

Skin intervention of fullerene-integrated nanoemulsion in structural and collagen regeneration against skin aging

ABSTRACT

Despite the fact that intrinsic oxidative stress is inevitable, the extrinsic factor such as ultraviolet radiation enhances reactive oxygen species (ROS) generation resulting in premature skin aging. Nanoemulsion was loaded with fullerene, a strong free radical scavenger, and its efficacy to provide protection and regenerative effect against ROS-induced collagen breakdown in human skin was studied. Stable fullerene nanoemulsions were formulated using high shear homogenization and ultrasonic dispersion technique. An open trial was conducted using fullerene nanoemulsion on skin twice a day for 28 days. The mean collagen score significantly increased ($P<0.05$) from 36.53 ± 4.39 to 48.69 ± 5.46 with 33.29% increment at the end of the treatment. Biophysical characteristics of skin revealed that skin hydration was increased significantly ($P<0.05$) from 40.91 ± 7.01 to 58.55 ± 6.08 corneometric units (43.12% increment) and the water was able to contain within the stratum corneum without any increased in transepidermal water loss. In the in vitro safety evaluation, fullerene nanoemulsion showed no acute toxicity on 3T3 fibroblast cell line for 48h and no indication of potential dermal irritation. Hence, the fullerene nanoemulsion may assist in protecting collagen from breakdown with cosmeceutical benefit.

Keyword: Fullerene; Nanoemulsion; Oxidative stress; Skin aging; Sonography