



The Cross-training effect on muscle performance in patients with multiple sclerosis: a pilot study

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INTRODUCTION AND AIM

- Cross-Training (CT) refers to an interlimb phenomenon whereby exercise on one limb can increase strength in the untrained side
- In patients with unilateral hyposthenia, the most-affected limb might not always be efficiently trained as it is frequently too compromised to sustain any exercise program.
- For these patients, a CT approach may induce indirect strength gains in the most-affected limb by training the less-affected one.

AIM

- No data are currently available on the CT-effect in multiple sclerosis (MS).
- Aim of this study was to prove the occurrence and magnitude of the CT-effect compared to a Standard-Training (ST) in MS.

METHODS

Design: pre-test/post-test randomized case-control study.

Participants: Sixteen patients with relapsing-remittent MS (13F:3M; 42.4±11.7 years old.; 63.3±14.6 kg; EDSS: median=3.5, range=2-5.5) presenting a predominant unilateral strength impairment of ankle dorsiflexors were studied.

Intervention: Participants were randomized in two groups: Cross-Training (CT: n=8) and Standard-Training (ST: n=8) groups, who underwent a 6-week unilateral isokinetic/concentric training (3 times/week, at 45°/s and 10°/s) of the less-affected and most-affected ankle dorsiflexors, respectively. Training was administered at maximal intensity.

Measurements: Maximal-strength and functional measures (6-Minute-Walking-Test; Timed-Up-and-Go; 10 Meter-Walk-Test) were assessed before and after 6 weeks of training.

Statistical analysis: Levene's test was performed to test for homogeneity of variances between groups. A repeated-measures ANOVA was employed for continuous variables and non-parametric statistics for categorical data. Alpha was set at P<0.05 and all results are displayed as means±SD or SE for ordinal data.

