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Research paper

Novel topical nano-colloidal carrier loaded with cyclosporine: Biological evaluation potentially for psoriasis treatment

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Abstract

Psoriasis is an autoimmune condition appeared as a skin disease, spotted as dry skin with red and thick plagues, which commonly induce itchiness and extreme uncomfortable feeling to the patient. In any level of psoriasis, topical treatment has always been the first line treatment given to patients as this method is more patient compliance. The idea of incorporating an established immunosuppressant, cyclosporine into nanoemulsion system could be the best option for the drug to be delivered topically and skip its toxicity issues. Cyclosporine-loaded nanoemulsion was developed which consists of virgin coconut oil and nutmeg oil mixture (15.00–20.00%), cyclosporine (1.00%), surfactant (15.00%), xanthan gum (0.75%) and deionized water (67.55% and 62.55%). Despite the physicochemical and rheological characteristics, biological criteria have also been a big concern in making sure the safety of this product for future application. In this study, these newly developed nanoemulsions containing cyclosporine exhibited good results concerning biological aspects such as the toxicity assay, colony counting, transepidermal water loss and skin moisturizing studies by fifteen normal volunteers' skin and irritancy study. The result showed nanoemulsion carrier was proven in making the harmful cyclosporine became non-toxic (IC_{50} > 1000 mg/mL) towards the primary keratinocytes (HaCaT cells). For sterility potential test, a negative result was obtained with zero colony (neither positive nor negative gram microbes) counted on the nutrient agar. Cyclosporine-loaded nanoemulsion has successfully increased the water storage for all healthy volunteers' skin with maximum increment up to 54.67% and 68.87% by the application of Opt1 and Opt2, respectively. No record of acute irritancy side effect reported by volunteers which supported the low Human Irritancy Equivalent (HIE) values obtained from the irritancy analysis. The current finding suggested that the formulated nanoemulsions could be used to improve the skin condition of individual with psoriasis.