

Effectiveness of Aquatic Therapy on Increasing Range of Motion and Decreasing Pain in the Rehabilitation of Patients with Shoulder Pathologies: A Systematic Review

David Kearney, SPT
Ryan Lumia, SPT
Evan Siegel, SPT
Scott Szemenyei, SPT
Peter Leininger, PT, PhD, OCS





Definitions

- **Aquatic therapy (AT):** The use of water to facilitate the application of established therapeutic interventions, including stretching, strengthening, joint mobilization, balance and gait training, and endurance training¹
- **Rotator Cuff Repair (RCR):** Surgical intervention to repair one or more damaged or torn tendons of the shoulder girdle musculature
- **Shoulder Impingement Syndrome (SIS):** Pain and/or weakness with elevation of the shoulder joint, where the supraspinatus tendon becomes compressed between the head of the humerus and the coracoacromial arch²

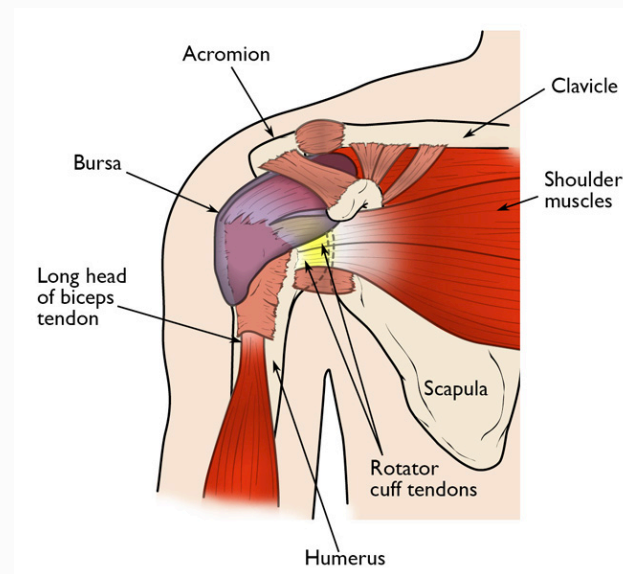


Overview

- Background
- Purpose
- Methods
- PRISMA
- Sackett Level
- Results
- Conclusions
- Limitations
- Discussion
- Clinical Relevance
- Future research
- Acknowledgements
- Reference

Background

- Common causes of shoulder pathologies
 - Tendon inflammation
 - **Rotator cuff tears**
 - Tendonitis
 - Bursitis
 - **Impingement**
 - Instability
 - Dislocation/subluxation
 - Osteoarthritis
 - Fracture
 - SLAP tear
 - Adhesive capsulitis





Background cont.

RCR³

- Incidence: >250,000 repairs per year
- Affects >40% of US population over 60 years of age
- Surgical Options
 - Open
 - Arthroscopic
- Recovery
 - Immobilization for 4-6 weeks
 - Passive exercise following immobilization
 - Strengthening at 8-12 weeks

Shoulder Impingement⁴

- Incidence: 44-65% of all shoulder pain complaints
- Surgical Options
 - Open
 - Arthroscopic decompression
- Other treatment options
 - PT
 - Medication
 - Analgesic, steroid
 - Rest
- Recovery
 - Surgical vs. non-surgical



Background cont.

- Aquatic therapy is most effective when using properties of water including
 - Buoyancy, viscosity, hydrostatic pressure⁵
- Allows patient to start rehab earlier without compromising tissue or bone
 - Land based therapies traditionally wait until structures can tolerate forces of gravity⁶
- Warm water has been shown to decrease pain and increase relaxation, allowing patient to work in larger ranges and prevent compensatory movements⁵
- Hydrostatic pressure provides pressure in all directions, increasing joint stability⁵



Background cont.

- Aquatic therapy has been shown to improve rate of return to prior level of activity⁶
- Improved benefits shown with hands on technique and 1 to 1 treatment sessions⁶
- Beneficial for early on education and retraining of stabilization and functional movement pattern^{5,6}
- Prevents delay in rehab, starting with early on low doses of therapy
 - Results in improved outcomes⁶



Purpose

To determine the effectiveness of aquatic therapy on increasing range of motion (ROM) and decreasing pain in adults with shoulder pathologies.



