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SARCOPENIA IN ELDERLY PATIENTS: WHAT ARE THE CONTRIBUTING RISK FACTORS?

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ABSTRAK

Sarkopenia adalah kondisi berkurangnya massa otot akibat penuaan yang terjadi secara bertahap. Proses terjadinya sarkopenia belum dipahami seutuhnya. Banyak faktor yang berisiko menyebabkan sarkopenia, seperti usia, jenis kelamin, dan aktivitas fisik. Deteksi dini dengan kuesioner SARC-F perlu dilakukan agar dapat mencegah terjadinya sarkopenia. Penelitian ini merupakan penelitian deskriptif observasional dengan pendekatan cross sectional secara total sampling untuk melihat gambaran sarkopenia beserta faktor risiko pada pasien usia lanjut di Poliklinik Geriatri RSUP Dr. Mohammad Hoesin Palembang. Data primer diambil melalui wawancara menggunakan kuesioner, lalu dianalisis secara univariat. Sebanyak 48,4% usia lanjut di Poliklinik Geriatri RSUP Dr. Mohammad Hoesin Palembang mendapat hasil sarkopenia. Pasien dalam kelompok sarkopenia paling banyak berusia 70-79 tahun (41,9%), perempuan (64,5%), status menikah (58,1%), riwayat pendidikan terakhir SD (32,3%), pernah bekerja (58,1%), komorbiditas ringan (58,1%), aktivitas fisik sedentary (74,2%), dan berisiko malnutrisi (54,8%).

ABSTRACT

Sarcopenia In Elderly Patients: What Are The Contributing Risk Factors?. Sarcopenia in Elderly Patients: What are the Contributing Risk Factors?. Sarcopenia is the gradual loss of muscle mass associated with aging. The process by which sarcopenia occurs is not fully understood. Many factors are at risk of causing sarcopenia, such as age, gender, and physical activity. Early detection with the SARC-F questionnaire is needed to prevent sarcopenia. This study is a descriptive observational study with a cross-sectional approach with total sampling to see the description of sarcopenia and risk factors in elderly patients at the Geriatric Polyclinic of Dr. Mohammad Hoesin Hospital Palembang. Primary data were collected through interviews using a questionnaire, and then analyzed univariately. A total of 48.4% of the elderly at the Geriatric Polyclinic of Dr. Mohammad Hoesin Hospital Palembang had sarcopenia findings. Patients in the sarcopenia group were mostly aged 70-79 years (41.9%), female (64.5%), married (58.1%), history of primary education (32.3%), had worked (58.1%), had mild comorbidities (58.1%), sedentary physical activity (74.2%), and at risk of malnutrition (54.8%).

INTRODUCTION

All countries face the enormous challenge of preparing their health and social systems for demographic change.[1] As life expectancy increases, so does the health and well-being of the population. This may lead to an increase in the elderly population.[2] According to Presidential Decree No. 88 of 2021, an elderly person is someone who is over 60 (sixty) years old.[3] The number of elderly people in the world will be 1 billion in 2020 and 1.4 billion in 2030. Since 2021, the proportion of elderly people in Indonesia has reached 10%, which means that it has stepped on the old population structure.[2] Data from the Central Bureau of Statistics states that the number of elderly people in 2020 was 27 million (10%) and will continue to increase to 40 million (13.8%) in 2035.[4] The number of elderly people in South Sumatra in 2022 based on the Central Bureau of Statistics is about 9.35% of the total population or 822,910 people.[2,5] As people age, they become more vulnerable.[1]

Aging is a natural process in old age in which damage of various molecular and cellular types accumulates over time. Decreased physical and mental abilities and increased risk of disease leading to death are signs of aging.[4] Almost all organ systems are involved in these physiological changes.[6] One part of the body that is affected by aging is muscle. The aging process is associated with a loss of muscle mass and strength known as sarcopenia.[7]

