Chapter 1

Introduction

1.1 Background

Skin health is of great concern, with conditions such as acne often resulting in discomfort and potential long-term scarring. It is affecting individuals of all ages, impacting not only physical health but also psychological well-being (Pruthi & Babu, 2012). Acne is a prevalent skin condition characterized by the clogging of hair follicles and oil glands in the skin caused by the overproduction of sebum and hyperkeratinization. It causes skin cells lining the hair follicles to become overly sticky and form comedones, the primary acne lesions (Sutaria & Schlessinger, 2019). These comedones can manifest as open (blackheads) or closed (whiteheads) depending on whether the follicular opening is obstructed. Bacterial overgrowth, primarily involving *Propionibacterium acnes* or *P. acnes*, further complicates matters, leading to inflammation and the formation of inflammatory acne lesions like papules and pustules. Acne vulgaris is a chronic skin condition characterized by various types of skin eruptions, including open and closed comedones, pustules, papules, and cysts, depending on its progression. Additionally, the improper choice of treatment or the presence of severe acne vulgaris can lead to the formation of atrophic scars. In regards to the healing process of the acne scar, it is initiated promptly after an injury to the epidermal layer and may extend over a period of several years and this intricate process involves well-coordinated cellular, humoral, and molecular mechanisms (Chilicka et al., 2022).

Green tea, derived from the dried leaves of the *Camellia sinensis* plant, possesses a spectrum of beneficial properties, including antioxidative, anti-aging, and anti-inflammatory effects (Asadi et al., 2013). It has the potential to modulate collagen production, reduce excessive accumulation, and influence immune responses, all made possible due to catechins. Notable among these

catechins are epicatechin, epicatechin gallate, epigallocatechin, and epigallocatechin gallate (EGCG), which function as key antioxidants. These compounds are able to enhance collagen synthesis which then facilitates wound healing processes (Asadi et al., 2013).

Allantoin has a long history of use in cosmetic and pharmaceutical products, serving various therapeutic purposes, particularly due to its wound healing properties. It possesses a range of properties and effects that promote the transition of a wound from an inflammatory to a proliferative phase. These include antioxidant and anti-inflammatory properties, direct antimicrobial effects, and the ability to facilitate the shedding of dead skin cells, which aids in wound healing (Becker et al., 2010). Additionally, allantoin has been demonstrated to support the growth of healthy tissue by stimulating cell proliferation and the synthesis of the extracellular matrix. Based on the evidence from Araújo's (2010) experiment regarding the profile of wound healing process induced by allantoin in mice models, the histological analysis showed the wound healing in rats following the application of allantoin revealed its capacity to enhance and accelerate the restoration of healthy skin tissue.

This research aims to investigate and explore the formulation of an acne scar serum infused with green tea extract and allantoin in hopes of a combined effect on wound healing towards acne scars. The research is of high interest to initiate a possible cosmetic product with a high rate of wound healing properties.

1.2 Objective

To formulate and evaluate an anti-acne serum combining *Camellia sinensis* extract and allantoin, assessing their combined wound healing effects, and identifying the best serum formulation amongst different types of thickening agents.

1.3 Hypothesis

The combination of *Camellia sinensis* extract and allantoin will enhance wound healing, and one of the three thickening agents will provide the most effective serum formulation in terms of stability and efficacy.