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Utilizing the Aquatic Environment to Treat Chronic Pain: A focus on Fibromyalgia & Chronic Low Back Pain

Assistant Professor
West Virginia University
lsherlock@hsc.wvu.edu

Defining Chronic Pain

• Pain that persists for longer than 6 months (IASP)
• Widespread pain is defined as pain present at 2 contralateral quadrants of the body and in the axial skeleton, and persisting for at least 2 months (Wolfe et al.)

Chronic Pain

• Three primary classifications of pain:
  ◦ Nociceptive pain
  ◦ Inflammatory pain
  ◦ Pathological pain
    ◦ Neuropathic
    ◦ Dysfunctional
Mechanism of Chronic Pain Development

- Inflammation → Sensitization of Peripheral Terminals of Nociceptors → Hyperexcitable Axons & Structural modifications of neuronal bodies, Brain, and SC → Central Sensitization, Neuroimmune Activation & Altered Neuronal Processing

Influences of Pain Amplification

- Mood
- Cognitive functions
- Memories
- Attention
- Distraction
- Modifications in neural structures

Symptoms Associated with Chronic Pain

- Alterations in Mood (Anxiety, Depression, Irritability…)
- Psychosocial problems
- Disengagement
- Fatigue
- Sleeplessness
- Immunosuppression
- Variations in Appetite
- Cognitive Abilities
- Sensory input perception
- Deconditioning
- Structural alterations in muscle tissue, DNA, and Cerebral Structures
How Physical Agents may Influence Pain

- Resolving inflammation
- Facilitating tissue repair
- Activating temporary analgesia
- Altering nerve conduction
- Providing a counterirritant
- Modifying muscle tone or tissue extensibility
- Reducing the probability of maladaptive central neuropathic changes developing into chronic pain generation loci
- Providing palliative relief from pain sensations
- Altering psychological aspects that influence pain

Effects of Exercise on Chronic Pain and Associated Symptoms

- Improvements in:
  - Low mood
  - Depression
  - Anxiety
  - Reduction in pain
  - Improvement in function
  - Pain threshold (immediately post)
  - Global wellbeing

Continuation of Exercise IS necessary for benefits to persist!

This is where WATER comes into play!!
Immersions Effects on Chronic Pain

- Potential therapeutic benefits of superficial heat are due to its effects on metabolic, neuromuscular and hemodynamic activity
- Promote enzymatic activity + increase oxygen uptake = increased healing
- Reduced firing rates and Gama fiber activity → Spasm decline
- Elevation of nociceptor threshold
- Increase vasodilation → reduced tissue ischemia & improved metabolite clearance

Benefits of Water Therapy

- Pain Reduction
- Muscle Relaxation
- Reduction of Compressive Forces/Mechanical Load
- Increased ROM, Pain Free ROM & Fear-Free Movement
- Increased Blood Flow to Tissues
- Increased Tactile Input
- Reduction of Edema
- Increased/Adaptable Resistance of Movement
- Greater control of movement

Benefits of Aquatic Interventions according to the Literature:

- Pain relief
- Health-related quality of life
- Muscle strength
- CV capacity & fitness
- Overall physical function, functional capacity, & physical fitness
- Grip Strength
- Social Functioning
- Psychological distress (anxiety, depression, etc)
- Improved ADL’s
- Walking time
- Fatigue
- Reduced Attrition Rate...ADHERENCE ACHIEVED!!
- ROM
- Balance
- Tender point count (FMS)
- Sleep Quality
- Cognitive Function
- Coordination
- Self Efficacy & Affect

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Potentially the most Important Offering of Aquatic Interventions

Generalized Therapeutic Recommendations
- Multidisciplinary approach
  - Physical Training with Graded Activity
    - Following ACSM guidelines
    - Adaptation Period
  - Counseling
  - Education
  - Cognitive Behavioral Therapy
  - Manipulation/ Mobilization
  - Group Intervention

“Exercise is considered to be a vital part of a multifaceted approach to the treatment and prevention of chronic pain.”
- Cochrane Collaboration

continued
ACSM Guidelines: CV Training
- Frequency: at least 2 days/week
- Intensity: 40-85% of HR reserve or 55-90% of predicted $H_r_{\text{max}}$
- Duration: 20-60 minutes (continuous or intermittent)
- Mode: Choice

ACSM Guidelines: Strength Training
- Frequency: 2-3 days/week
- Intensity/Duration: 8-12 repetitions at the 8-12 repetition max of each exercise
- Mode: progressive loading exercises

Training Modifications for Water
- Frequency, Intensity, Duration and Mode remain consistent with ACSM guidelines but:
  - Configuring intensity should be done using aquatic-specific methods
  - Activities done in the water may require more or less effort than when performed on land
  - Progression of activities utilizing hydrodynamic principals & aqua-physics should be employed
Aquatic Environment Recommendations

- Temperature: Thermo-neutral
  - Thermo-neutral: 92-96° F (33.5-35.5° C)

- Depth: Waist depth up-to full buoyant support/off-loading

- Adjustment period should be incorporated into the treatment plan

- Greater frequency & duration recommended

- Water Shoes

Recommended Aquatic Exercises: Chronic Low Back Pain

- Low, Moderate &/or High Intensity Aerobic Exercise
  - Chest depth or off-loaded preferred

- Individualized Strength Programming

- Individualized Stabilization Programming

- Flexibility, AROM, PROM

- Vertical or Horizontal suspension/traction

Recommended Aquatic Exercises: Fibromyalgia Syndrome

- Resistance Exercise

- Cardiovascular Exercise
  - Low, Moderate or High Intensity
  - Self-modified, symptom-limited, appropriate intensity exercise
  - Below pain and fatigue threshold

- Relaxation Enhancing Activities

- Flexibility Training

- Mixed Programming

- CV + STR + FLEX + RELAX
Why add Water?

