

**OPTIMASI SUHU DAN WAKTU EKSTRAKSI ULTRASONIK
DAUN DANDANG GENDIS (*Clinacanthus nutans*)
MENGUNAKAN *RESPONSE SURFACE METHODOLOGY*
TERHADAP AKTIVITAS ANTIBAKTERI *Cutibacterium acnes***

Rabbiah Putri Nurjannah

ABSTRAK

Jerawat merupakan penyakit kulit inflamasi dengan prevalensi tinggi yang terutama disebabkan oleh infeksi *Cutibacterium acnes*, sehingga diperlukan alternatif terapi antibakteri yang aman dan berkelanjutan untuk mengatasi resistensi antibiotik. Daun dandang gendis (*Clinacanthus nutans*) dipilih karena secara tradisional digunakan untuk pengobatan penyakit kulit dan mengandung flavonoid yang memiliki aktivitas antibakteri. Namun, kadar flavonoid dan efektivitas antibakteri sangat dipengaruhi oleh kondisi ekstraksi. Penelitian ini bertujuan mengoptimasi suhu dan waktu *Ultrasound-Assisted Extraction* (UAE) daun *C. nutans* untuk memperoleh kadar flavonoid total (KFT) dan aktivitas antibakteri optimum terhadap *C. acnes*. Optimasi dilakukan menggunakan *Response Surface Methodology* (RSM) berbasis *Central Composite Design* (CCD) untuk mengevaluasi pengaruh dan interaksi variabel secara efisien. Suhu dan waktu dipilih sebagai faktor utama karena berperan dalam pelepasan senyawa bioaktif dan berpotensi menyebabkan degradasi flavonoid. Respon yang diamati meliputi KFT dan diameter zona hambat. Model kuadratik signifikan dan layak digunakan untuk prediksi. Kondisi optimum diperoleh pada suhu 50,97 °C dan waktu 26,26 menit dengan KFT 51,15 mgQE/g dan diameter zona hambat 4,35 mm. Nilai validasi berada dalam rentang 95% *Prediction Interval*. Penelitian ini menunjukkan bahwa integrasi UAE dan RSM efektif meningkatkan kualitas ekstrak daun *C. nutans* sebagai kandidat antibakteri jerawat berbasis bahan alam.

Kata kunci: *Clinacanthus nutans*, *Cutibacterium acnes*, KFT, RSM, UAE

OPTIMIZATION OF ULTRASONIC EXTRACTION TEMPERATURE AND TIME OF *CLINACANTHUS NUTANS* LEAVES USING RESPONSE SURFACE METHODOLOGY FOR ANTIBACTERIAL ACTIVITY AGAINST *CUTIBACTERIUM ACNES*

Rabbiah Putri Nurjannah

ABSTRACT

Acne is a highly prevalent inflammatory skin disease primarily caused by *Cutibacterium acnes*, highlighting the need for safe and sustainable antibacterial alternatives due to increasing antibiotic resistance. *Clinacanthus nutans* leaves were selected because of their traditional use in treating skin disorders and their flavonoid content, which exhibits antibacterial activity through cell membrane disruption and inhibition of nucleic acid synthesis. However, flavonoid yield and antibacterial efficacy are strongly influenced by extraction conditions. This study aimed to optimize the temperature and extraction time of *Ultrasound-Assisted Extraction* (UAE) of *C. nutans* leaves to obtain optimal total flavonoid content (TFC) and antibacterial activity against *C. acnes*. Optimization was performed using *Response Surface Methodology* (RSM) based on a *Central Composite Design* (CCD), enabling efficient evaluation of variable interactions with minimal experiments. Temperature and time were selected as key factors due to their critical roles in bioactive compound release and potential flavonoid degradation. The responses evaluated were TFC and inhibition zone diameter. The quadratic model was significant and suitable for prediction. Optimal conditions were achieved at 50.97 °C and 26.26 min, yielding 51.15 mg QE/g TFC and a 4.35 mm inhibition zone. Validation confirmed that experimental values fell within the 95% prediction interval. This study demonstrates that integrating UAE and RSM effectively enhances the antibacterial potential of *C. nutans* leaf extract for acne treatment.

Keywords: *Clinacanthus nutans*, *Cutibacterium acnes*, TFC, RSM, UAE