Title : Development of Antioxidant Compounds Loaded Hyalurosome Delivery System for Enhanced Antioxidant Efficacy in a Facial Serum Formulation

Author(s) :
1. Ms. Siraprapha Wekintichakorn **Student ID :** 650510107
2. **Student ID :**
3. **Student ID :**

Major : Biochemistry and Biochemical Innovation

Advisor(s) :
1. Assistant Professor Dr. Kanchana Dumri
2.
3.

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ABSTRACT

Berberine chloride (BC) and resveratrol (RES) are bioactive compounds with potent antioxidant activity and promising applications in cosmetic formulations. However, their utilization is limited by poor aqueous solubility, instability, and low delivery efficiency. This study aimed to develop hyalurosomes, nanoscale vesicular carriers composed of phospholipids and hyaluronic acid, for the encapsulation of BC and RES, and to evaluate their antioxidant activity, physicochemical properties, and encapsulation performance. Antioxidant activity was assessed using the DPPH radical scavenging assay, with vitamin C as a reference standard. The half-maximal inhibitory concentration (IC_{50}) values were 1.074 mg/mL for BC and 0.045 mg/mL for RES and were used to guide concentration selection for formulation development. UV–visible spectrophotometry was employed for quantitative analysis. BC exhibited a maximum absorption wavelength (λmax) at 349 nm, while RES showed a λmax at 306 nm; these wavelengths were applied for the determination of encapsulation efficiency (%EE). The developed hyalurosomes exhibited particle sizes in the range of 133.5-185.5 nm, confirming successful nanoscale formation. Encapsulation efficiency ranged from 57.18–62.80% for BC and 51.15–59.77% for RES. The optimized

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systems were successfully incorporated into facial serum formulations, highlighting their potential as nanocarrier platforms for enhanced antioxidant delivery in cosmetic applications.

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