Formulation and characterization of diabetic wound healing gauze using PDGF-eugenol nanocomposites for Diabetic Foot Ulcer (DFU) – A 3D bioprinting approach

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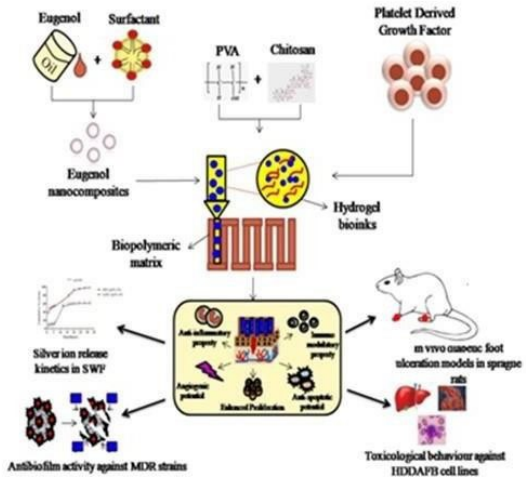
3

Graphical Abstract / Layout



Project Description:

Diabetes mellitus (DM) is a global syndrome characterized by excessive hyperglycemia. According to the International Diabetes Federation (IDF), approximately 536 million (20–79 years) adults are living with diabetes as of 2022 inIndia, and this number is projected to rise to 645 million by 2030 and 784 million by2045. Among the affected diabetic individuals worldwide, 20% of patients develop diabetic foot ulcers (DFUs). The novelty of this project is that conventional treatments for diabetic foot ulcers are beneficial, resulting in prolonged healing time, inadequateblood flow, and wound recurrence, leading to limb amputations. The delivery of inadequate and improper supply of antibiotics for foot ulceration tends to increase biofilms' survival, resulting in antimicrobial resistance (AMR). The 3D bio-printed

scaffolds impregnated with PDGF and eugenol-based nanocomposite potential open alternatives for skin replacements, enhancing anti-inflammatory properties, angiogenesis, accelerated cell proliferation, anti-apoptotic potential, and immunomodulatory properties. Hence, bio-printed scaffolds possess remarkable similarity to the extracellular matrix, better vascularization, and ensure the long-termsurvivability of skin tissues. The expected outcomes are that the fabricated 3D bio- printed scaffolds may provide faster wound healing, angiogenic potential, wound moisture, reduce pain, and absorb excess exudates. The 3D porous scaffolds may possess good swelling properties, immunomodulatory potential, vascularization,cytocompatibility, hemocompatibility, and anti-inflammatory activity.