



# Correlations of 6-minute walk distance (6MWD) with Subjective Measures of Dyspnea in Systemic Sclerosis (SSc) Patients.

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## Abstract

### Background

The six minute walk distance (6MWD) is a standardized measure of submaximal exercise capacity and serves as a key outcome measure in many studies of pulmonary involvement. 6MWD is not fully validated in SSc nor are definitions of minimally clinically important differences (MCID).

### Purpose

To evaluate the correlation of the  $\Delta$  6MWD with  $\Delta$  subjective outcome measures of lung disease in SSc patients and to explore the possibility of establishing an MCID for 6MWD based on changes in Borg dyspnea/fatigue indices (BDI, BFI).

### Methods and Patients

119 SSc patients with multiple 6MWD were retrospectively identified. Data abstracted include 6MWD; BDI and BFI at rest and peak; and pulmonary function test results (FVC, DLco, TLC). Mean age was 56.1 yrs  $\pm$  12.1 and mean disease duration 8.2 yrs  $\pm$  7.6. 104 were female (87.4%); 81 (68.1%) were classified as limited and 38 (31.9%) as diffuse SSc.

### Results

(See table)

Mean interval between two 6MWT was 8.6 mths  $\pm$  7.3. The absolute mean  $\Delta$  6MWD was 45.05 m  $\pm$  39.85 (range -187.8 to 193.5). BDI and BFI remained fairly stable between tests (e.g., mean  $\Delta$  BDI-Peak:  $-0.17 \pm 1.68$ ; mean  $\Delta$  BFI-Peak:  $-0.65 \pm 1.88$ ). Mean absolute  $\Delta$  % of predicted FVC was  $5.41 \pm 4.47$  (range -17 to +23), % of predicted DLco was  $5.71 \pm 5.35$  (range -16 to +23), and % of predicted TLC was  $6.1 \pm 4.65$  (range -14 to +21). The following significant correlations between  $\Delta$  6MWD and other  $\Delta$  measures were found: 0.46 with FVC ( $\leq .05$ ); 0.34 ( $\leq .05$ ) with DLco; and -.22 for BDI Peak ( $\leq .05$ ).

### Conclusions

6MWT was designed as a measure of submaximal functional ability representative of activities of daily living. Borg scales, measuring perceived exercise exertion, is strongly influenced by multiple psychophysical functions reflecting the "Gestalt of perceived exertion" (Borg G. Med Sci Sports Exer 1982; 14: 377). Both measures have been used as a surrogate for lung functioning but never fully validated in SSc. In the present study,

### Conclusions (cont)

6MWD, Borg, and PFT measures were relatively stable over time and showed minor change although ranges were large. There does not appear to be an association between change in mean distance walked and change in the Borg indices.

Our findings do not support further study in minimal clinically important difference in 6MWT based on  $\Delta$  Borg Index reported. Borg indices in SSc appear insensitive to change and to lack construct and content validity. Similar data with analyses of 6MWD suggest the need for a SSc specific measure of outcome in studies of exercise capacity.

## Introduction

- 6MWD is a simple standardized measure of submaximal exercise capacity.

- Used in clinical trials of pulmonary involvement in SSc but its utility as outcome measure is not fully validated.

- Goal of study: establish MCID for 6MWD.

## Methods

### Subjects

- Patients with diagnosis of SSc by ACR classification criteria with 2 or more 6MWT. Presented are data for 119 patients with 2 6MWT

- retrospective study

- Patient characteristics:

- 81 (68.1%) with limited and 38 (31.9%) with diffuse SSc

- Age:  $56.1 \text{ y} \pm 12.1$

- Gender: 104 (87.4%) females

- Duration of Disease :  $8.2 \text{ y} \pm 7.6$

### Data:

1) 6 MWT

2) Pulmonary Function Test (FVC, DLco, TLC)

3) Borg Dyspnea and Fatigue Index at Rest and at Peak

## Results

Mean  $\Delta$  6MWD change per unit  $\Delta$  Borg for Peak Dyspnea and Fatigue Indices were:

| $\Delta$ Borg Time1/Time2 | n  | BDI Peak Mean $\Delta$ 6MWD in meters/sd | n  | BFI Peak Mean $\Delta$ 6MWD in meters /sd |
|---------------------------|----|--|----|---|
| +2.0                      | 7  | $-21.85 \pm 71.86$                       | 9  | $-18.86 \pm 62.39$                        |
| +1.5                      |    |  | 1  | 44.81                                     |
| +1.0                      | 20 | $-32.97 \pm 10.50$                       | 15 | $38.26 \pm 46.91$                         |
| +0.5                      | 2  | $21.34 \pm 18.11$                        | 5  | $27.31 \pm 39.76$                         |
| 0.0                       | 34 | $29.78 \pm 59.36$                        | 19 | $35.03 \pm 58.7$                          |
| -0.5                      | 3  | $0 \pm 14.78$                            | 2  | $12.80 \pm 18.11$                         |
| -1.0                      | 17 | $11.19 \pm 54.53$                        | 5  | $-52.91 \pm 45.72$                        |

(-) Borg change = less breathlessness at T2

(+) Borg change = more breathlessness at Time 2

## Conclusions

### 6 Minute Walk Test/ Borg:

- 6 MWT is designed as a measure of submaximal functional ability representative of activities of daily living.
- Borg, measures perceived exercise exertion and is influenced by several psychophysical functions reflecting the "gestalt of perceived exertions" (Borg G. Med Sci Sports Exer 1982; 14: 377)
- Both measures used as surrogates for lung function in SSc but not never fully validated.

### 6 Minute Walk Test/ Borg/PFT:

- All measures were relatively stable over time but ranges were large.
- No association was found between change in mean distance walked and change in the Borg Indices.
- Borg Indices appear insensitive to change and seemingly lack construct and content validity.

**Findings do not support establishment of MCID in 6MWD based on Borg Indices.**