

Antimicrobial Activities of Commercialised Gamat Oil Against *Klebsiella pneumoniae* and *Escherichia coli*

Amir Imran Zulkifly, Tengku Idzzan Nadzirah Tengku Idris*

Structured Abstract

Background: Antimicrobial resistance has become an increasingly challenging issue, causing the use of antibiotics in treating diseases to become increasingly ineffective, especially towards *Escherichia coli* and *Klebsiella pneumoniae* strains, which are highly acquired resistance-gene bacteria. Gamat oil is one of the complementary and alternative products that contains the extract of sea cucumber with antimicrobial properties towards bacteria. This study aimed to demonstrate the efficacy of gamat oil against *E. coli* and *K. pneumoniae* and determined how gamat oil can be an alternative topical antibiotic for preventing skin infection in wounds.

Methods: *E. coli* and *K. pneumoniae* bacterial suspensions and four different concentrations of gamat oil A and B (70%, 80%, 90%, and 100%) were prepared. Methods include antimicrobial susceptibility testing (AST) by using a disc diffusion assay, followed by minimum inhibitory concentration (MIC) in a 96-well microtitre plate. Then, the minimum bactericidal concentration (MBC) was determined by taking the positive sample from the MIC, and Fourier-transform infrared (FTIR) spectroscopy was conducted.

Results: There is no zone of inhibition for either bacterium in the disc diffusion assay for AST. However, gamat oil A shows bacteriostatic activities, which is a positive result against *K. pneumoniae* in MIC testing, and MBC testing also proves that all commercialised gamat oils tested do not have bactericidal activities against both bacteria. However, ATR-FTIR proves that both gamat oils are able to disrupt some major compounds of the bacteria. It shows that both gamat oils are able to kill bacteria if they contain a higher concentration of sea cucumber extract to make gamat oil more effective in killing the bacteria.

Conclusion: Commercialised gamat oil is a bacteriostatic substance where it can be effective to inhibit the growth of bacteria depending on the concentration of sea cucumber extract or other ingredients that have antimicrobial activities. Commercialised gamat oil A proved to be effective in inhibiting the growth of *K. pneumoniae*, while commercialised gamat oil B was not effective in inhibiting the growth of both *E. coli* and *K. pneumoniae*.

Keywords: FTIR, Gamat Oil, Antimicrobial Activities, *E. coli*, *K. pneumoniae*

*Correspondence: tengkuidzzan@uitm.edu.my

School of Biology, Faculty of Applied Sciences, Universiti Teknologi MARA, Shah Alam, Malaysia