

Occurance, antibiotic resistance of *Staphylococcus aureus* in foods of animal origin in China

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Abstract

Staphylococcus aureus is considered to be one of the leading causes of food-borne diseases. The number of *S. aureus* strains that exhibits antimicrobial-resistance properties has increased, together with the potential risk of inducing infections hard to be treated or transmitting the same properties to the human microflora via foods. This paper reports the results of a survey from December 2006 to September 2007 on the occurrence of *S. aureus* in foods of animal origin. Of 2560 samples examined, 108 (4.2%) were contaminated *S. aureus* according to GB/T 4789.10-2003 in China. The isolation rates of *S. aureus* from milk, pork, chicken, fresh eggs and incubated eggs were 10.54%, 7.11%, 4.12%, 0% and 1.38% respectively. The drug sensitivity test against 25 antimicrobials of 108 coagulase-positive *S. aureus* strains was performed using broth micro-dilution method. The rates of resistance to penicillin G (94.4%), ampicillin (93.5%), trimethoprim (92.6 %) and sulfisoxazole (88.0 %) were high. The rates of resistance to gentamicin, kanamycin, tilmicosin, lincomycin, erythromycin, azithromycin and tetracycline were 20.4%~48.1%. Few strains were resistant to chloramphenicol (6.5%), danofloxacin (3.7 %) and ciprofloxacin (2.8 %). All strains were susceptible to oxacillin, cephalosporins, ceftriaxone, ceftiofur, amikacin, doxycycline, enrofloxacin, lomefloxacin and norfloxacin. Their antimicrobial resistance spectrums were at least 2 antibiotics, and demonstrated multi-drug resistance mainly to penicillins, sulfonamides and macrolides. A triplex polymerase chain reaction (PCR) assay was used for the simultaneous detection of *blaZ* (β -lactams resistance), *mecA* (methicillin resistance) and *nuc* (*Staphylococcus aureus* identification) genes in a single assay. Screening 79 food origin *S. aureus* isolates used the triplex PCR, and comparing with the results of phenotypic testing. The results indicated that the positive rates for detection of *nuc*, *blaZ* genes using PCR were 97.47% and 73.42% respectively, PCR results of *mecA* gene was negative. The coincidence rate between *nuc* gene detection and phenotypic identification was 97.47%. The coincidence rate of *blaZ* gene detection, β -lactamase test and penicillins sensitivity test was 49.37%, the coincidence

rates of PCR detection between the later two were 60.76% and 75.95% respectively. And the results were concordant with *mecA* gene detection and methicillin resistant phenotype. There was no methicillin-resistant isolates of 79 strains tested. This study provided evidence that the presence of antimicrobial resistant strains of *S. aureus* has become remarkably widespread in foods. This calls for better control of sources of food contamination and of the spread of antimicrobial-resistance organisms.

Keywords: *Staphylococcus aureus*; Antimicrobial resistance; animal origin food; Mutiplex PCR