Shouldering Independence with ADLs: A Systematic Review

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Abstract: This systematic review investigated the most effective interventions for adults with complete rotator cuff tears to regain independence in activities of daily living (ADLs). Five studies from 2014 to 2024 met the inclusion criteria, focusing on two main themes: the effectiveness of combining physical agent modalities (PAMs) with strengthening exercises, and manual therapy exercises on shoulder pain. Results indicate that PAMs combined with exercises significantly reduce shoulder pain and improve function. Additionally, manual therapy exercises alone are beneficial for enhancing shoulder mobility. These findings suggest that both interventions can effectively aid in the rehabilitation of rotator cuff injuries. Further research with larger sample sizes and longer follow-up periods is recommended.

Importance: A complete rotator cuff tear is a common injury that causes chronic shoulder pain among adults making it difficult to perform ADLs independently. Due to how common the injury is, occupational therapists need to be prepared to treat adults with complete rotator cuff tears and have the knowledge of what are the most effective rehabilitation methods.

Objective: To identify, evaluate, and synthesize the current literature concerning effective interventions used for adults with a complete rotator cuff tear to determine the efficacy of returning to independence.

Data Sources: A literature search occurred between May 9, 2024, and May 17, 2024. Follow up searches were conducted on May 24, 2024. Databases included MEDLINE, Academic Search Complete, CINAHL Complete, Hearth Source, MasterFILE Complete, Psychology and Behavioral Sciences Collection, Vocational and Career Collection, Vocational Studies Complete, Business Source Complete, and Computer Source using Hawai'i Pacific University's online library databases. Search terms included *rotator cuff tear* and *occupational therapy*, as well as combinations of these terms.

Study Selection and Data Collection: This systematic review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. Published studies on effective interventions used for adults with a complete rotator cuff tear were included in the systematic review. Data from presentations, non-peer reviewed literature, and dissertations were excluded.

Findings: Only five studies were included: four Level I and one Level II, according to the American Occupational Therapy Association's Levels of Evidence. The outcomes of these studies indicate that adding PAMs to strengthening exercises or using manual movement

exercises to reduce shoulder pain was most effective in helping individuals return to independence with ADLs.

Conclusion and Relevance: Adding PAMs to strengthening exercises or using manual movement exercises is effective and improves independence with ADLs for adults with a complete rotator cuff tear.

What This Systematic Review Adds: There are limited high quality studies that evaluate effective interventions used for adults with a complete rotator cuff tear. This systematic review provides a starting point for evaluating the efficacy of effective interventions used for adults with a complete rotator cuff tear in OT practice. More research is needed to determine the effectiveness of interventions that promote independence with ADLs after a complete rotator cuff tear.

Key words: ADL, adults, independence, rotator cuff injuries, independence

Introduction

According to the American Academy of Orthopaedic Surgeons, there are approximately 2 million people each year who seek medical attention for rotator cuff issues (Tashjian, 2012). Despite complete rotator cuff tears being a prevalent injury among adults, there is limited evidence regarding the most effective interventions for recovery and restoring independence in ADLs.

Occupational therapists play a vital role in the recovery process for those with rotator cuff injuries. Interventions focus on restoring function, preventing further injury, and returning to independence. The prevalence of this injury emphasizes the importance of identifying effective rehabilitation strategies to restore independence and improve patient outcomes.

The lack of literature available created the need for a systematic review to synthesize existing research and provide clear guidance for best clinical practice. The objective of this systematic review was to identify and evaluate current literature on effective interventions for adults with complete rotator cuff tears, focusing on restoring independence in ADLs. By examining studies published between 2014 and 2024, this review aimed to highlight the most effective treatment strategies and identify limitations and areas where further research is needed.

