

Green synthesis, antimicrobial and cytotoxic effects of silver nanoparticles mediated by *Eucalyptus camaldulensis* leaf extract

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Objective: To investigate the environmental-friendly extracellular biosynthetic technique for the production of the silver nanoparticles (AgNPs) by using leaf extract of *Eucalyptus camaldulensis* (*E. camaldulensis*).

Methods: The NP were characterized by colour changes and the UV-visible spectroscopy. The cytotoxic effects of prepared AgNPs was detected against four types of pathogenic bacteria, including two Gram-negative bacteria (*Pseudomonas aeruginosa* and *Escherichia coli*) and two Gram-positive bacteria (*Staphylococcus aureus* and *Bacillus subtilis*) by using agar well diffusion method.

Results: A peak absorption value between 400-450 nm for the extract and the colour change to dark brown were corresponding to the plasmon absorbance of AgNPs. On the other hand, aqueous extract of *E. camaldulensis* leaves could be effective against tested microorganisms which showed inhibition zones of 9.0-14.0 mm. Furthermore, biologically synthesized AgNPs had higher ability to suppress the growth of the tested microorganisms (12.0-19.0 mm).

Conclusions: Our findings indicated that extracellular synthesis of AgNPs mediated by *E. camaldulensis* leaf extract had an efficient bactericidal activity against the bacterial species tested. The exact mechanism of the extracellular biosynthesis of metal NP was not well understood. Further studies are needed to highlight the biosynthesis process of AgNPs and also to characterize the toxicity effect of these particles.

Keywords: *Eucalyptus camaldulensis*, Silver nanoparticles, Antimicrobial activity, Bacteria