

Synthesis of cellulose acetate nanofibers and its application in the release of some drugs

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ABSTRACT

Objective(s): The purpose of this study was to compare novel sandwich-structured nanofibrous membranes, and coaxial and usual methods, to provide sustained-release delivery of morphine for drug delivery. In this work, synthesis of nanofibrous cellulose acetate (NFC) was carried out by electrospinning.

Methods: A weighed amount of cellulose acetate (CA) powder was dissolved in 3:1 v/v acetone/dimethylformamide (DMF) to obtain a CA solution at a concentration of 8 to 16% w/v. Acetaminophen or morphine-loaded CA solutions were prepared by dissolving CA powder and Acetaminophen (A) or morphine in the weight ratio of 5:1, in an acetone/DMF mixture. Under optimum condition, they were electrospun into sandwich structured membranes with the coaxial method and cellulose acetate as the surface layer and cellulose acetate/drugs as the core.

Results: Characterization of the radius of fiber is shown as 52.9 ± 0.1 nm with scanning electron microscopy (SEM). The full range drug release profiles of nanofibers are shown as 80.7% of the contained drug in 8h. The drug release from nanofiber was controlled through a typical Fickian diffusion mechanism from the cellulose acetate matrix by a release exponent value of 0.24 for conventional nanofiber, 0.35 for coaxial nanofiber and 0.40 (less than 0.45) for sandwich nanofibers.

Conclusions: All the cellulose acetate nanofibers showed that they could release large amounts of drugs in vitro for more than one day. However, among these three methods, the best one is a sandwich method because its release is slower than that of the other methods.

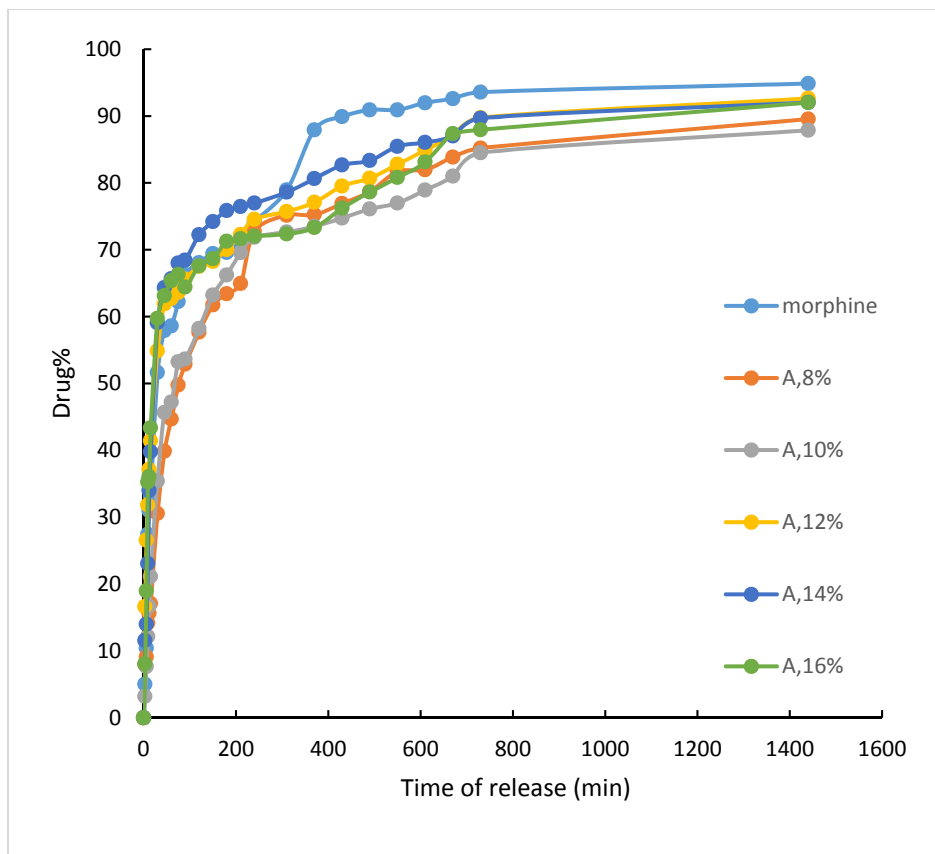


Fig. 8s. In vitro release profiles of A in different concentrations of CA and release profile of morphine in pH=7.4.