The Effectiveness of Exercise Therapy in Reducing Pain and Improving Clinical Outcomes in Rotator Cuff Tendinopathy- A Systematic Review

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**Research completed as a component of the Master of Physical Therapy program.*

Background

Disorders of the glenohumeral joint are common, and rotator cuff impairments are the most prevalent of all chronic shoulder conditions. Physiotherapists often prescribe exercises for the conservative treatment of rotator cuff tendinopathy, but few evidence-based guidelines exist which outline the optimal parameters for exercise prescription. The primary objective of this review was to determine the effectiveness of exercise therapy in the treatment of adults with rotator cuff tendinopathy. The secondary objective was to determine the ideal exercise parameters for treating this group of conditions.

Methods

The following databases were searched: Medline OvidSP, CINAHL, and EMBASE. Only RCTs were reviewed. Participants in the included studies must have had a demonstrable pathology of one or more rotator cuff tendons. There must have been an exercise intervention aimed at treating an impairment associated with the tendinopathy. Exercise treatments could be concurrent with other modalities or interventions so long as the exclusive effect of the exercise intervention could be demonstrated. The following were excluded: subjects with significant co-morbidities or other shoulder pathologies, non-English papers, and participants under age 18. The PEDro scale was used to assess the quality of the included RCTs. Scores ranged from 5-10 out of 11 and were considered in the interpretation of the results.

Of the ten articles selected, there were two pairs of articles which were based on the same clinical trials (primary authors Brox and Osteras)- therefore, a total of eight different RCTs were reviewed. Due to the small number of studies, the heterogeneity amongst articles, and the lack of reported means and standard deviations, it was not feasible to perform a meta-analysis. Therefore, a qualitative analysis of the literature was performed.

Results

Pain

Pain was reported in 7 of the 8 studies, in which 5 reported significant between-group differences favoring the exercise intervention group.

Strength

Strength was reported in 5 studies. Each utilized some measure of rotator cuff strength, scapular stabilization strength, or general shoulder strength. There was no consistency in which aspects of strength improved across these studies- however, there were some significant improvements noted which favored the intervention group. One study showed a significant improvement favoring the control group. The majority showed no significant between-group differences.

Range of Motion

Range of motion was reported in 4 studies. 3 studies reported significant improvements favoring the exercise intervention.

Quality of Life

Quality of life was reported in 4 studies, all of which showed a significant between-group difference favoring the exercise intervention. Each study reported quality of life using a different outcome measure.

Function- Combined Measures

Function was reported in some manner in all studies. All but one study demonstrated a between-group difference favoring the exercise group in at least one measure of function.

Primary author	PEDro score	Duration of intervention (weeks)	Weekly exercise dosage	Measurement times (weeks)	PT Supervision	Type of program	Type of exercise	Control Group	Details of exercise progression
Bae (2011)	5	4	3.75 hours	0, 4	Full	Individual	Scapular motor control and strengthening	Conservative	Without pain
Baskurt (2011)	5	6	3 sessions	0, 6	Full	Individual	Scapular stabilization	Conservative	Without substantial pain or fatigue
Brox (1993, 1999)	7/6	13-26	7 hours	0, 13, 26, 130	Partial (decreasing with time)	Individual	ROM/strengthening of rotator cuff and scapular stabilizers	Placebo	Not defined
Holmgren (2012)	10	12	4.6 hours for first 8 weeks, 2.3 hours for last 4 weeks	0, 13	Partial (decreasing with time)	Individual	Eccentric rotator cuff strengthening, and strengthening of scapular stabilizers	Pseudo-control	As per pain monitoring model described in article
Lombardi (2008)	9	8	30 minutes	0, 8	Full	Individual	Progressive strengthening of rotator cuff	No intervention	Based on percentage of 6RM
Ludewig (2003)	7	8	2 hours	0, 8	Minimal	Individual	Strengthening/ stretching rotator cuff and scapular stabilizers	No intervention	Increasing reps and then weight with pain free completion
Osteras (2009, 2010)	7/8	13	3 hours	0, 13, 39, 65	Full	Group-based	High dosage semi-global and global strengthening exercises, and aerobic exercises	Conservative	Pain-free
Walther (2004)	7	12	1.25 hours	0, 6, 12	Minimal (4 sessions)	Individual	Strengthening and stretching of rotator cuff	Pseudo-control	Not stated

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Discussion

This review provides level 1A(-) evidence. In all but one study, exercise was found to be comparable to or more beneficial than placebo or control/comparison groups in all domains. There was inconsistency among studies with respect to the parameters of the exercise programs, so it is difficult to determine which exercises are most effective.

There are definite faults with current definitions of shoulder pathologies and with the diagnostic criteria used to identify the heterogeneous clinical sub-groups. These criteria, as well as current definitions of "tendinopathy," may need to be re-evaluated to allow for more consistency in the inclusion and exclusion of study populations- however, this will limit the generalizations which can be made regarding the effectiveness of exercise for patients with all forms of tendinopathy.

This review has several limitations, including the potential for missed articles, the absence of a meta-analysis, missing data, and the quality of the evidence as there was no cutoff PEDro score for inclusion.

Previous systematic reviews on this topic have found mixed results. Several studies are in agreement with the current review that exercise is beneficial for the treatment of rotator cuff tendinopathy. Others could not support or refute the effectiveness of exercise interventions. No studies have found that exercise has a detrimental effect. The current systematic review adds to the literature by discussing the impact of specificity and dosage in treating rotator cuff tendinopathy- however, specific dosage parameters could not be determined.

Conclusion

The current review has identified a general trend supporting exercise in the treatment of all clinical outcomes examined, but cannot provide more conclusive statements about the effectiveness of exercise in the treatment of rotator cuff tendinopathy. More high quality RCTs are needed in order to determine the ideal parameters for exercise prescription.