Cerebral Palsy and Fall Interventions
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Introduction/Background
• Cerebral Palsy (CP): Central Nervous System disorder
  – The CP population is at a higher risk for falls due to decreased motor control and weakness
  – Gross motor skills tend to plateau at adolescence
  – GMFCS Levels: I-V
• It is unknown whether or not specific balance programs improve motor control in patients with Cerebral Palsy

PICO Question
Does a balance program for children/adolescents with Cerebral Palsy, who have experienced one or more falls, reduce their falls risk?

Methods
– Balance training AND Cerebral Palsy AND fall risk
  • PubMed: 3
– Cerebral Palsy AND postural balance AND pediatric AND hippotherapy
  • PubMed: 4
– Cerebral Palsy AND balance
  • CINAHL: 258
  • Wolters Kluwer: 12
Effect of Balance Training on postural balance control and risk of fall in children with diplegic cerebral palsy

• Research Synthesized
  – 2 were eliminated using the filters: last 5 years, clinical trial
  – RCT: 1
• Used: RCT

The Effects of Hippotherapy on Postural Balance and Functional Ability in Children with Cerebral Palsy

• Research Synthesized
  – Case report: 1
  – Clinical trials: 3
• Used: clinical trial

“Strong and steady”: a community-based strength and balance exercise group for children with cerebral palsy

• Research Synthesized
  – 241 articles eliminated using filters:
    • last 5 years, academic journal articles, full text, and human subjects
  – Quasi-experimental: 1
  – Case control: 1
  – Randomized control trials: 4
  – Systematic reviews: 1
  – Clinical trials: 4
  – Cross-sectional studies: 4
  – Qualitative study: 1
  – Pilot Study: 1
• Used: Quasi-experimental study

An Intensive Virtual Reality Program Improves Functional Balance and Mobility of Adolescents with Cerebral Palsy

• Research Synthesized
  – Filter: 8 years
    • 10 articles eliminated
    • 1 commentary article
  – Quasi-Experimental: 1
• Used: Quasi-Experimental
Results

• Significant improvements in balance and a decreased risk for falls have been found with the implementation of balance programs in patients with Cerebral Palsy.\textsuperscript{1,2,3,4}

• Balance programs found to show significant improvements in motor control for these patients include: Biodex – Dynamic Limits of Stability Training (DLS) and fall risk, Hippotherapy, “Strong and Steady” and Virtual Reality Training.

Results Continued…

• Biodex DLS and fall risk training \textsuperscript{1}
  – Significantly greater improvements in the ability to control balance, risk of fall, directional control and time taken to complete task

• Hippotherapy \textsuperscript{2}
  – Significant difference in outcome measure scores at start and end of training program: AMTI Accusway system (postural balance), Berg, PEDI

Results continued…

• Strong and Steady \textsuperscript{4}
  – Significant improvements in
    • Strength on both the less and more impaired sides
    • Functional muscle strength for seated throw and distance jump
    • Lateral and forward reach
    • Total balance score: MABC

• Virtual Reality Training \textsuperscript{3}
  – Significant changes on CB&M scores
  – Scores improved on 6MWT in 3 out of 4 participants
  – Initial improvements on TUDS scores
  – No change in GMFM

Discussion

• Implementing balance specific training programs into treatment for children with cerebral palsy has shown improvements to the following:
  – Balance control
  – Fall risk
  – Level of disability
  – Functional mobility
  – Strength
  – Time taken to complete a task
Discussion continued…

• Programs that may enhance motivation in children with CP
  – Visual tracking (Biodex)
  – Virtual reality
  – Hippotherapy

• Impacts on balance control
  – Muscle strengthening
  – Muscle sequencing

Areas for Future Research

• Larger sample sizes (hard... CP population small)
• Longer intervention periods
• Comparison of training protocols
• Combination of training protocols
• Effect on different types and GMFCS levels of CP

References


