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Title: Antimicrobial activity of *Citrus limon* essential oil against *Escherichia coli* in minced meat

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Abstract

The efficacy of lemon oil as a food preservative against the well-known meat pathogen was investigated. *Escherichia coli* was detected and identified from 20 samples of frozen minced beef by using VITEK II automated system. The disc diffusion method was used to test the antibacterial activity of lemon essential oil diluted in ethanol 70% against *E. coli* on agar plates. The oil presented a significant antimicrobial activity against the tested bacterium; the minimum inhibitory concentration (MIC) was determined to be 0.25%, lemon oil (0.25%) had a measurable inhibitory effect when mixed with beef infected with 10⁶ CFU/ml bacterial load. SEM images of the treated *E. coli* revealed membrane rupture, abnormal shaped cells, and cellular damage. The volatile profile of the oil revealed that it is mainly composed of monoterpenes, with citral, 6-exohydroxy camphene, and fenchone as the major compounds. The lemon essential oil could be a good alternative for existing biocides due to its potent antibacterial properties and its safety to the environment and human health.

Keywords: Antimicrobial, *E. coli*, GC-MS, lemon oil, SEM.