Methods

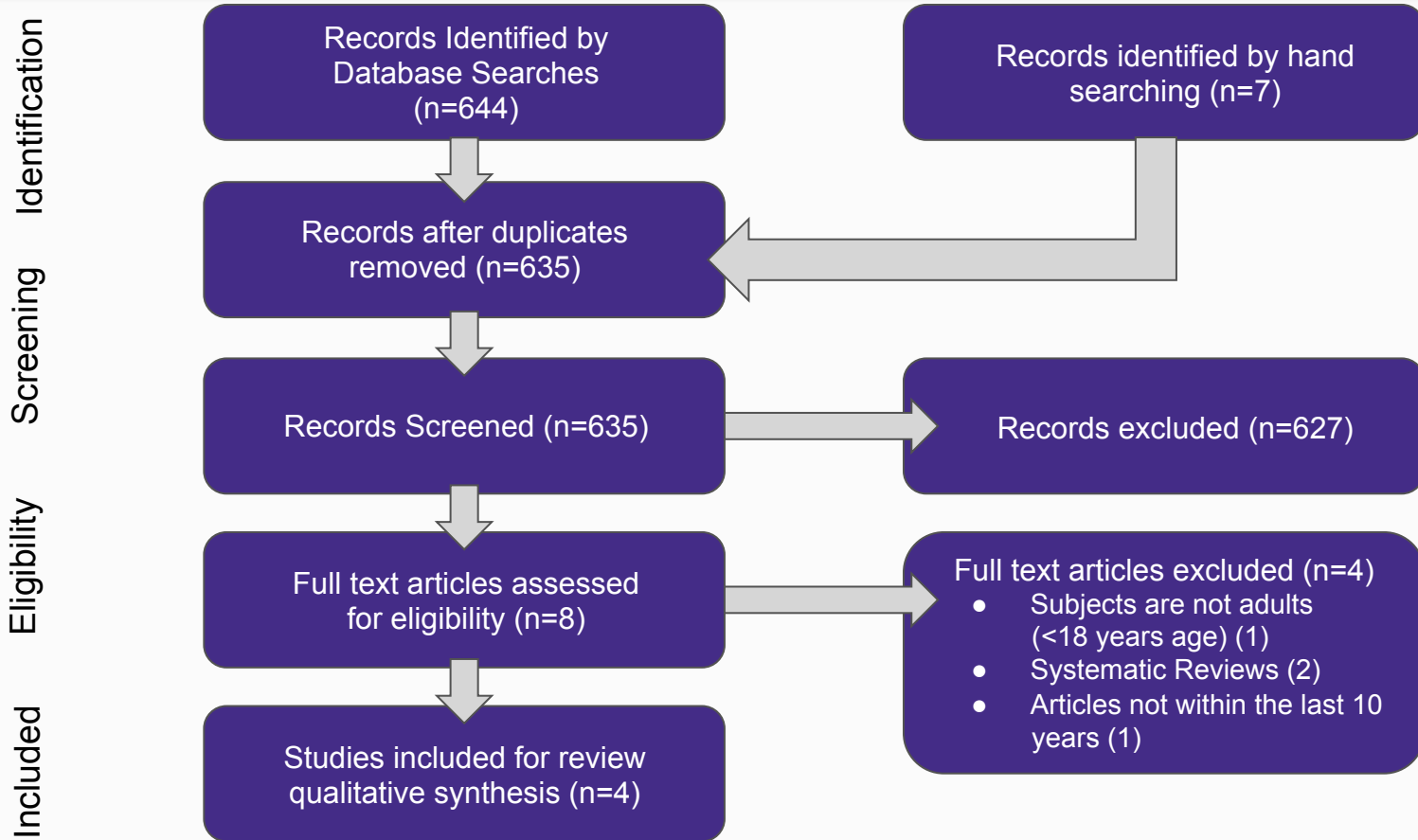
- Search Terms:
 - (Aquatic therapy OR hydrotherapy OR aquatic exercise OR water exercise) AND (rotator cuff OR shoulder injury) AND (Physical therapy or Physiotherapy)
- Search Engines:
 - Google Scholar, MEDLINE/PubMed, Proquest Central, Science Direct, PT NOW



Methods cont.

