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The Effect of Sarcopenia on Functional Recovery in Subacute Stroke Patient

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Objective

Stroke is a leading cause of disability which is usually caused by hemiplegia as a common neurologic complication. In hemiplegic patients, structural muscular changes followed by brain injury lead to rapid reduction of muscle mass. On the other hand, sarcopeniais characterized by muscle wasting and decline in strength and gait function. So initial presence of sarcopenia in stroke patients would have negative effect on functional recovery. Thus, the aim of this study is to investigate the effect of sarcopenia on functional recovery in subacute stroke patient.

Methods

Subacute stroke patients those who were referred to cardiocerebrovascular rehabilitation center were enrolled. At the day of referral, the patient diagnosed as sarcopenia were assigned to sarcopenia group. Sarcopenia was diagnosed according to the Asian Working Group on Sarcopenia and diagnostic criteria for sarcopenia consists of decreased Skeletal Muscle Index (SMI) (Men<7.00kg/m2, Women<5.70kg/m2) and unaffected side grip strength (Men<26kg, Women<18kg). And those without sarcopenia were assigned to non-sarcopenia group. All patients were able to walk independently without a brace or assistive devices. Both group received conventional stroke rehabilitation treatment for 3 weeks. All patients were evaluated at the day of referral and after 3 weeks of treatment. SMI, Body Mass Index and Skeletal Muscle Mass were measured using the Bioelectrical Impedance Analysis. Unaffected upper extremity grip strength was measured by a hand dynamometer. Gait speed was measured by 4 Meter Walking Test (4MWT). Gait endurance was measured by 6 Minutes Walking Test (6MWT). Functional status was measured by Timed Up and Go test (TUG) and Modified Barthel Index (MBI).

Results

Twenty patients were enrolled, 8 patients were assigned to sarcopenia group and 12 patients were assigned to non-sarcopenia group. There were no significant differences in baseline characteristics (Table 1). After 3 weeks of treatment, all groups showed improvement in 4MWT, TUG and MBI. In addition, 6MWT significantly improved in non-sarcopenia group (Table 2). When changes between groups were compared, 6MWT and

TUG showed more improvement in non-sarcopenia group than sarcopenia group (Table 3).

Conclusion

In this study, we found that sarcopenia had negative effect on functional recovery in subacute stroke patients. As a result, it could be anticipated that stroke patients with preexisting sarcopenia would have more functional compromise than without sarcopenia.

Table 1.Baseline characteristics of subjects at the initial evaluation

	Sarcopenia (n=8)	Non-sarcopenia (n=12)	p-value
Sex (Male/Female)	4/4	5/7	
Stroke type (Infarction/Hemorrhage)	5/3	6/6	
Age (year)	68.24±12.92	64.85±9.73	0.628
Stroke duration (day)	14.17±5.42	16.73±5.53	0.617
BMI (kg/m^2)	21.75±2.42	23.23±2.61	0.335
SMM (kg)	22.23±7.85	24.35±8.98	0.236
SMI (kg/m^2)	6.45±2.24	7.12±2.59	0.181
Grip strength (kg)	24.81±7.27	27.46±6.55	0.213
4MWT (m/s)	0.65±0.24	0.78±0.32	0.338
6MWT (m)	143.52±15.18	155.64±17.85	0.598
TUG (sec)	10.15±3.28	9.84±3.67	0.354
MBI	73.13±9.66	75.25±10.57	0.698

Values are mean ± standard deviation.

BMI; Body Mass Index. SMM; Skeletal Muscle Mass, SMI; Skeletal Muscle Index, 4MWT; 4Meter Walking Test, 6MWT; 6 Minute Walking Test, TUG; Timed up and Go Test, MBI; Modified Barthel Index.

Table 2.Changes of measurements after treatment

	Sarcopenia			Non-sarcopenia		
	pre	post	p-value	pre	post	p-value
Grip strength (kg)	24.81±7.27	26.24±7.46	0.536	27.46±6.55	29.63±7.19	0.648
4MWT(m/s)	0.65±0.24	0.78±0.38	**0.047***	0.78±0.32	0.98±0.48	**0.046***
6MWT(m)	143.52±15.18	172.52±21.18	0.087	155.64±17.85	202.18±20.71	**0.028***
TUG (sec)	10.15±3.28	7.76±2.78	**0.036***	9.84±3.67	6.12±3.48	**0.039***
MBI	73.13±9.66	82.63±7.16	**0.045***	75.25±10.57	86.33±9.86	**0.041***

Values are mean ± standard deviation.

4MWT; 4Meter Walking Test, 6MWT; 6 Minute Walking Test, TUG; Timed Up and Go Test, MBI; Modified Barthel Index.

*p<0.05, by Wilcoxon signed-rank test

Table 3.Comparison of changes between two groups

	Sarcopenia	Non-sarcopenia	p-value
Δ Grip strength (kg)	1.44±0.93	2.27±1.04	0.348
Δ 4MWT(m/s)	0.13±0.08	0.20±0.12	0.137
Δ 6MWT(m)	28.87±7.71	47.52±9.55	**0.038***
Δ TUG(sec)	2.48±1.89	3.78±2.04	**0.045***
Δ MBI	9.62±4.67	11.5±11.96	0.228

Values are mean ± standard deviation.

4MWT; 4Meter Walking Test, 6MWT; 6 Minute Walking Test, TUG; Timed Up and Go Test, MBI; Modified Barthel Index.

*p<0.05, by Mann-Whitney U test