INTRODUCTION

The skin is a portal of knowledge on aging. From its softness and smoothness in infancy, through its suppleness in youth, to its wrinkled texture in elders, the skin displays the most visible and accessible manifestations of aging. As the proportion of the aging population in industrialized countries continue to increase, Research interest in the process of aging has grown and people are becoming obsessed with looking and staying young ***(Cotofana et al., 2016)***.

The face has received most of the attention and generated most of the studies related to beauty and aging because it is the most expressive part of the human body, responsible for visual evaluation, recognition and social interaction ***(Pastorek, 2017).***

Aging is a process in which both intrinsic and extrinsic factors lead progressively to loss of structural integrity and physiological function. Intrinsic aging of the skin occurs inevitably as a natural consequence of physiological changes that are genetically determined. Extrinsic factors include smoking, exposure to sunlight and pollution. The synergistic effects of intrinsic and extrinsic aging factors produce deterioration of the cutaneous barrier with significant associated morbidity ***(Fang et al., 2016).***

Cumulative sun exposure (photoaging) is the most important extrinsic factor in aging skin. Photoaging is the

superposition of solar damage on the normal aging process, defined specifically by damage produced in tissue by single or repeated exposure to UV light. Sunlight is believed to account for the vast majority of not only aesthetic effects of skin ageing, but also clinical problems as well ***(Vashi et al., 2016).***

Skin Aging is a complex phenomenon clinically described by numerous features (wrinkles, sunspots, uneven skin color, telangiectasia, skin loosening, etc...) that often depend on ethnic origin. In addition to genetic inheritance, numerous factors can interfere and modify skin color and/or skin color heterogeneity including climatic changes, social and cultural conditions and hormonal status. The different patterns of aging may result from different environmental and constitutional factors which could be explored by an epidemiological approach ***(De Rigal et al., 2010 and Monstier et al., 2005).***

Aging process differs among different ethnic groups. Many studies were done to investigate signs of face aging among different populations. To the best of our knowledge, no previous studies were done about face aging in Egypt. Therefore, we aimed in the current study to assess clinical signs of face aging among Egyptian women.

Aim of the Work

The aim of this study is to assess the different clinical patterns of facial wrinkles and signs of skin aging among different age categories of Egyptian females.

I- Introduction to Basic Aesthetics of the Face

Defining the Basic Aesthetics of the Face

Beauty is easy enough to spot, but tricky to define. Beauty is essentially a visual phenomenon. To be perceived as beautiful, structures need to be visually appealing and capable of evoking an emotional level of pleasure. The visual processing of human faces, the most complex and captivating structure in nature, has attracted the imagination and received the attention of philosophers and scientists for centuries. The face has received most of the attention and generated most of the studies related to beauty because it is the most expressive part of the human body, responsible for visual evaluation, recognition and social interaction ***(Sephar et al., 2015).***

Contrary to common belief, beauty can be scientifically defined and is not necessarily a subjective perception only. Despite an apparent impression that every human society has its own standards of beauty, it seems that there is a universal standard for beauty regardless of race, age and sex because of the recent globalization of modern society ***(Jakubietz et al., 2005).***

The important aspects of face aesthetics are:

1-Proportions:

From ancient Greek times to modern surgical practice, the classical position that attributes beauty to specific symmetrical proportions has been in doubt. This doubt results from the difficult definition of symmetry as a precise and well-defined concept of balance, The Greek philosopher Aristotle defined beauty as 'an imprecise sense of harmonious or aesthetically pleasing proportionality ***(Prokopakis et al., 2013).***

In 1509 Luca Pacioli published in his ''De Divina Proportione'' illustrated by Leonardo da Vinci, the first canons on the proportions of the face, making reference to the "Golden ratio" as an example of harmony and balance between the different parts of the face as the most aesthetically pleasing proportion. It is a ration of two parts in which the shorter one is to the longer one as the longer one is to the complete line. Mathematically speaking the shorter part is 0.618 of the longer, and the longer part is 1.618 of the shorter. The precise value of the golden ratio is the irrational number phi ($\Phi = a/b = (a+b)/a = 1.61803399...$) named by the sculptor of the Parthenon Phidias. The golden ratio is also referred to as the Fibonacci ratio or the 'divine proportion ***(Millar, 1986; Abrams and Lauber, 1990).***

