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Digestive enzyme inhibitory activities and anti-glycation properties of *Myristica fragrans* (nutmeg) seed extracts

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Diabetes mellitus is a metabolic disorder characterized by hyperglycaemia. Management of type 2 diabetes mellitus is by controlling hyperglycaemia and its complications. The objective of this study was to investigate the α-glucosidase inhibitory activity, α- amylase inhibitory activity and anti-glycation properties of *Myristica fragrans* (nutmeg) seed extracts.

Dried and powdered seeds of *Myristica fragrans* were extracted sequentially with hexane, ethyl acetate and methanol using the ultra sonicator. Different concentrations of the extracts were subjected to the non-pre-incubation and pre-incubation amylase inhibition assay using starch as the substrate, 3,5-dinitrosalysilic acid as the chromogen and porcine pancreatic α-amylase as the enzyme[1]. The extracts were also subjected to a non-pre-incubation glucosidase inhibition assay using 4-Nitrophenyl α-D-glucopyranoside as the substrate and α-glucosidase enzyme from *Saccharomyces cerevisiae*[2]. The effect of the extracts on inhibition of protein glycation was observed with native polyacrylamide gel electrophoresis (PAGE) using bovine serum albumin as the protein and fructose as the sugar[3]. Extracts were further assessed for their glycation induced protein cross-linking inhibitory potential using sodium dodecyl sulphate polyacrylamide gel electrophoresis (SDS–PAGE) and lysozyme as the protein and fructose as the sugar[4].

All the three extracts showed amylase and glucosidase inhibition and the methanol extract exhibited the highest inhibition for both amylase and glucosidase assays. The values exhibited by methanol, ethyl acetate and hexane extracts for the amylase inhibition using non-pre-incubation method were 53.96 ± 3.42 %, 7.30 ± 3.92 %, 13.56 ± 3.43 % and using pre-incubation method were 73.27 ± 2.40 %, 8.94 ± 3.20 %, 5.05 ± 2.89 % respectively. The methanol extract showed an IC_{50} value of 1.03 mg/ml for the non-pre-incubation method compared to that of acarbose which was 0.004 mg/ml. The IC_{50} value of methanol extract obtained using the pre-incubation method was 0.153 mg/ml while acarbose exhibited a value of 0.004 mg/ml. The glucosidase inhibitory activities given by the methanol, ethyl acetate and hexane extracts were 90.93 ± 1.68 %, 74.35 ± 3.53 %, 43.35 ± 3.97 % respectively. The methanol extract showed a much lower IC_{50} value of 8.46 µg/ml as compared to that of acarbose which was found to be 178 µg/ml. Among the three extracts a strong glycation inhibitory potential was observed with the methanol extract and a moderate inhibition was shown by the ethyl acetate extract while the hexane extract did not show any significant inhibition on glycation of proteins. In the assessment of glycation induced protein cross-linking inhibitory potential the methanol extract exhibited a clear inhibition which was comparable with the inhibition of the positive control aminoguanidine. Ethyl acetate and the hexane extract did not show any significant inhibition.

Methanol extract of *Myristica fragrans* seeds could be a source of potent amylase and glucosidase inhibitors. As well as it could be a good source for inhibitors of protein glycation and glycation induced cross-linking of proteins. Further, the ethyl acetate extract could be a source of glucosidase and protein glycation inhibitors.

References

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