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Development of hydrocolloid Bi-layer dressing as an alternative of advanced tissue scaffold: Effect of Gamma radiation

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Bio-active bi-layer thin film having both bio-adhesive and non-adhesive end composed of polyvinyl alcohol (PVA) and gelatin/chitosan/polyethylene glycol (PEG) blend was developed for biomedical applications especially as an alternative of advanced tissue scaffold. The developed composite film was subjected to mechanical, thermal and physico-chemical characterization such as tensile strength (TS) and elongation at break (Eb), differential scanning calorimetry (DSC), Fourier transform infrared spectroscopy (FTIR), fluid drainage capacity and biocompatibility. Suitable packaging was also selected and stability study and aging test of the composite film were performed after packing. The incorporation of chitosan and PEG into gelatin showed improved mechanical properties of both TS and Eb, which suggested the occurrence of interaction among gelatin, chitosan and PEG molecules in the composite film. The prepared thin films were irradiated by gamma radiation (25kGy) for further crosslinking and sterilization. The presence of crosslinking as an interaction of above three polymers was also confirmed by FTIR study. Results from the DSC study suggested increased thermal stability after crosslinking. On the other hand, water uptake studies suggested excellent fluid drainage capability and hydro-stability of the composite film. The proposed dressing also showed excellent biocompatibility. Based on the studies related to the performance with confirmed identity, we concluded that our developed bi-layer film is very potential as an ideal wound dressing material.

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