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The Effect of Exercise During Dialysis on Key Indices of Sarcopenia in Elderly Patients with End-Stage Chronic Kidney Disease (ESRD)

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Objectives : Exercise has been shown to improve sarcopenia outcomes in stable dialysis patients, but there is no clear conclusion in elderly patients with ESRD. This study aimed to evaluate the effects of intradialytic exercise on sarcopenia in elderly patients with ESRD.
Methods : Studies up until 12 January 2024 were identified from many databases. Keywords used as search terms were "chronic kidney disease", "dialysis", "exercise", "physical function". Study quality was assessed using the Physiotherapy Evidence Database (PEDro) Scale.
Results : A total of 5 RCTs meeting the inclusion criteria were included in this systematic review. Pooled results demonstrated that aerobic training improved the score 6MWT (95%CI [500±30], $p<0.001$). Resistance training significantly improved the speed of 10MWT (1.45 m/s, 95%CI [1.23 to 1.80 m/s], $p<0.001$), handgrip strength (21.8 kg, 95%CI [17.5 to 28.0 kg], $p<0.05$), isometric knee extension strength (43.3%, 95%CI [32.1 to 52.8%], $p<0.05$), SPPB (12 point, 95%CI [10 to 12 point], $p<0.05$), 30-s STS (95%CI [9.71±0.42], $p<0.01$), and 8-foot TUG (95%CI [11.77±3.19], $p<0.01$). In physical performance, aerobic training and resistance training have some beneficial effect on improving the score 6MWT (95%CI [453.9±96.4], $p<0.001$; 95%CI [461.0±95.3], $p<0.001$) and median version of CS-30 (95%CI [15.2±3.7], $p<0.001$; 95%CI [17.0±4.7], $p<0.001$).
Conclusions : This review showed that resistance training may lead to improvement in muscle strength and muscle mass of elderly patients during dialysis. Combined exercise (aerobic and resistance) may be a potential strategy to improve muscle strength and physical performance in elderly patients with ESRD undergoing dialysis.

table.png

Author (year), country	Participants	Intervention comparator	Outcomes measures	Duration	Results
Takahashi et al,[1] 2022 (Ohio)	Total participant: n=308; 139 men, 169 women. Duration of dialysis=54.5±15 years.	Intervention: stretching exercise for 20 seconds; resistance training depending on the preference and ability of the participant, total duration 15 minutes per day	Physical function: hand grip strength, isometric knee extension strength, SPPB, 10MWT.	Follow-up: 12 months.	Physical performance • Isometric knee extension strength ↑* • SPPB↑* • 10MWT↑*
Watanabe et al,[2] 2021 (Japan)	Total participant: n=53; 41 men, 12 women. Duration of dialysis=5.05±3.51 years Intervention: n=26;20 men, 6 women. Age=66.19±13.05 years. Control: n=27; 21 men, 6 women. Age=64.00±12.95 years.	Intervention: walk for 20-30 minutes, 3-5 times/week. Resistance exercise for upper and lower body, 3 times per week, one set of 10-15 repetitions. Control: usual care.	Physical function: hand grip strength, 30-s chair-stand test, 6MWT.	Follow-up: 6 months	Muscle strength • Handgrip strength (kg) (NS) Physical performance • 6MWT (m) ↑* (in patients with high adherence to aerobic exercise)
Liao et al,[3] 2016 (Taiwan)	Total participant: n=40; 17 men, 23 women. Duration of dialysis=6.4±5.0 years Intervention: n=20;8 men, 12 women. Age=62±8 years. Control: n=20; 9 men, 11 women. Age=62±9 years.	Intervention: cycling ergometry, 3 times/week for 30 minutes at an intensity of 12-15 on Borg's RPE scale. Control: usual care.	Physical function: 6MWT.	Follow-up: 12 weeks.	Physical performance • 6MWT (m) ↑*
Bennett et al,[4] 2016 (Australia)	Total participants: n=171;107 men, 64 women. Duration of dialysis=3.6±2.1 years. Age=68.1±12.6 years. Intervention: 12Wk group: n=51;31 men, 20 women. 24Wk group: n=61;37 men, 24 women. 36Wk group: n=59;39 men, 20 women.	Intervention: progressive free-weight exercises (resistance bands) for upper and lower body, 3 times per week, 2 sets of 15-20 repetitions. Control: usual care.	Strength: 30s STS. Physical function: 8Ft-TUG, Four-Square Step Test. QOL: KD-QOL Index.	Follow-up: 12, 24, 36 weeks.	Physical performance • TUG (s) ↓* Muscle strength • 30s STS (NS)
Groussard el at,[5] 2015 (France)	Total participants: n=18; 12 men, 6 women Duration of dialysis=3.3±0.7 years. Intervention: n=10; 7 men, 3 women. Age=68.4±3.7 years. Control: n=8; 5 men, 3 women. Age=66.5±4.6 years.	Intervention: progressive cycle ergometry, 3 times weekly for 15-30 minutes at an intensity of 55-60% of the watts determined in an ergometer test for pedal frequency 50r/minute. Control: usual care.	Physical function: 6MWT, VO1peak Muscle mass: lean and fat mass X-ray absorptiometry.	Follow-up: 12 weeks	Physical performance • 6MWT (m) ↑*