Physical activity levels in youth with cerebral palsy during therapeutic horseback riding: A pilot study

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Introduction

- Cerebral Palsy (CP) is a posture and movement disorder due to an insult to the developing brain.
- Non-ambulatory youth with CP show lower levels of physical activity (PA) which may increase the risk of secondary health problems later in life.
- In therapeutic horseback riding (THR), specially trained instructors carry out lessons for people with disabilities. Although there are numerous studies investigating the effectiveness of THR in improving gross motor function, posture and strength, there is limited evidence regarding the value of THR in increasing PA.
- The aim of this study is to assess the feasibility of measuring movement using an activity monitor during THR in five non-ambulatory youth with CP.

Methods

Participants

- CP
- age 7 – 18 years
- GMFCS Level III – V.
- recruited from The Equestrian Association for the Disabled (TEAD)
- Informed consent was obtained from the participants' parents.
- Ethics approval was granted by the Research Ethics Board REB #: 11-641-S).

Physical activity outcome measures:

•Hip accelerometry using the ActiGraph GT1M activity monitor

•Movement was objectively assessed in 3-second recording intervals or epochs.

•Participants wore the accelerometers over the hip and at the wrist during all waking hours for two days with THR and two days without THR.

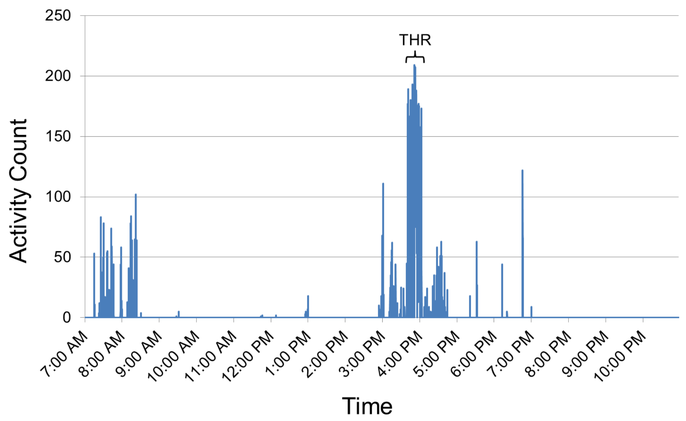

Figure 1. Physical activity levels during a day with THR. Activity counts are based on hip accelerometry data for participant D.

Results

Table 1. Participant characteristics

Participant	Age	Gender	GMFCS	Self Mobility
A	18	M	III	Manual wheelchair
B	17	F	IV	Power wheelchair
C	16	M	IV	Bike, manual wheelchair, walker
D	7	M	III	Hands and knees, manual wheelchair, walker
E	7	M	IV	Hands and knees, manual wheelchair, walker

Physical Activity

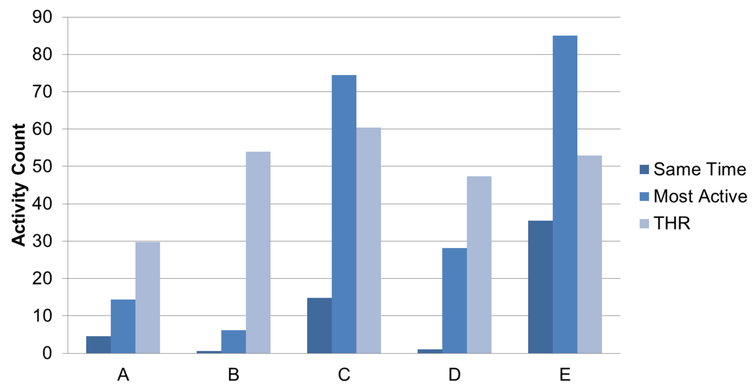

Figure 2. Physical activity levels during THR as compared to the same time and most active time on a day without THR. Activity counts are based on hip accelerometry data for participants A - E.

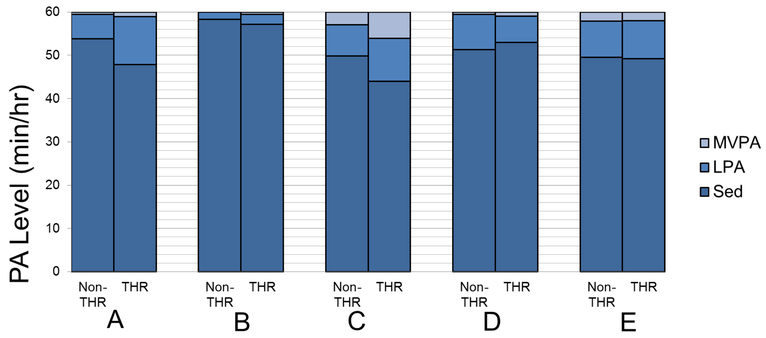

Figure 3. Average physical activity levels in minutes/hour based on hip accelerometry data for participants A - E. MVPA, Moderate to Vigorous intensity Physical Activity; LPA, Light intensity Physical Activity; Sed, Sedentary; THR, therapeutic horseback riding.

Discussion

- It is feasible to measure PA during THR
- During an hour long THR session, participants were active for an average of 43.0 min compared to 7.4 min/hr on a non-THR day.
- Hip and wrist activity counts during THR were consistently higher than during the same time as the lesson on a non-THR day.
- THR was more valuable in increasing hip activity than wrist.
- Consistent with previous research,[4] none of the participants are exercising enough to meet the Canadian Physical Activity Guidelines (Fig 3)

There are a number of limitations to this study:

- Small sample size (n = 5)
- No participants with GMFCS Level V
- Physical activity levels may have been inflated during the horseback riding session due to the movement of the horse and/or physical support provided by an instructor or caregiver (e.g. lifting the participant onto the horse).

Future Directions

Future studies should investigate how movement during THR translates into physical activity and health benefits for children and adolescents with CP.

Recent research

A recent study showed that during THR significant – but small - increases from rest were seen for mean HR, .VO2, .VE, and energy expenditure.

Bongers BC, Takken T. Physiological demands of therapeutic horseback riding in children with moderate to severe motor impairments: an exploratory study. Pediatr Phys Ther. 2012 Fall;24(3):252-7.

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