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

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Structured Abstract

Background: The genus *Pseudomonas* is a widespread bacterium that is recognized by its resistance to antibiotics and ability to form biofilms, which makes it difficult to eradicate. This study focuses on *P. aeruginosa* infections that are resistant to multiple drugs (MDR) and difficult to treat (DTR), which represent significant therapeutic problems in Malaysia. Since current antibiotics have limited effectiveness, new therapeutics are required. Tetrahydro-β-carbolines (THβCs), possible antibacterial agents against *P. aeruginosa*, have various pharmacological characteristics. This study utilized five strains of *P.aeruginosa* from Raja Permaisuri Bainun Hospital, Ipoh, Perak and three derivatives of THβCs compounds from Chemical Synthesis Group, Puncak Alam. The purpose of this study is to investigate the effect of THβCs against *P. aeruginosa.*

Methods: The study analyzed a comprehensive analysis of biofilm production by *P. aeruginosa* . This involved the use of a biofilm assay to evaluate the ability of the bacteria to form biofilms under specific conditions. Prior to the staining of protein glycosylation and subsequent protein profiling, we performed Minimum Inhibitory Concentration (MIC) and Minimum Biofilm Inhibitory Concentration (MBIC) tests to determine the efficacy of various treatments against the biofilm. Following these preliminary tests, we utilized SDS-PAGE to profile the proteins involved in the biofilm formation and glycosylation processes, allowing for a detailed examination of the molecular characteristics associated with *P. aeruginosa* biofilms.

Results: The data revealed significant differences in *P. aeruginosa* biofilm production among clinical isolates. THβCs showed promising antibacterial activity, successfully reducing biofilm formation with MIC values below 20 µg/mL. Differential expression patterns correlated with resistance levels and the ability to build biofilms were identified via protein profiling.

Conclusion: These findings suggest that THβCs might be useful alternatives in treating *P.aeruginosa* infections. Further research should focus on optimizing THβCs compositions and conducting in-vivo studies to prove its therapeutic potential. More proteome research is needed to better understand the process behind THβCs activity and efficacy.

Keywords: *P. aeruginosa,* THβCs, Biofilm production, MIC, MBIC

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