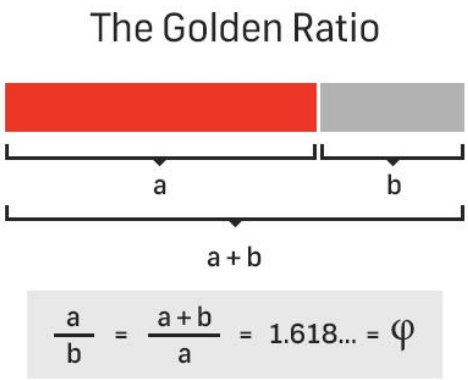

Figure 1: The Golden Ration ***(Millar, 1986; Abrams and Lauber, 1990).***

Philosophers and scientists have long tried to appreciate beauty in terms of numeric symmetry and proportions, mostly by dividing the face into quadrants or thirds **(Figure 2, A-B)**. The validity of these schemes has not been verified by modern analysis, enhancing the notion that beauty is an individual, cultural and non-quantifiable matter. However, one cannot dispute that the aesthetic perfection of the face is not an abstract conception, but rather a quantitatively well-defined anatomic quality. Numerous facial landmarks and proportions, like eye width/ mouth width, menton- nasion / menton-trichion, as well as other corporal ratios have been proposed. However, the majority of them, like nose width/mouth width, nose width/nose length eye width/mouth width and dental width/dental height, sometimes are not considered ideal unless they conform to the golden ratio. It was rational for surgeons to propose this ratio as a planning tool for the reconstruction of facial deformities ***(Prokopakis et al., 2013).***

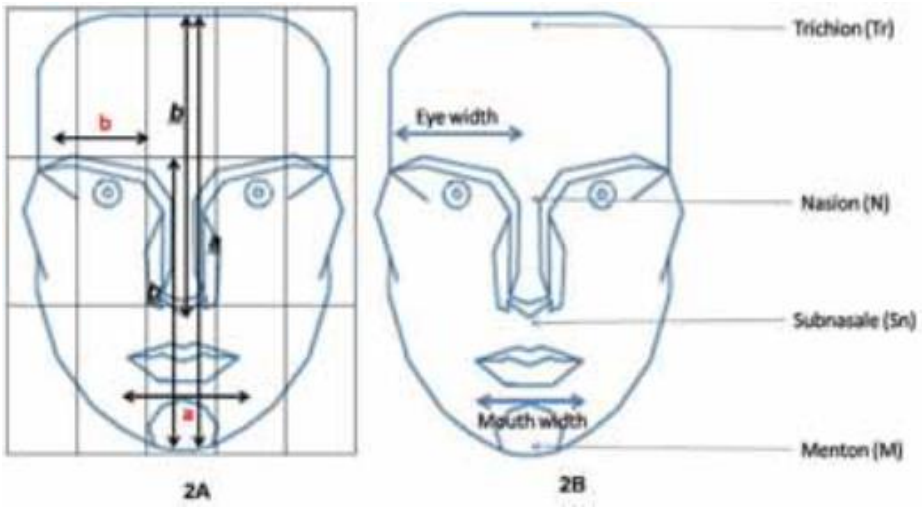

Figure 2: (A) Facial graph, divided vertically into fifths and horizontally into thirds.(B) Proportions that conform to golden ratio (φ = a:b) in beautiful faces are (Tr-M):(Tr-Sn), (Tr-M):(N-M) in repose position, and eye width: mouth width in smiling position ***(Prokopakis et al., 2013)***.

2-Symmetry:

There is a debate whether symmetry is a sign of beauty or not. It has been suggested that facial symmetry contributes to facial beauty and harmony but it is not the determining factor. Others say that perfectly similar faces are very rare and if exists it has artificial look and the normal asymmetrical faces were rated more attractive. Facial symmetry may be measured by bisecting the face in the midsagittal plane and comparing the left and right sides. The degree of asymmetry between the two sides of the face depends primarily on the degree of bony development, fat deposition, and muscle activity on either side ***(Little et al., 2011).***

3-Distinguishing Features:

The distinguishing features may lead to above-average beauty. Some authors believe that face's attractiveness is based on the eyes, nose, and oral features primarily. The center of the beautiful face is preferred to consist of baby-like features in the form of large eyes spaced widely apart, a high forehead, a small nose, chin and full lips. While the periphery would imply sexual maturity like prominent cheekbones ***(Hönn and Göz, 2007).***

II-Face Aging

Aging has been defined as the biological process of growing older. It is the molecular, biochemical and cellular progressive decline during the life span. It represents the natural unavoidable process for all organs of the body and the ideal marker of aging process is the skin ***(Hernández-Bautista et al., 2014).***

Facial aging reflects the dynamic, cumulative effects of time on the skin, soft tissues, and deep structural components of the face, and is a complex synergy of skin textural changes and loss of facial volume. Many of the facial manifestations of aging reflect the combined effects of gravity, progressive bone resorption, decreased tissue elasticity, and redistribution of subcutaneous fullness ***(Coleman and Grover, 2006).***

Face aging can be divided into two major components:

- Age related skin changes.
- Age related subcutaneous changes.

