

# Aquatic Therapeutic Exercise

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ESAT 3642  
Therapeutic Exercise

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## Introduction

- Greek and Romans
- Early 1900's – whirlpools
- Recent interest in using water for rehabilitation exercise

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## What and Why of Aquatic Therapeutic Exercise

- Application of therapeutic exercise that takes place in water
- Advantageous if athlete unable to perform land-based exercises
  - Begin exercises sooner
  - Non-weight bearing

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## What and Why of Aquatic Ther. Ex. Continued

- Total exercise programs
  - CV conditioning
  - Flexibility
  - Strength
  - Muscle endurance

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## Physical Properties and Principles of H<sub>2</sub>O

- Specific Gravity (Relative density)
  - Density of an object relative to that of water
    - Water = 1
    - Object density > 1 = sink
    - Object density < 1 = float
    - Relative density of human body determined by body composition
    - Fat = 0.8, bone = 1.5-2.0, muscle = 1.0

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## Physical Properties and Principles of H<sub>2</sub>O

- Buoyancy
  - Archimedes' principle
    - A body partially or fully immersed in a fluid will experience an upward thrust of that fluid that is equal to the weight of the fluid it displaces
  - Center of buoyancy
    - Center of gravity of displaced fluid and the point at which buoyant force acts on body
    - Equilibrium of floating body
      - Center of buoyancy and center of gravity are vertically aligned

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## Physical Properties and Principles of H<sub>2</sub>O

- Hydrodynamics
  - Movement through water is governed by:
  - Viscosity
  - Drag
    - Form
    - Wave
    - Frictional

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## Physical Properties and Principles of H<sub>2</sub>O

- Hydrostatic pressure
  - Pascal's law – pressure from fluid is exerted equally on all surfaces of an immersed object at any given depth
    - Deeper = greater pressure
    - + affect on edema
  - Weight bearing in water
    - Deeper the body = less weight borne by lower extremity

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## Exercise Equipment

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|---------------------|---------------------|
| ■ Assistive devices | ■ Resistive devices |
| ■ Floatation cuffs  | ■ Water shoes       |
| ■ Pull buoys        | ■ Fins              |
| ■ Vests and belts   | ■ Boots             |
| ■ Kickboards        | ■ Webbed gloves     |
| ■ Water dumbbells   | ■ Paddles           |
| ■ Other             | ■ Bells             |

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## Indications

- Pain
- Edema
- Muscle spasm
- Loss of motion
- Weakness
- Limited endurance
- Restricted weight-bearing status

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## Advantages

- Early activity with non-weight bearing status
- Reduction of joint compressive forces
- Warmth of water
  - Relaxation of muscles
  - Gate theory mechanisms
- Psychological factors

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## Precautions

- Fear of water
- Medications
- Ear infections
- Diabetes
- CV disease
- Seizure disorders
- Sensitivity to pool chemicals

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## Contraindications

- Illness
- Open wounds
- Tracheostomy
- Severe kidney disease
- Presence of nasogastric tube
- Fecal incontinence
- Radiation treatments in last 3 months
- History of uncontrolled seizures

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## Aquatic Exercise Progression

- Early-phase exercises
- Middle-phase exercises
- Advanced-phase exercises
- End-phase exercises
- Progression guidelines

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## Deep-Water Exercise

- Non-weight bearing

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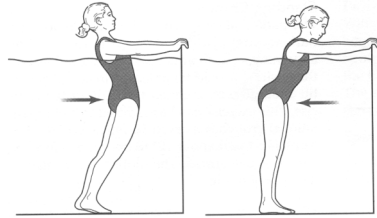
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## Exercises for the Spine – Shallow Water

- Neck stretches
- Spine flexion-extension



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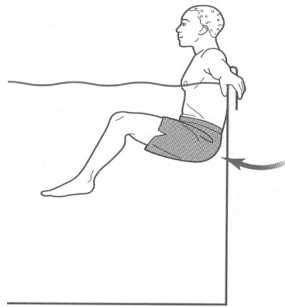
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## Exercises for the Spine – Shallow Water

