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Study on the Incidence of Stroke-Related Sarcopenia in Hospitalized Male Patients

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Abstract

Objective To observe and analyze the incidence of sarcopenia in male patients with stroke-related sarcopenia. **Methods** From June 2018 to June 2019, the muscle mass of 45 patients who had recovered from stroke, who underwent DXA testing at Linyi People's Hospital during the period from June 2018 to June 2019. During the same period, 50 healthy subjects served as the control group to explore the muscles of stroke patients. **Results** The incidence of stroke-related sarcopenia was higher. The SMI, grip strength, upper and lower limb muscle mass, and calf circumference were significantly lower than those of patients with normal skeletal muscle mass and the control group ($P < 0.05$). **Conclusion** Stroke patients have a higher incidence of sarcopenia, and the occurrence of sarcopenia should be prevented during the recovery process.

Subject Areas

Cardiology, Geriatrics

Keywords

Sarcopenia, Stroke, Incidence

1. Introduction

The concept of stroke-related sarcopenia has been proposed in recent years. The disease is considered to be different from age-related sarcopenia. Studies have found that muscle structural changes begin to appear within a few hours after stroke, and then muscle mass decreases rapidly [1]. Park *et al.* [2] conducted a large-scale survey of 3009 men and 4199 women and found a strong positive

correlation between stroke and sarcopenia. This study intends to investigate the incidence of stroke-related sarcopenia in hospitalized stroke patients recovering from stroke.

2. Objects and Methods

2.1. Research Objects

45 stroke male patients hospitalized in Linyi People's Hospital from June 2018 to June 2019 were set as the observation group, and 50 healthy men with physical examination at the same time period were selected as the control group. This study has been reviewed by the ethics committee of our hospital.

Inclusion criteria: 1) Patients who meet the diagnosis of stroke; 2) Patients who meet the diagnosis of sarcopenia.

Exclusion criteria: 1) Patients with other diseases; 2) Patients with long-term use of hormones and other drugs that cause sarcopenia.

Sarcopenia refers to the 2019 diagnostic criteria of the Asian Sarcopenia Working Group [3]: Dual-energy X-ray examination of male skeletal muscle mass index (SMI) < 7.0 kg/m^2, female SMI < 5.4 kg/m^2; male grip strength < 28 kg, female Grip strength < 18 kg; calf circumference: male < 34 cm, female < 33 cm.

2.2. Measurement Method

Use the Lunar dual-energy X-ray bone densitometer (DXA) from GE Company to measure the body muscle mass. After removing the metal objects worn by all patients, they lie supine on the measuring bed at room temperature and rest, and measure the muscle mass of the whole body according to the DXA procedure. A grip device (EH101, Xiangshan, China) was used to test the grip strength. The subject was in a standing position and the elbow extension was tested; if the subject could not stand independently, a sitting position was used for the test. Use the dominant hand or both hands to perform the test with the maximum force, at least 2 times, and select the maximum value.

2.3. Statistical Processing

Using SPSS22.0 statistical software, t-test or rank-sum test was used for comparison of measurement data between groups, and chi-square test was used for count data.

3. Results

A total of sarcopenia and pre-sarcopenia were detected in the observation group, and a total of sarcopenia and pre-sarcopenia were detected in the control group. The incidence of the observation group was significantly higher than that of the control group (see Table 1).

The SMI, grip strength, skeletal muscle mass of the upper and lower limbs, and calf circumference of the observation group of sarcopenia patients were significantly lower than those of non sarcopenia patients (see Table 2).

Table 1. The incidence of sarcopenia in the two groups.

	Cases	sarcopenia	pre-sarcopenia	non sarcopenia
Observation group	45	15	11	19
Control group	50	5	7	38
χ^2		7.76	1.68	11.26
P		0.005	0.20	0.001

Table 2. Comparison of basic data of the two groups of subjects ($\overline{x} \pm s$).

	Observation group			Control group		
	non sarcopenia	pre-sarcopenia	sarcopenia	non sarcopenia	pre-sarcopenia	sarcopenia
Age (years)	56.63 ± 12.73	59.27 ± 9.79	62.67 ± 7.56	54.16 ± 12.02	61.43 ± 6.40	57.60 ± 6.43[a]
SMI (kg/m^2)	8.04 ± 0.62	6.42 ± 0.68[a]	6.50 ± 0.36[a]	8.01 ± 0.62	6.62 ± 0.65[a]	6.60 ± 0.35[a]
Upper limb muscle mass (kg)	6.60 ± 0.98	4.54 ± 0.83[a]	5.01 ± 0.51[a]	6.37 ± 0.98	4.86 ± 0.70[a]	5.30 ± 0.38[a]
Lower limb muscle mass (kg)	17.34 ± 2.01	12.84 ± 2.19[a]	14.03 ± 1.33[a]	16.98 ± 1.88	14.01 ± 1.88[a]	14.36 ± 1.08[a]
BMI (kg/m^2)	27.40 ± 2.04	25.25 ± 2.30[a]	23.57 ± 2.51[a]	26.33 ± 2.98	25.63 ± 2.45	22.69 ± 1.89[a]
Grip strength (kg)	36.06 ± 10.64	36.46 ± 5.48	23.62 ± 9.46[ab]	36.97 ± 10.47	36.76 ± 7.29	25.44 ± 8.56[ab]
Calf circumference (cm)	37.37 ± 2.99	33.91 ± 3.07[a]	33.73 ± 2.67[a]	36.53 ± 2.79	34.36 ± 3.46	34.00 ± 2.45

[a]compared with patients with non-sarcopenia, $P < 0.05$, [b]compared with patients with pre-sarcopenia, $P < 0.05$.

4. Discussion

This study shows that the prevalence of sarcopenia is higher among stroke rehabilitation patients, which is significantly higher than that of the general population. Ryan *et al.* [4] studied 190 patients 6 months after the onset of stroke and showed that the prevalence of sarcopenia in stroke patients was between 14% and 18%. Jyunya *et al.* [5] conducted a study on 117 chronic stroke survivors 65 years of age or older, and detected a total of 60 sarcopenia patients, and found that sarcopenia patients are mainly knee extension weakness and ankle weakness. The assessment and intervention of skeletal muscle in patients with stroke sarcopenia should focus on the knee and ankle joints. Su *et al.* [6] found that the combined prevalence of stroke-related sarcopenia was 42%. In this study, the incidence of sarcopenia was 33.33%, and the incidence of pre-sarcopenia was 24.44%, which was higher than healthy people.

The study found that the number of motor units in patients with cerebral infarction began to decrease 4 hours after cerebral infarction, and the number of motor units in muscle tissue decreased significantly within 30 hours after cerebral infarction. The reason may be due to the synapses of the spinal cord alpha motor neurons that innervate the muscle was suppressed [7]. Deyne *et al.* [8] found that in contrast to the transition of the fiber type in elderly patients with sarcopenia from fast muscle contraction fibers to slow muscle contraction fibers, in stroke patients, slow muscle contraction fibers were observed to be fast muscle contraction dominated by anaerobic metabolism. The reverse transition of fiber MHC type II subtype, and the proportion of fast muscle contraction fiber

MHC type II is inversely proportional to the severity of gait defect. Matsushita *et al.* [9] showed that stroke-related sarcopenia seems to be a predictor of how male patients will engage in activities of daily living after recovery.

5. Conclusion

In summary, the incidence of stroke-related sarcopenia is relatively high, and it is not significantly affected by age, and has an important impact on the prognosis of patients. Therefore, it is necessary to pay special attention to the screening of sarcopenia for stroke rehabilitation patients in clinic.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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