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

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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 training\(^1\)

- **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 arch\(^2\)
Overview

- Background
- Purpose
- Methods
- PRISMA
- Sackett Level
- Results
- Conclusions

- Limitations
- Discussion
- Clinical Relevance
- Future research
- Acknowledgements
- Reference
Common causes of shoulder pathologies

- Tendon inflammation
  - Rotator cuff tears
  - Tendonitis
  - Bursitis
- Impingement
- Instability
  - Dislocation/subluxation
- Osteoarthritis
- Fracture
- SLAP tear
- Adhesive capsulitis
RCR

- 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 Impingement

- 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
Aquatic therapy is most effective when using properties of water including
  - Buoyancy, viscosity, hydrostatic pressure

Allows patient to start rehab earlier without compromising tissue or bone
  - Land based therapies traditionally wait until structures can tolerate forces of gravity

Warm water has been shown to decrease pain and increase relaxation, allowing patient to work in larger ranges and prevent compensatory movements

Hydrostatic pressure provides pressure in all directions, increasing joint stability
● Aquatic therapy has been shown to improve rate of return to prior level of activity\textsuperscript{6}

● Improved benefits shown with hands on technique and 1 to 1 treatment sessions\textsuperscript{6}

● Beneficial for early on education and retraining of stabilization and functional movement pattern\textsuperscript{5,6}

● Prevents delay in rehab, starting with early on low doses of therapy
  ○ Results in improved outcomes\textsuperscript{6}
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
Records Identified by Database Searches (n=644)

Records after duplicates removed (n=635)

Records Screened (n=635)

Records identified by hand searching (n=7)

Records excluded (n=627)

Full text articles assessed for eligibility (n=8)

Full text articles excluded (n=4)
- Subjects are not adults (<18 years age) (1)
- Systematic Reviews (2)
- Articles not within the last 10 years (1)

Studies included for review qualitative synthesis (n=4)
<table>
<thead>
<tr>
<th>Author (Year)</th>
<th>Sackett Level of Evidence</th>
<th>Study Design</th>
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</thead>
<tbody>
<tr>
<td>Subasi² (2012)</td>
<td>1B</td>
<td>RCT</td>
</tr>
<tr>
<td>Klintberg⁷ (2009)</td>
<td>1B</td>
<td>RCT</td>
</tr>
<tr>
<td>Brady⁶ (2008)</td>
<td>2B</td>
<td>Non-randomized cohort study</td>
</tr>
<tr>
<td>Burmaster³ (2016)</td>
<td>3B</td>
<td>Case-controlled study</td>
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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
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Questions

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References