Is there association between muscle strength and body composition parameters in elderly patients on hemodialysis?

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Introduction and Aim

- The combination of chronic kidney disease, hemodialysis (HD) and aging can lead to diminished muscle mass and muscle strength[1]. However, it is not clear whether the reduction of strength in elderly on HD is accompanied by a concomitant reduction in body composition parameters.

- Thus, the **aim** of this study is to evaluate whether changes in handgrip strength are associated with changes in body weight, body fat, fat free mass and skeletal muscle mass in a group of elderly patients on hemodialysis.

Methods

- Observational, longitudinal and prospective study.

- Patients: prevalent 92 elderly (≥ 60 years) patients on maintenance HD patients for at least 3 months.

- Handgrip strength (HGS, by dynamometer), body fat percentage (BF%, by the sum of skinfold thicknesses), fat free mass (FFM) (by BIA), skeletal muscle mass[2] (SMM, by BIA), 7 point subjective global assessment[3] and serum albumin were assessed in all participants at baseline and after 12 months. BF, FFM and SMM were divided by the square height in meters to calculate the BF index, FFM index and SMM index.

- Three groups were created according to the HGS change (delta: final value - initial):
  - **HGS Gain Group (HGS-GainG)**: HGS gain ≥1kg;
  - **HGS Loss Group (HGS-LossG)**: HGS loss ≥1kg and
  - **HGS Maintenance Group (HGS-MaintenanceG)**: HGS changes between 0.99 g to -0.99 g

Results

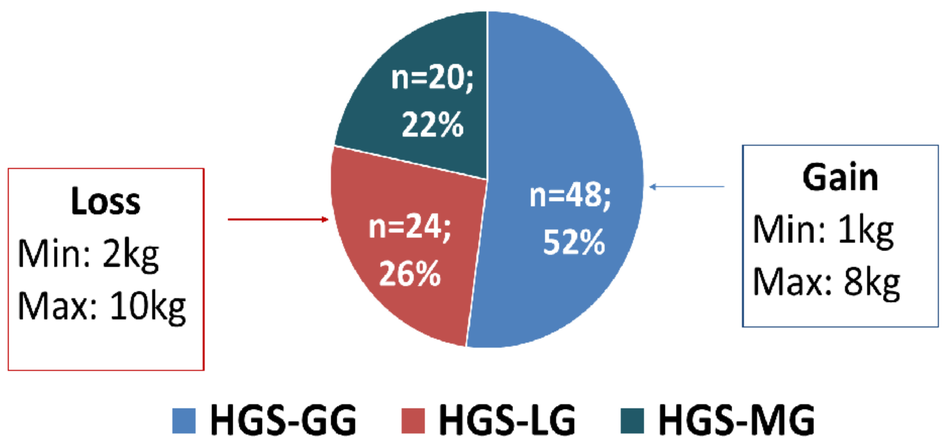

Figure 1. Distribution of elderly in groups created according to the HGS change (n=92).

Table 1: Baseline characteristics according to the groups of HGS changes (n=92)

	HGS-GainG n=48	HGS-MaintenanceG n=20	HGS-LossG n=24	*p*
Age (years)	**69.6 ± 6.0[a]**	**74.5 ± 8.5[b]**	**71.9 ± 6.5[b]**	**0.028**
Male (n,%)	31 (64.6)	15 (75.0)	19 (79.2)	0.39
Length of dialysis (years)	2.5 (1.5;4.9)	3.3 (1.5; 6,2)	4.5 (1.8;6.7)	0.29
Diabetes (n,%)	13 (27.1)	9 (45.0)	10 (41.7)	0.26
Body weight (kg)	70.6 ± 10.8	67.8 ± 11.6	70.5 ± 16.9	0.67
BMI (kg/m²)	26.2 ± 3.5	25.9 ± 4.4	25.7 ± 4.9	0.87
BF index (kg/m²)	8.6 ± 3.1	8.1 ± 3.2	8.1 ± 3.1	0.73
FFM index (kg/m²)	17.9 ± 2.1	17.5 ± 3.4	17.5 ± 3.5	0.76
SMM index (kg/m²)	8.5 ± 1.4	8.6 ± 2.3	8.5 ± 1.9	0.96
Malnutrition by SGA (%)	22 (45.8)	11 (55.0)	16 (66.7%)	0.24
Albumin (g/dL)	**4.1 ± 0.4[a]**	**3.8 ± 0.3[b]**	**3.7 ± 0.5[b]**	**0.001**

Mean ± standard deviation or Median (25th percentile, 75th), as appropriate
one-way analysis of variance test, Chi-square test or Kruskal-Wallis test, as appropriate.
Superscribe with different letters indicate statistical differences between the groups, by Turkey Post Hoc Test.

Table 2: Univariate association between HGS changes and nutritional parameters changes over 12 months in the **total group** (n=92).

	Pearson Correlation coefficient	*p*
Δ Body Weight (kg)	-0.09	0.39
Δ BF (%)	-0.16	0.13
Δ FMM (kg)	-0.11	0.31
Δ SMM (kg)	0.009	0.93

Table 3: Univariate association between HGS changes and nutritional parameters changes over 12 months in **HGS-Gain Group** (n=48).

	Pearson Correlation coefficient	*p*
Δ Body Weight (kg)	-0.06	0.68
Δ BF (%)	-0.22	0.13
Δ FMM (kg)	-0.14	0.37
Δ SMM (kg)	0.21	0.16

Table 4: Univariate association between HGS changes and nutritional parameters changes over 12 months in **HGS-Loss Group** (n=24).

	Pearson correlation coefficient	*p*
Δ Body Weight (kg)	0.02	0.92
Δ BF (%)	**-0.43**	**0.038**
Δ FMM (kg)	0.24	0.27
Δ SMM (kg)	0.33	0.12

BF: body fat, FFM: fat free mass, SMM: skeletal muscle mass.

Table 5: Linear regression analysis adjusted for gender, age and dialysis length between HGS changes and nutritional parameters changes over 12 months in **HGS-Loss Group** (n=24).

	β	*p*	95% Confidence Interval	
			Lower Bound	Upper Bound
Δ Body weight (kg)	-0.01	0.93	-0.304	0,279
Δ BF (%)	**-0.26**	**0,008**	**-0.448**	**-0.079**
Δ FMM (kg)	0.03	0.19	-0,454	0,041
Δ SMM (kg)	0.35	0.09	-0.065	0.769

BF: body fat, FFM: fat free mass, SMM: skeletal muscle mass.

Conclusion

➔ **Over 12 months of follow up, no association between changes in HGS and in the body composition parameters was observed in the total group.**

➔ **Our results suggest that the group that gained strength had younger age and higher serum albumin concentration indicative of an overall better condition.**

➔ **Finally, the group that lost strength was associated with an increased gain in BF%, suggesting that this body compartment seems to negatively influence change in strength in elderly patients on HD.**

References

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