Sarcopenia is a skeletal muscle disorder that develops gradually and progressively.[8] The global prevalence of sarcopenia in older patients is estimated to be 10%.[9] Asia has a higher prevalence of sarcopenia than other continents. The Asian Working Group for Sarcopenia (AWGS) reported that the prevalence of sarcopenia in Asian men and women was 9.6-22.1% and 7.7-21.8%, respectively. In the elderly in Indonesia, the prevalence of sarcopenia based on SARC-F is 17.6%. The prevalence of sarcopenia was found to be lowest in the Sundanese elderly (8.2%).[10] Sarcopenia can lead to an increased incidence of falls, functional decline, frailty, and even death.[8] In Indonesia, frailty has become a major health problem among the elderly. Frailty is a state of excessive vulnerability to stressors due to the decline of age-related physiological reserves in all organ systems, making it difficult to maintain or restore homeostasis.[11]

Research conducted by Harimurti et al. found that one in five older people in Indonesian society suffer from sarcopenia, and factors associated with a high risk of sarcopenia are female gender, dependent functional capacity, frailty, and a history of falls.[10] The high prevalence of sarcopenia and the lack of research on sarcopenia in the city of Palembang make researchers interested in discussing the description of sarcopenia in elderly patients at the Geriatric Polyclinic of Dr. Mohammad Hoesin Hospital Palembang to see the factors that put them at risk for sarcopenia.

METHOD

This study is a descriptive observational study with a cross-sectional method that aims to determine the prevalence of sarcopenia and the frequency distribution of risk factors in old age. Respondents were interviewed using a total sampling technique in all elderly patients who sought treatment at the Geriatric Polyclinic of Dr. Mohammad Hoesin Hospital Palembang from October 4, 2023, to November 4, 2023. The interview was conducted after the patient agreed to the given informed consent and the patient also did not receive any other treatment so that this research would not harm the patient.

Patients with sarcopenia in this study were determined by the total score of the SARC-F questionnaire, which has high sensitivity and relatively good diagnostic accuracy.[12] The SARC-F

questionnaire has 5 component questions with a score of 0-2 for each question. A score of 0 means not difficult, a score of 1 means somewhat difficult, and a score of 3 means very difficult, requires assistance, or cannot be done. In the 5th question (falls) there is a difference in the meaning of the score, namely a score of 0 means no falls, a score of 1 means falls 1-3 times, and a score of 2 means falls 4 or more times. If the total score on the SARC-F questionnaire was ≥ 4, the patient was classified as having sarcopenia.

The sociodemographic questionnaire was used to obtain data on the patient's age, gender, marital status, educational history, and previous occupation to see the patient's employment history. These factors were taken to see the influence of the patient's sociodemographic on the condition of sarcopenia. Patients were also interviewed using other questionnaires to assess comorbidities, physical activity, and nutritional intake, which are also risk factors for sarcopenia. Patients' comorbidities were assessed using the Charlson Comorbidity Index (CCI) questionnaire with outcome groupings of no comorbidity (score 0), mild (score 1-2), moderate (score 3-4), and severe (score ≥5). Patients' physical activity was assessed using the Physical Activity Scale for the Elderly (PASE) questionnaire with outcome groupings of sedentary (score 0-40), light (score 41-90), and moderate-severe (score >90) physical activity. The Mini Nutritional Assessment Short-Form (MNA-SF) questionnaire was used to assess patients' nutritional intake with outcome grouping of malnutrition (score 0-7), at risk of malnutrition (score 8-11), and normal nutrition (score 12-14). The data obtained were analyzed by univariate analysis using the SPSS application.

RESULTS

In this study, the total number of elderly patient respondents who came for treatment at the Geriatric Clinic was 64 individuals. The distribution of respondent characteristics in this study can be found in Table 1.

