ORIGINAL ARTICLE

Bali Dermatology Venereology and Aesthetic Journal (BDVAJ) 2023, Volume 6, Number 2, 32-35
P-ISSN : 3046-7985, E-ISSN : 3046-7993

Published by
Department of Dermatology and Venereology, Universitas Udayana

Characteristics of skin aging at the Dermatology and Venereology Outpatient Unit at Prof. dr. I Goesti Ngoerah Gde Ngoerah General Hospital, Denpasar from January to December 2019

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Submitted: 2022-12-01
Accepted : 2023-01-26
Published: 2023-12-31

ABSTRACT

Background: Skin aging is a complex biological process influenced by intrinsic and extrinsic factors. In addition, national data regarding skin aging is still scant. This research was carried out to learn the characteristics of skin aging at the Dermatology and Venereology outpatient unit of Prof. Dr. I G. N. G. Ngoerah General Hospital, Denpasar, in January-December 2019.
Methods: This research is a quantitative descriptive study with a cross-sectional design. Sampling was carried out by total sampling with research subjects consisting of skin-aging patients at the Dermatology and Venereology Outpatient Unit of Prof. dr. I G. N. G. Ngoerah General Hospital in January-December 2019. The data collected consists of age, gender, smoking history, alcohol consumption history, body mass index, usage of sunscreen, duration of sun exposure, and Glogau scale classification. Descriptive analysis was carried out using SPSS ver. 23.
Results: Twenty cases of skin aging were included. Most cases of skin aging were in the age group of 36-45 years old, all of whom were female, all of whom had no history of smoking, all of whom had no history of alcohol consumption, most body mass index classification was overweight, most do not use sunscreen, the duration of the sun exposure is mostly 30 minutes-6 hours, and the highest classification of the Glogau scale is group III.
Conclusion: In this study, body mass index, usage of sunscreen, and duration of sun exposure are the main factors affecting skin aging.

Keywords: characteristics, extrinsic factor, intrinsic factor, skin aging.
Cite This Article: Evangelista T, Puspawati NMD, Rusyati LMM, Praharsini IGAA, Characteristics of skin aging at the Dermatology and Venereology Outpatient Unit at Prof. dr. I Goesti Ngoerah Gde Ngoerah General Hospital, Denpasar from January to December 2019. *Bali Dermatology Venereology and Aesthetic Journal*. 2023;6(2):32-35. DOI: balidervenaesthj.v6i1.33

INTRODUCTION

Aging is inevitable and is experienced by everyone. As aging occurs, the skin also undergoes an aging process. The skin is the largest organ covering the body's external surface.[1] One of the most important extracellular matrix (ECM) is collagen. Collagen plays a role in determining the tensile strength of the skin. It contributes to the aging process.[2] Skin aging is a complex biological process influenced by various factors that cause physical and histological changes.[3] Some experts claim that signs of skin aging begin to appear after the age of 25 because the production of collagen in the body decreases so that the skin becomes less elastic.[4] Physically, there are several signs of skin aging, which include dry skin, wrinkles, and dyspigmentation or discoloration of the skin.[5] Histologically, physical signs can arise due to atrophy of collagen.[2]

Skin aging is triggered by a combination of two components consisting of intrinsic aging and extrinsic aging.[6] About 10% of skin aging is caused by intrinsic factors, and extrinsic factors cause 90%. Different factors trigger intrinsic and extrinsic skin aging. Skin aging triggered by intrinsic factors, also called chronological aging, occurs as a result of the natural aging process of the body, which is influenced by age, gender, ethnicity, anatomical variations, and hormonal changes.[7] Extrinsic skin aging, also known as photoaging, involves environmental factors such as sun exposure, nutritional status, smoking history, and alcohol consumption history. Exposure to the sun's ultraviolet (UV) radiation can cause skin changes, such as the breakdown of the matrix structure of the dermis. However, extrinsic aging can be avoided in contrast to intrinsic aging, which is inevitable.[6,7]

The skin aging process causes changes in appearance that could decrease confidence. According to previous research, the impact of skin aging can cause social anxiety and low levels of self-confidence. In some others, manifestations of skin aging can cause psychological disorders such as eating and body dysmorphic disorders.[8] Currently, data

on skin aging is still scant. In addition, judging from the impact caused by skin aging, which is quite significant and could impact the quality of life, this study aimed to evaluate the characteristics of skin aging at the Dermatology and Venereology Outpatient unit at Prof. dr. I G. N. G. Ngoerah General Hospital, Denpasar Between January - December 2019.

METHODS

This research is a quantitative descriptive study with a cross-sectional design to determine skin aging characteristics at the Dermatology and Venereology Outpatient unit at Prof. dr. I G. N. G. Ngoerah General Hospital, Denpasar between January-December 2019. Data was collected in one month using secondary data from the patient's medical record. The sampling technique is carried out using total sampling. Subject criteria included in this study were all patients who attended the Medical Cosmetic Division and complained of skin aging as the primary or secondary concern. The data collected includes age, gender, body mass index (WHO classification for Asia), history of smoking, history of alcohol consumption, usage of sunscreen, duration of sun exposure, and Glogau scale classification. Exclusion criteria if the data were not recorded completely. Data were analyzed descriptively using SPSS version 23 to obtain frequency and proportion for each characteristic.

