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Biomembrane stabilization and kinetics of modulatory role of *Cyperus esculentus* L. on the specific activity of key carbohydrate metabolizing enzymes

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Statement of the Problem: The prevalence of diabetes is increasing annually, affecting more than 150 million (about 4.6%) people globally and the projection is pegged at well above 300 million before 2025. With this projection, someone dies from its complications every 10 sec and 1 in every 5 individuals may be diabetic by 2025. The continuous search for new lead compounds as viable inhibitors of specific enzymes linked to carbohydrate metabolism has intensified. *Cyperus esculentus* L. is one of the therapeutically implicated botanicals against several degenerative diseases including diabetes mellitus. This study evaluated the membrane stabilization and mechanisms of inhibitory potential of aqueous extract of *C. esculentus* on α -amylase and α -glucosidase *in vitro*.

Methodology & Theoretical Orientation: The extract was evaluated for its membrane stabilization effect against bovine serum erythrocytes. The α -amylase inhibitory potential of the extract was investigated by reacting its varying concentrations with the enzyme and starch solution, while the α -glucosidase inhibition was determined by pre-incubating α -glucosidase with different concentrations of the extract followed by addition of *p*-nitrophenylglucopyranoside. Lineweaver-Burke plot was used to predict the manner in which the enzymes were inhibited.

Findings: The data obtained revealed that the extract moderately and potently inhibited the specific activities of α -amylase and α -glucosidase, respectively. The inhibition was concentration-related with respective IC_{50} values of 5.19 and 0.78 mg/mL relative to that of the control (3.72 and 3.55 mg/mL). The extract also significantly stabilized erythrocyte membrane, scavenged free radicals and the effects elicited could be ascribed to its phytoconstituents.

Conclusion & Significance: The respective competitive and uncompetitive mode of action of the extract is due to its inhibitory potentials on the activities of α -amylase and α -glucosidase which is crucial to modulating glucose metabolism. Going forward, in addition to completely characterize the exact compounds responsible for the elicited activity in this study, pertinent attention will be given to the *in vivo* evaluation of the identified constituents

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