

A Comparison of Core Versus Extremity Strengthening Interventions in Patients with Multiple Sclerosis: A Systematic review and Meta-analysis

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Abstract:

Introduction: Mobility impairments associated with Multiple Sclerosis (MS) include poor selective trunk control, imbalanced activation of core, and imbalanced activation of the lower extremity (LE) musculature during gait. Based on these impairments, altered gait mechanics commonly include shorten stride length, decreased cadence, prolonged double stance phase and reduced LE joint motion. Progressive resistive training (PRT) is a longer standing intervention with a fair amount of literature, in MS subjects. Core strengthening has gained more studies with its growing popularity. There is however, no meta-analysis that compares the two intervention. Proximal stability as a prerequisite to distal mobility is a proposed mechanism that may favor core training over extremity PRT training. PRT training also does not address poor selective trunk control directly, however, a more proximal base could directly affect the functional measures of the LE. Therefore, the purpose of this meta-analysis was to determine if strengthening proximal core could be more effective than peripheral LE PRT, for improving both the TUG and walking speed tests. It was hypothesized that core strengthening would have a significant effect on TUG and functional mobility outcomes compared to PRT.

SUBJECTS, METHODS AND MATERIALS: Study design was in accordance with PRISMA guidelines. Search strategy included an exhaustive review of five major databases (PubMed, PEDro, CINAHL, Academic Search Complete, and ProQuest databases). Search terms were systematically reviewed. Inclusion Criteria: studies with an exercise intervention that contained core strengthening and stability training or progressive resistance training. The interventions had to be delivered by a physical therapist. The population of interest was ambulatory people with Multiple Sclerosis (pwMS) between the ages 18 to 65. Abstracts were reviewed and had to yield outcome measures including the Timed Up and Go (TUG), the 10 meter walk test (10MWT) or the 25 foot walk test (25FWT). Quality Appraisal were conducted using the PEDro Scale and Duke University Medical Center Library-Critical Appraisal Sheet.

RESULTS: Nine articles meeting the inclusion criteria were analyzed. Results for the TUG yielded a Grand effect size of .951 in favor of PRT; $Q = 2.419$, $p = .298$. The walking speed yielded a Grand effect size = .821 in favor of PRT; $Q = 2.167$, $p = .338$. Because of significant post-test variability, rate of change was also analyzed. Rate of change of the TUG yielded a Grand effect size = -.017 in slight favor of Core;

Q=2.763, p=.251. Walking speed yielded a Grand effect size= -.002 in slight favor of Core; Q= .034, p=.983.

CONCLUSIONS: The null hypothesis was initially rejected with results favoring PRT over Core (opposite the hypothesis). However, once high variable post-test data was controlled using magnitude of change, (not raw score), the null (no difference between the two) was accepted. It is important to note that while both PRT and Core showed no clear benefit over each other, the Core participants averaged much higher levels of disability than their PRT counterparts yet, they experienced similar change rates variables.

SCIENTIFIC/CLINICAL MERIT/SIGNIFICANCE: pwMS Subject who were more impaired (using EDSS levels) showed just as good of gains using core strengthening as an intervention compared to PRT.