

Exploring medicinal potential of *Bixa orellana* L. root extract: Synthesis and analysis of silver nanoparticles

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Bixa orellana L., commonly known as “sindoor,” has been used for various medicinal applications, which showed its potential use as an active ingredient in pharmaceutical products. The aim of this work was to exhibit the ethnopharmacological and biological activity and the studies on phytochemistry of *Bixa orellana* L root extract. The root extract was subsequently used for the green synthesis of silver nanoparticles (AgNPs), which was confirmed by UV, SEM and XRD analysis. The antimicrobial efficacy of these nanoparticles was assessed against both Gram-positive and Gram-negative bacteria as well as fungi and was compared with the indigenous root extract. The *Bixa* root extract was found to have potential effect against clinical pathogens, free radicals and HEP-2 cell lines. FTIR analysis confirmed the presence of various amine, alcohol, and carboxylic acid groups. UV spectra of AgNPs showed surface plasmon resonance at 425 nm and spherical nanoparticles ranging from 35-53 nm by SEM. X-ray diffraction spectrum exhibited 2θ values corresponding to the silver nanocrystal. The antimicrobial activity of these nanoparticles was compared with that of root extract. This study shows the well-characterized pharmacological actions that may be considered relevant for the future development of an innovative therapeutic agent.

Keywords: Antimicrobial, Antioxidant, *Bixa* root extract, HEP-2 cell line