SIX-MINUTE WALK TEST AND TIMED UP & GO TEST IN PERSONS WITH TRANSFEMORAL AMPUTATIONS

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Introduction

Transfemoral amputation results in permanent disability and impairment among people of all ages. Therefore, the main goals of rehabilitation programs are the improvement of functioning, especially mobility, and successful reintegration in the community. Generally, the effectiveness of these programs is assessed in terms of ability to walk independently, as well as, the maximum functional independence achieve by the subject (2). Walking speed and distance are commonly recorded following lower limb prosthetic fitting, and can be measured by timed walk or fixed distance tests.

In several pathologies and age groups, the Six-Minute Walk Test (6MWT) and the Timed Up & Go Test (TUGT), are considered as gold standard measures showing high test-retest reliability. Additionally, good results were found in subjects with transtibial amputation. Thus, it becomes relevant to explore the reliability of these two tests in other lower-limb amputees, such as transfemoral one's.

Purpose

(1) **To analyze** the between two days test-retest reliability of the 6MWT and the TUGT in persons with transfemoral amputation.

(2) **To investigate** the relationship between the distance of walking in the 6MWT and the time to perform the TUGT.

Participants

Thirty subjects (25 men; 5 women) with unilateral transfemoral amputation participated in this study (Table 1). The causes of amputation included: trauma, diabetes, vascular problems and tumor. Subjects with upper limb amputations were excluded. They were recruited from hospitals, rehabilitation centers and prosthetic manufactures of Lisbon. All participants gave their written informed consent.

Table 1-Demographics of the participants (n=30).

Characteristics	Mean±SD	Range
Age (yr)	44.0±17.3	(18–80)
Height (cm)	169.9±7.6	(159–189)
Body mass (kg)	71.7±15.2	(45–110)
BMI (kg/m^2)	24.7±5.3	(17.5–40.4)
Years with prosthesis (ys)	9,6±10.6	(1-34)

Methods

Participants performed one trial of 6MWT and two trials of TUGT on two different days (48h), in a test-retest study design.

After being instructed to walk along a 30-m indoor corridor, the subjects performed the 6MWT (Figure 1), according to the American Thoracic Society (ATS) guidelines (1). During this test, heart rate was monitored continuously with a Polar F-55 watch.

The TUGT was performed according the instructions in Figure 2 (4). In order to minimize the influence of fatigue, it was carried out half an hour later. Each subject performed twice this test with a two minutes rest time between trials.

On the second day, the tests were performed in the same order and time.

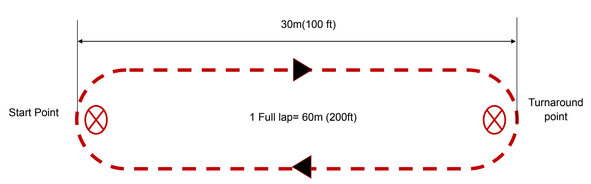

Figure 1– Outline of 6MWT course.

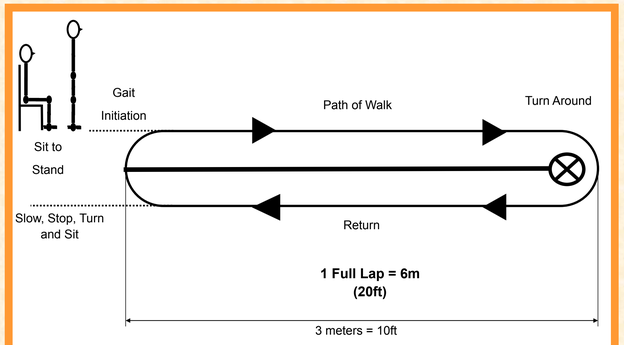

Figure 2– Outline of TUGT course.

Descriptive statistics are reported as mean±SD. Comparisons were computed using Wilcoxon signed-rank test. Reliability of the two trials was examined with Intraclass Correlation Coefficient (ICC3). Spearman´s rank correlation coefficient was used to evaluate statistical dependence between 6MWT and TUGT. Statistical significance was set at $p<0.05$.

Results

Between days comparisons of the 6MWT and the TUGT showed better values in second day (Table 2). The ICC test-retest of the 6MWT and the TUGT (Figure 3) showed high reliability. High correlations were observed between 6MWT and TUGT (Figure 4).

Table 2-Outcome measure scores at first and second day assessments (n=30)

	day1	day2	pvalue
6MWT	314.0±109.7m	329.4±109.7m	P<0.001
TUGT	13.3±4.7s	12.7±4.5s	P<0.001

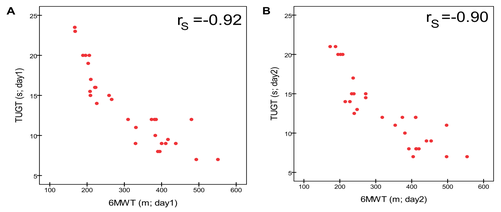

Figure 3-Retest versus test with a 45º line through the origin for (A) 6MWT, (B) TUGT.

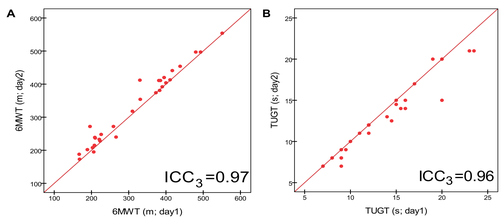

Figure 4-TUGT versus 6MWT for (A) day1 and (B) day2.

Discussion

All the individuals completed the study protocol and none of them needed to rest during the 6MWT or TUG test.

A high intraclass correlation coefficient (ICC=.97) between distances walked on two days was obtained, suggesting that the 6MWT is a reliable test for this population. Similar results were reported in literature in several studies, namely in a within-week test-retest study, with lower limb amputees (ICC=.97) (5), and in a within-day test-retest with transtibial amputees (ICC=.94) (3).

A high intraclass correlation coefficient for the time spent between two days was obtained (ICC=.96), indicating high reliability as observed in previous studies, such as a within one-day test-retest with transfemoral amputees (ICC=.97) (6), and a within one-week test-retest with lower limb amputees (ICC=.88) (5).

In the current study, the participants with transfemoral amputation showed better performance of 6MWT (314±110m) than lower-limbs amputees (332±115m) (5). Results of TUGT (13.3±4.7s) were similar to the obtained in subjects with lower-limb amputations (12.3±4.5s) (5).

Discussion

Strong and negative correlations were observed between 6MWT and TUG test. A moderate degree of negative linear correlation was reported on transtibial population (r=-.76) (3).

All these results suggest that subjects who walked a longer distance in 6MWT performed the TUG test in less time.

Conclusions

The results showed high test-retest reliability between days, both for the 6MWT and the TUGT. Subjects that walked longer distance in 6MWT performed the TUGT in less time.

Recommendations

The 6MWT might be considered as a reliable instrument to measure functional capacity in persons with transfemoral amputation. The TUGT should be used for assessment of physical mobility, postural control, set of transfers, level walking, and turns in amputees.

References

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