Increased Hip Strength Following a 4-Week Comprehensive Ankle Rehabilitation Program in Persons with Chronic Ankle Instability

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Context: Chronic ankle instability (CAI) is a complex condition associated with a myriad of impairments throughout the lower extremity. Rehabilitation programs which included balance training, strength training, and manual therapies have successfully addressed many of the impairments local to the ankle. However, people with CAI have also demonstrated hip muscle weakness which may promote altered movement patterns and re-injury mechanisms. Currently, it is unclear if hip strength can be improved through the evidence-based interventions previously developed for CAI. Objective: Determine if a 4-week comprehensive ankle rehabilitation program can improve hip strength in individuals with CAI. Design: Interrupted time-series. Setting: Laboratory. Patients or Other Participants: Twenty adults (15 females; age=24.4±7.0 years; height=169.29±10.1cm; weight=70.6±12.9kg) with self-reported CAI participated. Inclusion criteria consisted of a history of ≥1 ankle sprain, ≥2 episodes of giving way in the past three months, answering “yes” to ≥4 questions of Ankle Instability Instrument, and scoring ≤24 on the Cumberland Ankle Instability Tool. Interventions: All subjects participated in a 4-week intervention which included dynamic balance training, ankle strengthening exercises, and talocrural joint mobilizations during twelve sessions with an athletic trainer. Subjects were also instructed to perform daily gastrosoleus complex stretching and ankle strengthening exercises at home throughout the four weeks. Isometric hip abduction, adduction, flexion, and extension strength were assessed using a handheld dynamometer. Peak forces were recorded to the nearest 0.1N. Hip strength was measured four weeks before the intervention (baseline), prior to the first intervention session (pre-intervention), 24 hours following the final intervention session (post-intervention), and two weeks following the intervention (follow-up). For each measure, three trials were collected and averaged during each data collection session and used for analysis. Main Outcome Measures: The independent variable was time (baseline, pre-intervention, post-intervention, follow-up). The dependent variables were peak isometric strength for hip abduction, adduction, flexion, and extension normalized to body mass (N/kg). Minimal detectable change (MDC) was assessed using baseline and pre-intervention data. Separate repeated-measures ANOVAs examined differences over time (pre-intervention, post-intervention, follow-up). Bonferroni post hoc comparisons were completed in the presence of main effects. Alpha was set a-priori at p≤0.05. Results: MDC values for hip abduction, adduction, flexion, and extension were 0.177, 0.168, 0.179, and 0.199N/kg, respectively. A significant main effect was detected for abduction (p=0.002), adduction (p<0.001), flexion (p=0.03), and extension (p<0.001). Significant increases were identified at post-intervention (p≤0.03) and follow-up (p≤0.002) for all measures except post-intervention abduction (p=0.12) and follow-up flexion (p=0.15). Most change scores improved beyond the MDC values for each measure. Conclusion: A 4-week comprehensive ankle rehabilitation program increased hip strength in individuals with CAI. These findings suggest the current evidence-based rehabilitation strategies for CAI may have widespread benefits for lower extremity function despite targeting common ankle impairments.

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