



Pongamia pinnata seed extract-mediated green synthesis of silver nanoparticle loaded nanogel for estimation of their antipsoriatic properties

Darshan R. Telange¹ · Nilesh M. Mahajan² · Tushar Mandale² · Sachin More² · Amol Warokar²

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Abstract

This research describes the eco-friendly green synthesis of silver nanoparticles employing *Pongamia pinnata* seed extracts loaded with nanogel formulations (AgNPs CUD NG) to improve the retention, accumulation, and the penetration of AgNPs into the epidermal layer of psoriasis. AgNPs were synthesized using the Box–Behnken design. Optimized AgNPs and AgNPs CUD NG were physico-chemically evaluated using UV–vis spectroscopy, SEM, FT-IR, PXRD, viscosity, spreadability, and retention studies. It was also functionally assessed using an imiquimod-induced rat model. The entrapment efficiency of AgNPs revealed ~79.35%. Physico-chemical parameters announced the formation of AgNPs via surface plasmon resonance and interaction between O–H, C=O, and amide I carbonyl group of protein extract and AgNO₃. Optimized AgNPs showed spherical NPs ~116 nm with better physical stability and suitability for transdermal applications. AgNPs CUD NG revealed non-Newtonian, higher spreadability, and better extrudability, indicating its suitability for a transdermal route. AgNPs CUD NG enhanced the retention of AgNPs on the psoriatic skin compared to normal skin. Optimized formulations exhibit no irritation by the end of 72 h, indicating formulation safety. AgNPs CUD NG at a dose of 1 FTU showed significant recovery from psoriasis with a PASI score of ~0.8 compared to NG base and marketed formulations. Results indicated that seed extract-assisted AgNPs in association with CUD-based NG formulations could be a promising nanocarrier for psoriasis and other skin disorders.

Darshan R. Telange and Nilesh M. Mahajan have been identified and contributed equally.

✉ Darshan R. Telange
darshan.pharmacy@dmihir.edu.in

✉ Nilesh M. Mahajan
nmmahajan78@gmail.com

¹ Datta Meghe College of Pharmacy, Datta Meghe Institute of Higher Education and Research (Deemed to Be University), Sawangi (Meghe), Wardha 442004, Maharashtra, India

² Dadasaheb Balpande College of Pharmacy, Rashtrasant Tukdoji Maharaj Nagpur University, Nagpur 440037, Maharashtra, India