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DEVELOPMENT OF SERICIN-BASED BIOACTIVE COMPOUNDS FOR WOUND HEALING

Mrs. M. Meenakshi

Sri Ramakrishna College of Arts & Science for Women, Assistant Professor, Department of Microbiology.

ABSTRACT Sericin obtained from silkworm cocoons proves to be a promising natural protein for wound healing enhancement according to latest biomaterial research findings.The protein sericin demonstrates noteworthy properties that make it suitable for medical use because it displays three key characteristics which are biocompatibility along with biodegradability as well as effective functionality towards human skin tissue .the research examines the procedure of developing wound healing materials through sericin addition of bioactive compounds starting with sericin extracting processes while examining bioactive compound identification and concluding with material preparation and effectiveness measurements. Wound healing represents a critical metical challenge even in current time because chronic wounds stand out as a specific concern to medical professionals The healing process for wounds requires multiple cellular and molecular functions to work together as a whole system. Sericin extracted from natural sources now gets wide consideration for its potential to aid wound healing. Extraction of sericin protein from silkworm cocoons reveals this substance exhibits antioxidant properties together with anti-inflammatory and antimicrobial actions. The research goal is to extract sericin from silkworm cocoons and characterize its properties for evaluation as wound healing material development.

KEYWORDS : Sericin, Silkworm, anti-inflammatory, Fermentation, eco-friendly

INTRODUCTION

Wound healing processes benefit highly from bioactive compounds because these substances control cellular reactions and improve tissue restoration while organizing surrounding wound conditions. The compounds which originate from natural or synthetic origins possess anti-inflammatory together with antioxidant plus antimicrobial features that help manage the multiple stages of wound repair starting from hemostasis through excitation and cell division and tissue remodeling. Bioactive materials demonstrate several beneficial properties including reduction of inflammatory reactions along with promotion of blood vessel formation which together speeds up the healing processes (Ruotao Li *et al*.,2022).

Natural substances including terpenoids and alkaloids together with polyphenols and flavonoids exist in honey and medicinal plants and marine life. Wound healing receives a speed boost through bioactive substances due to their ability to promote angiogenesis as well as collagen formation and cellular proliferation. The antibacterial effects along with antioxidants in bioactive substances protect wounds from bacterial infections while reducing the impact of oxidative stress. Scar closure and enhanced healing success is achieved due to their ability to control inflammatory reactions (Patil *et al*., 2022).

Bioactive compounds bring various benefits to wound treatment that exceed standard therapeutic approaches. These compounds demonstrate biological compatibility and degradability which minimizes chances of adverse effects because they differ from synthetic medications. Bioactive compounds containing curcumin and chitosan demonstrate both antimicrobial and anti-inflammatory properties in nature which helps decrease the requirement for antibiotics and steroids. Tissue repair becomes more efficient through their property to activate fibroblast migration and their role in extracellular matrix deposition. The bioactive compounds show potential as wound management agents because they can enter wound care products including dressings and ointments at affordable and environmentally friendly costs(Gupta & Jain *et al*., 2021).

Figure 1: Cocoon

Figure 2: Gel formulated using sericin and allantoin

Cocoon was collected from kovilpatti in tamilnadu.

Collection Of Cocoons & Its Processing

The cocoons are white and oval-shaped, with some showing evidence of openings or discoloration, indicating stages of maturation or hatching. They are submerged in water in plastic and metal containers, suggesting they are being cleaned, softened, or prepped for further processing. The use of a water bath in the orange container and sorting in smaller containers reflects systematic preparation for silk extraction or another processing phase. Tools such as graduated cylinders and other containers in the background hint at a scientific or industrial setting for handling the cocoons. The discoloration of some cocoons might indicate contamination or variance in quality. Further classification could improve uniformity in the output product. Water treatment likely softens the sericin (silk protein) surrounding the cocoon, facilitating silk thread extraction. Ensuring proper soaking conditions is crucial to maintaining silk quality and preventing fiber breakage. Regular monitoring of water cleanliness to prevent bacterial growth that could affect the cocoons.

Extraction Of Sericin

The extraction of sericin was successfully carried out using a centrifugation method. The process involved obtaining a light yellow solution, indicating the solubilization of sericin proteins from the silk fibers. The sericin extract was collected and subsequently stored under refrigeration to maintain its stability and prevent degradation

CONCLUSIONS

The gel formulated using sericin and allantoin exhibited smooth and uniform consistency with a clear to slightly translucent appearance, indicating good stability without phase separation or precipitation. The pH of the gel was found to be in the range of 6.0–7.0, which is compatible with the skin's natural pH, minimizing irritation risks. The spreadability was excellent, ensuring easy application and even coverage on the skin. The viscosity, optimized with Carbopol 940 and adjusted using triethanolamine, remained stable over time, confirming the formulation's stability and usability.

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