

Instantaneous enteric nano-encapsulation of omeprazole: pharmaceutical and pharmacological evaluation

Ehab Rasmy , Aly A Abdelbary

Professor

Abstract

Recently, great attention has been paid to nanocapsules. The interest of these structures is due to their promising applications as drug delivery systems. The objective of this study was to develop novel enteric coating technique based on instantaneous encapsulation of the acid-labile drug, omeprazole in innovative enteric nanocapsules. Omeprazole enteric nanocapsules were formulated by varying the type and amount of the enteric polymer. The particle size (PS), polydispersity index (PDI), zeta potential (ZP) and encapsulation efficiency (EE) values of the prepared enteric nanocapsules were determined. A full 21×31 factorial design was used for planning and analysis of the experimental trials to select the optimized formulation. The highest desirability value was 0.7463 for formula E3 (containing 200 mg hydroxypropyl methylcellulose phthalate (HPMCP)). The stability of omeprazole was reflected by the absence of the exothermal peak when the drug was encapsulated as detected by differential scanning calorimetry (DSC) thermograms. In vitro drug release study confirmed the USP specifications required to meet the key formulation characteristics of gastro-resistance. In vivo pharmacological assessment showed that the optimized nanocapsules were able to protect rat stomach against ulcer formation compared to the aqueous suspension of the drug which showed less significant protection.

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