

B.P.H.E Society's
Ahmednagar College, Ahmednagar
Executive Summary of the project

Title : **“Functional Characterization of Amylase Inhibitors from Tamarindus indica (L.) Seed Coat Pertaining to Diabetes related Carbohydrate Metabolizing Enzymes”**

Name of Principal Investigator : Dr. S. R. Bale

Nature of project : Major

Duration of the project : Three years (2015-18)

Funding agency : The University Grant Commission, New Delhi

Diabetes is one of the most rapidly and exponentially increasing life-style disorders with detrimental consequences. Though there is no fool proof medication yet available for the treatment of the diabetes on the medical scenario, its management through proper medication and other life style related aspects is possible. Management of postprandial hyperglycemia through inhibition of carbohydrate metabolizing enzymes presents one of the safe and non-harmful strategies. Large number of plant based formulations has been experimented for their application based on such strategies.

The studies were carried out to evaluate the potential of Tamarindus indica (L.) seed coat as an anti-diabetogenic agent and management of postprandial hyperglycemia through the ability of its content to inhibit the carbohydrate metabolizing enzymes. The active agents from the dried seed coat were extracted in different solvents and tested for their inhibition of the alpha amylases; both salivary and porcine pancreatic amylase. The degree of inhibition was evaluated qualitatively as well as quantitatively. Both, qualitative as well as quantitative studies showed that, the all three extracts tested viz; aqueous, metabolic and DMSO showed substantial inhibition of human salivary alpha amylase and porcine pancreatic amylase relative to the acarbose, a standard drug

available on the market for the management of the type-II diabetes based on the glucosidase inhibition strategy. Kinetic parameters of both acarbose and the tested extracts of Tamarindus seed coat extracts yielded similar results indicating the efficacy of the active principles of later as an anti-hyperglycemic agent.

The studies related to the hematological parameters pertaining to the diabetes were carried out in-vitro using the streptozotocin induced diabetic mice model. The results obtained on the parameters like blood glucose, alanine aminotransferase (ALT), total proteins and total cholesterol over the period of 4 weeks showed positive results and comparable to those observed with acarbose treatment. The decrease in the substantial blood sugar and cholesterol level in the mice treated with Tamarindus seed coat extract were notable and encouraging. Statistical analyses showed that the treatment with Tamarindus seed coat extract had significant effect on the decrease in the blood glucose level in the diabetic mice over the period of time.

The in-vitro toxicity studies were carried out using streptozotocin induced diabetic mice to assess the effect of Tamarindus seed coat extract on the vital organs like liver, pancreas and kidney. The results of histological parameters clearly showed that, the content of Tamarindus seed coat extract did not showed any significant change on the anatomy of these organs indicating that extracts are safe and non-toxic.

In conclusion, the studies carried out in the present research work showed that, the pharmacologically active principles of the Tamarindus seed coat efficiently inhibit the carbohydrate metabolizing enzymes and also positively manage the other hematological parameters as far as type II diabetes is considered. The contents are also safe and have no negative side-effect on the anatomy of the organs of experimental mice. This led us to conclude that, the Tamarindus seed coat has pharmacological potential as an anti-diabetogenic agent for management of postprandial hyperglycemia.

The Tamarindus seed coat extract presents the tremendous potential as lead compound for further drug research. As it is one of the most easily available materials as the byproduct of agro industry, it could be harnessed to convert the non-useful material to a product of high economic value. The further research in the field is warranted towards

purification of the individual compound responsible for inhibition of the alpha amylases and positive effect on the hematological parameters like blood cholesterol. Further, the simple aqueous or methanolic extracts of the Tamarindus seed coat could be formulated along with other ayurvedic and traditionally available formulations to increase their efficiency as an anti-diabetic agent. The research into the standardization of the components of active pharmacological components of the Tamarindus seed coat extracts, preparation of new and unique anti-hyperglycemic formulations and testing their efficacy, identification of lead compounds, optimization of the extraction processes and advanced studies towards the commercialization are needed to be carried out in the future to explore the huge potential of Tamarindus seed coat.