

**Aquatic Exercise:  
Benefits and Principles for  
the EDS Population**

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**Benefits of Aquatic Exercise**

- Reduce stress on joints
- Increase muscle strength and tone
- Decrease pain
- Increase cardiovascular function
- Improve balance and coordination
- Decrease edema
- Improve posture and trunk control
- Increase in limited range of motion
- Improve circulation due to hydrostatic pressure

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**Benefits of Aquatic Exercise (cont.)**

- Warm water promotes relaxation
- Improve proprioception
- Improve kidney function
- Increase respiratory function - due to hydrostatic pressure

• **Fun**

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**Water as a Medium for Exercise**

- **Buoyancy**
  - Decreases the stress placed on joints resulting in less pain
  - Assists with movement by eliminating gravity
- **Resistance**
  - Allows for increased resistance without the use of weights, limiting the distraction of joints
- **Pressure**
  - Hydrostatic pressure reduces joint and soft tissue swelling
  - Improves joint position awareness
  - Assists with venous return
- **Relaxation**
  - Warm water allows for relaxation of muscles and blood vessels, improving blood flow

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**Physical Properties of Water Related to Aquatic Exercise**

- **Buoyancy**
  - *Upward pressure exerted by a fluid in which a body is immersed (Archimedes Principle)*
  - Buoyancy and gravity are antagonists
  - Equilibrium is reached when floating partially immersed
    - Upright at neck level

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**Physical Properties of Water Related to Aquatic Exercise (cont.)**

- **Buoyancy (cont.)**
  - Provides support
    - Reduces effects of gravity on joints
    - Decreases strain on muscles and joints
  - Provides resistance
    - Using flotation equipment

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**Physical Properties of Water**  
**Related to Aquatic Exercise** (cont.)

- **Hydrostatic pressure**
  - *Fluid pressure is exerted equally on all surface areas of an immersed body at rest at a given depth (Pascal's Law)*
  - The deeper the body part is in water, the greater the force
- **Benefits**
  - Returns blood to heart more efficiently
    - e.g. - from legs to heart
  - Mild resistance of rib expansion- breathing in neck deep water is exercise in itself

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**Physical Properties of Water**  
**Related to Aquatic Exercise** (cont.)

- **Relative density**
  - *Relation of mass of object to mass of equal volume of liquid at standard temperature and pressure*
  - Sink or float
    - Object more dense than water, will sink
    - Object less dense than water, will float
    - Muscle is more dense than adipose tissue (fat)

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**Physical Properties of Water**  
**Related to Aquatic Exercise** (cont.)

- **Fluid resistance**
  - *Force that opposes motion of an object through a fluid*
  - It is necessary to push through water in order to move yourself, thus acting as resistance
  - Supports your body in water and assists you with holding your position

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**Physical Properties of Water  
Related to Aquatic Exercise** (cont.)

- **Fluid resistance** (cont.)
  - Benefits
    - Improve balance
    - Increase sensory awareness
    - Improve reaction time in a gentle environment

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**Physical Properties of Water  
Related to Aquatic Exercise** (cont.)

- **Turbulence-**
  - *Random motion of water as it responds to a disturbance*
  - Benefits
    - Swirling of water against the body
      - Massage
        - Increase circulation
        - Decrease pain
      - Resistance
      - Sensory input
        - Overpowers pain message to brain (like a TENS unit does)
  - Change in speed or direction can alter turbulence force
  - Increase turbulence with gloves, paddles, jets, and more people in water around you

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**Signs of Overuse in the EDS  
Population**

- It is **normal** for muscles to feel sore or tired for 24-48 hours after exercising
- It is **not normal** to have the following symptoms after exercising:
  - Muscle cramps/spasm
  - Muscle twitching
  - Increase in muscle/joint pain
  - Decrease in range of motion
  - Decrease in functional activity
  - Extreme fatigue

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### Guidelines for the EDS Population

