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The Association Between Sarcopenia and Functional Recovery in Elderly Stroke

HongSeok Baek, MD[1], IkHyun Lim, MD[1], GeunHee Kim [3], JongMoon Kim, MD[1,2], SeYoung Shin, MD[1,2], MinYoung Kim, MD, Ph.D.[1,2]

[1]*Department of Rehabilitation Medicine, CHA Bundang Medical Center, CHA University School of Medicine, Republic of Korea*

[2]*CHA University School of Medicine, Republic of Korea*

Introduction

- Sarcopenia is characterized by a progressive muscle strength loss, that may cause adverse clinical outcomes such as falls, fractures, physical disability, and an increased mortality.
- This retrospective observational study aimed to clarify whether the pre-existing sarcopenia affects the recovery after stroke onset in elderly.

Subjects and Methods

Study design & Study participants

- This study is a retrospective case-control study.
- Among the stroke patients who were admitted to rehabilitation department of the study hospital between January 2017 to June 2022, those who met the inclusion criteria were included: 1) age ≥60 years, 2) a stroke diagnosis confirmed by CT or MRI, and 3) Functional Ambulation Classification (FAC) ≥1 at initial assessment within a week after admission.
- Those who failed to get assessment on admission or discharge, and patients with a change in functional outcome score caused by deterioration of brain lesion or acute medical condition were excluded.

Measurement method

- We used Hand-Grip Strength (HGS) as the criterion for sarcopenia with the cutoff values less than 28kg for men and 18 kg for women, which was measured on the non-affected side.
- Clinical assessments were conducted two times; within a week from the admission and at the time of discharge
- Functional outcomes were assessed using scores of Functional Independence Measure (FIM), Berg Balance Scale (BBS), Trunk Impairment Scale (TIS), Mini-Mental State Examination (MMSE), and Modified Barthel Index (MBI)

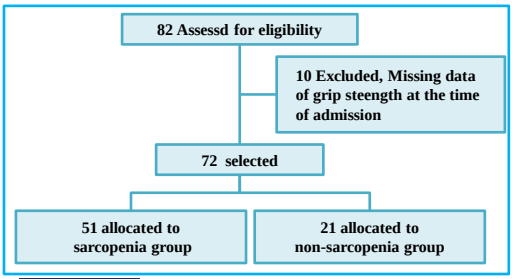
Primary outcome

- Relative changes of these functional assessment scores from the patient's initial state to discharge.
- △Functional score= (score at discharge−score at admission)/(total score−score at admission) X 100

Statistical analysis

- Between-group comparisons were made using the Student t-test for normally distributed data, and Mann-Whitney U-test for data with skewed distributions and Fisher's exact test for categorical data.

Figure 1. Participant Enrollment Flowchart



Result

- Among 82 patients who met the inclusion criteria, 10 were excluded because of missing data of grip strength at the time of admission. Finally, 72 eligible patients were included in the analysis.
- Of these, 51 (70.83%) participants were classified as sarcopenia (S) group (28 male and 23 female) which were shown to be significantly older than non-sarcopenia (NS) group ($p < 0.05$). The HGS ([S] 13.82 ± 6.32 vs [NS] 29.88 ± 7.50; $p < 0.001$) were significantly lower in patients with sarcopenia.
- Patients with pre-existing sarcopenia had significantly worse functional status at admission than those who without sarcopenia as measured by evaluation parameters including BBS, TIS, MMSE, FIM total, FIM-motor, FIM-cognitive and MBI (ps <0.05). (Table 1).
- Participants without sarcopenia showed bigger functional gains compared to those with sarcopenia in BBS, FIM total, FIM motor and MBI (ps <0.05) (Table 2).

Table 1. Demographic and Clinical Characteristics of Participants

Variables on admission	Sarcopenia (N=51)	Non-sarcopenia (N=21)	p-value
Age, years	72.86 ± 8.41	66.95 ± 4.46	< 0.001†
Sex			0.291ª
Male	28 (54.90)	15 (71.43)	
Female	23 (45.10)	6 (28.57)	
Stroke type			1.000ª
Hemorrhagic	19 (37.25)	3 (14.29)	
Ischemic	32 (62.75)	18 (85.71)	
Brain lesion			0.251ª
Right	31 (60.78)	10 (47.61)	
Left	12 (23.53)	9 (42.86)	
Both	8 (15.69)	2 (9.53)	
Hand-Grip strength, kg	13.82 ± 6.32	29.88 ± 7.50	< 0.001†
Male	16.80 ± 6.39	33.17 ± 5.84	< 0.001‡
Female	10.20 ± 3.93	21.67 ± 4.03	< 0.001‡
BBS, score	15.29 ± 14.50	34.90 ± 16.60	< 0.001†
TIS, score	8.06 ± 4.97	13.90 ± 4.13	< 0.001†
MMSE, score	19.45 ± 5.73	25.05 ± 4.15	< 0.001†
FIM total, score	59.86 ± 17.34	78.67 ± 18.28	< 0.001†
FIM subscores			
Motor, score	37.37 ± 13.00	51.33 ± 16.77	< 0.001†
Cognition, score	22.49 ± 6.28	27.33 ± 5.98	0.004†
MBI, score	39.69 ± 18.53	55.62 ± 21.67	0.002†

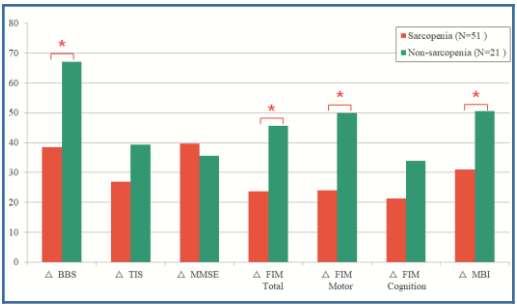
Values are presented as number (%) or mean±standard deviation.
BBS, Berg Balance Scale; TIS, Trunk Impairment Scale; MMSE, Mini-Mental State Examination; FIM, Functional Independence Measure; MBI, Modified Barthel Index
† Student t-test ‡ Mann-Whitney U test a Fisher's exact test

Table 2. Difference in Functional Gain Between Sarcopenia and Non-Sarcopenia Groups During Admission

	Sarcopenia (N=51)	Non-sarcopenia (N=21)	p-value
△ BBS	38.49 ± 27.48	67.14 ± 23.91	< 0.001†
△ TIS	26.84 ± 23.51	39.28 ± 25.65	0.051†
△ MMSE	39.71 ± 26.51	35.61 ± 36.54	0.644†
△ FIM total	23.74 ± 18.30	45.60 ± 20.12	< 0.001†
△ FIM Motor scale	24.05 ± 19.25	49.83 ± 23.49	< 0.001†
△ FIM Cognition scale	21.28 ± 25.12	33.92 ± 24.60	0.055†
△ MBI	30.95 ± 19.52	50.54 ± 23.39	<0.001†

△Functional score= (score at discharge−score at admission)/(total score−score at admission) X 100
All values are presented as mean ± standard deviation; † student t-test

Figure 2. Difference in Functional Gain Between Sarcopenia and Non-Sarcopenia Groups During Admission



Conclusion

- The presence of sarcopenia on admission is associated with relatively limited functional gain. Pre-existing sarcopenia should be considered when setting goals for rehabilitation in elderly stroke patients.

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