Table 1. Distribution of respondent characteristics

Characteristics	n	%
Sarcopenia		
Non-Sarcopenia	33	51.6
Sarcopenia	31	48.4
Age		
60-69 years	26	40.6
70-79 years	28	43.8
≥80 years old	10	15.6
Gender		
Male	19	29.7
Female	45	70.3
Marital Status		
Unmarried	1	1.6
Married	46	71.9
Divorced	0	0
Widow/Widower	17	26.6
Education History		
Not in School	2	3.1
Elementary School	14	21.9
Junior High School	7	10.9
Senior High School	16	25.0
College	25	39.1

Work History		
Not Working	21	32.8
Work	43	67.2
Comorbidities		
None (Score 0)	4	6.3
Mild (Scores 1-2)	43	67.2
Medium (Scores 3-4)	11	17.2
Severe (Score ≥5)	6	9.4
Physical Activity		
Sedentary (Score 0-40)	32	50.0
Mild (Score 41-90)	24	37.5
Moderate-Severe (Score >90)	8	12.5
Nutritional Status		
Malnutrition (Score 0-7)	5	7.8
At risk of malnutrition (Score 8-11)	30	46.9
Normal (Score 12-14)	29	45.3

Table 2 shows the distribution of responses to each question on the SARC-F questionnaire by all 64 respondents to see the conditions most experienced by patients.

Table 2. Distribution of SARC-F questionnaire results

Questions	Answer					
	0		1		2	
	n	%	n	%	n	%
Strength How much difficulty do you have in lifting and carrying 5 kg?	35	54.7	11	17.2	18	28.1
Assistance walking How much difficulty do you have walking across a room?	38	59.4	20	31.3	6	9.4
Rise from a chair How much difficulty do you have transferring from a chair or bed?	23	35.9	35	54.7	6	9.4
Climb stairs How much difficulty do you have climbing a flight of 10 stairs?	16	25.0	25	39.1	23	35.9
Falls How many times have you fallen in the past year?	51	79.7	13	20.3	0	0

In this study, respondents were divided into two major groups, non-sarcopenia and sarcopenia. The distribution of respondents with sarcopenia based on age, gender, marital status, education history, employment history, comorbidities, physical activity, and nutritional intake is shown in Table 3.

Table 3. Distribution of sarcopenia

Distribution	Non-Sarcopenia		Sarcopenia		Total	
	n	%	n	%	n	%
Age						
60-69 years	17	51.5	9	29.0	26	40.6
70-79 years	15	45.5	13	41.9	28	43.8
≥80 years old	1	3.0	9	29.0	10	15.6
Gender						
Male	8	24.2	11	35.5	19	29.7
Female	25	75.8	20	64.5	45	70.3
Marital Status						
Unmarried	0	0	1	3.2	1	1.6
Married	28	84.8	18	58.1	46	71.9
Divorced	0	0	0	0	0	0
Widow/Widower	5	15.2	12	38.7	17	26.6
Education History						
Not in School	1	3.0	1	3.2	2	3.1
Elementary School	4	12.1	10	32.3	14	21.9
Junior High School	4	12.1	3	9.7	7	10.9
Senior High School	8	24.2	8	25.8	16	25.0
College	16	48.5	9	29.0	25	39.1
Work History	8	24.2	13	41.9	21	32.8
Not Working						
Work	25	75.8	18	58.1	43	67.2
Comorbidities	3	9.1	1	3.2	4	6.3
None (Score 0)						
Mild (Scores 1-2)	25	75.8	18	58.1	43	67.2
Medium (Scores 3-4)	2	6.1	9	29.0	11	17.2
Severe (Score ≥5)	3	9.1	3	9.7	6	9.4
Physical Activity	9	27.3	23	74.2	32	50.0
Sedentary (Score 0-40)						
Mild (Score 41-90)	18	54.5	6	19.4	24	37.5
Moderate-Severe (Score >90)	6	18.2	2	6.5	8	12.5
Nutritional Status	2	6.1	3	9.7	5	7.8
Malnutrition (Score 0-7)						
At risk of malnutrition (Score 8-11)	13	39.4	17	54.8	30	46.9
Normal (Score 12-14)	18	54.5	11	35.5	29	45.3
Total	33	100	31	100	64	100

