

CHAPTER I

INTRODUCTION

In recent years, many successful medications derived from medicinal plants have received a great deal of attention. There are many advantages of medicinal plants from natural origin. Since the sources of medicinal plants are commonly found, it is possible to produce a high quantity with low cost. The safety and efficacy of medicinal plants have led to the widely applications in prevention and treatment of illness.

Garcinia mangostana is one of the medicinal plants that have been used for a long time for treatment of both normal and infected wounds. It was also used for diarrhea and dysentery (Farnsworth and Bunyapraphatsara, 1992). Phytochemical investigations indicated that the fruit rind contains various xanthenes and mangostin is the most active component. These xanthenes show considerable pharmacological activities such as antimicrobial, anti-inflammatory and anti-tumor activities (Bruneton, 1995). Previous studies showed that the extract from this plant exhibited significant antibacterial activity against *Streptococcus mutans*, bacteria in dental plaque (Gritsanapan et al., 2001; Rojanapanthu et al., 2001).

Dental caries and periodontal diseases are the most common of oral diseases, caused by dental plaque. Elimination of bacteria in dental plaque is an essential factor in prevention and treatment of the diseases. Therapeutic approaches are mechanical scaling and root planing. However, severe forms of the diseases cannot be controlled by mechanical treatment alone. Many studies suggest that local delivery devices of antimicrobial agents are a useful adjunct to conventional treatments (Schwach-Abdellaoui, Vivien-Castioni and Gurny, 2000).

Liquid crystalline phases offer a number of useful properties for drug delivery. First, they allow drug solubilization; both water soluble and oil soluble drugs may be incorporated. Second, liquid crystalline phases display a high viscosity, which offer opportunities for drug localized such as in the oral cavity (Malmsten, 2002). Glyceryl

monooleate or monoolein is a polar lipid which swells in water and gives rise to different kinds of liquid crystalline phases. The liquid crystalline phases formed by glyceryl monooleate have the potential of acting as an *in situ* forming drug delivery system. Moreover, glyceryl monooleate is a biodegradable and nontoxic material (Ganem-Quintanar, Quintanar-Guerrero and Buri, 2000). The glyceryl monooleate-water systems have been described as a sustained release carrier for both conventional and peptide or protein drugs. For periodontal delivery, there have been developed stable and sustained release formulations containing metronidazole and *Andrographis paniculata* extract for treatment of periodontal diseases (Norling et al., 1992; Komwatchara, 1996). The formulations were transformed to release-controlling and high-viscous liquid crystalline phases when contact with the gingival crevicular fluid. These studies suggested that addition of triglyceride into the glyceryl monooleate improved the flow properties of glyceryl monooleate and the formulations could be administered through a syringe into a periodontal pocket and was found to have the most favorable sustained release properties, compared to no addition.

The successful results of the above study demonstrate an interesting application of glyceryl monooleate for periodontal drug delivery. In this study, a drug delivery system based on a mixture of monoglycerides and triglycerides containing *Garcinia mangostana* extract was developed. Triglycerides from vegetable oils such as sesame oil, soybean oil and olive oil were used in the study due to their desirable release, stability, inexpensiveness and easy availability.

The purposes of this study were as follows:

1. To study the effects of different triglycerides on the ternary phase diagram.
2. To develop the formulation of monoglyceride-based drug delivery systems containing *Garcinia mangostana* extract.
3. To study the physicochemical properties and antimicrobial activity of *Garcinia mangostana* extract monoglyceride-based drug delivery systems.