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Pain Management in Burn Wounds with Dual Drug Loaded Double Layered Nano-Fiber Based Dressing

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Abstract : Localized application of drug has various advantages and fewer side effects as compared with other methods. Burn patients suffer from swear pain and the major aspects that are considered for burn victims include pain and infection management. Nano-fibers (NFs) loaded with drug, applied on local wound area, can solve these problems. Therefore, this study dealt with the fabrication of drug loaded NFs for better pain management. Two layers of NFs were fabricated with different drugs. Contact layer was loaded with Gabapentin (a nerve painkiller) and the second layer with acetaminophen. The fabricated dressing was characterized using scanning electron microscope, Fourier Transform Infrared Spectroscopy, X-Ray Diffraction and UV-Vis Spectroscopy. The double layered based NFs dressing was designed to have both initial burst release followed by slow release to cope with pain for two days. The fabricated nanofibers showed diameter < 300 nm. The liquid absorption capacity of the NFs was also checked to deal with the exudate. The fabricated double layered dressing with dual drug loading and release showed promising results that could be used for dealing pain in burn victims. It was observed that by the addition of drug, the size of nanofibers was reduced, on the other hand, the crystallinity %age was increased, and liquid absorption decreased. The combination of fast nerve pain killer release followed by slow release of non-steroidal anti-inflammatory drug could be a good tool to reduce pain in a more secure manner with fewer side effects.

Keywords : pain management, burn wounds, nano-fibers, controlled drug release
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