

INTISARI

Jinten hitam merupakan tanaman herbal yang dilaporkan memiliki berbagai aktivitas farmakologis, diantaranya imunomodulator. Ekstrak jinten hitam (EJH) memiliki kelarutan dan bioavailabilitas yang rendah. Untuk mengatasi masalah ini, ekstrak jinten hitam diformulasikan menjadi *Self-Nano Emulsifying Drug Delivery System* (SNEDDS) menggunakan minyak ikan hiu cucut botol, tween 80 dan croduret 50 ss, serta PEG 400. Penelitian ini bertujuan untuk mengevaluasi pengaruh SNEDDS EJH terhadap aktivitas imunomodulator secara *in vivo* dengan parameter fagositosis makrofag, indeks proliferasi limfosit, dan titer antibodi IgG pada mencit BALB/c dibandingkan dengan ekstrak jinten hitam tanpa formulasi.

Formula SNEDDS ekstrak jinten hitam pada penelitian sebelumnya dievaluasi kembali % transmitten, waktu emulsifikasi, viskositas, dan ukuran tetesan nanoemulsi. Uji aktivitas imunomodulator dilakukan terhadap 36 ekor mencit BALB/c yang dibagi kedalam 6 kelompok secara acak, yaitu kontrol normal (baseline), kontrol positif (EJH tanpa formulasi dosis 200 mg/kgBB), kontrol plasebo (SNEDDS kosong tanpa ekstrak), SNEDDS EJH berbagai dosis (200 mg/kgBB; 100 mg/kgBB; dan 50 mg/kgBB). Hewan uji diberi perlakuan selama 18 hari. Pada hari ke-18, dilakukan pengambilan darah melalui vena orbitalis mata dan pembedahan. Selanjutnya, dilakukan uji aktivitas fagositosis makrofag, proliferasi sel limfosit, dan titer antibodi.

Hasil karakterisasi formula SNEDDS EJH menunjukkan nilai % transmitten sebesar $98,03\% \pm 0,15$, waktu emulsifikasi sebesar $47,21 \pm 2,60$, viskositas sebesar $232,30 - 235,52$ cP dan ukuran tetesan nanoemulsi $16,3$ nm dengan nilai PI sebesar $0,202$. Hasil uji aktivitas imunomodulator secara statistik dengan ANOVA menunjukkan bahwa SNEDDS ekstrak jinten hitam dapat meningkatkan fagositosis makrofag dan proliferasi limfosit, tetapi tidak berpengaruh signifikan terhadap titer antibodi dibandingkan kontrol normal dan ekstrak jinten hitam tanpa formulasi. Aktivitas dan indeks fagositosis tertinggi diperoleh dari SNEDDS EJH dosis 200 mg/kgBB dengan nilai sebesar $59,33 \pm 3,35$ dan $1,55 \pm 0,12$, serta proliferasi limfosit sebesar $0,614 \pm 0,310$.

Kata kunci : Jinten hitam, SNEDDS, fagositosis makrofag, proliferasi limfosit, titer antibodi.

ABSTRACT

Black cummin is an herb that is reported to have many pharmacological activities, including as immunomodulator. Black cummin extract has low solubility and bioavailability in the blood. To overcome this problem, black cummin extract was formulated into self-nano emulsifying drug delivery system (SNEDDS) using shark liver oil, tween 80, croduret 50 SS, and PEG 400. This study aims to evaluate the effect of SNEDDS black cummin extract on immunomodulatory activity by in vivo with the parameter macrophage phagocytosis, lymphocyte proliferation, and antibody titer on BALB/c mice compared to black cummin extract without formulation.

The optimum SNEDDS formula in the previous study was re-verified with the % transmittance, emulsification time, viscosity, and size of droplet nanoemulsion. Immunomodulatory activity was performed on 36 BALB/c mice with the body weight about 30 gram that divided into 6 groups include normal control (baseline), black cummin extract without formulation (200 mg/kgBB), placebo control (SNEDDS empty without extract), SNEDDS black cummin extract dose 200 mg/kgBB, 100 mg/kgBB, and 50 mg/kgBB that induced by hepatitis B vaccine. The treatment was done for 17 days and all of mice were sacrificed on the 18 days. Macrophages were isolated from peritoneal cavity while lymphocyte cells from the spleen, and the blood were collected from *plexus retroorbitalis*. The quantification of macrophages were done by microscope, while the lymphocyte proliferation and antibody titer measured by optical density that was read with ELISA reader at λ 550 nm and 450 nm.

The result shown that SNEDDS black cummin extract has transmittance value $98,03 \pm 0,15$, emulsification time $47,21 \pm 2,60$, viscosity $232,30 - 235,52$ cP, and droplet size was 32,7 nm with PI value 0,228. Immunomodulatory activity test results shown that SNEDDS of black cummin extract increased the macrophages phagocytosis and lymphocyte proliferation, but did not show effect increased antibody titer significantly compared to normal control and black cummin extract without formulation. Activity and index of phagocytosis highest obtained from SNEDDS black cummin extract dose 200 mg/kgBB with value to $59,33 \pm 3,35$ and $1,55 \pm 0,12$; and lymphocyte proliferation index 0.614 ± 0.310 .

Keywords : Black cummin, SNEDDS, macrophage phagocytocys, lymphocyte proliferation, antibody titer.