

## Abstract

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

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**Abstract:** *Staphylococcus* species are considered as 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 the crystal violet micro-titer-plate-based (CV-MTP) method. 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 observed on the basis of MR (susceptible:  $0.881 \pm 0.309$  vs. resistant:  $0.890 \pm 0.347$ ;  $p = 0.133$ ) and according to the resistance to most other antibiotics. Rifampin-resistant isolates were more potent biofilm-producers, than their susceptible counterparts (S:  $0.802 \pm 0.296$  vs. R:  $1.194 \pm 0.221$ ;  $p = 0.024$ ). The association of the antibiotic-resistant phenotype and biofilm-formation is still inconclusive, due to the heterogeneity of the results in the 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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