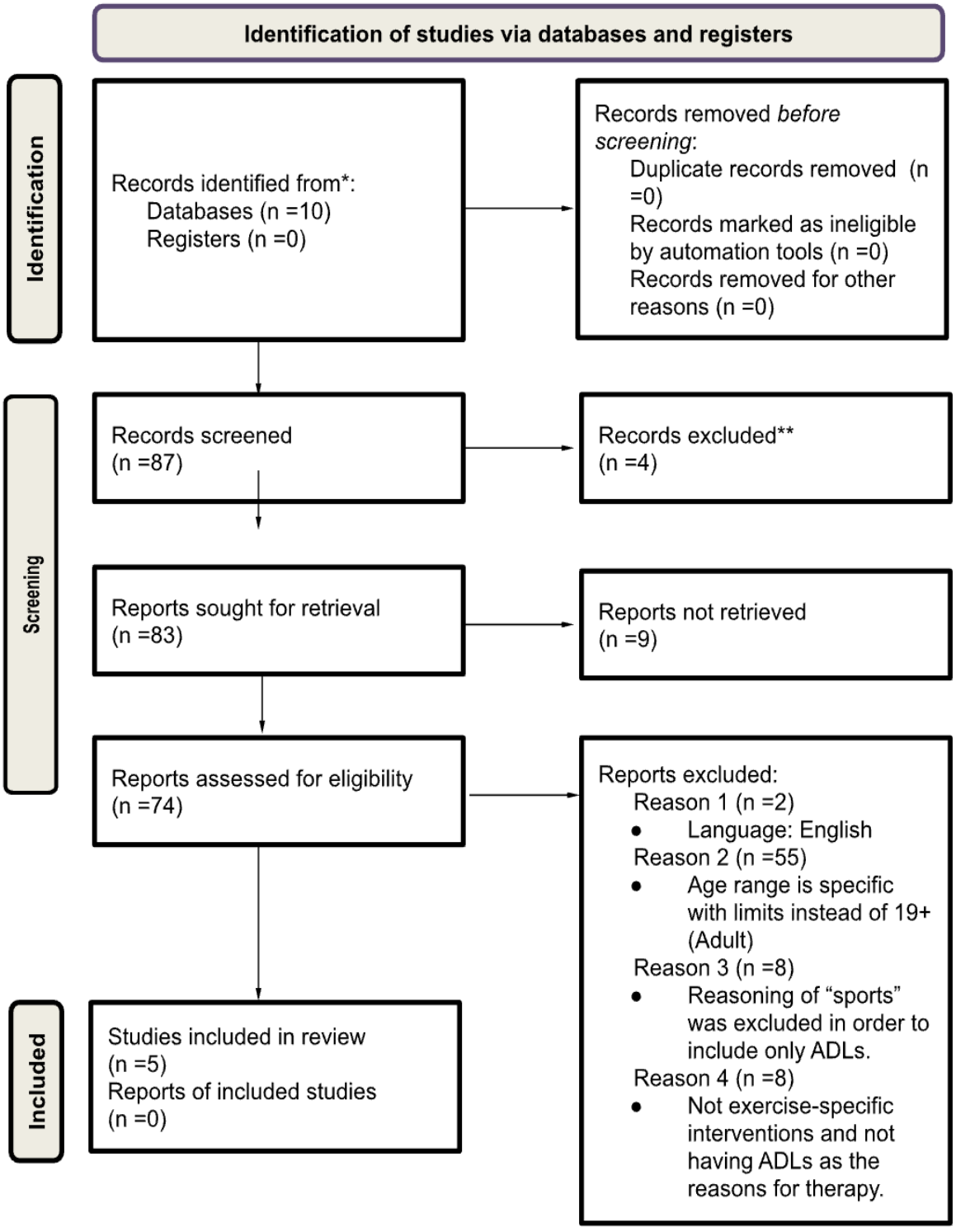
Method

The systematic review adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) and incorporated recommended processes for conducting a systematic review. The guiding research question for this systematic review was: What are the most effective interventions used for adults with a complete rotator cuff tear to return to independence with ADLs?

A broad search of the literature occurred between May 9, 2024, and May 17, 2024. An additional search was conducted May 24, 2024, to ensure all relevant research was included. The inclusion criteria for studies in this systematic review were as follows: peer-reviewed, published in English, and dated between 2014-2024. Exclusion criteria, in addition to those studies that did not meet the inclusion criteria, included articles that were systematic reviews, scoping reviews, dissertations, and presentations. A search for relevant literature was completed using electronic databases: MEDLINE, Academic Search Complete, CINAHL Complete, Hearth Source, MasterFILE Complete, Psychology and Behavioral Sciences Collection, Vocational and Career Collection, Vocational Studies Complete, Business Source Complete, and Computer Source through Hawai'i Pacific University's online library database. Search terms included *rotator cuff tear* and *occupational therapy*, as well as combinations of these terms. Appendix A provides an extensive list of all search terms used for this systematic review. The initial search included 87 articles related to the research topic (Figure 1). Four independent reviewers completed the screening and selection of the studies, assessed their quality, and extracted the data.

