Executive Summary

Title of the project:

Screening of micro-organisms for acarbose like novel alpha-amylase inhibitors and their characterization

Project: Minor research project, funded by UGC, New Delhi (**47-1213/14 General/27/WRO XII Plan** dated **16th March 2017)**

Principal Investigator:

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Summary of the work done:

Diabetes is a group of metabolic diseases that results in hyperglycemia due to the inefficiency in the operation and function of the insulin system. Use of alpha glucosidase inhibitors is a unique approach to achieve a good metabolic control over diabetes. Due to their unique mode of action, it has been used for management as well a treatment purpose of diabetes. Over last 20 years, acarbose has been effectively used for the treatment of diabetes. Voglibose and miglitol have added recently in treatment line. Though acarbose appears to be safe, continual use in patients is associated with several adverse reactions such as gastrointestinal disturbances, flatulence and constipation. Due to its efficacy and safety, more drugs with similar mode of action and properties need to be discovered. Therefore, the search for more safer, specific and effective hypoglycemic agents has continued to be an important area of investigation. In the present studies, the fungus identified as *Ceratocystis spp* was isolated that was

capable of producing high levels of the alpha-amylase inhibitory (α-AI) molecule in the fermentation medium. Time course of the fermentation studies showed that production of α-AI molecule peaks on the 7^{th} day of the incubation (95 % inhibition of human salivary α –amylase). The α-AI molecule was quite thermostable showing the activity ranging from 20 to $50^{o}C$ while pH stability was optimum at neutral (pH = 7). The inhibitory concentration (IC_{50}) against human salivary α-amylase, porcine pancreatic amylase and yeast glucosidase were determined to be 77.3 µg/ml, 63.79 µg/ml and 93.37 µg/ml respectively. The media optimization studied revealed that, maltose is most critical carbon source while ammonium nitrate is the most critical nitrogen source that affects the level of α-AI in the fermentation process. The further research for molecular identification of the fungus, identification of the α-AI is warranted so that it could prove to be a molecule of pharmaceutical significance. The further studies related to optimization of the fermentation studies through response surface methodology and large scale batches could be undertaken to enhance the production of α-AI. The animal trials are also necessary to establish the anti-diabetic potential of α-AI and its role in management of hyperglycemia through inhibition of carbohydrate metabolizing enzymes.