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NANOLIPOSOMES OF *SPONDIAS PINNATA* STEM BARK AQUEOUS EXTRACT: *IN VITRO* ANTIDIABETIC ACTIVITY AND RELEASING PROFILES

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Nanoliposomes are amongst the most versatile lipid-based carriers, which can encapsulate a range of compounds with different polarities. Decoctions, prepared from *Spondias pinnata* (L. f.) Kurz (wal ambarella) stem bark is used in Sri Lankan traditional medicine for the management of diabetes mellitus. Encapsulation of aqueous extract of stem bark (SAE) of *S. pinnata* in nanoliposomes could enhance its therapeutic potential by increasing bioavailability and providing controlled release. The present study investigates the in vitro anti-hyperglycaemic activity of SAE-encapsulated nanoliposomes (SAE-NLS) using α-amylase inhibitory, α-glucosidase inhibitory, glucose uptake, and glucose adsorption assays along with in vitro release profiles. Dried, powdered stem bark parts of *S. pinnata* were extracted using distilled water under ultrasonication to prepare SAE. SAE-NLS were synthesized from SAE, [phosphatidylcholine and cholesterol (20:1)] and an aqueous phase [phosphate buffer saline (pH 6.8) with Tween® 80 (0.1% v/v)], using a modified emulsification and ultrasonication methods. The synthesized SAE-NLS were characterized via size, zeta potential and FTIR data, encapsulation efficiency (EE) and loading capacity (LC) determination. The free polyphenol content was determined by the Folin-Ciocalteu method and was used in the estimation of EE. Further, the in vitro antidiabetic activity of SAE-NLS was screened using α-amylase, α-glucosidase inhibitory, glucose uptake and glucose adsorption activity assays. The Z-average particle diameter (389 nm), polydispersity index (0.37), and zeta potential (−27.27 mV) of SAE-NLS indicated moderate polydispersity. The free polyphenol content was determined by the Folin-Ciocalteu method. The highest EE (95.42±0.56%) and LC (0.02±0.00%) were observed when SAE was loaded at 3.0% w/v. The α-amylase inhibitory activity and α-glucosidase inhibitory activity (IC50) of SAE-NLS were 2.29±0.14 and 1.44±0.03 mgmL-1, respectively, while those for SAE were 0.05±0.01 and 0.08±0.00 mg mL-1, respectively. The glucose uptake (16.07±0.14%) at 10 mM glucose concentration and glucose adsorption (0.22±0.06 mmolg-1) of SAE-NLS at 50 mM were significantly higher ($p<0.05$) than those of reference standard metronidazole (5.81±1.27% and 0.05±0.01, respectively). The release of SAE from SAE-NLS was higher in simulated gastric fluid (60.63±0.27%) than in simulated intestinal fluid (24.11±0.94%) after 10 h. SAE-NLS showed higher α-glucosidase inhibitory and glucose adsorption activities than acarbose, and metronidazole, respectively. The results revealed that SAE-NLS are potential nanocarriers with potent in vitro antidiabetic activity providing controlled release.

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Keywords: Antidiabetic, Nanoliposomes, *Spondias pinnata*