

عنوان مقاله:

Anti-bacterial Activity of Bio-Synthesis of Cerium Oxide Nanoparticles with Gallic acid

محل انتشار:

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خلاصه مقاله:

BACKGROUND AND OBJECTIVES Cerium oxide nanoparticles, also known as nanoceria, are particles of cerium oxide that are less than 100 nanometers in size. They have unique physical and chemical properties that make them attractive for a wide range of applications, including catalysis, energy storage, biomedical function, and drug delivery. The antibacterial properties of cerium oxide nanoparticles are believed to be due to their ability to generate reactive oxygen species (ROS). The objective of this study is to investigate and characterize the antibacterial effect of cerium oxide nanoparticles (CeO₂NP) synthesized using Gallic acid. **MATERIALS AND METHODS** The biosynthesis of CeO₂NP was performed using Gallic acid by sol-gel method; This method involves the reaction of a cerium nitrate with a stabilizing agent (Gallic acid), then pH of the solution adjusted to basic to 10, and heated in 400 °C for 2h to form cerium oxide nanoparticles. The synthesized nanoceria was evaluated by SEM, XDR, DLS, ZETA and FTIR tests. Antimicrobial properties of CeO₂NP against Escherichia coli, Staphylococcus aureus, Bacillus subtilis and Klebsiella bacteria were measured by MIC. **RESULTS AND DISCUSSION** The results of current study shown that average size of CeO₂NPs was 100-200 nm and XRD analysis displayed the cubic fluorite structure of the synthesized nanoparticles. FT-IR reveals stretching frequencies at 550 cm⁻¹ which confirmed the Ce-O stretching bands and showing application of natural components for the production of nanoparticles. The SEM images reveal that the prepared CeO₂NP are composed of spherical nanoparticles in aggregated form. Minimum bactericidal concentrations for Gram positive and -negative of 100-250 µg/mL were generated. However, S. aureus and E. coli exhibited the higher sensitivity, while other were the slightest sensitive to CeO₂NPs. **CONCLUSION** These results indicate that CeO₂NPs synthesized using Gallic acid are hopeful another treatment for some bacterial infection. Also, this study will give the possible for the sustained progress of biocompatible nanoparticles with improved biological abilities derived from natural products.

کلمات کلیدی:

Cerium oxide nanoparticle, Green synthesized, Anti-bacterial, Gallic acid

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