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Synthetization and characterization of natural biocompatible composite having sustained drug release mechanism for topical and subcutaneous applications

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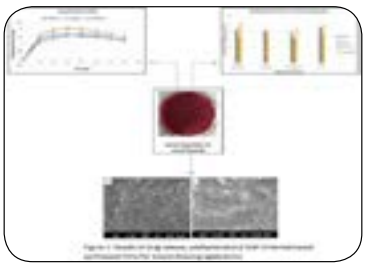
Statement of the Problem: The integrity of injured tissue and prevention from microbes at the site of wound is important factor for healing the target site. Currently, the main aims of wound dressings are to come up with natural material based environment which will not only prevent environmental intervention but also help in reducing microbial attack along with accelerating wound healing. The aim of this study was the synthetization and characterization of natural composite films that possess natural antimicrobial agent and can release it in a sustained manner. In this study CMC (CarboxyMethyl Cellulose), PVA (Polyvinyl Alcohol) and Basil seed gum were used for the preparation of a nature composite and Hermal seed extract was added as an anti-microbial agent.

Methodology & Theoretical Orientation: For the fabrication of films, solvent casting method is used. The different ratios of PVA, CMC and basil gum is used to synthesis the films with constant amount of drug. Afterwards, films were subjected to drug release testing along with antimicrobial and SEM analysis.

Findings: The SEM analysis of successfully fabricated films showed accumulation of drug over the surface of the films which resulted in initial burst release of Hermal and later slow release. The films showed good results against various bacterial strains.

Conclusion & Significance: The intrinsic antibacterial property of Hermal extract is combined with swelling property of PVA, basil seed gum and CMC. The composite films were screened drug release and antibacterial activity against P. aeruginosa, E. coli, S. aureus and B. subtilis. According to the results obtained from antibacterial and drug release studies, the composition with the ratio of CMC/Gum 3:1 with Hermal extract is considered to be better among all other ratios used. Thus, this composition can be considered as a potent candidate for coatings and wound healing applications.



Recent Publications

1. Boateng, J., & Catanzano, O. (2015). Advanced therapeutic dressings for effective wound healing—a review. Journal of pharmaceutical sciences, 104(11), 3653-3680.
2. Capanema, N. S., Mansur, A. A., Carvalho, S. M., Mansur, L. L., Ramos, C. P., Lage, A. P., & Mansur, H. S. (2018). Physicochemical properties and antimicrobial activity of biocompatible carboxymethylcellulose-silver nanoparticle hybrids for wound dressing and epidermal repair. Journal of Applied Polymer Science, 135(6).
3. Mogoşanu, G. D., & Grumezescu, A. M. (2014). Natural and synthetic polymers for wounds and burns dressing. International journal of pharmaceutics, 463(2), 127-136.
4. Singh, B., Sharma, S., & Dhiman, A. (2013). Design of antibiotic containing hydrogel wound dressings: biomedical properties and histological study of wound healing. International journal of pharmaceutics, 457(1), 82-91.

5. Shaw, G. S., Biswal, D., Banerjee, I., Pramanik, K., Anis, A., & Pal, K. (2017). Preparation, characterization and assessment of the novel gelatin–tamarind gum/carboxymethyl tamarind gum-based phase-separated films for skin tissue engineering applications.

Biography

Bakhtawar Ghafoor has her expertise in biomaterials and medical implants coatings. She has done her MS in Biomedical Sciences and currently she is doing PhD in Biomedical Sciences from National University of Sciences and Technology, Pakistan. She has worked on coatings for medical implants, electrospun mats for wound healing and on the synthesis of films for different biomedical applications.

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