Difference of Fitness Level Changes by Age Group After Rehabilitation Exercise Program among Stroke Patients

Dae Gyun Jeong[1], Hee Ju Kim[1], Jae Hak Kim[2], Dae Taek Lee[1*]

[1] Kookmin University, Seoul, Republic of Korea, [2] National Rehabilitation Center, Seoul, Republic of Korea.

* dtlee@kookmin.ac.kr

INTRODUCTION & PURPOSE

- Stroke is one of the leading causes of long-term disability worldwide, often resulting in significant motor and functional impairments that severely limit independence in daily life and overall quality of life.
- These impairments vary considerably across individuals, and age is considered a key factor influencing the degree of functional decline and recovery potential following stroke.
- Given these profound impacts, rehabilitation exercise programs (REP) have been increasingly recognized as a critical intervention for promoting functional recovery and improving physical, emotional, and social outcomes in stroke survivors.
- However, how the effects of REP differ across age groups remains insufficiently explored.
- This study aims to analyze the effects of a rehabilitation exercise program among stroke patients across different age groups.

METHODS

- A total of 80 stroke patients with stroke within one year of onset who had no physical rehabilitation experiences and were admitted to the Korea National Rehabilitation Center were recruited.
- They participated in REP lasting 60 min a session, twice a week for 8 weeks. Exercise intensity of the Ratings of Perceived Exertion between 11 and 16 was maintained.
- Participants were grouped by the age of 10-29 (G20, n=20, 20.4±5.8 yrs, 164.2±13.5 cm, 63.3±15.7 kg), 30-49 (G40, n=20, 41.8±4.6 yrs, 172.0±7.7 cm, 77.3±11.9 kg), 50-69 (G60, n=20, 58.6±5.8 yrs, 165.0±8.1 cm, 65.6±9.2 kg), and 70< (G80, n=20, 78.6±5.5 yrs, 160.5±4.9 cm, 61.4±5.8 kg), and a difference of fitness parameters was compared.

Table 1. Participant Characteristics by Group (n=80)

	G20	G40	G60	G80
Age (yrs)	20.35 ± 7.60	41.80 ± 4.56	58.60 ± 5.82	78.60 ± 5.54
Height (cm)	164.18 ± 9.30	172.02 ± 7.66	164.97 ± 8.14	160.46 ± 4.91
Weight (kg)	63.29 ± 3.90	77.31 ± 11.89	65.60 ± 9.17	61.42 ± 5.83

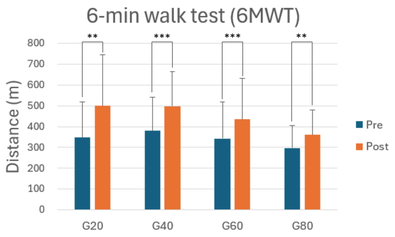
- REP consists of whole-body strength training, aerobic circuit training, and manipulative exercises such as throwing, catching, striking, and rolling. Before and after REP, their muscular strength (Grip Strength; GS), muscular endurance (Arm Curl; AC, Sit-Up; SU), cardiopulmonary endurance (6-Minute Walk Test; 6MWT), flexibility (Sit and Reach Test; SRT), coordination (Visual Reaction Time Test; VRT), and balance ability (Timed Up and Go Test; TUG) were evaluated.

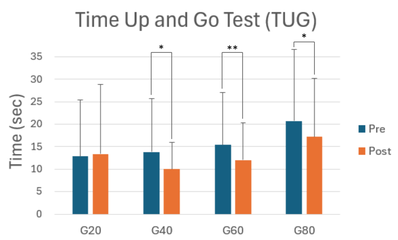
RESULTS

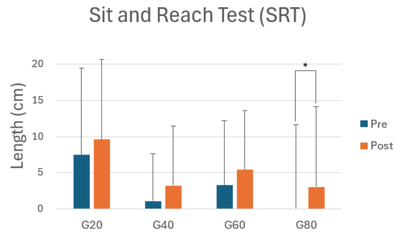
- For G20 and G40, GS of the affected side increased from 12.3–14.1 kg to 16.1–16.5 kg ($p<0.05$) after REP, while no change was observed in G60 and G80. GS of the unaffected side did not change in all groups.
- For G20, G40, and G60, AC (both sides) increased from 21.4–32.6 reps to 28.1–39.0 reps ($p<0.05$) and SU increased from 14.6–18.6 to 18.9–23.3 reps ($p<0.05$), while no changes were observed in G80.
- For all groups, 6MWT increased from 298–380 m to 361–501 m ($p<0.05$) and VRT increased from 55.0–83.4 reps to 62.0–90.2 reps ($p<0.05$).
- SRT increased from –0.2 to 3.1 cm only in G80 ($p<0.05$) TUG decreased from 13.9–20.7 s to 10.0–17.2 s in G40, G60, and G80 ($p<0.05$), while no change was observed in G20.
- TUG decreased from 13.9–20.7 s to 10.0–17.2 s in G40, G60, and G80 ($p<0.05$), while no change was observed in G20.

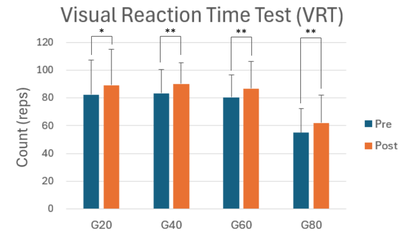
Table 2. Muscular strength and endurance (M±SD)

	G20				G40				G60				G80			
	Pre	Post	t	p	Pre	Post	t	p	Pre	Post	t	p	Pre	Post	t	p
Grip strength (affected side, kg)	12.33±8.78	16.07±9.99	-2.338	.031*	14.10±10.62	16.47±10.98	-2.796	.012*	12.68±10.91	12.98±10.44	-0.444	.662	11.62±9.46	12.49±9.54	-1.650	.117
Grip strength (unaffected side, kg)	23.89±11.82	25.58±13.00	-1.403	.177	29.49±10.05	30.88±8.78	-1.590	.128	27.28±10.02	27.78±9.89	-0.761	.456	20.27±7.86	20.86±7.33	-0.915	.373
Arm curl (affected side, reps)	21.38±11.99	28.06±12.11	-2.872	.012*	23.32±16.14	29.53±18.32	-2.506	.022*	24.17±13.07	32.89±15.33	-4.123	.001**	20.40±14.20	25.60±16.71	-1.392	.185
Arm curl (unaffected side, reps)	31.00±12.91	38.29±12.65	-4.635	.000***	31.85±9.50	39.85±10.24	-4.873	.000***	32.55±12.83	39.00±16.68	-2.705	.014*	30.06±11.16	34.50±13.65	-1.907	.075
Sit-Up (reps)	15.42±11.30	20.84±13.38	-5.099	.000***	18.55±8.57	23.30±10.40	-2.473	.023*	14.60±9.48	18.85±9.88	-4.834	.000***	6.50±5.40	7.92±7.00	-2.020	.068









CONCLUSIONS

- Rehabilitation exercise program for stroke patients has a positive effect on overall physical fitness level. However, age specific rehabilitation program for stroke patients may be required, for example muscular strength and endurance for over 70 years old and flexibility for younger than 70 years.