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Validity, Test-Retest Reliability, and Learning Effect on the 1-Minute Sit-To-Stand Test in Individuals With Heart Failure

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Abstract

Objective: To evaluate the reliability, the minimally important difference (MID), and the learning effect of the 1-minute sit-to-stand test (1STST) in assessing functional exercise capacity in patients with heart failure (HF).

Design: A cross-sectional study.

Setting: Two hospitals.

Participants: Patients with an HF (N=47) diagnosis by a cardiologist following the 2021 European Society of Cardiology HF guideline. Most participants were men (60%). Most participants had a normal body mass index (62%). All participants were classified as having New York Heart Association Functional Class II or III.

Interventions: Not applicable.

Main outcome measures: Each patient performed a 6-minute walk test (6MWT) and 2 1STSTs on 2 occasions spaced 1 month apart. Test-retest reliability between occasions was evaluated using the intraclass correlation coefficient (ICC), Bland-Altman plot analysis, and linear regression. The MID was determined using a distribution-based method. To assess the learning effect, we conducted a paired t test comparing the 2 1STSTs on each occasion, and the magnitude of the learning effect was quantified using Cohen's d. The correlation between the 1STST and 6MWT was performed to confirm validity.

Results: The 1STST showed good test-retest reliability (ICC=0.98, $P<.001$) with good agreement between the 2 measurements, without proportional bias ($P>.05$). The MID was 1.1 repetitions. A learning effect of the 1STST was observed ($P<.001$) with a large effect size when repeated a month later (Cohen's $d>0.8$). The 1STST strongly correlated with the 6MWT ($r=0.74$, $P=.01$).

Conclusions: The 1STST is a valid and reliable measure of functional exercise capacity in patients with HF. Because of the learning effect, this study recommended performing 2 trials to capture the true value.

Keywords: 1-Minute-sit-to-stand test; Heart failure; Learning effect; Rehabilitation; Reliability; Validity.

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