Journal of Novel Physiotherapies
ISSN: 2165-7025

Cesar et al., J Nov Physiother 2017, 7:S4
DOI: 10.4172/2165-7025.1000342

Short Communication OMICS International

Should Gait Outcomes be the Primary Focus in Pediatric Gait Rehabilitation?

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Received date: March 22, 2017; **Accepted date**: March 30, 2017; **Published date**: April 07, 2017

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Many children with physical disabilities experience difficulty walking as fast and efficiently as desired. Impaired ambulatory capability leads to decreased engagement in physical activities, negatively impacting children's musculoskeletal and cardiorespiratory fitness. Currently, inactivity in children with physical disabilities is a major factor contributing to secondary medical conditions, further hindering desired health outcomes and functional independence [1,2].

Although knowledge concerning gait rehabilitation for adults with disabilities has taken great strides with the advancement of therapeutic technology, such progress has not yet reached the pediatric literature. For example, gait rehabilitation with body weight-supported treadmill training has been largely substantiated with rigorous research designs (such as randomized controlled trials, RCTs) for adults with a wide range of neurologic impairments [3-5]. Evidence of this approach's efficacy in children with disabilities is limited in quantity and diagnoses [6]. Robotic technology (e.g., Lokomat) has been increasingly scrutinized in RCTs with the adult population [7,8]; however, there are only a few pediatric RCTs studies currently underway [9,10]. A motor-assisted elliptical device (ICARE) has also led to improvements in walking for adults with disabilities [11,12], but pediatric literature with this technology is just starting to emerge [13-15].

While pediatric rehabilitation can lead to improvements in walking, it is still unclear what impact these gains have on promoting greater participation in life. Walking speed, a common gait variable targeted in most interventions, is a valid measure of functional status across all age groups and it is a known predictor for safe community ambulation and longevity in the elderly population [16]. Enhancing children's capacity to walk faster or farther should lead to changes in daily engagement in activities, such as playing with friends and family, and participation in school activities. Increased ambulatory capacity and further participation in such settings are related to enhanced health status in children without disabilities and, very much so, in children with disabilities [17]. However, one point that still requires further exploration in the pediatric population is the impact of enhanced gait capacity measured in laboratory settings on life participation [18].

Even if walking quality (i.e., optimal joint motions) or quantity (distance walked) does not demonstrate notable gains following an intensive locomotor training program, it is probable that the child's capacity to participate in community activities could still improve given gains in cardiorespiratory fitness. Mass repetition of stepping motions associated with high intensity levels of training provided by current gait rehabilitation protocols [3,11] could provide substantial challenge to the cardiorespiratory system, potentially increasing fitness levels. Since secondary medical complications associated with the cardiorespiratory system are unfortunately common in children with limited mobility [19], it is imperative that future pediatric interventions place a primary focus on improving cardiorespiratory fitness to enhance functional gait capacity.

Conclusion

Changes in participation in community and school activities, as well as independence in activities of daily living that emerge after gait training interventions are seldom quantified in current pediatric studies. If increasing gait capacity is the goal of a child's intervention, what is the goal of increasing gait capacity? Moreover, what is the best strategy to achieve enhanced walking ability? Should improvements in quality of motion be secondary to enhancing cardiorespiratory fitness? These questions should provide a basis for future pediatric research. Furthermore, since enhanced function, independence, and wellbeing are ultimately the desired outcome of interventions, quantification of changes that occur outside the laboratory environment (i.e., in the community) should be well documented.

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This article was originally published in a special issue, entitled: **"Physical Activity"**, Edited by S4