

The Relationship between Physical Activity and Fat Percentage Towards Probable Indicators of Sarcopenia in the Elderly in the Working Area of the Sungai Selan District Public Health Center

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ABSTRACT

Sarcopenia is a geriatric syndrome characterized by a decline in muscle mass and strength, commonly occurring among the elderly and associated with an increased risk of falls, disability, and reduced quality of life. Factors influencing the development of sarcopenia include low levels of physical activity and high body fat percentage. Therefore, this study aimed to analyze the relationship between physical activity and body fat percentage with probable sarcopenia indicators among older adults in the working area of Sungai Selan Health Center. This research employed a cross-sectional design with consecutive sampling of participants aged over 50 years. Data were collected using the SARC-F questionnaire to assess sarcopenia, the IPAQ Short Form to measure physical activity, and Bioelectrical Impedance Analysis (BIA) to determine body fat percentage. The data were analyzed using SPSS through bivariate correlation tests. The results showed a significant relationship between physical activity level and body fat percentage, with probable sarcopenia indicators among the elderly in the working area of Sungai Selan Health Center.

INTRODUCTION

Amount resident age carry on will the more Lots If number hope life Keep going increase. People aged 60 years to on considered of carrying on age by the World Health Organization (WHO). Continued age is the group demographics of people who have reached the end of the life functional range. While that, someone considered carry on age If has aged six tens year to on according to the Constitution Number 13 of 1998 concerning Welfare Carry on Age. Life expectancy in Indonesia and throughout the world is influenced by progress in the field of health and related fields (Pusdatin, K., 2022). Projections improvement amount resident 60 years old to on globally from 1.4 billion in 2020 to 2.1 billion in 2050 will occur in 2030. According to the Central Statistics Agency (2021), eight provinces in Indonesia will own structure marked demographics with a proportion resident carry on high age, namely exceeding 10%.

Structural changes that occur as a consequence of aging include gradual weakening of muscles, slowing down of muscle function, and loss of muscle mass in general. Cannot avoid that everyone in the end will die as a consequence from change physiological that are not inevitable changes caused by aging. Several physiological processes, including a decline in cell number, tissue protein damage, atrophic network, slowing down the rate of metabolism, loss of body fluid, and abnormal calcium metabolism, trigger the aging process. According to Park and Yeo (2013), the phenomenon physiological they can cause musculoskeletal dysfunction, endocrine problems, immune system disorders, neurological disorders, and cardiopulmonary system disorders.

An increasing trend of sarcopenia has appeared because of the increasing percentage of elderly people aging in Indonesia, which is accompanied by improved health and well-being of the population. As a result, aging, mass, and functional muscle in a way experience a decrease, a known condition as sarcopenia, namely progressive abnormalities in muscles linked frame with improvement risk of falling (Setiorini A., 2021 in Cruz-Jentoft AJ et al). Implications physical and economic from sarcopenia are also substantial. Sarcopenia is associated with improvement problem health problems, including mobility disturbance, increased risk of falls and broken bones, difficulty performing daily tasks, and increased prevalence of cardiovascular disease, respiratory disorders, cognitive, and similar conditions. Although important, muscles account for around half of the body's mass (Aryana, IGPS, 2021).

By increasing mitochondrial function, lowering cytokine inflammation, increasing the amount of muscle cells, and improving muscle capillarity, exercise physiques reduce muscle mass and inhibit muscle function. As they increase age, the body We experience change in composition, with more lean mass, fat-free, and more Lots fat mass as a result. Extra fat accumulation in the body is characteristics typical obesity. Strength muscle and insulin sensitivity both reduce when there is excess fat to cover emptiness in the muscles (Suhada et al. 2021).