DISCUSSION

From the results of the study, the majority of the respondents were elderly without sarcopenia with a total of 33 people (51.6%). This result is consistent with the results of previous research found that the majority of respondents were not sarcopenia as many as 150 people (54.5%).[13] Most of the elderly in this study were aged 70-79 years with a total of 28 people (43.8%), whereas Wardhana, et al. reported the results of most of the elderly aged 60-69 years as many as 232 people (75.3%).[14] These different results may be due to differences in location so that the characteristics of the population are different and also the number of samples obtained is greater. The results of this study showed that most of the respondents were elderly women as many as 45 people (70.3%). Research conducted by Sumandar, et al. and Harimurti, et al. also found that the largest number of respondents were elderly women, namely 175 people (63.6%) and 224 people (58%).[10,13] In this study, it was also found that the majority of elderly people were married as many as 46 people (71.9%). Widajanti, et al. also found that the majority of the elderly were married with a total of 178 people (57.8%).[15] Most of the elderly from this study have a history of college education with a total of 25 people (39.1%). This result is different from the research by Sumandar, et al. whose results show that most of the elderly have a history of senior high school education with a total of 112 people (40.7%).[13] In this study, most of the elderly had a history of working as many as 43 people (67.2%) with the majority working as civil servants. This result is different from the data from the Central Bureau of Statistics, which states that most of the elderly work in agriculture.[2] The different results may be due to the location in this study, which does not have much agricultural land compared to the rest of Indonesia. The results of this study showed that the majority of the elderly had mild comorbidities with a total of 43 people (67.2%). These results differ from research by Wardhana, et al. who found that the majority of elderly people had moderate comorbidities with a total of 153 people (49.7%).[14] The elderly in this study had the most sedentary physical activity with a total of 32 people (50%). These results are consistent with research by Curcio, et al. who found the average elderly PASE score to be 31.4, which is classified as sedentary physical activity.[16] Most of the elderly in this study were at risk for malnutrition with a total of 30 people (45.3%). These findings are consistent with research by Alva, et al. who found that most elderly patients were at risk of malnutrition with a total of 65 people (72.2%).[17]

This study showed that the majority of respondents found it somewhat difficult to get up and move from a chair or bed a total of 35 respondents (54.7%) and found it very difficult or impossible to climb 10 stairs with a total of 23 respondents (35.9%). As we age, skeletal muscle homeostasis is disrupted, resulting in an imbalance between the anabolic and catabolic processes of protein synthesis. Muscle undergoes changes in the form of a decrease in the size and number of type II muscle fibers. Satellite cells, which are useful for replacing and repairing damaged muscle fibers, also decrease. Nerve degeneration also causes muscle strength and size to decrease, making it difficult for patients to stand up, move around, and climb stairs.[18]

The results showed that sarcopenia was most prevalent in the 70-79 age group at 41.9%, followed by the 60-69 and ≥80 age groups. These results are consistent with the research by Handajani, et al. which showed that 52.2% of elderly people aged 70 years and above experienced sarcopenia.[19] Since mid-adulthood and age 60 years and above, muscle mass is lost approximately 3 - 8% of muscle per decade.[20] The results of this study are consistent with the literature which states that the middle and very old age groups have a much higher risk of sarcopenia than young age groups.[19]

In this study, it was found that most sarcopenia was experienced by older women (64.5%) compared to older men (35.5%). Research by Harimurti, et al. obtained similar results to this study, namely sarcopenia occurred mostly in the female sex as many as 45 people (66.2%).[10] Another study by Sumandar, et al. also showed the same results, namely more female respondents affected by sarcopenia compared to male respondents, as many as 70 people or 56% of female respondents.[13] The female gender is associated with a three times higher risk of sarcopenia than the male gender because elderly women have less muscle mass and muscle strength compared to elderly men. According to Harimurti et al, this difference may be due to less physical activity in older women.[10] Menopause can also alter body composition and fat distribution, resulting in decreased lean body mass in women, along with increased body weight, fat mass, and central fat deposition. This is characterized by a tendency to decrease muscle mass, leading to a higher incidence of sarcopenia in older women.[15]

