An Investigation on Loading Combined Medications in Polymeric Films: Effect of Drug Load and Polymer Type

By

Aisha Ahmad Kanaan

Supervisor

Dr. Ola Tarawneh

Co-supervisor

Dr. Walid Al-Zyoud

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Abstract

Research and development in pharmaceutical drug delivery have increasingly relied on polymers due to their versatility and the benefits they offer in improving drug delivery systems. Polymeric drug delivery systems have gained significant attention in recent years due to their potential to address various challenges, including safety, compliance, and patient acceptability. However, the compatibility of different polymers and grades is a crucial aspect of developing effective drug delivery systems. Furthermore, the employment of more than one drug in polymer mixture raises more challenges in the compatibility and drug loading capacity. The aim of this study was to prepare the best possible film formulations using different combinations of polymers in order to study the film's drug loading capacity of two combined model drugs, Candesartan (CC) and Hydrochlorothiazide (HCTZ). Four formulations of CC-HCTZ-loaded films were prepared from EL100, PVA, PVP and CMC polymers with or

without plasticizers using solvent casting technique. Moreover, to enhance the solubility of drug in the polymeric matrix, a surfactant and co-surfactant were added. The films were simulated to be employed as orodispersible films (ODFs). The prepared films were investigated with regards to the physical appearance, thickness, weight uniformity, surface pH, folding endurance, mechanical properties, bioadhesion, disintegration time, erosion profile and drug content uniformity. All the prepared films were found to be clear when assessed visually and possessed good uniformity in weight and thickness. They also had a pH close to the normal pH of saliva. DMTA showed that the drugs were miscible in the polymeric matrix. Tensile test, alongside folding endurance test were showed that the films were flexible, elastic and had excellent mechanical properties. The disintegration and erosion profile of the films in phosphate buffer (pH 7.4) were dependent on the polymer type. The HPLC-developed method showed uniformity in the drug content between tested films and it was in the range of 85-110%.

Keywords: Candesartan cilexetil, Hydrochlorothiazide, combined polymers, ODFs, solvent casting technique, HPLC.