



# Colloidal Copper Nanoparticles Loaded with Vanillic Acid as Liquid Dressings: Development, Characterisation and Evaluation

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Accepted: 18 February 2025

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## Abstract

**Purpose** The study aimed to develop liquid dressings containing copper nanoparticles infused with vanillic acid to enhance their antibacterial properties.

**Method** PEG 6000 served as a stabilising agent in the chemical reduction process. The Box-Behnken design was employed to optimise the synthesised nanoparticles. Vanillic acid, obtained from *Vanilla planifolia*, possesses medicinal qualities, promoting wound healing and antioxidant properties. The nanoparticles were integrated into an optimised batch of in-situ film (liquid dressing) and assessed using DSC, FESEM, cytotoxicity analysis, and in-vivo testing.

**Result** The optimised batch exhibited an entrapment effectiveness of 90.9%, an in-vitro drug release of 89.6%, a particle size of 97.9 nm, a zeta potential of -31 mV, and a polydispersity index of 0.316.

**Conclusion** The liquid dressing exhibited superior wound healing capabilities compared to the pure Vanillic acid solution.

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