NT_564

The Preparation and Properties of Oleamide Serinol-Loading Niosomes with Anionic Surfactants for Enhanced Delivery System

Ryu, Ji Soo[1]; Seo, Jae Yong[1]; Sung, Mi Kyung[1]; KANG, YUJIN[2]; PARK, YOUNGAH[2]; Cho, Hyun Dae[1]
[1] New Technology Lab., Cosmecca Korea Co., Ltd, 323 Pangyo-ro, Bundang-gu, Seongnam-si, Gyeonggi-do, Republic of Korea;
[2] H&A Pharma Chem Co., Ltd, R&D center, 48, Bucheon-ro 186 beon-gil, Bucheon-si, Gyeonggi-do, Republic of Korea

Introduction

In recent years, the vesicular drug delivery systems have been developed, such as microemulsions, nanoparticles, and vesicular systems, to maintain and transport high concentrations of drugs to be effective. Liposomes are the most common vesicular delivery systems of active ingredients, which are composed of natural or synthetic phospholipid bilayer. On the other hand, liposomes have several disadvantages, such as toxicity, high cost of their formulation, stability issues. Thus, it is necessary to promote the finding of new vesicular carrier systems with enhanced properties.

Niosomes have been investigated to improve the delivery of drugs and vaccines, as an alternative to liposome because of low cost of nonionic surfactants and greater chemical stability, content uniformity. However, it could be an issue of physical instability with the aqueous suspension, such as aggregation formation, drug leakage from the entrapment site, and hydrolysis of encapsulated drug that shorten the shelf life of niosomal formulation. The addition of a charged molecule to the bilayer can be used for stabilization. The charge molecule is added at an amount lower than 5 mol% that it could inhibit the formation of niosomes because of the high concentration of charged molecules.

Oleamide serinol, synthesized by serinol and oleic acid has beneficial effects on human skin which offers brightening, anti-inflammatory and moisturizing properties. However, it has a low solubility in water which is risk factor to commercial applications in the cosmetic industry as active ingredients. Therefore, the use of vesicles as carriers are required to overcome issues of solubility and chemical stability of the formulation.

To our knowledge, the loading of oleamide serinol in the formulation of niosomes by using the different type of anionic surfactants as a niosome bilayer stabilizer has not been studied yet. In this study, we developed niosomal systems containing oleamide serinol with different types of anionic surfactant as a membrane modifier to improve the skin delivery. This suggests that the niosomal development has a potential for restoring and maintaining skin barrier function in cosmetics applications.

Materials & Methods

Oleamide serinol were purchased from Daebong Life Science Ltd., Korea. Glycerin and Caprylic/capric Triglyceride were obtained from KLK OLEO Co., Ltd. Polyglyceryl-5 Trimyristate was acquired from Taiyo Kagaku Co., Ltd and cholesterol was from Active Concepts LLC. Brassica Campestris (Rapeseed) Sterols was bought from BASF and potassium Cetyl Phosphate was from DSM. 1,2-Hexanediol was obtained from Jungdo Chemical Co., Ltd and macadamia Ternifolia Seed Oil was from Jan Dekker International BV.

PCP-based niosome (P-Niosome) composed of potassium cetyl phosphate was prepared using the microfluidizer method by including the addition of oleamide serinol, while SSG-based niosome (S-Niosome) consisted of sodium stearoyl glutamate as a stabilizer by the addition of a charged molecule to the bilayer. Compared to P-Niosome, blank PCP-based niosome (BP-Niosome) was fabricated with microfluidizer techniques without oleamide serinol. Blank SSG-based niosome (BS-Niosome) was prepared by excluding the addition of oleamide serinol, compared to S-Niosome as well. The molar ratio of cholesterol and non-ionic surfactant taken was 1:1. In four niosomal formulation, the non-ionic surfactant of polyglyceryl-5 trimyristate were used.

Results & Discussion

Table 1. Particle size and zeta potential of the niosomes

Samples	Particle Size (nm) (mean ± SD*)	Zeta Potential (mV) (mean ± SD*)
(a) PCP-based niosome (P-Niosome)	15Z4.6 nm	148.9 nm
(b) SSG-based niosome (S-Niosome)	-76.6 mV	-71.5 mV

* n = 3.

