ANTIMICROBIAL RESISTANCE PROFILES AND DETECTION OF *sea* GENE IN *Staphylococcus aureus* ISOLATED FROM READY-TO-EAT FOODS

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Bogor, July 2026

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RINGKASAN

SAMUEL KAMAU MAINA. Profil Resistensi Antimikroba dan Deteksi Gen *sea* pada *Staphylococcus aureus* yang Diisolasi dari Pangan Siap Saji. Dibimbing oleh RATIH DEWANTI-HARIYADI dan HARSI DEWANTARI KUSUMANINGRUM.

Staphylococcus aureus merupakan salah satu patogen penting yang dapat menyebabkan infeksi melalui kulit dan saluran pernafasan dan atau menyebabkan intoksikasi melalui enterotoksin tahan panas dalam pangan, termasuk pangan siap saji (PSS). Beberapa tahun terakhir, *S. aureus* telah menjadi masalah kesehatan masyarakat yang serius akibat meningkatnya resistensi antibiotik yang menyulitkan infeksi karena bakteri ini menjadi sulit ditangani dengan antibiotik. Penelitian ini bertujuan untuk mengisolasi *S. aureus* dari PSS dari kedai kaki lima di Bogor, Indonesia, mengarakterisasi profil resistensi antimikroba dan enterotoksisitasnya. Isolasi *S. aureus* dilakukan sesuai ISO 6888-1:2021, sedangkan kerentanan antimikroba ditentukan menggunakan metode Kirby-Bauer. Gen penyandi resistensi antibiotik dan enterotoksin Staphylococcus A (*sea*) dideteksi menggunakan metode *Polymerase Chain Reaction* (PCR). Dari 25 isolat presumtif yang diisolasi dari 25 sampel PSS, 12 (48%) terkonfirmasi sebagai *S. aureus* koagulase positif (CPS). Hasil uji fenotipe resistensi antibiotik menunjukkan bahwa 75% (9/12) isolat CPS resisten terhadap setidaknya satu antibiotik dan 8,3% (1/12) resisten terhadap banyak antibiotik. Lima puluh persen (6/12) dari isolat menunjukkan resistensi terhadap antibiotik golongan β-laktam 25% (3/12) terhadap eritromisin, 16,7% (2/12) terhadap kloramfenikol, 16,7% (2/12) terhadap cefoxitin. Semua isolat (12/12) rentan terhadap tetrasiklin, siprofloksasin, dan sefalotin. PCR mendeteksi tiga gen resistensi antimikroba: *blaZ* (91,7%), *mecA* (16,7%), dan *msrA* (25%). Perbedaan persentase resistensi genotipe dan fenotipe terhadap antibiotik β-laktam menunjukkan adanya ekspresi gen yang mengalami represi. Secara keseluruhan, CPS yang membawa gen *sea* terdeteksi pada 12% dari isolat presumtif (3/25) yang diperoleh dari PSS yang menunjukkan potensi terjadinya keracunan pangan yang dimediasi oleh enterotoksin. Keberadaan AMR *S. aureus* dalam PSS dapat berfungsi sebagai *reservoir* atau perantara penularan gen resistensi antimikroba di saluran pencernaan manusia. Oleh karena itu, penelitian ini menekankan pentingnya peningkatan praktik kebersihan dan pengawasan berkelanjutan untuk menekan penyebaran resistensi antimikroba serta penyakit yang ditularkan melalui makanan.

Kata kunci: Enterotoksin *Staphylococcus* A, Pangan siap saji (PSS), Resistensi-antimikroba (AMR), *Staphylococcus aureus*, *Staphylococcus aureus* koagulase-positif (CPSA)

SUMMARY

SAMUEL KAMAU MAINA. Antimicrobial Resistance Profiles and Detection of *sea* Gene in *Staphylococcus aureus* Isolated from Ready-To-Eat Foods. Supervised by RATIH DEWANTI-HARIYADI and HARSI DEWANTARI KUSUMANINGRUM.

Staphylococcus aureus is an important pathogen that can cause infections through the skin and respiratory tract and cause foodborne intoxication through heat-stable enterotoxins in ready-to-eat foods. In recent years, *S. aureus* has become a significant public health concern due to its alarming rise in antibiotic resistance, complicating the treatment of linked infections. The current research aimed to isolate *S. aureus* from RTE foods at food stalls in Bogor, Indonesia, characterize their antimicrobial resistance and enterotoxicity profiles. *S. aureus* isolation followed ISO 6888-1:2021, and antimicrobial susceptibility was determined using the Kirby-Bauer method. The resistance-coding genes and the enterotoxin gene were detected by polymerase chain reaction. Out of 25 isolates from 25 RTE samples, 12 (48%) were confirmed as coagulase-positive *S. aureus* (CPSA). Phenotypic data for antibiotic resistance showed that 75% (9/12) of CPSA isolates were resistant to at least one antibiotic, and 8.3% (1/12) were resistant to multiple antibiotics. Fifty percent (6/12) of the isolates showed resistance to β-lactam, 25% (3/12) to erythromycin, 16.7% (2/12) to chloramphenicol, 16.7% (2/12) to cefoxitin, respectively. All isolates (12/12) were susceptible to tetracycline, ciprofloxacin, and cephalothin. PCR detected three antimicrobial resistance genes: *blaZ* (91.7%), *mecA* (16.7%), and *msrA* (25%). Notably, discrepancy in genotypic and phenotypic resistance percentages to β-lactam antibiotics suggested inducible or suppressed gene expression. Overall, CPSA isolates carrying the *sea* gene were detected in 12% (3/25) of presumptive *S. aureus* isolates from ready-to-eat foods, highlighting the potential for enterotoxin-mediated food poisoning. The occurrence of AMR *S. aureus* in RTE foods may serve as reservoirs or vehicles for the transmission of antimicrobial-resistant genes in the human gastrointestinal tract. Therefore, this research emphasizes the need for improved hygiene practices and continuous surveillance to alleviate the spread of antimicrobial resistance and foodborne illnesses.

Keywords: Antimicrobial-resistance (AMR), coagulase-positive *Staphylococcus aureus* (CPSA), Ready-To-Eat (RTE) foods, *Staphylococcus aureus*, *Staphylococcus* enterotoxin A

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Samuel Kamau Maina

Table of Contents

LIST OF TABLES

LIST OF FIGURES