Preparation, Characterization and *In-Vitro* Release Study of Ascorbic Acid-Encapsulated Liquid Crystal Liposomes

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The use of liquid crystals at the nano level shows some valuable applications in numerous areas. Liposome formulations are used in the medical, food and cosmetic fields after the encapsulation with bioactive ingredients. Generally, liposomes are mainly formed of phospholipids and are used as a store and vehicle for bioactive ingredients.

The purpose of the present research was to formulate effective and controlled drug release liquid crystal liposomal formulations. Water soluble ascorbic acid (vitamin C) was used as the model drug and carbohydrate liquid crystal, ETAGP (2,3,4,6-tetra-o-acetyl-epiandrosteronyl-1-O-ß-D-glucopyranoside) was used as the model liquid crystal. For comparison, conventional liposomes were formulated with phospholipids (egg yolk lecithin) and mixed liposomes with phospholipids and carbohydrate liquid crystals in different compositions. Characterization of the prepared liposomes regarding encapsulation efficiency, pH dependence, particle size analysis and *in-vitro* release were performed.

Carbohydrate liquid crystal liposomes show some characteristics similar to conventional liposomes, such as the drug encapsulation efficiency and pH dependence, whereas the drug release rate is significantly increased in the carbohydrate liquid crystal liposomes. Interestingly, the particle size in the carbohydrate liquid crystal liposomes is in the nano range and the particle size remains the same without forming clusters for several weeks. These novel liquid crystal liposome formulations may have potential applications in encapsulation and delivery of drugs and bioactive ingredients in cosmetic formulations.