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Synthesis and Preliminary Pharmaceutical Evaluation of New Polymeric Prodrug of Levofloxacin as a Drug Delivery System

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Authors

Lamiaa H Saleh [1]; Raheem Jameel[2]; Mohammed Sabar Al-Lami[3]; Rana Mohammed Abdulnabi[4]

[1]Department of pharmaceutical chemistry, University of Basrah/ College of Pharmacy, Basra, Iraq

[2]Department of pharmaceutical chemistry, College of Pharmacy, University of Basrah, Iraq

[3]Department of pharmaceutical science, College of Pharmacy, University of Basrah, Iraq

[4]Department of clinical laboratory sciences, College of Pharmacy, University of Basrah, Iraq

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Abstract

In this work, a new polymeric prodrug was successfully synthesized by Fischer-esterification between chitosan as biodegradable polymer and levofloxacin as drug material. Levofloxacin was linked directly to the chitosan through a degradable ester bond at (chitosan: levofloxacin) ratios of (1:1), (1:2), and (2:1). The resulting product was characterized by Fourier transform infrared spectroscopy, ultraviolet spectroscopy, thermogravimetric analysis, and differential scanning calorimetry to confirm its structure. Furthermore, the physical properties of the product were determined. The polymer–drug conjugate was evaluated for its drug content and in vitro drug release at pH 1.2 at a condition similar to physiological conditions. Profile of the in vitro drug release showed that levofloxacin was released in a sustained manner from pro(1:2). A high swelling index for pro(1:2) confirmed this finding. Therefore, the ester bond hydrolyzed in acidic media to release the drug. Antibacterial assay was conducted for synthesized prodrug against Pseudomonas aeruginosa, Escherichia coli, and Staphylococcus aureus species. The polymeric prodrug could be used successfully as a controlled drug delivery system.

Keywords

Antibacterial activity; Chitosan; Ester hydrolysis; Levofloxacin; Polymeric prodrug; Sustained released

Main Subjects

Pharmaceutical Chemistry