

## Chemical Composition and Antimicrobial Activity of *Lavandula angustifolia* L. Essential Oil Determined by GC-MS

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### Abstract

*Lavandula angustifolia* L. is one of the most valuable aromatic plants widely used in pharmaceutical, cosmetic, and food industries due to its essential oil rich in bioactive volatile compounds. In this study, the chemical composition and antimicrobial activity of *L. angustifolia* essential oil were investigated. The volatile constituents were analyzed by gas chromatography–mass spectrometry (GC–MS) in Selcuk University İLTEK. The chemical composition of *L. angustifolia* L. essential oil was analyzed by GC–MS. The sample was diluted in hexane to obtain a 2000 ppm solution and injected into an Agilent 7890B GC–MS system equipped with an HP-5MS column (30 m × 0.25 mm × 0.25 µm). Helium was used as the carrier gas at 1.0 mL/min. The injector temperature was 220 °C with a split ratio of 50:1 and an injection volume of 1 µL. The oven temperature was programmed from 60 °C (5 min) to 240 °C at 4 °C/min, with a 10 min hold, and spectra were recorded in scan mode. GC–MS analysis revealed a complex mixture of monoterpenes and oxygenated monoterpenes. The major component of the essential oil was linalool (35.10%), followed by camphor (~4.85%), eucalyptol (1,8-cineole) (~4.28%), and borneol (~3.67%). In addition, minor constituents such as  $\alpha$ -pinene, camphene,  $\beta$ -myrcene,  $\beta$ -ocimene, and  $\gamma$ -terpinene. Antimicrobial activity was determined by the broth microdilution method against selected Gram-positive (*Staphylococcus aureus*, *Bacillus cereus*, *Sarcina lutea*) and Gram-negative (*Escherichia coli*, *Pseudomonas aeruginosa*, *Klebsiella pneumoniae*, *Salmonella enteritidis*) bacteria. The essential oil showed notable antibacterial activity, with MIC values of 3.125 mg/mL for *B. cereus*, 1.562 mg/mL for *S. lutea*, 6.25 mg/mL for *S. aureus*, 6.25 mg/mL for *E. coli* and *K. pneumoniae*, and 3.125 mg/mL for *S. enteritidis* and *P. aeruginosa*. cymene were also identified. Overall, the findings indicate that *L. angustifolia* L. essential oil rich in oxygenated monoterpenes, particularly linalool, exhibits promising antibacterial activity and may have potential applications in pharmaceutical, cosmetic, and natural antimicrobial formulations.

**Key Words:** *Lavandula angustifolia* L., essential oil, GC–MS, linalool, antimicrobial activity, MIC

