

CHAPTER V

CONCLUSION

Nowadays, the botanical extract is playing an increasingly important role in cosmetics. In the research for new natural whitening agents, several plant with the depigmenting effects including tyrosinase inhibitory activity, melanogenesis inhibitory and antioxidant activity which are related to their function and chemical structure were investigated. As application for cosmetics, isolation and purification of the active ingredient within the crude extract are sometimes needed because such isolation and purification may lead to a loss of the biological activity and may lead to toxicity. Therefore, in this study, the crude extract of *Artocarpus incisus* was clarified its melanogenesis inhibitory and antioxidant activities. In the past, some papers have reported the constituents and effects of *A. incisus*'s heartwood methanol extract on melanogenesis inhibition. However, as far as we known, there has never been report about the effects of the ether extract of *A. incisus*'s heartwood on tyrosinase enzyme, melanogenesis or oxidation activities.

For our study, firstly, *A. incisus*'s heartwood was extracted by using two solvent systems; methanol or diethyl ether. HPLC analysis was then used to determine the content of artocarpin, a major component which has been reported its melanogenesis inhibitory in cell culture and *in vivo* models, contained in both types of extracts. We found that the methanol and ether extract composed of artocarpin in an amount of 45.19 ($\pm 0.45\%$) and 19.61 ($\pm 0.05\%$) w/w, respectively. As higher content of artocarpin, the ether extract of *A. incisus*'s heartwood was further used to investigate its *in vitro* actions on tyrosinase enzyme, melanin production and ROS scavenging. The obtained results showed that the ether extract had tyrosinase inhibitory activity with IC_{50} of 10.26 (± 3.04) $\mu\text{g/mL}$ while kojic acid, a well-known whitening agent, had IC_{50} value of 7.89 (± 0.18) $\mu\text{g/mL}$. This activity of the ether extract may result from the presence of other flavanoids since the previous study reported non-inhibitory action of artocarpin on the tyrosinase

enzyme. For activity on melanogenesis inhibition at the concentration in range of 2 to 25 $\mu\text{g/mL}$, the ether extract could decrease the melanin production of B16F1 melanocytes without cytotoxicity. As comparing between the purified component, artocarpin (4.5 $\mu\text{g/mL}$) and the ether extract (10 $\mu\text{g/mL}$) at the similar equivalent concentration of the artocarpin, both did not show difference in decreasing of melanin production. However, artocarpin at this concentration showed significantly decreasing in number of melanocytes, as similarity to 10 $\mu\text{g/mL}$ of hydroquinone. These findings indicated that the crude extract of *A. incisus*'s heartwood exhibited similar activity on melanogenesis inhibition but lesser cytotoxicity comparing to the component purified from such plant. Additionally, the extract exhibited antioxidant activity with EC_{50} value of 169.53 (± 9.73) $\mu\text{g/mL}$, according to DPPH assay. This would provide much more benefit and also indicated the potential for application in whitening purpose. However, further studies including toxicity on human cell, irritability and *in vivo* toxicity and efficacy should be performed to evaluate the valuable of the extract for marketing in the future.