Effect of compositions in nanostructured lipid carriers (NLC) on skin hydration and occlusion.

ABSTRACT

Purpose: To study the effects of varying lipid concentrations, lipid and oil ratio, and the addition of propylene glycol and lecithin on the long-term physical stability of nanostructured lipid nanocarriers (NLC), skin hydration, and transepidermal water loss. Methods: The various NLC formulations (A1-A5) were prepared and their particle size, zeta potential, viscosity, and stability were analyzed. The formulations were applied on the forearms of the 20 female volunteers (one forearm of each volunteer was left untreated as a control). The subjects stayed for 30minutes in a conditioned room with their forearms uncovered to let the skin adapt to the temperature (22°C±2°C) and humidity (50%±2%) of the room. Skin hydration and skin occlusion were recorded at day one (before treatment) and day seven (after treatment). Three measurements for skin hydration and skin occlusion were performed in each testing area. Results: NLC formulations with the highest lipid concentration, highest solid lipid concentration, and additional propylene glycol (formulations A1, A2, and A5) showed higher physical stability than other formulations. The addition of propylene glycol into an NLC system helped to reduce the particle size of the NLC and enhanced its long-term physical stability. All the NLC formulations were found to significantly increase skin hydration compared to the untreated controls within 7 days. All NLC formulations exhibited occlusive properties as they reduced the transepidermal water loss within 7 days. This effect was more pronounced with the addition of propylene glycol or lecithin into an NLC formulation, whereby at least 60% reduction in transepidermal water loss was observed. Conclusion: NLCs with high lipid content, solid lipid content, phospholipid, and lecithin are a highly effective cosmetic delivery system for cosmetic topical applications that are designed to boost skin hydration.

Keyword: Nanostructured lipid carriers; Particle size; Skin hydration; Transepidermal water loss.