

# Perbandingan metode fenotipik terhadap metode genotipik untuk deteksi methicillin resistant staphylococcus aureus (MRSA) = Comparison between phenotypic method to genotypic method to detect methicillin resistant staphylococcus aureus (MRSA)

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## Abstrak

### [<b>ABSTRAK</b><br>

Infeksi yang disebabkan oleh methicillin-resistant Staphylococcus aureus (MRSA) telah menyebabkan beban mortalitas dan morbiditas yang bermakna. Mengingat hal tersebut, sangat penting untuk dapat mendeteksi MRSA dengan cepat dan akurat. Saat ini deteksi MRSA dapat dilakukan dengan dua cara, yaitu metode fenotipik dan genotipik. Pada penelitian ini, metode fenotipik dilakukan dengan uji kepekaan antibiotik menggunakan oksasilin dan sefoksitin, sementara metode genotipik dilakukan dengan polymerase chain reaction (PCR) gen nuc dan mecA.

Gen nuc merupakan penanda genetik S. aureus, sedangkan gen mecA adalah gen yang mengkode penicillin-binding protein 2a (PBP2a). Protein ini memiliki afinitas rendah terhadap antibiotik -laktam, sehingga menyebabkan resistensi terhadap antibiotik seperti metisilin, oksasilin, dan sefoksitin. Penelitian ini bertujuan untuk membandingkan metode fenotipik terhadap metode genotipik yang merupakan baku emas dalam mendeteksi MRSA.

Sebanyak 136 isolat S. aureus diikutsertakan dalam penelitian ini.

Dilakukan PCR untuk mengamplifikasi gen nuc dan mecA dengan hasil: 37 sampel terdeteksi sebagai MRSA (nuc+, mecA+), 96 sampel sebagai methicillinsensitive Staphylococcus aureus atau MSSA (nuc+, mecA-), and 3 sampel sebagai bukan S. aureus (nuc-). Persentase MRSA yang dideteksi dengan metode genotipik adalah sebesar 27,8%.

Deteksi MRSA dengan metode fenotipik dilakukan dengan uji kepekaan antibiotik menggunakan oksasilin dan sefoksitin. Tidak terdapat perbedaan hasil uji kepekaan antara kedua antibiotik tersebut. Secara keseluruhan, hasil deteksi MRSA dengan metode fenotipik konsisten dengan metode genotipik, dengan dideteksinya MRSA sebesar 27,8%. Hal tersebut mengartikan bahwa sensitivitas dan spesifisitas metode fenotipik terhadap metode genotipik adalah sebesar 100%.

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### <b>ABSTRACT</b><br>

Methicillin-resistant Staphylococcus aureus (MRSA) infection has caused significant morbidity and mortality burden. Therefore, detecting MRSA accurately as early as possible is very important. There are two methods used in detecting MRSA, which are phenotypic and genotypic methods. In this study,

phenotypic method was done by antibiotic susceptibility test using oxacillin and ceftazidime, while genotypic method was carried out by amplifying nuc and mecA gene with polymerase chain reaction (PCR).

Nuc gene is a genetic marker for *S. aureus*, and mecA gene is responsible in the coding of penicillin-binding protein 2a (PBP2a). This protein has a low affinity to  $\beta$ -lactam antibiotics, thus causing antibiotic resistance to the antibiotics, such as methicillin, oxacillin, and ceftazidime. This study was aimed to compare phenotypic method to genotypic method as the gold standard, to detect MRSA. There were 136 *S. aureus* isolates included in this study. PCR to amplify nuc and mecA gene was conducted with the results of the following: 37 samples detected as MRSA (nuc+, mecA+), 96 samples as methicillin-sensitive *Staphylococcus aureus* or MSSA (nuc+, mecA-), and 3 samples as non-*S. aureus* (nuc-). The percentage of MRSA detected by genotypic method was 27,8%.

The detection of MRSA through the phenotypic method was done by antibiotic susceptibility test using oxacillin and ceftazidime. Susceptibility test between these antibiotics showed no difference in result. In general, the result of phenotypic method was consistent to the results from the genotypic method, by detecting 27,8% MRSA. Therefore, the sensitivity and specificity of phenotypic method compared to the genotypic method were 100%.;Methicillin-resistant *Staphylococcus aureus* (MRSA) infection has caused

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