SHORT REPORT

Clinimetric properties of a walking scale in peripheral neuropathy

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See Editorial Commentary, p 899

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Difficulty in walking is seen in many people with peripheral neuropathies, but walking ability is not comprehensively measured by commonly used outcome measures. The clinimetric properties of the 12-Item Multiple Sclerosis Walking Scale (MSWS-12, renamed the Walk-12) were investigated in 65 patients with peripheral neuropathies. Owing to its excellent internal consistency and reliability, and strong correlation with measures of physical and social function ($r > 0.8$), the Walk-12 is recommended for measuring walking ability in peripheral neuropathies.

Many people with peripheral neuropathies have difficulty in walking, require walking aids and experience restricted outdoor mobility.^{1 2} Walking ability is not comprehensively examined by the common measures used in peripheral neuropathy. The 12-Item Walking Scale (MSWS-12; appendix) was designed to examine patients' perception of their walking ability in multiple sclerosis.³ It is a questionnaire completed by patients and consists of 12 items that are answered from five possible options (1–5). The final score is calculated by subtracting the minimal score possible (12) from the total score and calculating it as a percentage.³ A higher score indicates a greater limitation in perceived walking ability. It is consistent, reliable, responsive and correlates strongly with physical functioning in people with multiple sclerosis.^{3 4} Although initially developed for patients with multiple sclerosis, the use of the scale in patients with peripheral neuropathy may be valid, as walking is a generic activity and many patients with peripheral neuropathy report problems similar to those dealt with in the questions of the MSWS-12. Thus, we investigated the clinimetric properties of the MSWS-12, renaming it the Walk-12, as suggested by the authors of the original paper,³ in patients with peripheral neuropathies.

METHODS

We recruited 50 consecutive patients with any form of peripheral neuropathy who attended the peripheral nerve clinic at Guy's Hospital, London, and 15 community-dwelling volunteers with peripheral neuropathy who attended King's College London, London, for testing. Approval was granted by the local ethical and audit committee. All assessments were carried out by a physiotherapist (RCG) or a consultant neurologist (RACH).

In addition to the Walk-12, we collected the Medical Research Council (MRC) Sum Score (adapted to include the first dorsal interossei, and therefore scored from 70),⁵ the time taken to walk 10 m as quickly as possible and two disability questionnaires, the Overall Disability Sum Score (ODSS) and the Overall Neuropathy Limitations Scale (ONLS).⁶ Patients were asked to complete the Walk-12 by the end of their visit. The analysis and interpretation of scores

on the Walk-12 was not carried out until all other data had been collected. Fifteen participants also completed the 36-Item Short-Form (SF-36) Questionnaire.⁷ Twelve participants completed the Walk-12 on a second occasion, 1 week after the initial measurement.

The internal consistency of the Walk-12 was assessed by using Cronbach's α for all participants. A value of $\alpha > 0.7$ indicates acceptable consistency.⁸ Test-retest reliability was investigated by calculating an intraclass correlation coefficient (two-way fixed) for repeated measurements in 12 participants. We predicted that the Walk-12 would have strong correlations with the SF-36 Physical Function Subscale, Physical Component Summary Score and lower limb sections of the ODSS and ONLS, thus showing convergent validity. We also hypothesised that associations between the Walk-12 and the SF-36 Mental Health Subscale, Mental Component Summary Score and upper limb sections of the ODSS and ONLS would be low (divergent validity). The ability of scores on the Walk-12 to discriminate between participants who used a walking aid and those who did not was tested with a two-tailed independent t test.

RESULTS

Participant characteristics are shown in table 1. Among 65 participants, only four people missed out one item when completing the Walk-12. This was substituted by the mean score on the other items.³ The mean scores on the Walk-12 are shown in table 1. Ten (15%) participants scored 0 (ceiling effect) on the Walk-12 and two (3%) scored 100 (floor effect), indicating maximal walking limitation.

The internal consistency of the Walk-12 was excellent (Cronbach's $\alpha = 0.97$; $n = 61$). No significant differences were observed between repeated scores on the Walk-12, and the intraclass correlation coefficient was high (0.96).

The Walk-12 correlated strongly with the SF-36 Physical Function Subscale ($n = 15$; $r = -0.82$), Physical Component Summary Score ($r = -0.72$) and the lower limb section of the ONLS ($r = 0.77$). Correlations with the SF-36 Mental Health Subscale ($r = -0.45$), Mental Component Summary Score ($r = -0.40$), age ($r = 0.03$) and upper limb scores on the ODSS and ONLS ($r = 0.32$ and 0.29 , respectively) were low. Interestingly, we found a high association between the Walk-12 and the Social Function Component of the SF-36 ($r = -0.86$). The ODSS lower limb score did not correlate highly with the Walk-12 ($r = 0.36$). The association between the Walk-12 and MRC Sum Score was also weak ($r = 0.28$),

Abbreviations: CIAP, chronic idiopathic axonal neuropathy; CIDP, chronic inflammatory demyelinating polyradiculoneuropathy; CMT, Charcot-Marie-Tooth disease; GBS, Guillain-Barré syndrome; MMN, multifocal motor neuropathy; MRC Sum Score, Medical Research Council Sum Score; ODSS, Overall Disability Sum Score; ONLS, Overall Neuropathy Limitations Scale; PDN, paraproteinaemic demyelinating neuropathy; SF-36 Questionnaire, 36-Item Short-Form Questionnaire; Walk-12, 12-Item Walking Scale

