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Exploring antioxidant and antidiabetic potential of *Muntingia calabura* (Kerukupsiam) leaf extract: *In vitro* analysis and molecular docking study

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Abstract Antioxidant activity and antihyperglycemic constituents and of traditional medicinal plants are currently the preferred therapeutic means of treatment and management of diabetes because of the undesired adverse effect of synthetic drugs. *Muntingia calabura* (Kerukupsiam) leaves and other parts are considered as alternative natural sources of treatment for diabetes. Ultrasonic assisted extraction is a novel approach for extraction of phytoconstituents which gives high

extraction yield of bioactive compounds. However, there has been no published information presently on the use of ethanol ultrasonic assisted extraction method for assessment of antioxidant and antidiabetic activities of *M. calabura* leaves. Hence, the current study aims to evaluate the in vitro antioxidant and antidiabetic activities of *M. calabura* leaf extract. IC50 analysis was done to determine the inhibitory concentration and the results obtained from 2,2-Diphenyl-1-picrylhydrazyl (DPPH) radical scavenging assay showed IC50 of gallic acid to be 1.0 $\mu\text{g/ml}$, which is lower than *M. calabura* leaves extract at 2.54 $\mu\text{g/ml}$, indicating that only small concentration of gallic acid was required to inhibit the free radicals at 50 %. However, IC50 analysis for amylase inhibition showed that *M. calabura* extract had 44.39 $\mu\text{g/ml}$ antidiabetic activity compared to acarbose with 57.1 $\mu\text{g/ml}$ activity. This indicates that *M. calabura* leaves extract has a better inhibition on amylase activity compared to the acarbose which is a synthetic drug. Further still, in silico study was carried out and the molecular docking result of eight ligands against amylase indicates quercetin had the least binding free energy of -9.1 kcal/mol, indicating the strongest interaction. Using Lineweaver-Burk plot, the results showed a competitive inhibition, hence, it was justified that *M. calabura* has the potential to manage diabetes and other diseases related to free radicals.

Keywords

Author Keywords: Diabetes; Medicinal Plant; Amylase Inhibitor; Lineweaver-Burk; In silico

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