This study shows that patients with sarcopenia are more likely to be married (58.1%) than divorced or never married. This result is consistent with the results of the research by Sumandar, et al, where 119 people, or 95.2% of patients who were positive for sarcopenia were married.[13] Until now, no research has been found that discusses in detail the relationship between marriage and the incidence of sarcopenia. In this study, patients with sarcopenia were most likely to have an elementary school education (32.3%). Research conducted by Sumandar, et al. showed different results, namely a history of senior high school education (43.8%) had the most positive results for sarcopenia. Based on previous research, education is associated with sarcopenia in people living in China and Vietnam.[13] Education level is associated with the incidence of sarcopenia because the lower the socioeconomic conditions, the higher the likelihood of experiencing sarcopenia.[21] This situation may lead to sarcopenia due to a lack of knowledge about nutrition, physical activity, and other risk factors for sarcopenia. This study showed that older patients with sarcopenia were more likely to be respondents who had previously worked (58.1%). The majority of elderly people are currently not working (50.5%). Patients who used to work, are currently not working. This non-working status results in decreased activity in older adults, putting them at higher risk for sarcopenia.[21]

Based on the results of this study, the majority of sarcopenia occurred in respondents with CCI 1-2 or older patients with mild comorbidities (58.1%). Previous research by Wardhana, et al. found that most elderly with sarcopenia had mild-moderate comorbidities (CCI 1-4) (58.9%).[14] Many types of diseases are found in old age. In this study, based on the CCI questionnaire, the most common diseases in patients with sarcopenia were connective tissue disease, cerebrovascular disease, and peptic ulcer. When multiple diseases occur together, the higher the consumption of nutrients, especially by muscles, so the higher the CCI score, the lower the muscle area in the elderly.[22] Acute conditions, such as hospitalization, or chronic conditions characterized by physical inactivity, such as cancer, diabetes, and peripheral arterial disease, appear to accelerate the development of muscle atrophy.[16] This study was conducted on outpatients so that the comorbidities of the patients obtained were mostly mild.

In this study, the highest percentage of sarcopenia patients were elderly with sedentary physical activity with a total of 23 patients (74.2%). In a study conducted by Curcio, et al, the average score of patients with sarcopenia was 40.2, which was also categorized as sedentary physical activity.[16] According to the results of research by Sumandar, et al, as many as 80 sarcopenia patients (54.1%) had mild physical activity when measured by the Physical Activity Level (PAL). These results suggest that the majority of sarcopenia patients engage in low levels of physical activity.[21] Sedentary

physical activity leads to faster muscle loss by increasing the amount of deep adipose tissue and visceral fat, which increases protein breakdown due to catabolic effects on muscle.[23] Physical inactivity is a potential target for intervention to slow the progression of age-related muscle loss.[24] A sedentary lifestyle leads to greater and faster muscle loss than an active lifestyle. Physical inactivity can adversely affect muscle anabolism and catabolism and determine oxidative stress, muscle inflammation, muscle denervation, and changes in contraction-excitation coupling leading to progressive fiber loss and fiber atrophy.[16]

This study shows that sarcopenia is prevalent in elderly patients at risk of malnutrition with a total of 17 individuals or as much as 54.8%. In contrast to the results of the research by Harimurti, et al, which state that the elderly with the greatest sarcopenia have a good nutritional status with a total of 58 people (85.3%).[10] Recent research has shown that older adults who are malnourished have lower myoglobin levels and are therefore more likely to have sarcopenia.[22] Muscle mass changes with age. It is estimated that from mid-adulthood onward, approximately 3-8% of muscle is lost per decade, and this rate increases after the age of 60.[20] A person who is malnourished is likely to be deficient in dietary nutrients such as protein, vitamin D, calcium and acid-base balance, which play a role in maintaining muscle mass, strength, and physical performance. Another possible explanation is that malnourished individuals have reduced muscle protein synthesis. Reduced nutrient intake, impaired protein synthesis, acute injury, and immobilization can lead to sarcopenia, a decrease in the body's protein reserves.[15]

CONCLUSIONS

The study revealed that individuals with sarcopenia were predominantly aged 70-79, female, married, with a primary school education, had previous employment, had mild comorbidities, engaged in sedentary physical activity, and were at risk of malnutrition. As a result, it is recommended that elderly patients undergo screening for early detection of sarcopenia. Preventative measures for sarcopenia include increasing physical activity and improving nutritional intake. Future research should explore various descriptive and analytical aspects of sarcopenia, as there is still limited research on the topic in Indonesia.

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