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Tripolyphosphate-crosslinked chitosan/ poly (ethylene oxide) electrospun nanofibrous mats as a floating gastro-retentive delivery system for ranitidine hydrochloride

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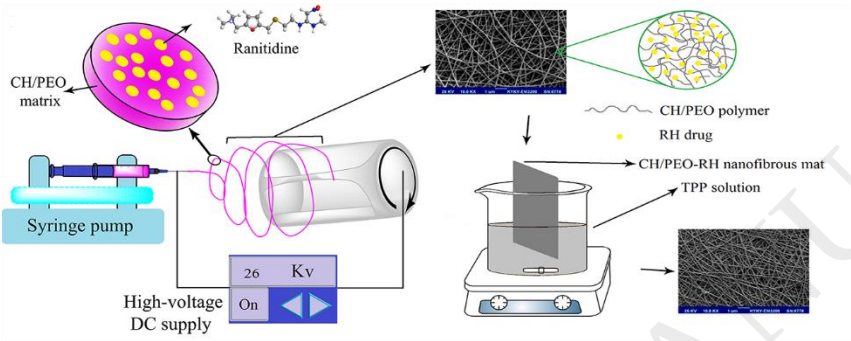
Graphical Abstract



Highlights

- Chitosan/PEO nanofibrous mats were crosslinked by tripolyphosphate solution.
- Prepared mat was used as a floating gastro-retentive delivery system for ranitidine.
- Structural characteristics of nanofibers were evaluated using different techniques.
- Swelling profile of the prepared nanofibers were investigated at different media.
- Release profile of the nanofibrous mats were studied at different physiological pH.

Abstract

The present study describes the fabrication of Tripolyphosphate (TPP)-crosslinked nanofibrous mats based on chitosan for use as a floating gastro-retentive delivery system. TPP-crosslinked chitosan (CH)/ poly (ethylene oxide) (PEO)- ranitidine hydrochloride (RH) electrospun nanofibers (75.27± 2.10 nm) were prepared by electrospinning 70% v/v acetic acid solutions, and followed by crosslinking by TPP anions. The mechanical, structural and morphological properties of the prepared nanofibers were evaluated via tensile testing, XRD, FT-IR, TGA, NMR, AFM and SEM experimental techniques. The prepared nanofibrous mats showed a pH sensitive swelling profile with maximum water absorbing at pH 1.2. Results obtained from above experimental techniques indicated that crosslinking process did not significantly altered morphological property of nanofibers but rather decreased their diameter and swelling degree, and increased their mechanical properties, thermal stability and bioadhesive strength. Viscosity measurements showed that the addition of PEO and RH to the chitosan solution, depending to its concentration lead to decrease in the viscosity of its solution. Also, floating test showed that the prepared nanofibrous mats remain