

Modified Release 3D-Printed Capsules Containing a Ketoprofen Self-Nanoemulsifying System for Personalized Medical Application"

Dr. Hiba Natsheh* and Dr. Bahaa Shaqour

Hiba.natsheh@najah.edu

This work focuses on the investigation the utilization of 3D-printed dosage forms patient tailored enteric capsules designed for the modified release of ketoprofen, serving as a model drug. The research investigates two distinct scenarios: the modification of drug release from 3D-printed capsules crafted from hydroxypropyl methylcellulose phthalate:polyethylene glycol (HPMCP:PEG) and poly(vinyl alcohol) (PVA), tailored for pH sensitivity and delayed release modes, respectively. Additionally, a novel ketoprofen-loaded self-nanoemulsifying drug delivery system (SNEDDS) based on pomegranate seed oil (PSO) was developed, characterized, and employed as a fill material for the capsules. Through the preparation and characterization of the HPMCP:PEG based filament via the hot-melt extrusion method, the study thoroughly investigated its thermal and mechanical properties. Notably, the in vitro drug release analysis unveiled the intricate interplay between ketoprofen release, polymer type, and capsule thickness. Furthermore, the incorporation of ketoprofen into the SNEDDS exhibited an enhancement in its in vitro cyclooxygenase-2 (COX-2) inhibitory activity. These findings collectively underscore the potential of 3D printing in shaping tailored drug delivery systems, thereby contributing significantly to the advancement of personalized medicine.