RESULTS

The total number of subjects seeking treatment at the Medical Cosmetic Division of the Dermatology and Venereology Outpatient Unit of Prof. dr. I G. N. G. Ngoerah General Hospital has 110 patients. Patients who came with complaints of skin aging accounted for 22 cases or 20% of the total 110 patients seeking treatment. Two cases were excluded from a total of 22 cases due to incomplete medical record data, so a total sample of 20 cases was obtained, consisting of all women who had met the inclusion and exclusion criteria. Research findings showed that (Table 1) the age group that experiences skin aging is the 36-45 age group, with 11 cases (55%). The youngest subject was 33 years old, and the oldest subject was 48 years old. With an average age of 40.10 ± 4.87 years old. All skin-aging patients are female and without any history of smoking. Most cases were overweight (23-24.9 kg/m2) in the body mass index group, with 10 cases (50%). Most skin-aging patients did not use sunscreen, with 14 cases (70%). Most of the duration of sun exposure in the range of 24 hours was 30 minutes to 6 hours, with 16 cases (80%). Most cases were in the Glogau III group, with 18 cases (90%).

Table 1. Age distribution of skin aging subjects

Characteristic		Frequency	Proportion (%)
Age classification	Age group (years)		
Late adolescents	17-25	0	0%
Young adults	26-35	5	25%
Late adults	36-45	11	55%
Young elderly	46-55	4	20%
Late elderly	56-65	0	0%
Senior	>65	0	0%
Mean ± SD	40.10 ± 4.87		
	Total	20	100%
Gender			
Male		0	0%
Female		20	100%
Total		20	100%
Smoking history			
Yes		0	0%
No		20	100%
Total		20	100%
Alcohol consumption history			
Yes		0	0%
No		20	100%
Total		20	100%
BMI classification	BMI range		
Underweight	<18.5 kg/m^2	0	0%
Ideal	18.5-22.9 kg/m^2	7	35%
Overweight	23-24.9 kg/m^2	10	50%
Obesity I	25-29.9 kg/m^2	3	15%
Obesity II	>30 kg/m^2	0	0%
Total	Total	20	100%
Sunscreen usage			
Yes		6	30%
No		14	70%
	Total	20	100%
Duration of sun exposure			
<30 minutes		4	20%
30 minutes - 6 hours		16	80%
>6 hours		0	0%
	Total	20	100%
Glogau classification			
I (mild)		0	0%
II (moderate)		2	10%
III (advanced)		18	90%
IV (severe)		0	0%
	Total	20	100%

SD: standard deviation; BMI: body mass index

DISCUSSION

Skin aging is a complex biological process influenced by various factors that cause physical and histological changes. Early signs of skin aging begin to appear at the age of 25 years. The ratio of collagen composition will change with age. At a younger age, the skin comprises 85% type

I collagen and 15% type III collagen. With chronological aging, the ratio of type III collagen will increase compared to type I collagen.[9] Each year, the signs of aging will become more significant due to decreasing collagen production, causing the skin to be less elastic. In addition, several major components of the extracellular matrix, such as elastin and hyaluronic acid, undergo structural changes.[10,11]

Cases of skin aging for <26 years old were 0 cases (0%) can be caused as the early signs of skin aging only begin to appear after the age of 25 years. In this study, most age groups that experience skin aging were between 36-45 years old. Most patients in a productive age range are more susceptible to external factors such as UV radiation and pollutants. Previous epidemiological research stated that air pollution from motor vehicle emissions such as particulate matter (PM), NO2, and soot is associated with premature skin aging because it contains polycyclic aromatic hydrocarbons (PAHs), which bind to aryl hydrocarbon receptors (AHR); thus damaging the skin barrier.[12]

Early manifestations of skin aging appear earlier in women because the dermal thickness and collagen density are lower in women. At the time of menopause in women, changes in hormone levels, such as lower estrogen levels, will cause the thickness of the skin to decrease significantly, making the signs of aging more visible. Meanwhile, men have a thicker dermal thickness, causing manifestations of skin aging to appear later.[13] In this study, most patients had not experienced menopause, so the incidence of skin aging was not caused by a decrease in hormones due to menopause.

