

ENGINEERING KRATOM-BASED NANOFORMULATION FOR WOUND HEALING

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ABSTRACT

Nanostructured lipid carriers (NLC) have evolved as effective vehicles for improving the bioavailability of poorly water-soluble drugs as well as protecting them from degradation and metabolism. The present study investigated the preformulation and its impact on different liquid lipids and solid lipids with diverse chemical structures and hydrophilic-lipophilic balance (HLB) for the critical quality attributes of *Mitragyna speciosa* leaves extract (MS)- based nanostructured lipid carriers suitable for drug delivery system. The presence of bioactive alkaloids (mitragynine, 7-hydroxymitragynine, speciogynine), flavonoids (quercetin, apigenin, kaempferol), saponins (daucosterol, quinovic acid 3-o-beta D-quinovopyranoside, 1-o-feruloyl-beta D-glucose), and other bioactive phytochemicals (chlorogenic acid, umbelliferone, ursolic acid) in MS leaves extract was detected using LCMS/MS analysis to support its medicinal properties. The total phenolic content, total flavonoid content, and DPPH assay of MS were 90.88 ± 0.30 GAE mg/g, 50.43 ± 0.47 QE mg/g, and IC_{50} at 0.0397 ± 0.0035 mg/mL, respectively. The screening preparation of NLC requires the selection of liquid lipid (oil), solid lipid, and surfactant. Based on the solubility test, the maximum solubility of MS leaves extract in oleic acid (liquid lipid) and Compritol ATO 888 (solid lipid) were $2.859 \pm 0.010\%$ and $53.02 \pm 0.39\%$ respectively at ratio 70:30. Tween 80 was selected as the main surfactant for the preparation of NLC due to its highest emulsification efficiency (51.53%). The antimicrobial study showed that MS leaves extract gives antimicrobial effect towards *Streptococcus aureus* bacteria. The preformulation information collected offers a better, efficient, and cost-effective choice for further formulation development of MS leaves extract in drug delivery systems.

Keywords: kratom, *mitragyna speciosa*, nanostructured lipid carrier, drug delivery, wound

Themes: Medicinal/Material Chemistry