Yamada et al. found that sarcopenia seldom occurred in Korea (6.3% of men and 4.1% of women), but osteoarthritis seldom occurred in Hong Kong (12.3% of men and 7.6% of women). By using EWGSO criteria, research

previously in Taiwan found that 18.6% of women and 23.6% men experience sarcopenia with age (Vitriana, N., Defi, IR, Irawan, GN, & Setiabudiawan, B., 2016). Research results. This is contradictory to findings. The SARC-F questionnaire was used as a diagnostic tool for sarcopenia. This approach is very specific and can detect sarcopenia at the beginning of the stage. Naseeb et al. (2017) noted that impedance bioelectric analysis (BIA) is an approach that can be reliable and easily used to evaluate mass muscles. Characteristics, anthropometry, and expectations of life in Taiwan's border population are similar with population in Indonesia when considering ethnicity, genetics, body size, lifestyle, and background (Vitriana et al, 2016; Chen et al, 2016; Chen et al, 2014). As a result, the population functions as an indicator to evaluate the mass status of muscles in the elderly. Cho et al. (2022) and Wiśniowska-Szurlej et al. (2021) found that strength grip hand (HGS) is a fast, easy, and cheap way to detect potential sarcopenia.

More Good sarcopenia has been found since early, so that action can be taken to prevent it before it arrives. Research shows that action to avoid decline in muscle mass and function can be done until age 60 years. For more understand sarcopenia, research will see a correlation between sarcopenia score, level of activity, and body fat percentage. More Lots study epidemiology and planning comprehensive handling, which must be covers method prevention sarcopenia, can use findings from this study as a stepping stone. Remembering the limit value obtained from studies on the population of the elderly in China, Hong Kong, Japan, Singapore, South Korea, Taiwan, and Thailand, there are possible differences in tribe, culture, lifestyle, and social status economy, so testing clinical sarcopenia in Indonesia using AWGS 2019 and EWGSOP cannot be done.

Based on the description above, the withdrawal formulation problem is whether there is a connection between sarcopenia score, physical activity, and mass muscle, as well as strength muscles, at the age of carrying on in the work area. Sungai Selan Health Center is located in Sungai Selan District, Central Bangka Regency, Bangka Tengah Province. Bangka Belitung Islands. Study. The aim for now is to connect the SARCF score, physical activity, physique, fat percentage, muscle mass, and strength at age.

LITERATURE REVIEW

Muscle Mass

Network software called mass muscle plays an important role in supporting the body's activity, maintaining posture, as well as produce movement. In a general way, the body has three main network muscles, namely smooth muscles found in internal organs such as intestines and blood vessels, the heart that forms a layer of the heart, and skeletal muscles attached to bones, as well as comprising about 30-40% of the total body mass (Hasibuan, 2022). Muscles frame Alone arranged in a complex from Lots myofibrils that form cell muscle or myofiber. Each myofiber own sarcomere as the smallest functional unit. A collection of myofibers joins to form fascicles, and some fascicles join to form a network muscle in a way whole. The whole structure is coated by a

matrix, and extracellular functions protect and support the network (Mukund & Subramaniam, 2019).

The formation process of the muscle frame started from the paraxial mesoderm, namely, the layer of embryonic myogenic cells (McCuller, 2023). Cells experience division and produce myoblasts, which then join to form myotube nucleated many. Myotube: This produces various contractile proteins like actin, myosin, troponin, and tropomyosin, which then form muscle fibers. In a gradual, muscle frame develop become the segments called somitomeres, which also form structural muscles in the head, neck, and limbs.

Review About Sarcopenia

The term sarcopenia originates from Greek, namely sarc, which means muscles, and penia, which means loss. This term first introduced by Rosenberg in 1989 For describe decline mass muscle in a way gradually due to the aging process (Santilli et al., 2014). With the development of knowledge, various international organizations have given a more comprehensive definition of sarcopenia. According to the European Working Group on Sarcopenia in Older People (EWGSOP), sarcopenia is marked by a decline in mass and force, resulting in a decrease in walking speed. Diagnosis of sarcopenia can be enforced if the third indicator, the mass, power, and performance of muscles, experience a significant decline. Meanwhile, ESPEN-SIG defines sarcopenia as a condition of decline, mass and force muscles being measured via speed parameters walking, while the International Working Group on Sarcopenia (IWGS) emphasizes that sarcopenia is the disappearance of mass muscles that are often accompanied by improvement body fat mass. Condition: This not only affects physical function, but also has an impact on the health of the elderly in a way overall. According to Chen et al. (2014), sarcopenia increases the risk of falls, disability, hospitalization, decline in quality live, and mortality.

