

Title : Utilization of Lignin Extracted from Longan Peel as an Ingredient in Peel-off Acne Treatment Gel

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## ABSTRACT

This research aimed to utilize lignin extracted from longan (*Dimocarpus longan*) peel, an abundant agricultural waste in northern Thailand, as an ingredient in a peel-off acne treatment gel formulation. Lignin was extracted from longan peel using the organosolv method, employing 70% (v/v) ethanol as the solvent and hydrochloric acid as a catalyst. Following lignin extraction and precipitation, the lignin yield obtained ranged from 1.50% to 4.98%. The physicochemical properties of the extracted lignin were characterized. Fourier Transform Infrared Spectroscopy (FTIR) confirmed the characteristic functional groups of lignin. Dynamic Light Scattering (DLS) analysis revealed particle sizes ranging from 615.1 to 1484 nm with zeta potentials between -33.3 and -35.0 mV, indicating good colloidal stability. Antibacterial activity was evaluated using Minimum Inhibitory Concentration (MIC), Minimum Bactericidal Concentration (MBC), and disc diffusion assays against *Staphylococcus aureus*, *Staphylococcus epidermidis*, and *Pseudomonas aeruginosa*. The results demonstrated that longan peel-derived lignin exhibited strong antibacterial activity, with MIC values ranging from 0.31 to 1.25 mg/mL and an MBC of 10 mg/mL against all tested strains. Furthermore, the extracted lignin was incorporated into a peel-off acne treatment gel formulation using carboxymethyl cellulose (CMC) and polyvinyl alcohol (PVA) as the base components. The formulated peel-off gel demonstrated stronger antibacterial activity than commercial products. The characteristics of the gel showed no significant changes in color, homogeneity, or external appearance during storage at room temperature for 7 days. These findings indicated that lignin derived from longan peel exhibits antibacterial properties and represents a promising natural and sustainable ingredient for skincare applications, while also contributing to the value-added utilization of agricultural waste.

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