RESULTS

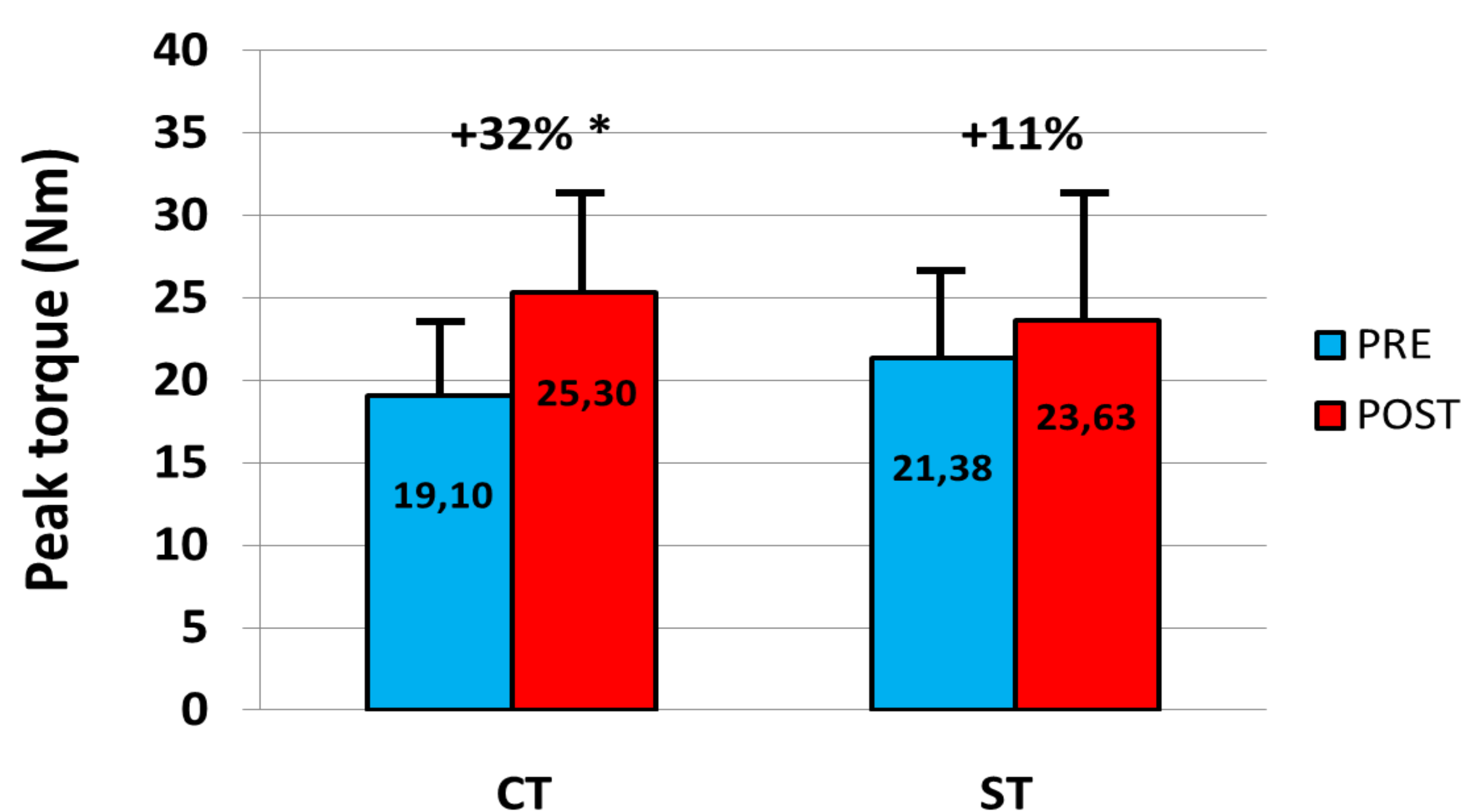


Figure 1. (Mean±SD) Tibialis anterior (TA) strength (peak torque) at 45°/s speed of the untrained leg for the CT (cases) and ST groups following unilateral maximal isokinetic training of the less-affected and more-affected leg, respectively. CT= Cross-training; ST= Standard-training; * Significant for P < 0.001.

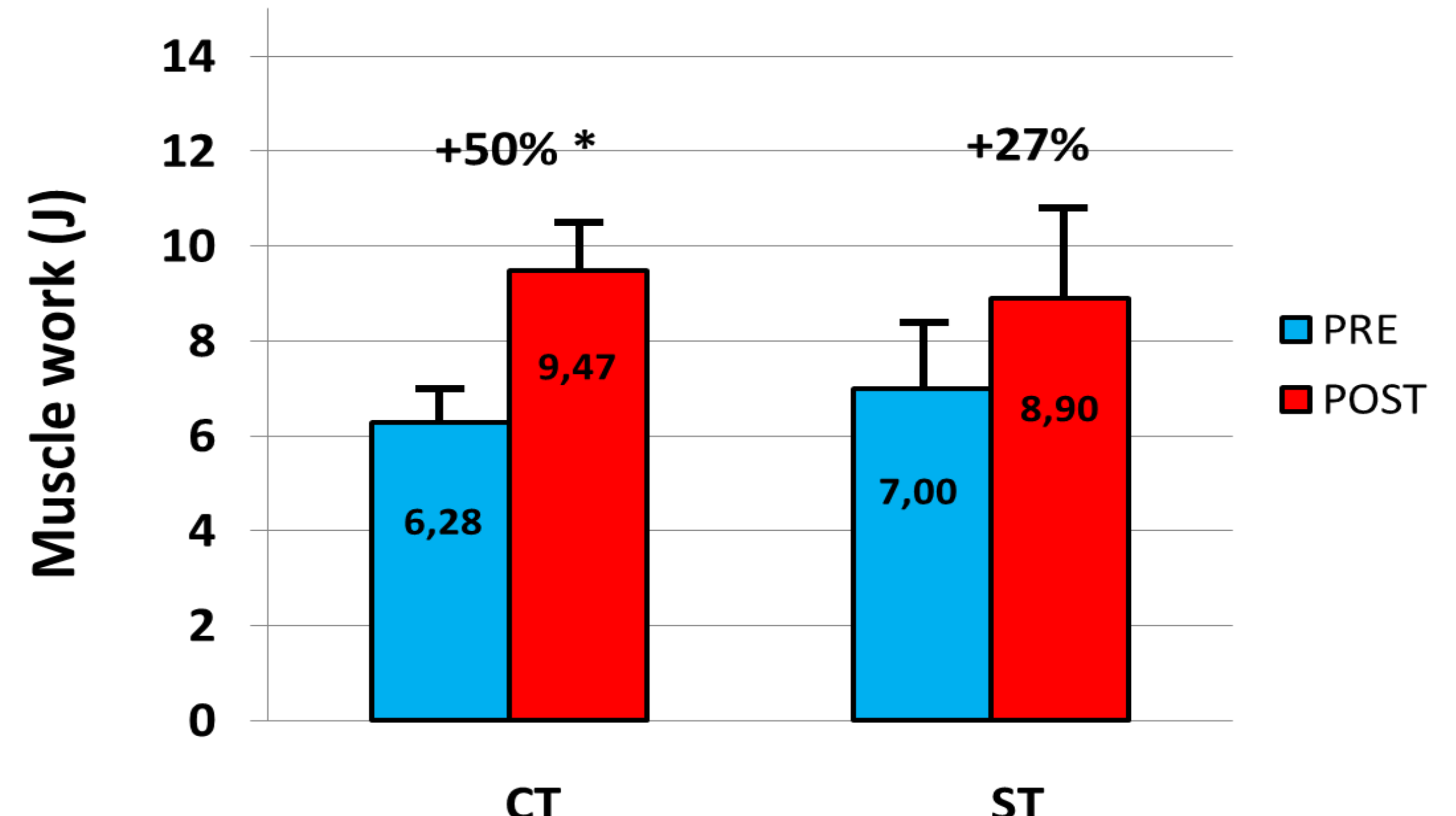


Figure 2. (Mean±SD) Tibialis anterior (TA) strength (muscle work) at 45°/s speed of the untrained leg for the CT (cases) and ST groups following unilateral maximal isokinetic training of the less-affected and more-affected leg, respectively. CT= Cross-training; ST= Standard-training; * Significant for P < 0.001.

