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Interference of quorum sensing regulated bacterial virulence factors and biofilm by Plumbago zeylanica extract

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Abstract

The excessive and unnecessary use of antibiotics has led to the enormous development of dissemination of antimicrobial resistance (AMR) globally. The situation of AMR has reached an alarming stage and it is speculated that it may become major of global mortality and morbidity. The development of AMR has an urgent need for the development of alternative therapeutic strategies that will selectively target the bacterial pathogenicity without exerting selection pressure, a major factor in development of AMR. Targeting biofilms and quorum sensing (QS) is one of the most promising strategy to combat bacterial pathogenicity. In this study, Plumbago zeylanica methanolic extract was fractioned in different solvents using liquid-liquid partitioning to obtain the active fractions. The effect of bioactive extract of P. zeylanica on QS-controlled virulence factors of C. violaceum 12472, P. aeruginosa PAO1, and S. marcescens MTCC 97 was studied. Major phytocompounds found in hexane fraction of P. zeylanica (PZHF) were cinnamaldehyde dimethyl acetal, plumbagin, asarone, 4-Chromanol, phthalic acid, palmitic acid, ergost-5-en-3-ol, stigmasterol, and β-sitosterol. The violacein production in C. violaceum 12472 was inhibited by more than 80% in the presence of PZHF (200 µg/ml). The most active fraction of P. zeylanica (PZHF) reduced the production of QS-controlled virulence factors of P. aeruginosa PAO1 such as pyocyanin, pyoverdin, rhamnolipid production, motility etc. significantly at sub-MICs. Moreover, PZHF showed 59-76% inhibition of biofilm formation of above test pathogens. The findings revealed that active fraction of P. zeylanica was effective against the QS-regulated functions and biofilms development of Gram -ve pathogenic bacteria.

Biography

Iqbal Ahmad is professor at Department of Agricultural Microbiology, Aligarh Muslim University. He is recently published article on Interference of quorum sensing regulated bacterial virulence factors and biofilm by Plumbago zeylanica extract.

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