

Extrinsic risk factors for skin aging

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Abstract

Skin aging is a degenerative process that naturally occurs as a person ages. It happens to everyone. Skin aging itself affects health and even one's confidence level. Skin aging is predicted to occur faster due to various factors from the external environment. Factors that cause skin aging are environmental and lifestyle. Factors such as sunlight and pollution inevitably affect skin pigmentation and cause chronic skin diseases. Lifestyle factors such as improper nutritional intake patterns and smoking add to the deterioration of skin function and clinical features of aging in a person. Extrinsic factors influence the skin aging process. Overall, changes in proper nutrition, smoking cessation, use of sunscreen and proper skin care are essential to prevent skin aging.

Keywords: Skin aging; Extrinsic factors; Environment; Lifestyle

1. Introduction

Skin aging is a degenerative process that naturally occurs in a person's skin as their age [1]. This process results in functional changes such as reduced skin elasticity, dull skin, and other aesthetic skin changes [2]. The incidence of skin aging continues to be experienced by people all over the world [3]. Although skin ageing does not result in immediate death, it can lead to serious chronic diseases that impact health [4]. The high incidence of skin aging globally makes this case an urgent one to understand in order to raise people's awareness of the importance of skin aging prevention. There are two factors that influence skin aging: intrinsic factors that are naturally and genetically occurring [5], and extrinsic factors that play the most role in skin aging and are varied [6]. Some external factors that are suspected to play a major role in skin aging include sun exposure, pollution, smoking, and nutrition [6][7].

2. Review content

2.1. Sun exposure

Skin aging due to sun exposure was reported in a study to reach 80% [8]. Terrestrial solar ultraviolet radiation (UVR) reaching 295-400 nm is divided into three parts, namely UVA with waves 320-400 nm, UVB with waves 280-320 nm, and UVC with waves reaching 100-280 nm, which do not fully penetrate the earth's surface due to stratospheric ozone. UVB contributes to greater skin damage when compared to the effects of UVA [9]. Sunlight is mostly detrimental and has both acute and chronic effects [10]. Sun exposure or so-called photoaging results in the appearance of clinical features such as fine wrinkles, rough skin, dry skin, telangiectasis, and pigmentary changes [11]. Photoaging also causes skin atrophy with erythema and increased risk of skin cancer, in addition to hypertrophic with increased skin thickness and dullness [12]. Such effects occur due to UVB, but there is also an effect of UVA on aging skin, namely a decrease in blood pressure [13].

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2.2. Pollution

The WHO identifies four main air pollutants as sulfur dioxide, nitrogen dioxide, ground-level ozone, and particulate matter (PM) [14]. Air pollution is currently considered a harmful environmental risk to human skin, known to increase aging and inflammation to other skin disorders [15]. Skin as the outermost organ of the body is often exposed to pollutants such as PM [16]. An epidemiological study was conducted to see the relationship between air pollutants such as diesel exhaust particles (DEP) and hyperpigmentation in sufferers, with significant results between the two, but the direct relationship is still not fully understood [17]. PM-mediated molecular mechanisms contribute to the pathological process of skin aging, including dysfunction of multiple signaling pathways, the skin barrier, and decreased function of the skin barrier [18]. The clinical features caused by PM are obvious, such as skin allergy (urticaria), contact dermatitis, psoriasis, and other signs of skin aging [19]. Excessive PM concentration is directly proportional to the ROS generated resulting in protein carbonylation, apoptotic protein expression, DNA damage, nucleic acid damage, mitochondrial curtailment, and endoplasmic reticulum (ER) stress, resulting in inflammation and skin dysfunction from apoptosis and autophagy processes [20].

2.3. Nutrition

All humans need nutrients to live, as well as to maintain their biological functions including skin health [21]. Nutrition is related to skin health and is required for all biological processes that occur in humans from birth to old age, with proper nutrition and diet can prevent and repair damage to the skin [22]. One of the macronutrients such as protein can promote cellular protein synthesis and metabolism. Therefore, an inappropriate protein diet can have an effect on skin aging [23]. Another macronutrient such as fat, if on a high-fat diet can increase the expression of inflammatory factors and tumor necrosis in the skin due to UVB and produce inflammation and even skin cancer [24]. In addition, water is an important element to regulate the balance and function of tissues in the body. Water functions as a nutrient, solvent, maintains body volume, and regulates body temperature, when the body is deficient it can cause tissue dehydration resulting in skin aging and inflammation [25].

2.4. Smoking

Tobacco is harmful to cells and can promote skin aging [26]. Smoking induces oxidative stress, which has immunomodulatory effects by altering inflammatory cell function and releasing proteolytic enzymes [27]. An in vitro study has shown a link between tobacco and skin aging affecting collagen production, increasing the production of tropoelastin and matrix metalloproteinases (MMPs) resulting in matrix proteins being degraded. Smoking is also strongly associated with various dermatological conditions such as premature skin aging, squamous cell carcinoma, melanoma, hidradenitis suppurativa, oral cancer, acne, psoriasis, hair loss, and poor wound healing [28] [29]. Studies have shown that smoking cessation has a positive impact on skin color which becomes lighter and melanin in the skin is reduced as early as 1 month after quitting smoking [30] [31]. In addition, smoking affects folds in the nasolabial region and causes other coarse wrinkles on the face [32].

3. Conclusion

In conclusion, this literature review calls for better research efforts to understand the relationship of each extrinsic factor to skin aging in an individual. Each person's body response is different and therefore the clinical picture of skin aging is different. This is also associated with various other supporting factors such as the pattern of sunscreen use and skin care used, the length of exposure to extrinsic factors, nutritional consumption patterns, and others. This understanding is critical for developing effective prevention strategies and public health interventions to reduce the impact of skin aging into a chronic disease. Based on the global health system, research on skin aging should continue to be developed and can be used as an educational tool for the public.

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