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THE EFFECT OF LIFESTYLE ON SKIN AGING

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Abstract

Skin aging is a natural process influenced by intrinsic and extrinsic factors, with lifestyle-related exposures such as ultraviolet radiation, pollution, poor diet, smoking, alcohol consumption, and inadequate sleep contributing to its acceleration. However, research examining the comprehensive impact of lifestyle on objectively measured skin aging parameters in rural Indonesian populations remains limited. The novelty of this study lies in its focus on a rural community in Eastern Indonesia, combining a validated lifestyle assessment with objective clinical skin analysis to generate context-specific evidence. This study aimed to determine the influence of lifestyle on skin aging among individuals aged 30–40 years in Lipulalongo Village, Banggai Laut Regency, Central Sulawesi. An observational analytic study with a cross-sectional design was conducted on 60 respondents selected through simple random sampling. Lifestyle was assessed using the Lifestyle Assessment Questionnaire 2025, while skin aging was measured using the Vision Skin Analyzer based on hydration, elasticity, wrinkles, and pigmentation parameters. Data were analyzed using univariate and bivariate methods, with the Spearman rank correlation test applied due to the ordinal nature of lifestyle data. The results showed that most respondents had lifestyles requiring improvement (61.7%) or were at high risk (38.3%), with skin conditions predominantly classified as normal (28.3%) and slightly moist (21.7%). A significant moderate correlation was found between lifestyle and skin aging (P-value < 0.001; r = 0.514). In conclusion, lifestyle significantly influences skin aging, highlighting the importance of targeted health education to promote healthier behaviors in similar rural populations.

Keywords: Lifestyle; Skin aging; Sleep quality; Stress; Vision Skin Analyzer.

INTRODUCTION

Skin aging is a natural process that occurs with age, but can be accelerated by various external factors, including an unhealthy lifestyle (1). The skin aging process is divided into two types, namely intrinsic aging which is influenced by age and genetic factors, and extrinsic aging that occurs due to environmental factors, such as exposure to ultraviolet (UV) rays, pollution, alcohol consumption, smoking, and poor diet. Skin aging can be characterized by the appearance of fine lines, wrinkles, loss of elasticity, uneven pigmentation, as well as decreased skin volume. The significant increase in the proportion of the elderly population (over 65 years old), coupled with Indonesia being a tropical country with year-round sun exposure, makes the issue of skin aging even more relevant. Data shows that the prevalence of brownish patches in individuals aged 41-50 years in Indonesia reaches 100%, and the prevalence of skin aging increases with age (2) Therefore, it is important to understand the factors that affect skin aging, one of which is lifestyle.

Previous research has shown that lifestyle has a huge impact on skin health.

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Exposure to UV rays is one of the main factors that cause damage to skin collagen and elastin, leading to the onset of wrinkles and uneven pigmentation (3,4). In addition, smoking and alcohol consumption also accelerate the aging process of the skin through complex mechanisms, such as dehydration, decreased levels of vitamins and minerals, and increased oxidative stress (1,5). Poor sleep duration can affect the regenerative function of the skin, with individuals who sleep less than five hours per day showing increased transepidermal water loss (TEWL) and decreased skin recovery ability after exposure to UV rays (6) Psychological stress also plays a role in skin aging, with an increase in the hormone cortisol that damages collagen and elastin (7) An unbalanced diet, especially the consumption of sugar and trans fats, can accelerate skin aging through a process of glycation that damages skin tissue (8) This wide range of scientific evidence suggests that lifestyle, including eating habits, sleep, stress, and physical activity, greatly affects skin quality and accelerates skin aging.

Based on these findings, the hypothesis of this study is that an unhealthy lifestyle contributes to the acceleration of skin aging, whereas a healthy lifestyle can slow down the process. The urgency of this research lies in the importance of understanding the influence of lifestyle on skin aging in order to develop effective prevention and intervention efforts. Given the high prevalence of skin aging in Indonesia and its relationship with modifiable external factors, this study is expected to provide useful information to reduce the negative impact of these factors, as well as encourage the implementation of a healthy lifestyle as a skin aging prevention strategy.

