

Formulation of Nanosuspensions of *Psidium guajava* Fruit Extract and Evaluation of the Antioxidant Activity

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Abstract

Psidium guajava (Guava:G) is an antioxidant rich, one of common fruits growing in Sri Lanka. However due to certain properties of phytochemicals, the in-vivo activity of natural antioxidants is less than expected. Therefore, the present study was aimed to initiate the development of novel nanoformulations of unripe guava fruit extract with the purpose of enhancing the antioxidant capacity. Nanosuspensions (NS) of the fruit extract were synthesized by nanoprecipitation method using two polymers, polyvinylpyrrolidone (PVP) and sodium alginate (SA) as stabilizers to increase the water solubility of phytochemicals. Then the antioxidant capacity of the crude extract and the nanosuspensions were assessed by DPPH scavenging assay, Ferric Reducing Antioxidants Potential determination (FRAP) and Nitric Oxide (NO) scavenging assays. The morphology and particle size of nanoparticles in guava PVP nanosuspension (G-PVP-NS) and guava SA nanosuspension (G-SA-NS) were obtained by scanning electron microscope (SEM). The G-PVP-NS ($77.59 \pm 0.009\%$) and G-SA-NS ($84.30 \pm 0.038\%$) exhibited a significant ($p < 0.05$) enhancement of DPPH scavenging activity at the lowest concentration (0.0781 mg/mL) compared to the crude extract ($58.76 \pm 0.005\%$). The results of the FRAP assay, also indicated a significantly ($p < 0.05$) increased antioxidant power in both nanosuspensions (G-PVP-NS: $1598.50 \pm 0.071\text{AAE}/100\text{ g}$, G-SA-NS: $550.85 \pm 0.242\text{AAE}/100\text{ g}$) at 0.0781 mg/mL compared to the crude extract ($334.60 \pm 0.033\text{AAE}/100\text{ g}$). The results observed in NO scavenging assay revealed that the G-PVP-NS exhibited maximum activity ($6.82 \pm 0.036\%$) at the 0.0781 mg/ml, while the G-SA-NS showed the highest activity ($24.93 \pm 0.068\%$) at the 0.625 mg/ml. The SEM images confirmed the formation of nanoparticles. The results of the present study revealed that the antioxidant capacity of guava fruit extract is significantly enhanced by nano-sizing.

Keywords: *Free radical scavenging activity, Antioxidant, Nanosuspensions*