CHAPTER V

CONCLUSION

For our study, firstly, the heartwood of *A. incisus* was extracted by using diethyl ether. The *A. incisus* extracts were then determined the content of artocarpin, major component of *A. incisus* extract, by using HPLC method. The content of artocarpin found in ether extract was 44.5 ± 0.1% w/w. The ether extract was then evaluated for melanogenesis inhibitory, antioxidant activities and anti-inflammatory activities. The results showed that the ether extract of *A. incisus* could decrease the melanin production of B16F1 melanocytes without cytotoxicity. The obtained IC_{50} value of melanogenesis inhibition was 43.5±2.3 μg/mL while kojic acid provided IC_{50} of 57.6±1.3 μg/mL. As comparison to kojic acid at the similar equivalent concentration, kojic acid changed morphology of the melanocytes by losing dendrites under the microscopic observation. Additionally, the extract exhibited antioxidant activity with EC_{50} value of 168.6 ± 6.8 μg/mL, according to DPPH assay. For anti-inflammatory activity, the inhibitory effect of the extract on TNF-α release was less than prednisolone about 8 folds. These finding indicated that its antioxidant activity together with melanogenesis inhibitory and anti-inflammatory activity would enhance the potential of acting as the whitening agent.

From nanoemulsion preparation, this PIT method provided finely dispersed of small oil droplets including non-tacky feel and rich buttery texture without the need for high input of energy. Further, the type of emulsifier and coemulsifier including concentration of ingredients had profound effect on mean droplet size and polydispersity values of nanoemulsion. The optimum particle size of 325±15 nm with the minimum polydispersity of 0.31±0.02 was obtained when formulated with 0.02% w/w *A. incisus* extract, 41.62% w/w isopropyl myristate, 8% w/w ceteareth-10, 5% w/w glyceryl monostearate and 0.03% w/w carbopol 940. Nanoemulsion formulations were physically and chemically stable. On the basis of lowest droplet size and optimum emulsifier and coemulsifier concentration, we selected these formulas for using in *in vitro* and *in vivo* studies. The *in vitro* permeation studies through mouse

skin revealed that approximately 87.2±1.6% of artocarpin were released from nanoemulsions within 24 hr. Furthermore, the dorsal skin color of C57BL/6 mice after using the product for six weeks, the result showed a decrease of melanin value. Throughout the study, as any sign of the skin irritation was not found, therefore, it probably indicated that this developed product tended to be safe. By this reason, it can be concluded that the developed nanoemulsions have great potential for transdermal drug delivery. However, further studies including toxicity on human cell, irritability and *in vivo* toxicity should be perform to evaluate the valuable of the extract for marketing in the future.