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PRESCRIPTION

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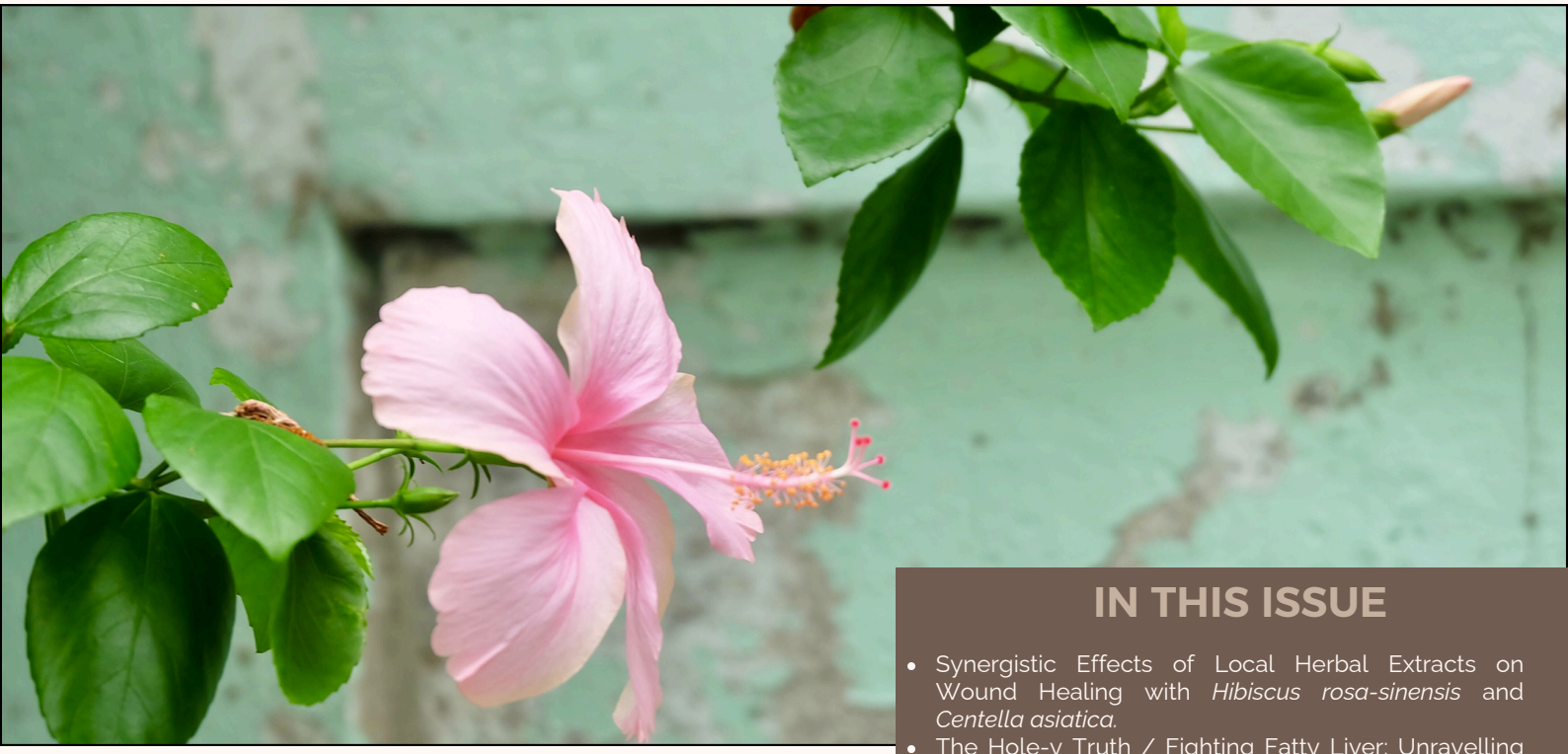

Synergistic Effects of Local Herbal Extracts on Wound Healing with *Hibiscus rosa-sinensis* and *Centella asiatica*

By: Dr. Aida Azlina Ali

Wound healing is a vital biological process that ensures tissue repair and restores skin integrity following injury. Although the skin naturally heals through complex mechanisms involving inflammation, proliferation, and remodelling, these processes can be delayed or impaired by factors such as infection, chronic disease, or aging. To address these challenges, researchers are actively exploring innovative ways to enhance healing, with particular interest in natural products with medicinal properties. In this context, a recent study by our research team, comprising researchers from UiTM, UPM and UKM, has yielded promising results through the synergistic use of two traditional medicinal plants, *Hibiscus rosa-sinensis* and *Centella asiatica* (HRSCA).

