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### Relationship between exercise capacity and muscle function in adult patients with heart failure

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**Introduction:** Physical fitness is a multidimensional concept and is of great importance to assess in heart failure (HF) patients, due to that HF is associated with exercise intolerance, dyspnea and fatigue. Some measures of physical fitness have been associated to HF severity, rehospitalization and mortality risk.

**Purpose:** The aim of this study was to explore the relationship between two different measures of physical fitness in patients with HF: exercise capacity and muscle function.

**Methods:** This is a secondary analysis performed on the baseline data of a multi-centre RCT study aimed at exploring the effect of exergame access to improving exercise capacity in HF patients. Physical fitness was assessed by two different measures: exercise capacity assessed by the 6-minute walk test (6MWT), and muscle function assessed by 3 different isometric tests of upper and lower limbs. Descriptive statistics, Spearman correlation and principal component analysis were used to analyse the data.

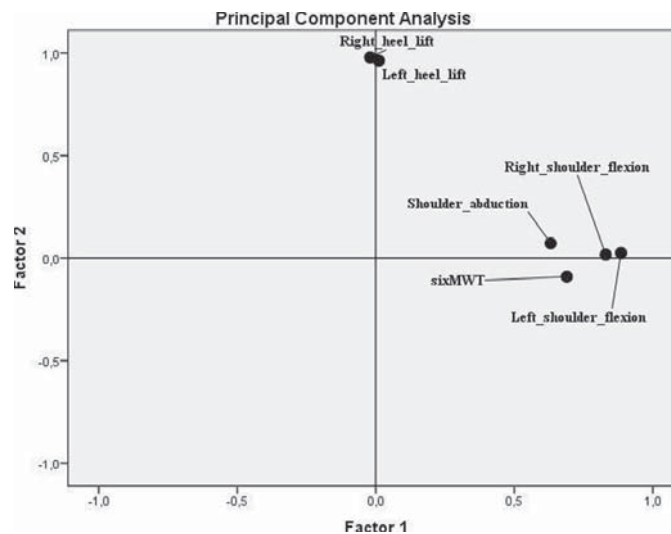
**Results:** In total, 605 HF patients were included in this analysis (mean age 67±12, 29% women, 90% NYHA II/III). Exercise capacity (6MWT) was correlated with all of the muscle function tests, with correlation-coefficients ranging from r=0.23 to r=0.50 (p<0.001). Principal component analysis showed a bi-dimensional nature of physical fitness, with the first dimension including the lower body strength and the second dimension including the upper body strength and exercise capacity. These two dimensions explained 71% of the total variance of the measured variables.

**Conclusions:** Although strong correlations between exercise capacity and muscle function tests, the measures loaded on two different factors. The results suggest that upper body strength and exercise capacity had a stronger relationship than with lower body strength. This may imply that muscle function tests for upper and lower limbs and exercise capacity represent different aspects of physical fitness and to attain a more complete assessment of physical fitness all three tests are important.

Correlation matrix (n=605)

	6MWT	Right Heel-Lift	Left Heel-Lift	Shoulder abduction	Right Shoulder Flexion	Left Shoulder Flexion
6MWT	1					
Right Heel-Lift	0.23**	1				
Left Heel-Lift	0.26**	0.86**	1			
Shoulder abduction	0.40**	0.30**	0.34**	1		
Right Shoulder Flexion	0.47**	0.51**	0.48**	0.52**	1	
Left Shoulder Flexion	0.50**	0.49**	0.48**	0.52**	0.83**	1

\*\*p<0.001.



Principal Component Analysis