Insight Medical Publishing

American Journal of Pharmacology and Pharmacotherapeutics

ISSN 2393-8862

2020

Vol.7 Iss 2

Formulation development, process optimization and characterization of dermal etodolac nanosuspensions

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Abstract

Drug application from skin is a suitable route for local or systemic effect. However poor solubility of drug candidates limits drug application through skin. Nanosuspensions are promising approach to increase solubility of lipophilic compounds and hence dermal penetration. They can be defined as nano-sized drug particles prepared with minimum quantity stabilizer. The objective of this study was to prepare etodolac (ETD), the NSAID drug compound which is Biopharmaceutical Classification System (BCS) Class II drug with low solubility and high permeability, nanosuspensions using wet ball grinding method. PVP was used as stabilizer. The Box-Benkhen design was created randomly to perform the experiments. Diameter of grinding beads (0.1, 0.5, 1 mm), grinding time (1, 2.5, 4 h) and grinding speed (200, 400, 600 rpm) were selected as independent variables. Particle size (PS), particle size distribution (PDI) and zeta potential (ZP) values were analyzed as dependent variables. Nanosuspensions were lyophilized and DSC was performed to determine melting points of samples. The XRD patterns of ETD and nanosuspensions were collected to evaluate possible changes of crystallinity. The PS, PDI and ZP values were found, 210.1 ± 2.3 nm, 0.098 ± 0.012, -15.3 ± 0.4 mV, respectively. SEM images were also proved that PS values were obtained approximately 200 nm. Uniform and spherical particles were observed. DSC and XRD results showed that, the structure of ETD was not changed during preparation process. ETD nanosuspensions were prepared using wet ball grinding method successfully. Box-Benkhen design to develop nanosuspension formulation was found effective approach to improve final product quality while reducing the number of experiments.

Biography:

Alptug Karakucuk was born in Turkey in 1988. He was graduated at Gazi University Faculty of Pharmacy in year 2012. He also took his Ph.D at Gazi University, Department of Pharmaceutical Technology in 2017 as a research and teaching assistant. He is still Ph.D., instructer at the same department. He is also co-founder and general manager of Fiber Pharma Drug, Cosmetics and Consulting Co. He published or presented several scientific studies in international areas, patented and commercialized some products, participated in scientific projects as researcher or coordinator.

Speaker Publications:

1. “Correction to: Development of Nanocrystal Ziprasidone Orally Disintegrating Tablets: Optimization by Using Design of Experiment and In Vitro Evaluation; AAPS PharmSciTech volume 21, Article number: 144 (2020)

2.“ Investigation of Formulation and Process Parameters of Wet Media Milling to Develop Etodolac Nanosuspensions; Pharmaceutical Research volume 37, Article number: 111 (2020)

3. New perspective to develop memantine orally disintegrating tablet formulations: SeDeM expert system; Pages 512-519 | Received 09 Mar 2017, Accepted 19 Jun 2017

4. Preparation, characterization and antimicrobial activity evaluation of electrospun PCL nanofiber composites of resveratrol nanocrystals Received 22 Apr 2020, Accepted 02 Aug 2020,

5. Essential Oils: Extraction Techniques, Pharmaceutical And Therapeutic Potential - A Review; Current Drug Metabolism; Volume 19 , Issue 13 , 2018

19th International Conference on Pharmaceutics & Novel Drug Delivery Systems; Webinar; June 18-19, 2020

Abstract Citation:

Alptug Karakucuk, Formulation development, process optimization and characterization of dermal etodolac nanosuspensions, Pharmaceutica Meet 2020, 19th International Conference on Pharmaceutics & Novel Drug Delivery Systems; Webinar, June 18-19, 2020 (https://novel-drugdelivery-systems.pharmaceuticalconferences.com/middleeast/2020)