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The research aimed to scientifically evaluate the wound healing efficacy of these plant extracts, both of which are individually recognised for their healing properties. This ground-breaking study combined traditional herbal knowledge with modern molecular biology techniques, offering valuable insights into the potential of herbal combinations in regenerative medicine. The study was conducted in two main phases: (1) an in vivo experiment using Wistar rats to observe clinical and histological parameters, and (2) a three-dimensional (3D) human skin model to evaluate molecular gene expression changes associated with wound healing pathways.

Wound healing efficacy of Hibiscus rosa-sinensis and Centella asiatica study

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Phase 1
an in vivo experiment using Wistar rats to observe clinical and histological parameters

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Phase 2
a 3D human skin model to evaluate molecular gene expression changes associated with wound healing pathways

In the in vivo model, 24 healthy male rats were inflicted with full-thickness excisional wounds and divided into four groups: untreated control, positive control (treated with 10% Betadine®), and two treatment groups receiving 5% and 10% HRSCA, respectively. The wounds were monitored for 14 days, and several parameters were assessed, including wound contraction rate, re-epithelialisation period, tensile strength, and histological features. The group treated with 10% HRSCA showed significantly faster wound closure compared to both untreated and positive control groups. By day 14, this group achieved a wound contraction rate of over 90%, indicating accelerated healing. Histological analysis further supported these findings. The HRSCA-treated groups displayed more organised collagen fibers, reduced inflammation, and minimal granulation tissue, the hallmarks of efficient wound remodelling. Notably, Masson's Trichrome staining revealed a greater presence of mature collagen fibres in the treated samples, suggesting that HRSCA not only promotes wound closure but also enhances tissue quality and reduces the risk of excessive scar formation.

Beyond these physical observations, the study's novelty lies in its molecular exploration of the wound healing process. Our team successfully developed a 3D organotypic skin model using human keratinocytes and fibroblasts embedded in a collagen scaffold. This model closely mimics the human skin architecture and allows for detailed investigation of gene expression during wound repair. The wound model was treated with 5% HRSCA, and after 14 days, RNA was extracted for gene expression profiling using the Qiagen Human Wound Healing RT^2 Profiler PCR Array, which evaluates 84 key genes involved in inflammation, extracellular matrix remodelling, adhesion, growth factors, and signal transduction.

Gene expression analysis revealed that HRSCA treatment resulted in the upregulation of 12 genes and downregulation of 34 genes, suggesting a balanced modulation of the wound healing environment. Notably, WISP1, a gene involved in cell survival and proliferation, was significantly upregulated. Additionally, genes related to growth factors such as IGF1, PDGFA, TGFA, and VEGFA showed increased expression, indicating enhanced cell proliferation and angiogenesis, the critical components of effective wound healing. Conversely, several inflammatory cytokines and chemokines, including CXCL11, CXCL5, and IL6ST, were downregulated, implying that HRSCA helps modulate inflammation, a key factor in preventing chronic wounds or hypertrophic scarring. Furthermore, the downregulation of collagen-related genes such as COL5A3 indicates a potential reduction in excessive collagen deposition, which may help minimise the risk of fibrosis and keloid formation. The integrin family of genes, particularly ITGA5 and ITGA1, which regulate cell adhesion and migration, were also significantly downregulated. This selective gene modulation indicates a controlled cellular response, facilitating efficient tissue remodelling without prolonging early inflammatory or migratory activity.

These findings highlight the multifaceted role of HRSCA in modulating various stages of wound healing. By promoting keratinocyte proliferation and fibroblast migration, stimulating angiogenesis, and controlling inflammation, HRSCA appears to support a healing process that is both rapid and effective. The study presents a compelling case for further investigation of HRSCA as a topical wound healing agent. With the growing global interest in plant-based and natural therapies, this research supports the development of herbal formulations derived from Hibiscus rosa-sinensis and Centella asiatica. These plants are abundant in Southeast Asia and have a long-standing history of use in traditional medicine, making them culturally and economically viable candidates for pharmaceutical development.

In conclusion, this work underscores the value of integrating traditional botanical knowledge with cutting-edge biomedical science. By combining animal studies, 3D skin models, histology, and gene profiling, the research methodology sets a strong benchmark for future investigations into natural products and their potential clinical applications.

About the author

Dr. Aida Azlina binti Ali is a Senior Lecturer at the Faculty of Pharmacy, UiTM. She holds a PhD in Medical Sciences (Pharmacology) from Universiti Kebangsaan Malaysia and a Bachelor of Biomedical Sciences from Universiti Putra Malaysia. Since 2010, Dr. Aida has been actively involved in pharmacology education and research. Her research interests span herbal medicine, wound healing and antimicrobial studies. She has contributed to numerous peer-reviewed publications and has secured several national research grants, including FRGS, RAGS, and DUCS-GIP.

Dr. Aida is also a member of the Malaysian Society of Pharmacology and Physiology (MSPP) and the Laboratory Animal Science Association of Malaysia (LASAM). Her contributions to educational innovation have been recognised with multiple awards at Pharm-IIDex and related platforms.

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