

Abstrak

PENGARUH NANOSTRUCTURED LIPID CARRIERS (NLC) EKSTRAK ETANOL SAMBILOTO (*Andrographis paniculata*) TERHADAP EKSPRESI mRNA IL-1 β PADA HATI MENCIT YANG DIINDUKSI CCl₄

Lurinda Beta Asyfia, Dhadhang Wahyu Kurniawan, Dody Novrial

Latar Belakang: Kerusakan hati merupakan kondisi serius yang sering dipicu oleh paparan senyawa hepatotoksik, salah satunya karbon tetraklorida (CCl₄) yang memicu stres oksidatif dan respon inflamasi hati dengan ditandai adanya peningkatan ekspresi sitokin proinflamasi, terutama interleukin-1 β (IL-1 β). Sambiloto (*Andrographis paniculata*) diketahui memiliki aktivitas antiinflamasi. Namun, rendahnya kelarutan Andrografolida sebagai senyawa marker sambiloto, mendorong pengembangan sistem penghantaran berbasis nanoteknologi, salah satunya *Nanostructured Lipid Carriers* (NLC) yang berpotensi meningkatkan kelarutan zat aktifnya. Namun, pengaruh NLC ekstrak etanol sabiloto (EES) terhadap modulasi respon inflamasi hati, khususnya ekspresi mRNA IL-1 β belum pernah diteliti. Oleh karena itu, penelitian ini dilakukan untuk mengkaji pengaruh NLC-EES terhadap ekspresi mRNA IL-1 β pada hati mencit yang diinduksi CCl₄.

Metodologi: Penelitian eksperimental *in vivo* dilakukan pada 30 ekor mencit jantan galur BALB/c yang dibagi menjadi lima kelompok (n=6) menggunakan *random sampling*. Kelompok terdiri atas kontrol sehat, kontrol sakit (CCl₄), NLC-EES dosis 70 mg/kgBB, ekstrak etanol sambiloto (EES) dosis 70 mg/kgBB, dan *empty* NLC. Induksi CCl₄ diberikan pada hari pertama secara intraperitoneal pada dosis 1 mL/kgBB. Perlakuan dilakukan pada hari ketiga dan kelima secara sonde oral. Ekspresi relatif mRNA IL-1 β dianalisis menggunakan qRT-PCR dengan metode Livak ($2^{-\Delta\Delta Ct}$).

Hasil Penelitian: Seluruh kelompok perlakuan menunjukkan penurunan ekspresi relatif mRNA IL-1 β dibandingkan dengan kelompok CCl₄. Uji *post hoc* *duun* menunjukkan tidak terdapat perbedaan bermakna antarkelompok ($p>0,05$).

Kesimpulan: Pemberian *Nanostructured Lipid Carriers* (NLC) ekstrak etanol sambiloto (*Andrographis paniculata*) mampu menurunkan ekspresi mRNA IL-1 β pada inflamasi hati akut akibat induksi CCl₄.

Kata Kunci: *Carbon tetrachloride*, IL-1 β , mRNA, *Nanostructured Lipid Carrier*, Sambiloto.

Abstact

THE EFFECT OF NANOSTRUCTURED LIPID CARRIERS (NLC) OF ETHANOL EXTRACT OF *Andrographis paniculata* ON IL-1 β mRNA EXPRESSION IN CCl₄-INDUCED MICE LIVER

Lurinda Beta Asyfia, Dhadhang Wahyu Kurniawan, Dody Novrial

Background: Liver damage is a serious condition often triggered by exposure to hepatotoxic compounds, one of which is carbon tetrachloride (CCl₄), which causes oxidative stress and an inflammatory response in the liver, characterized by increased expression of proinflammatory cytokines, particularly interleukin-1 β (IL-1 β). Sambiloto (*Andrographis paniculata*) is known to have anti-inflammatory activity. However, the low solubility of Andrographolide as a marker compound of sambiloto has encouraged the development of nanotechnology-based delivery systems, one of which is Nanostructured Lipid Carriers (NLC), which has the potential to increase the solubility of its active ingredients. However, the effect of NLC ethanol extract of sambiloto (EES) on the modulation of the liver inflammatory response, particularly IL-1 β mRNA expression, has not been studied. Therefore, this study was conducted to examine the effect of NLC-EES on IL-1 β mRNA expression in the liver of CCl₄-induced mice.

Methods: An in vivo experimental study was conducted on 30 male BALB/c mice divided into five groups (n=6) using random sampling. The groups consisted of healthy controls, sick controls (CCl₄), NLC-EES at a dose of 70 mg/kgBW, ethanol extract of sambiloto (EES) at a dose of 70 mg/kgBW, and empty NLC. CCl₄ induction was administered on the first day intraperitoneally at a dose of 1 mL/kgBW. Treatment was administered on the third and fifth days via oral sonde. Relative expression of IL-1 β mRNA was analyzed using the qRT-PCR with the Livak method ($2^{-\Delta\Delta Ct}$).

Result: All treatment groups showed a decrease in relative IL-1 β mRNA expression compared to the CCl₄ group. *Post hoc dunn* tests showed no significant differences between groups (p>0,05).

Conclusion: Administration of Nanostructured Lipid Carriers (NLC) of ethanol extract of *Andrographis paniculata* was able to reduced IL-1 β mRNA expression in acute liver inflammation induced by CCl₄.

Keywords: *Andrographis paniculata*, Carbon tetrachloride, IL-1 β , mRNA, Nanostructured Lipid Carrier.