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Molecular assessment of accessory gene regulator (agr) quorum sensing system in biofilm forming Staphylococcus aureus and study of the effect of silver nanoparticles on agr system

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ABSTRACT Background and Objectives: Staphylococcus aureus is an opportunistic human pathogen that causes a variety of diseases. Staphylococcal biofilms are a source of chronic and continual infections. This study was conducted to estimate the distribution of agr among different isolates of S. aureus and their relationship with biofilm. Also, it was aimed to check the association of operon agr with virulence factors (seb, eta, spa and tst v8) and study the effect of biosynthesis silver nanoparticles on the function of the agr system. Materials and Methods: Out of 580 clinical specimens, 100 S. aureus isolates were isolated and identified based on cultural, morphological, and different biochemical tests, in addition to molecular identification using PCR with specific primer 16SrRNA. For biofilm detection, the fungi synthesized silver nanoparticles were used to check its effect on agr system. Results: The biofilm producer among S. aureus was 61% and non-biofilm producer isolates were 39%. It was found that the total number of agr - bearing isolates was 31 (50.82%), with a significant difference in the distribution percentage of virulence factors genes in isolates of biofilm-forming S. aureus carried agr. The results also revealed a relationship between the agr-quorum sensing system and the prevalence of virulence genes in the isolated S. aureus. Silver nanoparticles (AgNPs) were synthesized by Agaricus compestris, and it was found that it activates the agr system in 31 (100%) of biofilm-forming and carrying operon agr after treatment with sub-MIC of AgNPs. Conclusion: The findings of this study revealed that not all isolates of S. aureus have agr system. Also, it was found that AgNPs have a positive effect on bacterial virulence factors production and could be used for treatment or in cooperation with antibiotics to decrease resistance

Keywords: Staphylococcus aureus, Biofilm, Agaricus compestris, AgNPs nanoparticles