

**Academic Year: 2024-2025**

**Author:** Mehran Mohammadpour

**Thesis Title:** Evaluation of effects of bacterial nanocellulose/honey composite on excisional wound healing in mouse

**Abstract**

In recent years, the application of wound dressings derived from natural sources has grown significantly. Bacterial nanocellulose (BNC), produced by *Komagataeibacter xylinus*, is recognized as a promising biomaterial due to its unique structural characteristics, including high crystallinity, biodegradability, and biocompatibility, making it a suitable candidate for wound healing applications. Honey also exhibits antimicrobial, anti-inflammatory, and tissue regeneration-stimulating properties.

This study aimed to evaluate the effects of BNC composites containing honey on the healing process of excisional wounds and their impact on parameters such as wound contraction, histopathology, biochemical markers, and the promotion of collagen synthesis in mice. Twenty-four mice were assigned to four groups: (1) untreated control, (2) honey-treated group, (3) BNC-treated group, and (4) BNC/honey treated group. Full-thickness excisional wounds (8 mm in diameter) were created on the dorsal thoracic region of the animals. Wound contraction was assessed via planimetry on days 3, 6, 9, 12, and 14.

Histopathological analysis on days 7 and 14 revealed enhanced tissue regeneration, with increased angiogenesis and greater fibroblast activity in the composite-treated group. Biochemical evaluations revealed a notable rise in total antioxidant capacity and glutathione peroxidase activity, accompanied by a reduction in oxidative stress markers (TOS and MDA) in Group 4. Additionally, hydroxyproline levels, indicative of collagen synthesis, were significantly higher in the BNC/honey composite-treated group.

The results of this study demonstrate that the BNC/honey composite accelerates wound healing by improving collagen synthesis, reducing inflammation, and enhancing antioxidant activity, making it a promising candidate for clinical wound care applications.

**Keywords:** bacterial nanocellulose, honey, composite, wound healing, mice