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Biochemical approaches to evaluate the biological activity of legume seeds and other foods

Yadahally Nareppa Sreerama

UNU-Kirin Fellow from India

Nutritional Function Laboratory

National Food Research Institute, NARO

Legumes and nuts, besides their nutritional importance possess many bioactive phytochemicals, which may exert different health-promoting effects in reducing the risk of various oxidative stress-induced diseases. Alpha-glucosidase and pancreatic lipase are key enzymes involved in intestinal glucose and triglyceride absorption, respectively. Inhibition of these enzymes could be a key strategy in the control of hyperglycemia (diabetes) and heperlipidemia (obesity). Phenolic extracts of various legumes and nuts were evaluated for their antioxidant properties and inhibitory activities against α -glucosidase and pancreatic lipase. Mung bean seed coat which contains highest concentrations of phenolic compounds was found to be the most active scavenger of free radicals and also possess highest inhibition against α -glucosidase and lipase activities. Significant contribution from adzuki bean varieties and walnut were also noted in antioxidant capacities and enzyme inhibitory activities. HPLC analysis and identification of the active compounds indicated that C-glycosyl flavonoids, vitexin and isovitexin were the main contributors to the inhibitory activities of mung bean seed coat. However, vitexin, isovitexin and anthocyanins largely contributed to the bioactive functional properties of adzuki bean varieties. In addition, ellagic acid, gallic acid and flavan-3-ols, which are predominant in walnut showed higher inhibitory activities. Furthermore, results also demonstrated that the presence of glucose residue at 6 or 8 position of flavonoid A ring is more favorable for α -glucosidase inhibition and the hydroxyl substitution on B ring of anthocyanidins enhanced the inhibitory activity. In addition, the presence of galloyl moieties within the structure of flavan-3-ols was more responsible for α -glucosidase and lipase inhibitory activities. The results generated from this study may help to exploit the use of legumes and nuts as functional food ingredients for promoting health.