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IN VITRO ANTI-DIABETIC ACTIVITY OF ACACIA CATECHU BARK EXTRACT

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Abstract:

Acacia catechu bark are rich source of catechin and epicatechin (gallic acid derivatives), with smaller amounts of flavonoids and are used as anodyne, bactericide, refrigerant, detergent, astringent, styptic, masticatory, expectorant, stimulant, antiphlogistic and as an anti-diabetic agent which helps in lowering of blood sugar levels in patients with diabetes mellitus. Diabetes mellitus is a disease currently affecting millions of people worldwide. As such, a remedy obtained from koyer, which even if it cannot cure the disease at least is effective in normalising the high blood sugar levels as seen in diabetic patients, can be a boon to human beings. The aim of the study is to assess the anti-diabetic activity of *Acacia Catechu* bark extract.

Keywords: *Acacia Catechu*, Diabetes mellitus, Anti-diabetic.

Introduction: *Acacia catechu* Willd. (*Mimosaceae*), also known as Khair, is a medium sized deciduous tree with crooked and forked trunk. It is found growing in both natural and plantation forms in most of the parts of country.(1) The main areas for its habitat in the country are the eastern slopes of the Western Ghats and the Himalayan tracts chiefly in Punjab, Garhwal and Kumaon, Bihar and Orissa. The leaves, bark, heartwood of this tree has many nutritional and medicinal uses.(2) The heartwood extract of *A. catechu*, called pale catechu or “Katha” in Hindi.(3) The heart wood contains gummy extract called katha or cutch. The chief constituents of the heartwood are catechin and catechutannic acid. The wood contains epicatechin, Atzelchin, catechin tetramer, dicatechin, gallochin, gossypetin, phlobatannin, kaempferol, quercitrin, quercitin. Catechin is biologically highly active. The extract of *Acacia catechu* extract have been reported to have various pharmacological effects like antibacterial(4), anti-oxidant,(5) immuno modulatory,(6) anti pyretic,(7) anti-diarrhoeal, hepatoprotective activity.(8) Diabetes mellitus is a disease currently affecting millions of people worldwide can quickly progress to cardiovascular disorders, diabetic retinopathy, and diabetic nephropathy. Various part of the plant leaves, bark, heartwood possess diverse

pharmacological actions for management of various disorders.(9) α -Amylase is a protein enzyme that hydrolyses alpha bonds of large, alpha-linked polysaccharides, such as starch and glycogen, yielding glucose and maltose. It is the major form of amylase found in humans and other mammals. It is also present in seeds containing starch as a food reserve, (10) and is secreted by many fungi which is responsible for starch digestion thereby, reducing the blood glucose level.

Materials and Methods:

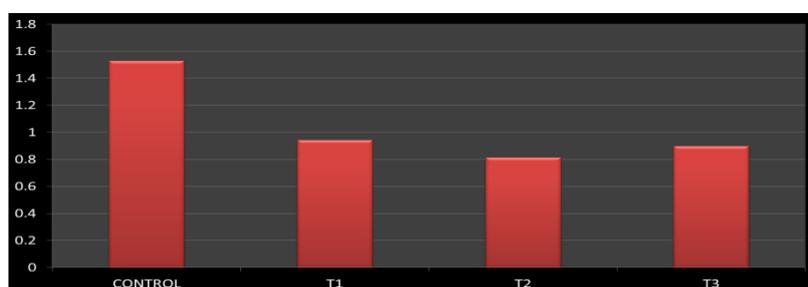
Plant material: The *Acacia Catechu* bark extractis obtained from GreenChemHerbal extract and formulations, Bengaluru.

In vitro alpha amylase method: 100 μ l, of the bark extract was allowed to react with 200 μ l of α amylase enzyme and 100 μ l of 2mM of Phosphate buffer (pH 6-9). After 20 minute incubation, 100 μ l of 1% starch solution was added. The same was performed for the controls where 200 μ l of enzyme was replaced by buffer, after incubation for 5 minutes, 500 μ l of dinitro salicylic acid reagent was added to both control and test. They were kept in boiling water bath for 5 minutes. The absorbance was recorded at 540 nm using spectrophotometer and the percentage inhibition of α amylase was calculated using the formula: (11)

$$\% \text{ inhibition} = 100 \times \frac{\text{Control} - \text{test}}{\text{Control}}$$

Results: The preliminary phytochemical screening of *Acacia catechu* showed the presence of catechin, epicatechin, epigallocatechin, phloroglucin, protocatechuic acid, quercetin, poriferasterol glycosides, and many other flavonoids. The bark extract of *Acacia Catechu* assayed for in vitro alpha amylase activity. Four different concentration were tested, the extract showed good inhibitory effect at all the tested concentrations (0.94, 0.933, and 0.81 mg/ml) . A higher concentration of 1.53mg/ml which was taken as control the maximum inhibitory effect of extract was showed significant alpha amylase inhibitory activity with the % of inhibition of 93.38% (Figure 1). The experiment was repeated for three times and results expressed as mean value of inhibition activity percentage.

Figure 1



Discussion:

Many herbal extracts have been reported to have antidiabetic activities and are used in Ayurveda for the treatment of diabetes. In this study, an in vitro inhibitory effect of different extracts of *Acacia Catechu* bark on porcine pancreatic amylase activities was evaluated.(13)The alpha-amylases inhibitors are the calcium metalloenzymes which can't function in the absence of calcium. There are many digestive enzymes in humans and among them the most important one is pancreatic alpha-amylase, that act as a catalysis in the reaction which involves the hydrolysis of the alpha-1,4 glycosidic linkages of the starch, amylopectin, amylose, glycogen, and numerous maltodextrins and is responsible for starch digestion thereby, reducing the blood glucose level (14). Hence, the *Acacia Catechu* (16) bark extracts with alpha- amylase inhibitory activity decreases postprandial blood glucose levels. In the present study conducted,it was observed that there is a dose dependent increase in inhibition of alpha amylase enzyme with increase in the concentration comparatively with the standard.

Hence, *Acacia catechu* bark is proved to be an promising candidate for the management of type-2 diabetes mellitus. The use of these bark extracts will be greatly beneficial to reduce the rate of digestion and absorption of carbohydrates and thereby contribute for effective management of diabetes by decreasing the post-prandial hyperglycemia hence, in the treatment of diabetes mellitus.(15)

Conclusion:

Acacia catechu bark is proved to be a promising candidate for the management of type-2 diabetes mellitus by decreasing postprandial blood glucose levels. Further, in-vitro studies is needed to prove its efficacy.

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