CHAPTER I

INTRODUCTION

Aging is a complicated process involving a number of subtle changes that occur in our body with the passage of time. Skin aging is a combination of intrinsic and environmentally induced processes, predominantly ultraviolet (UV) light from the sun, resulting in characteristic tissue alterations such as degradation of collagen and formation of visible fine lines and wrinkles.

Aging is caused by reaction of excessive reactive oxygen species (ROS) that caused oxidative damage in cellular proteins, lipids and carbohydrates, which accumulate in the dermal and epidermal compartments, contributing to the aetiology of skin aging. Therefore, topical preparation of antioxidant is an important maneuver to prevent various forms of damages that can occur in the skin. Although many antioxidants are available in both synthetic and natural forms, the natural antioxidants are more offen used because they originate from natural sources and are expected to have limited toxicity.

Mahaad (*Artocarpus lakoocha* Roxb.) is a tropical tree belonging to the family Moraceae. The dried aqueous extract of *A. lakoocha* heartwood or Puag-Haad powder is commonly used in traditional Thai medicine as an anthelmintic and antipruritic agent. The main constituent of purified Puag-Haad is 2, 4, 3', 5'-tetrahydroxystilbene or oxyresveratrol (Mongkolsuk, Robertson and Towers, 1957). Oxyresveratrol from *A.lakoocha* heartwood extract has been shown to possses potent inhibitory effect on tyrosinase enzyme, which catalyzes rate-limiting steps of melanin biosynthesis (Sritularak, 1998; Sritularak, De-Eknamkul and Likhitwitayawuid, 1998). The *in vitro* study and *in vivo* skin whitening efficacy of the extract was subsequently evaluated in guinea pigs and human volunteers (Tengamnuay, Pengrungruangwong and Likhitwitayawuid, 2003). The result clearly demonstrated that the heartwood extract of *A.lakoocha* could reduce melanin formation in both guinea pig and humans. Recently, antioxidative and free radical scavenging activity of *A.lakoocha* extract has been reported (Wachiranuntasin 2005). It was found that oxyresveratrol showed an antioxidant activity and capable of scavenging several ROS

including superoxide anion, hydroxyl free radical, singlet oxygen as well as DPPH, a synthetic free radical often used as a standard model. Lorenz et al. (2003) reported that oxyresveratrol was a more potent scavenger of DPPH and nitric oxide radicals than resveratrol, a related substance well known for its strong antioxidant activity. Considering its various antioxidant properties, the extract appeared to have a very promising potential for further development as a safe, effective and economical anti-wrinkle agent in cosmetic product.

Development of cosmetic formulation depends on various factors such as the stability and availability of active ingredient. Recently, the stability of Puag-Haad in terms of physical and biochemical stability have been investigated (Pengrungruangwong, 2001; Wachiranuntasin, 2005). However, the chemical stability of Puag-Haad solution have not been previously reported.

This study focused on the physical and chemical stability of Puag-Haad powder dissolved in aqueous propylene glycol in presence of various antioxidants. The anti-wrinkle efficacy of Puag-Haad in both aqueous solution and lotion dosage forms were subsequently investigated in human female volunteers.

The specific objectives of this investigation were as follows:

1. To assay for the content of active constituent (oxyresveratrol) in dried aqueous extract of *Artocarpus lakoocha* heartwood (Puag-Haad) by high performance liquid chromatographic method.
2. To evaluate chemical stability of different aqueous solutions of *Artocarpus lakoocha* heartwood extract.
3. To evaluate anti-wrinkle efficacy and irritation potential of solutions containing *Artocarpus lakoocha* heartwood extract in female volunteers.
4. To formulate lotions containing *A. lakoocha* heartwood extract and evaluate their anti-wrinkle efficacy in female volunteers.

The overall aim of this study was to assess the potential of *A. lakoocha* heartwood extract for use as novel antioxidant/anti-wrinkle agent in cosmetic products.