

Evaluation of dermoscopic photoaging score among multiethnic in Medan, Indonesia



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ABSTRACT

Background: Skin is considered a reflection of a person's appearance, so it is normal if many people try to take care of their skin, especially facial skin, and retard the aging process. Dermoscopy is a quick, non-invasive technique that allows physicians to observe the skin. Different ethnic groups may show different signs of aging on the face. Medan is a multiethnic city and thus might show facial skin aging differently. This study aimed to evaluate facial skin aging through the Dermoscopic Photoaging Scale (DPAS) and assess the relationship between DPAS, Glogau and Fitzpatrick scales among various ethnic groups in Medan, Indonesia.

Subjects and Methods: This cross-sectional study enrolled 155 subjects from 10 ethnicities in Medan. The examination of facial aging is based on DPAS using 11 criteria, the Glogau scale, and the Fitzpatrick skin type.

Results: Malay and Karonese got the highest DPAS score. There was a significant difference between DPAS, Glogau, and Fitzpatrick in age ($p = <0.001, <0.001$ and 0.032), and Fitzpatrick scores in ethnicity ($p < 0.001$). There was a strong and significant correlation between DPAS and Glogau scores ($p < 0.001, r = 0.748$), while DPAS and Fitzpatrick's scores showed a moderate and significant correlation ($p < 0.001, r = 0.288$).

Conclusion: The highest DPAS scores were found in the Malay and Karonese ethnic groups. There were significant differences between DPAS, Glogau, and Fitzpatrick in age and Fitzpatrick scores in ethnicity. There was a strong and significant correlation between DPAS scores and the Glogau scale and a moderate and significant correlation between DPAS and Fitzpatrick scores in various ethnic groups.

Keywords: facial aging, dermoscopy, DPAS, Glogau, Fitzpatrick, ethnic.

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INTRODUCTION

Skin is the largest and most visible organ of the human body and a reflection of our health condition, so it is normal for many people to take care of the skin, especially facial skin, and slow the aging process.¹ People think a woman's self-esteem and social relationships will improve if she looks young and attractive.^{1,2} Skin aging is a complicated process consisting of two continuous processes; intrinsic and extrinsic aging. The intrinsic aging process is a true aging process characterized by physiological changes related to human genetics, hormonal and biochemical over time, while extrinsic aging processes is engendered by external factors such as exposure to ultraviolet light, alcohol consumption, smoking, malnutrition, and other ecological variables, which can be avoided in some situations.³⁻⁵

Exposure to the sun's ultraviolet (UV) rays is the most important external factor that speeds up aging. This is why external skin aging is often called "photoaging". The occurrence and severity of these changes in skin appearance and function are even more visible on photo-exposed areas such as the face.⁶ Indonesia is a tropical country with UV rays from the sun throughout the year, so the Indonesian population is exposed to the UV rays all year long and vulnerable to photoaging.⁷

Glogau came up with the first way to classify photoaging in 1996. He divided photoaging into four types, from type I to type IV. Severe photoaging is classified as Glogau type IV (severe), usually found at 60 years old and characterized by many wrinkles.⁸ Fitzpatrick Skin Type (FST) was made to figure out the tendency of sunburn during exposure to light. It is also used to describe skin color and ethnic

type,⁹ which classifies the skin into six skin tone types, ranging from very pale (skin type I) to very dark (skin type VI).¹⁰

Dermoscopy is a quick, non-invasive technique that allows physicians to observe skin aging in vivo and visualize the morphological structures invisible to the naked eye.¹¹ Isik et al. created Dermoscopy Photoaging Scale (DPAS) to evaluate photoaging.¹² DPAS is a reliable and valid diagnostic criterion. It can determine skin photoaging quantitatively with the help of objective criteria to assess facial skin aging.¹³

Ethnicity and skin color are important considerations that impact the presentation and manifestation of many conditions in dermatology, particularly on the appearance of aging skin.¹⁴ Ethnicity usually refers to a broader population group that incorporates social, linguistic, religious, pattern components, food, and

other cultural components. On the other hand, races often represent a particular population in genetic similarity.¹⁴⁻¹⁷ Ethnic variations in skin appearance are still being studied. Many studies analyzing traits within the same ethnic group often report results that differ from previous literature.¹⁸ This study aimed to evaluate facial skin aging through the DPAS score among various ethnic groups and the relationship between DPAS, Glogau and Fitzpatrick scales in various ethnic groups in Medan, Indonesia.