- If you exhibit signs of overuse, you did too much
  - Decrease one or more of the variables
  - If symptoms continue, discuss with your PT or doctor
- Water exercise can be deceiving, it may seem easy and that you can do more than you should
- The first time you exercise in the water, stick with an easy workout, until you see how the water has affected you
  - Warm water can increase fatigue, use caution
- Be sure to hydrate – you still sweat in water
- Wear pool shoes for better traction
- Your body may be tired after water exercise, be sure to have a safe way to get out of the pool
- **NEVER GO IN THE WATER ALONE**

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### Types of Aquatic Exercise

- **Ai Chi**
  - Strengthen and tone body while enhancing relaxation
- **Aquatic PNF**
  - Proprioceptive neuromuscular facilitation which uses patterns of movement in different positions with specific exercises
- **Bad Ragaz Ring Method**
  - A series of movements while being supported by a ring or float at neck and hips

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### Types of Aquatic Exercise (cont.)

- **Back Hab**
  - Walking program using varying strides and stretches
  - Useful for individuals with back pain, hamstring injuries, or decreased abdominal strength
- **Fluid Movements**
  - Individuals follow a series of movements based on early developmental stages of infancy
- **Halliwick Method**
  - Rotational patterns are performed to improve balance and postural control

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**Types of Aquatic Exercise** (cont.)

- **Swim stroke**
  - Using a variety of stroke forms
- **Task type training**
  - Use of functional activities in water
- **Watsu**
  - Moving the body in a way that enables one part of the body to be stretched at a time

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**Aquatic Exercise Equipment**

- **Assistive**
  - Floats
    - Noodles
    - Vests
    - Belts
  - Dumbbells
  - Webbed gloves
  - Flippers
  - Kickboards

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**Aquatic Exercise Equipment** (cont.)

- **Resistive**
  - Webbed gloves
  - Foam dumbbells
  - Paddles
  - Flippers
  - Jets

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**Components of Aquatic Exercise**

- **Warm up**
  - 5-10 minutes
  - Gentle movements
  - Adapt to being in water
  - Walking

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**Components of Aquatic Exercise (cont.)**

- **Stretching and ROM**
  - Can be used as part of the warm up
  - Range of Motion (ROM) should only be done within the normal range
  - Stretching should focus on any areas that are tight and should only be done within the normal ROM
  - Warm water will relax the muscles, enabling muscles to stretch easier
    - *This can lead to overstretching/hyperextension in the EDS population which is contraindicated. Use caution.*

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**Components of Aquatic Exercise (cont.)**

- **Strengthening/Toning**
  - Variables that impact strengthening/toning
    - Buoyancy
    - Resistance
    - Surface area
    - Turbulence
    - Lever arm length
    - Speed
    - Depth
    - Frequency
    - Repetitions

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**Components of Aquatic Exercise** (cont.)

- **Depth of Water as it Relates to Weight Bearing**
  - The deeper the water, the less force will be placed through your joints
  - If you are at C7 (neck level), you are at 10% of your body weight
  - If you are at the xiphoid process, you are at 33% of your body weight
  - If you are at the level of your belly button, you are at 50% of your body weight

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**Components of Aquatic Exercise** (cont.)

- **Strengthening/Toning**
  - **Use of buoyancy to support**
    - Floating position on back
    - Move arms and legs in a way that the water supports you

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**Components of Aquatic Exercise** (cont.)

- **Strengthening/Toning (cont.)**
  - **Use of buoyancy to assist**
    - Positioning self in a way that the water will assist with the movement
      - In neck deep water, palm on thigh
      - Allow water to assist hand coming to surface
      - Longer lever arm will increase ease of movement

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**Components of Aquatic Exercise** (cont.)

- **Strengthening/Toning** (cont.)
  - **Use of buoyancy to resist**
    - Use of the water to resist your movement
      - Neck deep - palm on surface of water and pull down to thigh
      - Same exercise can be made harder with the addition of a floatation device such as a Styrofoam dumbbell
      - Longer lever arm is going to increase difficulty

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**Components of Aquatic Exercise** (cont.)

