Determination of icaD gene expression level in Staphylococcus aureus by treatment with Garlic extract and Rifampin

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Introduction & Objective: Staphylococcus aureus is considered as an important pathogenic disease, which can create chronic infections through the formation of biofilms and protect itself the host defense system and become resistant to antibiotic activity. The genes encoding the most important biofilm materials and proteins, especially the Polysaccharides agent, belong to ica and one of the most important of these genes is icaD. Garlic has many health benefits, including antimicrobial, which is attributed to its key element, Allicin. Rifampin is also one of the strongest and most widely used antibiotics against bacterial pathogens, affecting the metabolism of bacteria by interrupting RNA synthesis at the molecular level. The aim of this study was to evaluate the antimicrobial properties and compare the effect of garlic extract and rifampin on the expression of icaD biofilm gene. Materials and Methods: Two pathogenic strains and one standard strain of Staphylococcus aureus, ed and approved. Antibiogram, MIC and MBC tests were conducted with specific concentrations of rifampin antibiotic and garlic extract (garlic tablet). Biofilm phenotypic test was performed with 96 wells microplate and with different concentrations of rifampin and garlic. Following the extraction of RNA rifampin and garlic-affected specimens, as well as control, cDNA synthesis and then real time PCR were performed and the icaD gene expression level was measured in the samples. Results and discussion: The anti-staphylococcal property of garlic extract and its comparison with rifampin effect on pathogenic and standard strains according to antibiogram results was confirmed. The results of MIC and MBC under rifampin treatment and the combination of garlic and rifampin for all strains were 375 and 750 µg / ml, respectively. Based on Real time PCR results, icaD gene expression was influenced by garlic extract and rifampin, and decreased significantly in the strains.

In addition, the rifampin composition and garlic extract resulted in a further reduction in the expression of this gene. Garlic extract and rifampin in the standard strain reduced the icaD expression to 62% and 44%, respectively and the combination of rifampin and garlic extract led to a reduction of 33% of the icaD biofilm gene expression.

Keywords : : rifampin, garlic extract, icaD gene, biofilm, staphylococcus aureus

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