

INTISARI

Jinten hitam (*Nigella sativa*) mengandung senyawa timokuinon yang berefek sebagai imunostimulan. Ekstrak jinten hitam dikembangkan menjadi SNEDDS (*Self-nanoemulsifying Drug Delivery System*) karena masalah kelarutan. Penelitian dilakukan untuk mengetahui karakterisasi SNEDDS ekstrak jinten hitam yang meliputi viskositas, ukuran tetesan nanoemulsi, *extract loading*, dan stabilitas. Pengujian aktivitas imunostimulan SNEDDS meliputi rasio sel makrofag dan indeks fagositosis.

SNEDDS ekstrak jinten hitam dioptimasi dengan metode *Simplex Lattice Design* menggunakan *software Design Expert 7.1.5.*, selanjutnya SNEDDS optimal diuji ukuran tetesan nanoemulsi dan zeta potensial, serta uji viskositas. Uji aktivitas imunostimulan dilakukan dengan metode *biolates assay* terhadap tikus *Sprague Dawley* sebanyak 5 tikus/kelompok selama 15 hari dengan pemberian satu kali sehari yaitu kontrol positif (ekstrak meniran 2,7 mg/tikus), kelompok perlakuan yaitu ekstrak jinten hitam dengan dosis 200 mg/kgBB serta SNEDDS ekstrak jinten hitam (200 mg/kgBB), kelompok plasebo berupa formula SNEDDS tanpa ekstrak jinten hitam, dan kontrol normal, selanjutnya dihitung rasio dan indeks fagositosis makrofag. Selanjutnya SNEDDS optimal diuji *extract loading* dan stabilitasnya.

SNEDDS ekstrak jinten hitam optimal mengandung 15% minyak ikan hiu cucut botol, 67,34% surfaktan (10,10% Croduret 50 SS dan 57,24% Tween 80), 17,66% PEG 400 sebagai ko-surfaktan dengan hasil ukuran tetesan nanoemulsi 16,3 nm, PI sebesar 0,202, zeta potensial -43,5 mV, dan viskositas antara 234,69 – 255,71 cP. SNEDDS ekstrak jinten hitam dengan dosis 200 mg/kgBB dapat meningkatkan rasio sel makrofag dan indeks fagositosis dibandingkan dengan ekstrak jinten tanpa formulasi ($P < 0,05$). Hasil *extract loading* sistem SNEDDS mencapai 600 mg ekstrak/g sistem. SNEDDS stabil setelah penyimpanan selama 90 hari pada suhu kamar dan uji *freeze-thawing*.

Kata kunci : Ekstrak jinten hitam, *Simplex Lattice Design*, SNEDDS, aktivitas imunostimulan

ABSTRACT

Black cumin (*Nigella sativa*) contains timokuinon having immunostimulant effect. However, due to solubility problems, the extract was developed into SNEDDS (Self-nanoemulsifying Drug Delivery System). The study was conducted to find out the characterization of SNEDDS black cumin extract which include viscosity, nanoemulsion droplet size, extract loading and stability. Immunostimulant study was conducted to find out the ratio and phagocytosis index of macrophage.

SNEDDS of black cumin extract was optimized using Simplex Lattice Design by Design Expert 7.1.5., The optimal formula then tested the droplet size, zeta potential of nanoemulsion, and viscosity of SNEDDS. Immunostimulant activity test using *biolates assay* was carried out on Sprague Dawley rats by 5 mice/group for 15 days by administration once a day, there are a positive control (meniran extract 2,7 mg/rat), the treatment group that black cumin extract at dose 200 mg/kgBW and SNEDDS black cumin extract (200 mg/kgBW), the placebo group was SNEDDS without black cumin extract, and the last was normal controls, then calculated the ratio of macrophage and phagocytosis index. Furthermore SNEDDS optimal was tested extract loading and stability test.

The optimal formula of SNEDDS black cumin extract containing 15% Gulper shark liver oil, 67.34% surfactant (10.10% Croduret 50 SS and 57.24% Tween 80), 17.66% PEG 400 as co-surfactant. The results of the droplet size is 16.3 nm, PI 0.202, zeta potential -43.5 mV, viscosity of SNEDDS is 234.69 to 255.71 cP. SNEDDS black cumin extract 200 mg/kgBW can increase the ratio of macrophages and phagocytosis index compared with black cumin extract without formulation ($P < 0.05$). SNEDDS system can load up to 600 mg extract/g system. The SNEDDS is stable after storage for 90 days at room temperature and freeze-thawing stability test.

Keywords: Black cumin extract, Simplex Lattice Design, SNEDDS, immunostimulant activity