- Lateral stretch
- Pelvic roll



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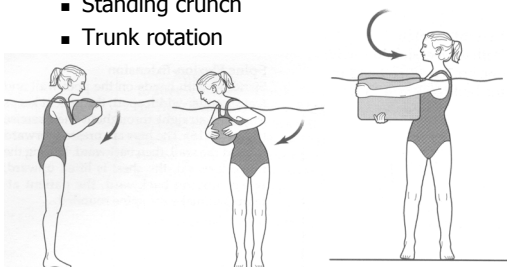
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## Exercises for the Spine – Shallow Water

- Standing crunch
- Trunk rotation



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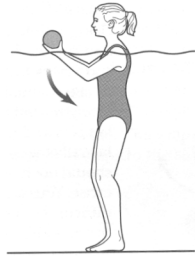
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## Exercises for the Spine – Shallow Water

- Wall push-offs
- Pull-downs



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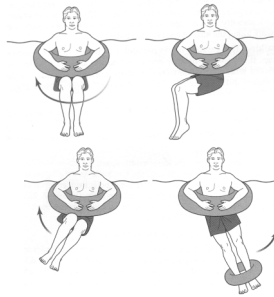
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## Exercises for the Spine – Deep Water

- Double-leg lift
- Trunk rotations
- Lateral flexion



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## Exercises for the Lower Extremity – Ambulation and Balance Activities in Shallow Water

- Forward walking
- Backward walking
- Toe walking
- Heel walking

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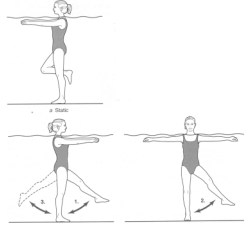
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### Exercises for the Lower Extremity – Ambulation and Balance Activities in Shallow Water

- Single-leg balance



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### Exercises for the Lower Extremity – Ambulation and Balance Activities in Shallow Water

- Lunges
- Carioca
- Running

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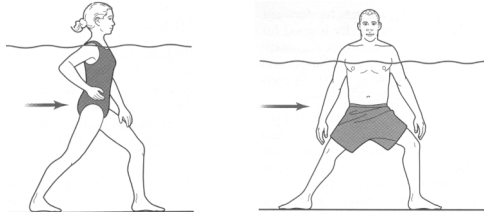
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### Hip Exercises - Shallow Water

- Hip extension
- Hip abductor stretch



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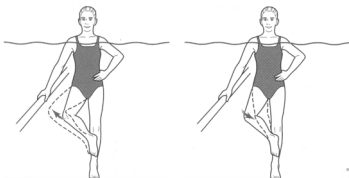
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## Hip Exercises - Shallow Water

- Hip internal-external rotation
- Figure 8's



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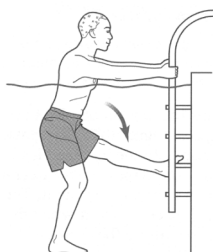
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## Knee Exercises - Shallow Water

- Quadriceps stretch
- Hamstring stretch



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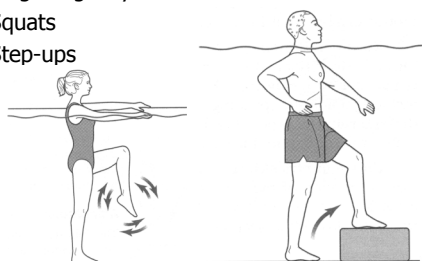
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## Knee Exercises - Shallow Water

- Single-leg bicycle
- Squats
- Step-ups



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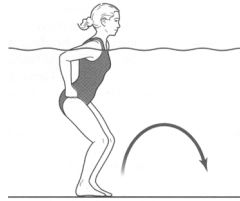
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## Ankle Exercises - Shallow Water

- Gastrocnemius-soleus stretch
- Heel raises
- Ankle walking
- Hopping



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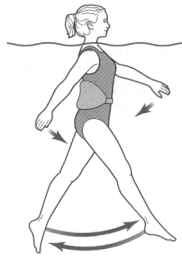
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## Exercises for the Lower Extremity –Ambulation and Balance Activities in Deep Water

- Stride walking
- Cycling
- Running
- Cross-country skiing



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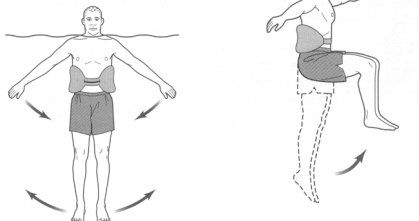
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## Hip Exercises - Deep Water

