

Development and Characterization of a Novel Coenzyme Q₁₀ Emulsion as Milk Formula Supplement for Neonates †

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Abstract: Coenzyme Q₁₀ (CoQ₁₀) is an endogenous antioxidant with a fundamental role in mitochondrial bioenergetics. Its deficiency is associated with neurological diseases, which could be mostly overcome through external supplementation of CoQ₁₀. Nowadays, no commercially available formulation covers the special needs of neonates. For that reason, this work aimed to develop a highly concentrated liquid emulsion (90 mg/mL) of CoQ₁₀ suitable as an additive in formula milk. The O/W emulsion contains CoQ₁₀, soy lecithin, labrasol, and labrafac (oil phase) and tween 80, TPGS, and conservants (aqueous phase). The oil phase was added drop by drop into the aqueous phase under magnetic stirring and finally emulsified with an ultrasonic homogenizer. Organoleptic and physicochemical parameters, such as particle size, specific surface area, viscosity, zeta potential, density, pH, and API content, were determined. Storage conditions for the stability study were 25±2°C/60±5%RH for 3 months, and samples were analyzed by HPLC-UV. In use and microbiological stability was also performed. Results show that CoQ₁₀ content remains over 90% throughout the period of study. Creaming, flocculation, cracking phenomena, and deterioration by microorganisms was not observed; meanwhile, organoleptic characteristics remain unalterable. Based on the good preliminary results, this novel formulation could be suitable for neonates with CoQ₁₀ deficiency and thus contribute to a significant improvement in their quality of life.

Keywords: Coenzyme Q₁₀; nanoemulsion; neonates.

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Conflicts of Interest

The authors declare no conflict of interest.