Inclusion Criteria:

- Adults 18 years or older
- Diagnosis of shoulder injury including rotator cuff repair or shoulder impingement syndrome
- Intervention including aquatic therapy and a measure of range of motion outcomes





| Author (Year) | Sackett Level of Evidence | Study Design |
|-------------------------------|---------------------------|-----------------------------|
| Subasi ² (2012) | 1B | RCT |
| Klintberg ⁷ (2009) | 1B | RCT |
| Brady ⁶ (2008) | 2B | Non-randomized cohort study |
| Burmester ³ (2016) | 3B | Case-controlled study |



Results

- Four articles met selection criteria
 - Three studies looked specifically at rotator cuff repair
 - One study included shoulder impingement syndrome
- Sample sizes ranged from 1 to 57 subjects (90 total) and ages (26-73), all with full thickness RCR or SIS
- Treatment for RCR varied from 2-3x/week with a duration of 6 weeks (2B) and 12 weeks (3B)



Results Cont.

- Outcome measures included:
 - ROM
 - Visual Analog Scale
 - Pain Disability Questionnaire
 - QuickDASH
 - SPADI
 - Penn Shoulder Score
 - Perceived Wellness Survey
 - Western Ontario Rotator Cuff Index
 - Likert Scale



Results Cont.

- One study (1B) continued until subjects returned to prior level of function (PLOF). The 1B study was conducted over a 2-year span. The Shoulder Impingement Syndrome (SIS) study (1B) consisted of 20 days of continuous therapy with AT beginning at day 10.
- ROM increases were seen in both 1B studies and the 2B study.
- All studies showed statistically significant decreases in pain with early AT.



Limitations

- Limited number of randomized control trials
- Mix of land based and AT based therapy
- Varied outcome measures used throughout studies
- Small sample sizes
- Length of interventions varied



Conclusions

- Moderate to strong preliminary evidence (1B,1B, 2B, 3B) suggesting use of AT as an adjunct to land based therapy to improve ROM and decrease pain following RCR and SIS
- Early implemented AT has demonstrated earlier return to functional activity compared to land based interventions alone
- AT was found to improve sleep quality and function



Clinical Relevance

- Clinicians should consider AT as a complementary treatment to a standard land-based protocol
- Early-administered water-based exercise program allows for patients to achieve greater ROM by unweighting the arm incorporating the property of buoyancy
- Allows for early increases in ROM and greater functionality
- Evidence demonstrates increased ROM and decreased pain with complementary AT, allowing quicker return to PLOF



Future Research

- Future research is needed to identify the optimal protocol to be used to increase ROM and decrease pain
- Further research is necessary to determine the most appropriate time to transition from aquatic to land based therapy
- Randomized control trials with a larger sample size to allow for more extensive comparisons of traditional land based and aquatic based protocols



Acknowledgments

- Thank you
 - Peter Leininger, PT, PhD, OCS
 - Renée Hakim, PT, PhD, NCS
 - Tracey Collins, PT, PhD, M.B.A., GCS
 - John Sanko, PT, Ed.D.
 - University of Scranton Physical Therapy Department

Questions ?





References

1. Kisner C, Colby LA. *Therapeutic exercise: foundations and techniques*. 6th ed. Philadelphia: F.A. Davis; 2013. (AT – 1)
2. Subaşı et al. Water-Based versus Land-Based Exercise Program for the Management of Shoulder Impingement Syndrome. *Turk J Phys Med Rehab*. 2012; 58:79-84
3. Burmaster C, Eckenrode BJ, Stiebel M. Early incorporation of an evidence-based aquatic-assisted approach to arthroscopic rotator cuff repair rehabilitation: Prospective case study. *Phys Ther*. 2016;96(1):53-61.
4. De Yang Tien J, Hwee Chye Tan A. Shoulder Impingement Syndrome, A Common Affliction of the Shoulder: A Comprehensive Review. Department of Orthopedic Surgery, Singapore General Hospital, 2014; 23(4)
5. Aquatic therapy early intervention. *Rehab Management*. 2011.
6. Brady B, Redfern J, Macdougall G, Williams J. The addition of aquatic therapy to rehabilitation following surgical rotator cuff repair: a feasibility study. *Physiotherapy Research International*. 2008;13(3):153-161.
7. Klintberg IH, Gunnarsson A, Svantesson U, Styf J, Karlsson J. Early loading in physiotherapy treatment after full-thickness rotator cuff repair: A prospective randomized pilot-study with a two-year follow-up. *Clin Rehabil*. 2009;23(7):622-38.
8. Iannucci L. Making waves with aquatic therapy. *PT in Motion*. 2012;4(9):16-23.