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# Peepal (*Ficus religiosa*) leaf extract mediated green synthesis of lanthanum and cerium oxide nanoparticles: Characterization and potential biological applications

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The present study describes the synthesis of lanthanum and cerium oxide ($La_2O_3$ and $CeO_2$) nanoparticles (NPs) based on eco-friendly approach using *Ficus religiosa* leaves extract. The synthesized NPs have been characterized using various analytical techniques, including UV-Visible and FT-IR spectroscopy, and PXRD. The surface morphology and shape of the NPs have been determined using advanced imaging techniques such as Scanning Electron Microscope (SEM), Transmission Electron Microscope (TEM) and High-Resolution Transmission Electron Microscope (HRTEM) revealing that the NPs possessed predominantly spherical and rod-like shapes. Additionally, the surface area covered by NPs has been calculated using BET analysis and it shows an increment from a value of 7.243 $m^2 g^{-1}$ to 45.144 $m^2 g^{-1}$ and peak pore volume increases from 0.0743 $cm^3 g^{-1}$ to 0.1904 $cm^3 g^{-1}$. The antibacterial activity of NPs has been evaluated against Gram-positive and Gram-negative bacteria showing significant activity. Finally, the hemolytic and antioxidant activity of NPs have been assessed and have demonstrated their efficacy suggesting their potential applications.

**Keywords**: Lanthanum oxide nanoparticles, Cerium oxide nanoparticles, Transmission electron microscopy, Antioxidant, Green synthesis, Hemolysis