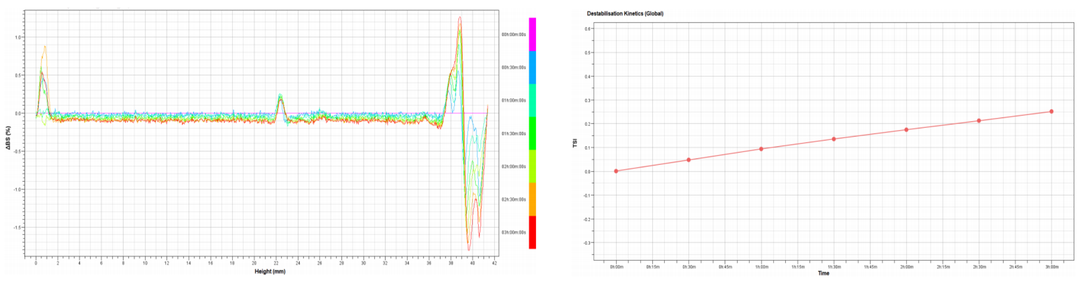

Figure 1. Delta Backscattering and turbiscan stability index (TSI) of PCP-based niosome (P-Niosome)

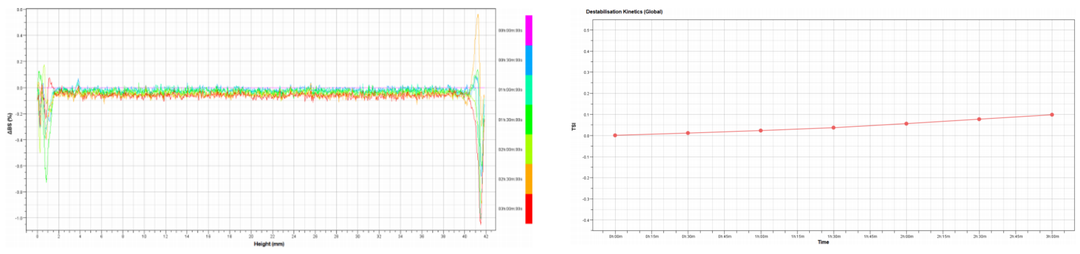

Figure 2. Delta Backscattering and turbiscan stability index (TSI) of SSG-based niosome (S-Niosome)

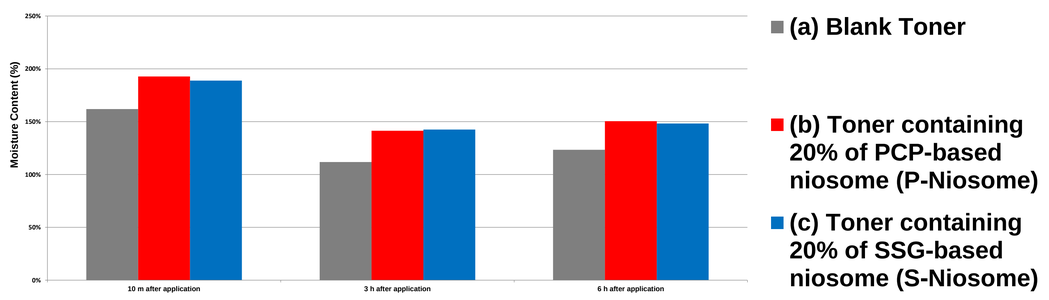

Figure 3. Percentage of Moisture Content in (a) blank toner, (b) toner containing 20% of PCP-based niosome (P-Niosome), and (c) toner containing 20% of PCP-based niosome (P-Niosome) after application.

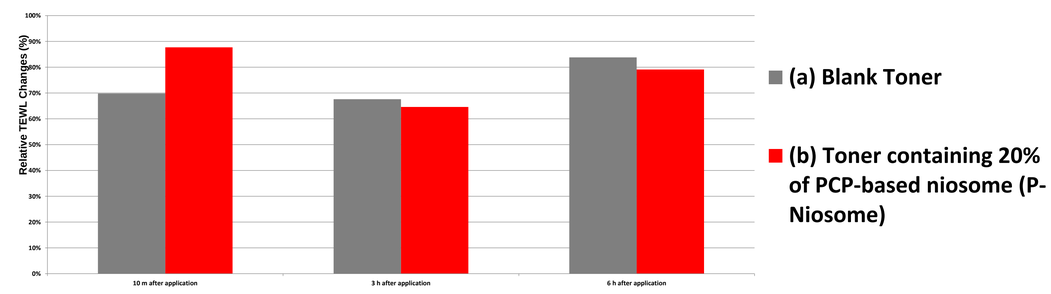

Figure 4. Percentage of relative TEWL changes in (a) blank toner and (b) toner containing 20% of PCP-based niosome (P-Niosome) after application.

Conclusions

The niosomal formulation of potassium cetyl phosphate (PCP) demonstrated a comparatively more effective as compared to sodium stearoyl glutamate (SSG) by the improvement of the stability of vesicles and skin hydration of the stratum corneum. Based on our results, we suggest that the niosomal development has a potential for the repair of a disrupted skin barrier in cosmetics applications.

Aknowledgments:

This work was supported in part by the Material Components Technology Development Project (10077377) of the KEIT, MOTIE (KOREA).