Inhibition and eradication of *Pseudomonas aeruginosa* biofilms by secondary metabolites of *Nocardiopsis lucentensis* EMB25

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Millions of people worldwide have been impacted by biofilm-associated disorders, which are impregnable owing to frequent changes in surface antigens and gene expression. Globally, about 11% of nosocomial infections, including cystic fibrosis, chronic wound infections, and post-surgical infections, are caused by *Pseudomonas aeruginosa*, the most prevalent Gram-negative bacterial species. Moreover, biofilms are highly resistant to the host's immune system, and exhibit increased tolerance to stress factors such as starvation, dehydration, and antimicrobials. Here, we have isolated a rare halophilic actinobacteria, *Nocardiopsis lucentensis* EMB25, and utilized the secondary metabolites to inhibit and eradicate *P. aeruginosa* biofilm. For the first time, *N. lucentensis* EMB25 bacteria was explored to study the anti-effect of secondary metabolites on pre-established biofilm. The secondary metabolites targeted the quorum sensing pathway and were found to bind to LasR and RhlR, as confirmed via molecular docking. Also, the reduction in virulence factors, rhamnolipids and pyocyanin further supported the study as these two are regulated by LasR and RhlR. In addition, the downregulation of various QS system genes lasA, lasB, rhlA, rhlB, and pqsA confirmed that the secondary metabolites act on two main regulators of the quorum sensing pathway, LasR, and RhlR. The findings of this study support the bioprospecting of previously unknown and extreme-condition actinobacteria as a rich source of novel bioactives against infections caused by bacterial biofilms.