Figure 1

PRISMA Flow Diagram



Results

Five studies met the inclusion criteria. The studies were assessed according to their risk of bias, level of evidence, quality, and outcome measures. This systematic review included five studies that contained relevant information regarding effective interventions used for adults with a complete rotator cuff tear to return to independence with ADLs. The information from these studies were divided into two themes: (1) the effectiveness of adding PAMs to strengthening exercises and (2) the use of interventions to reduce shoulder pain. An evidence table is provided in Appendix B. The Cochrane risk-of-bias guidelines were used to assess each article and are provided in Appendix C.

Strengthening Exercises Combined with Physical Agent Modalities

Three of the five studies on the topic discussed the effectiveness of adding physical agent modalities (PAMs) to strengthening exercises to reduce shoulder pain. The PAMs included dry needling, low level laser therapy (LLLT), and ultrasound guided corticosteroid injections. All three of these studies were Level I studies (see Appendix B). All studies provided evidence that the effectiveness of adding PAMs to strengthening exercises and the use of interventions to reduce shoulder pain is effective and potentially beneficial for adults with complete rotator cuff tear injuries.

Ellegaard et al. (2016) evaluated the effects of low-load exercise on postneedling-induced pain after dry needling of active trigger point in individuals with subacromial pain syndrome. In this study, the exercise group that received a single bout of low load exercise on the shoulder experienced a significant decrease in postneedling-induced pain immediately after post-needling when compared to the placebo and control groups. The quantitative data suggest that low-load exercise can effectively reduce short-term pain after dry needling (Ellegaard et al., 2016).

Alfredo et al. (2021) explored the effect of how low-level laser therapy (LLLT) associated with exercise impacts shoulder pain and disability in patients with subacromial impingement syndrome. The participants of the study were assigned to three groups that were treated three times a week for eight weeks. Group I received low laser therapy and exercise, Group II was exercise only and Group III was low-laser therapy only. The group that received low-level laser therapy associated with exercise therapy showed a significant greater improvement in pain score. Additionally, low-level laser therapy combined with exercise improved shoulder function and decreased medication intake in patients with subacromial impingement syndrome (Alfredo et al., 2021).

Salom-Moreno et al. (2017) investigated implementing exercise therapy after ultrasound guided corticosteroid injection in patients with subacromial pain syndrome (SAPS) to improve the effect of the injection therapy on shoulder pain**.** The only statistically significant difference between the groups was observed on the ultrasound examination at week 13. The group that exercised the affected shoulder showed fewer participants with impingement compared to the control group who exercised the uninvolved shoulder. This suggests that exercise therapy might

help reduce impingement in subacromial pain syndrome (SAPS) patients (Salom-Moreno et al., 2017).

The limitations of the studies related to the use of strengthening exercises combined with PAMs include small sample sizes (Ellegaard et al., 2016, Salom-Moreno et al., 2017), short follow up periods (Ellegaard et al., 2016, Salom-Moreno et al., 2017), lack of qualitative data (Ellegaard et al., 2016) and no true control group (Alfredo et al., 2021). One study had a sample size of 90 participants (Ellegaard et al., 2016) and the other had 99 participants (Salom-Moreno et al., 2017). Lastly, Salom-Moreno et al.'s (2017) population was specific to SAPS patients with thickened subacromial bursa, which may not be representative of all SAPS patients.

Implementing Manual Therapy Techniques

Two of the five studies on the topic discussed the effectiveness of simply implementing manual therapy techniques to reduce shoulder pain. One study was classified as a Level I study and the other was classified as a Level II study (see Appendix B). The study provided evidence that manual therapy exercise is effective and potentially beneficial for adults with complete rotator cuff tear injuries.

Lin et al. (2022) evaluated the effectiveness of PNF techniques to improve shoulder mobility and pain in patients with shoulder injuries. The randomized controlled trial consisted of one group who received PNF techniques with manual therapy while the control group received standard manual therapy. The results showed that PNF joint mobilization technique significantly reduced the thickness of the coracohumeral ligament and capsule in axillary recess. Participants of the intervention group also reported a reduction in pain levels and better performance in ADLs (Lin et al., 2022).

Delgado-Gil et al. (2015) compared the effects of mobilization with movement (MWM) to a sham technique in 42 patients (mean ± SD age, 55 ± 9 years; 81% female) with shoulder impingement syndrome (SIS). The study primarily measured pain intensity, pain during AROM, and maximal AROM by a clinician blinded to group allocation. The results, from baseline and after two weeks of MWM or sham, showed that patients with SIS presented better outcomes for pain during shoulder flexion, pain-free range of shoulder flexion, maximal shoulder flexion, and maximal external rotation when participating in four sessions of MWM versus those who received sham intervention (Delgado-Gil et al., 2015).

