

## CHAPTER 5

### CONCLUSIONS

From this research work the following conclusions can be drawn:

1. Several organic solvents were tested to maximize the antioxidant activity of the pomegranate fruit peel extract. The result indicates that methanol is the suitable solvent for extraction of the antioxidant active compounds from pomegranate fruit peels. The methanol extract showed the strongest antioxidant effect, with  $ED_{50}$  value of  $68.99 \pm 1.40$   $\mu\text{g/ml}$ .

2. Fractionation of the methanol extract using liquid-liquid extraction between ethyl acetate and water was capable of producing the strong antioxidant fraction, which exhibited the  $ED_{50}$  value of  $6.33 \pm 0.13$   $\mu\text{g/ml}$ .

3. Extraction under reflux conditions was determined in order to overcome the time-consuming in maceration process. The result showed that the extract obtained from extraction under reflux conditions possessed antioxidant activity equal to that obtained from maceration method. In addition, extraction under reflux conditions required the extraction time markedly lesser than maceration method.

4. The method for preparation of the antioxidant active extract from pomegranate fruit peels, which was established from this study, was capable of producing the strong antioxidant extract. This extract has a potential for further studies on an alternative treatment of wrinkle.

5. Ellagic acid could be recommended as an indicative marker for standardization of pomegranate fruit peels extract. The extract used in this study was standardized as the ellagic acid content was not less than 21 %w/w.

6. The solubility study showed that the antioxidant active extract of pomegranate fruit peels is very slightly soluble in ethanol and water, slightly soluble in propylene glycol, and practically insoluble in glycerin and mineral oil.

7. Physical and chemical stability studies of the antioxidant active extract of pomegranate fruit peels demonstrated that the extract was not stable due to the affect of temperature, light and humidity.

8. Preliminary formulation study of antioxidant cream using the antioxidant active extract of pomegranate fruit peels revealed that although the pomegranate extract cream exhibited inhibitory effect after heating and cooling test of storage, ellagic acid is not stable in the oil in water cream bases. Stability of pomegranate extract cream in this research was not success. This indicated that stabilizing agents such as antioxidants or chelating agent may need in formulations Therefore; it requires further studies to find a suitable cream base or suitable dosage form. In addition, skin irritation should be determined.