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Abstract

Biomimetic biocompatible hydrogel composed of jelly fig polysaccharide and lauric acid accelerates wound tissue regeneration: An in vitro study

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Abstract:
Tissue regeneration is an essential process to maintain a normal anatomical structure and function of the skin. Natural biopolymer-based polymeric hydrogels are capable of absorbing a large quantity of water to maintain the moisture environment at the desired site. The eminence of hydrogels should be biocompatible, nontoxic, keep the moist environment to supply oxygen and nutrients, protect the wound against microbes and absorb enough wound exudates. Here, we have prepared hydrogel using jelly fig polysaccharide extracted from achenes of jelly fig (Ficus pumila var. awkeotsang) as base material and loaded with lauric acid (0.5 and 1%) as a bioactive ingredient to promote the tissue regeneration. The physiochemical properties of the hydrogel such as swelling, degradation, morphology, chemical nature (ATR-FTIR) were thoroughly characterized. Also, the biocompatibility of the hydrogel was studied using NIH 3T3 fibroblasts by MTT assay, live/dead and cell proliferation by DAPI/FDA staining. Further, tissue regeneration ability was assessed by in vitro scratch wound assay. MTT assay showed that jelly fig (JF) hydrogel and lauric acid loaded jelly fig (JF + LA) hydrogels did not show any toxicity. DAPI staining showed more live cells on hydrogels compared to control (Tissue culture plate). Cell proliferation was increased in (JF + LA 1%) hydrogels compared to control. In vitro scratch wound assay revealed that (JF + LA 1%) hydrogels improved the cell migration and completed wound closure within 24 h. Hence, the JF + LA hydrogels can be used as an ideal wound dressing for the acceleration of wound repair and tissue regeneration.

Biography:
Dr. T. Ponrasu has obtained his Ph.D. at CSIR-Central Leather Research Institute affiliated to Madras University, India in August 2013. Later, he has done his postdoctoral research (July 2014 – June 2017) in the Department of Biotechnology, Indian Institute of Technology Madras, India. Currently, he is working in the Department of Chemical and Materials Engineering, National Yunlinn University of Science and Technology, Taiwan. He has developed a variety of wound dressing materials for skin tissue engineering and wound healing applications. He has published 34 articles in peer-reviewed journals and he has been serving as a reviewer of many reputed journals.

Publication of speakers:

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