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# Cerebral Palsy: Overcoming Disability

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# Cerebral Palsy Overcoming Disability

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## Abstract

Cerebral Palsy has posed many questions to researchers and clinicians regarding the etiology, best means of classification, and most effective treatment. Thus, the purpose of this study is to review the literature on the key aspects of Cerebral Palsy and review the controlled studies done testing the efficacy of resistance training (RT) in children with spastic Cerebral Palsy. Nine controlled experimental studies were included in the literature review on resistance training efficacy. The results indicate that resistance training cannot be determined decisively in children with spastic Cerebral Palsy, and further research should focus on resistance training in adults with Cerebral Palsy and further development in training protocols.

## Cerebral Palsy Defined

Cerebral palsy describes a group of permanent disorders of the development of movement and posture, causing activity limitations that are attributed to non-progressive disturbances that occurred in the developing fetal or infant brain. The motor disorders of cerebral palsy are often accompanied by disturbances of sensation, perception, cognition, communication, and behavior, by epilepsy, and by secondary musculoskeletal problems.”

## Classification

- Motor abnormalities: Spasticity, Dyskinesia (dystonia and choreoathetosis), Ataxia
- Motor Ability: Measured by the Gross Motor Function Classification Scale (GMFCS)
- Accompanying Impairments
- Anatomical Position: Diplegia, Hemiplegia, Quadriplegia
- Neuroimaging
- Time and Cause of brain lesion

## Effects of CP

- Oral motor dysfunction (in ninety percent of CP patients): affects speech and nutritional intake
- Behavior: includes autism, Attention Deficit Hyperactive Disorder, sleep disturbances, mood disorders, and anxiety disorders
- Chronic pain, fatigue, and depressive symptoms have been found to be significantly increased in adults with severe spastic bilateral cerebral palsy
- Musculoskeletal Problems (deformation, growth restrictions, weakness)
- Abnormal motion such as in walking gait

## Participants in RT Efficacy

Studies included in the Literature Review were required to be controlled and include participants who were children with spastic Cerebral Palsy. All studies included participants with diplegic, quadriplegic, and hemiplegic CP and with a Gross Motor Function level ranging from one to three.

## Measures and Methods

The measures in the included studies were muscular force and torque output measured by isometric or isokinetic dynamometry and/or Gross Motor Function Measures. Eight of the nine studies focused on concentric movement in lower limbs, while the ninth one focused on eccentric torque output in elbow flexion. One study also measured the electromyography of muscle regions focused on. The methods included a resistance training program ranging from five to twelve months in seven of the studies and long-term programs in the other two. Finally, one study measured changes in muscle diameter pretest and posttest.

## Results for RT Efficacy

Three studies found significant improvements in Gross Motor Function while three found that no such improvements. Three studies also found improvement in muscle force or torque output while two found no significant difference between the intervention groups and the controls. The study measuring muscle mass found a significant increase posttest.

## Common Limitations

- Most studies had a small number of participants
- RT met guidelines intended for typically-developed children. Verschuren et. al. developed a protocol for children with spastic CP, but it has not yet been tested.
- Methods of measuring strength often included the use of handheld dynamometer
- Restricted to children

## Discussion

In conclusion, not enough evidence exists to support the efficacy of RT on children with spastic CP to improve muscle torque or gross motor function. However, RT has been shown to have no negative side effects such as increases in spasticity, and several studies suggest that RT can improve muscle torque. Little to no research has been done testing the efficacy of strength training in children with more severe CP or adults. This is especially important because increases in muscle strength following strength training programs in prepubescent individuals is mainly due to neural factors and not hypertrophy. Since CP is a neurological condition, however, it is conceivable that hypertrophy is the best means to increase neuromuscular strength. In puberty and post-puberty individuals, greater hypertrophy is generally found after RT programs. This suggests that adults with CP may benefit from RT programs more than children with CP do.

## Future Research

- Testing the efficacy of the new protocol proposed for children with spastic CP.
- Testing the efficacy of RT in adults with CP
- Testing the efficacy of eccentric RT in individuals with spastic CP.
- Testing force output using more reliable measures that handheld dynamometry.