Smoking and alcohol are both risk factors for skin aging. Nicotine in cigarettes can cause a decrease in blood supply, causing a lack of oxygen and wrinkles. Previous studies show that matrix metalloproteinase (MMP)-1 in smokers is higher than in non-smokers. High MMP levels can degrade collagen, elastic fibers, and proteoglycans and cause an imbalance between the synthesis and degradation of dermal connective tissue.[14] Research also shows that smokers have a thicker epidermis and low dermal density and elasticity.[15]

Previous research showed a significant correlation between alcohol consumption and the formation of eye bags, midface volume loss, and fine blood vessel appearance. The literature states that alcohol damages carotenoid antioxidants in the skin, which increase UV sensitivity. Excessive alcohol consumption is also reported to cause eye bags due to reduced suborbital fat pads.[16] However, there were no cases recorded regarding the history of smoking and alcohol consumption; hence, this study is unable to conclude the correlations between smoking and alcohol consumption in skin-aging patients.

Previous study shows that patients with overweight body mass index show earlier signs of aging significantly due to various mechanisms. At higher body mass index, changes in the epidermal barrier cause trans-epidermal water loss (TEWL) and increased erythema compared to control subjects with ideal body weight. Some subjects with severe obesity also have dry skin and damaged skin barrier. An in vivo experiment showed that the skin's mechanical strength was weaker in obese patients than in the control group due to the failure of collagen deposition to accommodate the increased surface area of the skin. Another study showed that excess body mass index correlates with increased type III collagen turnover.[17] Conversely, in a previous study involving 128 subjects, low body mass index causes skin wrinkles to be visible due to xerosis and reduced skin elasticity.[18] This is consistent with the findings in this study, which discovered that most skin-aging patients are classified as overweight (23-24.9 kg/m^2).

Sunscreen application on skin exposed to sun from the sun can protect the skin from damage caused by UV radiation. There are 2 mechanisms of action for sunscreen products depending on the UV filter used. Chemical sunscreens work by absorbing UV radiation.[19] Physical sunscreens work by reflecting or scattering UV radiation.[20] The results of previous observational studies prove that proper sunscreen prevents the formation of free radicals such as ROS, thus preventing signs of photoaging such as wrinkles, hyperpigmentation, and telangiectasia.[21] This is consistent with the findings in this study, which discovered that most skin-aging patients did not use sunscreen protection. The distribution of smoking habits and alcohol consumption habits of as much as 0 cases (0%) can also support that in this study, skin aging is caused by intrinsic and extrinsic factors in the form of exposure to UV of the sun without optimal protection.

Exposure to UV is an extrinsic factor that has the biggest role in causing premature aging. Direct sun exposure for more than 15 minutes without protection can cause premature skin aging. Caucasian women showed that the impact of exposure to UV rays increased with age. The impact of sun exposure can vary between individuals depending on the skin type. Despite the major role of extrinsic factors, chronological aging and photoaging have complex and inseparable correlations. Therefore, detailed quantification of the duration of direct sun exposure on aging is difficult to obtain.[22]

There are 3 spectrums of UV radiation, namely UVA, UVB, and UVC. Ultraviolet radiation will activate reactive oxidative stress (ROS), which correlates with the activation of the mitogen-activated protein kinase (MAPK) pathway, which causes cellular inflammatory activity. The ozone layer has absorbed most UVC. Most of the UV radiation that enters the earth's surface is UVA. Ultraviolet B has greater energy than UVA but can only reach the skin's epidermis. Ultraviolet-B can carry out broader oxidation modifications to proteins that cause molecular changes in carcinogenesis processes. UVA can reach the dermis and hypodermis of the skin. Ultraviolet-A radiation reduces transforming growth factor (TGF)-β1, causes dysfunction of the G1 arrest phase and increases the expression of MMPs and degradation of ECM such as glycosaminoglycans, collagen, and elastin.[23–25]

Glogau classification is used to determine the degree of severity of photoaging. Glogau classification III usually occurs at 50-65 with signs of wrinkles at rest. Research findings show that skin aging patients recorded are in the age range of 33-48 years. The age classification specified in the Glogau photoaging classification may shift to earlier or later depending on exposure to

extrinsic factors of each subject.[6,8,16] In this study, a shift in aging was found to be premature. In the distribution of duration of sun exposure and sunscreen usage, it was found that most cases were exposed to sunlight for a duration of >30 minutes per day and did not use sunscreen. These factors can affect the shift in the age of Glogau classification, which may occur earlier than it should be. The weakness of this study is the small number of samples, the fact that it only used recall memory and the possibility of recall and selection bias. In addition, the classification of skin aging only uses Glogau photoaging classification, which only shows skin aging due to UV exposure factors, so it cannot provide an overview of skin aging due to internal factors.

CONCLUSION

Based on the results of this study, it can be concluded that the main precipitating factors that play a role in skin aging in this study are body mass index, sunscreen usage, and duration of sun exposure.

ETHICS IN PUBLICATION

This research has been through the Ethics Committee review in the Research Ethics Committee Faculty of Medicine, Universitas Udayana (643/UN14.2.2.VII.14/LT/2022).

CONFLICT OF INTEREST

All authors declare there are no conflicts of interest in this study.

FUNDING

None.

AUTHORS CONTRIBUTION

The author and co-authors contributed equally to this research.

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