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PRESCRIPTION

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THE WOUND HEALING AND SKIN RESTORATION PROPERTIES OF BAECKEA FRUTESCENS

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Chronic wounds, particularly in aging populations and individuals with diabetes or obesity, pose significant healthcare challenges due to delayed healing and persistent inflammation. Among various approaches, plant-based remedies have emerged as a promising avenue. Baeckea frutescens, a shrub native to Southeast Asia, has shown potential as a wound-healing agent based on traditional use and scientific validation.

ETHNOBOTANICAL BACKGROUND

Baeckea frutescens (local name: Cucur atap) is widely distributed in Southeast Asia, Southern China, and Australia, thriving in nutrient-poor sandy soils at high altitudes (Bean, 1997). The leaves, characterised by their needle-like structure and aromatic properties, have been traditionally used in Chinese medicine for fever, snakebite, dermatitis, and colds (Hou et al., 2020). In Malaysia and Indonesia, the leaves are incorporated into herbal drinks ("Jamu") for treating vaginitis and postpartum abdominal pain (Jantan et al., 1998; Elfahmi et al., 2014). Chemical analyses have identified bioactive compounds, including phloroglucinols, sesquiterpenes, chromones, flavonoids, and meroterpenoids (Kamiya & Satake, 2010; Nisa et al., 2016; Hou et al., 2020; Ito et al., 2017), which contribute to its biological activities such as anti-inflammatory, anti-proliferative, and antioxidant effects (Navanesan et al., 2015; Shahruzaman et al., 2019; Quang et al., 2008).

CYTOTOXICITY AND PROLIFERATIVE EFFECTS

Our research team has established the safety of *B. frutescens* extracts at non-toxic concentrations. Research has demonstrated that ethanolic extracts (BFLE) stimulate keratinocyte and fibroblast proliferation, both essential for tissue regeneration. Similarly, aqueous extracts (BFAE) enhance cell migration, accelerating wound closure by over 1.3-fold within 12 hours (Kamarazaman et al., 2023; Kamarazaman et al., 2024). These findings underscore the potential of *B. frutescens* to support wound healing processes.

ANTIOXIDANT PROPERTIES

Oxidative stress impairs wound healing, but the antioxidant properties of *B. frutescens* extracts mitigate such effects. Assays such as 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging and ferric reducing antioxidant power (FRAP) have demonstrated antioxidant activity comparable to green tea extract (Kamarazaman et al., 2024). Phenolic compounds, flavonoids, and tannins contribute to these effects by fostering a favorable environment for cellular repair (Quang et al., 2008; Navanesan et al., 2015).

WOUND HEALING MECHANISMS

Our research team indicates that *B. frutescens* extracts influence key molecular pathways involved in wound healing. The ethanolic extract upregulates the expression of genes such as transforming growth factor-beta (TGF-β), interleukin-1 beta (IL-1β), vascular endothelial growth factor (VEGF), and matrix metalloproteinases 2 (MMP-2), which facilitate angiogenesis, cell migration, and extracellular matrix remodeling (Kamarazaman et al., 2024). Additionally, the extract downregulates pro-inflammatory cytokines and reduces lipid peroxidation, further supporting healing (Shahruzaman et al., 2019).

IN VIVO VALIDATION

Our research team, using animal models, specifically Wistar albino rats, has reinforced the therapeutic potential of *B. frutescens*. Topical application of BFLE improved wound closure rates, tensile strength, and collagen deposition. Even at low concentrations, such as 2.5% (w/v), the extract demonstrated efficacy in reducing inflammation and promoting granulation tissue formation (Kamarazaman et al., 2023; Kamarazaman et al., 2024).

CONCLUSION

The findings on *Baeckea frutescens* highlight its potential as a natural agent for wound healing. Its activities —ranging from promoting cellular regeneration to modulating oxidative stress and inflammatory responses— support its use in developing therapeutic formulations. Future research will aim to further elucidate its molecular mechanisms and optimise its application in clinical settings. Integrating traditional knowledge with modern science, *B. frutescens* offers a promising solution to the challenges of wound healing.

*Image source for *Baekea frutescens* plant: Noosa's Native Plants Webpage

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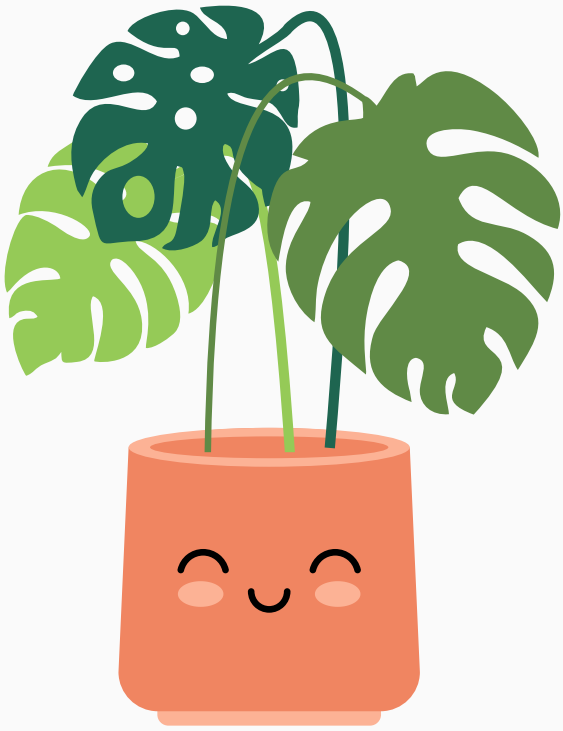

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Assoc. Prof. Dr. Hasseri Halim earned his PhD (Pharmaceutical Technology) from the University of Chulalongkorn, Thailand in 2012. His research interests expand across anti-inflammatory and metastasis of cell signalling. He had published various scientific papers on these topics including wound healing properties of *Baeckea frutescens*.