Assessing the Reliability, Agreement and Convergent Validity Between the 10-Meter Walk Test and GAITRite® Systems in Healthy Adults

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PURPOSE

Gait speed serves as an important functional outcome for patients of various diagnoses and may be considered the sixth vital sign as it is one of the best predictors of health and fall risk.[1] In fact, various studies have shown that walking speed may predict longevity, hospitalization, recovery time after surgery and even mortality.[1] Due to this evidence, gait speed is an important domain for assessment and intervention during rehabilitation in attempts to prevent hospitalization, prolong independence, and delay recovery time after surgery. Common assessment tools to examine gait speed include the ten meter walk test (10 MWT) and GAITRite® system (CIR Systems, Inc., Franklin NJ). Although both the 10 MWT and GAITRite® system have been found to be valid and reliable tools in select samples to measure gait speed, the research is limited regarding the agreement between these tests, which may add to the decision-making of clinicians in choosing the most appropriate assessment.[2,3] Therefore, the purpose of this study is to examine the reliability of the 10 MWT and 12 and 20-foot GAITRite® systems among healthy adults, the validity and agreement between the 10 MWT and 20-foot GAITRite® system among healthy adults, and the agreement between the 12-foot and 20-foot GAITRite® systems among healthy adults.

METHODS

An observational reliability and validity study was conducted in which a convenience sample of 71 healthy adults, 52 females and 19 males, mean age 24.14 years old (± 5.367 SD) performed gait speed assessments including the 10 MWT, 12-foot GAITRite® , and 20-foot GAITRite®. For each test, participants completed two normal pace trials and two fast pace trials. The average gait speed was recorded for each trial.

ANALYSIS

Data analysis was performed with SPSS version 22. Test-retest reliability was assessed using Intraclass correlation coefficient (ICC [3,1]). Internal consistency was examined using Cronbach's alpha. Convergent validity was assessed using bivariate correlation coefficients. The agreement between the 10 MWT and 20-foot GR, as well as the 12-foot GR and 20-foot GR, was examined via Bland Altman plots. A 95% limits of agreement was used in this study.

RESULTS

Intraclass correlation coefficients (Table 1) between trials demonstrated excellent test-retest reliability for all normal and fast pace trials for each gait assessment: 12-foot GR (normal: ICC (3,1)=.84, fast: ICC (3,1)=.94); 20-foot GR (normal: ICC (3,1) =.79, fast: ICC (3,1)=.96); 10 MWT (normal: ICC (3,1)=.82, fast: ICC (3,1)=.89). Cronbach alpha values demonstrated good to excellent internal consistency for all normal and fast pace trials for each gait assessment: 12-foot GR (normal: Cronbach alpha=.92, fast: Cronbach alpha=.97); 20-foot GR (normal: Cronbach alpha=.88, fast: Cronbach alpha=.98); 10 MWT (normal: Cronbach alpha=.90, fast: Cronbach alpha=.94). Pearson's product correlation coefficient values (Table 2) demonstrated strong convergent validity between the 12-foot and 20foot GR for normal and fast gait speed (normal: r=.81, p<.001; fast: r=.93, p<.001), and between the 20-foot GR and 10 MWT for normal and fast gait speed (normal: r=.75, p<.001; fast: r=.93, p<.001). Bland Altman plots demonstrated excellent agreement between the 12-foot and 20-foot GR, as well as for the 20-foot GR and 10 MWT (Figure 1) for normal and fast gait speed.

