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# Non-ambulatory children with cerebral palsy

## Effects on passive range of motion and spasticity in the hip after four months of static compared to dynamic standing exercise

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Dynamic standing in the motorised device Innowalk

### CONCLUSION

- 30 minutes of dynamic standing exercise increases passive range of motion and reduces the spasticity in the hip
- Four months of dynamic standing exercise increases passive range of motion but does not reduce spasticity
- Our results may improve the possibility for individualised standing recommendations



Static standing in a standing frame

### BACKGROUND AND OBJECTIVES

The recommendations for non-ambulatory children with *Cerebral Palsy* (CP) include supported *Static Standing* (StS) in standing frames for 30-90 minutes daily in order to maintain the *Passive Range Of Motion* (PROM) and to prevent contractures in their lower limbs.

The novel motorised device Innowalk gives an opportunity to experience walking movements in an upright weight-bearing position, making *Dynamic Standing* (DyS) possible. Knowledge about the effects of DyS on PROM and on spasticity is lacking.

The aim of this study was to compare the effects of four months of two types of structured training regimes, StS versus DyS, on PROM and spasticity in the hip among non-ambulatory children with CP.

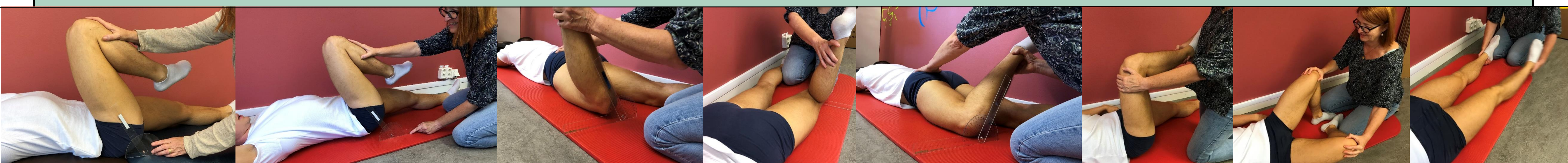
### METHODS

The participants performed four months of StS and of DyS. At the beginning and end of each exercise period, adaptive effects in the hip from the exercise programs were measured before and after a 30 minutes bout of StS respectively DyS:

- PROM was assessed with a handheld goniometer
- Spasticity was assessed with the Modified Ashworth Scale

During StS, the participants were encouraged to exercise according to the standard care recommendations in Sweden including daily supported StS for 30-90 minutes.

During DyS, daily exercise for at least 30 minutes at a speed between 30 to 50 rpm in an *Innowalk* was recommended. Non-parametric statistics was used and each leg was used as its own control.



### STUDY PARTICIPANTS & SETTING

Twenty-four children with CP, GMFCS-E&R level IV and V, aged 5-17 years (mean 11,6 +/- 3.6 years; 9 female), were included to this exercise intervention study with a crossover design. Four children did not complete the intervention (surgery, illness, pain), and they are not included in this analysis.

The exercise training and exercise tests were performed in the children's habitual environment, at home or at their school.

### RESULTS

PROM in the hip was found to increase after 30 minutes of exercise testing of DyS ( $p < 0.001$ ) in all directions and after four month of exercise training ( $p < 0.001$ ).

30 minutes of DyS reduced the spasticity in the muscles around the hip ( $p < 0.001$ ) and to a statistically significant higher degree than 30 minutes of StS ( $p < 0.001$ ).