SOLID LIPID PARTICLES FOR IMPROVED DERMAL DELIVERY OF VIRGIN COCONUT OIL

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Dedicated to my beloved Husband, Mohd Husni Yusoff, my mom, Wan Norhani Wan Mustaffa, my dad, Mohamed Noor Bin Ba Md Yunus and my children, Iman Syakirin and Nur Damia Safrina.
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ABSTRACT

Coconut oil has been recognized as a health oil in Ayurvedic medicine. Virgin Coconut Oil (VCO) is unique because it has a high degree of saturated fats, medium chain triglycerides, antioxidant activity and antimicrobials property. These factors make VCO a suitable lipophilic active ingredient in skin care products. VCO is usually extracted from well matured and fresh coconut through specialized process and is prepared in such a way that does not damage its natural structure or nutrition. Solid Lipid Particles (SLPs) is a novel delivery system of lipophilic functional cosmetic active ingredients. In this work, formulation, characterization and efficacy of VCO-SLPs have been studied. VCO-SLPs were prepared using ultrasonification of molten stearic acid and virgin coconut oil in an aqueous solution. From screening experiments, the best formula for VCO-SLPs was 1.78% Tween 80, 0.73% soy lecithin, 10% stearic acid, 5% VCO and 82.5% distilled water. Ultrasoncating was performed at several power intensities and different exposure times. The particle sizes of VCO-SLPs obtained were ranged from 0.608 µm to 44.265 µm. The zeta potentials of all the particles were from -43.2 mV to -47.5 mV showing that the particles obtained have good stability. The cumulative permeation of the VCO-SLPs range from 3.83 µg/cm² to 3.59 µg/cm² for VCO-SLPs in the range of 0.608 µm to 39.255 µm. VCO-SLPs with the particle size of 0.608 µm was chosen for subsequent study. Double blind skin evaluation test was conducted to analyze the performance of the VCO-SLPs incorporated moisturizing lotion. Moisturizing lotion incorporated with VCO-SLPs was found to increase skin hydration and skin elasticity by 24.8% and 2.60% respectively from day 0 to day 28. This shows that solid lipid particles has the potential to be utilized as a carrier for improved dermal delivery of VCO.
ABSTRAK

Minyak kelapa telah diiktiraf sebagai minyak kesehatan dalam perubatan Ayurverdic. Minyak Kelapa Dara (VCO) bersifat unik kerana ia mempunyai kandungan lemak tepu yang tinggi, rantai trigliserida sederhana, aktiviti antioksidan dan ciri-ciri antimikrobial. Faktor ini menjadikan VCO sebagai bahan lipofilik aktif yang sesuai digunakan di dalam produk penjagaan kulit. VCO kebiasaannya diekstrak daripada kelapa yang matang dan segar melalui beberapa proses bagi mengelakkan kerosakan kepada struktur dan nutrien semulajadinya. Partikel Lipid Pepejal (SLPs) adalah sistem penyampaian bagi bahan-bahan kosmetik bersifat lipofilik. Dalam kajian ini, formulasi, pencirian dan keberkesanan VCO-SLPs telah dikaji. VCO-SLPs telah disediakan menggunakan ultrasonifikasi asid stearik cair dan minyak kelapa dara dalam satu larutan akuas. Daripada eksperimen saringan, formula terbaik untuk VCO-SLPs mengandungi 1.78% Tween 80, lestin soya 0.73%, 10% asid stearik, VCO 5% dan 82.5% air suling. Ultrasonikasi dijalankan pada kuasa dan masa pendedahan yang berbeza. Saiz zarah VCO-SLPs yang terhasil adalah 0.608 µm hingga 44.265 µm. Potensi zeta bagi semua zarah yang terhasil adalah dari -43.2 mV sehingga -47.5 mV yang menunjukkan bahawa zarah yang diperolehi mempunyai kestabilan yang baik. Penyerapan kumulatif VCO-SLPs adalah dari 3.83 µg/cm² sehingga 3.59 µg/cm² untuk partikel bersaiz 0.608 µm sehingga 39.255 µm. VCO-SLPs dengan saiz partikel 0.608 µm telah dipilih bagi kajian seterusnya. Penilaian pada kulit secara gelap ganda telah dijalankan bagi mengkaji keberkesanan losyen pelembab VCO-SLPs. Losyen pelembab yang mengandungi VCO-SLPs didapati telah meningkatkan hidrat dan keanjalan kulit masing-masing sebanyak 24.8% dan 2.60% dari hari 0 sehingga hari ke 28. Ini menunjukkan bahawa, partikel lipid pepejal berpotensi sebagai agen pembawa VCO yang lebih baik ke bahagian kulit.