

CHAPTER V

CONCLUSIONS

In this study *Garcinia mangostana* Linn. extract Linn. extract buccal mucoadhesive film was formulated from the purified extract, which composed of mangostin. Essentially various bioadhesive polymers were investigated for the appropriate physical properties and mucoadhesion. The effects of carbopol concentration combined in cellulose derivative polymer and the effects of molecular weight of chitosan, type and concentration of acid solution used in chitosan film preparation on the physical and mucoadhesive properties were investigated. The physical properties, mucoadhesion, release characteristics properties were evaluated. Finally, the stability study under accelerated condition of the formulations by quantitative analysis of mangostin using HPLC method was performed. In summary, the experimental results can be concluded as follows:

1. *Garcinia mangostana* Linn. extract could be prepared by extraction and recrystallization as mangostin crystals after isolation with quick column chromatography. The yellow bright needle shaped crystalline powder of mangostin were obtained. The molecular weight of this crystals was determined to be 410 and the melting point was 180.9 – 182.0 °C.

2. *Garcinia mangostana* Linn. extract had antimicrobial activities against *Staphylococcus aureus* ATCC 25923, *Streptococcus mutans* ATCC KPSK₂ and *Streptococcus sanguis* clinical isolate with the minimal inhibitory concentrations of 1.2, 0.75 and 0.75 µg/ml, respectively, and the minimal bactericidal concentrations of 4.8, 4 and 6 µg/ml, respectively.

3. Several bioadhesive polymers were investigated. It was found that SCMC, and HPMC, used as single polymers and combined with 10% and 20% carbopol gave appropriate physical appearance of mucoadhesive free films. For chitosan films, acetic acid and lactic acid at 1% and 2% w/w, could be used to prepare chitosan film with satisfactory physical appearance.

4. From the result of mechanical property investigation, it was found that the higher concentration of carbopol resulted in the increasing of the strength and flexibility of SCMC. The reverse result was obtained from HPMC groups. Molecular weight of chitosan, type and concentration of acid in chitosan film preparation also influenced on strength and flexibility of films. The higher molecular weight caused a significant increase in tensile strength but decrease flexibility of film. While, different type of acid produced a difference in characteristic and mechanical property of the film. Moreover, chitosan film prepared from 1% acid exhibited a significantly increase in tensile strength but decrease flexibility in comparison with 2% acid. The highest tensile strength was obtained from SCMC combined with carbopol while the highest % elongation of chitosan medium molecular weight film prepared from 2% lactic acid.

5. The results obtained from swelling test revealed that increasing concentration of carbopol caused a decrease in swelling index value of SCMC film. For chitosan film, it was found that chitosan acetate films showed a significantly higher swelling index value than chitosan lactate film. The swelling index values of chitosan film prepared from 1% and 2% acetic acid were insignificant different while chitosan film prepared from 1% lactic showed a considerable higher swelling index value than 2% lactic acid.

6. From the evaluation of mucoadhesion, the higher concentration of carbopol led to increase in stronger mucoadhesive force of SCMC and HPMC and longer duration time of HPMC, whereas, SCMC groups exhibited shorter adhesive time. It was revealed that mucoadhesive force was increased with increasing molecular weight of chitosan. In addition, chitosan acetate films presented higher adhesive strength and longer adhesive time than chitosan lactate films. The higher adhesive strength and adhesive time were obtained from chitosan films prepared from 1% acid. The highest mucoadhesive strength was obtained from high molecular weight chitosan film prepared from 1% acetic acid while medium molecular weight chitosan prepared from 1% acetic acid exhibited the longest adhesion time.