Age related skin changes:

Skin aging can result from both intrinsic and extrinsic agents that might trigger different cellular and molecular pathways leading to skin damage. Generally, intrinsic aging is mainly regulated by genetic factors; extrinsic aging is mainly caused by ultraviolet (UV) rays. The skin goes through intrinsic

and extrinsic changes simultaneously during the aging process**.** Intrinsic aging accounts for about 15% of the aging process, while extrinsic aging accounts for 85% of the visible signs of aging ***(Fang et al., 2016).***

1-Intrinsic Aging:

Intrinsic aging is the deterioration of the regenerative ability of the skin due to aging itself. It reflects the same degenerative process seen in other organs. It occurs by the passage of time and its structural changes occur as a consequence of physiological aging and are genetically determined. It usually begins in the twenties but the actual signs of intrinsic aging are not visible for decades later ***(Zouboulis et al., 2011; Longo et al., 2013).***

A- Clinical picture and histopathological changes:

The clinical manifestations of intrinsic aging are fine wrinkles, thin and transparent skin, increasing the visibility of veins, loss of underlying fat leading to hollowed cheeks, eye sockets and changing the contour of the face, dry and itchy skin, and inability to sweat sufficiently ***(Zouboulis et al., 2011).***

Intrinsic aging mainly affects the deeper soft tissue of the face decreasing skin elasticity, soft tissue volume and dermal vascularity. These changes are manifested by dermal and fat atrophy (**figure 3)** ***(Kaur et al., 2015).***

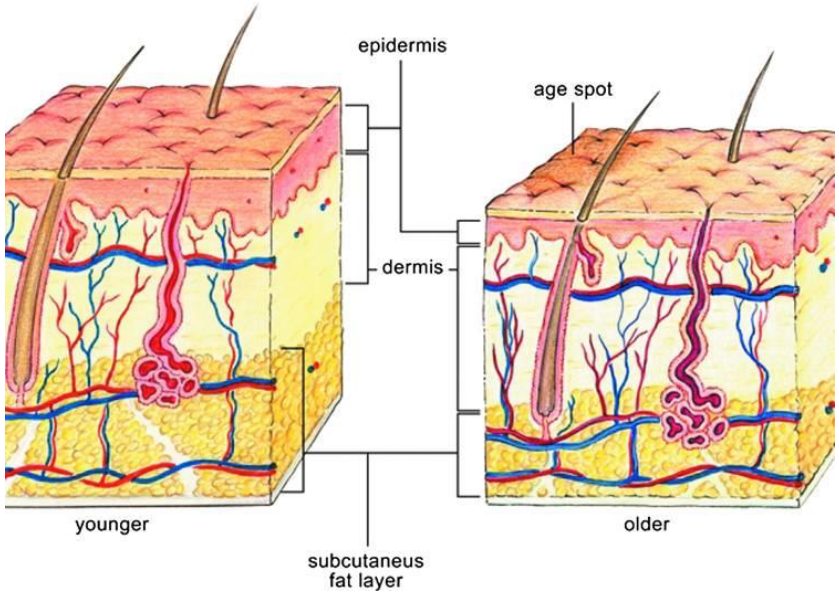

Figure 3: Differences in skin structure between younger and older skin ***(Farage et al., 2013)***.

