

# Pengaruh Limonena dalam Lemon Essential Oil Terhadap Uji Penetrasi Formula Mikroemulsi Ketoprofen = Effect of Limonene in Lemon Essential Oil on Penetration Study of Ketoprofen Microemulsion Formula

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## Abstrak

Ketoprofen merupakan obat non selektif siklooksigenase-2 untuk terapi rheumatoid arthritis dan osteoarthritis. Pemberian ketoprofen secara peroral dapat mengalami first pass metabolisme, sedangkan dalam bentuk sediaan topikal tingkat penetrasi ke dalam kulit masih rendah. Ketoprofen juga memiliki kelarutan rendah dalam air, sehingga penelitian ini bertujuan untuk memformulasikan ketoprofen dalam bentuk mikroemulsi transdermal yang stabil dan memiliki tingkat penetrasi yang baik. Lemon essential oil digunakan sebagai fase minyak sekaligus penetration enhancer, mikroemulsi dibuat dengan metode titrasi fase. Mikroemulsi yang jernih dan stabil yaitu pada konsentrasi smix 60% dengan perbandingan 1:1. Konsentrasi lemon essential oil adalah FA (3%), FB (5%), dan FC (10%). Evaluasi dilakukan dengan mengukur ukuran globul, tegangan permukaan, bobot jenis, pH, viskositas, uji sentrifugasi, uji stabilitas fisik, cycling test dan penetapan kadar ketoprofen. Uji penetrasi dilakukan dengan menggunakan sel difusi Franz selama 8 jam. Hasil penelitian menunjukkan ketiga formula stabil secara fisik selama penyimpanan 12 minggu dan hasil uji penetrasi pada jam ke-8, jumlah kumulatif Formula A sebesar  $821,6031 \pm 112,4390$  g/cm<sup>2</sup>, Formula B  $1591,1888 \pm 275,3595$  g/cm<sup>2</sup>, dan Formula C sebesar  $3515,9289 \pm 385,7081$  g/cm<sup>2</sup>. Penelitian ini menunjukkan bahwa semakin tinggi konsentrasi lemon essential oil yang digunakan dalam formula mikroemulsi maka semakin tinggi tingkat penetrasinya.

.....Ketoprofen is a non-selective cyclooxygenase-2 that is used to treat rheumatoid arthritis and osteoarthritis. Oral administration of ketoprofen has disadvantages on first-pass metabolism. Also, the penetration rate into the skin is relatively low if it is given in topical dosage forms. Ketoprofen is a drug which has low solubility in water, therefore this study aimed to formulate ketoprofen in the form of a transdermal microemulsion that is stable and has a good penetration rate. Lemon essential oil is used as an oil phase as well as a penetration enhancer, microemulsions are made using the phase titration method. The microemulsion was clear and stable at 60% smix concentration with a ratio of 1:1. The concentration of lemon essential oil is FA (3%), FB (5%), and FC (10%). Microemulsion evaluation was carried out by measuring globule size, surface tension, density, pH, viscosity, centrifugation test, physical test, cycling test, and determination of ketoprofen content. Ketoprofen penetration test was carried out using a Franz diffusion cell for 8 hours. The result of the triplicate test showed that the formula was physically stable for 12 weeks of storage and based on the results of the penetration study at the 8th hour, the cumulative amount of Formula A was  $821.6031 \pm 112.4390$  g/cm<sup>2</sup>, Formula B was  $1591.1888 \pm 275.3595$  g/cm<sup>2</sup>, and Formula C was  $3515.9289 \pm 385.7081$  g/cm<sup>2</sup>. This study showed that higher the concentration of lemon essential oil used in the microemulsion formula increases its penetration rate.