

ABSTRACT

Synthesis and Characterization of Cellulose Nanofiber as a Model of Drug Delivery System

This study is aimed to determine characteristics of cellulose nanofiber that produced from electrospinning techniques to be used as a drug delivery system which coated on to surgical suture. Cellulose that is successfully converted into nanofiber is an ester of cellulose i.e. cellulose acetate with $M_w = 30,000$ using acetone/DMAc (2:1) as a solvent with concentration of 17% w/v on The condition of voltage 22 KV, the distance collector with needle is 15 cm, and the flow rate of 0.005 mL/min. Ceftriaxone and ibuprofen successfully added to the polymer solution of cellulose acetate and converted into a nanofiber with electrospinning techniques in similar conditions with nanofiber cellulose acetate, then coated on the surgical suture. The Diameter average of fiber result are 558.5 nm for cellulose acetate, 412.5 nm for cellulose acetate-ceftriaxone, and 533.5 nm for cellulose acetate-ibuprofen.

The coating process of the fibers on surgical suture give an effect to the tensile strength, the results of the tensile test showed a decrease 40% of the surgical suture after coated with cellulose acetate fiber, 20% with cellulose acetate-ceftriaxone fiber, and 25% with cellulose acetate-ibuprofen fiber. Homogeneity test of the drug release from fiber based on *Levene test* is obtained $p=0.085$ for cellulose acetate-ceftriaxone fiber and $p=0.385$ for cellulose acetate-Ibuprofen fiber, p value $> 0,05$ indicates that the sample variant is the same.

The meshes value of fiber against drug particles is 12.04% for cellulose acetate-ceftriaxone fiber that coating surgical suture, 28.88% for cellulose acetate-ibuprofen fiber that coating surgical suture, 5.81% cellulose acetate-ceftriaxone fiber, 7.07% for cellulose acetate-ibuprofen fiber, and 8.12% cellulose acetate-ceftriaxone membrane.

Keywords: Nanofiber, Electrospinning, cellulose, cellulose acetate, ceftriaxone, ibuprofen, Drug delivery system