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Stabilization and Antioxidant Activity of Aqueous Nanoparticles of CoQ10 in shaping with Liquid Crystal

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Abstract:

In recent years, the growth of the functional foods industry has increased research into new compounds with high added value for use in the fortification of traditional products. One of the most promising functional food groups is those enriched in antioxidant compounds of a lipophilic nature. Coenzyme Q10 (CoQ10) is critical for the cell power supply in mitochondria. CoQ10 shuttles electrons from complexes I and II to complex III, and can be anti-oxdiative.

It's supplementation has been widely used to treat aging, stroke, neuromuscular diseases, Alzheimer's disease, Parkinson & Huntington's disease, progressive supranuclear palsy, autosomal recessive cerebellar ataxias and lots of other problems.

In this research, lyotropic liquid crystalline nanoparticles (LCNPs) prepared from glyceryl monooleate (GLCQ) and phytantriol (PLCQ). Exhaustive optimization of the process variables was carried out, and optimized lyophilized formulations were found to have particle sizes of 154.35 ± 4.83 nm and 210.42 ± 5.40 nm and a polydispersity index of 0.17 ± 0.01 and 0.24 ± 0.03 for GLCQ and PLCQ, respectively. The morphological characteristics of the developed formulations were assessed using high resolution transmission electron microscopy and small-angle X-ray scattering analysis, which showed hexagonal (H_{II}) structure.Through the procces the CoQ10 agglomerates were removed by centrifugation (5000×. g, 30min) and filtration through a glass filter. As the temperature increased, the amount of CoQ10 which was stably dispersed increased.

Finally Differential scanning calorimetry and X-ray diffraction analysis revealed significantly higher stability and antioxidant activity of CoQ10-LCNPs as compared to that of free CoQ10.The CoQ10 Crystallin dispersion, however, remained homogeneous without forming precipitates during ambient storage for 2 weeks.

Keyword: Nanoparticles, Coenzyme Q10, antioxidant compounds, stability