



The prevalence of cardiovascular risk factors in adolescents with cerebral palsy: Relationship with daily levels of physical activity

Nai-Yuen Ho, Brian W. Timmons, Maureen J. MacDonald, Audra A. Martin, Stephen Noorduyn, and Jan Willem Gorter (on behalf of the Stay-FIT study group*)

Department of Pediatrics, McMaster University, Hamilton, Canada



INTRODUCTION

- Individuals with lower levels of physical activity are known to be at greater risk of cardiovascular disease (CVD).
- Since risk of CVD in childhood often carries on into adulthood, early identification is important for CVD prevention.
- Cerebral palsy (CP) limits motor function, which is commonly associated with lower participation in physical activity (1, 2).
- No studies have examined the prevalence of CVD risk factors in this population or have correlated them with daily levels of physical activity.

OBJECTIVES

1. To determine the prevalence of select CVD risk factors in ambulatory adolescents with CP.
2. To determine the relationship between levels of physical activity and the prevalence of select CVD risk factors.

METHODS

SUBJECTS

- 7 ambulatory adolescents (2 females, 4 males) aged 9-18 years with CP (Gross Motor Function Classification System Levels I-III) participated.
 - Physical activity was monitored over 7 consecutive days using accelerometers attached to the waist.
- NOTE: Physical activity was not monitored in one subject.

MEASUREMENT OF CVD RISK FACTORS

- Seated blood pressure was measured using an automated blood pressure cuff.
- Body mass index (BMI) = weight (kg) / height (m)²
 - ❖ Weight was measured with street clothes but without shoes.
 - ❖ Height was measured against a wall, using anthropometric tape.
- Waist circumference was measured at 4 cm above the umbilical cord, using anthropometric tape.

METHODS

ASSESSMENT OF RISK FACTORS

Percentiles were age- and gender-specific.

CVD risk factor	Cutoff percentiles
Seated blood pressure	≥ 90 th (systolic & diastolic)
Body mass index (BMI)	≥ 85 th
Waist circumference	≥ 90 th

METHODOLOGICAL REMARKS

- Adolescents may not be able to stand upright for the measurement of height (H), so surrogate measures were also used:
 - ❖ Knee height (KH):
 - MALES H = 40.54 + 2.22*KH
 - FEMALES H = 43.21 + 2.15*KH (3)
 - ❖ Armspan (AS): H = 7.1668 + 0.9225*AS (4)

RESULTS

Table 1. Mean percentiles of body mass-index (calculated from armspan) and waist circumference (n=7). Values are means ± SD (range). Blood pressure percentiles were only used to estimate prevalence of CVD risk.

CVD risk factor	Percentile
BMI by armspan	44.7 ± 20.7 (19-75)
Waist circumference	60.0 ± 29.3 (10-95)

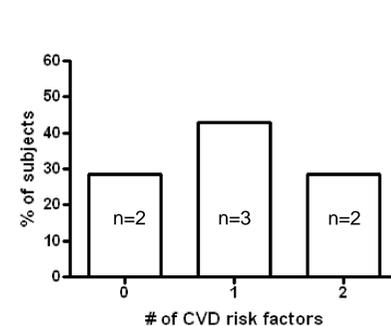


Figure 1. Prevalence of CVD risk factors amongst adolescents with CP (n=7).

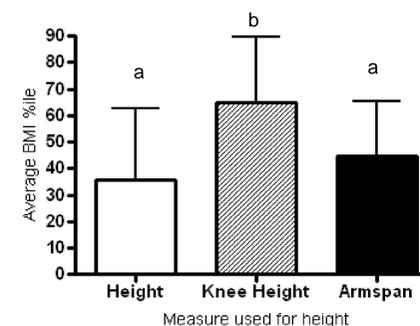


Figure 2. Comparison of mean BMI percentiles when using different measures to determine height (n=7). Values are means ± SD. Bars with different letters are significantly different from each other (paired t-test, two-tailed).

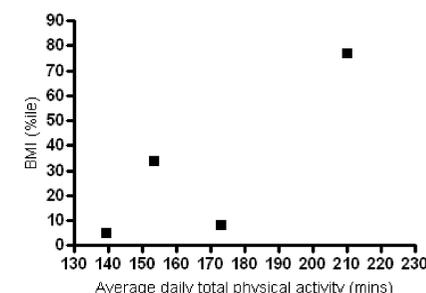


Figure 3. BMI percentiles (using height) for different levels of average daily total physical activity in minutes. No significant correlation was found (r=0.81, p=0.18) **. Height was not measured in one subject due to inability to stand.

**NOTE: Physical activity data for one participant is still being analysed.

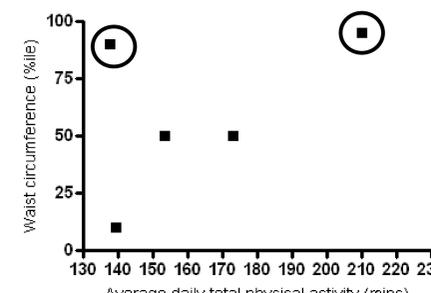


Figure 4. Waist circumference percentiles for different levels of average daily total physical activity in minutes. No significant correlation was found (r=0.49, p=0.40). Circled data points indicate waist circumferences measured when seated (for subjects that were unable to stand for extended periods)**.

CONCLUSIONS

- Mean percentile for BMI by all height measures and for waist circumference were below the CVD risk cutoffs.
- 5 out of 7 subjects (71%) had 1-2 CVD risk factors.
- CVD risk factors were not significantly correlated with total daily levels of physical activity, although a small sample size is acknowledged.

METHODOLOGICAL REMARKS

- Functional limitations of adolescents with more severe forms of CP limit the ability to use anthropometry to evaluate CVD risk.
 - ❖ Knee height may not be useful for prediction of BMI, but armspan may be a useful predictor.
 - ❖ Seated waist circumference may not be an accurate predictor of CVD risk.

FUTURE DIRECTIONS

- More research is needed to confirm the prevalence of CVD risk factors in adolescents with CP and its relationship with levels of physical activity.
- The feasibility and accuracy of using anthropometry in this clinical population to determine CVD risk factors requires further evaluation.

ACKNOWLEDGEMENTS

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