This study aims to determine the influence of lifestyle on skin aging in individuals aged 30-40 years. The specific purpose of this study was to describe the lifestyle of individuals in that age range, analyze the results of the Vision Skin Analyzer tool in individuals aged 30-40 years, and find out the extent to which lifestyle affects skin aging. The benefits of this research include providing insight and knowledge for the public about the importance of a healthy lifestyle in preventing skin aging. In addition, this

research is also expected to contribute to the development of research at the Faculty of Medicine, Muslim University of Indonesia and as a reference for broader skin aging prevention efforts. The expected outcome of this study is the existence of evidence showing the influence of lifestyle on skin aging, which can be used to educate the public on how to prevent and slow down skin aging by adopting a healthy lifestyle.

RESEARCH METHOD

This study employed an analytical observational method with a cross-sectional design to analyze the influence of lifestyle on skin aging. The research was conducted in Lipulalongo Village, Labobo District, Banggai Laut Regency, Central Sulawesi, from September 17 to October 2, 2025. This location was selected due to the observed homogeneity of its population's demographic and environmental characteristics and the absence of previous similar research in the area, providing a unique opportunity to establish foundational data on lifestyle and skin health in this understudied region. The target population was individuals aged 30-40 years. Using the Slovin formula, a sample of 60 respondents was obtained, selected through simple random sampling based on predetermined inclusion criteria (individuals aged 30-40 years) and exclusion criteria (those who had undergone dermatological procedures or taken anti-aging drugs).

The independent variable, lifestyle, was measured using the Lifestyle Assessment Questionnaire 2025. This instrument covers aspects of diet, sleep habits, physical activity, and the consumption of alcohol and cigarettes. To ensure its accuracy, the questionnaire underwent rigorous construct validity and reliability testing prior to data collection. The dependent variable, skin aging, was assessed using the Vision Skin Analyzer, a device that measures skin condition based on moisture, wrinkles, and elasticity on an ordinal scale. The measurement procedure was consistently performed by the researcher, who had received prior training from a qualified dermatologist to ensure standardized and accurate operation of the device. Data were analyzed using univariate and bivariate methods, with the Spearman rank correlation test applied due to the ordinal nature of lifestyle data. This research has received ethical approval from the Research Ethics

Committee of the Muslim University of Indonesia (No. UMI0120507504).

RESULTS AND DISCUSSION

Results

Table 1. Results of Distribution of Respondent Characteristics

Variable	Frequency	
	n	%
Age		
30-35	33	55,0
36-40	27	45,0
Total	60	100,0
Occupation		
Civil Servant	1	1,7
Midwife	1	1,7
Village Council Member (BPD)	2	3,3
Regional Public Sector Employee	1	1,7
Lecturer	1	1,7
Contract/Gov't Honorary Employee	4	6,7
Homemaker	26	43,3
Fisherman	5	8,3
Village Official	1	1,7
Nurse	1	1,7
Farmer	5	8,3
Civil Servant	1	1,7
Police Officer	1	1,7
Gov't Contract Teacher (PPPK)	6	10,0
Private Sector Employee	1	1,7
Total	60	100,0
Lifestyle		
Very High Risk	0	0,0
High Risk	23	38,3
Need for Lifestyle Improvements	37	61,7
Healthy Lifestyle	0	0,0
Total	60	100,0
Skin Aging		
Dry	8	13,3
Slightly Dry	9	15,0
Normal	17	28,3
Slightly Alkaline	13	21,7
Moist	13	21,7
Total	60	100,0
Gender		
Male	20	33,3
Female	40	66,7
Total	60	100,0

