OPTIMASI DAN KARAKTERISASI *NANOSTRUCTURED LIPID CARRIER* DARI L-DOPA-ASAM STEARAT-MINYAK KEDELAI (NLC-DSS) SEBAGAI KANDIDAT OBAT PARKINSON

SKRIPSI

Diajukan untuk memenuhi syarat memperoleh gelar Sarjana Sains pada Fakultas Pendidikan Matematika dan Ilmu Pengetahuan Alam

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PROGRAM STUDI KIMIA

FAKULTAS PENDIDIKAN MATEMATIKA DAN ILMU PENGETAHUAN ALAM

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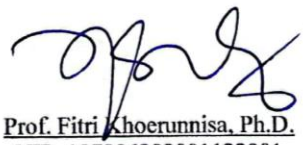

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PERNYATAAN KEASLIAN SKRIPSI

Dengan ini saya menyatakan bahwa skripsi dengan judul **"OPTIMASI DAN KARAKTERISASI *NANOSTRUCTURED LIPID CARRIER* DARI L-DOPA-ASAM STEARAT-MINYAK KEDELAI (NLC-DSS) SEBAGAI KANDIDAT OBAT PARKINSON"** ini beserta seluruh isinya adalah benar benar karya saya sendiri. Saya tidak melakukan penjiplakan atau pengutipan dengan cara-cara yang tidak sesuai dengan etika ilmu yang berlaku dalam masyarakat keilmuan. Atas pernyataan ini, saya siap menanggung risiko/sanksi apabila dikemudian hari ditemukan adanya pelanggaran etika keilmuan atau ada klaim dari pihak lain terhadap keaslian karya saya ini.

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ABSTRAK

Pengobatan penyakit parkinson saat ini dilakukan dengan menggunakan L-Dopa sebagai prekursor dopamin. Namun, bioavailabilitas dan stabilitas L-Dopa yang rendah, maka diperlukan sistem penghantaran obat menggunakan *Nanostructured lipid carrier* (NLC). Tujuan dari penelitian ini adalah memperoleh formulasi optimum, karakteristik, nilai *entrapment efficiency*, dan profil *drug release* dari NLC yang mengandung L-Dopa berbasis asam stearat dan minyak kedelai (NLC-DSS) dengan surfaktan tween 80. Metode yang digunakan dalam pembuatan NLC-DSS menggunakan homogenisasi panas dan ultrasonikasi dengan variabel perbandingan lipid, konsentrasi surfaktan, dan waktu ultrasonikasi. Karakterisasi produk meliputi penentuan ukuran partikel, indeks polidispersitas dan zeta potensial menggunakan PSA, morfologi partikel menggunakan TEM, dan FTIR untuk analisis gugus fungsi. Penentuan *entrapment efficiency* dan *drug release* menggunakan instrumen spektrofotometer UV-Vis. Hasil penelitian menunjukkan bahwa kondisi optimum dari pembuatan NLC-DSS terdapat pada formulasi perbandingan asam stearat terhadap minyak kedelai sebesar 1:9 dengan konsentrasi surfaktan 2,5% dan waktu ultrasonikasi selama 50 menit. Produk NLC-DSS yang diperoleh memiliki ukuran partikel rata rata sebesar 60,75 nm dengan indeks polidispersitas 0,45 dan zeta potensial -30,2 mV. Karakterisasi FTIR menunjukkan terjadinya pergeseran puncak serapan pada gugus –OH, C=O dan –NH yang mengindikasikan terjadinya interaksi antara L-Dopa dan matriks lipid. Morfologi partikel dari produk NLC berbentuk *spherical* dengan ukuran kisaran 61,05 nm. Persentase *entrapment efficiency* sebesar 72,19%. Profil *drug release* NLC-DSS kondisi pH 1,2 dan 7,4 mengikuti model kinetika orde nol yang menunjukkan pelepasan L-Dopa secara lambat dan terkontrol hingga 6 jam dan mencapai 46,28% dan 66,81% setelah 16 jam. Berdasarkan hasil yang diperoleh, maka produk NLC-DSS berpotensi sebagai kandidat obat penyakit parkinson.

Kata kunci : Parkinson, *Nanostructured lipid carrier*, L-Dopa, Asam Stearat, Minyak Kedelai

ABSTRACT

Parkinson's disease treatment is currently carried out using L-Dopa as a dopamine precursor. However, the bioavailability and stability of L-Dopa are low, so a drug delivery system using Nanostructured lipid carrier (NLC) is needed. The purpose of this study was to obtain the optimum formulation, characteristics, entrapment efficiency value, and drug release profile of NLC containing L-Dopa based on stearic acid and soybean oil (NLC-DSS) with tween 80 surfactant. The method used in the preparation of NLC-DSS was heat homogenization and ultrasonication with variable lipid ratio, surfactant concentration, and ultrasonication time. Product characterization included determination of particle size, polydispersity index and zeta potential using PSA, particle morphology using TEM, and FTIR for functional group analysis. Determination of entrapment efficiency and drug release using UV-Vis spectrophotometer instrument. The results showed that the optimum conditions for the preparation of NLC-DSS were found in the formulation of stearic acid to soybean oil ratio of 1:9 with surfactant concentration of 2.5% and ultrasonication time of 50 minutes. The NLC-DSS product obtained had an average particle size of 60.75 nm with a polydispersity index of 0.45 and zeta potential of -30.2 mV. FTIR characterization showed a shift in the absorption peaks of –OH, C=O and -NH groups indicating the interaction between L-Dopa and the lipid matrix. The particle morphology of the NLC product was spherical with a size range of 61,05 nm. The entrapment efficiency percentage was 72.19%. The drug release profile of NLC-DSS at pH 1.2 and 7.4 followed a zero-order kinetics model showing a slow and controlled release of L-Dopa up to 6 hours and reached 46.28% and 66.81% after 16 hours. Based on the results obtained, the NLC-DSS product has potential as a drug candidate for Parkinson's disease.

***Keywords**: Parkinson's disease, Nanostructured lipid carrier, L-Dopa, Stearic acid, Soybean oil.*

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