There is no obvious alteration in stratum corneum, keratinocyte shape and their cohesion, but a decreased number of melanocytes and Langerhans cells is evident. As individual ages, proliferation rates consequently begin to drop in the epidermis, inducing a steady deterioration of skin structure and function**.** There is epidermal atrophy and decrease in epidermal cell turnover, which may account for slower wound healing, less effective desquamation and increased skin roughness ***(Jafferany et al., 2012).***

The most consistent structural change in aged skin is flattening of the dermal epidermal junction by more than a third which occurs as a result of loss of dermal papillae**.** This results in less nutritional transfer and poor adhesion between the dermis and epidermis. This in turn leads to superficial abrasions

with minor trauma and an increased prevalence of bullous formation due to injury ***(Neerken et al., 2004).***

There is a decrease of dermal thickness and reduction in mast cells and vasculature. The collagen bundles and elastic fibers are fragmented and disoriented. Senile purpura, as an example of aging, is due to lack of support of vasculature by collagen tissue and reduced perivascular cells. There is reduced numbers of dermal fibroblast and decrease in subdermal adipose tissue ***(Murakami et al., 2011).***

B-Factors affecting intrinsic skin aging:

a. Ethnicity:

Ethnicity refers to groups of populations with a common culture and/or language, ethnic skin is the broad range of skin phenotypes and complexions that characterize group of population ***(Barsh, 2003).***

The greatest effect of ethnicity on ageing is primarily related to differences in pigmentation. High levels of pigmentation are protective with regard to the cumulative effects of photoaging. Skin of color is more compacted than light skin, as well as having a higher intercellular lipid content, which may contribute to more resistance to aging. Wrinkling in Africans has been documented to occur later and with less severity than in Caucasians**.** In addition, if sensitivity is measured in terms of skin cancer incidence, skin cancer rates

between Caucasian and African-Americans indicate that pigmentation provides a 500-fold level of protection form UV radiation ***(Vashi et al., 2016).***

b. Hormonal factor:

The skin is a target organ for various hormones. Hormonal action requires the binding of the hormone to specific receptors. Estrogen and other hormone receptors have been detected in keratinocytes, fibroblasts, sebaceous glands, hair follicles, endocrine glands and blood vessels. The receptors vary in density according to site, with higher concentrations of estrogen receptors in facial skin than in the skin at the pelvis or breast. Hormones play an important role in skin homeostasis; the intrinsic aging process is associated with decreased secretion of pituitary, adrenal and gonadal hormones ***(Thornton, 2013).***

Sex steroids have a profound influence on both skin development and composition; adequate levels are required to facilitate its structural integrity and functional capacity. Decreased sex hormones thus induce a reduction of those skin functions that are under hormonal control ***(Martini, 2004)***.

In clinical terms, women nearly spend 1/3 of their live or at least 20 years in menopause in which progesterone level decreases. Since progesterone controls androgens in women, there is a relative peripheral hyperandrogenism with age. Many females experience a sudden onset of skin aging symptoms

several months after the menopause. Estrogen decreases rapidly after menopause and until the age of 60, then remains at a low plateau ***(Thornton, 2013)***.

One of the first signs which women experience is increasing skin dryness, followed by loss of skin firmness and elasticity, and postmenopausal flushing. The increasing looseness of the skin outweighs other symptoms, manifested by wrinkles. These symptoms correspond to changes in collagenous and elastic fibers that have been reported to be due to estrogen deficiency. Approximately 30% of skin collagen is lost in the first 5 years after the menopause, with an average decline of 2.1% per postmenopausal l year over a period of 20 years. There is skin atrophy with up to 50% reduction in epidermis thickness and up to 30% decrease in dermal thickness and decreased sebum synthesis ***(Hall et al., 2005).***

2-Extrinsic aging:

Extrinsic aging occurs due to a number of external factors often acting together with the normal aging process to prematurely age the skin. These factors include cumulative exposure to UV light and near-infrared radiations (IRA) which is called (photoaging), chemicals and smoking, alcohol intake, poor nutrition and environmental pollution ***(Mackiewicz and Rimkevičius, 2008).***

A. Role of exposure to sunlight (photoaging) on extrinsic aging:

Photoaging is the superposition of solar damage on the normal aging process, defined specifically by damage produced in tissue by single or repeated exposure to UV light. It accounts for up to 80% of the total damage to the skin explaining why some would label extrinsic aging as photoaging. It is considered a multisystem degenerative process that involves the skin and skin support system. It depends primarily on the degree of sun exposure and skin pigment**.** Exogenous insults contribute to the aging process by causing thousands of cellular DNA alterations leading to cumulative damage of the skin that amplifies normal chronological decline ***(Vierkotter et al., 2010).***

Sunlight is composed of three different types of radiation: UVC, UVB and UVA. UVC (100–290 nm) is largely blocked by the ozone layer and has little impact on skin. UVB (290–320 nm) penetrates only into the epidermis and is