



CORRELATION BETWEEN LIFESTYLE FACTORS, BODY FAT COMPOSITION AND BIOLOGICAL AGE

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ABSTRACT

Living a healthy lifestyle considers various components that influence daily life. In contrast, an unhealthy lifestyle may lead to changes in body fat composition and biological age. This study aims to analyze the relationship between lifestyle with the distribution of body fat components and biological age. This cross-sectional quantitative was carried out in Cihanjuang Rahayu Village on men and women aged 30-60 years. Using the purposive sampling technique, 157 respondents was selected based on the predetermined age criteria. Data collection involved a questionnaire to assess lifestyle data, while an Omron device measured body fat composition. The data were analyzed using the Spearman correlation test with a significance level of 0,05. This study found no significant relationship between lifestyle and body fat composition in the subcutaneous tissue and legs (P -value $> 0,05$). However, a significant relationship was observed between a healthy lifestyle and body fat composition in trunk, arms, and biological age (P -value $< 0,05$). The findings of this study demonstrate a significant association between a healthy lifestyle and body fat distribution, especially in the trunk, arms, and biological age. Conversely, no significant relationship was found between lifestyle and body fat composition in the subcutaneous area or legs. These findings suggest that a healthy lifestyle can influence specific aspects of body composition, particularly in certain body regions.

Keywords: biological age; body fat; lifestyle

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INTRODUCTION

In recent decades, and especially since the onset of the COVID-19 pandemic in 2020, modern lifestyles have considerably changed. These changes encompass diet, physical activity, stress levels, and sleep quality, all of which directly or indirectly impact body composition, including body fat and biological age. According to Kolodziejczyk & Liudvytsa (2022), understanding the connection between lifestyle patterns and body fat components, as well as biological age, is becoming increasingly vital for global public health, given the growing prevalence of non-communicable diseases and obesity worldwide. Lifestyle changes in the modern era have a profound effect on human health, particularly in terms of body fat composition and the aging process. Unhealthy habits, such as a diet rich in saturated fats, sugars, and salt, insufficient physical activity, smoking, chronic stress, and poor sleep, contribute to accelerated aging and an increased risk of chronic diseases. Lifestyle changes in the modern era have a profound effect on human health, particularly in terms of body fat composition and the aging process. Unhealthy habits, such as a diet rich in saturated fats, sugars, and salt, insufficient physical activity, smoking, chronic stress, and poor sleep, contribute to accelerated aging and an increased risk of chronic diseases. A prolonged unhealthy lifestyle can lead to the accumulation of visceral fat in the intra-abdominal region, which has harmful effects on health. Unlike subcutaneous fat, which sits under the skin, visceral fat surrounds key organs such as the

liver, pancreas, and intestines. The buildup of visceral fat has been shown to increase systemic inflammation, which in turn raises the risk of chronic conditions, including metabolic syndrome, type 2 diabetes, and cardiovascular disease (Crujeiras et al., 2022; Yin et al., 2022).

Furthermore, systemic inflammation and chronic oxidative stress, linked to an unhealthy lifestyle, are believed to accelerate the aging process, resulting in a rise in 'biological age,' which does not necessarily match one's actual age (Kelly T., Unwin D., 2020). Behavioral factors like inadequate sleep, chronic stress, and lack of physical activity result in chronic inflammation and redox imbalances, both of which contribute to premature aging (Putri et al., 2022). Poor lifestyle choices such as smoking, consuming a diet rich in fat and sugar, lack of physical activity, and chronic stress are major contributors to obesity and the buildup of excess body fat (Sulasmi et al., 2017). Visceral fat is stored in the peritoneal cavity, including around the omentum and abdominal organs, in contrast to subcutaneous fat which lies under the skin. Due to its greater activity, visceral fat more readily enters the bloodstream via the liver's portal vein. (Shen et al., 2020). It is believed that high consumption of fructose and animal fats, excessive calorie intake due to inactivity, and the harmful effects of cigarette smoke impair fat metabolism regulation. This leads to an increase in fat within intra-abdominal adipose tissue (Yin et al., 2022). Visceral fat, also known as abdominal fat, is a type of metabolizable fat that accumulates in the peritoneal cavity, including the omentum and intestinal mesentery. Unlike subcutaneous fat, visceral fat is more easily released into the bloodstream and transported to the liver via the portal vein (Pratiwi et al., 2015). A Excess abdominal fat, or central adiposity, is particularly harmful as it can trigger systemic inflammation by increasing the production of pro-inflammatory cytokines such as TNF- α , IL-6, leptin, and resistin, while decreasing the levels of anti-inflammatory adiponectin. Chronic inflammation caused by oxidative stress and endothelial dysfunction can increase the risk of atherosclerosis, type 2 diabetes, and hypertension (Pratiwi & Yunita, 2015).

