

Addressing Sri Lanka's Noncommunicable Disease Burden Through a Novel *Hibiscus sabdariffa* L. Functional Beverage: Development, Evidence-Based Formulation and Consumer Acceptability

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Sri Lanka faces a high prevalence of noncommunicable diseases, necessitating effective dietary interventions. *Hibiscus sabdariffa* L. (Roselle) has clinically proven effects on blood pressure, lipid profiles, and blood glucose levels, yet remains underutilized in Sri Lankan markets despite growing well under local conditions. This study aimed to develop a commercially viable, functional Ready to Serve (RTS) Roselle beverage that harnesses its health benefits while promoting local production and consumption, using amounts previously validated to produce beneficial physiological effects in humans. Dried Roselle calyces were extracted in water at 90°C for 10 minutes followed by heat treatment at 85°C for 30 minutes. The RTS beverage was formulated comparing varying amounts of dried Roselle calyces with two different sweetener levels (5% W/V and 8% W/V of sucralose) and evaluated against two locally available food flavors (Strawberry and Guava). Sensory evaluation was conducted using a consumer panel of 40 members in controlled sensory laboratory facilities to prevent bias, with formulation acceptability assessed via paired preference and ranking tests using identical servings. Physicochemical analyses measured total soluble solids, pH, and titratable acidity. Statistical analysis was performed using Minitab statistical software. A shelf-life study was conducted under ambient temperature conditions for 28 days without the addition of artificial preservatives. The most acceptable formulation consisted of 150 g/10 l of dried Roselle calyx, 8% W/V of sucralose, and strawberry flavor. Further, it had significantly higher ($p < 0.05$) consumer preference for sensory attributes. Physicochemical analyses reported values of 1.2°B for total soluble solids, 2.391 ± 0.01 for pH, and 2.27% for titratable acidity. The beverage remained shelf-stable for 28 days under ambient temperature conditions without preservatives, demonstrating both stability and palatability throughout the shelf-life period while maintaining the bioactive compounds associated with Roselle's health benefits. This research represents the first development of a scientifically validated, value-added Roselle product in Sri Lanka.

Keywords: RTS beverage, dried roselle calyx, physicochemical properties, functional beverage, noncommunicable diseases