A synergistic association between adhesion-related genes and multidrug resistance patterns of Staphylococcus aureus isolates from different patients and healthy individuals

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Abstract

Objectives: Biofilm -forming capacity of Staphylococcus aureus (S. aureus) as a commensal opportunistic bacterial species induce a growth in antibiotic resistance in chronic diseases. Since expression of biofilm- related genes and antibiotic resistance function are interdependent, the present study was an attempt to inquire biofilm formation and its relationship with antibiotic resistance in clinical isolates.

Methods: 208 S. aureus clinical isolates from four major provinces of Iran were investigated in terms of presence of adhesion genes (icaA, icaD, icaB, icaC, fnbpA, fnbpB, clfA, clfB, cna, sasC, sasG and bap) using PCR. In addition, microtiter plate (Mtp) assay was performed to examine quantitative biofilm formation of the isolates and their antibiotic resistance patterns against 16 antibiotics determined upon CLSI criteria.

Results: The results revealed high prevalence rate (almost 100%) of icaADBC and MSCRAMMs genes in the isolates. Moreover, bap gene was not detected in any of the tested clinical isolates. Based on phenotypic method 169 isolates (81.25%) were also found to have biofilm formation ability. Among 208 isolates, 98 (47.12%) isolates were multidrug resistant (MDR). Vancomycin, linezolid, nitrofurantoin and quinupristin/dalfopristin were the most effective drugs against MDR strains. Furthermore, the findings demonstrated a significant relationship between MDR and biofilm forming capacity.

Conclusion: Prevalence rate of adhesion- related genes was high in S. aureus from isolates in Iran ;so these genes might be expressed under certain conditions and cause emergence of MDR strains. Therefore, further investigations are necessary to prevent initial attachment based on new candidate adhesion genes for vaccine design.

Keywords: Biofilm; MSCRAMMs; Multidrug resistance; Polysaccharide intercellular adhesion; Staphylococcus aureus.