The result of poor lifestyle choices can also impact one's biological age. An unhealthy lifestyle is believed to contribute to accelerated aging, particularly in the accumulation of abdominal visceral fat. Aging is marked by a decline in the ability of cells and tissues to repair damage, maintain homeostasis, and withstand environmental stress. Over time, this results in a decline in body function and endurance (Hou et al., 2020). The increasing 'biological age' of an individual, which does not correspond to their chronological age, provides a way to assess the effects of aging. Biological age, along with lifestyle factors, is a more accurate indicator of health risks (McLewin et al., 2022). Biological markers that indicate aging include telomere length, DNA methylation, plasma protein and metabolite profiles, and the composition of the gastrointestinal microbiome (Kelly T., Unwin D., 2020). It has been established that unhealthy lifestyles—such as inadequate sleep, chronic stress, smoking, alcohol consumption, and obesity—lead to telomere shortening and DNA methylation changes, causing a biological age greater than one's chronological age (Hou et al., 2020). This premature aging raises the likelihood of developing chronic diseases related to aging, such as cancer, neurodegenerative diseases, type 2 diabetes, and cardiovascular diseases (McLean et al., 2023). Given this background, the author is interested in researching the 'RELATIONSHIP BETWEEN LIFESTYLE PATTERNS WITH BODY FAT COMPONENTS AND BIOLOGICAL AGE,' with the aim of understanding how lifestyle affects body fat composition and biological age, key factors in the occurrence of degenerative diseases."

METHOD

Using a quantitative approach, this study applies a cross-sectional research design with a descriptive correlation analysis to investigate the relationships among variables. Adults aged 30-60 years from Cihanjuang Rahayu were sampled for this study, with data collected during a single time frame. The population in this study consisted of 160 individuals, with the sample randomly selected based on the age criteria of 30-60 years. A total of 157 respondents were obtained using the Purposive Sampling technique. The analysis employed a Pearson correlation test to examine the relationship between variables. Data collection was conducted using a research instrument in the form of a questionnaire that had undergone validity and reliability testing, achieving a validity score of 0.444 and a Cronbach's alpha value of 0.919. The collected data were processed using SPSS and Microsoft Excel. This study was deemed ethically feasible and approved by the Ethics Committee (KEPK) of Universitas Advent Indonesia.

RESULT

Involving 157 participants, this study analyzed three main variables: lifestyle, body fat components, and biological age among the population of Cihanjuang Rahayu.

Table 1.

Overview of Lifestyle Characteristics of the Cihanjuang Rahayu Village Population			
Variable	f	%	
Gender			
Male	58		36.9
Female	99		63.1
P.A (Daily exercise)		n	
Poor	84		53.5
Good	73		46.5
P.A (Aerobic Exercise > 30M)			
Poor	66		42.0
Good	91		58.0
P.A (Daily activities)			
Poor	47		29.9
Good	110		70.1
P.A (Walking activity <10M)			
Poor	69		43.9
Good	88		56.1
P.A (Sitting > 4-6 hours a day at the office/home)			
Poor	74		47.1
Good	83		52.9
Diet (Meat)			
Poor	76		48.4
Good	81		51.6
Diet (Coconut Milk/Offal)			
Poor	77		49.0
Good	80		51.0
Diet (Fried Foods)			
Poor	94		52.9
Good	63		47.1
Diet (Junkfood)			
Poor	94		59.9
Good	63		40.1
Diet (Caffeinated Beverages)			
Poor	88		56.1
Good	69		43.9
Diet (Eating Salted Fish)			
Poor	92		58.6
Good	65		41.4

