

## CHAPTER 5

### CONCLUSION

The successful development of *P. emblica* extract tablet as a dietary supplement for antioxidant and antiglycation activity supported our hypothesis that the fractional extraction can improve the activity and appearance of the crude extract. After fractional extraction, the ethyl acetate fraction demonstrated the second highest yield value ( $16.00 \pm 1.75\%$ ) following the butanol fraction ( $26.78 \pm 0.85\%$ ). The ethyl acetate fractional extract had the highest antioxidant activity. Its free radical scavenging activity ( $IC_{50}$  value of  $12.08 \pm 2.62 \mu\text{g/ml}$ ), reducing activity (EC value of  $177.91 \pm 22.43 \text{ mM/mg}$ ) and total phenolic content (GAE value of  $51.65 \pm 7.69 \text{ mg/g}$  dry extract) were greater than those of the crude extract and other fractions. Moreover, the antioxidation power of the ethyl acetate fraction was higher than that of  $\alpha$ -tocopherol as well. The good correlation between antioxidant activities and total phenolic content was demonstrated with the correlation coefficients ( $r$ ) of all relationships more than 0.9 or less than -0.7. The ethyl acetate fractional extract of *P. emblica* fruits showed the highest %inhibitory activity on glycation reaction ( $IC_{50}$  value of  $19.20 \pm 1.99 \mu\text{g/ml}$ ) and its value was greater than that of the positive control, aminoguanidine. The HPLC chromatograms of the ethyl acetate and water fraction showed that polyphenols, particularly gallic acid or its derivatives were substantially extracted by ethyl acetate while ascorbic acid retained in the water fraction due to its high polarity.

The ethyl acetate fractional extract was selected for tablet formulation. The preformulation study on rheological property demonstrated that it was less viscous than the crude extract. The appropriate tablet formulation for 250 mg of PEF was 40% Avicel<sup>®</sup> PH101 as a diluent, 5% Ac-Di-SI<sup>®</sup> as a disintegrant, 2% purified talcum and 0.5% magnesium stearate as a glidant and a lubricant, respectively. PEF tablets had the average weight of  $514.9 \pm 9.3 \text{ mg}$ ; the average hardness of  $78.52 \pm 0.23 \text{ N}$ , the friability of 0.0058% and the disintegration time of  $19.19 \pm 2.32 \text{ min}$ . The dissolution study of PEF tablets presented the good dissolution profile with more than 90% of

gallic acid dissolved in phosphate buffer pH 6.8 within 60 minutes, providing that it is ready for absorption in the gastrointestinal tract after administration.

As for the stability of PEF tablets, the percentage changes of the IC<sub>50</sub> (DPPH), EC<sub>1</sub>, GAE, IC<sub>50</sub> (Antiglycation) and gallic acid content were 5.59%, 13.90%, 10.25%, 42.29% and 19.39% after storage at 30°C, 65% RH for 120 days, and were 35.15%, 26.57%, 13.59%, 44.23% and 27.28% after storage at 45°C, 75% RH for 120 days. It can be considered that the antioxidant activity, antiglycation activity, total phenolic content and gallic acid content in PEF tablets were less stable at 45°C, 75% RH than at 30°C, 65% RH condition. Therefore, PEF tablets should be stored at low temperature to extend the stability of the product.