A persistent antimicrobial resistance pattern and methicillin-resistance associated genotypes in a short term Staphylococcus aureus carriage of a student population

ABSTRACT

Background: Staphylococcus aureus is an opportunistic commensal of human anterior nares. Under favorable conditions, colonization may persist and pose significant threat in healthy individuals leading to infections. Antimicrobial treatment may be limited due to the emergence of methicillin-resistant Staphylococcus aureus (MRSA) which is also frequently resistant to a wide range of antibiotics.

Objective: This study aims to assess and compare the antimicrobial sensitivity pattern and methicillin resistance-associated genotypes of carriage S. aureus previously isolated from a student population at two isolations of one-month interval.

Materials and Methods: In a previous study, S. aureus was isolated from 31.3% (60/192) and 33% (60/180) of a student population during two isolations in October and November 2013 respectively (Mat Azis et al., 2014). Thirty-nine (65%) students were detected for S. aureus at both isolation events and referred as persistent carriers. All isolates were screened for MRSA by PCR detecting the mecA gene. mecA positive isolates were subjected to staphylococcal cassette chromosome (SCC) mec typing. In this current study, all 120 isolates from both isolation episodes were subjected to antibiotic susceptibility test (AST) by Kirby-Bauer disc-diffusion method against cefoxitin (30 µg), erythromycin (15 µg), vancomycin (30 µg) gentamicin (10 µg), ciprofloxacin (5 µg), rifampin (5 µg), penicillin (10 units), and tetracycline (30 µg). Isolates that showed resistant towards cefoxitin were further validated by Etest. Isolates from the 39 persistent carriers were further subjected to spa typing.

Results and Conclusion: Overall, all 120 S. aureus isolates from both isolation events were susceptible toward vancomycin, ciprofloxacin and gentamycin. A highest frequency of resistance was observed for penicillin at both isolations (70% and 65% respectively). This was followed by tetracycline with a similar resistance rate (11.67%) in both isolation events. While low level of resistance was observed against erythromycin at both events. This indicates the persistence of the antimicrobial resistance pattern in the population over the short study period. As for methicillin resistance, out of the 120 isolates of S. aureus, 10 (8.33%) were positive for mecA gene with 4 and 6 isolates from first and second isolation events respectively; 2 isolates were from a same individual. However, among the mecA positive isolates, only 8 isolates showed resistance towards cefoxitin (4 isolates from each isolation event) while the other two mecA positive isolates (from second event) were cefoxitin-susceptible by both disc and Etest methods. The mecA-positive isolates belonged to SCCmec types I (n = 9) and V (n = 1). This indicates the tendency of MRSA to persist although at a low rate with limited genotypes. As for the persistent S. aureus carriers, it was found that for 19 (48.72%) of them, respective individual carried S. aureus of a similar spa types in the respective individuals over the short term period. The limitation of this study is that it only represents a short term carriage in a student population. Whether the observed

findings reflect the population at large requires more studies with a longer study period and a wider population size. The incidence of mecA carrying isolates susceptible to cefoxitin requires more validation on potential heterogeneous characteristics of MRSA found in this student population.