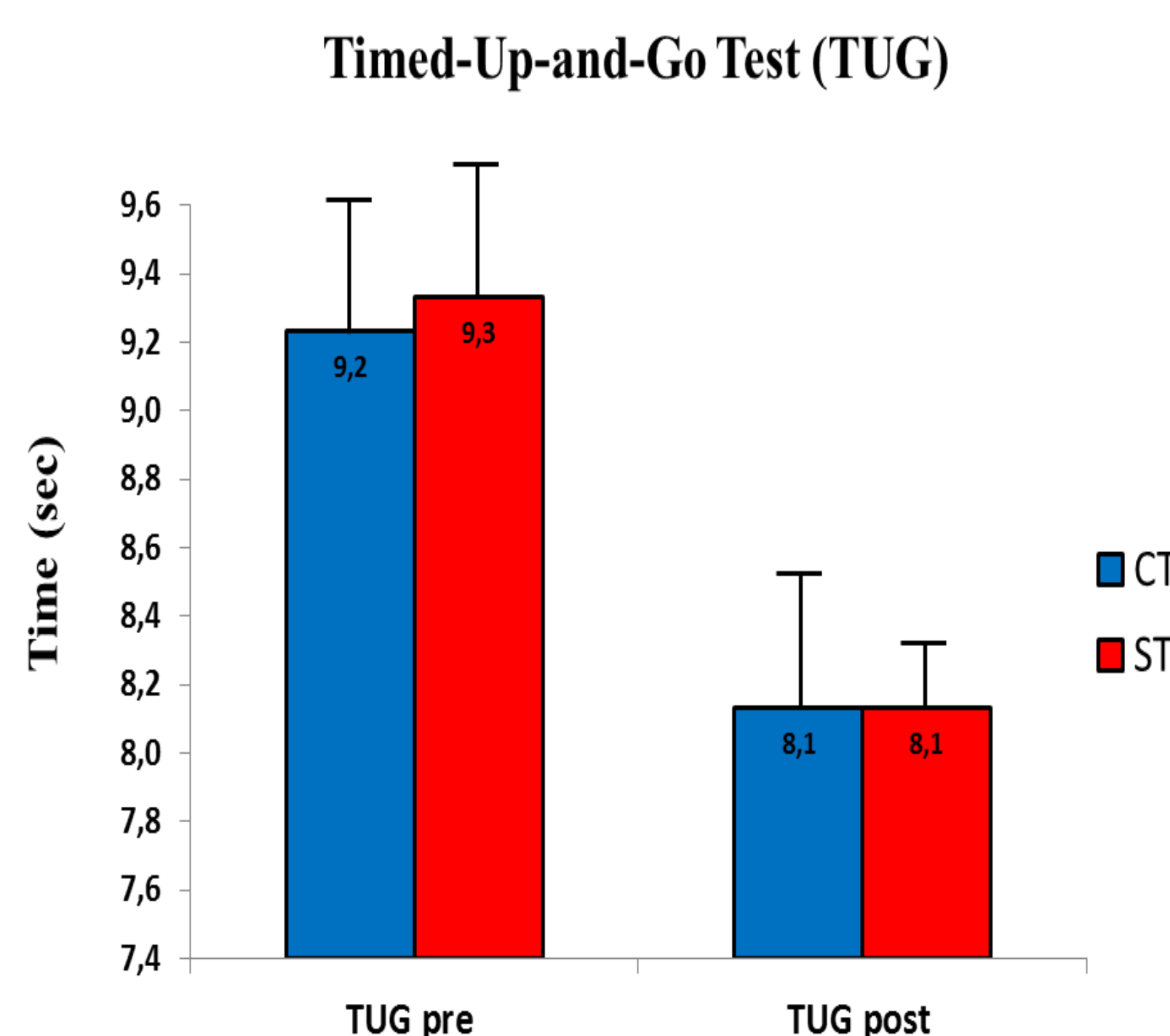


Figure 3. Timed-Up-and-Go Test

After 6 weeks, the most-affected limb in the CT-group showed significant increases in peak torque (+32% at 45°/s; +29% at 10°/s; p<0.0001) and in muscle work (+50% at 45°/s; +42% at 10°/s); in the ST-group peak torque showed a trend of increase (+11%; p=0.12 at 45°/s; +14% at 10°/s), as well as muscle work (+19% at 45°/s; +17% at 10°/s). Data at 10°/s not shown.

