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Staphylococcus epidermidis is known as the most important and opportunist hospital pathogenic normally associated to biofilms formation in medical devices, and consequently causes multiples diseases. Although rifampicin has been proving to be one of the most effective antibiotics against *S. epidermidis* biofilms, its use as a single agent can lead to the rapid acquisition of resistance. Therefore, in the present study it was assessed the combined effect of rifampicin with four aliphatic long-chain aldehydes from olive flavor ((E)-2-Decenal, (E)-2-Heptenal, (E)-2-Nonenal and (E,E)-2,4-Decadienal) in the control of *S. epidermidis* biofilms. Three *S. epidermidis* strains were assayed: 9142 and 1457 (good biofilm producers) and the mutant 1457-M10. Biofilm formation was performed during 24 hours in 96-well microtitre plates, at 37°C with shaking at 130 rpm and using TSB with 0.25% of glucose. After 24 hours, biofilms were washed twice with saline solution (NaCl) and 200 µl of each agent were added (natural agents in a concentration of 250 µg.ml⁻¹ and rifampicin in a concentration of 0.015 - 1.95 µg.ml⁻¹). After 24 hours under the same conditions, biofilm biomass was assessed by the Crystal Violet method and the cellular activity through colony-forming units (CFU). In general, strain 9142 formed biofilms with higher susceptibility to all the aliphatic aldehydes tested alone and in combination with rifampicin. (E)-2-Heptenal was the natural compound that has the lowest antimicrobial effect alone and in combination with rifampicin. On the contrary, the combination of (E,E)-2,4-Decadienal with rifampicin showed synergistic effect, promoting a reduction in the number of viable cells of almost 9 log in strain 9142 and 1457-M10 and 5 log in strain 1457. In conclusion, the combination of these natural compounds with rifampicin constitutes a promising strategy to combat infections caused by *S. epidermidis* biofilms and can be a potential alternative to current therapy.