METHODS

This descriptive observational study with a cross-sectional design enrolled 155 subjects with facial aging. This study was conducted from September 2020 to February 2021. The research protocol was approved by the Faculty of Medicine Ethics Committee, Universitas Sumatera Utara, number 261/KEP/USU/2020.

The inclusion criteria are women aged ≥ 30 years old, ethnic origin from Javanese, Bataknese, Malay, Minang, Mandailingnese, Karonese, Acehnese, Nias, Tionghoa, and Indian who agree to participate in this study by signing informed consent. This study does not involve women who have used topical anti-aging skin products within the last three months containing retinol and its derivatives, use facial skincare products containing antioxidants, vitamin C, vitamin E, hydroxy acids, use contraceptives containing estrogen or hormone replacement therapy, consuming isotretinoin, antioxidants, or vitamin C or vitamin E, and women who undergo routine facial rejuvenation treatment procedures such as chemical surgery, micro-needling, dermabrasion and microdermabrasion, botox injections, filler injection, and various light and laser therapies, as well as plastic surgery and reconstructive surgery on their faces.

This study used the quota sampling technique based on the ethnic group populations. The samples consist of 47 Javanese, 26 Bataknese, 11 Malay, 12 Minang, 16 Mandailingnese, 12 Karonese, 7 Acehnese, 5 Nias, 14 Tionghoa, and 5 Indian. Each subject was evaluated for her dermatological history and physical examination. Signs of photoaging based on the DPAS criteria assessed include yellowish

discoloration, yellow papules, white lines (skin atrophy), ephelides/lentigines, hypo-hyperpigmented macules, telangiectasis, actinic keratoses, senile comedones, deep wrinkles, superficial wrinkles, and criss-cross wrinkles.

Statistical analysis of descriptive characteristics of research subjects was reported as the median (interquartile range) because the data were not normally distributed. For discrete variables, numbers and proportions are reported. Differences in the proportion of DPAS, Glogau, and Fitzpatrick scores by age and ethnicity were compared using the Kruskal-Wallis test. Spearman correlation test examines DPAS correlation and Glogau or Fitzpatrick scores. A two-tailed p-value of less than 0.05 was considered significant for all statistical tests.

RESULTS

Table 1 presents the demographic characteristics of the study subjects. A total of 155 women with aging facial skin

participated in this study. The authors found that as many as 47 people (30.3%) were Javanese. Most subjects were 30-39 years old, as many as 91 people (58.7%). Based on the type of occupation, as many as 37 people (23.9%) were technicians and professional assistants, consisting of nurses, laboratory workers, radiographers, and pharmacy officers. In addition, the data reveal 86.5% or 134 people were married based on marital status.

The highest DPAS scores were found in Malay and Karonese ethnic groups, although they were not statistically significant overall. Using the Kruskal-Wallis test, a significant difference was found between DPAS, Glogau, and Fitzpatrick in age ($p = <0.001$, <0.001 and 0.032 , respectively), and Fitzpatrick scores in ethnicity ($p <0.001$) (**Table 2**).

This study used the Spearman correlation test to determine the relationship between DPAS and Glogau scores (**Table 3**). The findings data showed a strong and significant correlation ($p <0.001$, $r=0.748$) between DPAS and

Table 1. Demographic characteristics

Variable	n	%
Age (Year)		
30-39	91	58.7
40-49	37	23.9
50-59	14	9.0
60-69	10	6.5
≥ 70	3	1.9
Ethnic		
Javanese	47	30.3
Bataknese	26	16.8
Malay	11	7.1
Minang	12	7.7
Mandailingnese	16	10.3
Karonese	12	7.7
Acehnese	7	4.5
Nias	5	3.2
Tionghoa	14	9.0
Indian	5	3.2
Occupation		
Professional Workforce	13	8.4
Professional Technicians and Assistants	37	23.9
Administrative Staff	31	20.0
Service Businesses and Salespeople	19	12.3
Blue-collar Workers	25	16.1
Unoccupied	30	19.4
Marital status		
Married	134	86.5
Unmarried	21	13.5