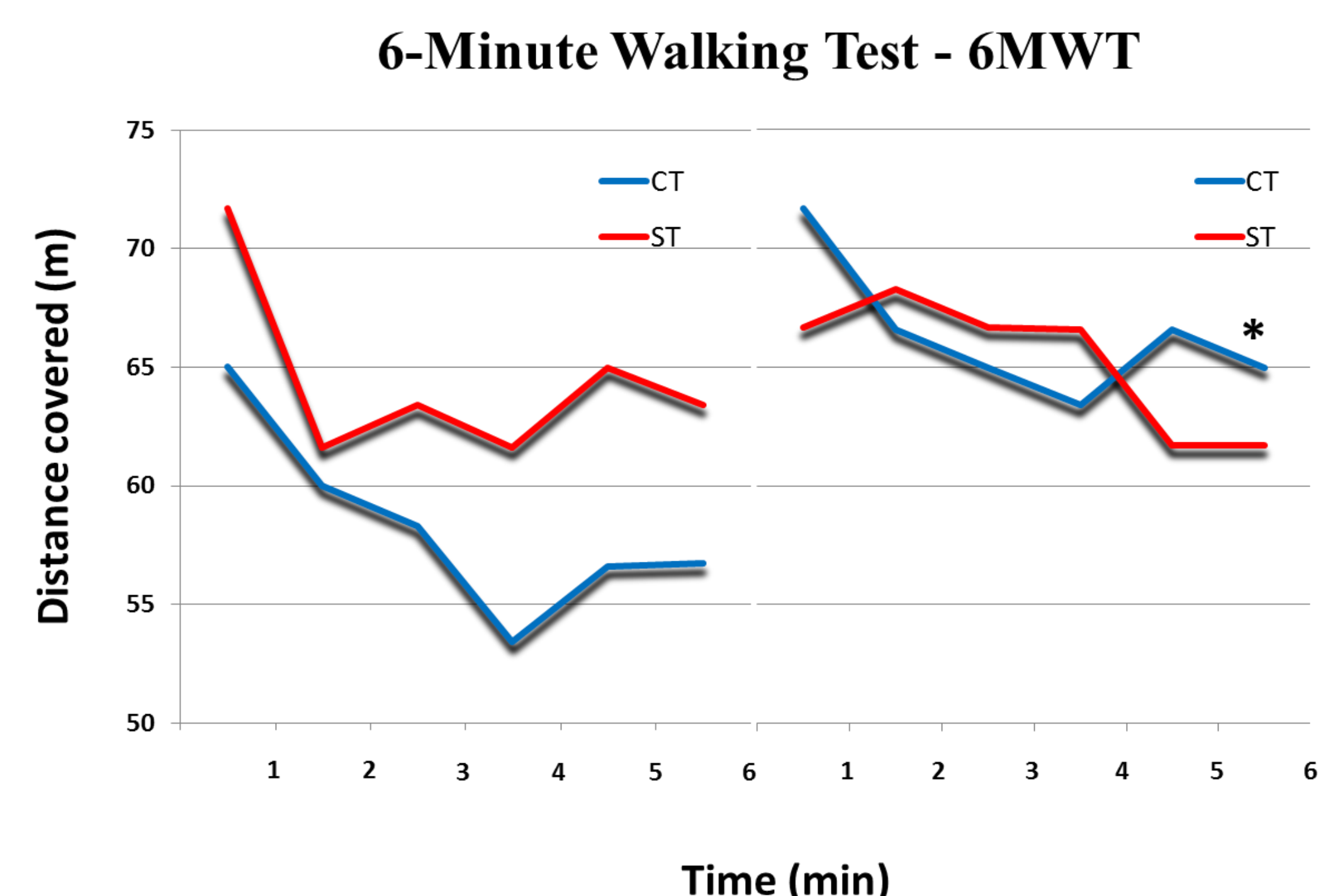


Figure 4. 6-Minute Walking Test * Significant for P < 0.05.

CONCLUSIONS

- Preliminary results show, for the first time, the occurrence of the CT-effect in MS. After 6 weeks of training, CT and ST groups both showed dynamometric and functional improvements but only after CT statistical significance was achieved.
- Surprisingly, despite the present design was set as an exploratory and non-inferiority proof-of-concept trial, the indirect training resulted in a greater gain of both strength and muscle work, which is the main finding of this study.
- These findings disclose new potential implications for CT as a promising approach to those conditions where unilateral muscle weakness does not allow or makes difficult performing a conventional strength training of the weaker limb.

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