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MULTI-TARGET INHIBITORY ACTIVITY OF *SALICORNIA BRACHIATA* AND *SUAEDA MARITIMA* SEED ON α-AMYLASE, TYROSINASE AND LIPASE

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Diabetes mellitus is a complex metabolic disorder that involves enzymes like α-amylase, tyrosinase, and lipase. Since currently used antidiabetic drugs have undesirable contraindications, plant metabolites, particularly seed-based metabolites, has gained special attention in scientific research as a promising source of enzyme inhibitors. With previous reports of promising activities of *Salicornia brachiata* and *Suaeda maritima*, this study aimed to explore the enzyme inhibition potential of extracts derived from the seeds of these two halophytic plant species. The seeds were sequentially extracted using hexane, dichloromethane (DCM), and methanol by cold maceration and tested for *in-vitro* inhibitory activity against α-amylase, tyrosinase, and lipase. The extracts of *S. brachiata* and *S. maritima* seeds effectively inhibited α-amylase activity by 52-83% and 18-73%, respectively, at 0.2 mg mL^{-1}. The hexane fraction of *S. brachiata* showed 83.50 ± 1.09% (at 0.2 mg mL^{-1}) inhibition activity that was not significantly different from the inhibition activity of acarbose, the positive control (at 0.2 mg mL^{-1}, 84.23 ± 0.88%; p=0.05). It is reported that inhibiting this enzyme slows carbohydrate digestion, lowering postprandial glucose levels. DCM fraction of *S. brachiata* and *S. maritima* seeds showed tyrosinase inhibitory activity of 57.90 ± 0.84% and 17.80 ± 0.94%, respectively, at 0.2 mg mL^{-1}, whereas Kojic acid, the positive control had an inhibitory activity of 86.00 ± 0.43% (at 0.2 mg mL^{-1}). Since tyrosinase inhibitors are directly involved with melanin biosynthesis, the findings are useful in managing hyperpigmentation caused by oxidative stress in diabetic patients. Moderate inhibition of lipase was observed in the hexane and methanol extracts of *S. brachiata* seeds (33-38%, at 0.4 mg mL^{-1}), while the DCM fraction showed activity of 54.39 ± 3.40% at 0.4 mg mL^{-1}, comparable to orlistat (60.83 ± 0.22%, at 0.4 mg mL^{-1}), the positive control. The three extracts from *S. maritima* seeds exhibited 36-43% (at 0.4 mg mL^{-1}) inhibition towards lipase, which is important for managing fasting glucose and insulin levels and reducing the risk of obesity-related type 2 diabetes. The obtained results prompt a preliminary conclusion towards the potential use of *S. brachiata* and *S. maritima* seeds as multi-target enzyme inhibitors for the modulation of metabolic diseases such as diabetes and associated complications.

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