

Effectiveness of a Resistance Training Program for the Sarcopenic Patient: Strengthening and Safety

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Introduction

Sarcopenia is defined as having low muscle mass and low muscle strength or low physical performance. Strength appears to significantly decrease after age 65. Adequate strength is required for independence and preventing injury in activities of daily living.

Incorporation of a resistance training program has been shown to halt or reverse the effects of sarcopenia in older adults.

A case report was utilized to determine the effectiveness of safety tactics and training parameters supported in the literature on an older adult subject.

Common Strength Training Parameters for Older Adults

	Time Period	Percentage 1 RM	Repetitions
Tissue Adaptation Period	0 to 8 weeks, Individualized	40 to 50%	10 to 30
Post Tissue Adaptation Period	2 to 8 weeks and beyond	65 to 75%	10 to 15
		70 to 80%	8 to 12

Patient History/Systems Review

66-year-old Caucasian male, 190 pounds, 5'11", BMI 26.6

HPI

- Complaints of weakness, declining independence, decreased balance, gait speed

PMH

- Osteoarthritis of bilateral knees, gallstones, and hypertension

Prior Activity Level

- No resistance training, some aerobic training, increasingly sedentary lifestyle

Examination

	Score	1RM	% Body Weight	Compared to Norms
6RM Leg Press	220 pounds	259 pounds	1.36	30 th percentile
6RM Chest Press	75 pounds	87.1 pounds	0.46	10 th percentile
BMI	26.6			Overweight
BESS	16/60			Below Average
6-minute walk	632 meters			WNL

The patient's main deficits were decreased strength and balance, which were represented by lower than average scores compared to norms.

Clinical Impression

The patient was appropriate for this case report because he had generalized weakness and fatigue, had limited resistance training knowledge, and was enthusiastic about learning about resistance training and completing an 8-week program.

Intervention

The patient worked with a Certified Strength and Conditioning Specialist (CSCS) from the National Strength and Conditioning Association (NSCA) in person at 0, 4, and 8 weeks to measure BMI, upper and lower body strength, and account for injuries and soreness.

Patient educated on:

- Proper warm-up and cool down, breathing mechanics, and posture
- Proper lifting mechanics, including how to hip hinge and keep neutral spine
- importance of water for hydration and protein intake for healing.

The patient was extremely compliant with the program, reporting 100% compliance with the written intervention plan, and attending all supervised sessions.

Weeks 1-2

- 50-60% 1RM, 2x weekly
- Rest between sets: 30-90 seconds
- 1 set, 12-16 repetitions

Weeks 3-6

- 60-70% 1RM, 2x weekly
- Rest between sets: 30-90 seconds
- 1 set, 12-18 repetitions

Weeks 6-8

- 70-80% 1RM, 3x weekly
- Rest between sets: 30-90 seconds
- 2 sets, 8-12 repetitions

Day 1			Day 2		
Body Part/Area	Exercise	Sets x Reps	Body Part/Area	Exercise	Sets x Reps
Chest	Machine Chest Press (lying down)	1 x 12-16	Chest	Incline Chest Press (seated machine)	1 x 12-16
Back	Lateral Cable Pulldown (seated)	1 x 12-16	Back	Cable Row (seated)	1 x 12-16
Shoulders	Machine Overhead Press (seated)	1 x 12-16	Shoulders	Lateral Raises (seated dumbbell)	1 x 12-16
Arms	Biceps curl (seated machine)	1 x 12-16	Arms	Triceps Extension (seated machine)	1 x 12-16
Upper Legs	Leg Press (seated machine)	1 x 12-16	Upper Legs	Leg Extensions (seated machine)	1 x 12-16
Lower Legs	Calf Raise (seated machine)	1 x 12-16	Lower Legs	Calf Raises (standing, bodyweight)	1 x 12-16

