Comparison of the passive range of motion of the upper (UE) and lower extremities (LE) after a session of classical hydrotherapy versus « Halliwick » in children with cerebral palsy (CP) : randomized clinical trial (RCT)

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Introduction:

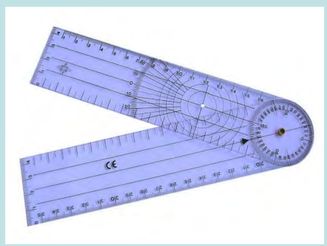
Aquatic therapy for non-ambulant children with cerebral palsy (CP) is generally based on the Halliwick concept in which the child is supported around the lower extremities in order to facilitate function of trunk, head and upper extremities.
Alternatively the classical methods uses floatation aids that limit function of trunk, head and upper extremities but allow the legs to move freely.
In this RCT we compared both approaches in order to assess the effects on range of motion (ROM).

Population:

15 Children with spastic CP (10 F – 5 M)
Age : 4 to 14 y
GMFCS II to V

Materials:

Goniometer with 2 arms
Carpet
Pool at 34°C (+/- 2°)



Methods:

The measures were taken at the most pathological side before the session (1)
- shoulder flexion, elbow and wrist flexion/extension (supine)
- hip flexion, knee and ankle flexion/extension (supine)
- hip extension (in prone)

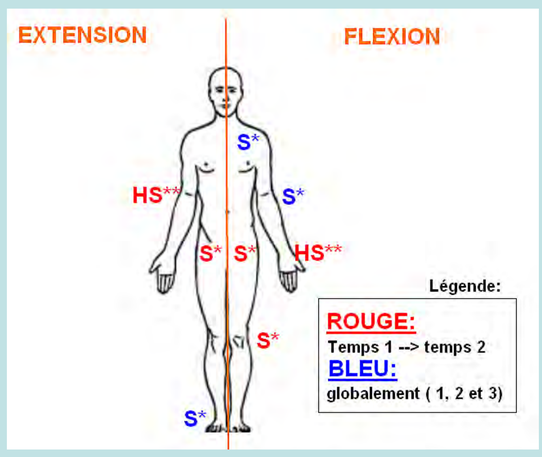
Then, we took the hydrotherapy sessions - 20 to 30 minutes - with either the classical method or with Halliwick
The same measurement were taken immediately after the session (2) and again +/- 30 minutes after the session (3)

statistical test:

- Anova
- Kolmogorov-Smirnov for the normality
- Sphericity test Mauchly

Results “Halliwick”:

EXTENSION	TIME 1-->2	ELBOUW	HS
		HIP	S
	TIME 1-2-3	ANKEL	S
FLEXION	TIME 1-->2	WRIST	HS
		HIP	S
		KNEE	S
	TIME 1-2-3	SCHOULDER	S
		ELBOUW	S



Results “classical hydrotherapy”:

Joints	Movements	Tests of inter-subject effects	Comparison 3 measures
shoulder	Flexion	NS	NS
	Extension	-	-
elbow	Flexion	NS	1-2 S
	Extension	NS	NS
wrist	Doral flexion	S	1-2 S + 1-3 S
	Palmar flexion	NS	NS
hip	Flexion	S	1-2 S
	Extension	THS	1-2 HS + 1-3 HS
knee	Flexion	S	2-3 S
	Extension	HS	1-3 S
ankle	Dorsal flexion	HS	1-3 S
	Plantar flexion	NS	NS

Discussion:

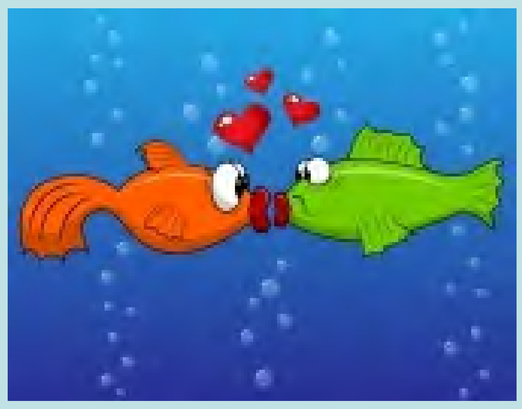
The classical method showed an increase of the range of motion of hip flexion, hip extension, dorsalflexion of the wrist and the ankle. The knee extension increased. Halliwick showed more effects in the UE than in the LE and more in the proximal than in the distal joints with small variations over the measurements.

The comparison of the two methods shows that Halliwick increases range of motion mainly in proximal joints of the UE, whereas the classical method shows a larger increase of range of motion in the distal joints of the LE (probably with more degrees of freedom).
Halliwick tends to be more specific and more localized, which is in accordance with the effects of Halliwick on spasticity (Meyer et al, 2013).
The classical method shows a more global effect for range of motion.

We hypothesize that the classical method doesn’t use as much rotatory movements as Halliwick and therefore limits the advantage of using proximal joints when exercising range of motion : distal movement increases.
The rotarory movements in Halliwick decrease tonus in proximal joints and consequently distal joints do not need to compensate proximal stiffness , probably because of handholds control.

Conclusion:

The classical method increases the range of motion mainly in the distal joints, whereas Halliwick increased the range of motion mainly in the proximal joints with more specific effects than the classical method.



Halliwick session ROM

References:

Meyer E, Fakhry A, Lambeck J. Pediatrics Comparison between A Session of Classical Aquatic Therapy and Specific According to the Halliwick Concept on the Modification of Spasticity in Children with Cerebral Palsy (CP).
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