

Chapter 1: Introduction

1.1. Background

Atopic dermatitis (AD) is a multifactorial chronic inflammatory skin disease of the skin characterized by acute flare-ups and exacerbations, chronic eczematous skin lesions on dry skin, as well as intensive pruritus. It has an early onset, usually in infancy or early childhood with the prevalence of 10% to 30% of children and 2% to 10% of adults globally and the prevalence has increased in the recent decades. AD is considered as a multifactorial disease as it is caused by genetic, immunologic, mechanical, and environmental factors. Genetically predisposed individuals when triggered with environmental or physiological triggers will initiate the immune dysregulation and hypersensitivity causing skin inflammatory which result in destruction of intact skin barrier as can be seen in AD clinical characteristics. In recent years, oxidative stress has also been implicated in the pathogenesis of AD where it has been shown to cause direct damage of cell membranes, DNA and organelles, as well as increasing the proinflammatory cytokines production which in turn resulting in dermal inflammation and histamine release that cause skin barrier defect. AD possesses a significant burden on the patient's quality of life due to the itchiness that may cause sleep deprivation, scarring, and time and financial loss to care for the lesions. The current standard treatment for AD consists of moisturizing lotions and creams, topical corticosteroids, and for severe cases, oral corticosteroids. However, those treatments mainly focus on palliative treatment such as minimizing itch, scar healing, and preventing rash to worsen with considerable side effects. Therefore, there has been an increase in interest to utilize natural resources as AD therapy of choice as it can be more affordable with less side effects.

One of the natural resources in spotlight is Tamanu oil derived from *Calophyllum inophyllum* or Nyamplung that can be found in coastal regions all throughout Indonesia. Its wood has been widely used as a windbreaker, ship-building material, and firewood. However, its extract has a wide variety of medicinal applications such as remedy for ulcers, skin diseases, and rheumatism. One of the most

interesting characteristics that *Calophyllum inophyllum* has is the possibility of it to possess antioxidant properties in which it is able to inhibit oxidative species (OS). Antioxidant has the ability to neutralize free radicals and restore the balance between oxidants and antioxidants which prevent oxidative stress and further damage. One recently discovered AD mechanism has shown correlation with oxidative stress, thus the antioxidant potentials of *Calophyllum inophyllum* may be useful as potential AD therapy. This research is conducted to explore the antioxidant potential of Tamanu oil derived from *Calophyllum inophyllum* extract by conducting cell viability on HaCaT cell line and antioxidant chemical assay.

1.2. Objective

The objective of this research is to investigate the antioxidant potential of *Calophyllum inophyllum* seed ethanol, methanol, and hexane fraction by doing cell viability MTT assay using HaCaT cell lines, and antioxidant chemical assay using DPPH analysis.