Limitations in the studies on manual therapy techniques included small sample sizes, no subgroup analyses for factors such as patient education, gender, and work description, and no evaluation of the patients' subjective feelings (Lin et al., 2022). Other limitations include limited generalizability of results, no measure of function, short-term follow-up and the intervention was applied in isolation (Delgado-Gil et al., 2015). Lastly, the timeline in Delgado-Gil et al.'s (2015) study spanned over a four-session-two-week period, and a greater number of sessions could potentially result in greater changes in outcomes or differences in the interventions.

Discussion

The purpose of this systematic review was to compile what is currently known about the most effective interventions used for adults with a complete rotator cuff tear to return to independence with ADLs. The results suggest that adding PAMs with strengthening exercises or using manual movement exercises to reduce shoulder pain was most effective in helping individuals return to independence with ADLs. These results provide a resource for clinicians to better understand the current evidence and learn about treatment options.

Limitations

This synthesis resulted in the review of only five studies, which is a limited amount of data. Given that 82 additional records were originally identified (but ultimately excluded) through other sources, there is the possibility that other studies related to this topic failed to be identified. The initial number of studies were identified with the use of only two search terms, as well as combinations of these terms, and so there is a possibility that other relevant studies related to this topic were excluded via a narrow initial search. During the systematic review process, the search criteria used to narrow the results included “all adult: 19+ years”, which additionally excluded specific age ranges that were above the age 19; because of this, studies relevant to this topic for individuals younger than 19 years of age may have been excluded.

Implications for Occupational Therapy Practice

The findings from the systemic review have several implications for clinical practice and future research regarding rotator cuff tears and the most beneficial interventions that enable individuals to return to ADLs. Occupational therapy practitioners should incorporate physical agent modalities (PAMs), manual therapy, and strengthening exercises to enhance outcomes for patients. There is also a need for more diverse patient populations and studies with larger sample sizes to not only compare interventions but provide insight of the long-term efficacy of incorporating PAMs, manual therapy, and strengthening exercises to interventions.

- Rotator cuff tear is a common injury, and so occupational therapists need to be prepared to competently treat it by pulling from a collection of effective rehabilitation methods.

- Incorporating PAMs, manual therapy, and strengthening exercises with interventions can potentially be beneficial for adults with a complete rotator cuff tear.
- There is a need for studies involving more diverse patient populations and larger sample sizes to compare interventions effectively.
- These interventions are identified as beneficial in enabling individuals to return to activities of daily living (ADLs).

Conclusion

Studies included within this systematic review provide evidence on the effectiveness of the interventions used for adults with a complete rotator cuff tear to return to independence with ADLs. Additional research is necessary to determine the efficiency of interventions that promote independence with ADLs after a complete rotator cuff tear. Advancements in rehabilitation treatments emphasize the importance of personalized care plans to optimize functional outcomes as well as long-term shoulder health.

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Appendix A

Search Terms

rotator cuff tendinopathy or shoulder tendinopathy or subacromial impingement syndrome AND occupational therapy or occupational therapist or occupational therapists or ot

Appendix B

Evidence Table

Systematic Review Evidence Table					
Author/ Year	Level of Evidence Study Design Risk of Bias	Participants Inclusion Criteria Study Setting	Intervention and Control Groups	Outcome Measures	Results
Alfredo et al. (2021)	Level of Evidence 1B Randomized controlled trial	Participants N= 120 age 50–70 years, visual analogue scale (VAS) score above 3 and Positive Neer impingement sign, positive Hawkins Kennedy impingement sign, painful arc between 60° and 120° during active abduction. Pontifical Catholic University	Intervention: Group I ($n = 42$): Low-level laser therapy and exercise Group II ($n = 42$): exercise only Group III ($n = 36$): Low-level laser therapy only	Primary outcome: change in shoulder pain and disability index (SPADI) Secondary outcome: changes in the numeric pain rating scale and medication intake.	Low-level laser therapy associated with exercise therapy for 2 months promoted a clinically important improvement in shoulder pain and disability (primary outcome), decreased analgesic medication consumption (secondary outcomes), and improved shoulder range of motion and self-efficacy for chronic pain in patients with subacromial impingement syndrome.

