CHAPTER V

CONCLUSION

The investigation of preparation of ibuprofen liposomes using soybean lecithin by mechanical dispersion method can be summarized as follows:

1. Ibuprofen liposomes can be prepared using soybean lecithin by mechanical dispersion method and attained as milky suspension. The characterization of liposomal preparation are carried out by ordinary microscopy, electron microscopy, particle size analysis by laser scattering analyzer and percentage drug entrapment.

2. From the scanning electron microscopy and transmission electron microscopy, ibuprofen liposomes are demonstrated to be spherical shaped vesicles and shows multilamellar structures.

3. The quantitative analysis of ibuprofen in liposomal preparations is UV spectrophotometric method at the maximum absorption wavelength of 222.6 nm. The absorbance of supernatant liquid of corresponding empty liposomal preparations corresponding lipid compositions with ibuprofen liposomes is used to subtract from that of ibuprofen liposomes in each formulation before calculation of drug concentration.

4. The appropriate conditions in the preparation process to obtain the thin film of lipids are important and dependent on flask size, amount of chloroform used,

evaporating temperature, hydration condition, including amount and composition of lipid contents. For the preparation of 3 ml liposomal preparation, appropriate amount of soybean lecithin used is 272.7 μmol.

5. The appropriate highest amount of ibuprofen than can be incorporated in liposomes is achieved as 2.7 mg/ml. An attempt to encapsulate the greater drug amount in liposomal preparation containing certain lipid composition other than soybean lecithin leads to drug crystallization in continuous aqueous medium.

Ibuprofen affects the size and the percentage drug entrapment of ibuprofen liposomes because ibuprofen liposomes containing only soybean lecithin have the largest size and the highest percentage drug entrapment. When other lipophilic substances are added, it leads to the competition of ibuprofen in bilayer membranes which results in the decrease of percentage drug entrapment.

6. The appropriate amount of cholesterol that can be incorporated into liposomal preparations is 9:1 molar ratio of soybean lecithin to cholesterol. Other than this molar ratio, the preparation are obtained as viscous gel.

Cholesterol significantly decreases the size and the percentage drug entrapment of ibuprofen liposomes. This may be caused from the tilting of cholesterol molecule in bilayer membranes and leads to decrease the membrane thickness which causes in the decrease of liposomal size and consequently results in the decrease of ibuprofen incorporated in bilayer membranes.

7. The appropriate ibuprofen liposomes that can be prepared with good stability are: the first one containing 9:1 molar ratio of soybean lecithin to cholesterol,

2.50 mole% of stearylamine, 90.9 μmol/ml of constant whole lipid and 2.7 mg/ml of ibuprofen; the latter containing 9:1 molar ratio of soybean lecithin to cholesterol, 2.50 mole% of stearylamine, 0.0125% of (±)-α-tocopherol, 90.9 μmol/ml of constant whole lipid and 2.7 mg/ml of ibuprofen. They are stabilized as milky suspension and unaggregated spherical vesicles.

Although stearylamine significantly decreases the size and the percentage drug entrapment of ibuprofen liposomes but it stabilizes ibuprofen liposomes after storage at $4^{\circ}C$ for 1 month from the aggregation and fusion by its repulsive force between the bilayer membranes and vesicles. Whereas (±)-α- tocopherol affects the size of ibuprofen liposomes but not to the percentage drug entrapment. It acts as an antioxidant which protects autoxidation of lipid in liposomal preparation. However, there is only one concentration, 0.0125%, which is suitable for this.