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Advanced phytochemical insights and therapeutic potential of *Hyssopus officinalis* antibacterial action and gastric mucosal protection

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Abstract:

Hyssopus officinalis (Lamiaceae) thrives in the mountainous regions of Algeria, where its aromatic properties and medicinal uses have been embraced by local. Traditionally used in herbal medicine, this aromatic plant has garnered attention for its potential benefits in treating infectious diseases and gastrointestinal issues, including ulcers. This study seeks to evaluate, *in vitro*, the antibacterial capacity of leaf η-butanol extract of *Hyssopus officinalis* (η-BLHE) against four pathogenic bacteria, investigate, *in vivo*, its protective effects on gastric mucosa, and identify its bioactive compounds. The agar well diffusion method was employed to assess the antibacterial effects. η-BLHE was orally administered to two experimental groups of rats, both before and after the induction of gastric ulcers using absolute ethanol. The extent of gastric mucosal lesions was assessed through macroscopic and histopathological examinations. Phytochemical compounds were recognized by UPLC-ESI-MS/MS. Among the 13 compounds identified in the η-BLHE, coumaric acid (45.26%) and rutin (18.93%) were found to be the most prevalent. η-BLHE demonstrated antibacterial activity comparable to gentamicin ($p < 0.05$) against *Staphylococcus aureus* strain. Our results indicated that pretreatment with η-BLHE significantly reduced the ulcerated and hemorrhagic areas in the gastric mucosa of rats subjected to ethanol-induced gastric ulcers. Macroscopic examination revealed a marked decrease in lesion size, while histopathological analysis demonstrated improved mucosal integrity and reduced inflammation. This dual functionality underscores the potential of *Hyssopus officinalis* in contemporary medicine, advocating for further investigation into its active constituents and their clinical applications in integrative health practices.

Keywords: *Hyssopus officinalis* L., gastroprotective effect, ethanol- induced gastric ulcers, antibacterial capacity.