

## INTISARI

Senyawa aktif 3,4-dimetoksikalkon diduga memiliki aktivitas sebagai *sunscreen* yang dapat mengabsorpsi dan mencegah penetrasi sinar ultraviolet A (UV-A) yang dapat menyebabkan berbagai gangguan pada kulit. Tujuan penelitian ini adalah untuk mengevaluasi karakter fisik 3,4-dimetoksikalkon, optimasi dan formulasi sediaan mikroemulgel 3,4-dimetoksikalkon serta mengidentifikasi aktivitasnya sebagai *sunscreen*, yang dibandingkan dengan bentuk sediaan gelnya.

Metode penelitian ini terdiri dari karakterisasi 3,4-dimetoksikalkon meliputi uji kelarutan, koefisien partisi, titik leleh, dan nilai pKa. Selanjutnya, optimasi formula mikroemulsi 3,4-dimetoksikalkon yang terdiri dari campuran minyak (*olive oil*), surfaktan (tween 80), dan kosurfaktan (PEG 400) menggunakan metode D-Optimal dengan bantuan software *Design Expert* versi 10 serta aquadest sebagai fase airnya. Pengujian aktivitas mikroemulgel dan gel 3,4-dimetoksikalkon meliputi uji *UV-A Protection Factor* secara *in vitro*, uji persen transmisi eritema (%TE) dan persen transmisi pigmentasi (%TP) serta identifikasi pergeseran spektra.

Hasil dan kesimpulan yang didapatkan yaitu senyawa 3,4-dimetoksikalkon praktis tidak larut dalam air, lipofilik ( $\log P$   $5,39 \pm 0,019$ ), meleleh pada suhu  $79,67 - 81,67 \pm 0,58^\circ\text{C}$  dan nilai pKa  $11,59 \pm 0,02$ . Formula optimum mikroemulsi, didapatkan dari kombinasi *olive oil* 3,33%; Tween 80 93,33%; dan PEG-400 3,34% yang didispersikan dalam 8 mL aquadest. Sediaan mikroemulgel 3,4-dimetoksikalkon, baik basis HPMC maupun CMC-Na, memiliki homogenitas yang baik. Viskositas basis HPMC sebesar  $298700 \pm 1212,44$  cP, basis CMC-Na sebesar  $87833,3 \pm 351,2$  cP. Nilai pH  $4,64 \pm 0,01$  (HPMC) dan  $6,40 \pm 0,01$  (CMC-Na), dengan daya lekat  $>1$  detik pada keduanya namun daya sebar kurang baik. Gel dan mikroemulgel 3,4-dimetoksikalkon memiliki kemampuan ultraprotektif terhadap paparan UVA dan perlindungan terhadap pigmentasi (nilai %TP rendah), namun tidak stabil di bawah paparan sinar UVA.

**Kata kunci:** 3,4-dimetoksikalkon, %TE, %TP, *UV-A Protection Factor*.

## ***ABSTRACT***

The active compound 3,4-dimethoxychalcone is known to have the activity as a sunscreen that can absorb and prevent ultraviolet A's (UV-A) rays, which can cause various skin disorders. The purpose of this study was to evaluate the physical characteristics of 3,4-dimethoxychalcone, optimization and formulation of 3,4-dimethoxychalcone microemulgel, and to identify its activity as a sunscreen compared to its gel dosage form.

The research methods consist the characterization of 3,4-dimethoxychalcone included solubility test, partition coefficient, melting point, and pK value. Furthermore, optimization of the 3,4-dimethoxychalcone microemulsion formula consisting of a mixture of oil (olive oil), surfactant (tween 80), and cosurfactant (PEG 400) using the D-optimal method with the help of Design-Expert software version 10. The mixture would be dispersed onto aquadest as the water phase. Testing for microemulgel and gel 3,4-dimethoxychalcone activity included in vitro UV-A Protection Factor test, test for percent erythema transmission (% TE) and percent transmission pigmentation (% TP), and identification of spectral shifts.

Results and conclusions suggest that the compound 3,4-dimethoxychalcone practically insoluble in water, lipophilic ( $\log P$   $5.39 \pm 0.019$ ), melted at a temperature of  $79.67 - 81.67 \pm 0.58^\circ\text{C}$  and a pKa value of  $11.59 \pm 0.02$ . The optimum microemulsion formula was obtained from a combination of olive oil 3.33%; Tween 80 93.33%; and PEG-400 3.34%, which was dispersed in 8 mL of aquadest. Microemulgel 3,4-dimethoxychalcone, both HPMC and CMC-Na bases, had good homogeneity. The base viscosity of HPMC was  $298700 \pm 1212.44$  cP, and the base CMC-Na was  $87833.3 \pm 351.2$  cP. The pH value was  $4.64 \pm 0.01$  (HPMC) and  $6.40 \pm 0.01$  (CMC-Na), with adhesiveness  $> 1$  second for both of them, but the spreadability was not good. Gel and microemulgel of 3,4-dimethoxychalcone had the ultraprotective ability against UVA exposure and protection against pigmentation (low% TP value) but were unstable under UVA exposure.

**Keywords:** 3,4-dimethoxychalcone, %TE, %TP, UV-A Protection Factor.