Formulasi dan Evaluasi Sediaan Solid Lipid Nanoparticles Mengandung Berberin Hidroklorida = Formulation and Evaluation of Solid Lipid Nanoparticles Containing Berberine Hydrochloride

Regita Putri, author

Abstrak

Berberin hidroklorida merupakan salah satu senyawa aktif yang memiliki berbagai aktivitas famakologi. Penelitian ini bertujuan untuk membuat formulasi solid lipid nanoparticles (SLN) sebagai sistem penghantaran berberin hidroklorida dan meningkatkan absorbsi dari berberin hidroklorida. Pada penelitian ini dibuat empat formula SLN menggunakan metode homogenisasi kecepatan tinggi dan ultrasonikasi menggunakan homogenizer bühler dengan kecepatan 15000 rpm selama 20 menit kemudian disonikasi selama 2 menit. Kemudian sampel tersebut diliofilisasi dengan cara dilakukan freeze drying pada suhu -106°C dan kemudian disimpan pada suhu 4°C. SLN berberin hidroklorida dikarakterisasi yang meliputi ukuran partikel, indeks polidispersitas dan potensial zeta, morfologi dengan Transmission Electron Microscopy (TEM), kadar lembab, penetapan kadar, efisiensi penjerapan, uji pelepasan berberin hidroklorida dari SLN, serta uji stabilitas.
Hasil liofilisasi menunjukkan SLN berberin hidroklorida berupa padatan lunak berwarna kuning. Hasil karakterisasi menunjukkan seluruh formula SLN yang diperoleh memiliki ukuran partikel 125-165 nm, indeks polidispersitas 0,271-0,321 dan nilai potensial zeta dengan rentang nilai -34,2 hingga -41,8 mV. Evaluasi dengan TEM menunjukkan morfologi SLN berberin hidroklorida memiliki ukuran 100 nm dan berbentuk sferis. Kadar lembab dari formula 1, 2, 3 dan 4 berturut-turut 2,19%, 2,99%, 1,97%, 2,38%. Kadar SLN dari formula 1, 2, 3 dan 4 berturut-turut 95,95% %, 95,37%, 96,44%, dan 96,09%. Efisiensi penjerapan formula 1, 2, 3, dan 4 berturut-turut 84,71%, 81,66%, 87,18%, dan 85,59%. Hasil evaluasi pelepasan obat SLN secara berurutan adalah F1 74,64 ± 0,47%, F2 72,90 ± 0,53%, F3 73, 47 ± 0,37%, F4 70,77 ± 0,30%. Berdasarkan hasil yang didapatkan, SLN berpotensi diaplikasikan untuk sistem penghantaran berberin hidroklorida secara oral karena memiliki karakteristik yang baik dengan efisiensi penjerapan yang tinggi.
.....
Berberine hydrochloride is one of the active compounds that has various pharmacologic activities. This study aims to formulate solid lipid nanoparticles (SLN) as a delivery system for berberine hydrochloride and to increase the absorbtion of berberine hydrochloride. In this study, four SLN formulas were made using the high speed homogenization and ultrasonication method using a Bühler homogenizer at a speed of 15000 rpm for 20 minutes then sonicated for 2 minutes. Then the sample was lyophilized by freeze drying at -106°C and then stored at 4°C. SLN berberine hydrochloride was characterized including particle size, polydispersity index and zeta potential, morphology by Transmission Electron Microscopy (TEM), moisture content, drug content, entrapment efficiency, in vitro drug release of berberine hydrochloride from SLN, and stability test. The results of lyophilization showed that SLN with berberine hydrochloride was in the form of a yellow soft solid.
The characterization results showed that all of the SLN formulas obtained had a particle size of 125-165 nm, a polydispersity index of 0.271-0.321 and a zeta potential value with a value range of -34.2 to -41.8 mV.

Evaluation by TEM showed morphology of SLN berberine hydrochloride has a size of 100 nm and spherical shape. The water content of formulas 1, 2, 3 and 4 were 2.19%, 2.99%, 1.97%, 2.38%, respectively. The drug content for SLN from formulas 1, 2, 3 and 4 were 95.95% %, 95.37%, 96.44%, and 96.09%, respectively. The entrapment efficiency of formulas 1, 2, 3, and 4 were 84.71%, 81.66%, 87.18%, and 85.59%, respectively. The results of the evaluation of SLN drug release sequentially were F1 74.64 ± 0.47%, F2 72.90 ± 0.53%, F3 73, 47 ± 0.37%, F4 70.77 ± 0.30%. Based on the results obtained, SLN has the potential to be applied to the oral delivery system of berberine hydrochloride because it has good characteristics with high entrapment efficiency.