The Use of Treadmill Training and Orthotics to Normalize Gait in Infants with Down Syndrome

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Background

- Currently, the most common genetic condition in the United States is Down Syndrome (DS)\(^1\).
- Approximately 400,000 currently share this diagnosis; which is due to an additional 21st chromosome\(^1\).
- Common traits seen are hypotonia, and ligamentous laxity\(^2\).
- Physical impairments frequently lead to a delayed onset of walking, and also impaired gait mechanics\(^3\).
- As an individual with DS’s physical capabilities are limited, cognition also becomes impaired.
- Often, children with DS will attend many rehabilitative sessions to combat such developmental delays. Of the plethora of interventions available,
- Our goal was to review the literature regarding treadmill training and orthotic use.
- Specifically, we were interested in the infant population to determine the potential longitudinal outcomes on normalizing gait mechanics.

PICO Question

Do Infants with Down Syndrome Respond to Use of Orthotics as Opposed to Treadmill Training to Achieve Development of Normal Gait Mechanics?

Results of Treadmill Interventions

- Infants who learned to walk without the orthoses had an advantage in terms of 4 point mobility, balance, and uprightness\(^4\).
- Average age walking independently:
  - High Intensity, Individualized (HI) group: 19.2 mo.
  - Low Intensity, Generalized (LG) group: 21.3 mo\(^4\).
- The HI training provided a more effective means for advancing the emergence of ankle plantar flexion before toe-off, facilitating hip abduction in the stance phase, and facilitating hip flexion in the swing phase\(^6\).

Results of Orthotic Interventions

- Flexible SMOs have a positive effect on measures of postural stability in children with Down Syndrome.
- Foot Orthoses (FO)
  - Foot less everted
  - Atypical internal rotation of the transverse plane foot angle

Conclusion

- HI treadmill training has greatest benefit when started within the first year of infant’s life\(^5\).
- FOs appear to be detrimental to the overall motor skill development in infants with DS when learning to walk\(^5\).
- Orthotic use may be more appropriate to implement after the age of three
- SMOs demonstrate more control over pronation secondary to hypotonia when compared to FOs\(^7\).

References