Ellegaard et al. (2016)	Level of Evidence-1 Randomized controlled trial Risk of Bias-L	n=99 (49 intervention/ 50 control) inclusion criteria- age 18 to 70 years, unilateral shoulder pain provoked by active shoulder abduction and lasting at least 4 weeks, An enlarged subacromial bursa (≥ 2 mm) as assessed by ultrasound imaging in the symptomatic shoulder.	two injections given (separated by 1 week), exercise program consisted of three sessions per week for 10 weeks, with one session per week being supervised by a physiotherapist; the other was home based. participants were randomized 1:1 in blocks of 4–6 using an envelope-based lottery. Due to the type of treatment in both the intervention and control group neither the participant nor the person performing the intervention were blinded.	Pain level (0-100) 0-no pain, 100- worst imaginable pain	No statistically significant differences between groups in the co-primary pain outcomes at week 26 In patients with SAPS and enlarged subacromial bursa, 10 weeks of unilateral exercise of the symptomatic shoulder, given as an add-on to two sequential steroid injections into the subacromial bursa, did not improve the primary outcome of shoulder pain, compared to exercise of the asymptomatic shoulder (control).

Delgado-Gil et al. (2015)	Level of Evidence I Randomized controlled trial	Participants: 55 MWM group: 21 Sham Manual: 21 55 +/- 9 years Patients with shoulder impingement syndrome	Intervention: Mobilization with Movement (MWM) Control: Sham Manual Contact	Primary Outcome Measure: pain intensity, pain during AROM, and maximal AROM.	Significant group x time interaction for pain intensity during shoulder flexion, pain-free shoulder flexion, maximum shoulder flexion, and shoulder external rotation favored the MWM group.

Lin et al. (2022)	Level of Evidence II Randomized controlled trial Risk of Bias Moderate	Participants N=48 (40–65 yr. old) Inclusion Criteria shoulder joint pain and limited mobility for more than 4 weeks Study Setting Department of Rehabilitation Medicine	Intervention: PNF technique under the ICF concept Control Groups: manual therapy	Outcome 1: thickness change of the structure was the thickness value after treatment subtracted from the baseline value upon patient admission. Outcome 2: pain assessment of the shoulder joint Outcome 3: evaluation the shoulder range of motion (ROM)	PNF joint mobilization technique significantly reduced the thickness of the coracohumeral ligament and capsule in axillary recess.

Salom-Moreno et al. (2017)	Level of Evidence-1 Randomized controlled trial Risk of Bias L	n=90 52% female mean age: 35 +/- 13 years active TrPs in the infraspinatus muscle	dry needling into the infraspinatus-divided randomly into experimental (low load exercise of shoulder muscles) and placebo (inactive ultrasound for 10 mins) control group (no intervention)	numerical pain rating scale (0-10), DASH	The exercise group demonstrated a larger decrease in postneedling-induced pain immediately after (P = .001), 24 hours (P = .001), and 48 hours after (P = .006) than placebo or control groups.
Note. RCT= randomized controlled trial					

Appendix C: Risk-of-Bias Table

Risk-of-Bias Table: Randomized Controlled Trial (RCT) and Non-RCT										
	Selection Bias (Risk of bias arising from randomization process)			Performance Bias (effect of assignment to intervention)		Detection Bias		Attrition Bias	Reporting Bias	Overall risk-of-bias (low, moderate, high
Citation	Random Sequence Generation	Allocation Concealment (until participants enrolled and assigned)	Baseline difference between intervention groups (suggest problem with randomization?)	Blinding of Participants During the Trial	Blinding of Study Personnel During the Trial	Blinding of Outcome Assessment: Self-reported outcomes	Blinding of Outcome Assessment: Objective Outcomes (assessors aware of intervention received?)	Incomplete Outcome Data (data for all or nearly all participants	Selective Reporting (results being reported selected on basis of the results?)	
Alfredo et al. (2021)	+	+	+	-	+	-	+	+	+	L
Delgado-Gil et al. (2015)	+	+	+	+	+	+	+	+	+	L
Ellegaard et al. (2016)	+	+	+	+	+	+	+	+	+	L
Lin et al. (2022)	+	+	+	+	+	+	+	+	+	L
Salom-Moreno et al (2017)	+	+	+	+	+	+	+	+	+	L

Note. Categories for risk of bias are as follows: Low risk of bias (+), unclear risk of bias (?), high risk of bias (–). Scoring for overall risk of bias assessment is as follows: 0–3 minuses, low risk of bias (L); 4–6 minuses, moderate risk of bias (M); 7–9 minuses, high risk of bias (H).

Citation. Table format adapted from Higgins, J. P. T., Sterne, J. A. C., Savović, J., Page, M. J., Hróbjartsson, A., Boutron, I., . . . Eldridge, S. (2016). A revised tool for assessing risk of bias in randomized trials. Cochrane Database of Systematic Reviews 2016, Issue 10 (Suppl. 1), 29–31. https://doi.org//10.1002/14651858.CD201601