

# THE INFLUENCE OF TORSO STRENGTH TRAINING ON THE PROGRESSION OF ADOLESCENT SCOLIOSIS

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## INTRODUCTION

Exercise for the treatment of adolescent scoliosis has in the past been considered useless. No specific rationale for exercise has been proposed. With the use of exercise equipment, however, more precise measurement of strength is possible. We have found that all adolescents with scoliosis have unequal torso rotation strength in one direction versus the other. This is not normal. All adolescents except elite one-arm athletes have equal strength. Therefore, the hypothesis was to determine if the strengths could be equalized and if that would have an effect on the progress of scoliosis.

inhibition of paraspinal musculature, which is associated with the spinal curvatures of scoliosis. This was confirmed with surface electrode EMG's. Whether it is cause or effect is unknown.

## METHODS

31 young adolescent patients (age: mean 13.7 years, range 11-18 years; 29 female, 2 male) who had been diagnosed radiographically with idiopathic scoliosis greater than 10° and less than 50° were referred to a physical therapy facility in San Diego or in Auckland, New Zealand. With a starting resistance of ¼ of body weight, they utilized a commercially available exercise device to perform torso rotation progressive resistance exercise. The pelvis was stabilized in a sitting position while exercising so that all musculature used for full range torso rotation was above the pelvis. Once they could achieve 20 repetitions in both directions, the resistance was increased about 5%. The patients exercised twice a week until they plateaued in rotation strength increase and then once a week until growth was complete. Radiographs monitoring curvature were carried out by the various physicians at the start and conclusion of treatment.

## RESULTS

The curvature at the conclusion of treatment was significantly reduced compared with the curvature at the start of treatment ( $p < 0.05$ ). The mean curvature at start of treatment was 29.5° (range 10°-50°). At the conclusion of treatment, the mean curve was 25.1° (range 4°-43°). The mean curve change was a decrease of 4.4° (range 2°-20°). No patient got worse. The percent change in rotation strength was 108.5% (range 35.7%-200%). No patient used a brace.

## DISCUSSION

The key element that differentiates this study from all other studies of exercise related to scoliosis is the use of specific exercise equipment. The exercise equipment allows isolation of appropriate musculature for strength training. It also allows a precise measurement of baseline and progress. Incremental increase in strength can be achieved on the basis of number of repetitions and increase in the resistance from the weight stack of the exercise device. Feedback of progress is readily apparent to the patient. Compliance was not a problem. There were no dropouts of those patients who started the program. The lack of need for bracing was an adequate inducement. The limitation of the study is the small size and lack of comparison to a similar group of adolescents treated in an alternative manner. Neither site of treatment for this study is considered a scoliosis center, thus limiting the size of the population.

The observation of nonsymmetric torso rotation strength offers no new information as to the basic cause of idiopathic scoliosis. However, this observation points to a correctable abnormality which, for curves that are still flexible and not severe enough to require surgery, offers a treatment opportunity which is simple, safe and significantly less expensive than customized bracing. This study does point to apparent