METHODOLOGY

Study This use cross-sectional design to analyze connection between level activity physical, mass muscle, and body fat percentage to sarcopenia in the elderly. Research was conducted at Sungai Selan Health Center during September 20–October 20, 2024. Population study is elderly aged 50 years with a consecutive sampling technique, namely all respondents who met the inclusion criteria were included during the research. The criteria for inclusion cover willingness to become respondents and age >50 years, whereas the exclusion criteria cover chronic diseases such as stroke, COPD, heart failure, kidney failure, and musculoskeletal disorders.

Instrument study covering the SARC-F questionnaire for measuring sarcopenia, IPAQ Short Form for measuring physical activity, Bioelectrical Impedance Analysis (BIA) for measuring muscle mass and body fat, as well as a Hand Dynamometer for measuring hand grip strength. Data collection was carried out through interviews and measurements directly with respondents. Data was analyzed quantitatively using SPSS, with univariate analysis to describe the characteristics of every variable and bivariate analysis to see the connection between variables using the correlation test. Research results

expected can give a description of the influencing factors to risk sarcopenia in the elderly in the work area, Sungai Selan Community Health Center.

RESULTS AND DISCUSSION

From September 20th to October 20, 2024, researchers from the Community Health Center Sungai Selan District came to the facility to do research. A total of 102 participants fulfilled all the criteria for inclusion and exclusion used as subject study.

Table 1. Characteristics Subject Study

Variables	Frequency	Mean
Gender		
Man	41(40.19%)	
Woman	61(59.80%)	
Age		58.41 \pm 7.464
50-60	64(62.74%)	
60-70	26 (25.49%)	
70-80	12 (11.7%)	
Muscle Percentage (%)		28.8 \pm 3.14 (Min: 23.5 Max: 42.5)
Low	40 (39.21%)	
Normal	48 (47.06%)	
Tall	14 (13.72%)	
Fat Percentage (%)		24,304 \pm 7.52 (Min:4.0 Max:38.1)
Not enough	21 (20.59%)	
Enough	55 (53.92%)	
Obesity	26 (25.49%)	
Strength Muscle (Kg)		17,262 \pm 6.79 (Min: 4.8 Max: 57.5)
Low	82 (80.39%)	
Normal	20 (19.60%)	
Activities Physical (MET-Minutes/ week)		7138.3 \pm 72094.14 (Min: 0 Max: 351330)
Light	8 (7.84%)	
Currently	17 (16.66%)	
Heavy	77 (75.49%)	
SARCF		1.1 \pm 1.57 (Min: 0 Max: 10)
Probable Sarcopenia	9(8.82%)	
No Sarcopenia	93 (91.18%)	

Table 2. Kolmogrov -Smirnov Test

Variables	<i>P value</i>
Fat Percentage	<0.001
Activities Physique	<0.001
Strength Muscle	0.200
Percentage Muscle	0.024
SARCF Scoring	<0.001

Table 3. Statistical Test

Variables	Fat Percentage		Activities Physique		Strength Muscle		Percentage muscle		SARCF Scoring	
	r value	p-value	r value	p-value	r value	p-value	r value	p-value	r value	p-value
Fat Percentage			-0.016	0.876	-0.057	0.569	-0.778	<0.001	-0.089	0.371
Activities Physique	-0.016	0.876			0.098	0.328	-0.034	0.738	-0.164	0.099
Strength Muscle	-0.057	0.569	0.098	0.328			0.055	0.586	-0.329	<0.001
Percentage Muscle	-0.778	<0.001	-0.034	0.738	0.055	0.586			-0.087	0.386
SARCF Scoring	-0.089	0.371	-0.164	0.099	-0.329	<0.001	-0.087	0.386		

Characteristics of subjects in the research. This shows that a big subject study various sex women, namely 61(59.80%), while various sexes of males 61 (59.80%). Data obtained showed that the average age subject study namely 58.41, with the highest frequency in the range of 60-70 years, namely 64(62.74%) and the smallest frequency in the range age 70-80 years namely 12 (11.7%).

