CHAPTER V

CONCLUSIONS

The fast dissolving films could open a new horizon in drug delivery systems. These thin and flexible films rapidly dissolved in oral cavity for reasonable improved patient compliance and convenience for use all the times without need of water.

In this study, orally fast dissolving films containing *Garcinia mangostana* husk extract were developed using by solvent casting method. The effect of type and ratio of polymer on mechanical properties, dissolution time and antimicrobial activity of formulations were investigated. The results of this study can be concluded as follows:

1. The yellow powder of *Garcinia mangostana* ectract was obtained by macerating method with ethyl acetate. The quantititive analysis of mangostin in extract by HPLC method was 55.86% w/w.

2. *Garcinia mangostana* extract showed antimicrobial activity against *Staphylococcus aureus* ATCC 25923 and *Streptococcus mutans* $KPSK_2$ with the minimum inhibitory concentration (MIC) of 3 and 1.5 μg/ml, respectively, and minimum bactericidal concentration (MBC) of 4 and 3 μg/ml, respectively.

3. From the results of mechanical properties of film bases, it was found that HPC LV gave the most soft and weak film and combination with HPMC in various ratios provided the stronger film. When increased HPMC 3 cps ratio in the combined polymers of HPMC 3 and 5 cps showed markedly decreasing the tensile strength, percentage of elongation and work of failure. It indicated that these films were more brittle and softer than HPMC 5 cps films alone. The effect of plasticizers on mechanical properties of HPMC 3 cps films were also investigated. It was found that glycerin increased toughness of the film, while combination of three plasticizers, PEG 400, PG and glycerin made the film too soft, moist and easy to break off.

4. The dissolution time of all film bases were observed. The results showed that the films with combination of HPMC 3 cps and HPC LV at all ratios had no statistically significant difference from a commercial product strips A (p>0.05). Therefore, these formulations were developed to the fast dissolving film containing *Garcinia mangostana* extract.

5. The study of surface morphology using by scanning electron microscope (SEM) and physicochemical properties by differential scanning calorimeter (DSC) of fast dissolving incorporated *Garcinia mangostana* extract found that the film with extract were more porous and rougher than its film bases. From DSC thermograms of film with extract, it was found that no peak of crystalline form of substances. This result indicated that the extract and other ingredients changed to either molecular dispersed or amorphous form.

6. According to the results of dissolution profiles, all formulations showed the rapid release of mangostin in simulated saliva fluid. About 80% of labeled amount of drug was released within 3-7 minutes. These revealed that the prepared fast dissolving films containing *Garcinia mangostana* extract had high efficacy of the films for rapid drug release.

7. Determination of antimicrobial activity of the films were performed and compared with commercial product strips A strips using agar diffusion method. The results found that film with extract exhibited antimicrobial effect against both *Staphylococcus aureus* ATCC 25923 and *Streptococcus mutans* $KPSK_2$, while commercial product strips A strips did not show this effect.

8. The fast dissolving films in the presence of *Garcinia mangostana* extract were stable under stress condition (40 ^{o}C, 75%RH) both chemical and physicochemical properties.

From the results obtained in this study, the fast dissolving films containing *Garcinia mangostana* extract that had *in vitro* antimicrobial activity against the oro-dental bacteria could be developed. The prepared films had good physical appearance

and were stable. However, the further study of these films for *in vitro* killing time and *in vivo* antimicrobial activity is necessary. That will provide a useful information to develop these fast dissolving films to the commercialized product in the future.