Title : Peel-off Facial Mask Gel Containing Lignin Nanoparticles from Rice Straw for Skin Conditioning

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ABSTRACT

This research focuses on developing a peel-off facial mask gel containing lignin nanoparticles extracted from rice straw to improve skin condition. Lignin was extracted from rice straw using an alkaline solution extraction with sodium hydroxide under a certain autoclave condition. The yield of lignin was found to be 14.62% (w/w). Lignin nanoparticles were prepared using high-frequency ultrasound, resulting in a 6.07 mg/ml concentration. The physicochemical characteristics of the lignin nanoparticles were conducted to evaluate their specific properties by a Dynamic Light Scattering (DLS) analysis. The results revealed that the average particle size was 256.53 ± 12.92 nm with a Zeta potential value of -24.17 ± 1.82 mV, indicating moderate stability. The Polydispersity Index (PDI) was 0.39±0.03, signifying uniform particle dispersion. The antioxidant activity of the extracted lignin nanoparticles was assessed using three methods. The results demonstrated that lignin nanoparticles extracted from rice straw exhibited antioxidant activity, with an IC_{50} value of 1.52 ± 0.22 µg/mL, as determined by the DPPH assay. The ABTS assay presented the antioxidant activity of the lignin nanoparticles, with an IC_{50} value of 2.38 µg/mL. In the FRAP assay, the lignin nanoparticles yielded a FRAP value of 259.79 ± 62.41 mg per gram of lignin nanoparticles. Furthermore, the lignin nanoparticles exhibited slight effectiveness in the tyrosinase inhibitory activity. This research indicated that lignin nanoparticles from rice straw had potential antioxidant activities and could be used as an alternative cosmetics ingredient such as peel-off facial mask.

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