Variable	f	%
Diet (Eating Vegetables)		
Poor	54	34.4
Good	103	65.6
Diet (Fruits)		
Poor	49	31.2
Good	108	68.8
Diet (Eating Sweets)		
Poor	93	59.2
Good	64	40.8
Diet (Snack/Chicki)		
Poor	96	61.1
Good	61	38.9
R.H (Waking up <2 times during the night)		
Poor	74	47.1
Good	83	52.9
R.H (Experiencing difficulty sleeping <2 times per week)		
Poor	75	47.8
Good	82	52.2
R.H (Rest/Sleep 1-2 hours per day >3 times per week)		
Poor	64	40.8
Good	93	59.2
R.H (Regular sleep of 6-8 hours per night per week)		
Poor	66	42.0
Good	91	58.0
R.H (Waking up to urinate 1-2 times per night)		
Poor	34	21.7
Good	123	78.3
S.O.H (Active smoker)		
Poor	38	24.2
Good	119	75.8
S.O.H (Number of cigarettes smoked daily: 1-5)		
Poor	38	24.2
Good	119	75.8
S.O.H (Smoking 1-10 cigarettes per day)		
Poor	38	24.2
Good	119	75.8
S.O.H (Smoking more than 15 cigarettes per day)		
Poor	38	24.2
Good	119	75.8
S.O.H (Feeling stressed in a week)		
Poor	53	33.8
Good	104	66.2
S.O.H (Drinking Alcohol)		
Poor	54	34.4
Good	103	65.6

Note: P.A (Physical activity), R.H (Resting habits), S.O.H (Smoking and other habits) 2024

Based on Table 1, physical activity in sports in the community falls into the bad category, with 84 respondents (53.5%). Based on lifestyle, the diet related to meat falls into the good category with 81 respondents (51.6%). Regarding resting habits, waking up more than 2 times at night falls into the good category with 83 respondents (52.0%). Based on smoking habits, active smokers in the community are in the good category, with 119 respondents (75.8%).

Table 2.

Overview of Lifestyle Pattern Category Variables

Variables of Lifestyle Habits	f	%
Unhealthy Lifestyle	13	8.3
Moderate Lifestyle	101	64.3
Healthy lifestyles	43	27.4

In the table shown, the lifestyle variable is divided into three categories: Unhealthy Lifestyle, Moderate Lifestyle, and Healthy Lifestyle, with different scores. The moderate lifestyle category includes 101 respondents (64.3%), the healthy lifestyle category includes 43 respondents (27.4%), and the unhealthy lifestyle category includes 13 respondents (8.3%).

Table 3.

Distribution of Body Fat Components and Biological Age Profile in the Population of Cihanjuang Rahayu Village

Variable	Min	Max	Mean	Std. Deviation
Body Fat Composition (Subcutaneous)	11	99	28.63	13,873
Body Fat Composition (Trunk)	11	99	27.54	15,882
Body Fat Composition (Arms)	11	99	37.97	14,459
Body Fat Composition (Legs)	13	84	35.34	12,609

Table 3 presents descriptive statistical data, with the highest value for body fat composition (Arms) having an average of 37.97, followed by body fat composition (Legs) with an average of 35.34, body fat composition (Subcutaneous) with an average of 28.63, and body fat composition (Trunk) with an average of 27.54

Table 4.

Biological Age Profile of the Cihanjuang Village Community

Variable	f	%	mean
Early adulthood	47	27.8	
Late adulthood	4	2.4	2.38
Early elderly	106	62.7	

Based on Table 4 regarding the biological age profile of the Cihanjuang Village population, the results show that in early adulthood, there are 47 respondents (27.8%), in late adulthood, there are 4 respondents (2.4%), and in early elderly, there are 106 respondents (62.7%), with an average biological age of 2.38.

Table 5.