Sources: Primary Data, 2025

Table 1 presents the distribution of respondents based on age, occupation, lifestyle, skin aging condition, and gender. The majority of respondents were aged 30–35 years (55.0%), while 45.0% were in the 36–40 years age group, indicating that most participants were relatively young adults who are nonetheless susceptible to early signs of skin aging. In terms of occupation, most respondents were housewives (43.3%), followed by PPPK employees (10.0%) and honorary workers (6.7%), with smaller proportions working as fishermen, farmers, and entrepreneurs, reflecting the diversity of predominantly informal and traditional occupations in rural communities. Regarding lifestyle, the majority of respondents (61.7%) were categorized as needing improvement, while 38.3% were classified as high risk for skin aging, suggesting that unhealthy habits are still prevalent. Assessment of skin aging conditions showed that most respondents had normal (28.3%) and slightly moist (21.7%) skin, while a smaller proportion (13.3%) had dry skin, indicating generally moderate skin conditions with potential for improvement. Additionally, the gender distribution revealed that most respondents were female (66.7%), compared to 33.3% male, suggesting greater female participation, possibly due to higher awareness and concern regarding skin health. Overall, this table illustrates the demographic and clinical profile of respondents, highlighting the interplay between age, occupation, lifestyle, and skin condition in this population.

Table 2. Results of Lifestyle Frequency Distribution on Skin Aging

Lifestyle	Skin Aging										Total	
	Dry		Slightly Dry		Normal		Slightly Alkaline		Moist			
	n	%	n	%	n	%	n	%	n	%	n	%
High Risk	8	100	6	66,7	5	29,4	1	7,7	3	23,1	23	38,3
Need for Lifestyle Improvements	0	0,0	3	33,3	12	70,6	12	92,3	10	76,9	37	61,7
Total	8	100	9	100	17	100	13	100	13	100	60	100

Sources: Primary Data, 2025

Table 2 reveals the distribution of respondents' lifestyle frequency to skin aging conditions. In the group with a high-risk lifestyle, most had dry (100%) and slightly dry skin (66.7%). In contrast, in the group whose lifestyle needed improvement, many had normal (70.6%) and slightly wet (92.3%) skin. These data suggest a link between a

high-risk lifestyle and poorer skin conditions. This table shows a clear correlation between a high-risk lifestyle and worse skin aging conditions, such as dry and slightly dry skin. This indicates that unhealthy lifestyles, such as smoking, lack of sleep, and poor diet, can accelerate skin aging. Therefore, lifestyle changes towards a healthy lifestyle are essential to maintain healthy skin

Tabel 3. Results of the Spearman Lifestyle Test on the Respondent's Skin Condition

		Lifestyle	Skin Aging
Lifestyle	Correlation Coefficients	1,000	
	P-value	-	
	n	60	
Skin Aging	Correlation Coefficients	0,514	1,00
	P-value	< 0.001	-
	n	60	60

Sources: Primary Data, 2025

Table 3 shows the results of the Spearman test to see the relationship between the respondents' lifestyle and skin condition. The correlation coefficient between lifestyle and skin aging was 0.514, with a p-value indicating that this relationship was significant ($p<0.05$). This suggests a moderately positive association between lifestyle and skin aging conditions. The Spearman test showed a moderate correlation between lifestyle and skin condition, which means that lifestyle has a significant influence on skin aging. This further emphasizes the importance of implementing a healthy lifestyle to slow down the aging process of the skin. Further research can deepen understanding of the specific factors that contribute to skin aging in a lifestyle context.

Discussion

Lifestyle Overview in Individuals 30–40 Years Old

The lifestyle picture of individuals aged 30–40 years in this study showed a variation in habits that reflected a combination of protective behaviors and behaviors at risk for skin aging. Based on the frequency distribution in Table 1, the majority of respondents are in the category of need for lifestyle improvement to be at high risk, which indicates that their daily habits have not fully supported optimal skin health. The age range of 30–40 years is the phase when signs of skin aging begin to

appear clinically, so diet, rest, physical activity, cigarette exposure, alcohol consumption, and stress levels are important determinants of skin quality. In terms of diet, some respondents have relatively good habits of consuming vegetables, fruits, and water, but they are still found to consume fast food and caffeinated beverages at a certain frequency. This condition is relevant because foods high in sugar and fat can increase oxidative stress as well as systemic inflammation that contributes to the acceleration of skin aging (9) In addition, differences in biological and behavioral characteristics are also seen between men and women: in men, smoking habits and exposure to a harsher work environment are more often associated with decreased physiological function and increased skin aging, while in women, hormonal factors influenced by psychological stress, sleep quality, and nutritional patterns play a major role in maintaining skin elasticity and metabolic stability.

