Comparison of the effect of garlic extract and gentamicin on icaA biofilm gene expression in Staphylococcus aureus

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Abstract Staphylococcus aureus is one of the most common bacterial pathogens. Infections of this bacterium become chronic due to the formation of biofilms in injuries and implants. Biofilm cells are more resistant to antimicrobial agents for biofilm acts as a barrier to antimicrobial agents. It is estimated that biofilms are associated with 80% of microbial infections. Biofilm production requires the presence of the icaADBC gene group and the strains carrying this genetic group have potential for biofilm production. Gentamicin is one of the antibiotics that is effective in treating staphylococcal infections, but unfortunately due to biofilms, the effect of this antibiotic is sometimes confronted with the problem. For this reason, researchers have tried to test the combination of antibiotics with natural ingredients to control staphylococcal infections. Garlic (Allium sativum) is a species of Alliaceae family. There are numerous reports of antimicrobial activity of garlic extract against gram positive and gram negative microorganisms. In this study, the effect of garlic extract and its comparison with gentamicin on strains of Staphylococcus aureus bacteria was evaluated based on Antibiogram and MIC tests. The effect of garlic extract and gentamicin alone and in combination on reducing biofilm production in this bacterium was evaluated. And by PCR, the presence of icaA gene in the studied strains was proven. By Real time PCR, icaA gene expression level was studied by treatment with garlic extract, gentamicin and garlic and gentamicin combined treatment compared to control samples. In the standard strain, gentamicin and garlic extract reduced the expression of icaA by 59% and 64% respectively, and the combined use of these two substances resulted in a 75% reduction in expression of this gene. The results of all these tests showed a positive effect of garlic extract on Staphylococcus aureus bacteria. Also, the effect of garlic extract on reduction of biofilm production and

reduction of icaA gene expression in strains studied was confirmed. Also, the combined effect of garlic extract with gentamicin has been shown to reduce of the icaA biofilm gene expression. Keywords: Staphylococcus aureus, garlic extract, gentamicin, biofilm, icaA gene.

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