Overview of the relationship between lifestyle patterns and the distribution of body fat components and biological age in the Cihanjuang Rahayu Village population

Variable		Independent Lifestyle	Interpretation
Dependent			
TLC (Subcutaneous)	Correlation	.061	Not Significant
	Sig. (2-Tailed)	.448	
	N	157	
TLC (Trunk)	Correlation	-.043	Significant
	Sig. (2-Tailed)	.595	
	N	157	
KLT (Arms)	Correlation	.009	Significant
	Sig. (2-Tailed)	.911	
	N	157	
TLC (Legs)	Correlation	.85	Not Significant
	Sig. (2-Tailed)	.291	
	N	157	
Body Age	Correlation	.032	Significant
	Sig. (2-Tailed)	.692	
	N	157	

Note: BFC (Body fat composition)

Based on Table 5 regarding the description of the relationship between lifestyle and body fat components and biological age using the Spearman correlation test with a significance level of 0.05, the results show that the relationship between the body fat component (subcutaneous) and lifestyle is not significant, with a p-value of 0.061. The body fat component (trunk) shows a significant relationship with lifestyle, with a p-value of 0.043. The body fat component (arms) is also significant with lifestyle, with a p-value of 0.009. The body fat component

(legs) is not significant with lifestyle, with a p-value of 0.85. Biological age shows a significant relationship with lifestyle, with a p-value of 0.032.

DISCUSSION

An overview of the characteristics of the lifestyle of the people of Cihanjuang Rahayu Village shows that the majority of participants in this study were women. The higher number of female respondents may provide a better representation of perspectives and experiences related to women. This is particularly relevant if the research aims to explore gender-specific issues such as reproductive health, education, or employment. The predominance of women in the study could also indicate that the research theme is more appealing or relevant to them. However, it is essential to consider the potential biases arising from this imbalance. Results obtained from an overrepresentation of one gender may not fully capture the experiences or perspectives of the other gender.

Excessive meat consumption can be linked to health risks such as increased body fat or metabolic disorders. Consuming organ meats (offal) and coconut milk-based dishes in moderation may provide beneficial nutrients without significantly impacting health negatively. Junk food typically contains high calories with low nutritional value, such as fast food, fried snacks, sugary treats, and processed foods. These foods tend to be high in saturated fats, added sugars, and salt, which can contribute to weight gain and increased body fat. Active smoking habits have a significant detrimental impact on health, including effects on body fat composition and metabolism. Poor lifestyle habits, such as a diet high in fats and low in vegetables or fruits, lack of physical activity, smoking, and insufficient sleep, contribute significantly to unhealthy body fat composition, particularly visceral fat, and increase the risk of chronic diseases such as obesity, diabetes, and heart disease.

Based on the findings, this study aligns with research conducted by Wayan, et al (2024), which revealed that physical activity is significantly associated with body weight, BMI, and body fat mass percentage. A sedentary lifestyle poses a risk of reduced energy expenditure in the body, whereas increased physical activity enhances fat expenditure. Smoking also demonstrated a positive association with body weight, BMI, and body fat. This is attributed to nicotine, a primary compound in cigarettes, which can increase energy expenditure and suppress appetite. However, heavy smokers often experience metabolic changes that promote fat accumulation compared to non-smokers, commonly linked to other poor lifestyle habits, such as physical inactivity (Astharie, 2020). Similarly, alcohol consumption is positively correlated with body weight, BMI, and fat mass percentage, with significant p-values ($P < 0,05$) (Adinda, 2022). Alcohol contains high calories and influences fat metabolism in the body. When alcohol is consumed, the liver prioritizes metabolizing alcohol over fat and carbohydrates, inhibiting fat burning and leading to increased fat storage. Consequently, individuals who frequently consume alcohol tend to have a higher fat mass percentage (Daniel, 2023).

CONCLUSION

Based on the research conducted, it can be concluded that individuals with higher levels of physical activity tend to have a lower percentage of body fat mass, while a sedentary lifestyle contributes to increased body fat mass. Physical activity plays a critical role in weight management and body composition. Studies have demonstrated that greater physical activity levels are associated with a reduced percentage of body fat mass, highlighting the importance of regular exercise in promoting health and preventing obesity.

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