Table 2. Comparison of DPAS, Glogau scale, and Fitzpatrick skin type in age and ethnicity

Subgroups	DPAS			Glogau			Fitzpatrick		
	Median	Min-max	p	Median	Min-max	p	Median	Min-max	p
Age									
30-39	12	5-20		2	1-3		4	2-5	
40-49	16	11-23		3	2-3		5	2-5	
50-59	19	14-24	<0.001	3	3-4	<0.001	5	2-5	0.032
60-69	22	14-25		3	3-4		5	3-5	
≥70	24	20-25		4	4-4		4	3-4	
Ethnic									
Javanese	14	5-24		3	1-4		4	3-5	
Bataknese	13.5	6-23		2	1-4		4	3-5	
Malay	16	10-22		3	1-3		5	3-5	
Minang	13	10-25		2	2-4		4	2-5	
Mandailingnese	12.5	6-25	0.895	2	1-3	0.195	4.5	3-5	<0.001
Karonese	16	5-24		3	1-4		4.5	4-5	
Acehnese	14	6-23		2	1-3		4	4-5	
Nias	13	10-20		2	2-3		4	4-4	
Tionghoa	14	6-24		3	1-4		2.5	2-4	
Indian	14	10-17		2	2-3		5	2-5	

Table 3. Correlation between DPAS with Glogau and Fitzpatrick scores

Variable	DPAS	
	p	r
Glogau	<0.001	0.748
Fitzpatrick	<0.001	0.288

Glogau. Meanwhile, the relationship between DPAS and Fitzpatrick scores showed a moderate and significant correlation ($p < 0.001$, $r = 0.288$).

DISCUSSION

In this study, the authors conducted a facial dermoscopy inspection among 155 women who lived in Medan from August 2020 until February 2021. All research subjects underwent history taking, dermatological and dermoscopy examination of the facial skin using the Dermlite DL3N dermoscopy.

The study results show that Javanese 47 (30.3%) were the ethnic groups most involved in this study. BPS data of Medan City in 2010 showed that 33.04% of Medan's population came from Javanese ethnicity. The largest age group was 30–39 years old, with as many as 91 people (58.7%), followed by the 40–49 years old group with 37 people (23.9%). The youngest subjects were 30 years old, and

the oldest was 73 years old. This present study's findings are relevant to the study conducted by El Sayed et al. in Egypt, who found that most research subjects were in the age group of 30–39 years old, as many as 96 people (44.2%).¹³ Furthermore, the research conducted by Isik et al. showed that 77 (17.5%) of 441 subjects were in the 30–39 year age group.¹² Meanwhile, the research of Galzote et al. related to the visual characteristics of facial skin in various Asian populations, 213 subjects were from the age group of 25–40 years old.¹⁹ There are variations related to the onset of skin aging. Some of the literature described that the signs of skin aging begin in the third decade, while some other studies showed that skin aging could occur earlier.^{12,16}

Most subjects are technicians and professional assistants, as many as 37 people (23.9%). Reports about facial skin conditions and occupation are limited. Yin et al., in a cross-sectional study in Japan, stated that higher working hours were not related to skin aging.²⁰ The married subjects were more dominant, with as many as 134 people (86.5%). Asakura et al. described 461 women with aging facial skin in Tokyo, Japan, and as many as 259 (57.9%) subjects were married.²¹

Furthermore, Isik et al. developed a Dermoscopy Photoaging Scale (DPAS) in 2013 to assess facial skin photoaging,

which is in line with the development of the era of dermoscopy. DPAS is expected to evaluate the effect of preventive and therapeutic applications for facial skin aging.¹³ In this study, significant differences were found between the DPAS, Glogau, and Fitzpatrick scores in age ($p < 0.001$, < 0.001 , and 0.032 , respectively) and the Fitzpatrick scale in ethnicity ($p < 0.001$). This variation is related to the onset of skin aging. Some kinds of literature state that the signs of skin aging begin to occur in the third decade, while several other studies show that skin aging can occur earlier.^{13,16} Melanocyte density often decreases by about 10–20% every decade. It happens to skin that is usually exposed to sunlight or protected skin.¹⁵ Galzote et al. revealed that pigmentation began to appear at the youngest age of 14–20 years old, especially in subjects from India and the Philippines, compared to those from China, Japan, and Korea.¹⁹ Meanwhile, the highest DPAS scores were found in Malay and Karonese, although they were not statistically significant overall. Further research is required to identify the underlying factors.

