

Characterization of Biofilm Forming Capabilities and The Potential of Tetrahydro- β -Carboline Against *Pseudomonas aeruginosa* Clinical Isolates

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Structured Abstract

Background: Antibiotics have been utilized for over 70 years to treat bacterial infections with diverse medical applications. However, their misuse has resulted in a rapid increase in antimicrobial resistance. *Pseudomonas aeruginosa* is a commonly known in antimicrobial resistance worldwide which is an opportunistic pathogen associated with various infections, particularly in immunocompromised patients. The emergence of multidrug-resistant strains necessitates the exploration of new antimicrobial compounds. Tetrahydro- β -carboline (THBC) compounds have shown potential promise in inhibiting biofilm formation and bacterial growth. This study investigates the efficacy of THBC against *P. aeruginosa* isolated from clinical isolates in Malaysia.

Methods: Clinical isolates of *P. aeruginosa* were tested for biofilm formation and antimicrobial susceptibility. THBC compounds were synthesized and tested for their inhibitory effects on biofilm formation and bacterial growth using Minimum Biofilm Inhibitory Concentration Assays (MBIC) and Minimum Inhibitory Concentration Assays (MIC). SYPRO Ruby staining and Pro- Q Emerald were employed together with 1D-gel electrophoresis to compare the protein profiles of *P. aeruginosa* clinical isolates.

Results: THBC compounds demonstrated significant inhibitory effects on biofilm formation and bacterial growth in *P. aeruginosa* isolates. Proteomic analysis revealed alterations in several proteins associated with biofilm formation and resistance mechanisms. The findings suggest that THBC compounds could serve as potential therapeutic agents against *P. aeruginosa* infections.

Conclusion: In conclusion, the findings of this study indicated that there is considerable potential of THBC compounds as effective antimicrobial agents of biofilm formation and bacterial growth in *P. aeruginosa*. The protein profiles of *P. aeruginosa* shown the total protein and glycoprotein that provide insights into the mechanisms of action and resistance, paving the way for future therapeutic developments.

Keywords: Antimicrobial resistance, *Pseudomonas aeruginosa*, Tetrahydro- β -carboline, Biofilm, Protein profiles.

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