CHAPTER I

INTRODUCTION

1.1 Statement and significance of the problem

Aging is a universal phenomenon. There is probably no single cause of aging. Several theories have been proposed to explain the cause of aging some of which explain aging on the basis of changes occurring at the genetic level after adulthood. Several events during the life span appear to be genetically controlled. However, the variations that are observed in the timing and duration of various phases such as; development, adulthood, and aging are modulated by extrinsic factors such as; nutrition, temperature, radiation, pollution and physiological stress, as well as by intrinsic factors such as hormones and free radicals. Cellular aging is generally thought to be influenced by complex cellular functions which cause change in protein synthesis and turnover, and reduce the efficiency of DNA repair and activity of enzymes. The integumentary system, particularly the skin, is one of the most conspicuous features of the body and provides obvious reminders that a person is aging. Skin aging is given in general appearance as wrinkles and sages (1).

The rate and degree of aging changes that occur in the various components of the integument system are influenced by a variety of factors, including heredity, a person's dietary habits, skin care habits and the level of various hormones in the body. In addition to these intrinsic factors, extrinsic factors such as the sun and wind can influence on aging of the integumentary system. Thus, aging changes in the integumentary system occur at different rates in different individuals. A person who might attempt to delay skin changes related to aging must prevents his or her skin through the use of skin care products, particularly antioxidant products, and avoiding the cause of aging (1, 2).

The evidence that reactive oxygen species are involved with the aging process and in the pathogenesis of many diseases as well as the indication that topical application and systemic administration of antioxidants has biological effects led to a great interest in the potential role of specific active substances in these effects. Some

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studies showed that some antioxidants acting could maintain or restore a healthy skin barrier. Among the frequently used antioxidants in anti-aging products we can point out that vitamin (A, C, E), Coenzyme Q_{10}, carotenoids, and polyphenols are obtained from external sources (3). Since the aging of skin is the accumulated result of numerous small changes over a long period, daily skin care treatment is important to prevent the various forms of damage that can occur in the skin. The cosmetic treatments of the last generation, developed against wrinkles, rely on the antioxidant properties of some ingredients, especially those derived from plants.

Momordica cochinchinensis (Lour.) Spreng, belongs to the melon family (Cucurbitaceae) and indigenous to Southeast Asia. The ripe fruit contains red soft and sticky arils which are a good natural source of carotenoids particularly β-carotene and lycopene, and vitamin E. Additionally, the carotenoids present in this fruit are bound to long-chain fatty acid (4, 5). Carotenoids which are natural fat-soluble pigments found in plants, such as orange, red or yellow fruits and vegetables and some dark green vegetables. A key property of carotenoids is their capacity for quenching singlet oxygen and free radicals (6). However, carotenoids are susceptible to isomerization and oxidation during processing and storage, the practical consequences being loss of color and biologic activity. The occurrence of oxidation depends on the presence of oxygen, light, heat, metal, enzymes, unsaturated lipids and pro-oxidants (7).

During the last 20 years there was only one novel carrier system which can be considered a major innovative contribution in the dermal area. Solid lipid nanoparticles (SLN) were developed at the beginning of 1990s as an alternative colloidal lipidic system for controlled drug delivery. NLC composed of a solid lipid matrix with a certain content of liquid lipid are a new generation of SLN, which can overcome the limitations of SLN. The advantages of both nanoparticles, SLN and NLC were protection of chemically labile compounds or occlusion effect on skin. However, NLC were developed to overcome some potential limitations associated with SLN. Compared to SLN, NLC show a higher loading capacity for a number of active compounds, a lower water content of the particle suspension and avoid/minimize potential expulsion of active compounds during storage (8, 9).

Thus, in this study, the aril oil of carotenoids stabilized in a model cream preparation was improved by developing ascorbyl palpitate loaded NLC using a hot

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homogenization method (10). The primary goal was to study the optimal conditions for their preparation as well as stability during storage. Additionally, to compare about the stability of carotenoids between conventional cream formulation containing aril oil and cream formulation containing aril oil loaded NLC. Finally, this research contributed to a better understanding of its effects on human skin when applied topically.

1.2 Objectives

1.2.1 To develop anti-wrinkle cosmetic from aril oil of *Momordica cochinchinensis* (Lour.) Spreng in Nanostructured Lipid Carriers (NLC).

1.2.2 To compare the stability of β-carotene between conventional cream formulation containing aril oil and cream formulation containing aril oil loaded NLC.

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