

ABSTRAK

FORMULASI NANOPARTIKEL EKSTRAK ETANOLIK KULIT BATANG BAKAU HITAM (*Rhizophora mucronata*) BERBASIS POLIMER CARBOXYMETHYL CHITOSAN

Aisyah Tisa Ariyanti¹, Tuti Sri Suhesti², Warsinah²

Latar Belakang: Kulit batang *R. mucronata* berpotensi sebagai antioksidan. Namun ukuran molekul *R. mucronata* tergolong besar dan kelarutannya rendah sehingga bioavailabilitasnya rendah. Pembuatan nanopartikel dapat meningkatkan bioavailabilitas obat dengan meningkatkan luas permukaan obat. Polimer *carboxymethyl chitosan* dengan *crosslinker* CaCl₂ dapat mengontrol pelepasan obat dan menjaga stabilitas obat.

Metodologi: Pembuatan nanopartikel ekstrak etanolik *R. mucronata* dengan 3 konsentrasi (200 mg, 300 mg, 400 mg). Formula optimum dipilih berdasarkan ukuran partikel terkecil dan nilai PDI paling homogen. Karakterisasi terhadap formula optimum meliputi zeta potensial, FTIR, dan morfologi. Data dianalisis secara deskriptif.

Hasil Penelitian: Nanopartikel ekstrak etanolik *R. mucronata* berbentuk kubus tidak beraturan dengan ukuran partikel sebesar 395, 667 ± 48,839 nm dan PDI sebesar 0,440 ± 0,127, zeta potensial sebesar -13,566 ± 0,152 mV, serta analisis FTIR adanya pergeseran panjang gelombang dan kesamaan gugus fungsi O-H, C=O, C-N, C-H.

Kesimpulan: Konsentrasi *carboxymethyl chitosan* yang menghasilkan formula optimum adalah konsentrasi 200 mgf dengan ukuran partikel rata-rata sebesar 395, 667 ± 48,839 nm dan nilai PDI sebesar 0,440 ± 0,127, nilai zeta potensial rata-rata sebesar -13,566 ± 0,152 mV, berbentuk kubus tidak beraturan, serta pada analisis FTIR menunjukkan bahwa ekstrak etanolik *R. mucronata* telah *ter-loading* dalam nanopartikel.

Kata Kunci: Nanopartikel, *Rhizophora mucronata*, *Carboxymethyl Chitosan*

¹Mahasiswa Jurusan Farmasi Fakultas Ilmu-Ilmu Universitas Jenderal Soedirman

²Departemen Farmasi Fakultas Ilmu-Ilmu Universitas Jenderal Soedirman

ABSTRACT

NANOPARTICLE FORMULATION OF BLACK MANGROVE (*Rhizophora mucronata*) STEM BARK ETHANOLIC EXTRACT BASED ON CARBOXYMETHYL CHITOSAN POLYMER

Aisyah Tisa Ariyanti¹, Tuti Sri Suhesti², Warsinah²

Background: *R. mucronata* stem bark has the potential as an antioxidant. However, the molecular size of *R. mucronata* is relatively large and its solubility is low, resulting in low bioavailability. The manufacture of nanoparticles can increase drug bioavailability by increasing the surface area of the drug. Carboxymethyl chitosan polymer with CaCl₂ crosslinker can control drug release and maintain drug stability.

Methodology: Preparation of *R. mucronata* ethanolic extract nanoparticles with 3 concentrations (200 mg, 300 mg, 400 mg). The optimum formula was chosen based on the smallest particle size and the most homogeneous PDI value. Characterization of the optimum formula includes zeta potential, FTIR, and morphology. The data were analyzed descriptively.

Results: Nanoparticles of ethanolic extract of *R. mucronata* are irregular cubic with particle sizes of 395.667 ± 48.839 nm and PDI of 0.440 ± 0.127 , the zeta potential of -13.566 ± 0.152 mV, as well as FTIR analysis of wavelength shifts and similarities of O-H, C=O, C-N, C-H functional groups.

Conclusion: The concentration of carboxymethyl chitosan that produces the optimum formula is a concentration of 200 mg with an average particle size of 395.667 ± 48.839 nm and a PDI value of 0.440 ± 0.127 , an average zeta potential value of -13.566 ± 0.152 mV, irregular cubic shape, and FTIR analysis showed that the ethanolic extract of *R. mucronata* was loaded into nanoparticles.

Keywords: Nanoparticle, *Rhizophora mucronata*, Carboxymethyl Chitosan

¹Student of Pharmacy, Faculty of Health Sciences, Jenderal Soedirman University

²Department of Pharmacy, Faculty of Health Sciences, Jenderal Soedirman University