The Benefits of Aquatic Therapy in Children with Spinal Muscular Atrophy
Mary Glorighian, Student Physical Therapist
Bellarmine University DPT Program

Spinal Muscular Atrophy

- Spinal muscular atrophy (SMA) manifests as diffuse weakness secondary to degeneration of the anterior horn cells and bulbar nuclei without pyramidal tract involvement
- 3 types:
  1) SMA type I (Werdnig-Hoffmann disease) or acute, infantile onset SMA
     - Occurs before 6 months of age
     - Life expectancy is typically 2-3 years at the maximum
     - Terminal event is usually respiratory failure
  2) SMA type II
     - Apparent between 6 and 18 months of age
     - Children may reach developmental milestones temporarily
     - Less severe disorder, however, still associated with significant morbidity and mortality
  3) SMA type III (Kugelberg-Welander)
     - Usually occurs between the ages of 5 and 15 years
     - Associated with much less morbidity, although patients use wheelchair by mid-adulthood
     - Life expectancy may extend until the sixth decade
- Contractures, hypotonia, fatigue, and spinal deformities are common impairments
- Proximal muscles affected more than distal muscles
- Second most common childhood neuromuscular disease other than Duchenne’s muscular dystrophy
- One of the leading hereditary causes of infant mortality
- Estimated incidence of one per 5,000-10,000 live births
- Diagnostic tests include electromyography and muscle biopsy
- Currently no pharmacological or surgical interventions

Physical Therapy Interventions

- Main goal of treatment is to slow the progression of the disease and prevent secondary impairments
- Physical therapy interventions:
  1) Chest physical therapy and suctioning to mobilize secretions, especially in SMA type I
  2) Strengthening, range of motion, and stretching exercises
  3) Positioning to prevent deformity and discomfort
  4) Adaptive equipment including standers, wheelchairs, braces, and orthotics

Aquatic Therapy

- Offers an adjunct to traditional physical therapy interventions by providing a “movement facilitated” setting based on the specific physical properties of water:
  1) Buoyancy counteracts gravity and allows a patient to move with less effort
  2) Pressure is exerted over a patient’s body via hydrostatic pressure providing enhanced tactile input
  3) Water viscosity, which is the friction between water molecules, results in surface tension and allows an increased response time for patients
  4) Turbulence of fluid molecules moving by each other can be used to challenge a patient’s balance or assist a patient’s movement through water

Clinical Significance

- Aquatic therapy is advised for patients with SMA that have a fear of falling on land to strengthen muscles, improve range of motion, stability, and gait.
- Aquatic therapy helps patients with SMA to have a feeling of accomplishment because gravity is lessened in the water, which makes it easier for them to move.

Benefits of Aquatic Therapy

- Muscle strength improvement in most lower limb muscles
- Increased postural stability
- Increased range of movements
- Aquatic activities emphasized improved balance
- Daily activities improvement in SMA type II patients
- Improvement in pelvic movements during walking and scissoring decreased
- Improved gross motor function and spatiotemporal gait characteristics
- Improvements in walking velocity, stride length, stride time, and single-limb support time
- Maintenance of function of what patient had before aquatic therapy
- Lessening of anxiety or fear of the water
- Water allowed patient to explore movement patterns and upright postural activities against gravity without fear of falling
- Feeling of success and accomplishment

References

2Figueres C. Aquatic therapy intervention for a child diagnosed with spinal muscular atrophy. Physical Therapy Case Reports. 1999;2:109-112

Figures C. Aquatic therapy intervention for a child diagnosed with spinal muscular atrophy. Physical Therapy Case Reports. 1999;2:109-112