**Genotypic and phenotypic characterization of methicillin resistance determinants and β-lactamase in Staphylococcus species**


ABSTRACT

Aims: To characterize the genotypic distribution of mec complex, bla complex, methicillin-resistance level (cefoxitinMIC) and ß-lactamase activity in carriage methicillin-resistant Staphylococcus species for a potential correlation.

Methodology and results: Biochemical test, 30 µg cefoxitin diffusion disc test, cefoxitin E-test, mec and bla complexes distributions, Pbp2a and ß-lactamase assays were conducted to characterize phenotypic and genotypic of MRSA and MRCoNS in our collection. Phylogenetic tree was constructed using MEGA6 software to trace the diversity of blaZ gene of MRSA and MRCoNS. Sixteen MRSA and nineteen MRCoNS were identified by biochemical tests followed by 30 µg cefoxitin antibiotic disc susceptibility test and mecA gene screening. Twenty nine isolates carry complete mecA genes (2.1 kb), incomplete mec regulator (negative or truncated) and positive Pbp2a assay for both MRSA and MRCoNS. Only MRCoNS SC177 isolate with cefoxitin MIC of 32 µg/mL carries complete mec complex. Thirty-one of thirty-five isolates carry complete bla complex (blaZ, blaRI, blaI) with 10 MRSA produce strong ß-lactamase and cefoxitin MIC of Ó12 µg/mL. Only 4 MRCoNS with cefoxitin MIC of Ò8 µg/mL produce strong ß-lactamase. The diversity of blaZ gene was demonstrated by phylogenetic analysis and unusual amino acid mutation at position 145 for MRSA SA60 isolate may compromise its ß-lactamase activity with low cefoxitin MIC level (2 µg/mL).

Conclusions, significance and impact of the study: Isolates that carry complete complete mecA gene were largely consistent with the expression of Pbp2a. Nevertheless, there is no clear correlation of mec regulator genes in relation to cefoxitin-MIC in both methicillin resistant (MR) Isolates that carry Staphylococcus species. On the other hand, various expression level of ß-lactamase may correlate with cefoxitin-MIC level in MRSA as compared to MRCoNS.



**Keyword:** Cefoxitin-MIC; Mec complex; Bla complex; ß-lactamase; MR Staphylococcus