

Anti-Diabetic and Anti-Obesity Properties of Locally Available Four Duckweed Varieties in Sri Lanka

H.R.P. Prasadini^{1,2}, W.A.S.H. Senavirathne³, T. Madhujith⁴, B.C. Jayawardena⁵, S. Wijesundara¹, R. Liyanage^{1*}

¹*National Institute of Fundamental Studies, Kandy*

²*Postgraduate Institute of Science, University of Peradeniya*

³*Department of Food Science and Technology, Faculty of Applied Sciences, Sabaragamuwa University of Sri Lanka*

⁴*Department of Food Science and Technology, Faculty of Agriculture, University of Peradeniya*

⁵*Department of Animal Science, Faculty of Agriculture, University of Peradeniya*
**ruvini.li@nifs.ac.lk*

The WHO emphasizes addressing diabetes and obesity for global health equity, highlighting plant-based traditional medicine as a low-risk, effective alternative to modern pharmaceuticals. This study aimed to evaluate the α -amylase and lipase inhibition activity (IC₅₀) of four duckweed varieties; *Spirodella polyrriza* (SP), *Lemna cf. minor* (LM), *Lemna perpusilla* (LP), and *Landoltia punctata* (LaP) extracted from Water, 70% EtOH and 60% EtOH. The assessment evaluated their potential effectiveness in combating diabetes and obesity by targeting α -amylase, lipase enzymes respectively. Acarbose (anti-diabetic) and Orlistat (anti-obesity) drugs were utilized as standards. The SPSS MANOVA analysis showed significant differences (P<0.05) in the inhibition of α -amylase and lipase enzymes among solvent extractions and duckweed varieties. 70% EtOH extract showed the highest (P<0.05) α -amylase inhibition activity for both SP (0.14 ± 0.00 µg/mL) and LaP (0.14 ± 0.00 µg/mL). Water extract exhibited the greatest inhibition (P<0.05) for both LM (0.19 ± 0.00 µg/mL) and LP (0.54 ± 0.05 µg/mL). The study shows that four duckweed varieties demonstrated stronger α -amylase inhibitory activity (P<0.05) compared to the Acarbose (12.16 ± 0.10 µg/mL). The 60% EtOH extract of SP showed the highest inhibition of lipase activity (P<0.05), with an (IC₅₀ = 1.39 ± 0.02 µg/mL). The 70% EtOH extracts of LM, LP and LaP also exhibited significant inhibition of lipase activity, with IC₅₀ value of 1.75 ± 0.01 µg/mL, 2.86 ± 0.02 µg/mL, and 2.62 ± 0.12 µg/mL, respectively. The inhibitory effect of the 60% EtOH extract of SP on lipase activity is comparable efficacy to Orlistat, with (IC₅₀ = 1.33 ± 0.44 µg/mL). The results reveal that all examined duckweed varieties exhibit potential for diabetes management, and the 60% ethanol extract of SP has shown promise for obesity management, indicating their possible therapeutic applications. Exploring duckweed's bioactive compounds offers a promising approach to tackling global health issues related to diabetes and obesity.

Keywords: Anti-diabetic, Anti-obesity, Duckweeds, Traditional medicine, α -amylase Inhibition, Pancreatic Lipase Inhibition