



Range of motion and clinical cut-off points in ankle dorsiflexion are not correlated with motor function in children with cerebral palsy – a cross sectional study



H.M. Rasmussen, J. Svensson, M. Thorning, N.W. Pedersen, S. Overgaard, A. Holsgaard-Larsen.
 Department of Orthopaedic Surgery and Traumatology Odense University Hospital, Odense, Denmark and
 Institute of Clinical Research University of Southern Denmark, Odense, Denmark

Background

The Cerebral Palsy follow-up program (CPOP) uses cut-off points (traffic light signals) to categorize passive range of motion (ROM) in: green, yellow and red in order to guide clinical decisions (figure 1).

The cut-off points are not evidence based and potential relationships with gross motor capacity and patient-reported gross motor performance have never been established.

Aim of study

To investigate passive ROM and the traffic light categories for ankle dorsiflexion and their relationships with gross motor capacity and patient-reported gross motor performance in children with cerebral palsy (CP) by testing the hypothesis that:

- associations between ankle dorsiflexion and gross motor capacity/performance exist in children with cerebral palsy.
- gross motor capacity/performance differs according to the traffic light categories using passive ankle dorsiflexion.

Conclusion

Passive ROM in ankle dorsiflexion is not correlated with gross motor capacity/performance, why the cut-off points used in CPOP are of limited clinical value in relation to gross motor capacity and patient-reported gross motor performance.

As a consequence passive ROM and gross motor capacity/performance may be considered as separate constructs, which may have impact on the decision-making of treatment for the patient group.

Material and methods

We conducted a cross-sectional study of 60 children with spastic CP at GMFCS levels I-II, aged 5-9 years.

Passive ROM were measured as maximal ankle dorsiflexion with flexed and extended knee using goniometry and the categories applied using the cut-off points provided by CPOP. Furthermore 1-min walking distance (1-min walk), Gross Motor Function Measure (GMFM) and Pediatric Quality of Life Inventory Cerebral Palsy Module: movement and balance subscale (PedsqI) were collected.

Associations were investigated with Pearson correlation coefficients. Differences in the three groups based on the traffic light categories were investigated with one-way ANOVA.



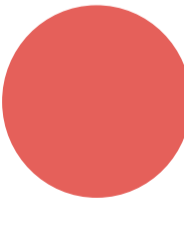
Results

Opposed to our hypothesis no significant correlation ($r^2 < 0.2$, $p > 0.05$) were documented between ROM versus 1-min walk, GMFM and PedsqI (table 1).

Furthermore, the group mean values of the outcome measures in the three categories according to ROM did not differ (table 2).

Figure 1 Ankle Dorsiflexion

Clinical cut-off points and clinical interpretation for the three categories of passive range of motion in ankle dorsiflexion with flexed and extended knee.

	Flexed knee	Extended knee
	$\geq 20^\circ$	≥ 10
	"Clear" - no indication of deterioration was noted during the examination".	
	$> 10^\circ - < 20^\circ$	$> 0^\circ - < 10^\circ$
	"Vigilant observation, modified treatment or initiation of treatment is necessary".	
	$\leq 10^\circ$	$\leq 0^\circ$
	"Alert - treatment is urgently needed, assuming no specific contraindications are present".	



Reference: www.cpop.se

Table 1. Pearson correlation coefficients

Dorsiflexion (knee 90°)	r	r ²	p-value
1-min walk test	0.11	0.01	0.41
GMFM	0.09	0.01	0.50
PedsqI	-0.01	0.00	0.96
Dorsiflexion (knee 0°)			
1-min walk test	0.17	0.03	0.21
GMFM	0.09	0.01	0.50
PedsqI	0.06	0.03	0.68

Abbreviations: Gross Motor Function Measure (GMFM), Pediatric Quality of Life Inventory Cerebral Palsy Module: movement and balance subscale (PedsqI).

Table 2. Mean scores (SD) of the three groups and results of the ANOVA.

Dorsiflexion (knee 90°)	Green	Yellow	Red	p-value
Participants	n=40	n=6	n=14	
1-min walk test	80 (13)	78 (15)	76 (18)	0.674
GMFM	82 (8)	82 (11)	8 (8)	0.975
PedsqI	74 (19)	73 (19)	78 (22)	0.744
Dorsiflexion (knee 0°)	Green	Yellow	Red	
Participants	n=49	n=5	n=6	
1-min walk test	80 (12)	80 (14)	73 (28)	0.529
GMFM	82 (8)	82 (11)	83 (8)	0.975
PedsqI	74 (20)	84 (20)	70 (16)	0.489

Abbreviations: Gross Motor Function Measure (GMFM), Pediatric Quality of Life Inventory Cerebral Palsy Module: movement and balance subscale (PedsqI).