This difference confirms that although the underlying mechanisms are similar, the manifestations of lifestyle-induced aging can appear differently in both sexes, so lifestyle interventions need to consider specific biological and behavioral characteristics in order for the aging process to be healthier and more controlled (10) The lack of consistency of a healthy diet also has implications for the low intake of vitamins and antioxidants that the skin needs to maintain moisture, elasticity, and tissue regeneration (11) Some literature even emphasizes the contribution of consuming high-cocoa pure dark chocolate (without added sugar/excess fat) as a source of flavonoids such as epicatechin and catechins to ward off free radicals, improve blood flow, improve skin hydration and elasticity, and help protect against UV damage (12). Moderate consumption can also lower systemic inflammation and support endothelial function, so it can be part of a lifestyle strategy to maintain skin quality (13).

Rest habits showed that the majority of respondents slept >6 hours/day, but some experienced poor sleep quality. Sleep plays an important role in skin regeneration, tissue repair, and regulation of the hormone cortisol; Sleep deprivation can increase transepidermal water loss (TEWL) so that

the skin appears dull, dry, and more susceptible to UV damage (14) In the smoking component, although only a small percentage of respondents are active/passive smokers, this habit is significant because it can cause vasoconstriction of blood vessels, decrease nutrient supply, and accelerate collagen degradation. Alcohol consumption was also found in a small percentage of respondents; Although not dominant, alcohol can still reduce skin hydration and interfere with the availability of important nutrients. The physical activity aspect shows that the majority of respondents do light–moderate activities, which are beneficial for circulation, tissue oxygenation, and metabolic balance (15), but not all respondents do it regularly. In addition, the level of stress/worry in some respondents is quite high. Chronic stress increases cortisol which can decrease the production of collagen and elastin, accelerating fine lines and wrinkles.

Overview of Vision Skin Analyzer Results and the Influence of Lifestyle on Skin Aging

The results of the Vision Skin Analyzer in respondents aged 30–40 years showed a variation in skin conditions from dry to moist, indicating that the difference in skin quality is not solely determined by age, but is greatly influenced by extrinsic factors and daily habits (15) Respondents with a relatively better lifestyle tended to show more optimal hydration, more maintained elasticity, and milder signs of aging; Conversely, respondents with unhealthy habits showed decreased hydration, dull skin, changes in texture, and more pronounced signs of early aging (16).

These findings are consistent with the biological mechanisms of skin aging accelerated by oxidative stress: poor lifestyle increases the accumulation of collagen-elastin-damaging ROS and corresponds to the oxidative stress model of aging that emphasizes the progressive breakdown of DNA, lipids, and cellular proteins (15). A diet high in sugar/fat increases AGEs that accelerate collagen breakdown (16) while vitamin C and linoleic acid intake is negatively correlated with wrinkles and dryness (17). Sleep deprivation worsens TEWL and skin recovery after UV (18) as well as increases cortisol which suppresses collagen

expression and increases MMPs. Smoking accelerates collagen breakdown through vasoconstriction and increased MMP-1, while alcohol lowers vitamins and increases lipid peroxidation (19). Regular physical activity improves the mitochondrial function of skin cells and slows down collagen degradation, while chronic stress triggers collagen degradation and fibroblast dysfunction (20) as per psychodermatology that attributes stress to skin changes through neuroendocrine pathways (21) as well as a decrease in antioxidant genes (SOD, GPx) that worsen skin homeostasis.

