

عنوان مقاله:

Antibacterial activity of airborne fungal mediated nanoparticles in combination with *Foeniculum vulgare* essential oil

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خلاصه مقاله:

Introduction: A cost-effective and ecologically friendly method of generating silver nanoparticles (AgNPs) includes pathways that utilize a variety of biological sources to decrease metal ions. This study was designed to synthesize AgNPs using a fungus strain *Aspergillus flavus* and evaluate its antibacterial activities alone or in combination with *Foeniculum vulgare* (fennel) essential oil (EO). **Methods:** The antibacterial activity of different concentrations of biosynthesized AgNPs by *Aspergillus flavus* individually and in combination with fennel EO was investigated using disc diffusion methods and minimal inhibitory concentration (MIC). Bacterial species, including *Escherichia coli*, *Pseudomonas aeruginosa*, *Klebsiella pneumoniae*, *Enterobacter cloacae*, *Shigella sp.*, *Staphylococcus aureus*, and *Staphylococcus epidermidis* were tested. **Results:** Formation of dark brown color, ultraviolet-visible (UV/Vis) spectroscopy, transmission electron microscope (TEM), and attenuated total reflectance Fourier transform infrared spectroscopy (ATR-FTIR) were used for the characterization of AgNPs. Obvious synergistic effects were observed between AgNPs and EO of fennel (*F. vulgare*) with all tested bacteria except *S. aureus*, through increases in fold area of inhibition (IFAs) within the range of ۰.۱۵ to ۸.۸۷. Although *S. aureus* had the most susceptibility toward both AgNPs and EO of fennel (۲۴ and ۱۷ mm, respectively), no synergistic activity was exhibited. The best synergistic capacity resulted from AgNPs and fennel EO was observed against *S. epidermidis* (۸.۸۷-fold in IFA). **Conclusion:** This study revealed that when biosynthesized AgNPs were mixed with the EO of *F. vulgare*, they became more bacteriostatic and might be developed to treat bacterial infections in the future.

کلمات کلیدی:

Nanoparticles, Synergistic activity, Antimicrobial activity, Medicinal plant, *Aspergillus flavus*

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