Collagen Silver Lipid Nanoparticles as Matrix and Fillers for Cosmeceuticals: An In-Vitro and In-Vivo Study

Authors : Kumari Kajal, Muthu Kumar Sampath, Hare Ram Singh

Abstract : In this context, the formulation and characterization of collagen silver lipid nanoparticles (CSLNs) were studied for their capacity to serve as fillers/matrix materials used in cosmeceutical applications. The CSLNs were prepared following a series of studies, such as X-ray diffraction (XRD), field-emission scanning electron microscopy (FESEM) coupled with energy-dispersive X-ray spectroscopy (EDS), Fourier-transform infrared spectroscopy FT-IR; thermogravimetric analysis (TGA); and differential scanning calorimetry (DSC). The studies confirmed the structural integrity of nanoparticles, their cargo and thermal stability. The biological functionality of CSLNs was studied by carrying out in vitro & in vivo studies. The antibacterial effect, hemocompatibility and anti-inflammatory characteristics of these fibers were systematically investigated. The toxicological assays included oral toxicity in mice and aquatic life tests with the fish Danio rerio model. The morphology of the nanoparticles was confirmed using high-resolution transmission electron microscopy (HR-TEM). The report found that CSLNs had strong antimicrobial effects, unmatched hemocompatibility, and low or absent inflammatory reactions, which makes them perfect candidates for cosmeceutical applications. The toxicological evaluations evinced a good safety record without any significant adverse effects in both murine and Danio rerio models. This research reveals the efficient way of CSLNs to the efficacy and safety of dermaceuticals.