EuroSciCon

June 21-22, 2018
London, UK

EuroSciCon Conference on
Cosmetology & Dermatology

Clin Pediatr Dermatol 2018, Voume: 4
DOI: 10.21767/2472-0143-C1-003

VEGETABLE OIL NANOEMULSION BY APPLYING D-PHASE EMULSIFICATION METHOD AND STATISTICAL APPROACH

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The interest in nanoemulsions has been growing considerably in recent decades due to its specific attributes such as high stability, prolonged efficacy, low side effects and attractive appearance. The high versatility of nanoemulsions includes a variety of manufacturing process options as well as a combination of widely assorted components: surfactants, liquid lipids or even drug-conjugates. Hence, one of the key elements to a successful nanoemulsion development is the selection of process. Two major methods used for nanoemulsion preparation are the high- and low-energy processes. The high-energy methods include high-pressure homogenization, microfluidization and sonication process. These mechanical methods are based on the application of intensive disruptive forces: collision, compression and cavitation. The low-energy process, also known as the physicochemical method, produces a spontaneous change of the interfacial curvature of the oil and aqueous phases. As a mild process for the sensitive molecules and energy-saving for large-scale production, the low-energy methods attracted more attention in the recent years. The D-Phase emulsification (DPE) method is a less known low-energy method. It does not require a strict adjustment of the hydrophilic-lipophilic balance nor high concentration of surfactants. Moreover, it is able to achieve nanoscale emulsion with high vegetable oil content, which is a limitation in conventional low-energy methods such as the phase inversion by temperature and composition methods. A nanoemulsion with a mean particle size of 20-30 nm was successfully obtained using the DPE method and Box-Behnken statistical design of experiment. The nanoemulsion formulation consisted of 40.0% (w/w) olive oil and 2.0% (w/w) single hydrophilic surfactant. These features provide alternatives for designing the innovative and high-value application nanoemulsions

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