maltose or sucrose) 1 ml with 0.2 M Tris buffer pH 8.0 and various concentration of plant extract for 5 min at 37°C. The reaction was initiated by adding 1 ml of alpha-glucosidase enzyme (1U/ml) to it followed by incubation for 40 min at 35°C. Then the reaction was terminated by the addition of 2 ml of 6N HCl. Then the intensity of the colour was measured at 540nm.

RESULTS AND DISCUSSION:

There was a dosage-dependent increase in percentage inhibitory activity against alpha amylase enzyme. It showed 50% inhibition at a concentration of HEEMP-54µg/ml, AEMP-78µg/ml, HEMP-91µg/ml. The order of α-glucosidase inhibitory activity as Acarbose> HEEMP> AEMP> HEMP(Fig.2).

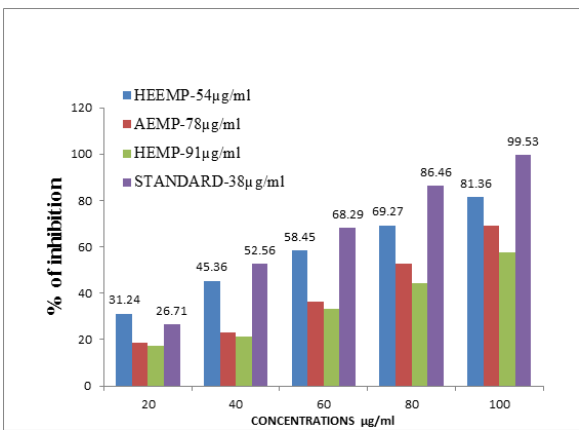

Fig.2. α-amylase activity of M.pudica flowers

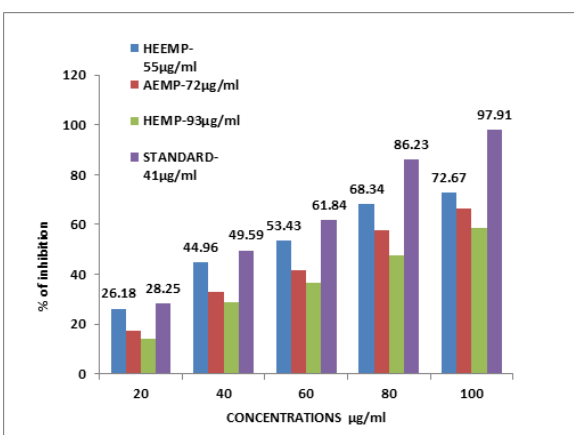

Fig.3.α-glucosidase activity of M.pudica flowers

Alpha-amylase catalyses the hydrolysis of alpha-1, 4-glycosidic linkages of starch, glycogen and various oligosaccharides. Alpha-glucosidase is a glucosidase located in the brush border of the small intestine that acts upon 1, 4-alpha bonds. This is in contrast to beta-glucosidase. Alpha-glucosidase breaks down starch and disaccharides to glucose. Alpha-glucosidase inhibitors are work by preventing the digestion of carbohydrates (such as starch and table sugar) by inhibition of enzyme alpha glucosidase. Carbohydrates are normally converted into simple sugars (monosaccharides), which can be absorbed through the intestine. Hence, alpha-glucosidase inhibitors reduce the impact of carbohydrates on blood sugar Alpha-glucosidase further breaks down the disaccharides to simple sugars, readily available for intestinal absorption. The inhibition of their activity in the digestive tract of humans is considered to be effective tool to control diabetes. The Hydroethanol extracts of M.pudica flower have exhibited potent inhibition of alpha-amylase and alpha-glucosidase enzyme activity. In addition, HEEBA was able to inhibit both the enzymes at lower concentration. glucosidase inhibitory activity. Further studies are required to elucidate whether M.Pudica have antidiabetic potential by in vivo for validating the traditional claim of the plant.

CONCLUSION:

In this present study we evaluated in vitro alpha amylase and alpha glucosidase activity of crude hydroethanol, acetone and hexane extract of M.Pudica flowers. The plant showed significant inhibition activity, so further the compound isolation, purification and characterization which is responsible for inhibiting activity, has to be done for the usage of antidiabetic agent.

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