

ANALYSIS OF STRENGTH TRAINING AND SHOULDER SORENESS IN THE ADOLESCENT COMPETITIVE SWIMMER.

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BACKGROUND: Shoulder soreness is a frequent complaint from competitive swimmers. Weakness or muscular imbalance of the shoulder muscles may be possible reasons for this soreness.

PURPOSE: To determine: 1) If strengthening enhances shoulder muscle performance, and 2) if strengthening results in decreased shoulder discomfort or soreness. It was hypothesized that 1) there would be no interaction between rotator cuff strengthening exercises and strength of the rotator cuff and 2) no interaction between rotator cuff strengthening exercises and level of shoulder soreness.

DESIGN AND SETTING: Prospective, randomized, controlled sample of convenience consisting of members of adolescent competitive swim team.

PARTICIPANTS: Male and female swimmers. Most swimmers in this study were under the age of 18 and required permission from a parent before any participation could occur.

METHODS: Shoulder strength was tested with a hand-held dynamometer. Each participant filled out a questionnaire rating current shoulder soreness on a visual/verbal analog scale (0-10). Random assignment was done via roll of a die. Muscle testing was performed by measuring isometric force production of the dominant arm. The primary muscles tested included the shoulder and rotator cuff. Testing occurred initially, at six weeks, and at 12 weeks. After initial testing, the control group continued regular swim practice and their normal swimming regimen. The experimental group was instructed in five different exercises for strengthening the shoulder and rotator cuff muscles. Following 12 weeks the experimental and control groups were compared at each interval: pretest, six week test, and posttest. Data was analyzed using a mixed-design two-way ANOVA. Dependent variables were shoulder and rotator cuff strength. Independent variable was level of soreness.

RESULTS: No differences were found between groups in pain ratings. No strength gain differences were seen for the motions of flexion, abduction, internal rotation, and extension. External rotation showed an increase in the experimental group compared to the control group with a mean increase of 1.14 kg, and 0.51 kg respectively. All participants gained external rotation strength; however, the experimental group gained more than the control. Soreness decreased to a greater degree in the experimental group; however not significantly. Post analysis, the difference in external rotation strength gains may be attributed to the fact that external rotation is the least used motion in swimming strokes;

therefore, the control group was not performing any exercises to increase the strength of this motion.

CONCLUSION AND RELEVANCE: Adolescents swimmers who perform external rotation strengthening can increase strength compared to controls. They will not however see differences in levels of soreness compared to controls.