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Hand grip and leg muscle strength in hemodialysis patients and its determinants

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Objectives: Chronic kidney disease is associated with chronic inflammation and progressive loss of peripheral muscle strength and the ability to exercise, and these changes are more pronounced in patients on hemodialysis (HD). We evaluated the hand grip and leg muscle strength in patients receiving HD and tried to find factors associated with muscle strength.

Methods:

We screened hand grip (opposite to fistula side) and leg muscle strength (both sides) at single center (n=112) by using digital hand and leg dynamometer (T.K.K.5401 and 5710e/5715, Takei scientific instruments Co. Ltd., Niigata, Japan).

Results: Mean age was 62.6 years, and 73.2% of patients were men. Diabetes was the cause of kidney failure in 50% of patients and median HD vintage was 34 months. 77.7% of patients answered 'yes' to regular home exercise and 33% of patients regularly participated in the hospital based latex-band exercise. Hand grip strength (HGS) and leg muscle strength (LMS) showed good correlation ($r = 0.715$, $p < 0.001$). HGS (25.1 vs. 17.0 kg) and LMS (30.1 vs. 20.4 kg) were better in men ($p < 0.001$ and $p < 0.001$, respectively). Older patients (≥ 60 years) showed decreased LMS than others in men and women ($p = 0.01$ and $p = 0.04$, respectively), but HGS was not different by age. Patients doing regular home or hospital based exercise showed higher HGS (24.2 vs. 18.6 kg, $p = 0.01$) but LMS did not show statistical significance (29.3 vs. 23.6 kg, $p = 0.19$). Multiple linear regression analysis proved male sex, younger age, and any type of exercise were factors associated with better HGS and LMS.

Conclusions: Sex, age, and exercise were the most important determinants of muscle strength in HD patients. We need to encourage patients to do regular home or group exercise and introduce new feasible form of exercise for HD patients.

Table 1

Table 1. Multiple linear regression analysis about the factors related with hand grip and leg muscle strength

	Hand grip strength		Leg muscle strength	
	Standardized coefficient	P-value	Standardized coefficient	P-value
Constant	23.698	<0.001	28.924	<0.01
Sex (female)	-0.492	<0.001	-0.449	<0.001
Age (year)	-0.301	<0.001	-0.532	<0.001
BMI (kg/m ²)	0.039	0.61	0.125	0.15
Serum albumin (g/dl)	0.015	0.85	0.02	0.82
Serum creatinine (mg/dl)	0.18	0.03	0.104	0.26
Exercise, any-type (yes)	0.336	<0.001	0.227	0.013