Antioxidant, Elastase, SPF and Anti-microbial Evaluation of Linum Usitatissimum Oil Nanoemulgel

Abstract: *Linum usitatissimum* (flax) seeds have been reported to have several biological efficacies such as antioxidant, anti-aging, sun protection, and antimicrobial actions. The present study aimed to develop *L. usitatissimum* oil nanoemulgel and evaluate its cosmeceutical and antimicrobial characteristics for use in topical applications. *L. usitatissimum* oil nanoemulgel formulations were prepared by optimising the non-ionic surfactant (Tween® 20, Tween® 80, and Span® 80) using a self-nanoemulsifying technique, followed by the addition of Carbopol®. The droplet size, polydispersity index, zeta potential, and rheological behaviour of the emulgel formulations were measured. In addition, the antioxidant activity, elastase inhibition activity, sun protection factor (SPF), and antimicrobial properties were evaluated. The prepared nanoemulgel had a homogenous appearance and a smooth creamy texture, and was found to have good spreadability and an acceptable adhesion to the skin. Tween® 80 gave the optimum nanoemulgel formulation, which had a droplet size of less than 200 nm. This nanoemulgel was found to have free radical-scavenging activity and elastase inhibition activity, which improved the anti-aging properties. Moreover, this nanoemulgel had an inhibitory effect on the growth of *Staphylococcus aureus* and a partial inhibitory effect on *MRSA* growth. However, no inhibition of *Candida* growth was found. In conclusion, a novel *L. usitatissimum* oil nanoemulgel was prepared that shows promise for pharmaceutical and cosmeceutical applications.

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