- Effective Intervention
- Better Tolerated than land therapy or exercise
- Greater benefits on Mood & Sleep Disorders when compared to land
- Effects may be more sustainable over the long-term
- Effects may have a more rapid onset
- Superior improvements in emotional aspects of chronic pain (depression & anxiety) over land treatment groups
- Easier environment to initiate exercise
- High adherence rates

Aquatic-Specific Techniques

- Water Walking/ Back-hab Program
- Bad-Ragaz Ring Method (BRRM)
  - Active
  - Passive
- Watsu
- Ai Chi
- AquaStretch
- Aqua Aerobics
  - Shallow
  - Deep
- Yoga
- Group Classes
- Swimming (Front Crawl & Back Crawl)

Water Walking & the BackHab Program

- Water Walking: striding in waist to chest depth water at a fast enough pace to meet ACSM guidelines for CV fitness gains
- BackHab: utilizes a water walking format with emphasis applied to posture and form cues

continued
Bad Ragaz Defined

- Horizontal treatment technique utilizing progressive resistance of water, levers and equipment
- Passive & Active movements are incorporated into the program to meet patient needs
- Sectioned into UE, LE & Trunk
- Based on PNF movements
- Utilizes tactile, visual and auditory stimulus in combo with PNF patterns to promoter use of the neuromuscular system.

Benefits of Bad Ragaz

- Relaxation
- Reduction of Muscle Tone & Spasm
- Increased ROM
- Muscle Reeducation & Improved Motor Skills
- Strengthening
- Increased Endurance
- Decompression of Spine
- Restoration of normal gross movement patterns
- Preparation for weight bearing

Patterns used in Bad Ragaz

- Isometric
  - Patient holds position while being moved through the water
- Isokinetic
  - Involves graded resistance provided by the patient, therapist stabilizes the body part and the patient determines the resistance via speed of movement
- Isotonic
  - Involves graded resistance controlled by the therapist, increases resistance by moving through the water while patient is performing the motion at full ability (moving in same direction of movement) or therapist assists movement if not able to be achieved by the patient alone (moving the opposite direction of movement)
Making Modifications to Bad Ragaz
- Lever Length
- ROM Modifications
- Speed Modifications
- Direction of Movements
- Use of Resistive Equipment
- Reduction of Flotation

Watsu Watsu?
- Combination of Japanese massage, chakra energy work, meditation, yoga and Zen Shiatsu
- Integration of
  - Passive stretching
  - Movement sequences
  - Acupressure
  - Massage

Benefits of Watsu Bodywork
- Relaxation & Calming
- Strengthens Breathing
- Reduces Fatigue
- Increases ROM / Flexibility
- Reduces soreness / pain
- Increases Circulation
- Assists in Muscle Reeducation
Watsu

http://www.youtube.com/watch?v=NQ_M1ZWopTA&feature=player_detailpage

Ai Chi

- Created by combining Tai-Chi with Shiatsu and Watsu
- Utilizes deep breathing and slow, broad movements of the arms, legs and torso

Benefits of Ai Chi

- Trunk stabilization/strengthening
- Pain Management
- Stress Management/Relaxation
- Increased ROM
- Decreased Insomnia
- Improves Liver Function/Efficacy
- Increased Circulation & Decreases Edema
Physiological Responses To Ai Chi

- Decreased HR
- Decreased BP
- Increased Metabolism
- Increased Blood Flow/Circulation

Ai Chi
http://www.youtube.com/watch?v=Wje4Y4E1CXA&feature=player_detailpage

AquaStretch

- Assisted stretching & myo-fascial release technique utilizing variable stretch resistance
- "Break-down fascial adhesions using the combination of intuitive movement, accented movement & the properties of water"
AquaStretch

- 4 Step technique:
  - Play
  - Freeze
  - Pressure
  - Move

AquaStretch Demo

Aqua Aerobics

- Total-body approach to fitness and wellness
- Can be performed in any depth of water
- Must follow ACSM guidelines to promote CV fitness
- Great for post-hab
Deep Water Running
- Running/ Jogging in the water using buoyancy devices and similar posture & gait patterns as in land running / jogging

Equipment
- Floatation Belts
- Floatation Vests
- Buoyancy Cuffs
- Tether Cord
- HR Monitor

Biomechanics & Form
- Water line at shoulder level
- Mouth should be out of the water without extension of cervical spine
- Head should be facing forward with neck unflexed
- Body should be leaning slightly forward with the spine in neutral
- Arms consistent with land motion
- Hands slightly clenched
- Hip flexion should reach ~ 60-80 degrees
- Hip & knee should reach full extension
- Ankle should move through dorsi & plantar flexion
Deep Water Running

http://www.youtube.com/watch?v=vrDMhxzLuk&feature=player_detailpage

Aqua-Yoga

- Yoga poses performed in the water and adapted to the water depth
- Can be performed shallow or deep (with flotation)

Aqua-Yoga

- Promotes:
  - Improvement in posture
  - Increased ROM/flexibility
  - Increased strength
  - Enhanced relaxation
  - Increased self-awareness
  - Increases synovial fluid release
  - Improves joint integrity
  - Assists in quality of sleep
  - Improves balance
  - Increases circulation
  - Reduced fatigue
  - Improves coordination
Thank you for your interest in the Aquatic Environment!

I hope you enjoyed the presentation

Questions???

Lori A. Sherlock
lsherlock@hsc.wvu.edu