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Gellan Gum (GG) thin film incorporated TiO_2 nanotubes for wound dressing application

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Statement of the Problem: Currently, there are approximately 165 million cases worldwide across different types of wounds either close or open wounds which is requiring the wound treatments. Thus, the demands in wound treatments are extremely huge and predicted to grow annually over 6% (Franco, 2010). The application of biological materials in form of solutions and creams for drug delivery to the wounds are not very effective as they rapidly absorb fluid during the process and lose their physical, mechanical properties and become unstable. For this reasons, the use of wound dressing is preferred as they provide better exudate management and prolonged residence at the wound site.

Methodology & Theoretical Orientation: There are more than 3000 types of wound dressing products available in market. However, wound dressing based on gellan gum has received great attention due to their biocompatibility and biodegradability properties. Although gellan gum has been reported to biocompatible on a few live cells, but researchers keep working to improve the proliferation rate on gellan gum thin film. Sankar et al. (2014) was reported titanium dioxide nanoparticles loaded with *Origanum vulgare* plant have delivered a novel therapeutic route for wound treatment in clinical practice and their study shows significant wound healing activity in Albino. Moreover, the inclusion of nanosized materials into biopolymers also improved cell biocompatibility, antibacterial and antiviral properties. Thus, in this study TiO_2 nanotubes was incorporated into Gellan Gun (GG) biopolynmer thin film in order to enhance the antibacterial properties and cell proliferation for wound healing.

Findings: Antibacterial studies proved the GG incorporated TiO_2 nanotubes has high antibacterial activities against *Escherichia coli* and *Staphylococcus aureus*. *In vivo* evaluation on rat confirms that the GG incorporated TiO_2 nanotubes showed faster wound healing, more complete re-epithelialization and denser collagen deposition properties.

Conclusion & Significance: The findings demonstrate that the prepared GG incorporated TiO_2 nanotubes thin films has a big potential as wound dressing for faster healing process.

Biography

Mohd Hasmizam Razali expertises are in nanomaterials and functional materials. He has a PhD degree in Materials Engineering (Nanomaterials) from Universiti Sains Malaysia (USM), MSc in Chemistry (Catalyst) and B.Sc (Hons) in Chemical Industry from Universiti Teknologi Malaysia (UTM). Currently he is a Senior Lecturer at School of Fundamental Sciences, Universiti Malaysia Terengganu (UMT), Malaysia. He has published more than 30 technical papers in journals and conference proceedings locally and internationally related to the nanomaterials and functional materials research. Owing to their significant impacts to the science, economy and society, his innovative research and inventions have attracted global and national interests, enabling him to secure financial support from both private and government agencies. He has been awarded Who's Who in the World for 3 years in a row 2013, 2014 and 2015 by The Marquis Who's Who Publications Board. In 2014, the Cambridge Biographical Centre listed him as one of 2000 Outstanding Intellectuals of the 21st Century. He is also the recipient of the MAWHIBA Award and GENEVA Gold Medal Award in 1999.

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