# Fabrication and Characterization of Helix aspersa Extract Incorporated Microneedles: A Novel Approach to Wound Healing

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Wounds are known to cause mortality and morbidity worldwide. The currently-used wound dressings are not sufficient in terms of proliferation or bacterial mitigation which highlights the need for alternative wound dressings. In this study, we aimed to fabricate an alternative wound dressing in order to overcome these challenges. We developed a microneedle based Helix aspersa incorporated wound dressing from GelMA, a chemically modified version of gelatin, in order to overcome these problems. The microneedles were designed using DLP-based 3D printing systems in which we evaluated three compositions: pure GelMA microneedles, Helix aspersa incorporated microneedles and Dexpanthenol incorporated microneedles which served as a clinically relevant control. Then the physicochemical properties were evaluated through SEM, FT-IR, DSC and LC-MS/MS while the biological performance was assessed through MTT, Scratch wound healing assay, Western Blot for PCNA expression and antimicrobial analysis. Our Helix aspersa extract loaded microneedles demonstrated high biocompatibility, proliferation and migration and significant antimicrobial activity compared to the control groups. These findings suggest that the incorporation of Helix aspersa to GelMa microneedles present a promising platforms to accelerate wound healing. Overall, this study presents an innovative, sustainable, and clinically relevant approach to chronic wound treatment, with the potential to reduce healthcare burden and improve patient outcomes through advanced biomaterial-based transdermal application technologies.

**Awards Won:**