

Assessing the antioxidative potential of lactic acid bacteria inhabiting tender coconut water

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Abstract

Probiotics are renowned for their beneficial impact on human health, including their antioxidative properties. Lactic acid bacteria (LAB), which constitute a major group within probiotics, have been recognized for their ability to act as potent antioxidants, providing relief from oxidative stress in the host. This study aims to evaluate the antioxidative activity of probiotic LAB inhabiting the tender coconut water samples collected from different regions of Sri Lanka. In a previous study, analysis of the collected tender coconut samples resulted in the identification of four potential probiotic strains at the species level: *Lactiplantibacillus plantarum* CWJ3, *Lacticaseibacillus rhamnosus* CWKu12, *Lacticaseibacillus paracasei* CWKu14, and *Lacticaseibacillus casei* CWM15. The antioxidative activities of these strains were evaluated using four different chemical antioxidant assays: the 2,2-diphenyl-1-picrylhydrazyl (DPPH) assay at 517 nm, the 2,2'-azino-bis(3-ethylbenzothiazoline-6-sulfonic acid) (ABTS) assay at 734 nm, the ferric reducing antioxidant power (FRAP) assay at 593 nm, and the total phenolic content (TPC) assay at 765 nm through spectrophotometric method. Three different concentrations of each bacterial strain (10^7 , 10^8 , and 10^9 CFU mL⁻¹) were prepared using overnight grown cultures in deMan, Rogosa, and Sharpe broth at 37 °C, included in the study. The results indicate a significant increase ($p < 0.05$) in antioxidative activity for all four strains across all analyzed methods with an increase in cell concentration. *Lactiplantibacillus plantarum* CWJ3 exhibited the highest antioxidative potential at 10^9 CFU mL⁻¹, with $88.85 \pm 0.84\%$ radical scavenging activity in the DPPH assay, $84.0 \pm 0.14\%$ radical scavenging activity in the ABTS assay, 0.029 ± 0.004 mg mL⁻¹ ascorbic acid equivalent in the FRAP assay, and 0.0052 ± 0.0006 mg mL⁻¹ gallic acid equivalent in the TPC assay. Conversely, *Lacticaseibacillus paracasei* CWKu14 demonstrated the lowest values for all antioxidative activities. Continued research on the antioxidative properties of probiotic LAB derived from tender coconut water holds promising prospects for the development of functional beverages.

Keywords: Antioxidative activity, Lactic acid bacteria, Probiotics, Tender coconut water.

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