

Isolation and Identification of Bacteria from Caves and Forest Soil with Antimicrobial Properties

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Structured Abstract

Background: AMR is a natural process that happens over time through genetic changes in pathogens. Its emergence and spread are accelerated by human activity, mainly the misuse and overuse of antimicrobials due to the understudied cave. The objectives of this study are to isolate bacteria from Gua Tempurung (E5b) and Taman Botani Shah Alam (Y1b) soil samples, to test its antimicrobial activity against several test bacteria, and to perform molecular characterization through 16S rRNA identification.

Methods: In this study, two bacterial isolates were tested for its antimicrobial activity against four test bacteria: *Staphylococcus aureus*, *Bacillus cereus*, *Salmonella enterica*, *Escherichia coli* by primary screening through perpendicular streak method. These two isolates were further tested by secondary screening through disk diffusion method and lastly molecular characterization through 16S rRNA identification was performed.

Results: The result indicates that only one isolate (E5b) was able to show potential antimicrobial activity as 5 mm inhibition zone was observed on *S. enterica* plate. These two isolates were further tested by secondary screening through disk diffusion method and no inhibition zones were observed on plate. The MIC and MBC results indicate that the extract of both E5b and Y1b isolate showed no visible growth on the 96-well microtiter plate. Molecular Identification revealed that isolates E5b was identified as *Bacillus sp.* with 98.22% similarity percentage to *Bacillus cereus* meanwhile isolate Y1b was identified as *Providencia sp.* with 97.36% similarity percentage as *Providencia stuartii*. The observed features through macroscopic and microscopic characterization also match with the identified bacteria.

Conclusion: As for conclusion microorganisms that were isolated from soil samples from Taman Botani and Gua Tempurung have been identified and verified to be *Providencia sp.* and *Bacillus sp.* respectively. This study shows that common bacteria were obtained instead of actinobacteria. Only E5b was able to show production of antimicrobial compound towards test bacteria during primary screening. For recommendation, the soil sample should be incubated for a longer amount of time to enhance the growth of actinobacteria.

Keywords: antimicrobial, primary screening, test bacteria

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