CHAPTER 4

CONCLUSIONS

From this research work the following conclusions can be drawn:

1. Ethyl acetate and methanol extracts of 18 Thai medicinal plants were tested for antibacterial activity against *Propionibacterium acnes* using disc diffusion and broth dilution methods. The results from the disc diffusion method showed that 16 plant extracts were capable of inhibiting the growth of *P. acnes*. Of these, the ethyl acetate extract of *Alpinia galanga* showed the strongest antibacterial effect, with MIC and MBC values of 156 and 312 µg/ml, respectively. The other plant extracts exhibited MIC values between 312 and >5000 µg/ml, and MBC values between 625 and >5000 µg/ml.

2. On the basis of bioassay-guided fractionation, the ethyl acetate extract of *A. galanga* was separated using several chromatographic techniques to afford an antibacterial compound, which was identified as 1′-acetoxychavicol acetate (1′-ACA).

3. 1′-ACA had a strong inhibitory effect against *P. acnes* with MIC and MBC values of 62 and 250 µg/ml, respectively. In addition, 1′-ACA exhibited antibacterial activity against *Staphylococcus aureus* and *S. epidermidis* with the same MIC (250 µg/ml) and MBC values (1000 µg/ml).

4. *A. galanga* extract would be an interesting material for further study on an alternative treatment of acne, and 1′-ACA could be recommended as an indicative marker for standardization of *A. galanga* extract.
5. High performance liquid chromatographic method was established for the
determination of 1′-ACA content in A. galanga rhizome extract. This analytical method showed
good resolution as well as linearity.

6. Standardized hexane extract of A. galanga rhizome was used for preliminary
formulation study. The content of 1′-ACA in hexane extract was 76.1 ± 0.62 %w/w.

7. Solubility and stability of A. galanga extract were examined prior to the formulation
study. The solubility study showed that A. galanga extract is sparingly miscible with ethanol and
mineral oil, slightly miscible with propylene glycol and very slightly miscible with glycerin.
Physical and chemical stability studies of the extract demonstrated that the examined temperatures
(25°C, 30°C and 45°C) did not affect the stability of the extract. However, the extract was not
stable if it was exposed to light.

8. The anti-acnes cream containing A. galanga extract were prepared. The results showed
that 1′-ACA was not stable in oil in water cream bases. However, the degraded products of 1′-
ACA, which may be 1′-hydroxychavicol acetate and p-acetoxy-trans-cinnamic alcohol, still
exhibited inhibitory effect against P. acnes.

9. Preliminary formulation study of anti-acne cream using A. galanga extract revealed
that although the A. galanga cream exhibited inhibitory effect after heating and cooling cycle test
and at room temperature after 30 days of storage, 1′-ACA is not stable in the oil in water cream
bases. Stability of A. galanga cream in this research was not success. Therefore, it requires further
studies to find a suitable cream base or suitable dosage form. In addition, skin irritation should be
a further study.