Preparation and optimization of ibuprofen-loaded nanoemulsion formulation

ABSTRACT

Nanoemulsion containing ibuprofen was developed. However, the composition and method to prepare nanoemulsion were not consistent and needed to be optimised. In this study, nanoemulsion containing a mixture of palm kerneloil esters (PKOE), ibuprofen,Tween 80 (T80), and water was modified from the previous report. It was prepared by a combination of two methods, including low energy and high energy emulsification methods. The composition of nanoemulsion was optimised by a Mixture of Experimental Design (MED), where PKOE, T80, and water were set as variables while droplet size was a response. A total of 15 run experiments were evaluated. An optimum formulation was validated, and the composition of 3.0 wt % of PKOE, 15.0 wt% of Tween 80, 2.0 wt % of ibuprofen and 80.0 wt. % of water with the droplet size of 97.26 nm was obtained. The formulation is stable in the storage at room temperature (25 ± 2 ºC) within 3 months against coalescence process. The polydispersity index and zeta potential of the optimized formulation were 0.271 and -19.8 mV, respectively.

Keyword: Palm kernel oil esters; Mixture experimental design; Ibuprofen; Non-steroidal anti-inflammatory drug; Nanoemulsion