CHAPTER I

INTRODUCTION

Nowadays, there are a lot of advantages to use *Phyllanthus emblica* extract for the oral and topical application because there are a lot of papers supporting their activities for example, antioxidant activity (Ghosal et al., 1996, Dhir et al., 1990 and 1991 Roy et al., 1992), whitening activity (Chaudhuri et al., 2004, Chaudhuri and EMD chemicals Inc., 2004) protective effect in hepatic injury (Pramyothin et al., 2006), prevent gastric ulcer (Sandip et al., 2000), killer cell and antibody dependent cellular cytotoxicity activities (Suresh and Vasudevan, 1994). Furthermore, *P. emblica* has a lot of vitamin C (Dhir et al., 1991).

The problem of *P. emblica* extract is the stability of its active constituents. *P. emblica* fruit is not produced all the year but they bear fruit in the season so *P. emblica* extract should be kept in dried fruit or powder. Spray drying method is one of the most important methods used for production of dried *P. emblica* extract powder.

Liposomes are the popular drug delivery system. It can stabilize the active ingredient and increase the penetration into the target cell (Roger, 1989). In this study *P. emblica* extract is encapsulated in liposomes in different part of the preparation using cholesterol ester to be the stabilizer in buffer solution. *P. emblica* extract was dissolved in the buffer pH5.5 and pH7.4. The physical characteristics are evaluated, i.e. particle size distribution and morphology. Chemical characterization of *P. emblica* extract can be performed by quantitative determination of total phenolic compound used gallic acid as a standard for assaying UV-VIS spectrophotometry, respectively (Polexsk et al., 2002). These characterization methods are used to determine the stability of *P. emblica* extract in liposomes.

Recent reports indicated the presence of gallic acid in the fruits of *P. emblica*. The gallic acid in this fruit is presented either in free form and bound tannin form (gallotannins and ellagotannins). The amount of free gallic acid presented in

formulations which varied by the extraction process. During the extraction process tannins present in the fruit samples may hydrolyze to give free gallic acid or they may remain in bound form. (Polewski et al., 2002).

There are many methods that use in preparing the liposomes for example mechanical dispersion (hand-shaken multilamellar vesicles, non shaken vesicles, pro-liposomes, freeze-drying, micro-emulsification liposomes, sonicated vesicles, membrane extrusion liposomes, dried-reconstituted vesicles, freeze-thaw sonication method, pH-induced vesiculation, calcium-induce fusion), solvent dispersion (ethanol injection, ether injection), water-in-organic phase, double emulsion vesicles (cell-size vesicles, multivesicular liposomes, reverse-phase evaporation vesicles), and detergent solubilization (Roger, 1989)

Many different changes can take place in liposomes with the passage of time. The phospholipids can undergo chemical degradation-oxidation and hydrolysis leading to a build up of short chain phospholipids and lyso-derivatives in the membrane. Liposomes maintained in aqueous suspension may aggregate, fuse of lead their contents. Methods devised to overcome the problems of liposomes instability fall into two categories, those designed to minimize the degradation processes which may take place, and secondly, those which contrive to help liposomes survive in the face of conditions which encourage these processes.

The prevention of physical degradation, leakage and fusion of vesicles can occur as a result of lattice defects in the membrane introduced during their manufacture. Although report particulars occur in SUVs when prepared below the membrane phase transition temperature, there is evidence for packing defects being maintained in other types of vesicle (detergent dialysis vesicles, freeze-thawed vesicles) even above the phase transition temperature. These irregularities can be dispersed by a process termed annealing which consists simply of incubation the liposomes at temperature high enough above the phase transition temperature to allow differences in packing density between opposite sides of the bilayer to equalize by transmembrane flip-flop.

Objectives

The purposes of this study were as follows:

To compare the stability of *P. emblica* extract in buffer solutions and in liposomes containing *P. emblica* extract

To determine total phenolic compound using gallic acid as markers.