Table 1 Clinical features

Participant characteristics n = 65	
Mean age in years (range)	57 (20–84)
Sex (male:female)	36:29
Diagnosis	GBS: 18, CIDP: 26, MMN: 1, CIAP: 4, PDN: 7, CMT: 3, Other: 6
Mean Walk-12 (SD, range)	45.8 (31, 0–100)
CIAP, chronic idiopathic axonal neuropathy; CIDP, chronic inflammatory demyelinating polyradiculoneuropathy; CMT, Charcot-Marie-Tooth disease; GBS, Guillain-Barré syndrome; MMN, multifocal motor neuropathy; PDN, paraproteinemic demyelinating neuropathy. Other neuropathies included vasculitic neuropathy (n = 3), sensory multiple mononeuropathy (n = 2) and idiopathic radiculoneuropathy (n = 1).	

and the time taken to walk 10 m accounted for only 39% of the variation in Walk-12 scores ($r = 0.63$).

Scores on the Walk-12 were significantly higher for participants who used a walking aid ($n = 21$, mean 63.3 (SD 14.4)) than for those who did not (mean 27.2 (SD 22.7); $p < 0.001$).

DISCUSSION

We found that the Walk-12 was a consistent, reliable and valid outcome measure in people with inflammatory peripheral neuropathies, justifying the extrapolation of its use from multiple sclerosis to peripheral neuropathy.

The Walk-12 was quick, easy and straightforward to complete. The quality of data collected was high, as only four participants omitted one item from the Walk-12, and we were able to compute total scores for all participants by adjusting for the missing items. Of 65 participants, 10 had scores at the ceiling of the range, indicating little limitation with walking. Two participants scored at the floor (indicating maximum limitation) of the Walk-12. This is within the range of ceiling and floor effects considered desirable for such scales,⁹ indicating that the scale was well targeted to the level of walking ability in this sample of people with peripheral neuropathy.

The Walk-12 had high internal consistency, indicating that scores were associated with little random error, and implying that it measures a single construct in peripheral neuropathy. The magnitude and pattern of correlation with other measures provide evidence for convergent and divergent validity, as the scale correlates highly with measures of physical function and lower limb functional ability, but poorly with mental health measures and upper limb function. Participants who used walking aids had markedly higher scores on the Walk-12 than those who did not, implying that the scale could also discriminate between these two states.

The Walk-12 correlated strongly with lower limb scores on the ONLS, but had only a weak association with lower limb scores on the ODSS. This was anticipated because, although the ODSS and ONLS differ on only one item in the lower limb category, the ONLS was specifically designed to be more sensitive to the presence of lower limb restrictions.

Of all the measures that correlated with the Walk-12, the Social Function Subscale of the SF-36 had the strongest association, accounting for 74% of its variance ($r = -0.86$), which has not been reported previously. The capacity of the

Walk-12 to reflect the influence of walking ability on social participation, which may be of great value to the patient, enhances its clinical usefulness.

From data routinely collected in clinic (MRC Sum Score, time taken to walk 10 m, ODSS and ONLS), the greatest variance in scores on the Walk-12 was accounted for by the lower limb section of the ONLS. This, however, explained only 59% ($r = 0.77$) of the variance of the Walk-12, indicating that the Walk-12 could add valuable information to assessment in clinical and research settings.

In conclusion, the Walk-12 is a useful, valid and reliable measurement tool for assessing the walking ability in people with peripheral neuropathy. The findings of the study are limited by the sample size and types of neuropathies examined. Further work is necessary to determine the responsiveness of the Walk-12 in this patient group. The Walk-12, however, appears to reflect aspects of walking ability not measured by commonly used outcome tools and is quick and easy to complete. Therefore, the Walk-12 is a useful measure of walking ability in practice and clinical trials, in people with peripheral neuropathy.

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APPENDIX

Walking Scale Questionnaire (Walk-12)

Please complete and hand to the doctor at the start of your consultation, thank you.

- These questions ask about limitations to your walking due to peripheral neuropathy *during the past 2 weeks*
- For each statement please circle the one number that best describes your degree of limitation
- Please answer all questions even if some seem rather similar to others, or seem irrelevant to you
- If you cannot walk at all please tick this box ☐

In the past 2 weeks how much has your peripheral neuropathy...	Not at all	A little	Moderately	Quite a bit	Extremely
Limited your ability to walk?	1	2	3	4	5
Limited your ability to run?	1	2	3	4	5
Limited your ability to climb up or down stairs?	1	2	3	4	5
Made standing when doing things more difficult?	1	2	3	4	5
Limited your balance when standing or walking?	1	2	3	4	5
Limited how far you are able to walk?	1	2	3	4	5
Increased the effort needed for you to walk?	1	2	3	4	5
Made it necessary for you to use support when walking indoors, eg holding on to furniture, using a stick, etc?	1	2	3	4	5
Made it necessary for you to use support when walking outdoors, eg using a stick or frame, etc?	1	2	3	4	5
Slowed down your walking?	1	2	3	4	5
Affected how smoothly you walk?	1	2	3	4	5
Made you concentrate on your walking?	1	2	3	4	5

Please check you have circled one number for each question.

Please hand this to the doctor at the start of your consultation.

Thank you for completing this questionnaire.

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