- **Strengthening/Toning** (cont.)
  - **Resistance**
    - Increase the resistance by increasing the speed
    - Decrease the resistance by decreasing the speed

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**Components of Aquatic Exercise** (cont.)

- **Strengthening/Toning** (cont.)
  - **Turbulence**
    - Movement of water around you will challenge your balance and strength
    - Water propelled by jets will increase the turbulence of the water and increase the challenge
    - Moving against turbulence will be the greatest challenge
    - Only progress through these levels when you are able to successfully perform at each level.
    - The more people in the water, the more the turbulence

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**Components of Aquatic Exercise** (cont.)

- **Strengthening /Toning** (cont.)
  - **Surface area**
    - Increasing the surface area of the water being displaced by movement will increase strength
    - Open hand with fingers spread apart will be easier than closing your hand and moving through the water
    - Moving through the water with the side of your palm cutting through the water will be easier than if you move through the water with your palm flat
    - This applies also to the concept of surface tension

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**Components of Aquatic Exercise** (cont.)

- **Aerobic exercise**
  - Walking
  - Swimming
  - Deep water bicycling
  - Deep water jogging
  - Treadmill walking/running
  - 10-20 minutes is the goal
    - May need to start at 2-3 minutes and gradually work up to longer time frame

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**Components of Aquatic Exercise** (cont.)

- **Cool down**
  - 5 minutes of relaxing movement
    - Slow walking
    - Gentle swimming/floating

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### Additional Components of Aquatic Exercise

- **Balance** - floats assist, turbulence challenges
- **Trunk control/Strength** - turbulence will challenge
- **Proprioception** -
  - Ankle weights assist (but not recommended in this population)
  - Buoyancy will challenge
  - Water takes away visual accuracy - improves prop.
- **Coordination**
  - More challenging with resistance of water

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### Water Temperature

- Recommendations:
  - 85-88 degrees for active/aerobic exercise
  - 88-92 degrees for passive or gentle active exercise
  - Over 95 degrees at risk for excessive fatigue and dehydration

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### Aquatic Exercise Precautions for POTS/ VEDS

- POTS
  - Movement will minimize issues
  - Issues can result from
    - Change of position (supine to stand)
    - Static postures (sitting /standing for longer than 20 mins.)
  - Water temperature should be less than body temp
- VEDS
  - Low impact
  - Minimal aerobic exercise

(Dr. Tinkle)

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### Precautions for Aquatic Exercise

- Fear of water
- Impaired mobility getting in and out of pool
- Significant balance or vestibular disorder
- Orthostatic hypotension
- Recently healed surgical incision
- Absent or impaired peripheral sensation
- Diabetes
- Respiratory dysfunction
- Colostomy
- Difficulty with bowel or bladder control
- Seizure disorder controlled well by medications
- Tracheotomy tube
- Compromised vision without corrective lenses
- Compromised cardiac or respiratory system (poor endurance or asthma)

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### Contraindications for Aquatic Exercise

- Cardiac failure
- Fever
- Infection
- Urinary infections
- Open wounds
- Infectious diseases
- Contagious skin rash
- Excessive fear of water
- Severely weakened or deconditioned state
- Uncontrolled seizures
- Bowel or bladder incontinence
- Colostomy bag or catheter used by patient
- Cognitive or functional impairment that would create a hazard to the patient in the pool
- Poor endurance
- Abnormal tone
- Severe or decreased range of motion that limits function

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### Case Study 1

- 45 year old pt. that has HEDS
- Occasional aches and pains that generally resolve
- Pt's goal is to increase general strength/tone
- Otherwise uncomplicated medical history

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### Case Study 2

- 12 year old child with frequent joint dislocations/ sub-luxations in knees, SI joint, elbows, shoulders, fingers
- Decreased muscle tone
- Pain in feet limiting activity
- Significant joint laxity in all gross joints
- Unable to participate in sports/PE

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### Case Study 3

- 25 year old with significant pain in shoulders, neck and back
- Has tried land based therapy 3 times with no success in resolution of pain
- Spends day at desk working on computer

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