Development of multiple W/O/W emulsions used in pharmaceutical field: effect of additives and insulin on physicochemical and rheological stability of emulsions.

Authors
Nassima Moussaoui, Larbi Hammadi, Nassr-Eddine Boudjenane, Rachid Ramdane Denine

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Abstract

The objective of this study is developing the multiple emulsions of water-in-oil-in-water (W/O/W) used in pharmaceutical field and investigating the influence of additives and insulin on physicochemical and rheological stability of emulsions. Multiple emulsions based on corn oil, with insulin or without insulin, were formulated with a lipophilic surfactant polymeric in nature (Abil® EM 90) and hydrophilic surfactants of different nature: monomeric (Tween® 80) or polymeric (Lutrol® F127). The preparation was carried out by the two-step process of emulsification at 15 ± 1 °C. The developed multiple emulsions were studied and followed in stability by microscopic observations, granulometric analysis, and conductometric and rheological analyses. The multiple emulsions have been developed with the couple of surfactants: Abil® EM 90-Tween® 80 which exhibited a remarkable stability over 30 months. The mechanism of release of encapsulated substances occurs by swelling-rupture oily membrane. The study also shows that the incorporation of insulin has a significant influence on the physicochemical and the rheological stabilities of multiple emulsions.

Keywords

Multiple emulsions- Stability- Surfactant polymeric- Rheological behavior- Insulin.