

CHAPTER V

CONCLUSIONS

The facial patch containing *P. emblica* extract nanoliposomes was formulated and developed. The mechanical property and the release profile were evaluated. In addition, the *in vivo* skin moisturizing and elasticity efficacy tests of facial patch containing *P. emblica* extract nanoliposomes were investigated. The results can be concluded as following:

The nanoliposomes of *Phyllanthus emblica* extract can be prepared using modified ethanol injection method. It was found that the nanoliposome obtained from SPC: Tween 80 in the ratio of 5:1 with 1% of the concentration of *P. emblica* extract gave the highest entrapment efficiency of approximately 50.56% and the mean size was 566.67 ± 43.50 nm.

The suitable plasticizer for facial patch containing *P. emblica* extract nanoliposomes preparation was 1% w/v glycerin. This formula (formula 1) was also used for preparing the backing layer of facial patch containing *P. emblica* extract nanoliposomes according to their mechanical properties in moderate tensile strength, high elongation, and low Young's modulus. The film was soft and tough

The amount of 20 g of mixture solution was selected for casting the patch into 9-cm diameter petridish since it gave an appropriate thickness for using on the face.

The backing layer of the facial patch containing *P. emblica* extract nanoliposomes was 2.5% w/v PVA and 1% w/v glycerin as a plasticizer resulted in a good appearance of the film.

The *in vitro* release study of *P. emblica* extract from nanoliposomes in the facial patch was investigated. More than 99% *P. emblica* extract was released from the nanoliposomes in the facial patch within 6 hours.

The *in vivo* skin hydration and elasticity efficacy tests of facial patch containing *P. emblica* extract nanoliposomes, the 21 volunteers were recommended to use the facial patch containing *P. emblica* extract nanoliposomes after 15 min face cleaning before bedtime at the forehead, leaving the patch for at least 5 h. everyday for 4 weeks. The moisture content and elasticity (Young' modulus value) were measured by Skin Diagnostic SD 27 and DermaLab® Elasticity probe, respectively. The moisture values were significantly increased while the Young's modulus values were significantly decreased that resulted in the improvement of the skin hydration and elasticity after application. From the macroscopic photograph, it can be clearly observed that the facial forehead skin was firmed and the wrinkle line was also significantly decreased after 4 weeks of the application.