

# Lower Extremity Impairment and Activity Limitations in Persons with Scleroderma

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**Purpose:** Much of the disability in systemic sclerosis or scleroderma (SSc) has been attributed to internal organ involvement and limitations in hand function. However, foot problems have been identified. Persons with SSc have been shown to have ulcerations, calcium deposits, decreased vascular supply (Raynaud's), and tight skin. Although these studies suggest feet involvement contributes to disability, they did not examine the rest of the lower extremities, that is, the hips and knees or functional use of the lower extremities to ambulate and manage stairs. Therefore the purpose of this study was to examine the extent of lower extremity impairments and the relationship to activity limitations.

**Methods:** To date, 28 persons with SSc have received evaluations of lower extremity joint motion (Keital Function Test lower extremity items), functional strength (Timed-stands Test) and basic mobility (Timed Up & Go Test) and completed a demographic questionnaire regarding symptoms in the lower extremities. Activity limitations were measured by the Rheumatoid and Arthritis Outcome Score (RAOS) which examines functional ability, pain and quality of life.

**Results:** Of the 28 people who have participated in the study so far, 96% were female. Their ages ranged from 32 – 68 years (mean 48.8) and disease duration ranged from 1 to 47 years (mean 13.3). Participants also reported the following symptoms: Raynaud's in feet (89%), edema in feet (42%), calcium deposits in feet (21%), pain in legs (85%), and swelling in legs (58%). Thirty percent used an assistive device to ambulate. Spearman rho correlation coefficients between the impairment measures of joint motion, strength, mobility and symptoms and activity limitations as measured by the RAOS revealed significant correlations between the Timed-stands Test ( $r = .53, p < .01$ ), the Timed Up and Go Test ( $r = .50, p < .01$ ) and the Keital Functional Test ( $r = .6, p < .001$ ) and the RAOS daily living scale. Neither skin thickness nor the presence of Raynauds, calcium, pain or swelling in the legs correlated with the RAOS.

**Conclusions:** The results of this study show that lower extremity involvement is present in persons with SSc. The findings regarding strength, mobility and joint motion relate to the ability to perform everyday activities suggest that these areas should be targeted for intervention in persons with SSc and that reduction of these impairments may improve functional ability.

## METHODS

### Participants

37 persons with a diagnosis of SSc who were ambulatory

### Instruments

- Demographics
- Keital Function Test (KFT)
- Timed Stands Test (TST)
- Timed Up and Go Test (TU&G)
- Rheumatoid and Arthritis Outcome Score
- Activities of Daily Living
- Lower Limb Quality of Life
- Pain

## FINDINGS

### Mean scores for impairment and activity limitation variables

Variable	Mean (SD)	Range
<i>Impairment</i>		
Skin thickness	6.6 (5.3)	0-18
Timed Stands (# in 30 sec)	10.4 (3.7)	0-19
Timed Up & Go	10.0 (2.6)	6 - 16
Keital Function Test	9.7 (5.8)	0-30
<i>Activity Limitation</i>		
RAOS ADL	65.3 (18.8)	25-100
RAOS QoL	45.8 (18.1)	6.3-100
RAOS pain	29.2 (20.3)	0-100
RAOS total	60.0 (17.7)	23.9-100

## Demographics of the Sample

Mean Age Years ±SD (range)	50.4± 10.5 (32-78)
Mean Disease Duration Years ±SD (range)	13.2 years± 12.0 (1-47)
Type of Scleroderma	
Limited	12
Diffuse	22
Unclassified	3
Gender	
% Females	89.2
% Male %	10.8
Ethnicity	
% white	80.6
Employment status	
% employed full time	33.3
Raynauds in feet	89.2 %
Edema in feet	37.8%
Calcium deposits in feet	16.2%
Pain in legs	89.2%
Arthritis swelling in legs	56.8%
Pulmonary involvement	55.2%
Use assistive device to walk	25.6%

Keital Lower Extremity Items scores	Mean (SD)	Range
Rise from chair (no use of hands) (0-6)	0.68 (1.4)	0-6
Stand on tiptoes 15 seconds (0-2)	0.54 (0.2)	0-1
Stand on heels 15 seconds (0-2)	0.14 (0.3)	0-1
Stand on right leg 15 seconds (0-2)	0.03 (0.2)	0-1
Stand on left leg 15 seconds (0-2)	0.15 (0.5)	0-2
Plantar surface of right foot placed on chair, knee flexed (0-2)	0.14 (0.4)	0-2
Plantar surface of left foot placed on chair, knee flexed (0-2)	0.19 (0.5)	0-2
Right heel placed on chair with knee extended (0-2)	0.19 (0.5)	0-2
Left heel placed on chair with knee extended (0-2)	0.19 (0.5)	0-2
Bend knees and hips in a squat (0-2)	0.97 (0.6)	0-2
External rotation right hip (0-2)	1.24 (0.9)	0-2
External rotation left hip (0-2)	1.30 (0.0)	0-2
Walk 30 meters in 20 seconds (0-6)	2.00 (1.5)	0-4
Walk upstairs 10 steps in 7 seconds (0-3)	1.40 (1.0)	0-3
Walk downstairs 10 steps in 7 seconds (0-3)	1.54 (0.9)	0-3

### Relationship between impairment and activity limitation measures

Impairment measure	RAOS ADL	RAOS QoL	RAOS Pain	RAOS total
Skin thickness	NS	NS	NS	NS
TST	.43**	.41*	NS	.46**
TU & G	-.43**	-.39*	NS	-.45**
KFT	-.48**	-.53**	-.44**	-.52**

## DISCUSSION & CONCLUSIONS

- Persons with SSc do have lower extremity involvement. They are slower on the TU&G test and complete less sit to stands compared to community dwelling healthy adults.
- External rotation of the hip and acute hip and knee flexion appears limited the most.
- Activity limitations in the lower extremities are related to strength, basic mobility and joint motion but not skin thickness.