

Abstrak

IDENTIFIKASI PROFIL METABOLIT EKSTRAK ETANOL RIMPANG KUNYIT (*Curcuma longa*) DAN EVALUASI AKTIVITAS ANTIBAKTERINYA MENGGUNAKAN UJI *TIME-KILL* TERHADAP BAKTERI MRSA ATCC 33591

Hari Trihatmojo¹, Muhamad Salman Fareza², Hendri Wasito²

Latar Belakang: *Methicillin-Resistant Staphylococcus aureus* (MRSA) ATCC 33591 merupakan strain bakteri resisten yang kebal terhadap berbagai antibiotik, sehingga dibutuhkan alternatif pengobatan baru, salah satunya melalui senyawa antibakteri alami seperti ekstrak etanol rimpang kunyit (*Curcuma longa*). Penelitian sebelumnya menunjukkan aktivitas antibakteri ekstrak ini terhadap MRSA, namun data mengenai kinetika pembunuhannya masih terbatas.

Metodologi: Penelitian ini bertujuan untuk menganalisis profil metabolit ekstrak etanol kunyit menggunakan *Gas Chromatography-Mass Spectrometry* (GC-MS) serta mengevaluasi aktivitas antibakterinya terhadap MRSA ATCC 33591 melalui uji *time-kill*. Analisis GC-MS dilakukan dengan membandingkan data antara pustaka internal dan pustaka *open-source* MS-Dial. Uji antibakteri dilakukan dengan konsentrasi 1×, 2×, 4×, dan 8× MIC (MIC = 31,25 µg/mL), serta ciprofloxacin sebagai kontrol positif (1× MIC = 0,25 µg/mL). Inokulum bakteri disiapkan pada konsentrasi 6×10⁵ CFU/mL, dan pengamatan dilakukan pada waktu 2, 4, 8, 16, dan 24 jam. Sampel diinokulasikan ke media *Mueller Hinton Agar* (MHA) dan jumlah koloni dihitung setelah inkubasi.

Hasil: Analisis GC-MS menunjukkan adanya senyawa aktif dominan seperti ar-turmerone, α-turmerone, curlone, caryophyllene, dan β-sesquiphellandrene. Uji *time-kill* menunjukkan efek penghambatan pada jam ke-2 dan ke-4, namun tidak terjadi pembunuhan total, sehingga dikategorikan sebagai bakteriostatik yang bersifat concentration dependent.

Kesimpulan: Ekstrak kunyit memiliki potensi antibakteri terhadap MRSA secara bakteriostatik. Kombinasi dengan antibiotik direkomendasikan untuk meningkatkan efektivitas bakterisidal.

Kata Kunci: Profil Metabolit, GC-MS, Uji *Time-Kill*, Ekstrak Etanol Rimpang Kunyit

¹Mahasiswa Farmasi, Fakultas Ilmu-Ilmu Kesehatan, Universitas Jenderal Soedirman

²Departmen Farmasi, Fakultas Ilmu-Ilmu Kesehatan, Universitas Jenderal Soedirman

Abstract

IDENTIFICATION OF METABOLITE PROFILE OF ETHANOL EXTRACT OF TURMERIC RHIZOME (*Curcuma longa*) AND EVALUATION OF ITS ANTIBACTERIAL ACTIVITY USING TIME-KILL ASSAY AGAINST MRSA ATCC 33591

Hari Trihatmojo¹, Muhamad Salman Fareza², Hendri Wasito²

Background: *Methicillin-Resistant Staphylococcus aureus* (MRSA) ATCC 33591 is a multidrug-resistant bacterial strain that poses a global health concern. As an alternative to conventional antibiotics, natural antibacterial agents such as ethanol extract of turmeric rhizome (*Curcuma longa*) have shown promise. Previous studies have demonstrated its antibacterial activity against MRSA, but data on its killing kinetics remain limited.

Methodology: This study aimed to identify the metabolite profile of ethanol extract of turmeric using *Gas Chromatography-Mass Spectrometry* (GC-MS) and evaluate its antibacterial activity against MRSA ATCC 33591 using a time-kill assay. GC-MS analysis was conducted by comparing internal library data with the open-source MS-Dial library. The extract was tested at 1, 2, 4, and 8 times MIC (MIC = 31.25 µg/mL), with ciprofloxacin (1× MIC = 0.25 µg/mL) as the positive control. The bacterial inoculum was adjusted to 6×10⁵ CFU/mL and incubated at 35 ± 2°C. Observations were made at 2, 4, 8, 16, and 24 hours. Samples were serially diluted and spread on *Mueller Hinton Agar* (MHA), then incubated for colony counting.

Results: GC-MS identified dominant antibacterial compounds such as ar-turmerone, α-turmerone, curlone, caryophyllene, and β-sesquiphellandrene. The time-kill assay showed initial bacterial inhibition at 2 and 4 hours, but no total killing within 24 hours, indicating concentration-dependent bacteriostatic activity.

Conclusion: The ethanol extract of turmeric exhibits bacteriostatic activity against MRSA. Combination with antibiotics is recommended to enhance bactericidal effect.

Keywords: Metabolite Profile, GC-MS, Time-Kill Assay, Turmeric Rhizome Ethanol Extract

¹Pharmacy Student, Faculty of Health Sciences, Jenderal Soedirman University

²Pharmacy Department, Faculty of Health Sciences, Jenderal Soedirman University