**Preparation and *in Vitro/In Vivo* Characterization of Sustained-Release Moxifloxacin-Carrageenan Complex**

**Samaa Abdullah1,2\*and Rana Talal Abu-Hwaij1**

1College of Pharmacy, Amman Arab University, Amman 11953, Jordan; s.abdullah@aau.edu.jo

2Creativity, Innovation & Entrepreneurship Center, Amman Arab University, Amman 11953, Jordan

\*Corresponding author

**Abstract**

The study aimed to investigate drug-polyelectrolyte complexation between moxifloxacin (Moxi) and α-carrageenan (CRG) and use the complex as a sustained-release matrix. The maximal binding capacity of the complexation was established using the dialysis bag technique, which was then used to construct the complex. In contrast to Moxi, CRG, and their physical mixing, the complex was investigated using differential scanning calorimetry, Fourier infrared spectroscopy, powder X-ray diffraction, and scanning electron microscopy. Moxi-CRG matrices, created as direct compression tablets based on the highest binding capacity, were tested for swelling, erosion, and drug release in 0.1 M HCl, and compared to CRG, Hydroxypropyl methylcellulose (HPMC), and Moxi-HPMC matrices. An in vivo absorption study comparing the Moxi-CRG matrix to the Cipro immediate-release pill was also conducted.

The highest binding capability of Moxi to CRG was 55% (w/w). Complexation with drug amorphization is thought to entail a variety of interactions, including electrostatic interactions, Vander wall forces, and hydrogen bonding. As a result of the complexation, CRG's swelling and erosion characteristics altered, with Moxi-CRG matrix exhibiting much less swelling and erosion than Moxi-free CRG matrix. Moxi-CRG matrix showed swelling and erosion comparable to Moxi-HPMC matrix. However, the earlier matrix showed Moxi release with substantially lesser burst effect and a significantly slower release rate. Furthermore, in vivo, Moxi-CRG matrices displayed slow-prolonged oral drug absorption, resulting in substantial alterations in pharmacokinetic parameters as compared to immediate-release tablets.