- Jumping jacks
- Double-knee lift



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## Hip Exercises - Deep Water

- Flexion with external rotation
- Hip abduction
- Flutter kicking



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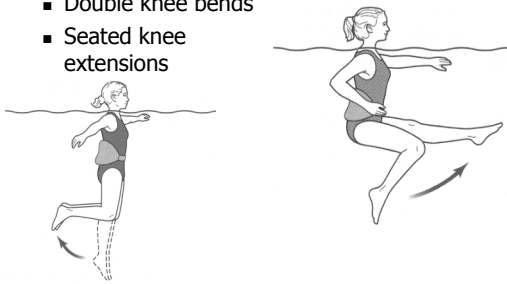
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## Knee Exercises - Deep Water

- Double knee bends
- Seated knee extensions



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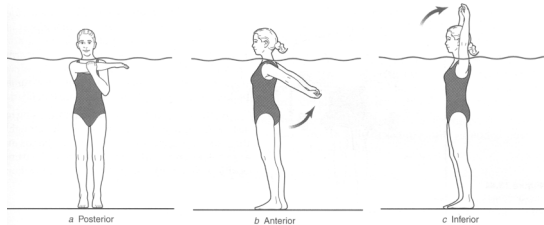
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## Upper-Extremities Exercises in Shallow Water - Shoulder

- Pectoralis stretch
- Capsule stretch



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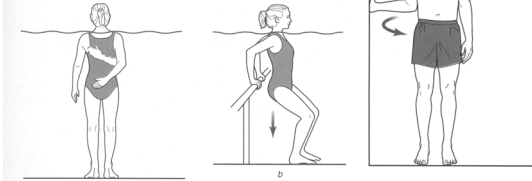
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## Upper-Extremities Exercises in Shallow Water - Shoulder

- External rotator stretch
- Internal rotator stretch



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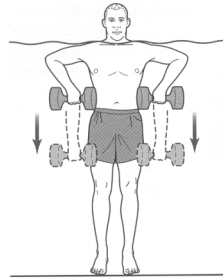
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## Upper-Extremities Exercises in Shallow Water - Shoulder

- Shoulder press-down
- Shoulder abduction-adduction



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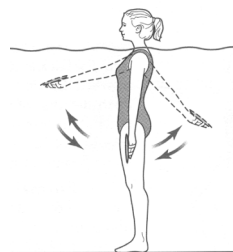
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## Upper-Extremities Exercises in Shallow Water - Shoulder

- Shoulder flexion-extension
- Horizontal abduction-adduction
- Internal rotation-external rotation



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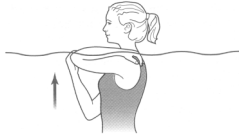
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## Upper-Extremities Exercises in Shallow Water - Elbow

- Elbow extensor stretch
- Forearm curl
- Supination-pronation
- Elbow extension



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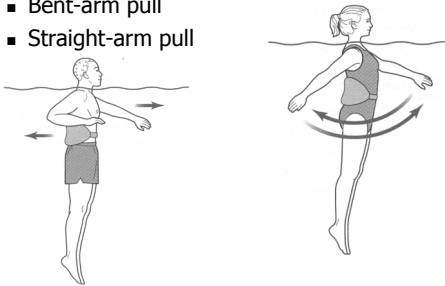
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## Upper-Extremity Exercises in Deep Water

- Bent-arm pull
- Straight-arm pull



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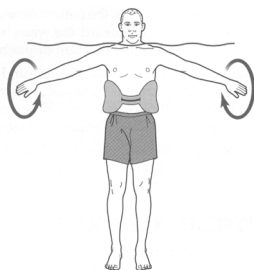
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## Upper-Extremity Exercises in Deep Water

- Arm circles
- Breaststroke



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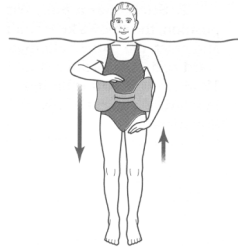
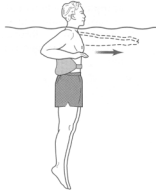
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## Upper-Extremity Exercises in Deep Water

- Shoulder press
- Elbow press
- Wave



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