

Strength Gains Without Muscle Injury After Strength Training in Patients with Postpolio Muscular Atrophy

Sidney A. Spector, MD, PhD, Patricia L. Gordon, RN, Irwin M Feuerstein, MD, Kumaraswamy Sivakumar, MD, Ben F. Hurley, PhD, and Marinos C. Dalakas, MD. Neuromuscular Disease Section, NINDS and the Department of Radiology, Clinical Center, National Institutes of Health, Bethesda, MD; and the Laboratory of Exercise Sciences, Department of Kinesiology, University of Maryland, College Park, MD.

OBJECTIVES:

Six patients aged 40-60 years, with postpolio muscular atrophy were evaluated to determine the effects of 10- weeks of progressive strength training on the strength in their quadriceps muscles and their triceps muscles. The quadriceps muscles were exhibiting symptoms of new weakness (occurring 15 or more years after the initial bout with polio) while the triceps muscles exhibited no symptoms.

Changes in muscle size were determined with magnetic resonance imaging. Blood levels of injury indicators were measured throughout training. Muscle biopsies were taken before and after the 10-week training to assess any muscle injury and changes in muscle fiber size and type.

RESULTS:

Strength training led to an increase in dynamic strength of 41% and 61% for the two different knee extensor tests, and 54% and 71% for the two different elbow extensor tests. Follow-up tests showed that up to 20% of the improvement was maintained 5 months after discontinuing training. Isometric strength, muscle cross-sectional areas, and blood levels of injury indicators did not change. The muscle biopsies also showed no indication of injury, and revealed no consistent changes in muscle fiber size or type.

SUMMARY:

These results demonstrate that a supervised strength training program can lead to significant gains in dynamic strength of the muscle groups of postpolio muscular atrophy patients without putting them at risk for muscular damage. This has significant implications for helping patients regain some of the strength lost as a result of the muscle atrophy.

KEISER PIECES USED:

Leg extension, leg press, triceps, and chest press machines.