

Abstract

Determination of the Antibacterial Activity of Eucalyptus, Lavender, and Citronella Essential Oils Against Gram-Negative Microorganisms [†]

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Introduction: Gram-negative bacteria present a major therapeutic challenge due to their phospholipid barrier, which restricts drug penetration. The World Health Organization lists *Pseudomonas aeruginosa*, *Acinetobacter baumannii*, and *Klebsiella pneumoniae* as critical-priority pathogens. Essential oils (EO), rich in terpenes and phenolic compounds, exhibit antimicrobial and antioxidant properties. This study aimed to compare the antibacterial activity of eucalyptus (*Eucalyptus citriodora*), lavender (*Lavandula angustifolia*), and citronella (*Cymbopogon winterianus*) EO against Gram-negative bacteria. **Methodology:** Commercial EO were obtained from Southeast Brazil. Minimum Inhibitory Concentration (MIC) and Minimum Bactericidal Concentration (MBC) were determined by macrodilution following CLSI M26-A (1999). Tests were performed against *Escherichia coli* (ATCC 25922), *Salmonella enterica* (ATCC INCQS 00236), *K. pneumoniae* (ATCC BAA 1706), *A. baumannii* (ATCC 019606), and *P. aeruginosa* (ATCC 27853). Results were expressed in mg/mL. **Results:** MIC values ranged from 2.09 to 17.05 mg/mL and MBC from 1.09 to 153.45 mg/mL from all EO tested. *E. coli* was the most susceptible strain (MIC 2.09–5.40 mg/mL; MBC 2.81–10.89 mg/mL), while *K. pneumoniae* was the most resistant (MIC 10.89–17.05 mg/mL; MBC 87.20–153.45 mg/mL). Citronella EO showed the strongest activity, with MIC < 0.53–17.05 mg/mL and MBC 1.09–153.45 mg/mL. **Conclusions:** The EO tested demonstrated antibacterial potential against Gram-negative pathogens, especially *E. coli*. Citronella EO was the most effective, suggesting its promising role in future applications. Considering their chemical complexity, EO combinations should be explored for synergistic effects, offering potential alternatives against multidrug-resistant strains.



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