In 1996, Glogau was the first person to put photoaging into groups. Glogau's system divides photoaging into four types, from type I to type IV. Glogau type I (mild) is an early phase of photoaging that usually occurs at 20 to 30 years old and is marked by no wrinkles. In Glogau

type II (moderate), signs of photoaging have begun, namely wrinkles in facial expression movements. Glogau type II is usually found at 30 to 40 years old. Glogau type III (advanced) shows further photoaging, usually found at 50 years old, characterized by resting wrinkles. Picture of severe photoaging is classified as Glogau type IV (severe), usually found at 60 years old and characterized by many wrinkles.^{8,22}

Sun is the primary source of UV rays, contributing to photoaging. UV rays are divided into UVA, UVB, and UVC with different wavelengths. UVA rays can penetrate deeper layers of the skin than other types of UV rays and generate more damage. The main effects of photoaging are DNA damage, inflammation, and immunosuppression, such as intrinsic aging. It will cause an increase in free radicals that will decrease synthesis and increase the extracellular matrix degradation of the skin.^{8,23}

This study uses the Spearman correlation test to determine the relationship between DPAS and Glogau scores. The findings data reveal that there was a strong and significant positive correlation ($p < 0.001$, $r = 0.748$). At the same time, the relationship between DPAS and Fitzpatrick scores showed a moderate and significant positive correlation ($p < 0.001$, $r = 0.288$). Magdy and Sadek state that individuals with Glogau IV had the highest DPAS scores and yellowish discoloration.²⁴ This present study is in line with the study of Magdy and Sadek, which proves that the dermoscopy picture increases with the Glogau scale and can be used as a substitute quantitative score.

The amount, type, and arrangement of melanin in the skin determine the natural color or skin pigmentation. The melanin pigment provides natural protection against UV rays, called the Sun Protection Factor (SPF). Darker skin has a higher natural SPF of 13.4 compared to Caucasian skin, which only has a natural SPF of 3-4 or even less. UV radiation that reaches the dermis layer of bright skin has more quantity when compared to dark skin. Hence, low- Fitzpatrick skin types tend to be more susceptible to photoaging.²⁵

The clinical features of photoaging include dry skin, irregular skin pigmentation (in various types from

getting dark or becoming paler), yellowish skin, deep and rough wrinkles, atrophic skin, sagging skin, telangiectasias, solar elastosis, actinic purpura, even the formation of precancerous lesions.^{26,27} Dark skin is more resistant to skin damage caused by UV exposure, so the manifestations of skin aging are lighter and occur slower at 10 until 20 years than lighter skin. On skin with Fitzpatrick types III and IV, dyspigmentation or skin pigment changes are the main features of photoaging.²⁸

Furthermore, this study also shows that a high DPAS score has a moderate and significant correlation with the Fitzpatrick scale (the signs of skin aging are more commonly found in subjects with a larger Fitzpatrick scale). However, because of this study's cross-sectional design, it was difficult to determine a causal relationship. The researchers are expected for future research in cohort studies or clinical trials to clarify this relationship further.

This study has limitations on observational research design and the distribution of study subjects based on age groups that are not evenly distributed in each ethnicity. Furthermore, this present study is the first to compare DPAS scores, the Glogau scale, and Fitzpatrick in facial aging among various ethnicities in Medan, Indonesia. The authors included ten ethnicities with multiple sample sizes and observed facial skin aging by applying the same instrument, namely a dermoscopy.

CONCLUSIONS

The highest DPAS scores were found in the Malay and Karonese ethnic groups, although they were not statistically significant. Significant differences were found between DPAS, Glogau, and Fitzpatrick in age and Fitzpatrick scores in ethnicity. There is a strong and significant relationship between DPAS and Glogau scores. In contrast, the DPAS and Fitzpatrick scores showed a moderate and significant correlation between facial aging in various ethnicities in Medan, Indonesia.

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DISCLOSURE

Author Contribution

The authors alone are responsible for the content and writing of the manuscript.

Conflict of interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this study.

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