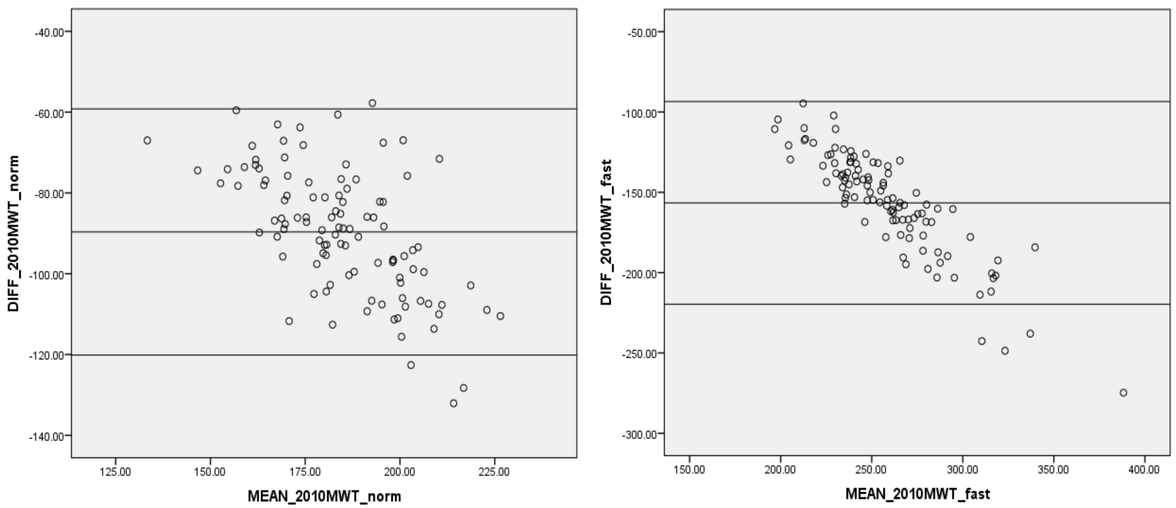

Figure 1. Bland Altman plots for agreement (95% limits of agreement) between 20-foot GAITRite® System & 10 MWT

Table 1. Test-retest reliability of gait assessments

Gait Assessment	ICC (3,1)	Cronbach alpha
10MWT normal	0.82	0.90
10MWT fast	0.89	0.94
12' GR normal	0.84	0.92
12' GR fast	0.94	0.97
20' GR normal	0.79	0.88
20' GR fast	0.96	0.98

Note. ICC = intraclass correlation coefficient

Table 2. Convergent validity among the gait assessments

	10MWT (comf)	10MWT (fast)	12' GR (comf)	12' GR (fast)	20' GR (comf)	20' GR (fast)
10MWT (comf)	1					
10MWT (fast)	0.11	1				
12' GR (comf)	0.66**	0.22	1			
12' GR (fast)	0.37	0.90**	0.32*	1		
20' GR (comf)	0.77**	0.10	0.81**	0.15	1	
20' GR (fast)	0.12	0.93**	0.24*	0.93*	0.11	1

Note. 10MWT=10-meter walk test (comfortable and fast). 12' GR=12-foot GAITRite® System (comfortable and fast). 20' GR=20-foot GAITRite® System (comfortable and fast).

* p<.05; ** p<.01.

DISCUSSION

Results from this study indicated that the 10 MWT, 12-foot and 20-foot GAITRite® systems are reliable tests to measure normal and fast gait speed, as revealed by good to excellent test-retest reliability and internal consistency. Therefore, when using these tools, clinicians can be confident that true changes in gait speed will be measured over time, allowing patient progress to be identified. Results also indicated that the 10 MWT, 12-foot and 20-foot GAITRite® systems are valid tests when measuring normal and fast gait speed, as revealed by strong convergent validity. Therefore, allowing clinicians to be confident that the target factor, gait speed, is indeed being measured accurately. The 12-foot and 20-foot GAITRite® systems and the 10 MWT and 20-foot GAITRite® system demonstrated excellent agreement via Bland Altman plots, suggesting that these tools can be used interchangeably as they were found to measure the same construct, gait speed, with similar and consistent results. More research is needed to determine the generalizability of these results across various patient populations.

CLINICAL RELEVANCE

It is useful for clinicians and researchers to know which gait tests can be used interchangeably when measuring patient progress over time or analyzing data. Determining agreement between these tests will also allow for various therapists across the patient's continuum of care to use either of these tests and be confident that a change in the target parameter over time is due to a true change in their gait speed. For example, a clinician can measure a patient's walking speed at initial evaluation using the 12-foot GR and then again at discharge using the 20-foot GR system. Also, a clinician in a home health setting can measure a patient's gait speed using the 10 MWT and then a clinician in an outpatient clinic can determine the patient's progress using the 20-foot GR with the ability to compare and interpret these values throughout the patient's episode of care.

REFERENCES

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