

INTISARI

Deteksi Gen Pengkode Resistensi Antibiotik *Staphylococcus aureus* Isolat Asal Sapi Perah dan Hewan Kesayangan

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Antibiotik berperan penting menangani infeksi bakterial, namun terancam tidak efektif akibat fenomena *antimicrobial resistance* (AMR). *Staphylococcus aureus* telah resisten terhadap berbagai antibiotik sehingga deteksi gen pengkode resistensi antibiotik *S. aureus* asal sapi perah dan hewan kesayangan penting dilakukan. Penelitian ini bertujuan untuk mengidentifikasi fenotipik, mengetahui sensitivitas antibiotik, serta mendeteksi gen resistensi antibiotik *S. aureus* asal sapi perah dan hewan kesayangan. Sampel susu berjumlah 30 dari peternakan sapi perah di Boyolali dan 62 sampel swab klinis asal hewan kesayangan di Yogyakarta dan Semarang digunakan dalam penelitian ini. Isolasi *S. aureus* dilakukan pada media plat agar darah dan *mannitol salt agar* yang dikonfirmasi fenotipik melalui pewarnaan Gram serta uji katalase dan koagulase. Uji sensitivitas antibiotik dilakukan menggunakan metode Kirby-Bauer *disc diffusion*. Konfirmasi secara molekuler dengan mendeteksi gen 23S rRNA dan *nuc* serta karakterisasi gen *coa* dilakukan pada seluruh isolat. Gen *tetK*, *tetM*, *blaZ*, *mecA*, *linA*, *msrB*, *ermA*, *aacA-D*, dan *norA* sebagai gen pengkode resistensi antibiotik dideteksi pada penelitian ini. Hasil identifikasi fenotipik serta genotipik diketahui 80% (24/30) sampel asal susu sapi perah dan 19,35% (12/62) sampel asal hewan kesayangan positif teridentifikasi *S. aureus*. Berdasarkan uji sensitivitas antibiotik diketahui isolat *S. aureus* asal susu sapi perah resisten terhadap penisilin G (50%), oksasilin (25%), tetrasiklin (21%), ampicilin (17%), gentamisin, cefoxitin, dan amoksisilin (13%), klindamisin (4%), serta masih sensitif terhadap eritromisin (100%). Isolat *S. aureus* asal hewan kesayangan resisten terhadap oksasilin dan eritromisin (13,3%), tetrasiklin, penisilin G, dan klindamisin (6,67%), namun masih sensitif terhadap gentamisin, ampicilin, cefoxitin, siprofloksasin, dan amoksisilin (100%). Gen *tetK* (100%), *tetM* (75%), *linA* (70,83%), *mecA* dan *norA* (62,5%), *msrB* (54,16%), *blaZ* (50%), dan *ermA* (4,17%) ditemukan pada isolat *S. aureus* asal susu sapi perah. Isolat *S. aureus* asal hewan kesayangan terdeteksi gen *tetK* dan *tetM* (100%), *norA* dan *linA* (91,67%), *mecA* (83,33%), *blaZ* (58,33%), *aacA-D* (50%), serta *msrB* (41,67%) dan tidak terdeteksi gen *ermA* (0%). Hasil penelitian ini mengindikasikan adanya mayoritas strain *multidrug resistant S. aureus* pada susu sapi perah dan hewan kesayangan yang membahayakan bagi kesehatan masyarakat sehingga dapat digunakan sebagai dasar strategi pengendalian *multidrug resistant S. aureus*.

Kata kunci: Antibiotik; Hewan kesayangan; *Multidrug resistant*; Sapi perah; *Staphylococcus aureus*

ABSTRACT

Detection of Antibiotic Resistance Encoding Genes of *Staphylococcus aureus* Isolated from Dairy Cattle and Pet Animals

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Antibiotics play a significant role in controlling bacterial infection, however, will no longer be effective because of antimicrobial resistance (AMR). *Staphylococcus aureus* has become resistant to various antibiotics, so detecting and analyzing genes encoding antibiotic resistance is important. This research aims to identify phenotypically, antibiotic sensitivity, and detect antibiotic-resistant genes in *S. aureus* isolated from dairy cattle and pet animals. Samples from dairy farms in Boyolali were used for 30 samples and 62 clinical swab samples of pet animals in Yogyakarta and Semarang. Isolation of *S. aureus* done on blood agar and mannitol salt agar media phenotypically confirmed by Gram staining, catalase, and coagulase test. Antibiotic susceptibility test used by Kirby-Bauer disc diffusion method. Molecular confirmation by detecting 23S rRNA and *nuc* gene also characterization by *coa* gene were performed on all isolate. Gene encoding antibiotic resistance such as *tetK*, *tetM*, *blaZ*, *mecA*, *linA*, *msrB*, *ermA*, *aacA-D*, and *norA* were detected in this research. Phenotypic and genotypic identification results showed 80% (24/30) dairy milk samples and 19,35% (12/62) pet animal samples were *S. aureus* positive. Based on antibiotic susceptibility test, dairy milk *S. aureus* isolates are resistant to penicillin G (50%), oxacillin (25%), tetracycline (21%), ampicillin (17%), gentamicin, cefoxitin, and amoxicillin (13%), clindamycin (4%), and still sensitive to erythromycin (100%). Pet animal *S. aureus* isolates showed resistance to oxacillin and erythromycin (13,3%), tetracycline, penicillin G, and clindamycin (6,67%), but still sensitive to gentamicin, ampicillin, cefoxitin, and ciprofloxacin and amoxicillin (100%). Antibiotic resistance encoding genes such as *tetK* (100%), *tetM* (75%), *linA* (70,83%), *mecA* and *norA* (62,5%), *msrB* (54,16%), *blaZ* (50%), and *ermA* (4,17%) genes were detected on *S. aureus* dairy milk isolate. Pet animal *S. aureus* isolate showed positive for *tetK* and *tetM* (100%), *norA* and *linA* (91,67%), *mecA* (83,3%), *blaZ* (58,33%), *aacA-D* (50%), and *msrB* (41,67%) but no *ermA* detected (0%). These results indicated there are majority of multidrug resistant *S. aureus* strains in dairy milk and pet animals threaten public health. These results can be used as a basic strategy for controlling and preventing multidrug resistance in *S. aureus*.

Keywords: Antibiotic; Dairy cattle; Multidrug resistance; Pet animal; *Staphylococcus aureus*