

Antimicrobial activity of ethanolic plant extracts alone and in combination with glycine and sodium acetate against *Escherichia coli*

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Abstract

Escherichia coli O157:H7 is a major foodborne pathogen, which causes severe human infections. Plant extracts, glycine, and sodium acetate (NaOAc) exert antimicrobial effects that can be used to control pathogenic *E. coli*. However, their combinations have not been investigated before. Thus, this study aimed to investigate the combined effect of ethanolic plant extracts with glycine and NaOAc against *E. coli* at various pHs and temperatures. Twenty-two plant extract samples were screened by disk diffusion method. Only clove and rosemary extracts exhibited significant antimicrobial activity against pathogenic and non-pathogenic *E. coli* with inhibition zones 12.25 to 17.25 mm and 11.25 to 12.00 mm, respectively. Clove extract inhibited the growth of *E. coli* with bactericidal manner with both minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) of 0.4%, while MIC and MBC of rosemary extract were 0.6% and 0.8%, respectively. Clove extract (0.2%) at neutral condition with 0.1% NaOAc or 1.0% glycine showed additive effect with fractional inhibitory concentration (FIC) index 0.53 and 0.75, respectively. At pH 5.5, 0.2% rosemary or 0.1% clove extract supplemented with 0.1% NaOAc showed additive interaction with FIC indices 0.53 and 0.70, respectively. The population of *E. coli* O157:H7 in phosphate-buffered saline (PBS) with 0.2% clove extract, 2% glycine, and 2% NaOAc showed more than 5 log reduction after incubation at 15 °C for 96 h, while the combination of 0.1% clove extract and 2% NaOAc at pH 5.5 completely inhibited *E. coli* within 24 h at 35 °C. Thus, the combination of plant extracts with glycine and NaOAc could serve as a promising hurdle technology in controlling the growth of *E. coli* and could be applied to food preservation.

Biography

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