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PVA/(2-PROPANOL) BASED BEE-HONEY(CORE) AND POVIDONE-IODINE (SHEATH) COAXIAL ELECTROSPUN BEADS ON STRING NANOFIBROUS SCAFFOLD FOR CONTROLLED DRUG RELEASE

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On one hand bee Honey is a potent natural wound healing biomaterial. On the other hand, povidone iodine is a readily available synthetic drug frequently used for wound healing. Preliminary studies were carried out to seek the possibility of incorporating them separately into coaxial electrospun polyvinyl alcohol polymer nanofiber films. Electrospinning was done by using PVA+bee honey as core solution and PVA+povidone iodine as the sheath solution. Fabrications of nano fibers were carried out under different electrospinning and experimental conditions to counter the transition phase from coaxial electrospray to coaxial electrospin. Three series of samples of fiber mats were prepared through coaxial electrospinning by changing only the weight percentage of the sheath solutions as (7.5, 10, 12.5) w/w% respectively while keeping the ratio between PVA to Povidone Iodine (PVI) as 4:1. Electrospinning was done by changing the flow rates where the core and sheath solutions had the same flow rate in a single electrospin. By SEM images, beads on string nanofibers under best conditions were seen in the third sample with the highest weight percentage of sheath solution of 12.5 w/w% where a higher percentage of beaded fibers in the interval of 80-90 nm were successfully fabricated. The rate of release of bee honey and PoI, in saline, was examined using UV–VIS spectroscopy. All three samples resulted in initial release after a short time of immersion in saline and there was no burst release as in common smooth nanofiber related drug-releasing applications. In vitro release profile of bee honey in the series of samples were similar while in povidone iodine release profile with increasing weight percentage of sheath solution drug release rate has been decreased. Sample 3 of best-beaded fibers had the slowest drug release rate. FTIR spectral analysis further verified that there is no significant bond formation in bee honey and PoI after they are released. This study exemplifies the potential of bee honey as a wound cushioning agent while the incorporated PoI executes its wound healing dynamics without burst release; giving ample time for the wound to heal.

Keywords: Beaded nanofibers, Coaxial electrospinning, Controlled release

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