Day 1			Day 2		
Body Part/Area	Exercise	Sets x Reps	Body Part/Area	Exercise	Sets x Reps
Chest	Machine Chest Press (lying down)	1 x 12-18	Chest	Incline Chest Press (seated machine)	1 x 12-18
Back	Wall Pushups	1 x 12-18	Back	Cable Row (seated)	1 x 12-18
Shoulders	Lateral Cable Pulldown (seated)	1 x 12-18	Shoulders	Lateral Raises (seated dumbbell)	1 x 12-18
Arms	Pull-up (machine assisted)	1 x 12-18	Arms	Triceps Extension (seated machine)	1 x 12-18
Upper Legs	Machine Overhead Press (seated)	1 x 12-18	Upper Legs	Leg Extension (seated machine)	1 x 12-18
Lower Legs	Forward Raises (seated dumbbell)	1 x 12-18	Lower Legs	Leg Curl (seated machine)	1 x 12-18
	Machine Overhead Press (seated)	1 x 12-18		Calf Raises (standing, bodyweight)	1 x 12-18
	Lateral Raises (seated dumbbell)	1 x 12-18			
	Triceps Extension (seated machine)	1 x 12-18			
	Leg Press (seated machine)	1 x 12-18			
	Calf Raise (seated machine)	1 x 12-18			

Day 1			Day 2		
Body Part/Area	Exercise	Sets x Reps	Body Part/Area	Exercise	Sets x Reps
Chest	Machine Chest Press (lying down)	2 x 8-12	Chest	Chest Flies (seated machine)	2 x 8-12
Back	Incline Chest Press (seated machine)	1 x 8-12	Back	Cable Row (seated)	2 x 8-12
Shoulders	Lateral Cable Pulldown (seated)	2 x 8-12	Shoulders	Chest Supported Row (machine)	1 x 8-12
Arms	Lateral Cable Pulldown (seated)	2 x 8-12	Arms	Lateral Raises (seated dumbbell)	2 x 8-12
Upper Legs	Machine Overhead Press (seated)	2 x 8-12	Upper Legs	Hammer Curl (seated dumbbell)	1 x 8-12
Lower Legs	Lateral Raises (seated dumbbell)	1 x 8-12	Lower Legs	Biceps Curl (standing barbell)	2 x 8-12
	Triceps Extension (seated machine)	2 x 8-12		Mini Squat	2 x 8-12
	Triceps Kickbacks (standing dumbbell)	1 x 8-12		Calf Raises (standing, bodyweight)	2 x 8-12
	Leg Press (seated machine)	2 x 8-12			
	Calf Raise (seated machine)	2 x 8-12			

Day 3		
Body Part/Area	Exercise	Sets x Reps
Chest	Incline Chest Press (seated machine)	2 x 8-12
Back	Cable Row (seated)	2 x 8-12
Shoulders	Lateral Raises (seated dumbbell)	2 x 8-12
Arms	Triceps Extension (seated machine)	2 x 8-12
Upper Legs	Leg Press (seated machine)	2 x 8-12
Lower Legs	Mini Squat	2 x 8-12
	Calf Raises (standing, bodyweight)	2 x 8-12
	Calf Raise (seated machine)	2 x 8-12

Outcomes

At 8 weeks, the patient reported less soreness than felt the first 4 weeks. He reported no injuries. He also reported less generalized fatigue, and the ability to walk approximately 1.5 miles further each day. He also reported an ability to walk more quickly and to complete household chores more efficiently.

Tests and Measures Results at 0, 4, and 8 Weeks

	6RM Leg Press	6RM Chest Press	BMI
0 weeks	220	75	26.6
4 weeks	230	90	26.2
8 weeks	235	90	26.1

Tests and Measures Results at 8 Weeks, Compared to Norms

	Score	1RM	% Body Weight	Compared to Norms
6RM Leg Press	235 pounds	273 pounds	1.45	50 th percentile
6RM Chest Press	90 pounds	104.5 pounds	0.55	10 th percentile
BMI	26.1			Overweight

Clinical Implications

It may be inferred that these strength gains may have been made due to the 8-week resistance training program, and that the guidelines and parameters in the literature for sarcopenic older adults are safe and effective.

In the post-rehab or wellness realm, a program following these parameters may help increase strength in patients with sarcopenia and prevent falls and further injuries.

Strength training programs may also increase functional independence with activities of daily living, and increase quality of life in the older adult, allowing more older adults to continue participating in recreational activities, such as golf or tennis.

Future research should focus more closely on patient education, testing the effectiveness of patient education on resistance training knowledge via a written test before and after education.