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Abstract

Is There a Relationship between Biofilm Forming-Capacity and Antibiotic Resistance in *Staphylococcus* spp.? In Vitro Results †

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Abstract: *Staphylococcus* species are considered important members of the normal skin microbiota, in addition to being common pathogens in human and animal infections. In addition to *S. aureus*, other members of the genus are now widely-recognized as pathogens, especially in immunocompromised individuals. One of the most important virulence factors of staphylococci is the formation of biofilm (slime), which enhances their survival on inanimate surfaces, in addition to providing protection against immune cells and antibiotics *in vivo*. There has been considerable interest in the study of the relationship between biofilm formation and the antibiotic resistant phenotype, however, the results in the available literature are inconsistent. Thus, this study aims to investigate the correlation between biofilm formation and antibiotic resistance in *Staphylococcus* spp. isolates using phenotypic methods. One hundred and eighty (n = 180) isolates were included in the study, with *S. epidermidis* (40.0%) and *S. lugdunensis* (10.0%) being the most numerous. Biofilm-forming capacity was assessed by means of the crystal violet microtiter-plate-based (CV-MTP) method. Methicillin-resistance (MR) was identified in 47.2% (n = 85) of isolates. Among the commonly-used antimicrobials, resistance was highest for clindamycin (51.1%), erythromycin (48.9%) and trimethoprim-sulfamethoxazole (51.1%). Based on the CV-MTP method, n = 13 (7.2%), n = 13 (7.2%), n = 42 (23.3%) and n = 113 (62.3%) staphylococcal isolates were non-biofilm-producing, weak, moderate and strong biofilm producers, respectively. No significant differences in biofilm-formation were shown to be observed on the basis of MR (susceptible (S): 0.881 ± 0.309 vs. resistant (R): 0.890 ± 0.347; p = 0.133) and according to the resistance, to most other antibiotics. Rifampin-resistant isolates were more potent biofilm-producers than their susceptible counterparts (S: 0.802 ± 0.296 vs. R: 1.194 ± 0.221; p = 0.024). The association of the antibiotic-resistant phenotype and biofilm-formation is still inconclusive, due to the heterogeneity of the results in presently available studies; however, the understanding of these mechanisms in *Staphylococcus* spp. is crucial to appropriately address the therapy and eradication of these pathogens.

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