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Anti-diabetic and organ protective potential of hydroalcoholic extracts of Australian lupin cultivars of unprocessed and processed seed flours: *In vitro*, *in vivo* and *in silico* approaches

Australia is the largest producer of lupin especially sweet lupin (*Lupinus angustifolius*) in the world, typically producing 0.75 million tons per year. Due to its unique nutritional value and chemical composition, Australian sweet white lupin is attracting worldwide attention as a new and healthy super food. The general aim of this research is to estimate the anti-diabetic potential of the Australian lupin cultivars for processed and unprocessed flours through *in vitro*, *in vivo* and *in silico* bioassays with aims to determine *in vitro* enzyme inhibitions (alpha amylase and alpha glucosidase), evaluate *in vivo* hypoglycemic and organ protective activities through biochemical and histopathological studies, *in silico* evaluation of mechanism of action of the selected metabolites of different cultivars isolated by LC-QTOF-MS/MS by exploring the α -amylase, α -glucosidase and DDP-4 inhibition activities through molecular docking analysis and ADME/T property studies also performed to measure the safety of the selected compound as drug of both processed and unprocessed lupin seed flour extracts of 9 cultivars. From *in vitro*, *in vivo* and *in silico* bioassay studies it was observed that all cultivars of *L. angustifolius* are found to be more potent against diabetes than *L. albus* cultivars. All the cultivars of *L. angustifolius* showed promising inhibition of alpha amylase and alpha glucosidase. Among them, extract of Jenabillup cultivar found to be most potent against both the enzymes. Jenabillup extract also increase the glucose uptake into the skeletal muscle and played role against diabetes. From *in vivo* study it was observed that both unprocessed and processed (cooked) extracts of Jenabillup at a dose of 500 mg/kg played effective role to control blood glucose level in alloxan induced diabetes rats. Both the extracts of Jenabillup also significantly protect alloxan induced organ damage. *In silico* ADME and molecular docking studies of the some of the isolated metabolites also correlate with the *in vitro* and *in vivo* results. The studies discussed above indicate that the impact of lupin on carbohydrate or glucose metabolism is extensive. Lupin is not only super food but also has huge therapeutic potential like anti-diabetic and organo-protective effects.

Biography

Kishor Mazumder has completed his PhD from Osaka University, Japan and Postdoctoral studies from Charles Sturt University School of Biomedical Sciences, Australia. He is the Chairman and Associate Professor, Advisor Research Cell of Jessore University of Science and Technology, Jessore, Bangladesh. He is also an Adjunct Senior Lecturer, School of Biomedical Sciences, CSU, NSW, Australia. He has published more than 35 papers in reputed journals and has been serving as reviewer of many reputed journals. His research interest is in on anti-diabetic and anticancer drug development and discovery from natural sources.

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