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Design of a transdermal anti-psoriatic hydrogel drug delivery system for the treatment of psoriasis vulgaris

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ABSTRACT

Psoriasis vulgaris (PV) is a chronic disease. Hydrocortisone (HCT) is currently utilized as a treatment however, it is associated with undesirable side effects. The aim of this study was to create a thermos-responsive nano-hydrogel delivery system. HCT-loaded Sorbitan monostearate (SMS)-polycaprolactone (PCL) nanoparticles encapsulated with thermo-responsive hydrogel carboxymethyl cellulose (CMC) were synthesized applying interfacial polymer deposition method following solvent displacement. Nanoparticles' properties were evaluated employing Differential Scanning Colorimetry, Thermogravimetric Analysis, Fourier Transform Infrared Spectroscopy, Scanning Electron Microscopy, Zeta sizer, Ultraviolet/Visual spectroscopy and cytotoxicity testing. The nanoparticle sizes were 110.5 nm with polydispersity index of 0.15 and the zeta potential of -58.7 mV. The drug entrapment efficacy of 76% was attained by the HCT-loaded SMS-PCL nanoparticles and in vitro drug release profiles showed continued drug release over a period of 24 hrs. Keratinocyte skin cells were treated HCT-loaded SMS-PCL nanoparticles encapsulated with CMC, the results indicated that the synthesized drug delivery system was less toxic to the keratinocyte cells compared to HCT. The combined trials and results from the formulation of HCT-loaded SMS-PCL nanoparticles encapsulated CMC, showed evidence that this hydrogel can be utilized as potential invaluable formulation for transdermal drug delivery of HCT with improved efficacy and patient conformity.

Keywords: Hydrogels, Polymers,Drug delivery, Psoriasis vulgaris