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The green synthesis and antibacterial efficacy of CuO and ZnO nanoparticles against Gram-positive and Gram-negative bacteria

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Infectious diseases possess a big challenge for the scientists worldwide. Antibiotics were once a boon for mankind to combat the infectious diseases. However, the emergence of antibiotic resistance among superbugs is matter of great concern throughout the world. Recent advances in the field of nanotechnology particularly synthesis of metal nanoparticles of specific size and shape are suggestive of bright future of these materials. Nano-sized particles of the metal oxides viz. CuO and ZnO were successfully synthesized using aqueous and alcoholic extracts of *Swertia chirayita* as a reductant and stabilizer. The as-prepared nanoparticles were further characterized by using

Fourier transform infrared spectroscopy, X-ray diffraction, UV-visible spectroscopy, high-resolution transmission electron microscopy, scanning electron microscopy and energy-dispersive X-ray spectroscopy. These nanoparticles were evaluated for their antibacterial efficacy against Gram-positive (*Staphylococcus aureus*) as well as Gram-negative (*Escherichia coli* and *Salmonella enterica*) bacterial strains. Among the two metal oxides, CuO nanoparticles showed better antibacterial efficacy as compared to ZnO nanoparticles against both the Gram-positive and Gram-negative bacterial strains.

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