In the research, the results obtained average activities physique subject study, namely 7138.3 MET-Minutes/week, with the most own activities physique heavy, namely 77 (75.49%), and the least own activities light, namely 8 (7.84%). This is regarding the subject study of the majority eye his livelihood as farmers and workers in the palm oil factory. Sedentary activities include sitting, lying down, and minimal activity. movement can cause a decrease in the quantity and quality of muscle and also increase body fat. In the results analysis obtained No there is there is no significant connection to the strength of muscles, SARCF score, and percentage of muscles. Findings study This strengthens findings Widyastuti (2021), who found that exercise strength, including lift load, is one of the activity the most effective physical activities for increasing mass and force in muscles. This is it may also be caused by the fact that surveys only catch a limited amount of data. Similarly, the combination of accelerometers and instruments evaluation performance physique has proven more successful than depending only on questionnaires in research conducted

by Hall (2017). In this research, the obtained existence correlation positive and significant between activities physique with sarcopenia indicators.

The subject's fat percentage research majority, including group enough as many as 55 (53.92%). As the age increases, the fat increases. Decreased mass, slim body, including fewer bones, and missing muscle mass, caused by the natural aging process, results from excess body fat. Research conducted by Widyastuti and colleagues in 2021. The results show a negative correlation between fat percentage and muscle mass, which shows that when fat percentage increases, the percentage of muscle decreases ($p < 0.001$). Findings are consistent with findings of Widyastuti (2021), who found a negative connection between % weaknesses body and mass muscles. The reason is the accumulation of fat in the muscles of the body. Aging, lack of physical exercise, and sex steroid imbalance are factors that cause fat accumulation in the muscle framework. Research conducted by Hamrick et al. in 2016. The decline in glucose for anabolic muscle is affected by insulin resistance, which develops along increase age and is associated with fat (Morley et al., 2014).

Indicator of sarcopenia in research. This is already good enough. Analysis results obtained a significant relationship between the strength of the muscle with SARCF Score, with a negative correlation, namely, the higher the strength of the muscle, the smaller the increase in the SARCF score ($p < 0.001$). Obtained a positive correlation between the strength of the muscle with presentation muscle. However, the results show no significant relationship ($p < 0.586$). Furthermore, obtained negative correlation was obtained between the presentation muscle with SARCF Score, but hungan No significant difference ($p < 0.386$). However, the percentage strength of the muscle showed probable sarcopenia of 82 (80.39%). Meanwhile, the SARCF questionnaire shows probable sarcopenia in as many as 9 (8.82%). Different Again, with presentation muscle showed probable sarcopenia of 40 (39.21%). This is in line with research Candidate (2023) shows possible sarcopenia results with measurement strength, ganggang hands, and performance physique. According to AWGS 2019, the number of cases was 69.9%. Furthermore, possible sarcopenia was confirmed. using SARCF modality as much as 6%. The study mentioned that there is sufficient diagnostic value in uncovering the parameters recommended by AWGS 2019. This is due to the fact that AWGS 2019 uses limits derived from the study of social economy, culture, style of life, and ethnicity practiced in Taiwan, Thailand, China, Hong Kong, Japan, Singapore, and South Korea Kandinata et al., 2023). On the other hand, questionnaires and techniques filtering other cause Lots subjectivity. Total mass of muscles correlated significantly with the strength of muscles being measured with dynamometer hand in the study. In this research, power is limited to the hands, but mass muscle shows the amount overall muscle in the body.

CONCLUSIONS AND RECOMMENDATIONS

There is a significant connection between fat percentage and muscle percentage with direction correlated negative. While correlated fat percentage was negative with each probable indicator (strength, muscle, and SCORE

SARCF), but No significant statistical difference. Activity physique correlated positively with muscle strength, whereas it correlated negatively with skeletal muscles and SCORE SARCF, but No significant difference in the way statistics. There is a significant connection between strength muscle with SCORE SARCF; meanwhile, strength muscle correlated positively with presentation muscles. However, no significant difference in the way statistics. SCORE SARCF correlates negatively with presentation muscle. However No significant difference in the way statistics. The need for assessment of parameters recommended by AWGS 2019 for implementation in Indonesia.

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