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

Benefits of Aquatic Exercise (cont.)
- Warm water promotes relaxation
- Improve proprioception
- Improve kidney function
- Increase respiratory function - due to hydrostatic pressure

• Fun
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
  - Assists with venous return
- **Relaxation**
  - Warm water allows for relaxation of muscles and blood vessels, improving blood flow

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

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
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

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)

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
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

- **Turbulence**
  - Random motion of water as it responds to a disturbance
  - Benefits
    - Swirling of water against the body
      - Increase circulation
      - Decrease pain
    - Massage
    - 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

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
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

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

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
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

Aquatic Exercise Equipment

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

Aquatic Exercise Equipment (cont.)

- Resistive
  - Webbed gloves
  - Foam dumbbells
  - Paddles
  - Flippers
  - Jets
Components of Aquatic Exercise

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

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.

Components of Aquatic Exercise (cont.)

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

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

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
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

- Resistence
  - Increase the resistance by increasing the speed
  - Decrease the resistance by decreasing the speed

- 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
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

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

Components of Aquatic Exercise (cont.)

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

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

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)
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)

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

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
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

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

Bibliography

- "Aquatic Precautions." Message to the author. 19 June 2012. E-mail.