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Hypoglycemic effect and antioxidant effect of pressured water extracts of *Alpinia calcarata* (heen araththa)

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Diabetes mellitus is a chronic metabolic condition that accounts for 1.5 million deaths annually worldwide. Since oral hypoglycemic medicines have adverse effects, there is a growing interest in employing herbal remedies for diabetes mellitus. *Alpinia calcarata*, a medicinally important plant from the Zingiberaceae family that grows in tropical climates like Sri Lanka and India, has a range of therapeutic uses. The rhizome of the plant has been used as a traditional systemic medicine in Sri Lanka for respiratory tract conditions, including asthma, cough, and bronchitis, as well as for inflammatory conditions like arthritis and metabolic disorder like diabetes mellitus. Since antioxidant activity inhibits hypoglycemic related complications, if *A. calcarata* rhizomes contain phytochemicals with antioxidant activities, it would be beneficial for diabetic patients. Therefore, the objective of this study was to investigate the hypoglycemic activity and antioxidant activity of low pressurised water extract (LPWE) and medium pressurised water extract (MPWE) of dried *A. calcarata* rhizomes. Phytochemicals in the ground rhizome of *A. calcarata* were extracted into the water by low pressurised water extraction method (0.098 MPa, 200 mL for 10 minutes) and medium pressurised water extraction method (0.103 MPa, 121°C, 100 mL for 20 minutes). The hypoglycemic effect was determined by performing the α -amylase inhibitory assay and glucose uptake by Yeast cells assay for three glucose concentrations (5 mM, 10 mM, and 25 mM). According to the results of α -amylase inhibitory assay, the IC₅₀ values of LPWE and MPWE were 166.8 ± 0.1 µg/mL and 152.1 ± 0.1 µg/mL, respectively. The glucose uptake by Yeast cell assay has revealed that the rate of glucose uptake by the plasma membrane of the yeast cell in all three glucose concentrations (5 mM, 10 mM, and 25 mM), was linear and the percent increase in the glucose uptake by the yeast cells was found to be inversely proportional to the glucose concentration. The antioxidant ability was assessed by performing the Ferric reducing antioxidant power (FRAP) assay, and by comparing the absorbance changes at 593 nm in both pressured water extracts with a standard series of ferrous ions (100-1000 µM). The FRAP value of MPWE exhibited a higher FRAP value than that of LPWE and both LPWE and MPWE were proportionate to their concentrations. Altogether, the results revealed that the LPWE and MPWE of dried *A. calcarata* rhizomes may have both hypoglycemic and antioxidant activities. Additionally, the current study suggests that preparing MPWE is a more effective way than preparing LPWE for obtaining more hypoglycemic phytochemicals from the dried rhizome of *A. calcarata*.

Keywords: *Alpinia calcarata*, Antioxidant, Diabetes mellitus, Hypoglycemic, Rhizome

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