Contextualizing Skin Health: The Role of Age and the Control of Intrinsic Factors

The study's finding that the majority of respondents fell into the "need for lifestyle improvement" category, yet still presented with "normal" or "slightly moist" skin, presents an interesting point for discussion. This phenomenon can be attributed to the demographic focus of the study on individuals aged 30-40 years. This age range represents a phase where intrinsic aging processes are just beginning to manifest, and the cumulative damage from extrinsic factors may not yet be fully apparent clinically. The skin's inherent regenerative capacity remains relatively robust in the early part of this decade, potentially masking the early effects of an unhealthy lifestyle. For instance, while poor dietary habits and inadequate sleep may already be inducing subclinical oxidative stress and low-grade inflammation (9), these changes may not have progressed sufficiently to disrupt the stratum corneum's barrier function or significantly degrade the dermal matrix. The 28.3% of respondents with "normal" skin and 21.7% with "slightly alkaline" skin likely represent individuals in this initial phase, where the biological insults of a high-risk lifestyle have not yet overwhelmed the skin's natural repair and maintenance systems. However, the data in Table 6, showing a clear trend toward drier skin in the high-risk lifestyle group, strongly implies that without intervention, this subclinical damage will eventually manifest as visible aging. Therefore, the relatively good skin condition in some respondents should not be interpreted as a sign that lifestyle is unimportant, but rather as a critical window of opportunity for

preventive intervention before irreversible damage occurs.

Furthermore, to contextualize these findings accurately, this study acknowledges the complex interplay between intrinsic and extrinsic factors in skin aging, as established in the literature (15,16). While the primary focus was on the modifiable extrinsic factor of lifestyle, the study's design and analysis accounted for intrinsic influences in several ways. First, by limiting the sample to a narrow age range (30-40 years), the study inherently controlled for the most significant intrinsic factor: chronological age, thereby reducing the variability in genetically programmed aging. Second, the use of a homogenous population sample from a single, rural village (Lipulalongo) served as a natural control for broad environmental factors like ambient air pollution and average sun exposure, ensuring that the primary difference between respondents was their personal lifestyle choices. Third, while genetic predispositions were not directly measured, the random sampling technique aims to distribute such intrinsic variations evenly across the lifestyle groups, allowing the statistical analysis to isolate the specific contribution of lifestyle. The significant correlation (P-value < 0.001) found between lifestyle and skin aging, despite the uncontrolled intrinsic genetic and metabolic diversity of the sample, strongly suggests that lifestyle is a powerful, independent predictor of skin health, even in this relatively young cohort. This reinforces the central role of modifiable behaviors in either accelerating or decelerating the natural, intrinsic aging trajectory.

This study provides a deeper understanding of the influence of lifestyle on skin aging, especially in individuals aged 30-40 years. The findings suggest that lifestyle habits such as unhealthy diet, lack of sleep, smoking habits, alcohol consumption, and stress can accelerate skin aging. Therefore, this study implies the need for prevention and intervention efforts through healthier lifestyle changes, such as a balanced diet, adequate sleep, regular exercise, and stress management. The results of this study can be used to educate the public about the importance of a healthy lifestyle in slowing down the skin aging process and maintaining overall skin health.

The study has several limitations, among which is that the sample is limited to only respondents aged 30-40 years in Lipulalongo Village, which may not be fully representative of the wider population. In addition, the study was cross-sectional, meaning it could not show a direct cause-and-effect relationship between lifestyle and skin aging. Skin aging measurements are also limited to the use of the Vision Skin Analyzer tool which only assesses the physical condition of the skin without considering genetic factors that may affect skin aging.

CONCLUSION AND RECOMMENDATION

Lifestyle has a significant influence on the skin aging process in individuals aged 30-40 years. Factors such as diet, sleep quality, smoking habits, alcohol consumption, and stress levels contribute to skin conditions and accelerate skin aging. Therefore, it is recommended for individuals to improve their lifestyle by adopting a healthy diet, getting enough sleep, exercising regularly, and managing stress to slow down the aging process of the skin. Healthy lifestyle-based interventions need to be promoted as a more effective prevention of skin aging.

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